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FARM LEVEL DETERMINANTS OF CREDIT ALLOCATION
AND USE IN SOUTHERN BRAZIL 1965-1969

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Gurbachan Singh, B.Sc., M.Sc.

* * * * *

The Ohio State University
1974

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CHAPTER I

INTRODUCTION

During the past two decades attention has been focused on increasing agricultural production in less developed countries. The use of credit as a technique for increasing agricultural output has been strongly emphasized in almost all developing countries. Recently, the reduction of inequality in distribution of wealth and income has been adopted as one of the important objectives of economic policy in many developing countries.¹ The effectiveness of credit policies in achieving these multiple objectives depends very heavily on a clear understanding of economic issues involved in the distribution and use of agricultural credit from institutional and non-institutional credit

sources.

Nature of the Problem

Generally, policy makers in developing countries are aware of the role and importance of agricultural credit. Available data indicates that in developing countries there has been a rapid increase in the amount of institutional credit for agriculture during the last decade. Despite this emphasis many rural residents still face shortages of credit, and a large majority of farmers are without financial help from institutional credit sources. Institutional credit, like income, is often distributed very unevenly in developing countries. For instance, in Peru it is estimated that over 50 percent of the nation's institutionally supplied agricultural credit is granted to less than one percent of the nation's farmers.

Formal or institutional credit is that granted by banks and officially recognized cooperatives. Informal or non-institutional credit is that granted by merchants, dealers, friends, relatives, etc. Henceforth, the terms institutional and formal credit (non-institutional and informal credit) are used interchangeably in the text.


farmers. Similarly in India, it has been estimated that credit per acre received by large farmers is twice that received by small farmers.

In the developing countries the scarcity of loanable funds is further aggravated by the imposition of sub-equilibrium and even negative real rates of interest by the government. Thus the institutional credit agencies try to distribute their loanable funds in such a way as to minimize their risk. Where the market forces are prohibited from playing their part, the bankers resort to other rationing methods. A banker would normally ask three critical questions before making a loan:

1. Does the borrower have the capacity to benefit from these funds? This question tends to probe into the farmer's intended use of borrowed funds.

2. Will the benefits of the loan be utilized to repay the loan? This question primarily relates to the character of the borrower.

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6B. Sen, op. cit., pp. 11-22.
(3) What collateral can be pledged to insure the repayment of credit, if all else goes wrong? This question basically deals with the credit worthiness of the borrower.

The answers to the first two questions require very detailed information and knowledge about the borrower. In a market characterized by inadequate facilities for dissemination of information in developing countries, the costs of getting answers to the first two questions are very high. Thus the information related to question three has assumed more importance because it is relatively easy and inexpensive to obtain. Also in view of the imperfect information about the new borrowers, the institutional credit agencies often prefer to do business with their old customers who have established a good reputation. Thus banks usually prefer (a) large accounts to small ones and (b) old accounts to new ones. Where non-market agricultural credit rationing exists, one would expect the basis for rationing to be the risk aversion and cost minimization considerations and the degree and length of continuing relationship among the borrowers and the institutional credit agencies. In order to minimize

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the risk as well as operating costs the institutional credit agencies often impose rigorous security requirements on their loans. The small farmers who constitute the bulk of the active agricultural population in developing countries are frequently very limited in their ability to meet security requirements which demand real estate, clear titles or written contracts. Some economists, therefore, argue that because of the rigorous security requirements of the institutional credit agencies, many of these small farmers must resort to non-institutional credit sources. Informal lenders usually have timely knowledge of their client’s financial status and thus do not need to insist upon formalities which are complex and time consuming. As a result, they are often able to help the small farmers overcome their financial problems.

Recent research suggests that the efforts to make agricultural credit available to small farmers have not been highly successful. An inequitable distribution of agricultural credit appears to be more acute in countries like

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Brazil which have highly bimodal distributions of farm land ownership.

Focus of the Study

The study is descriptive and focuses on the patterns of credit use among farmers in Southern Brazil. There is a feeling expressed in the literature that a major part of the agricultural credit needs in Brazil are met from the non-institutional sources and that small farmers, especially, are heavily dependent upon the non-institutional sources for credit. This descriptive portion will also include an analysis of the extent to which institutional and non-institutional agricultural credit use is associated with different farm characteristics: farm size, operating expenses, capital expenses, farm cash income, farm assets, etc. There is a feeling expressed in the literature that these farm characteristics have varied impacts on the decision making process of the institutional and non-institutional credit sources.

An attempt will also be made to identify the individual

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characteristics which differentiate the non-borrowers from the borrowers of agricultural credit. This descriptive portion of the study also provides some insight into the extent to which Brazil's agricultural credit programs have helped achieve various economic development objectives. To date studies of agricultural credit have not provided this detailed and integrated information on these types of issues.

Objectives

This study has five objectives. The first is to determine the patterns of agricultural credit use among farmers in Southern Brazil over the 1965 to 1969 period. The second is to evaluate the role of various farm characteristics in the allocation of institutional and non-institutional credit, and third, to evaluate the characteristics which differentiate non-borrowers from borrowers of agricultural credit. The fourth is to examine whether there has been a change in the pattern of evaluating the farm characteristics and distribution of institutional and non-institutional credit over time. The fifth is to suggest changes in credit policy which might improve the allocation of institutional credit for agriculture in Brazil.

For the sake of convenience these objectives are laid out in the form of hypotheses. The specific hypotheses to be tested relative to agricultural credit in Brazil are:
I. Non-institutional sources are the major suppliers of agricultural credit.

II. Farm characteristics\textsuperscript{10} influence allocation of institutional and non-institutional credit in Southern Brazil.

III. Non-borrowers and borrowers of agricultural credit have different farm characteristics.

IV. There has been no change in the pattern of evaluating the farm characteristics and distribution of institutional and non-institutional credit over time.

Hypothesis I

The assumption behind this hypothesis is that institutional sources of agricultural credit are risk averters and that they have very tight and rigorous security requirements. Thus users of agricultural credit, especially the small farmers, may be forced to use non-institutional sources of credit.

Hypothesis II

The theoretical background of this hypothesis is that institutional and non-institutional credit borrowers have different farm characteristics. Recent research suggests that the agricultural credit programs in Brazil have not achieved a more equitable distribution of credit in the rural areas. The institutional and non-institutional

\textsuperscript{10}Farm characteristics are meant to include also the characteristics associated with the borrowers such as age, etc.
sources of agricultural credit may serve different types of borrowers. Capacity, character, and collateral are three basic characteristics of the borrower which a lender may keep in mind when he makes a loan decision. It is costly for credit agencies to get information about all these characteristics. Thus, to minimize their costs and risks they place primary emphasis on landed property and clear titles for collateral. It is, therefore, felt that other equally important characteristics such as managerial ability, operational and investment expenses, consumption expenditure, farm income, etc. are relegated to a secondary position in the loan decision making process. In other words credit is granted according to the tangible property but not according to the economic potential of the loan for the borrower. It may thus occur that the production capacity and character of the borrower play a minor role in the decision making process of institutional credit agencies. It is further assumed that because of the concessional interest rates charged on institutional loans, social and political pressures are more weighty than the economic criteria in the institutional credit allocation process. Therefore, the non-institutional credit agencies serve those borrowers who lack the characteristics acceptable to the institutional credit agencies.
Hypothesis III

This hypothesis is based on the assumption that those farmers who do not borrow have different farm characteristics i.e., they may have poor resource endowments. They may have few economic uses for the credit and little repayment capacity.

Hypothesis IV

Some have assumed that the distributional patterns of credit have not changed over time in Brazil. That is, that changes in credit policy over the past decade has been neutral and possibly positive with respect to the concentration of credit use.

Organization of the Study

The discussion which follows is organized around the five general objectives. In Chapter II a brief review of literature on agricultural credit studies is presented. In Chapter III a brief review of literature on the theoretical conceptualization of the supply and demand functions of agricultural credit is given. Chapter IV deals with a brief description of the area, data used, the analysis framework, definition of variables and statistical methods utilized. Chapter V uses 1965 farm level information from Southern Brazil to describe credit use among the farm units studied.
Chapter VI presents a similar analysis on 1969 data as well as information on a panel of 338 farms interviewed in both 1965 and 1969. The final Chapter presents a summary, conclusion, policy implications, and suggestions for further research.
CHAPTER II

REVIEW OF LITERATURE

This chapter is divided into three subject areas. A discussion of allocation of agricultural credit is presented first. Second is a discussion of the economics of credit use. Finally, a review of literature on rural credit use in Brazil is presented.

Problems of Credit Allocation

Nurkse argued that a large majority of farmers in the developing countries suffer from a vicious circle of poverty.¹ Inadequate internal resources deter the farmer from financing investments and cash costs of agricultural operations, which in turn keep incomes low. Others have widely assumed that farmers in most of the less developed countries (LDC's) rely heavily on informal sources of credit

for their needs. Because the supply of timely credit was considered a crucial factor for agricultural development, rural credit programs have continued to be one of the most important agricultural policy instruments in LDC's. It is becoming increasingly apparent, however, that new technology and other major agricultural development techniques associated with credit use have not reached the rural poor. From the equity point of view agricultural credit programs are far from successful. This is because the institutions which handle these resources have largely evolved to service major market participants. Some economists feel that the institutional infrastructure which would allow the small farmers to participate in technological change and credit programs

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in a big way is not in place. Thus efficient institutional forms must be developed which will allow the small farmers to participate and benefit from technological change and credit programs.

Institutional credit policies in LDC's are generally based on the assumption that it is not possible for the poor and small farmers to get credit from the informal sources on economically favorable terms. Furthermore, a number of authors have argued that the interest rates on credit in the informal market in LDC's are high and exploitative, and thus, leave little or no incentive for profitable borrowing by the poor and small farmers. The question of high and exploitative rates of interest in the informal market has been discussed extensively. Some studies conclude that high interest rates in the informal credit market are justified because of high administrative


costs and opportunity cost of the loans advanced.\textsuperscript{7} Nisbet, in a study conducted in Chile, concluded that the real interest rates on informal loans were excessive even when inflation was taken into account.\textsuperscript{8} His conclusion is not very strongly supported by the empirical evidence which he presents, however.

Largely as a result of the assumption of exorbitant and exploitative rates of interest in the informal credit market, most rural credit programs in LDC's apply concessional rates of interest on agricultural loans. Some economists have challenged this low interest rate policy.\textsuperscript{9}


\textsuperscript{8}Charles Nisbet, "Interest Rates and Imperfect Competition in the Informal Credit Markets of Rural Chile," Economic Development and Cultural Change, Vol. 16, No. 1, October 1967, pp. 73-90.

They feel that in the developing countries the economic forces of demand and supply of agricultural credit have been curbed through government regulations of interest rates. They further argue that these regulations make it difficult to provide credit for agriculture in general, and for the small and poor farmers especially. When the institutional lenders are not allowed to charge a realistic rate of interest to compensate for high administrative costs and defaults on payments of interest and principal amount, they are forced to be choosy in selecting their customers. Small loans will always be expensive to service. The number of small loans in proportion to larger ones, if all small farmers are to be covered, creates many problems for the lender whether a bank, credit cooperative or the state itself.\textsuperscript{10} It is further contended that small farmer credit carries a higher risk for the lender because the small farmers have a less dependable market surplus above family needs. Thus some economists feel that the policy of sub-optimal rate of interest has not helped make more credit available to small farmers. Studies in Peru and India show that the institutional credit provided at

concessional rates of interest is very unevenly distributed and a major portion of the credit is taken by the large farmers.\textsuperscript{11} There is consensus of opinion among these economists that the small and the poor peasant producers are being serviced by the informal lenders.

A number of authors have expressed the belief that default is more important among small farmers, especially with respect to institutional credit. Thus it is believed that the fear of high risk prompted the institutional sources of credit to advance credit to large and wealthy farmers.\textsuperscript{12} This fear leads to uneven distribution of formal credit. There is little information in the literature about default rates in the informal credit market. Although agricultural credit delinquency rates are high in many less


developed countries, empirical evidence on who defaults in the institutional credit market is inconclusive. Some studies indicate that large farmers are more prone to default. Therefore, it cannot be assumed that the threat of high default rate among the small farmers is the only reason for the institutional lender being shy towards them.

Stansbury undertook a study in Peru to identify the causal factors of agricultural credit delinquency and to establish the origin of these causal factors. The study separated the causal factors at three levels. Three composite factors affecting delinquency were identified at the farmer level: the borrower's managerial ability, his resource package and his attitude. Stansbury also noted three composite factors which affect delinquency within the lending institution: the resources of the institution, especially the trained personnel to handle the business, the objectives of the institution and the operating procedures and performance of the institution. Under the general environment he found that the agricultural situation, the general economic situation, the infrastructure, the political attitudes and legal structure, the general physical

environment and the social attitudes and cultural structure are equally important factors which affect agricultural credit delinquency. He concluded that credit institutions and their problems are not completely isolated. They are interwoven with the economic, social and political system.

Ames' recent study in India also examined the problems of repaying agricultural loans. He concluded that overdue crop production loans increased with investment which suggested that anticipated increases in income due to new investment were overestimated, and thus the farmers were overfinanced irrespective of their farm sizes. This conclusion gives credence to the fact that the problem lay on both the lenders' as well as the borrowers' side. Both parties failed to make the correct assessment of the credit needs. He also found that farm assets were positively associated with overdue crop production loans. This conclusion stems from the fact that default increases with the increase in assets which is certainly contrary to the belief that the default rate is higher among small farmers. This may be due to the fact that people with more assets may have more political and social power to default. He further

found that the annual consumption expenditures on marriages, births, deaths and litigation were negatively related with the amount of overdue credit. This was a bit surprising, but there is no cogent reason given by the author for this relationship. He also found that small farmers' operating expenses were positively associated with the outstanding credit which suggests that small farmers are overfinanced in terms of their repayment abilities as far as crop production loans are concerned. Ames also found that natural calamities adversely affect the repayment capacity of the farmers and that other reasons such as death, injury or sickness were equally important in affecting adversely the repayment capacity.

Baker concluded that agricultural credit delinquency occurs due to any one or combination of the following reasons: 15

1. After receiving the loan the farmer may choose not to repay because he does not expect to borrow in the future. (2) He may also default because he expects the program will not be continued. (3) Default also can occur from external factors such as adverse weather, prices and illness. He suggests that although there seems to be

little doubt that the small farmer credit lending is subject to greater risks of default from external causes yet to allow easy default without penalty is to reduce the value of the small farmer credit programs in terms of financial education.

Eckaus categorizes the causes of default on loans to small farmers as: First, political influences i.e. the sociology of the community which means when the small farmers know that medium and large farmers have a higher rate of default, they also prefer to default. Second, lending institutions are poorly staffed and are unable to assess the borrower's repayment capacity or to demand repayment. Third, the income redistribution motives which play a role in many small farmer credit problems, undoubtedly inhibit the vigorous pursuit of defaulters in many countries. Fourth, natural events such as drought, insect-pest infestations and flood also contribute a lot to the default rate, and fifth, individual management problems such as sickness or death in the family also lead to agricultural credit default. He concludes that default rates above a few percent indicate that the small farmer credit program rather than being a financial program is being used for subsidies
to loan recipients.  

The above studies indicate that no clear cut conclusion can be drawn regarding why institutional lenders hesitate to lend to small farmers. It does not appear that risk due to high default rates may be a paramount reason.

Economics of Credit Use

In the early 1960's Schultz argued that there were few profitable investment opportunities for farmers in traditional agriculture. He argued that in traditional agriculture most profitable investment possibilities had been exhausted. Thus he concludes that there is neither a need nor a scope for employment of outside capital. The lack of modern technology rather than capital barriers explain slow rates of growth of agriculture in developing countries. Ruttan has stated that the availability of improved technological inputs which generate larger income streams represent the ultimate solution to the problem. These studies

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tend to conclude that the rural credit problems in LDC's are not supply based, rather demand based. The poor and small farmers do not have profitable opportunities for investment of borrowed funds. However, such assumptions as made by Schultz, Ruttan and others ignore the diverse nature of most agriculture. For example it was found in India in the 1950's that some farmers would borrow and invest productively to improve their incomes and if credit is not available they have to forego their investments.\(^\text{19}\) This argument has further been supported by later studies conducted in India. Gupta has observed in his study that where the landless tenants have been vested with the right of ownership it is necessary to provide them with additional capital for making investments in irrigation projects so that they may have assured water supply. They also need to be provided with credit to purchase improved seeds, implements and fertilizers.\(^\text{20}\) Mann has stated in his study that if improved techniques are followed without augmenting the existing limited resources of the cultivators, the farm


incomes would decrease instead of increasing or otherwise the improved technology would not be adopted in complete package of practices.\textsuperscript{21} Kumar, while working out the optimum plans with recommended technology and farm adjustments, has come out with the conclusion in his study that if the farmers are expected to adopt the improved technology, they must be provided with external capital to supplement their resources to purchase the improved technology.\textsuperscript{22}

Chen's study of structure and productivity of capital in agriculture of Taiwan has bearing on the economics of credit use.\textsuperscript{23} He found very high equity ratios on the farms which suggests that the farmers are in a position to borrow. He also found a high marginal revenue productivity of operating capital which indicated that the farmers had opportunities to profit from more investments. He concluded


\textsuperscript{22}Narindar Kumar, "A Study on Farm Adjustment Possibilities in Lower Dhaya Type of Farming Area of I.A.D.P. Ludhiana," unpublished M.S. Thesis, College of Basic Sciences and Humanities, Punjab Agricultural University, Ludhiana, India, 1969.

that the high equity ratios and high marginal productivity indicate that the farmers have enough economic opportunities to support additional borrowings from external sources.

These studies indicate that irrespective of the stage of technological development that a country is in, some farmers at least have the potential for economic use of external funds. Further, where a breakthrough in agricultural technology has taken place, farmers often need external funds to finance investments in improved technology. Therefore, in view of the diverse nature of most of agricultural economies, the blanket acceptance of Schultzian thesis may not be entirely justified.

Some economists have attempted to identify the factors which affect the flow of external funds into the agricultural sector. Hesser and Schuh conducted a study in the United States with the objective of identifying the factors which affect the gross flow of mortgage money to agriculture.\(^2\) The annual gross flow of farm mortgage loans was used as a measure of agricultural mortgage credit. Simultaneous equations techniques were used to estimate the demand for mortgage credit. They concluded that the elasticity of demand for mortgage credit with respect to interest,

internal funds, and technology is negative and is greater than one. The elasticity of demand for internal funds was found to be the most volatile of the demand shifters. This suggests that fluctuations in the internal funds cause major fluctuations in the quantity of farm mortgage credit demanded, and that wage rate elasticity of demand is greater than one and is positive. They suggested that the knowledge about the structural relationships can be useful to policymakers attempting to improve existing financial institutions.

Pani's study in India focused on whether the demand for credit had very low interest elasticity for all classes of cultivators and for all types of credit. He concluded that (1) the average cultivator's demand for credit is not wholly interest elastic: the borrowings of an average cultivator decline with a rise in the interest rate. (2) The credit demand of large farmers is more sensitive to changes in the rate of interest than it is for small farmers. (3) In the case of large farmers, a rise in capital expenditures results in an appreciable increase in cash loans. (4) The changes in family expenditures do not significantly influence large farms borrowing, but small farmers borrowings are influenced significantly by changes in family

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expenditure. And, (5) the value of assets does not seem to be a significant variable in explaining the demand for credit.

Long carried out a study in India to identify the factors which determine farm level credit use. He used two measures of credit i.e. outstanding debt during the year and the amount of new borrowings in the year. This study showed that a positive relationship existed between investment on farm with outstanding debt and the amount of borrowings in the year. This indicates that farmers borrow to finance capital outlays. He also found a negative relationship between rate of interest and outstanding debt, and the amount of borrowings in the year. This study also indicated a higher degree of negative correlation between transitory income and outstanding debt as compared to between transitory income and amount of borrowings in the year. This suggests that farmers probably tend to borrow more when their incomes are unexpectedly low. The results of this study also show a positive relationship between wealth and outstanding debt which means that the absolute amount of debt increases with the size of the farm firm. Long's study also showed that the amount of debt rose when the proportion of land owned by the farmer increased, which

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means land is considered important security against risk by the lenders.

Other studies of agricultural credit have also suggested that there is a growing demand for credit among farmers in the developing countries for land improvements and for the purchase of traditional and non-traditional inputs. 27

**Rural Credit Studies in Brazil**

Schuh's study indicates that comprehensive data on the amount of credit extended to agriculture, especially through the informal credit market are badly lacking in Brazil. 28 He concludes that the farmers depend heavily on informal sources for their credit needs, because the supply of credit from formal sources is limited. Without monetary correction in a highly inflationary environment, lending is a bad business where low rates of interest are fixed by


legislation. He also notes that interest rates could compensate for inflation if they were permitted to do so.

Further that a large portion of the institutional credit (about 90 percent) goes to large land holders.

Early concluded in his study that there was credit scarcity for agri-business firms which restricted the expansion and modification of facilities and services offered to the farmers. More than 90 percent of the firms included in his study used credit from the non-institutional sources and agri-business firms provided a substantial amount of the short-term credit available to farmers.29 He goes on to argue that non-institutional credit is the major source of agricultural credit in Brazil.

Rask and Sorensen conducted a study in Brazil with an objective to evaluate the impact of credit as a means of increasing agricultural productivity.30 In the mid-1960's low cost credit was used as a technique to encourage increased use of fertilizer in the production of basic food


30 Norman Rask and Donald M. Sorensen, "Credit as a Means of Increasing Agricultural Productivity - Brazilian Experience," unpublished paper, Department of Agricultural Economics and Rural Sociology, The Ohio State University, February 1968.
crops in Brazil. The authors concluded that their evaluation of this program did show a positive change in agricultural production. But the authors questioned a blanket recommendation of low cost credit program for use in agricultural development plans. They raised the question of program costs to society and thus the ultimate profitability of the credit program.

Rao's study in Brazil on the economics of credit use showed that credit needs in traditional farming are limited, but that transition from traditional to modern farming requires substantial amounts of credit. He also found that the marginal productivity of operating expenses of large farms is substantially lower than that of the small farmers. This implies that capital is under-utilized on the small farms as compared to large farms. This conclusion gives support to the view held by some economists that there is an inefficient distribution of credit and that small farmers are facing external credit-rationing. He goes on to conclude that shortage of credit is a bottle-neck for the growth of at least some small farms in Brazil.31

A study by Nelson dealt with the economics of

fertilizer use. \(^{32}\) He tested the Brazilian government's price and credit subsidies assumption that there is positive net returns to fertilizer use. This study provides indirect evidence on the economics of credit use through evaluation of the profitability of fertilizer use. This study concluded that the use of additional fertilizer was generally not profitable in the region because of technological barriers, and that credit and price programs would have little effect on capital formation and income unless these technological barriers were overcome.

White conducted a study in Brazil which tested the following assumptions: (1) the supply of credit for farmers is inadequate, (2) that farmers cannot or will not use credit at market rates of interest and that subsidized interest rates are necessary to induce them to borrow and (3) that there exists a number of opportunities which are technically feasible and profitable for the farmer. \(^{33}\) He concluded that owing to lack of profitable investment


\(^{33}\)T. Kelley White, "Credit and Agricultural Economic Development—Some Observations on Brazilian Case," unpublished paper, Department of Agricultural Economics, Purdue University, October 1972.
opportunities, simply increasing the availability of resources to the existing banking system would have little effect on agricultural economic development. He further argued that many banks found small agricultural loans unattractive. Thus, to channel more resources into the existing banking system does not appear to offer a very viable solution to the problem. This is because banks depend on asset position to determine credit worthiness. A policy whereby the government would guarantee repayment of small farm loans would have greater impact than reduced interest rates. With traditional agriculture the current low level of credit use is a function of low level of demand rather than restricted supply.

Productivity analysis done by Nehman showed that capital inputs were being effectively used on large farms and by farmers with borrowed capital. Capital inputs were not being effectively used on the smaller farms which had the lowest potential return on increases in operating expenses and no potential for increasing working assets. Rao's, Nelson, Nehman and White's studies in Brazil appear to support Schultz's hypothesis of technological barriers to growth.

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Rao's study in Brazil concluded that (1) credit use and operating expenses had a significant positive relationship, (2) there was a positive association between credit use and capital expenditure and (3) credit use and assets have a negative relationship. He concluded that capital shortage had been a real constraint on the growth of some farms.

Tommy's study had the objectives of measuring the changes in the level of farm capital between 1965 and 1969, and assessing changes in credit use among farmers between 1965 and 1969. He found that there had been an increase in the institutional credit use, but a decrease in non-institutional credit use. He also found that there was credit concentration in favor of those farmers who had previous credit experience, on some farms there was a significant growth in the value of capital, and that there was a close relationship between farmers who increased their capital base rapidly and their use of institutional credit.

Nehman's study concluded that (1) channeling concessionally priced credit through the formal banking sector


made it difficult for small farmers to obtain credit because (a) some farmers could not meet the security requirements imposed by the banks, (b) banks were hesitant to lend to small farmers due to loan cost considerations. (2) Informal lenders were popular with small farmers because they provided unique and ready services of credit. (3) The real cost of obtaining small formal loans was found to be higher than the corresponding cost of informal loans. It was for this reason that the small and medium-sized farmers sought out informal loans.  

In summary, the review of literature showed that there was little information on the following issues: (1) the pattern of allocation of agricultural credit from the institutional and non-institutional sources in Brazil, (2) the farm characteristics which affect the credit allocation among the farmers, (3) farm characteristics which differentiate the borrowers from non-borrowers, and (4) how the pattern of credit allocation over time has changed. Therefore, in this study, an attempt will be made to provide information on these aspects.

\(^{37}\)Nehman, op. cit., pp. 108-111.
CHAPTER III

FARM CREDIT SUPPLY AND DEMAND

In this chapter a brief review of literature on the theoretical conceptualization of credit supply and demand functions is given. In fact relatively little theoretical work has been done on the supply and demand functions for credit by industry. The discussion which follows attempts to draw together those parts of credit theory which have been covered in the literature. In the presentation, the rate of interest and volume of loans are postulated to be endogenous or mutually and simultaneously determined, subject to various exogenous variables or shifters of demand and supply functions of farm credit.

Supply of Farm Credit

In this section supply functions are conceptualized at macro and micro levels under various assumptions regarding market conditions.

Aggregate Supply of Farm Credit Under Perfect Market Conditions

The supply of credit to agriculture at the macro-level
is hypothesized to be a positive function of the farm credit rate of interest relative to the non-farm rate of interest.\(^1\) Other things remaining the same, additional quantities of agricultural credit per unit of time will be supplied at successively higher rates of interest. According to the loanable funds theory of interest, the supply of loanable funds depends on the rate of saving, changes in money supply and cash hoarding or dishoarding by the people. The supply of agricultural credit or loanable funds will be affected by these variables. It is expected that the supply of agricultural credit will increase with an increase in the rate of national savings, with an increase in the supply of money or with dishoarding of money.

Economic reactions are generally not instantaneous. Therefore, agricultural loans, lagged one time period, may be included as an additional independent variable in the supply function to test the null hypothesis that lenders react instantaneously to changing economic forces in the agricultural credit market.

The aggregate agricultural credit supply function may be expressed as follows. This model is conceptualized under conditions of perfect competition and certainty in the

market.

\[ Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \]

where

- \( Y \) = farm credit supplied per unit of time
- \( X_1 \) = the average rate of interest on farm loans per unit of time, \( \frac{\partial Y}{\partial X_1} > 0 \).
- \( X_2 \) = the differential between the farm loan rate of interest and non-farm loan rate of interest per unit of time, \( \frac{\partial Y}{\partial X_2} > 0 \).
- \( X_3 \) = the flow of national saving per unit of time, \( \frac{\partial Y}{\partial X_3} > 0 \).
- \( X_4 \) = change in money supply, i.e. the first difference of money supply, \( \frac{\partial Y}{\partial X_4} > 0 \).
- \( X_5 \) = ratio of index of prices received for all farm products to the index of prices paid for inputs used in production, \( \frac{\partial Y}{\partial X_5} > 0 \).
- \( X_6 \) = farm loans made the previous year, \( \frac{\partial Y}{\partial X_6} > 0 \).

It may be difficult, if not impossible, to get data on hoarding or dishoarding of money (\( X_7 \)). Therefore, this variable may not be included as an argument in the supply function of farm credit.

A study conducted by Hesser and Schuh in the United States of America showed that the supply of farm mortgage credit was positively associated with the interest rate, the
differential between the farm loan rate of interest and non-farm loan rate of interest, national savings, change in money supply, farm prices, farm assets and lagged quantity of supply of farm loans.\(^2\)

These macro-models of farm credit supply may be valid under conditions of perfect competition and certainty on the part of the lenders (banks). In the real world, however, there is always an element of risk involved in lending to the farm borrowers. Thus, the lending agencies (banks) work under conditions of risk and uncertainty and invariably resort to external credit rationing.\(^3\)

Thus a risk and uncertainty variable, enters as an independent variable in the supply function. Thus external credit rationing, consequent upon risk and uncertainty involved in lending, may be visualized to influence the supply of farm credit under two sets of situations: First, where the lending agencies are carrying out their business at equilibrium rates of interest and there is no restriction on the rate of interest to be charged on the

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amount of loan to be granted. Second, where the government imposes restrictions on the rate of interest to be charged and the amount of loans to be granted.

Supply of Credit Under Risk and Uncertainty and No Restrictions

This model is conceptualized under the following assumptions:

1. The rate of interest charged is the equilibrium rate.

2. The lending agencies face a homogeneous class of customers i.e. they face the same cost functions with respect to loans advanced to various customers.

3. There are no restrictions on the amount of loans to be advanced.

4. There is an element of risk and uncertainty involved.

SS curve (Fig. 1) represents the supply of loanable funds which the banks will lend at various rates of interest. DD curve represents the demand for loanable funds which the

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FIGURE 1. Supply of Credit Under Risk and Uncertainty And No Restrictions
banks face at various rates of interest. If the banks are sure that there is going to be no change in lending opportunities in the future, then they would find it profitable to lend OA amount of money. But, the banks do not see the future with absolute certainty. Therefore, they maintain some reserves of loanable funds for two reasons: (i) these reserves can be used to take advantage of favorable opportunities expected in some future date. (ii) These reserves can be used as cushions for adjustment to unfavorable situations. Thus the lending agencies derive a value or utility from reserves of loanable funds which is represented by $MU_F$ which measures the marginal utility of flexibility of loanable funds. Thus, due to self imposed restrictions by the lending agencies the amount of loanable funds has decreased from OA to OB. The amount BA, measured from right to left, has been kept in reserve by the lending agencies.

The formal lending agencies in the less developed countries do not face such a theoretical ideal situation, where they respond only to self imposed restrictions. They usually work under somewhat different circumstances. This, in fact, is the major objective of this research work to study the business behavior of the lending agencies in the less developed countries, with special reference to Brazil, where they are working under restrictions imposed by the government.
A Theoretical Model of Banks Behavior Under Restrictions Imposed by the Government

Given the restrictions imposed by the government the banks carry-out the final allocation of credit to their customers. This formulation is primarily a modified form of Gonzalez-Vega’s model. In Figs. 2 and 3, DD and SS are the demand and supply functions respectively for loanable funds in a competitive loanable fund market. AC is the average cost function of the commercial banks. At interest rate the quantity demanded OC is equal to quantity supplied OC of loanable funds. But in the less developed countries, the commercial banks are usually not working under competitive conditions in the agricultural loanable funds market. Both the rate of interest and the funds to be loaned are strongly influenced by the government. At a concessional rate of interest (Figs. 2 and 3) fixed by the government, the amount of loanable funds supplied is OA and the amount of loanable funds demanded is

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5Henceforth commercial banks, banks and formal lending agencies are used as synonyms.


FIGURE 2. Supply of Credit Under Restrictions Imposed By Government (OF < is)
FIGURE 3. Supply of Credit Under Restrictions Imposed By Government ($OF > i_s$)
OE. Thus the amount demanded is greater than the amount supplied and AE is the excess demand. Instead of OA amount being supplied by the commercial banks at $i_s$ rate of interest, they may be required by the government to supply OB amount of loanable funds at $i_s$ rate of interest (Figs. 2 and 3). The excess demand has been reduced from AE to BE. At $i_s$ rate of interest and OB amount to be loaned, both fixed by the government, $OEH_i_s$ and $OBF$ (Figs. 2 and 3) are the total revenue and the total cost respectively of the commercial banks. At $i_s$ rate of interest and OB amount loaned out $FGH_i_s$ is the profit (Fig. 2) or loss (Fig. 3) of the banks depending upon their cost functions.

Now irrespective of the nature of the commercial banks, i.e. whether private or nationalized, it is usually their prime objective to maximize their profit (Fig. 2) or to minimize their loss (Fig. 3) which is often used as an index of the efficiency achieved by the banks.

The constraints, therefore, under which the commercial banks are working, are as follows:

1. The prices are given to the commercial banks since the government sets the rate of interest.
2. The amounts to be loaned are also influenced by the government.

Therefore the commercial banks operate subject to the following constraints:
(1) $TR = rQ$ is a constant where

(i) $TR = \text{total revenue of commercial banks}$,

(ii) $r = \text{given rate of interest on loans}$,

(iii) $Q = \text{given volume of loanable funds}$.

Therefore, the decision variable with the commercial banks is the allocation of $Q$ between $q_1$ (large farms) and $q_2$ (small farms). The funds are exhausted in the two allocations i.e.

(2) $Q = q_1 + q_2$

The total cost $TC$ is the sum of cost of lending to large farmers $C_1$ and the cost of lending to small farmers $C_2$, i.e.

(iv) $TC = C_1 + C_2$

The cost functions for the two categories of borrowers are

(3) $C_1 = F_1 + A_1 (q_1) + L_1 (q_1)$

(4) $C_2 = F_2 + A_2 (q_2) + L_2 (q_2)$ where

$F_i = \text{fixed costs where } i = 1, 2.$

$A_i (q_i) = \text{administrative costs which are functions of } q_i$

$L_i (q_i) = \text{costs of supervision, losses and collection which are functions of } q_i$

**Assumptions**

(a) The cost functions differ for the two classes of borrowers.
(b) Both average variable costs and marginal costs are higher with the small farmers' loans than with the large farmers' loans i.e.

\[
(5) \begin{align*}
& (i) \left[ A_1(q_1) + L_1(q_1) \right] \left( \frac{1}{q_1} \right) < \left[ A_2(q_2) + L_2(q_2) \right] \left( \frac{1}{q_2} \right) \\
& \text{for any } q_1 = q_2 \\
& (ii) \frac{\partial c_1}{\partial q_1} < \frac{\partial c_2}{\partial q_2} \\
& \text{for any } q_1 = q_2
\end{align*}
\]

This is assumed because (1) the amount of paper work and time required to process a loan are more or less the same for loans regardless of loan size. Therefore, the cost per unit of money loaned will be lower in the case of large farmers than in the case of small farmers, and (2) a single large loan requires the visit to only one farm for supervision while a series of smaller loans adding up to the same amount require visits to several farms. Studies of costs of banks have confirmed the existence of economies of scale in their operations.⁸

Subject to the above conditions, the commercial banks attempt to maximize their profit (Fig. 2) or minimize their loss (Fig. 3). Profit or loss is the difference between total revenue and total cost. Profit maximization or loss minimization function is as follows.

(6) \[ \pi = TR - TC = rQ - (F_1 + F_2) - A_1 (q_1) - L_1 (q_1) - A_2 (q_2) - L_2 (q_2) \] subject to the constraint \[ Q = q_1 + q_2 \]

The Lagrangean function is

(7) \[ g = (\pi + \lambda (Q - q_1 - q_2) \]
\[ = rQ - F - A_1 (q_1) - L_1 (q_1) - A_2 (q_2) - L_2 (q_2) + \lambda (Q - q_1 - q_2) \] where \( F = F_1 + F_2 \)

and \( \lambda \) is the Lagrangean multiplier. The first order conditions for profit maximization or loss minimization are

(8) \[ \frac{\partial G}{\partial q_1} = - (A_1' + L_1') - \lambda = 0 \]
(9) \[ \frac{\partial G}{\partial q_2} = - (A_2' + L_2') - \lambda = 0 \]
(10) \[ \frac{\partial G}{\partial \lambda} = Q - q_1 - q_2 = 0 \]

This means that in order to maximize the profit or minimize the loss under the given constraints, the commercial banks have to equate marginal costs \( (A_1' + L_1' = A_2' + L_2') \) in the cases of large and small farmers loans in such a way that \( Q \) is exhausted.

The maintenance of concessional rates of interest reinforces the natural tendency of the banks to allocate a large proportion of funds to large loans. In general the average cost of lending is lower per unit of money the larger
the average loan size. This misallocation (under the	policy objective of equitable distribution) may further
be aggravated if the banks are required to charge small
farmers a lower rate of interest under the program of
transfer of income and subsidizing the credit to the
small farmers. It leads to even less credit being
allocated to small farmers. Therefore, the policy,
which is aimed at benefiting the small farmers, actually
turns against them.

Sometimes in addition to differences in cost func-
tions, there are other reasons such as social and political
influences which are equally important in inducing the
commercial banks to allocate a disproportionate share of
loan funds to large farmers and the banks may not even
equate the marginal costs.9 When the commercial banks
maximize their social and political influences they may not
equate the marginal costs.10 Therefore, under this situation,
it is the small farmer who is supposed to bear the
brunt of this allocation.

On the basis of the previous discussion and this
theoretical model of lending behavior of the commercial
banks, it is assumed that farm characteristics play an
important role in the decision making process of the

9Gerald I. Nehman, "Small Farmer Credit Use in a
Depressed Community of Sao Paulo, Brazil," unpublished Ph.D.

10Claudio Gonzalez-Vega, op. cit.
commercial banks. Because of the paucity of data on all the variables which go into the decision making process of the lending agencies, a partial analysis of farm credit allocation by the lending agencies will be made in this study. This study is primarily focused at the micro-level decision making process of allocation of farm credit by the lending agencies.

In the next section a review of literature on theoretical model of supply of agricultural credit at the farm level is presented.

Supply of Farm Level Agricultural Credit

One of the prime considerations in any loan transaction is the security of the loan. Thus at the individual farm level one would expect the farm characteristics to influence lender's behavior and determine the supply of loanable funds available to an individual farm business.\(^{11}\) Thus at the micro-level the supply of farm credit should be context-specific. Therefore, for purposes of this study, it is hypothesized that the credit supply at the farm level has the following functional relationship, i.e. the lenders look at the characteristics of the borrower and include them as arguments reflecting security in the supply

function for their loans.

\[ Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8) \] where

\( Y \) = farm credit supplied to an individual farmer per unit of time by the banks

\( X_1 \) = gross income which is a proxy for the size of farm business. A business with a large gross income would usually indicate a better credit risk than the one yielding a small gross income,

\[ \frac{\partial Y}{\partial X_1} > 0 \]

\( X_2 \) = yield per unit of input. High yields indicate good management and a good security against risks to loans,

\[ \frac{\partial Y}{\partial X_2} > 0 \]

\( X_3 \) = price for products sold. High prices received per unit of product indicate production of good quality and producer is studying and following price cycles. This variable is also an indicator of good managerial ability,

\[ \frac{\partial Y}{\partial X_3} > 0 \]

\( X_4 \) = production costs per unit of output. Low costs per unit of product indicate that the farmer is a good manager and follows good management practices,

\[ \frac{\partial Y}{\partial X_4} < 0 \]

\( X_5 \) = overhead costs per unit of output. Lower overhead costs per unit of product indicate that the farmer is not tying up cash in buildings and
equipment unless they are necessary for production, because unnecessary overhead investment impairs the income generating and loan repayment capacity of the farmer, \( \frac{\partial y}{\partial x_5} < 0 \)

\( x_6 = \) living costs of family. Low living costs indicate the thriftiness of the farmer. Low living costs are especially important during the establishment and expansion stages of the farm firm, \( \frac{\partial y}{\partial x_6} < 0 \)

\( x_7 = \) distribution of income over the year. An income flow which is spread throughout the year indicates that the farmer does not depend on any one particular market at a certain time of the year. This shows that the farmer has probably spread his incidence of risk over a number of markets.

\( x_8 = \) is a variable which indicates the purpose of the loan and the type of security offered by the farmer borrower.

**Aggregate Demand for Farm Credit**

In this section a review of literature on a theoretical model of aggregate demand for farm credit is presented. It is theorized that the demand function for farm credit is of
the following form: \(^{12}\)

\[ Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \]

where

- \( Y \) = demand for farm credit per unit of time,
- \( X_1 \) = rate of interest on loans per unit of time,
- \( X_2 \) = internal funds available,
- \( X_3 \) = expected farm prices,
- \( X_4 \) = wage rate,
- \( X_5 \) = technology,
- \( X_6 \) = amount of debt at the beginning of the year, and
- \( X_7 \) = farm assets in agriculture.

The amount of credit demanded will be inversely related to the price of credit i.e. the rate of interest

\[ \left( \frac{\partial Y}{\partial X_1} \right) < 0 \].

This relationship is conceptualized in the sense that if credit is considered as an input in production, then a negative slope to the demand relation can be assumed from the decreasing marginal productivity of an input.

The demand for credit will be inversely related to the amount of internal funds ($-\frac{\partial y}{\partial x_2} < 0$). Other things remaining the same, if there are more internal funds available, there will be less need for the use of credit or external funds.

The theory of firm suggests that three other variables should be included in the demand function. Each of these variables is important when the demand for credit is considered to be a derived demand from the demand for capital. (1) The real price of farm products is a shifter of the demand for inputs used in agriculture. To the extent that credit is used to finance investments, the concept of expected prices appears to be relevant. The demand for credit is directly related to the expected prices of farm products, ($\frac{\partial y}{\partial x_3} > 0$). (2) Theory suggests that prices of other factors of production also be included. The wage rate is considered to be a relevant variable to include because of its importance in the capital-labor substitution process. The demand for credit will be directly related to the wage rate ($\frac{\partial y}{\partial x_4} > 0$). (3) Technology may be a shifter of demand for an input. As technology improves e.g. mechanical technology, chemical technology and biological technology, the demand for credit or external funds may also increase. This is especially relevant in less developed
countries \( \left( \frac{\partial y}{\partial x_6} > 0 \right) \).

To the extent that new loans are used for refinancing part of the existing stock of debt, the stock of debt at the beginning of the year is a relevant variable to be included. The demand for credit will be directly related to the amount of debt at the beginning of the year \( \left( \frac{\partial y}{\partial x_6} > 0 \right) \). If the farm assets in agriculture are used as a proxy for the size of the agricultural sector, then it appears reasonable to include them as an argument in the demand function for farm credit. The amount of credit demanded will be positively related to the amount of assets in the agricultural sector \( \left( \frac{\partial y}{\partial x_7} > 0 \right) \).

Hesser and Schuh's study in the United States of America showed that demand for agricultural mortgage credit was negatively associated with the rate of interest, internal funds, and technology. They further found that mortgage credit was positively related to wage rates and lagged quantity of mortgage credit.\(^{13}\) Karnik's study in the United States of America showed a positive relationship between the use of credit and value of real estate, expenses of farm production, and increasing mechanization. The study also showed a negative association between credit and disposable income.\(^{14}\)

\(^{13}\)Leon F. Hesser and G. Edward Schuh, \textit{op. cit.}, pp. 1583-1588.

\(^{14}\)Kamud Chintaman Karnik, \textit{op. cit.}
Farm Level Demand of Credit

As this study is not aimed at deriving an aggregate demand function for farm credit, the main emphasis, therefore, is to study the factors which affect the demand for credit at the farm level. Thus the demand for credit at the farm level may also be influenced by the individual characteristics of the farm firm such as farm family size, farm family consumption expenditures, problems of cash flow, risk and uncertainty associated with the farm business, managerial capability, etc. \(^{15}\) Requirements of the farm household cannot be ignored in the organization of the farm business, especially of the small farm. \(^{16}\) The subsistence character of small farms enforces the need to consider consumption and production requirements in any serious consideration of economic behavior in general and


financial behavior in particular. Therefore, consumption expenditures appear to be a relevant variable in the demand function of an individual farm because the input requirements for the household are just as demanding as input requirements for the farm firm.

The farm level agricultural credit demand function may be expressed as follows:

\[ Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) \]

where

- \( Y \) = demand for farm credit per unit of time,
- \( X_1 \) = rate of interest on agricultural loans per unit of time, \( (\frac{\partial Y}{\partial X_1} < 0) \),
- \( X_2 \) = operating expenses \( (\frac{\partial Y}{\partial X_2} > 0) \),
- \( X_3 \) = investment expenses, \( (\frac{\partial Y}{\partial X_3} > 0) \),
- \( X_4 \) = cash agricultural income, \( (\frac{\partial Y}{\partial X_4} < 0) \),
- \( X_5 \) = farm inventory and assets, \( (\frac{\partial Y}{\partial X_5} > 0) \),
- \( X_6 \) = managerial capability, \( (\frac{\partial Y}{\partial X_6} > 0) \),
- \( X_7 \) = farm family consumption expenditures, \( (\frac{\partial Y}{\partial X_7} > 0) \).

\[ X_8 = \text{element of risk and uncertainty, } (\frac{\partial}{\partial x_8} < 0), \text{ and} \]
\[ X_9 = \text{amount of outstanding debt at the beginning of the year, } (\frac{\partial}{\partial x_9} > 0). \]

Normally the farmer does not use credit up to the optimum level i.e. where its marginal cost equals its marginal return. He restricts his borrowings short of the most profitable level. The probable reason is the risk and uncertainty he faces. He will not use more credit, even if it is interest free, if risk is very high. Therefore in view of the risk generated by the nature of farming, by uncertain markets, and by household events, the farmer prefers to maintain unused credit reserves. Credit reserves are an unprofitable use of funds as much of farmer’s capital lies idle a good part of the time. When the returns from capital are greater than the cost of borrowing, profits can be increased still further by using credit to supplement the farmer’s own funds in meeting the current operating expenses and in expanding the farm business. But the farmer, after using his own cash reserves, in order to

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obtain security and flexibility in his farming business indulges in self-imposed restrictions on himself in borrowing the money. This situation is illustrated in Figure 4.

$\text{MU}_{MVP}$ represents the satisfaction derived from the income generated by the additional borrowed funds (Fig. 4). $\text{MU}_C$ indicates the satisfaction obtained from borrowing additional funds for consumption. $\text{MU}_P$ represents the satisfaction obtained from borrowable reserve funds. The $\text{MU}_{MVP}$ and $\text{MU}_C$ are discounted functions to induce the farmer to take the risks involved in investing and consuming borrowed funds. Figure 4 indicates that the farmer can borrow $OT$ amount of funds at $i_e$ rate of interest. Out of this amount he would use $OP$ amount for income generating purposes and $PT$ amount for consumption purposes because at this level of allocation of $OT$ between income generating funds and consumption funds, $\text{MU}_{MVP}$ equals $\text{MU}_C$. But, the farmer would actually borrow $OC$ amount at $i_e$ rate of interest. He would invest $OP$ amount for income generating purposes and would consume $PC$ amount. Thus he would maintain $CT$ amount as a borrowable reserve for two reasons. (1) He will maintain borrowable reserves as a source of security against risk and uncertainty involved in his business. (2) He will maintain borrowable reserves to take the advantage of favorable opportunities which may take place in some future date. Thus only $OC$ amount would be
FIGURE 4. Farm Level Demand of Credit Under Risk and Uncertainty
borrowed which has a disutility of CD and utility of CE per unit of borrowed money. It is important to recognize the high cost at which CT amount of borrowable reserves is held. The opportunity cost of holding reserves is the potentially high returns they would return if committed in production or consumption. The utility of flexibility has to be sufficiently large to cover the foregone earning power of idle reserves as well as the profit which would have been made on the reserves. Thus the utility of flexibility derived from unused credit only has to be sufficiently large to cover the utility of the profit which would have been earned. This difference explains why the farmer obtains most of his flexibility from unused credit reserves rather than unused reserves of his cash.

The review of literature presented in this chapter dealt with the conventional theoretical models which conceptualize the supply and demand functions of credit. However, in developing countries like Brazil where the market forces are restricted to play their role, these models may not explain the real process of credit allocation. The rate of interest on agricultural credit is fixed. Thus rate of interest plays little role in the process of credit allocation. In view of high rate of inflation in LDC's,

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20Lawrence A. Bradford and Glenn L. Johnson, *op. cit.*
the real rate of interest may be negative. The negative real rate of interest thus carries an element of income subsidy. The demand for income subsidy is expected to be unlimited. With negative real rate of interest, the demand and supply functions in the negative quadrant do not conform to their conventional shapes. Therefore, the conventional theoretical models of demand and supply may not explain the process of credit allocation and use in the LDC's. The study of factors other than rate of interest, is necessary to understand the process of credit allocation. However, there exist some limitations to examining the interdependence between the farmer's demand for credit and various independent variables. For example, it may not be possible to measure precisely the farmer's risk preference, expected returns, rate of interest, etc. Thus the data are not available for so sophisticated an analysis. Therefore a partial analysis of factors affecting the use of credit at the farm level will be made in this study.

In chapters V and VI a partial analysis of allocation and use of farm credit is presented which is mainly based on the theoretical conceptualization of factors influencing the decision making process of the lenders and borrowers. In chapters V and VI only partial analyses are given because of paucity of data on all the relevant variables which go into the supply and demand functions of farm credit.
CHAPTER IV

DATA USED, CREDIT POLICY AND METHODOLOGY

The setting for this study is Brazil. It, like many other developing countries, has placed heavy emphasis on agricultural credit as a part of its agricultural development strategy. It therefore provides a good setting for testing the hypotheses of this study.

The data used in the analysis was drawn from studies conducted in Southern Brazil in the states of Rio Grande do Sul, Santa Catarina and Sao Paulo during 1965,1969. These data are a part of a larger study of capital formation done by the Department of Agricultural Economics and Rural Sociology, The Ohio State University. The number of farm interviews used by year and area are as follows:

TABLE 1.--Number of Farm Interviews By State and Year

<table>
<thead>
<tr>
<th>Year</th>
<th>State</th>
<th>Rio Grande do Sul</th>
<th>Santa Catarina</th>
<th>Sao Paulo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td></td>
<td>445</td>
<td>377</td>
<td>132</td>
<td>954</td>
</tr>
<tr>
<td>1969</td>
<td></td>
<td>366</td>
<td>366</td>
<td>---</td>
<td>732</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1965 and 1969.
In 1965, 954 farms were surveyed in the states of Rio Grande do Sul, Santa Catarina and Sao Paulo. In 1969, 732 farms were interviewed in the states of Rio Grande do Sul and Santa Catarina. Three hundred and thirty-eight of these interviews were with farmers surveyed in 1965. In the analysis which follows, use is made of the 1965 and 1969 data sets as well as the panel of 338 farms.$^1$

Observations from these various surveys were classified into eight landownership size groups for much of the analysis.

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Institutional Agricultural Credit Growth

In this section a brief overview of agricultural credit growth, policies and programs in Brazil is presented. The Brazilian agricultural credit policy has been very aggressive in the past couple of decades in expanding formal agricultural credit. A major expansion in the amount of agricultural credit has been an integral part of agricultural development policies. Table 2 presents the value of institutional credit distributed from 1960 through 1972. The table indicates that the real value of institutional agricultural credit increased almost six times between 1960 and 1972. Along with this there has been a sharp


TABLE 2.--Measures of Institutional Agricultural Credit Use in Brazil 1960-1972

<table>
<thead>
<tr>
<th>Year</th>
<th>Agricultural Production Loans Made During Year</th>
<th>Ratio of Agricultural Credit to Total Credit 2</th>
<th>Net Internal Product From Agriculture 3 Million</th>
<th>Ratio of Credit to Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number(^1) in '000s</td>
<td>Index 1960=100</td>
<td>Value(^1) Million 1972 Cr$</td>
<td>Index 1960=100</td>
</tr>
<tr>
<td>1960</td>
<td>231</td>
<td>100</td>
<td>3,103</td>
<td>100</td>
</tr>
<tr>
<td>1961</td>
<td>285</td>
<td>123</td>
<td>3,369</td>
<td>109</td>
</tr>
<tr>
<td>1962</td>
<td>441</td>
<td>190</td>
<td>4,498</td>
<td>145</td>
</tr>
<tr>
<td>1963</td>
<td>549</td>
<td>237</td>
<td>3,299</td>
<td>127</td>
</tr>
<tr>
<td>1964</td>
<td>771</td>
<td>334</td>
<td>5,010</td>
<td>161</td>
</tr>
<tr>
<td>1965</td>
<td>666</td>
<td>288</td>
<td>3,751</td>
<td>121</td>
</tr>
<tr>
<td>1966</td>
<td>856</td>
<td>371</td>
<td>4,652</td>
<td>150</td>
</tr>
<tr>
<td>1967</td>
<td>1,029</td>
<td>445</td>
<td>5,739</td>
<td>185</td>
</tr>
<tr>
<td>1968</td>
<td>1,500</td>
<td>649</td>
<td>7,036</td>
<td>227</td>
</tr>
<tr>
<td>1969</td>
<td>1,145</td>
<td>496</td>
<td>11,119</td>
<td>358</td>
</tr>
<tr>
<td>1970</td>
<td>1,191</td>
<td>515</td>
<td>13,003</td>
<td>419</td>
</tr>
<tr>
<td>1971</td>
<td>1,253</td>
<td>542</td>
<td>15,122</td>
<td>487</td>
</tr>
<tr>
<td>1972</td>
<td>1,266</td>
<td>548</td>
<td>18,669</td>
<td>602</td>
</tr>
</tbody>
</table>

SOURCE:

\(^1\)Various Central Bank of Brazil reports. Figures reflect number and value of new loans made during the year.

\(^2\)Total credit is equal to the domestic-credit-claims-on-private sector figure published by International Monetary Fund in International Financial Statistics. Data were adjusted to 1972 prices using the General Price Index for aggregate supply published by the Getulio Vargas Foundation.

\(^3\)Conjuntura Economica, Vol. 25, No. 9 (August 1971) pp. 107-111. Data were adjusted to 1972 prices using the Price Index cited in Note 2.

*Projected from the 1968 figure by compounding a seven percent growth rate.
increase in the ratios of agricultural-credit-to-total credit and credit-to-output in agriculture during the period under study.

**Agricultural Credit Policies and Programs**

The Rural Credit Law of 1965 was an attempt to further expand the coverage of the existing rural financial market in Brazil. Through this law the non-governmental banks were forced to become more aggressive participants in the agricultural credit market. The Rural Credit Law of 1965 specified four basic policy objectives: (1) to stimulate farm investments, (2) to provide additional working capital to farmers, (3) to strengthen the economic position of farmers, particularly small and medium sized farmers and (4) to encourage the use of modern technology in agriculture.

The law requires that the commercial banks commit to agricultural loans at least ten percent of bank deposits. The law further states that rate of interest on agricultural loans should not be more than 75 percent of rates charged on normal commercial loans. This has resulted in negative real rate of interest. Furthermore, the interest rate on small loans has been fixed below the interest rate charged on large loans. One would expect the restrictive provisions of the rural credit

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legislation to have encouraged banks to concentrate their agricultural lending in a few large, short-term loans.

Credit Allocation System

The Central Bank establishes general guidelines for distribution of rural credit, but individual banks usually determine their internal policies so that they are consistent with their specific objectives. Three basic steps are taken by the bank in advancing individual agricultural loans to avert risk. First the bank tries to get detailed information about the borrower, his personal characteristics, assets, liabilities and sources of income. Second, during the process of completion of the loan application, the bank tries to assess the amount of loan needed, time of disbursement and payments. Finally the bank inspects a sample of its total portfolio to ascertain that the credit is being properly used.

Various forms of collateral are used to insure repayment of loans. Where the borrower has a strong net worth position, the crop, livestock or machinery can serve as the collateral. In other cases, a mortgage may be taken against other unencumbered property. If the bank feels that the collateral offered is still insufficient, a borrower may get a co-signer who will be responsible for repayment in the event of default.
In addition to objective criteria, some subjective considerations are probably used in making credit allocation decisions. Some banks, for example, loan up to 60 percent of the expected value of production based on quite low expected yields in order to reduce their risks. On some other types of loans, credit may be extended for up to 60 percent of the value of the collateral. In many cases, a good co-signer can compensate for the borrower's weak net worth position or poor loan repayment history.

**Definitions Of Variables**

To test the hypotheses laid down in Chapter I, a number of variables and terms must be defined. This is followed by a discussion of analytical techniques used to measure the patterns of credit allocation and use.

1. **Terms:**

   **Cruzeiros** (Crs): The cruzeiro is the monetary unit of exchange in Brazil; its exchange value in 1965 was about U.S. $.50 and U.S. $.23 in 1969.

   **Hectare**: A hectare is a land measure used in Brazil. One hectare is equal to 2.47 acres.

   **Formal or Institutional Credit**: Formal or institutional credit is that granted by banks and officially recognized cooperatives.
Informal or Non-institutional Credit: Informal or non-institutional credit is that granted by merchants, dealers, friends, relatives, etc.

Cash Loan: Cash loan is that granted in cash by formal and informal sources.

Kind Loan: Kind loan is that granted in kind such as seeds, fertilizers, etc. It is generally granted by the informal sources.

Solvency Ratios: Solvency ratios are the indicators of a farm firm's ability to meet its credit obligations. A lender can judge from the solvency ratios the problems he is going to face in recovering the loans if the business fails. Some of the solvency ratios used are:

(a) Equity Ratio: Equity ratio measures the ratio of owner equity to total value of assets. Therefore,

\[ \text{Equity ratio} = \frac{\text{Owner equity}}{\text{Total value of assets}} \]

(b) Debt: Asset Ratio: Debt: asset ratio measures the farm firm's total obligation to creditors as a ratio of the assets of the owner.

\[ \text{Debt: asset ratio} = \frac{\text{Total debt}}{\text{Total assets}} \]

Efficiency Ratios: Efficiency ratios are the indicators of the organizational and managerial capabilities of the farm operator. These ratios provide some information to the lenders about the safety of their loans. Some of
the efficiency ratios used are:

(a) **Turnover Ratio**: This measures the ratio of gross cash farm income per year to total assets. The higher the ratio, the greater is the turnover of assets.

\[
\text{Turnover ratio} = \frac{\text{Gross cash farm income}}{\text{Total assets}}
\]

(b) **Operating Ratio**: This measures the ratio of operating expenses to gross cash farm income.

\[
\text{Operating ratio} = \frac{\text{Operating expenses}}{\text{Gross cash farm income}}
\]

(c) **Operating Expenses: Debt Ratio**: It measures the ratio of operating expenses to total debt.

\[
\text{Operating expenses: Debt ratio} = \frac{\text{Operating expenses}}{\text{Total debt}}
\]

(d) **Investment Expenses: Debt Ratio**: It measures the ratio of investment expenses to total debt.

\[
\text{Investment expenses: Debt ratio} = \frac{\text{Investment expenses}}{\text{Total debts}}
\]

(e) **Investment Expenses: Gross Cash Farm Income Ratio**: This ratio measures the ratio of investment expenses to gross cash farm income.

\[
\text{Investment expenses: Gross cash farm income ratio} = \frac{\text{Investment expenses}}{\text{Gross cash farm income}}
\]
2. Variables

The variables included in the analysis are divided into seven general categories: land, operating expenses, investment expenses, gross cash farm income, farm assets, net worth and credit-used.

**Land:** Owned land is used as a proxy for the overall economic well being of an operator. It is stated in hectares. Owned land is considered to be one of the important factors influencing the allocation of institutional credit in particular and non-institutional in general. Owned land is thought to be an important measure of credit worthiness of the borrower.

**Operating Expenses:** Operating expenses, used as a variable to explain use of credit, include crop costs, machine costs, livestock expenses, and wages of hired labor. Crop costs include cost of fertilizer, crop insurance, marketing costs, and cost of insecticides. Machine costs consist of machinery repairs, cost of machine hire, and fuel and insurance charges. Livestock expenses include purchases of feeds, livestock minerals, medication and marketing costs. Labor charges include the wages paid to hired labor.

**Investment Expenses:** Investment expenses consist of the actual amounts spent for acquiring farm assets, during the year. These expenses include the money spent on
land, buildings, livestock and farm equipment.

**Gross Cash Farm Income**: Gross cash farm income represents the sum of cash value of receipts from the sale of crops, livestock, livestock products, and hiring out of machinery.

**Farm Assets**: Farm assets include current market value of the total owned assets in land and construction, livestock, and farm machinery. Farm assets are considered to be a good proxy for the size of the farm firm and also a rough index of permanent income and credit worthiness of the borrower.

**Net Worth**: Net worth consists of total farm assets minus the outstanding debt at the end of the year.

**Credit Used**: Credit used is the sum total of the outstanding balance of credit at the end of the year plus the payments made on loan principal during the year.

3. **Analytical Techniques**

First, **Tabular analysis** is used to compare the number and value of loans received from institutional and non-institutional sources. It is next used to compare the farm characteristics of borrowers of credit with institutional and non-institutional sources, to compare the farm characteristics of borrowers and non-borrowers,
and to compare the changes in supply of credit from different sources over time.

**Gini Indexes of Concentration analysis** is the second analytical technique used. This technique is employed to measure the credit allocation and its degree of concentration among various farm sizes. Gini Indexes of Concentration are derived from the Lorenz Curve. Although this measure of inequality is subject to criticism since it is based on unrealistic standard of either perfect equality (Lorenz Curve) or perfect inequality (Gini Index of Concentration), yet the choice of the Lorenz Curve (or Gini Index of Concentration) is preferred due to the fact that it does not depend on any distribution assumption. Therefore, it is more convenient to compute.

The Gini Index of Concentration (GIC) is the proportion of the total area under the diagonal that is between the diagonal and the Lorenz Curve. This relationship is expressed as follows, using the notations found in Figure 5.
FIGURE 5. Illustrative Example Showing Computation of Gini Index Of Concentration

\[ \text{GIC} = \frac{A}{A + B} = \frac{\text{Area Between curve and diagonal}}{\text{Area under diagonal}} \]

Since the cumulative percents on each axis add to 100, the area under the entire square is 1 and the area under the diagonal is 1/2. Therefore, by rewriting the above expression we get

\[ \text{GIC} = \frac{1}{2} - \frac{\text{area under curve}}{1/2} = 1 - 2 \left( \text{area under curve} \right) \]

It is assumed that the curve between any two points is approximated by a straight line, hence the area for any segment of the curve can be expressed as follows:

\[ (f_{i+1} - f_i) \frac{(y_i + y_{i+1})}{2} \]

when summed up over all intervals, the area under the curve is

\[ \sum_{i=1}^{k} (f_{i+1} - f_i) \frac{(y_i + y_{i+1})}{2} \]

and substituting this in the expression for GIC above yields the formula that is used in computing the Gini Index of Concentration.

\[ \text{GIC} = 1 - \sum_{i=1}^{k} (f_{i+1} - f_i) (y_i + y_{i+1}) \]

*Graphic analysis* is the third analytical technique used to conceptualize the theoretical models of supply and demand function of agricultural credit reviewed under various restrictions imposed by government such as fixed interest rates and amount of loan to be advanced in developing countries like Brazil.
In the following chapters the results of the analysis on the data sets are presented. In Chapters V and VI the results of tabular and Gini Index of Concentration analyses are given and the results of analyses of all the data sets are summarized in Chapter VII.
CHAPTER V

ANALYSIS OF FARM CREDIT ALLOCATION IN 1965

In this study two sources of rural credit are analyzed: the non-institutional or informal sources, and the institutional or formal sources. In large part formal credit is granted in cash form, while informal credit is most commonly given in some physical form. In this study the non-institutional sources are defined as those which do not require written applications, which do not receive any savings deposits, which do not require membership, and which do not have policy making groups and offices. In Southern Brazil merchants, farmers, landlords, friends, relatives, and private money lenders constitute the major sources of non-institutional credit. The institutional sources are those which require written application forms, which receive savings deposits, which require membership and which have policy making groups and offices. Institutional credit sources are made up of private and public banks, and credit cooperatives.

In this chapter the following hypotheses are tested:

1. Non-institutional sources provide the major
portion of agricultural credit in Southern Brazil.

2. Farm characteristics influence the allocation of institutional and non-institutional credit, and

3. Non-borrowers and borrowers of agricultural credit have different farm characteristics.

This chapter is divided into four parts. First, the general economic characteristics of the units under analysis are discussed; second, the patterns of allocation of institutional and non-institutional credit are studied; third, the differences which exist between the borrowers of institutional and non-institutional credit are identified; and fourth, the differences which exist between the borrowers and non-borrowers are identified.

General Characteristics of the Units Under Analysis

a. Average Resource Level Per Farm

The 954 sample farms have been divided into 8 size groups on the basis of land owned by the operator. Table 3 presents details regarding the average resource position, level of capital intensity, gross farm income and credit used, along with standard deviations. Table 3 indicates that the average resource levels of farmers of first group are quite higher than those of the next two groups. These farms may be hog and poultry farms which require high
TABLE 3.--Various Economic Measures of Average Resource Levels in 95% Farms in Southern Brazil By Landownership Size Groups - 1965

<table>
<thead>
<tr>
<th>Item</th>
<th>0.0-9.9</th>
<th>10.0-19.9</th>
<th>20.0-29.9</th>
<th>30.0-45.9</th>
<th>50.0-99.9</th>
<th>100.0-199.9</th>
<th>200.0-499.9</th>
<th>500.0 and Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Farmers</td>
<td>12.5</td>
<td>197</td>
<td>191</td>
<td>165</td>
<td>169</td>
<td>55</td>
<td>53</td>
<td>59</td>
</tr>
<tr>
<td>Age of Farmers</td>
<td>44.7</td>
<td>44.5</td>
<td>44.5</td>
<td>44.5</td>
<td>44.5</td>
<td>52.4</td>
<td>59.1</td>
<td>42.8</td>
</tr>
<tr>
<td>Land Owned (Hectares)</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
<td>24.1</td>
</tr>
<tr>
<td>Operating Expenses (Cruzeiros)</td>
<td>1,668.9</td>
<td>433.6</td>
<td>433.6</td>
<td>433.6</td>
<td>433.6</td>
<td>2,499.2</td>
<td>4,603.3</td>
<td>17,710.3</td>
</tr>
<tr>
<td>Investment Expenses (Cruzeiros)</td>
<td>1,357.1</td>
<td>365.4</td>
<td>365.4</td>
<td>365.4</td>
<td>365.4</td>
<td>2,700.0</td>
<td>3,375.5</td>
<td>13,566.6</td>
</tr>
<tr>
<td>Gross Cash Agricultural Income (Cruzeiros)</td>
<td>3,066.7</td>
<td>1,168.3</td>
<td>1,356.7</td>
<td>1,356.7</td>
<td>1,356.7</td>
<td>4,137.8</td>
<td>4,869.3</td>
<td>10,186.5</td>
</tr>
<tr>
<td>Value of Inventory and Assets (Cruzeiros)</td>
<td>11,735.7</td>
<td>9,168.5</td>
<td>11,571.4</td>
<td>15,809.5</td>
<td>24,858.2</td>
<td>52,802.6</td>
<td>85,843.4</td>
<td>385,194.2</td>
</tr>
<tr>
<td>Credit Used (Cruzeiros)</td>
<td>2,179.0</td>
<td>508.8</td>
<td>639.0</td>
<td>965.9</td>
<td>2,358.0</td>
<td>4,683.6</td>
<td>5,156.4</td>
<td>13,622.5</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1965.

a One hectare is equal to 2.47 acres.

b Figures in the parentheses are the standard deviations of means.

Average value of credit used = Average value of outstanding balances on loans + Average value of principal repaid on loans during the year. Loans include both institutional and non-institutional credit.
investments. A perusal of Table 3 further reveals that the average age of the farmers in all the eight farm size groups in 1965 ranges between 43.4 to 51.4 years. The standard deviations of the respective means of age indicate that there is not much age variation among the farmers falling in each farm size. It also shows that there is not much age difference among the farmers falling in different farm size groups. Therefore, from the age point of view all the farmers appear to have the same age distribution. The average size of the owned farm ranges from 5.5 hectares to 1,424 hectares within each farm size there is not wide variation of land distribution. The standard deviations of means of other resources, such as operating expenses, investment expenses, gross cash agricultural income, inventory and assets and credit used, indicate that there is a wide variation of the distribution of these resources among the farmers of each farm size group. This indicates that there is uneven distribution of these resources among the farmers of each farm size.

b. **Total Resource Level**

The data in Table 4 reveals that 54 percent of the farmers have owned holdings of less than 30 hectares and own only 6 percent of the total land, whereas 46 percent of the farmers have owned holdings of more than 30 hectares.
<table>
<thead>
<tr>
<th>Item</th>
<th>0.0 - 9.9</th>
<th>10.0 - 19.9</th>
<th>20.0 - 29.9</th>
<th>30.0 - 49.9</th>
<th>50.0 - 99.9</th>
<th>100.0 - 199.9</th>
<th>200.0 - 499.9</th>
<th>500 and Over</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Farmers</td>
<td>125 (13.1)</td>
<td>127 (13.6)</td>
<td>120 (12.0)</td>
<td>165 (17.3)</td>
<td>169 (17.4)</td>
<td>55 (5.6)</td>
<td>59 (6.2)</td>
<td>59 (6.2)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>(Hectares)</td>
<td>1.5 (1.5)</td>
<td>2.0 (2.2)</td>
<td>2.0 (2.2)</td>
<td>4.0 (4.2)</td>
<td>4.0 (4.2)</td>
<td>1.5 (1.5)</td>
<td>1.5 (1.5)</td>
<td>1.5 (1.5)</td>
<td>2.0 (2.0)</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>205,163 (5.1)</td>
<td>68,334 (8.1)</td>
<td>81,005 (9.1)</td>
<td>117,379 (12.6)</td>
<td>200,759 (21.1)</td>
<td>139,937 (14.4)</td>
<td>341,077 (35.4)</td>
<td>1,004,666 (100)</td>
<td></td>
</tr>
<tr>
<td>(Crts)</td>
<td>(1.6)</td>
<td>(4.2)</td>
<td>(4.2)</td>
<td>(5.3)</td>
<td>(5.3)</td>
<td>(5.3)</td>
<td>(5.3)</td>
<td>(5.3)</td>
<td>(5.3)</td>
</tr>
<tr>
<td>Investment Expenses</td>
<td>144,976 (5.3)</td>
<td>71,979 (8.6)</td>
<td>93,950 (10.3)</td>
<td>144,182 (15.3)</td>
<td>176,251 (18.8)</td>
<td>76,591 (8.0)</td>
<td>160,121 (16.1)</td>
<td>2,124,110 (100)</td>
<td></td>
</tr>
<tr>
<td>(Crts)</td>
<td>(5.3)</td>
<td>(6.3)</td>
<td>(6.3)</td>
<td>(6.0)</td>
<td>(6.3)</td>
<td>(6.3)</td>
<td>(6.3)</td>
<td>(6.3)</td>
<td>(6.3)</td>
</tr>
<tr>
<td>Gross Total Actual</td>
<td>721,087 (3.7)</td>
<td>230,135 (2.6)</td>
<td>259,127 (2.7)</td>
<td>301,286 (3.2)</td>
<td>451,025 (4.7)</td>
<td>267,016 (2.8)</td>
<td>539,952 (5.5)</td>
<td>2,078,443 (100)</td>
<td></td>
</tr>
<tr>
<td>Income (Crts)</td>
<td>(5.1)</td>
<td>(5.8)</td>
<td>(5.8)</td>
<td>(6.0)</td>
<td>(6.0)</td>
<td>(6.0)</td>
<td>(6.0)</td>
<td>(6.0)</td>
<td>(6.0)</td>
</tr>
<tr>
<td>Value of Inventory</td>
<td>44,777 (1.6)</td>
<td>1,085,121 (3.1)</td>
<td>2,210,171 (3.0)</td>
<td>6,023,463 (6.0)</td>
<td>2,670,729 (2.8)</td>
<td>2,282,994 (2.4)</td>
<td>3,950,152 (3.8)</td>
<td>22,729,262 (100)</td>
<td></td>
</tr>
<tr>
<td>and Assets (Crts)</td>
<td>(3.6)</td>
<td>(4.4)</td>
<td>(4.4)</td>
<td>(4.8)</td>
<td>(4.8)</td>
<td>(4.8)</td>
<td>(4.8)</td>
<td>(4.8)</td>
<td>(4.8)</td>
</tr>
<tr>
<td>Credit '91</td>
<td>272,771 (100)</td>
<td>100,173 (3.1)</td>
<td>274,681 (3.0)</td>
<td>159,366 (3.1)</td>
<td>257,113 (3.0)</td>
<td>257,508 (3.0)</td>
<td>273,760 (3.0)</td>
<td>803,739 (3.0)</td>
<td>2,249,925 (100)</td>
</tr>
<tr>
<td>(Crts)</td>
<td>(12.1)</td>
<td>(4.3)</td>
<td>(3.6)</td>
<td>(7.2)</td>
<td>(11.8)</td>
<td>(11.5)</td>
<td>(12.2)</td>
<td>(35.7)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

**Sources:** Farm interviews conducted in 1965.

*Figures in the parentheses are percentages and have been rounded to one decimal place, hence the total may not add up to 100.

1 hectare is equal to 2.47 acres.

*Value of credit used = value of outstanding balances on loans + value of principal repaid on loans during the year. Loans include both institutional and non-institutional credit.
and own 94 percent of land. Farmers with owned holdings of less than 30 hectares incur 18 percent of the total operating expenses and 17 percent of investment expenses. These farmers contribute 19 percent of gross agricultural cash income. In light of the above information it may be inferred that although 54 percent of the farmers with owned holdings have only 6 percent of land, yet they are incurring proportionately more operating and investment expenses. At the same time they are contributing proportionately more gross agricultural cash income as compared to 46 percent farmers who own 94 percent land and contribute only 81 percent of gross agricultural cash income.

A perusal of Table 4 further indicates that gross farm inventory and assets are distributed almost in accordance with land distribution. However, the distribution of credit used among the eight size groups is somewhat different than the land distribution. The farmers with only 6 percent land use 22 percent of the credit as compared to farmers who own 94 percent of land and use only 78 percent of the credit. However, when this distribution of credit used is studied in the light of average resource distribution (Table 3) where it is found that standard deviations of means of credit used by the farmers of each size group are very high, it appears that there are a few farmers in each size group who use the bulk of the agricultural
credit. These farmers in each size group appear to have some special characteristics with respect to cash operating expenses, investment expenses, gross agricultural cash income, and gross farm inventory and assets as the standard deviations of the means of these variables are also very high. The study of Tables 3 and 4 leads to the conclusions: (a) there is a high degree of concentration of land ownership, (b) small farmers use less credit in proportion to their population and use more credit in proportion to their owned land, and (c) the wide variation of credit use among the farmers of each group indicates that in each size group of land holding there are farmers who are taking a large share of the agricultural credit. There appears to be a two way concentration of credit use. First, the large farms receive the major share of agricultural credit, and secondly, in each farm size group, there are a few farmers who take the major portion of the agricultural credit within that particular landownership size group.

Pattern of Allocation of Institutional and Non-institutional Credit

In this section, the hypothesis that the non-institutional sources provide the major portion of agricultural credit is tested. Table 5 again presents the distribution of units by landownership size, but this time by type of
TABLE 5.--Number and Percent of Farmers With Various Types of Loans By Landownership Size Groups - 954 Farms - Southern Brazil - 1965

<table>
<thead>
<tr>
<th>Landownership (hectares)</th>
<th>Number of Farmers</th>
<th>Number of Farmers With</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Formal Loans Only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>0.0 - 9.9</td>
<td>125</td>
<td>27</td>
</tr>
<tr>
<td>10.0 - 19.9</td>
<td>197</td>
<td>29</td>
</tr>
<tr>
<td>20.0 - 29.9</td>
<td>191</td>
<td>27</td>
</tr>
<tr>
<td>30.0 - 49.9</td>
<td>165</td>
<td>24</td>
</tr>
<tr>
<td>50.0 - 99.9</td>
<td>109</td>
<td>24</td>
</tr>
<tr>
<td>100.0 - 199.9</td>
<td>55</td>
<td>9</td>
</tr>
<tr>
<td>200.0 - 499.9</td>
<td>53</td>
<td>26</td>
</tr>
<tr>
<td>500.0 and Over</td>
<td>59</td>
<td>26</td>
</tr>
<tr>
<td>TOTAL</td>
<td>954</td>
<td>192</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1965.

- One hectare is equal to 2.47 acres.
- Formal credit is that granted by banks and officially recognized cooperatives.
- Informal credit is that granted by merchants, dealers, friends, relatives, etc.
credit used. Data in the table indicate that more than half (513) of 954 farms surveyed own less than 30 hectares of land and might be classed as small to medium sized farms. Almost one-third (336) of the 954 farms did not participate in any of the credit markets in 1965. A perusal of the table further indicates that almost half (288) of the 618 farmers participating in credit market were getting loans from both the institutional and non-institutional sources of credit. About one-third (192) of the 618 farmers are the recipients of formal credit only. Almost one-fifth (138) of the 618 farms using credit are getting their loans from the non-institutional lenders.

Table 6 shows the total number of loans and their values by farm size group and type of loans. Formal credit, value-wise, makes up about two-thirds of the credit used by all farmers. Nevertheless, the number of informal loans is greater than the number of formal loans. More than one-half (429) of 744 informal loans are held by the small farmers owning less than 30 hectares of land. Almost one-third (255) of the 669 formal loans were held by the same group of small farmers. Although the total amount of formal loans is greater than the amount of total informal loans, the number of formal loans is less than the number of informal loans. This means, of course, that the size of the average informal loan is smaller than the size of
### TABLE 6.—Number and Values of Various Types of Loans Held by Land Ownership Size Group, 954 Farms in Southern Brazil in 1965

<table>
<thead>
<tr>
<th>Landownership Size (Hectares)</th>
<th>Total Number of Loans</th>
<th>Total Value of Loans (Cruzeiros)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formal*</td>
<td>Informal*</td>
</tr>
<tr>
<td>0.0 - 9.9</td>
<td>74</td>
<td>95</td>
</tr>
<tr>
<td>10.0 - 19.0</td>
<td>89</td>
<td>142</td>
</tr>
<tr>
<td>20.0 - 29.9</td>
<td>92</td>
<td>192</td>
</tr>
<tr>
<td>30.0 - 49.9</td>
<td>99</td>
<td>131</td>
</tr>
<tr>
<td>50.0 - 99.9</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>100.0 - 199.9</td>
<td>43</td>
<td>36</td>
</tr>
<tr>
<td>200.0 - 499.9</td>
<td>62</td>
<td>25</td>
</tr>
<tr>
<td>500.0 and Over</td>
<td>127</td>
<td>42</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>649</td>
<td>744</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965.

*One hectare is equal to 2.47 acres.

*In 1965 two cruzeiros were equal to one U.S. dollar.

*Formal credit is that granted by banks and officially recognized cooperatives.

*Informal credit is that granted by merchants, dealers, friends, relatives, etc.

*Cash loan is that granted in cash by formal and informal sources.

*Kind loan is that granted in goods such as seeds, fertilizer, etc.
the average formal loan.

Gini Indexes of Concentration

The Gini Index of Concentration (calculated from Table 4) given in Table 7 indicates that the concentration of land distribution is quite high at .77. The cumulative percentages are worked out in the descending order of farm size groups, of credit used, land owned, cash operating expenses, investment expenses, gross farm inventory and assets and gross agricultural cash income. The Gini Indexes of Concentration are worked out for all the above mentioned variables with respect to the credit used. When the number of farmers is used as the measure of credit allocation, the Gini Index of Concentration is .46 which indicates that on the basis of farm population, the large farmers are getting proportionately more credit. However, if we use other measures of credit allocation, the position is changed. When the land owned is used as a measure of credit allocation, the Gini Index is .13, when investment expenses, gross farm inventory and assets, and gross farm cash income are used as measures of credit allocation, the respective Gini Indexes of Concentration are .12, .23, and .09 respectively. If the land distribution is taken as given, then the other resource variables such as operating expenses, investment expenses, gross farm cash income, and
<table>
<thead>
<tr>
<th>Item</th>
<th>Farmers and Landowned</th>
<th>Farmers and Credit Used</th>
<th>Land Owned and Credit Used</th>
<th>Operating Expenses and Credit Used</th>
<th>Investment Expenses and Credit Used</th>
<th>Assets and Credit Used</th>
<th>Cash Income and Credit Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Indexes</td>
<td>.77*</td>
<td>.46*</td>
<td>.34**</td>
<td>.13**</td>
<td>.12**</td>
<td>.23**</td>
<td>.09**</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965.

*Gini Indexes were calculated with respect to number of farmers, land and credit distribution in the ascending order of farm size.

**Gini Indexes were calculated with respect to land owned, operating expenses, investment expenses, inventory and assets, gross cash agricultural income and credit distribution in the descending order of farm size.
gross farm inventory and credit used may be considered almost equitably distributed. If, however, the farm population is taken as the basis for credit allocation then there appears to be concentration of credit allocation in favor of large farmers.

Data in Tables 6 and 7 indicate that the problem of credit allocation hinges around the problem of distribution of land which is heavily concentrated in favor of large farmers. The study of Tables 5, 6 and 7 shows that (a) informal loans are smaller than formal loans, (b) small farmers are importantly serviced by the informal credit market, (c) formal loans constitute the major portion of farm credit except in case of two farm size groups and (d) if farm population is considered as the base for measuring credit allocation then large farms have taken the major share of farm credit. If other measures such as land owned, operating expenses, etc., are used as measures of credit allocation, then credit is almost evenly distributed. Thus the study of Table 6 shows that generally formal sources provide a major portion of credit and hence the hypothesis that non-institutional sources provide a major part of agricultural credit in Brazil is rejected.
Characteristics of Borrowers of Institutional and Non-Institutional Agricultural Credit

In the following section the discussion is primarily directed to test the hypothesis that some farm characteristics influence the allocation of institutional and non-institutional agricultural credit.

Per Hectare Resource Level

Table 8 presents the per hectare use of various resources by the three categories of borrowers of agricultural credit. Data in the Table 8 indicate that the per hectare resources level is the highest in the case of borrowers of both institutional and non-institutional agricultural credit. The second position is secured by the borrowers of institutional agricultural credit only, and the last one by the borrowers of non-institutional agricultural credit only. Information in this table indicates that the farmers who have access to both the credit markets i.e. institutional and non-institutional, are better off from the point of view of availability and use of agricultural credit. Whereas, the farmers who depend only on the non-institutional sources of credit are worse off. The farmers who borrow from the institutional sources only, fall in between these two extremities.
<table>
<thead>
<tr>
<th>Items</th>
<th>Operating Expenses</th>
<th>Investment Expenses</th>
<th>Gross Agricultural Cash Income</th>
<th>Value of Inventory and Assets</th>
<th>Credit Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Institutional and non-institutional borrowers</td>
<td>24.2 (9.1) b</td>
<td>19.6 (3.1)</td>
<td>46.5 (14.3)</td>
<td>330.2 (102.4)</td>
<td>32.6 (13.5)</td>
</tr>
<tr>
<td>Institutional Borrowers Only</td>
<td>17.3 (3.9)</td>
<td>12.6 (5.2)</td>
<td>25.7 (5.3)</td>
<td>211.9 (67.9)</td>
<td>15.6 (3.9)</td>
</tr>
<tr>
<td>Non-Institutional Borrowers Only</td>
<td>9.3 (1.6)</td>
<td>7.5 (4.8)</td>
<td>18.8 (9.2)</td>
<td>254.1 (81.8)</td>
<td>20.3 (35.6)</td>
</tr>
<tr>
<td>t-statistics (Both institutional and non-inst. borrowers and inst. borrowers)</td>
<td>0.70</td>
<td>1.13</td>
<td>0.67</td>
<td>0.19</td>
<td>1.28***</td>
</tr>
<tr>
<td>t-statistics (Both inst. and non-inst. borrowers and non-inst. borrowers only)</td>
<td>1.62***</td>
<td>2.07*</td>
<td>1.28***</td>
<td>0.41</td>
<td>0.35</td>
</tr>
<tr>
<td>t-statistics (inst. Borrowers only and non-inst. borrowers only)</td>
<td>1.90**</td>
<td>0.72</td>
<td>0.82</td>
<td>0.23</td>
<td>0.13</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1965.

**In 1965 two cruzelros equal one U.S. dollar.

bFigures in parentheses are standard deviations of means.

*Significant at 5 percent level.

**Significant at 10 percent level.

***Significant at 20 percent level.
Perusal of Table 8 reveals that the borrowers from both institutional and non-institutional sources use more operating and investment expenses per hectare than the other two categories of borrowers. These expenses generate more income and accumulate more wealth per hectare. However, Table 8 indicates that the per hectare resource differences are not statistically significant in case of both institutional and non-institutional borrowers and institutional borrowers as well as in case of institutional borrowers only and non-institutional borrowers only.

Financial Ratios

Table 9 presents some of the measures of economic efficiency by the three classes of borrowers of agricultural credit.

Solvency Ratios: For the total sample of farmers the equity ratios range between .92 to .97. The borrowers from both institutional and non-institutional sources have the lowest equity ratio of .92 and the borrowers from the institutional source only, have the highest equity ratio of .97. The borrowers from the non-institutional sources only, have an equity ratio of .94. The study of these solvency ratios indicates that the borrowers from both institutional and non-institutional sources are under more
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Institutional and Non-institutional Borrowers</td>
<td>.92</td>
<td>.10</td>
<td>.14</td>
<td>.52</td>
<td>1.39</td>
<td>1.73</td>
<td>.42</td>
</tr>
<tr>
<td>Institutional Borrowers Only</td>
<td>.97</td>
<td>.05</td>
<td>.11</td>
<td>.99</td>
<td>.90</td>
<td>1.23</td>
<td>.36</td>
</tr>
<tr>
<td>Non-institutional Borrowers Only</td>
<td>.94</td>
<td>.07</td>
<td>.09</td>
<td>.38</td>
<td>2.18</td>
<td>2.70</td>
<td>.30</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965.

- a. Equity Ratio = \frac{Owner equity}{Total value of assets}
- b. Debt to Asset Ratio = \frac{Total liabilities}{Total assets}
- c. Turn-over Ratio = \frac{Gross cash income}{Total value of assets}
- d. Operating Expenses to Gross Farm Cash Income Ratio = \frac{Operating expenses}{Gross farm cash income}
- e. Debt to Operating Expenses Ratio = \frac{Total liabilities}{Operating expenses}
- f. Debt to Investment Expenses Ratio = \frac{Total liabilities}{Investment expenses}
- g. Investment to Gross Farm Cash Income Ratio = \frac{Investment expenses}{Gross farm cash income}
debts relatively than the borrowers from institutional or non-institutional sources. Borrowers from both the institutional and non-institutional sources have a net worth of .92 cruzeiro for every one cruzeiro of total assets, and .10 cruzeiro of debts for every one cruzeiro of total assets. The borrowers of non-institutional credit have .94 cruzeiro of net worth for every one cruzeiro of gross assets and .07 cruzeiro of debt for every one cruzeiro of gross assets. The borrowers of institutional credit have .97 cruzeiro of net worth for every one cruzeiro of gross assets, and .05 cruzeiro of debt for every one cruzeiro of total assets. The solvency ratios, which are the indices of the credit worthiness of the borrowers, are quite high. This shows that on the average the borrowers are not heavily in debt in comparison to their assets. But comparatively speaking the borrowers from both the credit markets i.e. institutional and non-institutional, are under more debt than the borrowers from either institutional or non-institutional credit markets.

Efficiency Ratios: As is also shown in Table 9, the turn-over ratio varies between .09 and .14. The borrowers from both credit markets have the highest turn-over ratio of .14 and the borrowers from the non-institutional resources have the lowest turn-over ratio of .09. The
borrowers from institutional sources have an average turnover ratio of .11. The borrowers from both the credit markets have an operating ratio of .52 and the borrowers from the non-institutional credit market have the operating ratio of .38. The institutional borrowers have an operating ratio of .49. The operating ratios indicate that the borrowers from both markets spend more money on operating expenses per cruzeiro of farm cash income as compared to other two categories of borrowers. The debt operating expenses and debt investment expenses ratios are the highest in the case of the non-institutional borrowers. These borrowers have 2.18 and 2.70 cruzeiros of loan per one cruzeiro of operating and investment expenses, respectively. The overall indication of these two ratios is that all the categories of borrowers have a high amount of debt per one cruzeiro of operating and investment expenses. The investment income ratio is also the highest (.42) among borrowers from both credit markets and is the lowest (.30) in case of borrowers from the non-institutional credit market. The efficiency ratios indicate that the borrowers from both the credit markets and from the institutional sources only, are comparatively better off farmers than the borrowers from the non-institutional sources of credit.

The above discussion indicates that borrowers from non-institutional sources are relatively less well off
farmers than the borrowers of the other two categories. This shows that the farmers belonging to the three categories of borrowers have different farm characteristics. In the following sections the statistical significance of these differences is tested. The null hypothesis $H_0$: $\bar{X}_{1i} = \bar{X}_{2i}$ is tested against the alternative hypothesis $H_a$: $\bar{X}_{1i} > \bar{X}_{2i}$ where $\bar{X}_{1i}$ is the mean value of $i$th variable of institutional borrowers and $\bar{X}_{2i}$ is the mean value of $i$th variable of non-institutional borrowers. The alternate hypothesis is based on the assumption that the institutional borrowers are comparatively well off farmers than the non-institutional borrowers.

Test of Hypothesis

(a) **Institutional and Non-institutional Borrowers**

The data in Table 10 shows that the borrowers from institutional sources are younger than the borrowers from the non-institutional sources. The age difference is statistically significant. The mean values of other resources of the borrowers from the institutional sources are higher than the corresponding mean values of the resources of the borrowers from the non-institutional sources. The differences of mean values of the resources of these two categories of borrowers are statistically
TABLE 10.—Average Resource Level of Institutional and Non-institutional Borrowers of Agricultural Credit - Southern Brazil - 1965

<table>
<thead>
<tr>
<th>Items</th>
<th>Number of Farmers</th>
<th>Age of Farmers (Years)</th>
<th>Land Owned (Hectares)</th>
<th>Operating Expenses (Cr$)</th>
<th>Investment Expenses (Cr$)</th>
<th>Gross Cash Income (Cr$)</th>
<th>Inventory and Assets (Cr$)</th>
<th>Credit Used (Cr$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Institutional and Non-Inst. Borrowers</td>
<td>288</td>
<td>42.7</td>
<td>116.6</td>
<td>2,819.8</td>
<td>2,866.7</td>
<td>5,417.2</td>
<td>39,399.4</td>
<td>3,911.1</td>
</tr>
<tr>
<td>Institutional Borrowers</td>
<td>192</td>
<td>43.9</td>
<td>288.4</td>
<td>4,997.4</td>
<td>3,637.7</td>
<td>10,286.1</td>
<td>85,816.8</td>
<td>4,409.9</td>
</tr>
<tr>
<td>Non-Inst. Borrowers</td>
<td>138</td>
<td>47.2</td>
<td>92.4</td>
<td>856.8</td>
<td>691.8</td>
<td>2,331.2</td>
<td>26,185.5</td>
<td>1,870.4</td>
</tr>
</tbody>
</table>

| t-statistics                 |                   |                        |                        |                          |                          |                          |                            |                   |
| (Institutional Borrowers only and Both Inst. and Non-Inst. Borrowers) | 1.1^*            | 3.15**                 | 2.47*****              | 2.10********             | 3.41****                 | 1.70********             | 3.84**                     | .70               |
| (Non-Institutional Borrowers only and Both Inst. and Non-Inst. Borrowers) | 3.75             | .78                    | 3.72*                  | 3.45*                    | 3.67*                    | 1.60******              | 3.04**                     |                   |
| (Institutional Borrowers only and Non-Institutional Borrowers only) | 2.63***         | 3.50*                  | 4.95*                  | 4.00*                    | 4.15*                    | 3.60*                    | 3.38*                      |                   |

SOURCE: Farm interviews conducted in 1965.

^Figures in the parentheses are the standard deviations of means.

^Significant at .1 percent level.
**Significant at .5 percent level.
***Significant at 1 percent level.
****Significant at 2 percent level.
*****Significant at 10 percent level.
significant. However, it may be noted that these mean values may be concealing some important features of credit distribution. As was previously noted, the large standard deviations of the means indicate that there is a wide variation in the distribution of these resources among the farmers in each class of borrowers. A study of Table 10 shows that the borrowers of the non-institutional credit are smaller farmers than the borrowers of institutional credit. This may lead to the conclusion that the relatively old, small and poor farmers have easier access into the local non-institutional credit market, in contrast to their access to the institutional credit market.

(b) Institutional Only And Both Institutional And Non-institutional Borrowers

There is no statistically significant age difference between the borrowers from institutional sources on one hand and the institutional and non-institutional borrowers on the other hand (Table 10). The borrowers of both institutional and non-institutional credit are relatively small farmers as compared to the borrowers of institutional credit. Consequently the mean values of all the resource variables are less than the corresponding mean values of resource variables of the borrowers of institutional credit. These differences are statistically significant
except in the case of credit used by the farmers of the two classes of borrowers. The borrowers from both the markets are smaller farmers than the borrowers from the institutional credit market only, yet the average amount of credit used is almost the same. From this one might conclude that farmers who have access to both credit markets may be in an advantageous position from the point of view of credit availability (Table 8) and that credit availability is positively related with the number of sources of credit used.

(c) Non-institutional Only And Both Institutional And Non-institutional Borrowers

The borrowers of non-institutional credit only are older than the borrowers of both the institutional and non-institutional credit (Table 10). The age difference is statistically significant. Although the non-institutional borrowers are relatively small farmers, but the land difference is not statistically significant. The means of other resource variables are higher in case of the borrowers of both institutional and non-institutional credit than the corresponding means of resource variables of users of non-institutional credit only. The mean differences are statistically significant (Table 10).

When the results shown in Tables 8 - 10 are studied
together the following conclusions may be drawn: (a) the borrowers of institutional credit are larger and better off farmers than the borrowers of other two categories, (b) the borrowers of non-institutional credit are older and poorer farmers, (c) the borrowers of both institutional and non-institutional credit are relatively well off farmers than the non-institutional borrowers, and use more credit per hectare and (d) the borrowers of non-institutional credit and the borrowers of both institutional and non-institutional credit have almost the same amount of land on the average.

These results show (Tables 8 - 10) that the borrowers of credit from different sources of credit belong to different farm populations. Thus in view of the above analysis and tests, the hypothesis that the farm characteristics influence the participation of institutional and non-institutional borrowers in credit market is accepted.

**Characteristics of Borrowers and Non-Borrowers of Agricultural Credit**

In this section the discussion is mainly focused on the hypothesis that the borrowers and non-borrowers of agricultural credit have different farm characteristics.
Average Resource Level:

Table 11 presents the average resource level of borrowers and non-borrowers of agricultural credit. The data in the table indicate that the borrowers have higher average amounts of land owned, operating expenses, investment expenses, gross farm inventory and assets and gross cash farm income than those of the non-borrowers. However, the borrowers have lower average age than non-borrowers. The following hypothesis is tested with respect to the averages of age, land owned, operating expenses, investment expenses, gross cash farm income and gross farm inventory and assets.

\[ H_0: \bar{X}_{1i} = \bar{X}_{2i} \]

\[ H_a: \bar{X}_{1i} \neq \bar{X}_{2i} \]

The t-statistics is used to test the above hypothesis.

\[ t = \frac{\bar{X}_{1i} - \bar{X}_{2i}}{\sqrt{\frac{s^2_{1i}}{N_1} + \frac{s^2_{2i}}{N_2}}} \]

\( \bar{X}_{1i}, s^2_{1i}, N_1 \) represent the mean values and variances of the ith resource variables and number of borrowers of agricultural credit, respectively. Whereas \( \bar{X}_{2i}, s^2_{2i} \) and \( N_2 \) stand for mean values, and variances of ith resource variable and number of the non-borrowers of agricultural credit, respectively.
TABLE 11.—Average Resource Level of Borrowers and Non-borrowers of Agricultural Credit - 954 Farms - Southern Brazil, 1965

<table>
<thead>
<tr>
<th>Items</th>
<th>Number of Farmers</th>
<th>Average Age of Farmer (yr.)</th>
<th>Land Owned (Hectares)</th>
<th>Operating Expenses (Crs)</th>
<th>Investment Expenses (Crs)</th>
<th>Gross Cash Income (Crs)</th>
<th>Inventory and Assets (Crs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowers</td>
<td>618</td>
<td>44.1&lt;sup&gt;a&lt;/sup&gt; (0.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>164.6</td>
<td>3,058.0</td>
<td>2,341.0</td>
<td>6,199.0</td>
<td>52,143.5</td>
</tr>
<tr>
<td>Non-borrowers</td>
<td>336</td>
<td>49.4 (0.7)</td>
<td>85.3</td>
<td>700.2</td>
<td>673.3</td>
<td>1,995.8</td>
<td>26,768.9</td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrowers</td>
<td>6.19*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-borrowers</td>
<td>3.14**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Cash</td>
<td>6.66*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-statistics</td>
<td>4.69*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Cash</td>
<td>5.70*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-statistics</td>
<td>3.90*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Farm interview conducted in 1965.

<sup>a</sup>Figures in the parentheses are the standard deviations of the means.

<sup>*<sup>t-statistics are significant at .1 percent level of significance.

<sup>**<sup>t-statistics are significant at .5 percent level of significance.
On the basis of the data in Table 11, the null hypothesis is rejected and the alternative hypothesis is accepted. t-statistics are significant at .1 and .5 percent level of significance. One might conclude that non-borrowers do not participate in the credit market due to one or more of the following factors: (1) Lending agencies both institutional and non-institutional hesitate to lend to the poor farmers. (2) These poor farmers are not willing to borrow because they want to avoid the risks of borrowing. (3) The non-borrowers may not have any investment opportunities. (4) Or, that the non-borrower may be able to finance adequately his own needs. The present study does not provide sufficient information to substantiate any or all of the above mentioned reasons.

Per Hectare Resource Level

Per hectare distribution of resource level of borrowers and non-borrowers is quite different (Table 12). The per hectare resource level is low in case of non-borrowers as compared to borrowers. This supports the results of Table 11, i.e. the non-borrowers are comparatively poorer farmers than the borrowers.

The study of Tables 11 and 12 leads to the following conclusions: (1) the borrowers of agricultural credit are
### TABLE 12.--Per Hectare Resource Level of Borrowers and Non-borrowers of Agricultural Credit - 954 Farms - Southern Brazil - 1965

<table>
<thead>
<tr>
<th>Items</th>
<th>Number of Farmers</th>
<th>Operating Expenses&lt;sup&gt;a&lt;/sup&gt; (Cruzeiro=Crs)</th>
<th>Investment Expenses (Crs)</th>
<th>Gross Cash Farm Income (Crs)</th>
<th>Inventory and Assets (Crs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowers</td>
<td>618</td>
<td>18.6&lt;sup&gt;b&lt;/sup&gt; (3.2)</td>
<td>14.2 (3.0)</td>
<td>37.7 (6.3)</td>
<td>317.1 (20.5)</td>
</tr>
<tr>
<td>Non-borrowers</td>
<td>336</td>
<td>8.2 (1.4)</td>
<td>7.9 (2.3)</td>
<td>23.3 (3.3)</td>
<td>313.0 (25.2)</td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td>2.97*</td>
<td>1.85***</td>
<td>2.03**</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965.

<sup>a</sup>Two cruzeiros were equal to one U.S. dollar in 1965.

<sup>b</sup>Figures in the parentheses are the standard deviations of means.

*Significant at .5 percent level.

**Significant at 5 percent level.

***Significant at 10 percent level.
younger than the non-borrowers, (2) the borrowers of agricultural credit are economically better off than the non-borrowers, and (3) the borrowers and non-borrowers belong to different farm populations.

On the basis of the above facts the hypothesis that the borrowers and non-borrowers of agricultural credit have different farm characteristics is accepted.

In Chapter VI the analysis of credit allocation is presented for 1969 data as well as panel data of 1965 and 1969. This analysis attempts to see whether there has been any change over time in the pattern of credit allocation in view of the fact that there has been massive increase in formal credit (Table 2).
CHAPTER VI

ANALYSIS OF CHANGES IN FARM CREDIT ALLOCATION

This chapter deals with the analysis of data which were collected in 1969 and the panel data collected in 1965 and 1969. Seven hundred and thirty-two farms were interviewed in 1969 in the states of Santa Caterina and Rio Grande do Sul. Out of these, 338 farms had been previously interviewed in 1965.

Analysis of 1969 Data

The data for 732 farms interviewed in 1969 were analyzed to test the following hypotheses and to make some partial comparison with the results of the 1965 analysis.

1. The non-institutional sources are the major suppliers of agricultural credit.

2. Farm characteristics influence allocation of institutional and non-institutional credit.

3. Non-borrowers and borrowers of agricultural credit have different farm characteristics.
4. The major farm level characteristics associated with credit use or non-use were the same in 1969 as they were in 1965.

General Features

a. Average Resource Level Per Farm

A study of Table 13 shows that the average age of the farmers in all the eight farm size groups in 1969 ranges between 41 to 56 years. The standard deviations of the respective means indicate that there is not much age variation among the farmers falling in each farm size, except in the size group of 500 hectares and over. Therefore, from the age point of view all the farmers in each farm size appear to have same age distribution. The standard deviations of other resources than land indicate that there is uneven distribution of these resources among the farmers of each farm size, although there is not a wide variation in land distribution in case of respective farm size groups. These results are similar to those reported for the 1965 data (Table 3).

b. Total Resource Level Per Farm

The study of Table 14 shows that 57 percent of the farmers own holdings of less than 30 hectares, and also
<table>
<thead>
<tr>
<th>Item</th>
<th>Farm Size in Hectares(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0-9.9</td>
</tr>
<tr>
<td>Number of Farmers</td>
<td>90</td>
</tr>
<tr>
<td>Age of Farmers</td>
<td>(11.2)</td>
</tr>
<tr>
<td>Land Owned (hectares)</td>
<td>(1.6)</td>
</tr>
<tr>
<td>Operating Expenses (Cra/hares)</td>
<td>7.937.5</td>
</tr>
<tr>
<td>Investment Expenses (Cra)</td>
<td>7.877.5</td>
</tr>
<tr>
<td>Agricultural Income (Cra)</td>
<td>(6.228.7)</td>
</tr>
<tr>
<td>Value of Inventory</td>
<td>29.793.2</td>
</tr>
<tr>
<td>and Assets (Cra)</td>
<td>(6.228.7)</td>
</tr>
<tr>
<td>Credit Used (Cra)</td>
<td>3.093.1</td>
</tr>
</tbody>
</table>
| \(^a\)Figures in parentheses are the standard deviations of the mean. \(^b\)One hectare equals 2.47 acres. \(^c\)Averages are based on one U.S. dollar. \(^d\)Average value of credit used = average value of outstanding balances on loans + average value of principal repaid on loans during the year. Loans include both institutional and non-institutional credit.

**Source:** Farm interviews conducted in 1969.
that this group owns only 16 percent of the total land. At the same time 43 percent of farmers own holdings of more than 30 hectares and own 84 percent of the land in 1969. Farmers with owned holdings of less than 30 hectares incurred 18 percent of the operating expenses and 21 percent of the investment expenses. These farmers contributed 20 percent of the gross agricultural cash income. In light of the above information it may be inferred that although 57 percent of the farmers have only 16 percent of the land, yet they are incurring proportionately more operating and investment expenses. At the same time they are contributing proportionately more gross agricultural cash income as compared to 43 percent farmers who own 84 percent of the land and contribute 80 percent of gross agricultural cash income.

A perusal of Table 14 further indicates that gross farm inventory and assets are almost distributed in accordance with land distribution. This is less true with credit. The farmers with 16 percent of the land use 24 percent of credit, as compared to farmers who own 84 percent of land and use 76 percent of credit. However, the high standard deviations of the (Table 13) credit used by the farmers of each farm size group indicate that the distribution of credit (Table 14) is highly skewed. As
### Table 14. -- Total Resource Level by Farm Size - 732 Farms - Southern Brazil - 1969

<table>
<thead>
<tr>
<th>Item</th>
<th>0.0 - 9.9</th>
<th>10.0 - 19.9</th>
<th>20.0 - 29.9</th>
<th>30.0 - 49.9</th>
<th>50.0 - 99.9</th>
<th>100.0 - 199.9</th>
<th>200.0 - 499.9</th>
<th>500 and Over</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Farmers</td>
<td>404 (12.3)</td>
<td>267 (22.8)</td>
<td>162 (17.9)</td>
<td>111 (15.2)</td>
<td>44 (6.0)</td>
<td>16 (2.2)</td>
<td>11 (1.5)</td>
<td>732 (100)</td>
<td></td>
</tr>
<tr>
<td>Land Owned (Hectares)</td>
<td>501 (1.2)</td>
<td>2,377 (5.9)</td>
<td>3,926 (9.2)</td>
<td>4,291 (12.1)</td>
<td>7,340 (18.6)</td>
<td>5,490 (12.1)</td>
<td>4,912 (12.1)</td>
<td>10,911 (13.9)</td>
<td>40,209 (103)</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>322,772 (5.3)</td>
<td>345,061 (5.7)</td>
<td>462,081 (7.6)</td>
<td>667,076 (10.9)</td>
<td>1,449,753 (22.6)</td>
<td>1,377,292 (22.6)</td>
<td>684,129 (12.2)</td>
<td>785,070 (12.9)</td>
<td>6,094,313 (103)</td>
</tr>
<tr>
<td>Investment Expenses</td>
<td>473,475 (8.7)</td>
<td>293,729 (5.5)</td>
<td>420,792 (7.7)</td>
<td>580,131 (10.6)</td>
<td>966,779 (17.7)</td>
<td>1,071,109 (17.7)</td>
<td>665,710 (11.2)</td>
<td>1,046,110 (19.2)</td>
<td>5,479,214 (103)</td>
</tr>
<tr>
<td>Gross Cash</td>
<td>359,147 (5.4)</td>
<td>621,797 (5.9)</td>
<td>909,532 (7.3)</td>
<td>1,238,317 (10.7)</td>
<td>2,590,756 (20.5)</td>
<td>2,178,640 (16.3)</td>
<td>1,112,041 (11.0)</td>
<td>1,312,392 (12.4)</td>
<td>10,552,728 (103)</td>
</tr>
<tr>
<td>Agricultural Income</td>
<td>4,005,182 (8.2)</td>
<td>4,661,773 (11.6)</td>
<td>6,616,160 (13.5)</td>
<td>9,612,278 (19.6)</td>
<td>7,990,786 (16.3)</td>
<td>5,936,018 (16.3)</td>
<td>7,886,013 (16.1)</td>
<td>40,911,057 (103)</td>
<td></td>
</tr>
<tr>
<td>Value of Inventory</td>
<td>2,226,674 (4.5)</td>
<td>3,405,182 (8.2)</td>
<td>5,661,773 (11.6)</td>
<td>6,616,160 (13.5)</td>
<td>9,612,278 (19.6)</td>
<td>7,990,786 (16.3)</td>
<td>5,936,018 (16.3)</td>
<td>7,886,013 (16.1)</td>
<td>40,911,057 (103)</td>
</tr>
<tr>
<td>Credit Used (Crts)</td>
<td>575,141 (5.9)</td>
<td>505,257 (5.2)</td>
<td>1,227,430 (12.6)</td>
<td>957,508 (12.8)</td>
<td>2,282,022 (25.3)</td>
<td>2,472,429 (25.3)</td>
<td>926,705 (9.5)</td>
<td>822,077 (8.6)</td>
<td>9,773,726 (103)</td>
</tr>
</tbody>
</table>

**Source:** Farm interviews conducted in 1969.

---

*Figures in parentheses are the percentages and have rounded to one decimal place, hence the total may not add up to 100.

*One hectare is equal to 2.47 acres.

*6.97 croutres are equal to one U.S. dollar.

*Value of credit used = value of outstanding balance on loans + value of principal repaid on loans during the year. Loans include both institutional and non-institutional credit.
in 1965 it appears there are few farmers in each farm size group who use the major portion of the agricultural credit. These farmers in each farm size group appear to have some special farm characteristics with respect to operating expenses, investment expenses, gross agricultural cash income and farm inventory and assets because the standard deviations of the means of these variables are very high.

**Pattern of Allocation of Institutional And Non-institutional Credit**

As is clear from Table 15, about 60 percent (419) of the 732 farms interviewed were small to medium sized units. That is they owned less than 30 hectares of land. A little more than 40 percent (313) of the farms owned more than 30 hectares. In 1965 about 50 percent of the farmers owned less than 30 hectares of land and about 50 percent owned more than 30 hectares of land (Table 5). Thus there appears to be not much change in the pattern of size distribution over time.

Table 15 indicates that about one-fourth (198) of the farmers did not have any loan at all. A little less than one-third (218) of the farmers had only formal credit and about one-sixteenth (48) of the farmers had only informal credit. More than one-third (268) of the farmers had both formal and informal credit in 1969. In 1965 about
TABLE 15.--Number of Farmers, Number and Value of Various Types of Loans Held by 732 Farmers in Southern 

Farm Site in 1969 by Land Ownership Size Groups

<table>
<thead>
<tr>
<th>Farm Size (Hectares)</th>
<th>Number of Farmers</th>
<th>Formal Loans Only</th>
<th>Informal Loans Only</th>
<th>Both Formal and Informal</th>
<th>No Loans</th>
<th>Total Number of Loans</th>
<th>Total Value of Loans (Cruzeiros)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>0.0- 9.9</td>
<td>90</td>
<td>12</td>
<td>13</td>
<td>7</td>
<td>8</td>
<td>39</td>
<td>43</td>
</tr>
<tr>
<td>10.0-19.9</td>
<td>167</td>
<td>53</td>
<td>32</td>
<td>9</td>
<td>6</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>20.0-29.9</td>
<td>162</td>
<td>48</td>
<td>30</td>
<td>13</td>
<td>6</td>
<td>58</td>
<td>36</td>
</tr>
<tr>
<td>30.0- 49.9</td>
<td>131</td>
<td>35</td>
<td>27</td>
<td>12</td>
<td>9</td>
<td>52</td>
<td>40</td>
</tr>
<tr>
<td>50.0- 99.9</td>
<td>111</td>
<td>39</td>
<td>35</td>
<td>6</td>
<td>6</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>100.0-177.9</td>
<td>44</td>
<td>17</td>
<td>39</td>
<td>1</td>
<td>2</td>
<td>21</td>
<td>48</td>
</tr>
<tr>
<td>200.0-499.9</td>
<td>16</td>
<td>11</td>
<td>69</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>45</td>
</tr>
<tr>
<td>500 and over</td>
<td>11</td>
<td>7</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>TOTAL</td>
<td>732</td>
<td>214</td>
<td>30</td>
<td>48</td>
<td>6</td>
<td>268</td>
<td>37</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1969.

*One hectare equals 2.47 acres.
*Informal credit is that granted by banks and officially recognized cooperatives.
*In informal credit is that granted by merchants, dealers, friends, relatives, etc.
*57 cruzeiros equal one dollar.
one-third of the farmers did not participate in any credit market and almost one-third of the participating farmers got credit from institutional sources. About one-third of the farmers got loans from both the markets (Table 5). This shows that there has not been much change in the pattern of participation in the credit market. But number of formal loans has decreased over time. The same table indicates that the number of formal loans (1072) was almost double the number of informal loans (572). Farmers with less than 30 hectares of land held little more than two-fifths (458) of the formal loans and little more than one-half (311) of informal loans by number. Farmers with less than 30 hectares of land had one-fifth of the formal loans and one-third of the informal loans by value. This indicates that the distribution of formal credit was relatively more skewed than that of the informal credit. The ratio of value of formal credit to total credit was .8 and the ratio of value of formal credit to informal credit was 4.6. When these ratios (1969) are compared with the corresponding ratios of 1965 (Table 6), it can be noted that the ratio of value of formal credit to total credit increased from .6 in 1965 to .8 in 1969. The ratio of value of formal credit to informal credit increased from 1.8 in 1965 to 4.6 in 1969. This means that the relative share of formal credit in the total credit increased from
1965 to 1969. Correspondingly there has been a decrease in the relative share of informal credit. Table 15 further indicates that the institutional sources are the major sources of agricultural credit. On the basis of these results the null hypothesis that the non-institutional sources are the major supplier of agricultural credit, again, is not accepted. These data support the results of 1965 (Tables 5 and 6) that the formal sources are the main suppliers of agricultural credit and the proportionate contribution of the formal credit is greater than the proportionate contribution of informal credit.

**Characteristics of Borrowers of Institutional And Non-institutional Agricultural Credit**

**Average Resource Level**

Table 16 presents the average resource level of institutional borrowers only, non-institutional borrowers only and borrowers of both institutional and non-institutional funds. A perusal of the table indicates that the standard deviations of the means in case of all the three categories of borrowers are very high. This again shows that there is wide variation in the distribution of resources among the farmers in each category of borrowers. A study of the table further reveals that the average resource levels of the non-institutional borrowers only are
TABLE 16.—Average Resource Level of Three Categories of Borrowers—Southern Brazil—1969

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Farmers</th>
<th>Age (Years)</th>
<th>Land (Hectares)</th>
<th>Operating Expenses (Crs)c</th>
<th>Investment Expenses (Crs)c</th>
<th>Cash Agr. Income (Crs)c</th>
<th>Inventory and Assets (Crs)c</th>
<th>Credit Used (Crs)c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Institutional and non-Institutional Borrowers</td>
<td>268</td>
<td>43.2</td>
<td>60.2</td>
<td>12,215.8</td>
<td>12,751.3</td>
<td>20,615.8</td>
<td>79,771.8</td>
<td>24,059.0</td>
</tr>
<tr>
<td>Institution Borrowers Only</td>
<td>218</td>
<td>46.6</td>
<td>51.0</td>
<td>11,150.7</td>
<td>7,741.1</td>
<td>18,050.0</td>
<td>83,100.0</td>
<td>14,937.2</td>
</tr>
<tr>
<td>Non-Institutional Borrowers Only</td>
<td>48</td>
<td>49.1</td>
<td>30.4</td>
<td>1,330.0</td>
<td>1,888.4</td>
<td>4,180.5</td>
<td>37,212.8</td>
<td>1,127.5</td>
</tr>
<tr>
<td>t-statistics (Inst. Only and both Inst. and Non-Inst. Borrowers)</td>
<td></td>
<td>3.33***</td>
<td>3.87****</td>
<td>6.52*****</td>
<td>5.25******</td>
<td>5.35*****</td>
<td>4.49****</td>
<td>6.74****</td>
</tr>
<tr>
<td>t-statistics (Inst. Only and Both Inst. and Non-Inst. Borrowers)</td>
<td></td>
<td>3.14****</td>
<td>.89*</td>
<td>.59*</td>
<td>2.15**</td>
<td>1.86******</td>
<td>.48*</td>
<td>2.31****</td>
</tr>
<tr>
<td>t-statistics (Inst. and Non-Inst. Borrowers)</td>
<td></td>
<td>1.44*</td>
<td>3.39****</td>
<td>6.57*****</td>
<td>4.77*****</td>
<td>5.99*****</td>
<td>4.81*****</td>
<td>6.98****</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1969.

*Figures in the parentheses are the standard deviations of means.  
**Not significant.  
***Significant at 5 percent level.  
****Significant at 2.5 percent level.  
*****Significant at .5 percent level.  
******Significant at .1 percent level.  

1. Acre = 0.4047 hectares.  
2. 1 acre = 0.4047 hectares.  
less than those of the institutional borrowers and both institutional and non-institutional borrowers. These differences are statistically significant. Thus the non-institutional borrowers are again shown to be relatively poor farmers. The borrower from both institutional and non-institutional sources have higher average resource levels than the other two categories of borrowers. The borrowers of both institutional and non-institutional credit are younger than the other two categories of borrowers and the age difference is statistically significant.

Per Hectare Resource Level

Table 17 presents per hectare resource level by categories of borrowers. Perusal of Table 17 indicates that per hectare resource level is lower in the case of non-institutional borrowers as compared to corresponding per hectare resource levels of the other two classes of borrowers. The per hectare resource levels of both institutional and non-institutional borrowers are higher than those of the other two categories of borrowers. Borrowers from both institutional and non-institutional sources use more credit per hectare which augments their use of operating and investment expenses. Relatively more use of operating and investment expenses generates more income per hectare and thus they accumulate more assets per
TABLE 17.—Per Hectare Resource Level of Three Categories of Borrowers—Southern Brazil—1969

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Farmers</th>
<th>Land Owned (Hectares)</th>
<th>Operating Expenses</th>
<th>Investment Expenses</th>
<th>Cash Agr. Income and Assets</th>
<th>Credit Used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Current Cruzelros)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Institutional Borrowers Only</td>
<td>218</td>
<td>15,659.5</td>
<td>155.0</td>
<td>107.8</td>
<td>253.9</td>
<td>1,187.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(31.0)</td>
<td>(18.5)</td>
<td>(28.4)</td>
<td>(91.0)</td>
<td>(36.0)</td>
</tr>
<tr>
<td>**Non-Institutional Borrowers Only</td>
<td>48</td>
<td>1,499.7</td>
<td>44.6</td>
<td>62.0</td>
<td>137.5</td>
<td>1,227.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.3)</td>
<td>(9.5)</td>
<td>(16.2)</td>
<td>(139.5)</td>
<td>(5.1)</td>
</tr>
<tr>
<td><strong>Borrowers from Both Instit. and Non-Inst. Sources</strong></td>
<td>268</td>
<td>16,124.0</td>
<td>204.0</td>
<td>212.6</td>
<td>342.6</td>
<td>1,325.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(44.6)</td>
<td>(43.7)</td>
<td>(67.8)</td>
<td>(105.3)</td>
<td>(128.0)</td>
</tr>
<tr>
<td><strong>t-statistics (Inst. Borrowers only and non-Inst. Borrowers Only)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.44*</td>
<td>2.20***</td>
<td>3.50*</td>
<td>0.22</td>
<td>4.71*</td>
</tr>
<tr>
<td><strong>t-statistics (Inst. Borrowers and Both Instit. and non-Inst. Borrowers)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.88</td>
<td>2.21***</td>
<td>1.23</td>
<td>0.95</td>
<td>1.44****</td>
</tr>
<tr>
<td><strong>t-statistics (Non-Inst. only and Both Instit. and Non-Inst. Borrowers)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.50*</td>
<td>3.37*</td>
<td>2.95**</td>
<td>0.59</td>
<td>2.84**</td>
</tr>
</tbody>
</table>

**Source:** Farm interviews conducted in 1969.

*a One hectare equals 2.47 acres.
*b In 1969, 4.37 cruzelros equaled one dollar.
**Figures in parentheses are the standard deviations of means.
*Significant at .1 percent level.
**Significant at .5 percent level.
***Significant at 5 percent level.
****Significant at 20 percent level.
hectare. Most of the per hectare resource level differences are statistically significant. This further confirms the conclusions drawn from Table 16. Thus data in Tables 16 and 17 reveals that, (1) the non-institutional borrowers are relatively poor farmers, (2) borrowers of both institutional and non-institutional credit are relatively younger and better-off farmers, (3) the per hectare use of credit is higher among borrowers of both institutional and non-institutional credit. This might be due to the fact that they could have more credit as they had access to both the credit markets, and (4) the institutional sources of credit and non-institutional sources served two different clientele of borrowers.

**Financial Ratios**

Financial ratios for the three classes of borrowers are presented in Table 18.

**Solvency Ratios:** The equity ratios again indicate that the borrowers of both institutional and non-institutional credit have more debts than the other two classes of borrowers. The non-institutional borrowers had the highest equity ratio. These results are further supported by the perusal of debt-to-asset ratios.
<table>
<thead>
<tr>
<th>Items</th>
<th>Equity Ratio</th>
<th>Debt to Asset Ratio</th>
<th>Turn-over Ratio</th>
<th>Operating Expenses to Gross Farm Income Ratio</th>
<th>Debt to Operating Expenses Ratio</th>
<th>Debt to Investment Expenses Ratio</th>
<th>Investment Expenses to Gross Farm Income Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Borrowers Only</td>
<td>.90</td>
<td>.19</td>
<td>.21</td>
<td>.61</td>
<td>1.35</td>
<td>1.94</td>
<td>.43</td>
</tr>
<tr>
<td>Non-Institutional Borrowers Only</td>
<td>.99</td>
<td>.03</td>
<td>.11</td>
<td>.32</td>
<td>.83</td>
<td>.60</td>
<td>.45</td>
</tr>
<tr>
<td>Both Institutional and Non-Institutional Borrowers</td>
<td>.31</td>
<td>.30</td>
<td>.26</td>
<td>.59</td>
<td>1.97</td>
<td>1.88</td>
<td>.62</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1969.

1 Equity Ratio = Owner Equity / Total value of assets
2 Debt to Asset Ratio = Total liabilities / Total assets
3 Turn-over Ratio = Gross cash income / Total value of assets
4 Operating Expenses to Gross Farm Income Ratio = Operating Expenses / Gross Farm Cash Income
5 Debt to Operating Expenses Ratio = Total liabilities / Operating Expenses
6 Debt to Investment Expenses Ratio = Total liabilities / Investment Expenses
7 Investment to Gross Farm Cash Income Ratio = Investment Expenses / Gross Farm Cash Income
Efficiency Ratios: Turn-over ratios and operating expenses to gross farm cash income ratios reveal that the non-institutional borrowers are comparatively less efficient farmers than the other two classes of borrowers, when these ratios are compared with the corresponding ratios of the other two categories of borrowers. Efficiency is being measured in terms of ratios. Thus the borrowers with higher ratios are defined as efficient farmers. Debt to operating expenses ratios and debt to investment expenses ratios of institutional borrowers only and borrowers of both institutional and non-institutional credit indicate that these farmers had more debt per cruzeiro of operating and investment expenses.

Thus study of Tables 16, 17 and 18 supports the hypothesis that farm characteristics influence the allocation of institutional and non-institutional credit. Although the sample farms are not exactly the same in 1969 as compared to 1965 sample farms, yet the results of 1969 are almost equal to those noted in the 1965 data (Tables 8, 9, 10).

Characteristics of Borrowers And Non-Borrowers of Agricultural Credit

Average Resource Level

Table 19 presents the average resource levels of
<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Farmers</th>
<th>Age (Years)</th>
<th>Land (Hectares)</th>
<th>Operating Expenses (Crs)</th>
<th>Investment Expenses (Crs)</th>
<th>Cash Agr. Income (Crs)</th>
<th>Inventory and Assets (Crs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Borrowers</strong></td>
<td>534</td>
<td>45.2</td>
<td>62.2</td>
<td>10,788.5</td>
<td>9,750.4</td>
<td>18,107.7</td>
<td>78,203.1</td>
</tr>
<tr>
<td></td>
<td>(0.5)</td>
<td>(6.6)</td>
<td></td>
<td>(1,026.8)</td>
<td>(1,136.0)</td>
<td>(1,787.8)</td>
<td>(5,288.2)</td>
</tr>
<tr>
<td><strong>Non-borrowers</strong></td>
<td>198</td>
<td>47.5</td>
<td>36.7</td>
<td>1,683.5</td>
<td>1,325.8</td>
<td>4,612.2</td>
<td>36,234.8</td>
</tr>
<tr>
<td></td>
<td>(0.78)</td>
<td>(5.1)</td>
<td></td>
<td>(763.4)</td>
<td>(678.3)</td>
<td>(1,299.9)</td>
<td>(6,461.8)</td>
</tr>
<tr>
<td><strong>t-statistics</strong></td>
<td></td>
<td>2.47***</td>
<td>3.05**</td>
<td>7.11*</td>
<td>6.37*</td>
<td>5.32*</td>
<td>4.96*</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1969.

*Figures in the parentheses are the standard deviations of the means.*

*bOne hectare equals 2.47 acres.*

*c4.37 cruzeiros equal one dollar.*

*Significant at .1 percent level.*

**Significant at .5 percent level.*

***Significant at 2 percent level.*
borrowers and non-borrowers. Again, the borrowers are younger than the non-borrowers and the age difference is statistically significant. The borrowers had higher resource levels than the non-borrowers and the average resource level differences were statistically significant. The standard deviations of the means of resource levels of borrowers and non-borrowers indicate that there were wide variations in the distribution of resources among borrowers as well as non-borrowers. Data in Table 19 reveals that (a) the borrowers were younger farmers than the non-borrowers, (b) the non-borrowers were comparatively poor farmers and (c) the resources were unevenly distributed among the borrowers as well as the non-borrowers, except the land distribution. These results are similar to the results of 1965 data (Table 11). On the basis of study of Table 19, the hypothesis that non-borrowers and borrowers have different farm characteristics is accepted.

Analysis of Panel Data 1965 And 1969

The following section deals with the hypothesis that there has been no change in the pattern of lender evaluation of farm characteristics and of distribution of institutional and non-institutional credit over time. To test this hypothesis, data from a panel of 338 farms for the years
1965 and 1969 are analyzed. These farms were located in the states of Rio Grande do Sul and Santa Catarina.

**Allocation of Credit**

The data in Table 20 indicate that about three-fourths of the 338 farms interviewed in 1965 and 1969 owned less than 30 hectares of land. Only 49 farmers owned more than 50 hectares of land. A perusal of Table 20 shows that one-third (120 and 116) of the farmers did not use any credit in 1965 and 1969 respectively.

Fourteen percent (48) of the farmers used formal credit in 1965 as compared to 26 percent (89) in 1969. Thirteen percent (43) and 8 percent (28) of farmers used only informal credit in 1965 and 1969 respectively. Thirty-eight percent (127) and 31 percent (105) of farmers used both formal and informal credit in 1965 and 1969 respectively.

A study of Table 20 reveals that (1) there was an 85 percent increase in the number of farmers from 48 in 1965 to 89 in 1969 who used formal credit only, (2) there was a 35 percent decrease in the number of informal credit users from 43 in 1965 to 28 in 1969, (3) there was a 17 percent decrease in the number of both formal and informal credit users from 127 in 1965 to 105 in 1969 and (4) there was only a 3 percent decrease in the number of
<table>
<thead>
<tr>
<th>Farm Size (Hectares)</th>
<th>1965</th>
<th>1969</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Farmers</td>
<td>Number of Farmers With Loans</td>
</tr>
<tr>
<td></td>
<td>Formal Only</td>
<td>Informal Only</td>
</tr>
<tr>
<td>0.0 - 9.9</td>
<td>37</td>
<td>2</td>
</tr>
<tr>
<td>10.0 - 19.9</td>
<td>108</td>
<td>19</td>
</tr>
<tr>
<td>20.0 - 29.9</td>
<td>95</td>
<td>15</td>
</tr>
<tr>
<td>30.0 - 49.9</td>
<td>55</td>
<td>0</td>
</tr>
<tr>
<td>50.0 - 99.9</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>100.0 - 199.9</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>200.0 - 499.9</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>500.0 and over</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
<td>48</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1965 and 1969.

*a One hectare equals 2.47 acres.
*b Formal credit is that granted by banks and officially recognized cooperatives.
*c Informal credit is that granted by merchants, dealers, friends, relatives, etc.
non-users of credit from 120 in 1965 to 116 in 1969. The number of formal credit users only increased by 41, but this was almost off-set by a drop of 37 users of informal and both formal and informal credit. The number of non-users also did not change much. This means that there was not a significant change in the credit market participation overall. The results of panel data (Table 20) indicate that the 1969 sample of 732 farms approximately represent the sample of 1965 of 954 farms, because the analysis of three sets of data (Tables 5, 15, 20) indicates that more than 50 percent of the farmers owned less than 30 hectares of land. The results of Table 20 further indicate that the trend of change in the pattern of allocation of credit from different sources of credit is almost similar to the trend observed in 1969 (Table 15) over 1965 (Table 6) i.e. there has been increase in the number of participants in the formal credit market only and there has been a decrease in the number of participants in the informal credit market only and of participants in both the credit markets. Also there was not a significant change in overall participation in the credit market.

Table 21 presents the total number and total values of formal and informal loans in 1965 and 1969. Table 21 shows that the number of formal loans increased by 42 percent and their real value increased by 110 percent. The
<table>
<thead>
<tr>
<th>Farm Size (Hectares)</th>
<th>1965</th>
<th>1969</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Farmers</td>
<td>Total Number of Loans</td>
</tr>
<tr>
<td></td>
<td>Formal</td>
<td>Informal</td>
</tr>
<tr>
<td>0.0 - 9.9</td>
<td>37</td>
<td>7</td>
</tr>
<tr>
<td>10.0 - 19.9</td>
<td>102</td>
<td>51</td>
</tr>
<tr>
<td>20.0 - 29.9</td>
<td>95</td>
<td>53</td>
</tr>
<tr>
<td>30.0 - 49.9</td>
<td>55</td>
<td>31</td>
</tr>
<tr>
<td>50.0 - 99.9</td>
<td>38</td>
<td>33</td>
</tr>
<tr>
<td>100.0-199.9</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>200.0-499.9</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>500.0 and Over</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
<td>197</td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
<td>280</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965 and 1969.

*One hectare equals 2.47 acres.

*Formal credit is that granted by banks and officially recognized cooperatives.

*Informal credit is that granted by merchants, dealers, friends, relatives, etc.

*Two cruzeros equal one dollar.

number of informal loans decreased by 20 percent and
their real value decreased by about 6 percent which indi-
cates an increase in average size of informal loans. The
farmers owning less than 30 hectares of land held 56 per-
cent of the total number of formal loans and 15 percent of
the formal credit in 1965, and held 59 percent of total
number of formal loans and 18 percent of formal credit in
real value in 1969. The farmers with less than 30 hectares
of owned land held 69 percent of total number of informal
loans and 34 percent of informal credit in 1965 and 64
percent of number of informal loans and 40 percent of
informal credit by real value in 1969. Although there was
a proportionate decrease in the number of informal loans,
there was about a 6 percent increase in informal credit
held by farmers owning less than 30 hectares of land in
1969 compared to 1965.

In 1965, the farmers who owned less than 30 hectares
of land derived a major portion of their credit, value wise,
from the informal sources. In 1969 all of the land-
ownership size groups received a majority of their credit
from formal sources. Tables 20 and 21 show that there was
an increase in the number of farmers who used formal
credit, along with a decrease in the number of informal
credit users. There was a significant increase in the use
of formal credit, followed by a small decrease in the use
of informal credit. As a consequence the ratio of value of formal credit to informal credit fell from .8 in 1965 to .4 in 1969. There was an increase overall of 157 percent in the use of credit both from formal and informal sources from 1965 to 1969. The comparison of the results of two cross sections data of 1965 and 1969 (Tables 6 and 15) indicate that the reliance of small farmers, who owned less than 30 hectares of land, on informal credit sources decreased over time. The ratio of informal credit, value wise, to formal credit decreased from .7 (Table 6) in 1965 to .4 in 1969. There was an increase in the number of farmers using formal credit from 20 percent in 1965 (Table 5) to 30 percent (Table 15) in 1969. There was a decrease in the number of informal credit users. There was an increase in the ratio of formal credit, value wise, to informal credit from 1.8 (Table 6) to 4.6 (Table 15) in 1969. These previously discussed results are supported by the trends indicated in the analysis of the panel data.

Average Resource Distribution By Source of Credit

Table 22 indicates that the three categories of borrowers i.e. institutional borrowers, non-institutional borrowers and borrowers of both institutional and non-institutional credit had almost the same economic base.
TABLE 22.—Average Resource Distribution By Source of Credit - 218 Farms - Southern Brazil, 1965

<table>
<thead>
<tr>
<th>Borrowers</th>
<th>Number of Farmers</th>
<th>Age of Farmers (Yrs.)</th>
<th>Operating Expenses (Cr$)</th>
<th>Investment Expenses (Cr$)</th>
<th>Cash Agr. Income (Cr$)</th>
<th>Inventory and Assets (Cr$)</th>
<th>Credit Used (Cr$)</th>
<th>Land Owned (Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional Borrowers Only</strong></td>
<td>48</td>
<td>30.4</td>
<td>913.4</td>
<td>772.2</td>
<td>2,039.3</td>
<td>15,346.0</td>
<td>876.7</td>
<td>27.9</td>
</tr>
<tr>
<td><strong>Non-Institutional Borrowers Only</strong></td>
<td>43</td>
<td>42.8</td>
<td>772.0</td>
<td>966.2</td>
<td>1,603.9</td>
<td>13,392.8</td>
<td>1,000.4</td>
<td>43.1</td>
</tr>
<tr>
<td><strong>Both Institutional and Non-Institutional Borrowers</strong></td>
<td>127</td>
<td>39.9</td>
<td>1,631.4</td>
<td>1,101.2</td>
<td>3,323.3</td>
<td>17,623.7</td>
<td>2,574.8</td>
<td>49.3</td>
</tr>
</tbody>
</table>

- **t**-statistics (Institutional Borrowers and Non-Institutional Borrowers):
  - 1.23
  - 1.29

- **t**-statistics (Institutional Borrowers and Non-Institutional Borrowers):
  - 1.47
  - 2.22**

<table>
<thead>
<tr>
<th><strong>Land Owned (Hectares)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.23</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965.

- Figures in parentheses are standard deviations of means.
- 1 cruziero equaled one dollar in 1965.
- 1 hectare equals 2.47 acres.
- Significant at 10 percent level.
- Significant at 5 percent level.
- Significant at 2.5 percent level.
Nevertheless, the borrowers from both sources of credit had more credit on the average than the institutional borrowers only and non-institutional borrowers only. These results had not changed over time as revealed by Table 23, except that the borrowers from both sources of credit had more resources such as operating and investment expenses and cash agricultural income than the non-institutional borrowers. They were also younger than non-institutional borrowers.

A study of Tables 22 and 23 indicates that the two credit sources might not be serving economically differentiated clientele of customers. These results are not in confirmity, however, with the results of analysis of two cross sectional data based on 618 farms (Tables 10, 11, 12) in 1965 and 534 farms (Tables 16, 17, 18) in 1969. These results might have been influenced by the small sized sample of 338 farms in 1965 and 1969. In the panel data about 70 percent of the farmers were small farmers as compared to 54 percent in 1965 and 57 percent in 1969. The panel farms are dominated by the small farmers and thus there might not have been much difference in the various types of borrowers. However, the borrowers and non-borrowers in 1965 and 1969 belonged to different farm populations. The borrowers had more farm resources on the
TABLE 23.—Average Resource Distribution by Source of Credit - 222 Farms, Southern Brazil, 1969

<table>
<thead>
<tr>
<th>Borrowers</th>
<th>Number of Farmers</th>
<th>Age of Farmers (Yrs.)</th>
<th>Operating Expenses (Crs)</th>
<th>Investment Expenses (Crs)</th>
<th>Cash Agr. Income (Crs)</th>
<th>Inventory and Assets (Crs)</th>
<th>Credit Used (Crs)</th>
<th>Land Owned (Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Borrows Only</td>
<td>89</td>
<td>46.0 (1.2)</td>
<td>2,994.5 (1,197.5)</td>
<td>2,542.8 (914.1)</td>
<td>6,966.8 (2,165.0)</td>
<td>36,665.2 (4,535.5)</td>
<td>1,297.4 (889.6)</td>
<td>31.3</td>
</tr>
<tr>
<td>Non-institutional Borrows Only</td>
<td>26</td>
<td>50.6 (1.2)</td>
<td>2,180.3 (636.0)</td>
<td>2,325.4 (728.6)</td>
<td>4,109.3 (7,732.0)</td>
<td>35,011.9 (2,672.2)</td>
<td>1,267.2 (3.1)</td>
<td>31.2</td>
</tr>
<tr>
<td>Both Inst. and Non-Inst. Borrows</td>
<td>105</td>
<td>43.7 (1.0)</td>
<td>7,051.3 (2,102.7)</td>
<td>7,508.3 (4,328.0)</td>
<td>12,463.4 (11,174.7)</td>
<td>33,059.5 (3,345.5)</td>
<td>11,337.7 (12.4)</td>
<td>51.3</td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Inst. Borrows and Non-Inst. Borrows)</td>
<td></td>
<td>1.56</td>
<td>1.47</td>
<td>1.98</td>
<td>0.20</td>
<td>2.19**</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Inst. Borrows and Inst. and Non-Inst. Borrows)</td>
<td></td>
<td>1.47</td>
<td>1.69*</td>
<td>2.04**</td>
<td>1.47</td>
<td>1.35</td>
<td>2.34***</td>
<td>1.59</td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Non-Inst. Borrows and Inst. and Non-Inst. Borrows)</td>
<td></td>
<td>3.47****</td>
<td>2.77****</td>
<td>2.20**</td>
<td>2.41***</td>
<td>1.33</td>
<td>3.02****</td>
<td>1.50</td>
</tr>
</tbody>
</table>

SOURCE: Farm interviews conducted in 1969.

*Figures in parentheses are standard deviations of means.
b7.37 cruzados equalled one dollar in 1969.
cOne hectare equals 2.47 acres.

*Significant at 10 percent level.
**Significant at 5 percent level.
***Significant at 2 percent level.
****Significant at 1 percent level.
*****Significant at .1 percent level.
average than the non-borrowers in 1965 and 1969. The differences were statistically significant. This means that the pattern of participation of borrowers and non-borrowers in the credit market did not change over time. In other words the comparatively poor farmers were not touched by the credit market i.e. either formal or informal credit markets.

**Average Resource Level**

Table 24 presents the average resource distribution of borrowers in 1965 and 1969. The large standard deviations indicate that there was unequal distribution of resources among the borrowers in 1965 and 1969. High values of standard deviations in 1969 further reveal that unequal distribution of resources has not been mitigated over time. The standard deviation of mean value of credit used in 1969 is quite high which means that the unequal distribution of credit had been accentuated over time. There has not been any significant change in resource level except in case of investment expenses and cash agricultural income in real terms.

**Gini Indexes of Concentration**

The changes in loan value concentration are given in Table 25. The first row presents the concentration ratios of distribution of land and credit vis-a-vis other farm resources of all the 338 farms in 1965 and 1969. Perusal of row 1, Table 25 indicates that there had been no change
### Table 24: Average Resource Distribution by Borrowers - Southern Brazil, 1965 and 1969

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Farmers</th>
<th>Land Owned (Hectares)</th>
<th>Operating Expenses (Crs)</th>
<th>Investment Expenses (Crs)</th>
<th>Cash Agr. Income (Crs)</th>
<th>Inventory and Assets (Crs)</th>
<th>Credit Used (Crs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowers (1965)</td>
<td>218</td>
<td>49.7</td>
<td>1,257.6</td>
<td>1,041.5</td>
<td>2,702.7</td>
<td>16,591.8</td>
<td>1,830.6</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>(253.8)</td>
<td>(253.4)</td>
<td>(195.9)</td>
<td>(828.4)</td>
<td>(2,455.6)</td>
<td>(393.7)</td>
</tr>
<tr>
<td>Borrowers (1969)</td>
<td>222</td>
<td>40.7</td>
<td>2,000.2</td>
<td>2,189.0</td>
<td>3,685.7</td>
<td>15,914.0</td>
<td>2,922.5</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>(672.9)</td>
<td>(494.9)</td>
<td>(779.6)</td>
<td>(2,417.6)</td>
<td>(696.7)</td>
<td></td>
</tr>
<tr>
<td>t-statistics</td>
<td></td>
<td>0.23</td>
<td>1.00</td>
<td>1.32**</td>
<td>2.03*</td>
<td>0.39</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Source:** Farm interviews conducted in 1965 and 1969.

*Figures in the parenthesis are the standard deviations of the means.*


*One hectare equals 2.47 acres.*

*Significant at 2.5 percent level.*

**Significant at 10 percent level.*

<table>
<thead>
<tr>
<th>Items</th>
<th>Farms and Land</th>
<th>Farms and Credit Used</th>
<th>Land and Credit Used</th>
<th>Operating Expenses and Credit Used</th>
<th>Investment Expenses and Credit Used</th>
<th>Income and Credit Used</th>
<th>Assets and Credit Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Borrowers</td>
<td>.51</td>
<td>.51</td>
<td>.62</td>
<td>.63</td>
<td>.17</td>
<td>.16</td>
<td>.09</td>
</tr>
<tr>
<td>Institutional Borrows Only</td>
<td>.37</td>
<td>.41</td>
<td>.39</td>
<td>.38</td>
<td>.04</td>
<td>.12*</td>
<td>.05</td>
</tr>
<tr>
<td>Non-Institutional Borrows Only</td>
<td>.59</td>
<td>.41</td>
<td>.55</td>
<td>.30</td>
<td>.02</td>
<td>.20*</td>
<td>.18</td>
</tr>
<tr>
<td>Both Institutional and Non-Institutional Borrows Only</td>
<td>.57</td>
<td>.63</td>
<td>.62</td>
<td>.67</td>
<td>.05</td>
<td>.007</td>
<td>.10</td>
</tr>
</tbody>
</table>

**SOURCE:** Farm interviews conducted in 1965 and 1969.

*The Gini Concentration Indices is the area between a Lorenz Curve and 45 degree diagonal divided by the area of the whole triangle. See Kary F. Henson, "Trends in the Income of Families and Persons," Technical paper 17, U.S. Bureau of the Census, 1967, p. 34, for the method used to calculate this coefficient.

*Coefficient of concentration has been worked in the descending order of owned farm size.
in the pattern of land distribution. However, the distribution of credit vis-a-vis the number of farmers and land has been further skewed over time. But the distribution of credit with respect to operating expenses, investment expenses, cash agricultural income and farm assets had improved during this period. Second row, Table 25 presents the Gini Indices of distribution of land, credit and other resources of the institutional borrowers. It is apparent that the land distribution has been distorted over time. The concentration of credit distribution with respect to land owned, operating expenses and cash agricultural income generated had been distorted in favor of the small farmers. This shows that on the average small farmers got proportionately more credit with respect to these resources over time. Perusal of the third row in Table 25 indicates that the distribution of land and credit with respect to number of farmers has tended to move towards the egalitarian line in case of non-institutional borrowers. The fourth row (Table 25) shows that in the case of borrowers from both institutional and non-institutional sources the distribution of land and credit with respect to number of farmers has moved away from the line of equality. The distribution of credit has been more distorted in case of borrowers from both the institutional and non-institutional
sources. This perhaps may be due to the fact that these farmers had better access to both the credit markets.

A study of Tables 20 through 25 shows that (1) the number of formal borrowers, the number of formal loans and their value in real terms increased since 1965 to 1969. (2) The number of informal borrowers, the number of informal loans and their value in real terms decreased over time. (3) The number of both formal and informal borrowers decreased over time. (4) The three categories of borrowers (Table 22) differed significantly only in case of credit used and other farm characteristics were almost the same in 1965. In 1969, however, the resource endowments of borrowers from both formal and informal sources were significantly different than those of the borrowers from informal sources (Table 23), and there was significant difference in the average credit used by the three classes of borrowers. (5) The pattern of overall resource distribution did not change over time, and (6) the credit distribution was more distorted in case of all borrowers and borrowers from both formal and informal sources. (7) Credit distribution was eased in case of formal borrowers and informal borrowers (Table 25).
Change in Credit Distribution By Loan Size

Table 26 is constructed to analyze the changes in credit distribution by loan portfolio size from 1965 to 1969. Loan portfolio size of 1965 is held constant to see the shifting of farmers from one loan size group to another from 1965 to 1969. For example if a farmer was in the loan size group of below 2,000 cruzeiros in 1965 he might have moved to the loan size group of 2,000 to 4,000 cruzeiros in 1969. Thus the Table 26 shows the movement of credit borrowers from one loan size group to another from 1965 to 1969.

Table 26 presents the change in the distribution of farmers among various loan portfolio size groups. Study of the table shows that little less than half (56) of farmers, who did not use credit in 1965, participated in the credit market in 1969. These 56 farmers had loan portfolio distribution below 4,000 cruzeiros in 1969. About one-fourth (51) of the farmers who had credit between 1-2,000 cruzeiros in 1965, did not get credit in 1969. The Table 26 further reveals that there has not been any change in the number of farmers from 1965 to 1969 who had loans between 1-2,000 cruzeiros. One farmer with a loan between 1-2,000 cruzeiros in 1965 jumped to the loan size of 20,000-40,000 cruzeiros. This farmer also entered into the
### TABLE 26.—Changes in Credit Distribution by Loan Portfolio Size from 1965 to 1969 For 338 Farms —
Southern Brazil

<table>
<thead>
<tr>
<th>Loan Portfolio Size in 1965 Cruzeiros a</th>
<th>Number of Farmers</th>
<th>0-1,999</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>2,000-3,999</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>4,000-9,999</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>10,000-19,999</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>20,000-39,999</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>40,000+</th>
<th>Change in Total Value (000) of (Crs)</th>
<th>Source: Farm interviews conducted in 1965 and 1969.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>220</td>
<td>64</td>
<td>+5.5</td>
<td>54</td>
<td>+17.4</td>
<td>2</td>
<td>+3.4</td>
<td>1</td>
<td>+1.4</td>
<td>1</td>
<td>+1.4</td>
<td>1</td>
<td>+1.4</td>
<td>Farmed in 1965 were equal to one U.S. dollar.</td>
</tr>
<tr>
<td>1-1,999</td>
<td>15</td>
<td>31</td>
<td>+28.4</td>
<td>122</td>
<td>+44.1</td>
<td>12</td>
<td>+20.6</td>
<td>0.7</td>
<td>+1.5</td>
<td>1</td>
<td>+4.8</td>
<td>1</td>
<td>+1.3</td>
<td>Deflated to 1965 prices using the index of price-paid-by-farmers-for-purchased-inputs in Sao Paulo, constructed by the Instituto de Economia Agricola, 1979. Base period 1948-52 = 100, 1965 = 7,687 and 1989 = 17,390. Conversion factor = .437.</td>
</tr>
<tr>
<td>2,000-3,999</td>
<td>15</td>
<td>31</td>
<td>+28.4</td>
<td>-18.9</td>
<td>+2.5</td>
<td>2</td>
<td>-1.1</td>
<td>+3.2</td>
<td>+8.8</td>
<td>2</td>
<td>+1.6</td>
<td>2</td>
<td>+8.4</td>
<td></td>
</tr>
<tr>
<td>4,000-9,999</td>
<td>6</td>
<td>1</td>
<td>+0.2</td>
<td>-4.3</td>
<td>+0.2</td>
<td>1</td>
<td>-0.7</td>
<td>+1.3</td>
<td>+3.2</td>
<td>2</td>
<td>-2.1</td>
<td>2</td>
<td>-2.1</td>
<td></td>
</tr>
<tr>
<td>10,000-19,999</td>
<td>4</td>
<td>-</td>
<td>+1.7</td>
<td>-0.2</td>
<td>-10.7</td>
<td>1</td>
<td>-2.8</td>
<td>+28.7</td>
<td>+48.2</td>
<td>2</td>
<td>-12.7</td>
<td>1</td>
<td>+50.8</td>
<td></td>
</tr>
<tr>
<td>20,000-39,999</td>
<td>5</td>
<td>-</td>
<td>+1.7</td>
<td>-2.8</td>
<td>-0.2</td>
<td>2</td>
<td>+6.3</td>
<td>-9.5</td>
<td>+4.2</td>
<td>2</td>
<td>-12.7</td>
<td>1</td>
<td>-5.9</td>
<td></td>
</tr>
<tr>
<td>40,000+</td>
<td>3</td>
<td>-</td>
<td>+1.7</td>
<td>2</td>
<td>-2.8</td>
<td>2</td>
<td>+4.2</td>
<td>2</td>
<td>-12.7</td>
<td>1</td>
<td>-5.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>338</td>
<td>116</td>
<td>+40.6</td>
<td>-1.7</td>
<td>-24.6</td>
<td>5</td>
<td>-8.6</td>
<td>-4.3</td>
<td>+18.1</td>
<td>4</td>
<td>-1.1</td>
<td>6</td>
<td>+8.2</td>
<td></td>
</tr>
</tbody>
</table>

c Loan includes both formal and informal loans.
informal credit market in 1969. Thus a major reason for his long jump appears to be his participation in the informal credit market and a substantial increase in his formal credit. The study of the table further reveals that the major change in participation in credit market has been among the non-users of credit in 1965 and the users of credit between 1-2,000 cruzeiros in 1969. It is also evident that the small users of credit in 1965 have not moved significantly into the category of large users of credit. This means that reshuffling of these farmers has been confined to small loan size groups. There is another important point to note that the major portion of the additional flow of credit appears to have been absorbed by the farmers who already had big loans. The use of informal credit decreased in the loan size groups up to 20,000 cruzeiros and increased in loan size groups above 20,000 cruzeiros. Thus the study of Table 26 leads to the following conclusions. First non-users of credit in 1965 who became users of credit in 1969 only entered the small loan size groups. Second the users of credit in 1965 who became non-users of credit in 1969, also belonged to small loan size group. Third at lower levels of loan size groups, the informal credit has decreased. Fourth, the additional flow of credit appears to have been absorbed by the farmers who already had big loans. Five percent of the farmers
who had loans more than 10,000 cruzeiros absorbed about two-third of the additional credit.

The above analysis of panel data leads to the following conclusions. First there has been a decrease in the number of participants in the informal credit market only as well as in both the formal and informal credit market. There has been a substantial increase in the number of borrowers in the formal credit market only. This may be due to the massive increase in formal credit in the agricultural sector (Table 2). Second, there has been a decrease, in real value terms, in the amount of informal credit. Third, the borrowers from both the credit markets are better off farmers and their average credit use is more than that of borrowers from institutional sources only and borrowers from non-institutional sources only. Fourth, although the distribution of averages of some of the resources of non-institutional borrowers are not significantly different from the corresponding average distributions of resources of institutional borrowers only and both institutional and non-institutional borrowers, yet it appears that the non-institutional credit borrowers are poorer farmers. Finally, the uneven distribution of resources has not been mitigated over time. Thus the above conclusions lead to accept the first part of the hypothesis
laid down in the beginning of this section that there has been no change in the pattern of lender evaluation of farm characteristics. The second part of the hypothesis that there has been no change in the pattern of distribution of institutional and non-institutional credit over time is rejected.

Comparison of results of analysis of 1965 (Ch. V) with the results of analysis of data of 1969 and the comparison of results of panel data indicate that (1) there has not been any significant change in the proportion of participants in the credit market. This indicates that in spite of the tremendous increase in supply of formal credit, the number of credit recipients has not changed over time. The average number of loans held per farmer, however, has increased during the same time period, which means that the farmers, who were already in the credit market, mainly got the benefits of the additional credit. (2) The proportion of informal credit in the total credit has decreased over time. (3) The skewed distribution of credit has not eased over time which shows that the additional flow of credit has not been accompanied by more even distribution of credit. (4) The borrowers in both the credit markets are better off farmers and have better access to credit availability. (5) The pattern of borrowers' participation
has not changed i.e. the relatively small and poor farmers are serviced by the informal credit market and comparatively better off farmers are serviced by both the credit markets and (6) the non-participants in the credit market are comparatively aged and poor farmers.

The above discussion indicates that the results of analysis of 1965 data when compared with the results of 1969 data are significantly supported by the results of panel data. The results of this study indicate that the overall pattern of credit distribution has not changed much over time except that a huge amount of formal credit has been injected into the agricultural sector.
Summary

The general objective of this research has been to study the farm level determinants of credit allocation and use in Southern Brazil. Cross sectional data obtained through personal interviews in 1965 of 954 farms and 732 farms in 1969 and panel data of 338 farms interviewed in 1965 and 1969 have been used. The sample farms were disaggregated into eight owned farm size groups for much of the analysis.

The specific objectives of this study have been: (1) to determine the patterns of agricultural credit use among the farmers, (2) to evaluate the role of various farm characteristics in the allocation of institutional and non-institutional credit, (3) to evaluate the characteristics which differentiate non-borrowers from borrowers of agricultural credit, (4) to examine whether there has been any change in the pattern of evaluating the farm characteristics and distribution of institutional and
non-institutional credit over time, and (5) to suggest changes in credit policy that might improve the allocation of institutional credit for agriculture in Brazil.

To study objective one, the number and percent of farmers with various types of loans by landownership size groups and also the number and values of various types of loans by landownership size groups were compared. This comparison was made on the assumption that the formal sources of agricultural credit are risk averters and they have very tight and rigorous security requirements. Thus users of agricultural credit, especially the small farmers, may be forced to use non-institutional sources of credit.

Objective two was examined by comparing the financial ratios, per hectare resource level and average resource level of various types of borrowers. The assumption behind this objective was that the institutional and non-institutional credit borrowers have different farm characteristics. Thus the institutional and non-institutional sources of credit serve different types of borrowers. It was also assumed that because of the concessional interest rates charged on institutional loans, social and political pressures are more weighty than the economic criteria in the institutional credit allocation process. Therefore non-institutional credit agencies serve those borrowers who lack
the characteristics acceptable to the institutional credit agencies.

Objective three was studied by comparing the farm characteristics of non-borrowers and borrowers of agricultural credit. This comparison is based on the assumption that those farmers who do not borrow have different farm characteristics i.e. either they may have poor resource endowments or they may be self-supporting investors on their farms.

To study objective four, a comparison of pattern of allocation of various types of credit was made by analyzing the panel data and also by comparing the pattern of allocation of various types of credit through the analysis of cross section data of 1965 of 954 farms and of 1969 of 732 farms. The assumption behind this objective was that the distributional patterns of credit have not changed over time. That is, the change in credit policy over the past decade has been neutral with respect to the concentration of credit use.

Conclusions

The first finding of this research was that almost one-third of the total farmers did not participate in the credit market and these farmers are relatively poor and
older farmers than the farmers who participated in the credit markets. There might be several reasons for this. First lending agencies both institutional and non-institutional hesitate to lend to these farmers. Second these farmers are not willing to borrow because they want to avoid the risk of borrowing. Third these farmers may not have profitable investment opportunities. Fourth, they are relatively older farmers and thus have short time horizon for investment opportunities. Therefore, these old farmers lack initiative and drive in the farm business.

The second finding was that only a minority of farmers, almost one-fifth of the farmers, got loans from informal sources. The majority of the farmers, about four-fifths of the borrowers, got credit from formal and both formal and informal sources. The major portion of the informal loans and small portion of formal loans was held by small farmers which indicated that mostly the small farmers are served by the informal credit market.

The third finding was that there is a concentration of credit allocation in favor of large farmers when farm population is used as a measure of credit allocation. However, when other measures of credit allocation such as land owned, operating expenses, investment expenses, gross cash farm income, etc., were used, it was found that credit
was almost evenly distributed. This raises some basic policy questions. First, whether the progress of credit program be judged through its impact on overall economic growth. Second, whether its progress be judged by its impact on economic development.

The answers to the above questions would depend upon the basic national economic, political and social policy objectives. If the national policy objective is to enhance the economic growth first and the economic development later on, then the present allocation of credit may be construed to be in line with the national policy objectives because the credit is allocated in proportion to the resources owned by the farmers. Moreover, the agricultural credit is supplied by the commercial banks which are profit oriented organizations. Thus these banks always try to maximize their profit when they allocate the credit. Therefore under the present arrangements of credit allocation, the equity question of credit allocation may not be resolved because agricultural credit is not a public good. If the national policy objective is to have economic growth and development both at the same time, then the present credit allocation needs to be adjusted.

The fourth conclusion was that the borrowers from non-institutional sources of credit only were relatively older and poor farmers than the borrowers from both
institutional and non-institutional sources. The average amount of credit used was larger among borrowers from both the institutional and non-institutional credit markets as they had better access to credit. Thus it is concluded that the institutional and non-institutional credit markets service different clientele of farmers. This situation poses a question whether or not the national credit policy is being followed in the right direction if one of the credit policy objectives is to help the poor and small farmers. This research shows that the non-institutional sources of credit are still the main suppliers of credit to the small and relatively poor farmers.

The fifth main finding is that over time the flow of farm credit from institutional sources has increased in real terms and it has not increased in real terms from the non-institutional sources. This means that one important source of credit is being stunted in a situation where agricultural credit is thought to be scarce.

The sixth finding was that for every one cruzeiro of operating and investment expenses, there was a higher amount of credit taken by the farmers. This suggests that at least some farmers are over financed. This situation may indicate that there is a leakage of credit outside the farm business.
The seventh finding was that the major portion of the additional credit injected into the market was absorbed by the farmers who had already big loans. The farmers with small loans did not enter into large loan size groups in a significant way.

The eighth important conclusion of this research was that within each farm size group there is wide range of credit allocation among farmers. This shows that in each farm size groups there are few farmers who have large amounts of credit. These farmers may have some special characteristics, both economic, political and social, which are different than those possessed by the average farmers of that particular farm size group. These few farmers in each farm size group absorb a major proportion of the agricultural credit.

Policy Recommendations

On the basis of this research the following policy recommendations are made about the Brazilian credit policy.

First this research indicates that the major problem of unequal distribution of economic resources, including agricultural credit, revolves around the unequal distribution of land. The concentration of almost all economic resources among farmers is according to concentration of land
distribution. This might have led to sub-optimal and inefficient allocation of some of resources. The small farmers have abundant labor force and less land. The large farmers have abundant land and less labor. This situation poses many questions which need to be answered before any policy recommendations are made to readjust the credit system to help the rural poor. Is it economically desirable and feasible to leave the problem of unequal distribution of land untouched and seek solutions for equitable distribution of other resources like credit? If the answer is categorical no, then the question arises; is it socially and politically expedient and feasible to redistribute land in order to eliminate inequalities in the distribution of resources? The answers to these questions are not within the scope of this study. However, these are some of the basic questions which need to be resolved. At present the formal credit offered at concessional rates of interest is viewed as a means of income transfer to the rural poor. This is tantamount to welfare payments. The question is, can a developing economy like Brazil afford this economic luxury without generating additional income? Even if the answer to this question is in the affirmative, this study shows that the benefit of income transfer through concessional rate of interest on credit is not going to the rural
Second, concessional rates of interest on formal credit and its massive flow in the agricultural sector have led to an increase in the amount, in real terms and number of formal credit. There has been a decrease in the amount in real terms and number of informal credit. Here again the policy question is whether this is a healthy trend. If there is a shortage of capital in Brazil, the present credit policies are discouraging the competition between the formal and informal credit markets. This situation may have contributed to drying up of availability of credit from informal sources. Moreover due to low interest rates on formal credit, the formal lending agencies have become very choosy in selecting their clientele. The risky clients, like old, small and poor farmers, who need the external financial help the most, are forced to rely on informal credit market.

Third the criterion of rural poverty and smallness need to be reviewed and redefined. Presently in almost all developing countries, rural poverty and smallness are measured by the amount of owned land. However, this study indicates that in each owned farm size group there are farmers who are poor and there are farmers who are well off. Within each farm size group there is concentration of credit allocation in few hands. It appears, therefore,
necessary that the concept of rural poverty and smallness need to be redefined in order to readjust the rural credit programs.

**Issues For Further Research**

On the basis of experience gained through this research, it is felt that in order to have better and deeper insight and understanding of the problem of credit allocation and to readjust the credit policy to help the rural poor, there is a need for research in the following directions.

1. There is little or no information about the non-borrowers of agricultural credit. It is not known whether (a) the non-borrowers voluntarily refrained from entering into credit market or (b) they wanted to participate in the credit market but were prohibited by the red tape which made the formal credit too costly or (c) they applied for the credit but they were refused credit by the lending agencies. It is necessary to identify the characteristics of those farmers who voluntarily refrained from borrowing and also of those farmers who wanted to participate in the credit market but were refused participation by the credit agencies. The knowledge of this information will have different policy implications to improve the effectiveness of existing credit system.
2. In developing countries like Brazil, some policies attempt to eliminate informal lenders. But this research indicates that the informal sources contribute a significant share of farm credit to rural poor. Therefore, it may be an economically unwise policy to discourage informal credit market from entering into rural credit market. Efforts need to be made to encourage and improve the working of the informal credit market rather than to discourage and dry up an important source of rural credit. Therefore, research should be directed at understanding the strong and weak points of the informal credit market. The weaknesses of the informal credit market need to be removed because the well being of the patient and of the people associated with him lies in his cure and recovery but not in his termination.

3. Research should be done to lay down some scientific criteria to define rural poverty and smallness.

4. There should be research on how economic, political and social pressures play their part in the credit allocation decision making processes of formal credit institutions. At present there is little information to shed light on the decision making processes of the formal credit institutions.
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