

FACTORS AFFECTING THE RESPONSIVENESS OF THE
AGRICULTURAL CREDIT DELIVERY SYSTEM
IN CENTRAL LUZON, PHILIPPINES

by

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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	v
ACKNOWLEDGEMENTS	vii
CHAPTER	
1. INTRODUCTION	1
The Role of Agricultural Credit in the Philippine Economy	2
Agricultural Lending Trends in the Past	5
Policy Structure of the Philippine Credit System	11
The Market Level	13
The Institutional Level	13
The Borrower Level	13
A Brief Evaluation of the Philippine Agricultural Credit System .	14
Objectives of the Study	19
Methodology	21
Regression and Correlation Analyses	23
Cross-tabulation	23
Discriminant Analysis	24
Limitations of the Study	24
2. FACTORS AFFECTING THE FARMERS' DEMAND FOR AGRICULTURAL CREDIT ...	26
A Brief Description of the Data Inputs	26
Amount of Loan Desired	26
Age (x_1)	26
Educational Attainment (x_2)	27
Annual Family Income (x_3)	27
Frequency of Farming (x_4)	27
Tenurial Status (x_5)	28

Chapter	Page
Distance Between the Farmer's Residence and the Nearest Bank (X_6)	28
Size of Farm (X_7)	29
Availability of Irrigation Facilities (X_8)	29
Main Crop Being Produced (X_9)	29
Results of the Regression Analysis	30
Tests on the Individual Coefficients	30
Age	32
Education	32
Annual Family Income	33
Frequency of Farming	35
Tenurial Status	38
Proximity of a Farmer's Residence to a Bank	38
Farm Size	39
Irrigation	39
Crop	44
3. A SEGMENTATION OF THE AGRICULTURAL CREDIT MARKET	47
Educational Attainment	47
Annual Family Income	50
Tenurial Status	51
Proximity of a Farmer's Residence to a Bank	54
Size of Farm	54
Description of the Relevant Market Segments	56
The "Big Borrower" Segment	58
The "Small Borrower" Segment	58

Chapter	Page
4. AN ANALYSIS OF SOME PROBLEMS PLAGUING THE PHILIPPINE AGRICULTURAL CREDIT SYSTEM	62
Capital Rationing	62
Delay in Loan Release	63
Delinquency in Repayment	65
Fungibility of Loans	68
Credit Source Preferences of Farmers	72
5. CRITERIA FOR EVALUATING CREDIT RISKS POSED BY FARMER-BORROWERS ..	74
Hypothesized Discriminators of Credit Risks	75
Age (Z_1)	75
Education (Z_2)	76
Annual Farm Income (Z_3)	76
Availability of Supplementary Source(s) of Income (Z_4)	77
Farm Ownership (Z_5)	77
Distance Between the Farmer's Residence and the Source of Credit (Z_6)	77
Farm Size (Z_7)	78
Availability of Irrigation Facilities (Z_8)	78
Main Crop Being Produced (Z_9)	78
The Significant Discriminators of Credit Risks	79
Farm Size	83
Farm Ownership	85
Educational Attainment	85
Distance Between the Farmer's Residence and the Source of Credit	87
Annual Farm Income	88
Application of the Discriminant Function	88

Chapter	Page
An Illustration	89
6. SUMMARY AND CONCLUSIONS	91
A Summary of Results	91
Determinants of Demand for Agricultural Credit	92
Segmentation of the Agricultural Credit Market	92
Problems Plaguing the Philippine Credit Delivery System	93
Capital rationing	93
Delays in loan releases	93
Repayment problem	93
Fungibility of loans	94
Criteria for Evaluating Credit Risks	94
Conclusions	95
Directions for Further Analysis	97
BIBLIOGRAPHY	99

LIST OF TABLES

TABLE	PAGE
1. Average Farm Area for Major Crops and Livestock, Philippines, 1977	3
2. Total Agricultural Loans Granted	6
3. Agricultural Loans Granted by Level of Activity	7
4. Agricultural Loans Granted by Institution	9
5. Agricultural and Total Loans Granted, Philippines, 1975-79 ...	10
6. Agricultural Loans Granted by Commodity	12
7. Agricultural Loans Granted and Past Due Loans	16
8. Regression Coefficients, T-values and Levels of Significance of Nine Independent Variables Related to Amount of Capital Borrowing Desired by Small Farmers, Central Luzon, 1979	31
9. Relationship Between Frequency of Farming and Income Level ...	32
10. Correlation Matrix for the Variables Used in the Regression Analysis	33
11. Correlation Matrix for Education, Tenure and the Methods of Irrigation	34
12. Regression Coefficients, T-values and Levels of Significance of Five Significant Variables Related To Amount of Capital Borrowing Desired by Small Farmers, Central Luzon, 1979	46
13. Levels of Borrowing Desired by Small Farmers	48
14. Relationship Between Educational Attainment and Amount of Loan Desired	49
15. Relationship Between Income and Amount of Loan Desired	52
16. Relationship Between Tenurial Status and Amount of Loan Desired	53
17. Relationship Between the Proximity Factor and Amount of Loan Desired	55
18. Relationship Between Size of Farm and Amount of Loan Desired .	57
19. Mean Values of the Variables Considered in the Segmentation Process	60

Table	Page
20. Regression Coefficients, T-values and Levels of Significance of Ten Independent Variables Related To Variations in the Length of the Loan Processing Period	64
21. Reasons Cited by Small Farmers for Delinquency in Loan Repayment	66
22. Relationship Between the Length of Loan Processing and Delinquency in Repayment	67
23. Actual Loan Utilization by Credit Beneficiaries	69
24. Attitudes of Small Farmers Toward Credit in Kind	71
25. Relationship Between Reasons for Preference and the Preferred Sources of Credit	73
26. Resulting F-Values and Prob > F from the Stepwise Discriminant Analysis	80
27. Mean of Variables in the Discriminant Function	82
28. Classification by Discriminant Analysis	84
29. Sample Correlations of Included Variables in the Discriminant Analysis	86

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Chapter 1

INTRODUCTION

Agricultural credit is a moving force that cannot be ignored in a country whose socioeconomic progress is inextricably linked to agriculture.

There have been reports of significant uptrends in total agricultural loans granted during the past decade. However, the Philippine agricultural credit delivery system suffers from several shortcomings which may lead to neglect of the credit needs of small farmers. These shortcomings include unbalanced physical distribution of credit facilities and recurrent problems of loan diversion, non-repayment and delinquency.¹ Such developments necessitate improvements in the system so that agriculture can remain a major contributory force in national development.

The success or failure of an agricultural credit program depends primarily on the farmers' demand for, use and repayment of credit, since these factors are ultimate determinants of the nation's productivity and financial institutions' profitability. Thus, there is a need for research concentrating on the farmer-borrower.

This thesis analyzes some factors affecting the amount of agricultural (production) loan desired by small farmers. It proceeds to develop some policy guidelines for stimulating demand for agricultural credit and for improving borrowers' attitudes toward the intended utilization and timely repayment of agricultural loans. It also segments the agricultural credit

¹Pedro R. Sandoval, "Agricultural Credit and Small Farms: Experiences, Policies and Programs," Journal of Agricultural Economics and Development 10 (January 1980): 76-96.

market as a guide to creditors in selecting an appropriate credit package. This thesis also explores some of the most common problems plaguing the agricultural credit system of the country. Finally, important factors for evaluating the credit worthiness of loan applicants are identified. General policy recommendations are drawn from the analyses.

THE ROLE OF AGRICULTURAL CREDIT IN THE PHILIPPINE ECONOMY

Despite the country's rapid advancement towards industrialization, agriculture still plays a critical role in the socioeconomic development of the Philippines. The population of the country is predominantly rural and the economy, mainly agricultural. Two out of every ten rural residents reside on farms where they produce about one third of the total value of goods and services generated by the economy.²

Of the total 30 million hectares land area, the cultivated portion represents about 11.9 million hectares (or approximately 40 percent) as of 1979.³ With 85 percent of the farms in 1971 under 5 hectares in size and 60 percent under 3 hectares, it can be said that small farmers dominate the Philippine rural scene. Of the total farmholdings, the average farm size was 3.6 hectares for all commodities, 2.7 hectares for rice and 13.6 hectares for sugar, suggesting generally subsistence operations (Table 1). Recent evidence indicates that the average farm size has remained constant as a result of rapidly increasing population outpacing

²Technical Board for Agricultural Credit, Financing Agricultural Development: The Action Program (Manila, 1977), p. 2.

³National Economic and Development Authority, Philippine Yearbook 1981 (Manila, May 1981, p. 231.

Table 1

Average Farm Area for Major Crops and Livestock,
Philippines, 1977

Major Crop and Livestock	Number of Farms (000)	Total Area (000 has.)	Average (has.)
All Farms	2,354	8,494	3.6
Crop:			
Palay	982	2,661	2.7
Corn	514	1,494	2.9
Coconut	432	2,153	5.0
Tabacco	4	7	1.8
Sugarcane	27	368	13.6
Coffee	14	48	3.4
Abaca	12	64	5.3
Banana	14	58	4.1
Others	48	131	2.7
Livestock:			
Chicken	3	4	1.3
Hog	12	25	2.1
Cattle	24	387	16.1
Others	268	1,094	4.1

Source: Pedro R. Sandoval, "Agricultural Credit and Small Farms: Experiences, Policies and Programs," Journal of Agricultural Economics and Development 10 (January 1980), p. 95.

land expansion in agriculture.⁴ Thus countryside development must be tied with some efforts toward enhancement of the economic viability and the improvement of the quality of life of the small farmer.⁵

The small farmer is almost always known for his inability to adopt new technology. This inability results in low productivity. Low productivity, on the other hand, leads to a low real income which, in turn, decreases the small farmer's capacity to save. As a consequence, capital formation is slowed or becomes difficult, impeding the adoption of new technology. This phenomenon has been called the "dissaving cycle."⁶

An essential element in breaking the cycle is the infusion of capital into the farm sector. The needy farmer can become a more productive member of the society if he is given control of a larger quantity of financial resources and a better understanding of how to manage them. The provision of adequate credit to meet the needs of the agricultural sector is therefore viewed as a necessary task.⁷

The role of agricultural credit in breaking the "dissaving cycle" has been the emphasis of several studies. Alviar and Nasol⁸, in their analysis of the effects of technological change on production, consumption

⁴Technical Board for Agricultural Credit, Financing Agricultural Development, p. 3.

⁵Technical Board for Agricultural Credit, Focus on Small Farmer Credit (Manila, Philippines, October 1977), p. 5.

⁶Sandoval, "Agricultural Credit", p. 76.

⁷Ibid., p. 77.

⁸Nelly Alviar and Ramon Nasol, "Effects of Technological Change on Production, Consumption and Savings of Farmers in Laguna, Batangas and Cavite", Journal of Agricultural Economics and Development 5 (January 1975): 12-21.

and savings of farmers, concluded that farmers who used credit and consequently, adopted technological innovations in farming, experienced increasing farm productivity and income, leading to generally improved conditions for their respective families.

Similarly, Sandoval (1977) concluded that (1) if credit is made available and new technology is adopted, a small farm can provide the operator much higher income; (2) increased productivity, as a result of a shift from share tenancy to leasehold or full ownership, can also contribute to higher income; and therefore, (3) increased income can enable the small farmers to provide for savings and cash on hand.⁹

Based on these discussions one can conclude that although the role of credit is largely supportive, it represents one of the instruments for accelerating the transfer of improved technologies, stimulating agricultural productivity, increasing the level of farm income and developing the rural financial markets. This ultimately makes the provision of agricultural credit a significant contributory factor to the development of the national economy.

AGRICULTURAL LENDING TRENDS IN THE PAST

There is no consistent time series data on agricultural credit when defined to include marketing and processing loans. The available estimates, however, reveal a significant uptrend for total agricultural loans granted from ₱ 3,404.5 million in 1971 to ₱ 17,445.6 million in 1979 (Table 2). Marketing and processing loans also exhibited significant uptrends from ₱ 792.4 million in 1971 to ₱ 8,990.4 million in 1976, then levelled off until 1979 (Table 3). In general, the data on the patterns of credit

⁹Sandoval, "Agricultural Credit", p. 85.

Table 2

Total Agricultural Loans Granted^a
(Amounts in Million Pesos)

Commodity	1971	1972	1973	1974	1975	1976	1977	1978	1979
Food commodities ^b	833.2	906.8	1,768.7	3,416.8	3,685.3	3,246.5	3,224.2	4,479.0	6,207.1
Commercial crops ^c	2,211.2	2,371.5	2,131.1	5,923.9	8,915.9	9,416.5	5,831.2	8,662.0	8,922.0
Forestry	360.1	455.0	438.9	516.1	1,494.1	1,450.7	1,502.8	1,767.1	2,316.5
TOTAL	3,404.5	3,733.3	5,388.7	9,856.8	14,095.3	14,113.7	10,540.2	14,908.1	17,445.6

Sources: Technical Board for Agricultural Credit, Financing Agricultural Development: The Action Program (Manila, Philippines, 1977), p. 7.

1 National Economic and Development Authority, Philippine Yearbook 1981 (Manila, May 1981), p. 260.

^aInclude production, processing and marketing loans

^bInclude rice, corn and feedgrains, livestock and poultry, fruits and vegetables, and fisheries

^cInclude sugar, tobacco, coconut, abaca, coffee and cacao, rubber, and cotton

Table 3

Agricultural Loans Granted, By Level of Activity
(Amounts in Million Pesos)

Activity	1975	1976	1977	1978	1979
Production	6,181.3	5,123.3	4,862.3	6,258.3	9,870.7
Processing	964.3	1,016.2	418.5	2,400.8	2,989.8
Marketing	6,949.6	7,974.2	5,259.4	6,249.0	4,585.1
TOTAL	14,095.3	14,113.7	10,540.2	14,908.1	17,445.6

Sources: National Economic and Development Authority, Philippine Development 6 (January 15, 1979); 9.

Idem, Philippine Yearbook 1981 (Manila, May 1981), p. 260.

distribution reveal increasing trends in total agricultural loans granted (Tables 4 and 5) although the annual growth rate of agricultural lending is declining.

Non-institutional sources, such as private money lenders, relatives, friends and landlords traditionally filled the bulk of the credit demands of the farm families who reportedly borrowed at average interest rates of between 50 to 95 percent per annum. Based on various surveys, the dependence on non-institutional credit channels was as high as 90 percent in 1954-1961, decreasing to 35 percent in 1975-76. The shift to institutional credit in the past few years appears to be an offshoot of the development of the countryside banking network and the government push toward supervised credit schemes.¹⁰

While the financial institutions have favored agriculture in relation to the other sectors of the economy, the stiff requirements of these institutions for loan approval has been considered a significant factor leading the small farmers to turn back to private money lenders for their credit needs. Various studies indicate that the percentage share of total production credit extended to farmers cultivating farms of less than 3 hectares in size was 1.6 percent in 1965 rising to 19.4 percent in 1974. Despite this increase, however, there still remains a substantial portion of the small farmer population beyond the reach of the institutional credit system.¹¹

¹⁰Technical Board for Agricultural Credit, Financing Agricultural Development, p. 5.

¹¹Ibid., p. 8.

Table 4

Agricultural Loans Granted, By Institution
(Amounts in Million Pesos)

	1975	1976	1977	1978	1979
Development Bank of the Philippines (DBP) ^a	550.5	840.9	536.1	508.5	701.4
Philippine National Bank (PNB) ^a	2,182.5	1,783.1	1,181.3	1,020.7	2,105.6
Agricultural Credit Administration (ACA) ^a	61.3	55.2	49.7	37.5	36.4
Rural Banks (RBs) ^a	2,177.5	1,658.7	1,799.1	2,384.8	2,950.4
Others ^b	9,123.5	9,775.8	6,974.0	10,956.6	11,445.6
TOTAL ^a	14,095.3	14,113.7	10,540.2	14,908.1	17,445.6

^aSource: National Economic and Development Authority, Philippine Yearbook 1981 (Manila, May 1981), pp. 261-265.

^bCalculated by subtracting the amount of agricultural loans granted by DBP, PNB, ACA and RBs from the Total. This category (Others) includes the Land Bank of the Philippines but it is estimated that private banking institutions comprise the major part of it.

Table 5

Agricultural and Total Loans Granted, Philippines, 1975-79
(Amounts in Million Pesos)

	1975	1976	1977	1978	1979
Total loans granted	91,333.4	101,057.1	100,776.9	113,956.0 ^a	n.a.
Agricultural loans granted	14,095.3	14,113.7	10,540.2	14,908.1	17,445.6
Ratio of agricultural to total loans granted	0.15	0.13	0.10	0.13	-

Sources: National Economic and Development Authority, Philippine Development 6 (January 15, 1979): 9.

Idem, Philippine Yearbook 1981 (Manila, May 1981), p. 260.

^aestimated

n.a. = not available

"[As shown in Table 6], there exists among financial institutions a tendency to favor commercial and export crops in terms of agricultural credit allocation. Sugar consistently received the highest share, accounting for 55 percent of the total agricultural loans while rice, corn and feedgrains averaged only about 19 percent. The seemingly disproportionate sharing pattern reflects the priorities of financial institutions favoring commercial crops, large-scale production and high profitability [thus, neglecting the credit needs of the small farmers]."¹²

The alleged tendency of financial institutions to neglect the credit needs of small farmers is an important hypothesis which needs to be tested. At the same time, one must not overlook the possibility that such disproportionate loan distribution patterns could be explained by relatively small demand for credit by the small farmer segment of the agricultural credit market. These possibilities, therefore, indicate a need to evaluate the individual levels making up the Philippine agricultural credit system in order to arrive at more objective findings.

POLICY STRUCTURE OF THE PHILIPPINE CREDIT SYSTEM

Policies on agricultural credit may affect the credit market, credit institutions and borrowers, either individually or collectively.¹³ Thus, an understanding of the policies affecting each of these sectors is necessary.

¹²Sandoval, "Agricultural Credit," p. 83.

¹³Technical Board for Agricultural Credit, Financing Agricultural Development, pp. 8-9.

Table 6

Agricultural Loans Granted, by Commodity
(Amounts in Million Pesos)

Commodity	1971	1972	1973	1974	1975	1971-75	
						Average amount	% Share
Agricultural Crops	<u>2,662.1</u>	<u>2,837.8</u>	<u>4,420.0</u>	<u>8,388.4</u>	<u>12,547.1</u>	<u>6,171.0</u>	<u>83.9</u>
Palay and corn	429.6	444.9	1,240.2	2,384.5	2,495.8	1,399.0	19.0
Coconut	277.8	278.9	469.2	771.2	759.2	511.3	6.9
Sugar	1,801.8	1,935.5	2,484.2	4,929.9	8,717.8	4,013.8	54.6
Other crops	152.9	178.5	226.4	302.8	384.3	246.9	3.4
Livestock and Poultry	<u>262.4</u>	<u>294.7</u>	<u>296.1</u>	<u>669.2</u>	<u>864.8</u>	<u>477.4</u>	<u>6.5</u>
Fisheries	<u>119.9</u>	<u>145.8</u>	<u>183.7</u>	<u>283.1</u>	<u>431.2</u>	<u>232.7</u>	<u>3.2</u>
Forestry	<u>360.1</u>	<u>455.0</u>	<u>438.9</u>	<u>516.1</u>	<u>604.5</u>	<u>474.9</u>	<u>6.4</u>
TOTAL	3,404.5	3,733.3	5,338.7	9,856.8	14,477.6	7,356.0	100.0

Source: Pedro R. Sandoval, "Agricultural Credit and Small Farms: Experiences, Policies and Programs," Journal of Agricultural Economics and Development 10 (January 1980), p. 93.

The Market Level

At this level, agricultural credit policies support a primarily private enterprise mechanism which allocates credit resources among seekers of credit and is managed by a set of incentives and penalties imposed by the government. The reduction of the Central Bank rediscounting rate for agricultural credit programs and the charging of low nominal rates of interest to small farmers such as agrarian reform beneficiaries and borrowers in priority programs, i.e. food production and export promotion, are all designed to instill social equity considerations in the profit motive guiding the market mechanism.

The Institutional Level

The institutional policy instruments include Presidential Decree 717 which earmarks 25 percent of loanable funds for agricultural credit, the loan guarantee policy which provides up to 85 percent cover for loan losses due to natural calamities to financial institutions, and Central Bank Circular No. 536 which requires the allotment of 75 percent of the total deposits generated in a particular region for investments in that region. These policies attempt to accelerate the flow of credit to the rural areas, in general, and to priority government programs in particular.

The Borrower Level

At the level of the agricultural borrower a number of policies have been established dealing with credit subsidies to farmers, non-collateral lending, acceptance of Certificates of Land Transfer (CLT) as collateral, group lending, forced savings, and hard-line policy on non-repayment. The credit subsidies to farmers in the form of low interest rates seek to

minimize the cost of borrowing and enhance the borrowers' chances of viability. The policies on non-collateral lending, acceptance of CLTs as collateral, and group lending are aimed at increasing the accessibility of the credit facilities to farmers. On the other hand, the forced savings program and the hardline policy on non-repayment attempt to instill discipline among farmers and mobilize savings.

A BRIEF EVALUATION OF THE PHILIPPINE AGRICULTURAL CREDIT SYSTEM

The participation of various lending institutions in agricultural credit programs has facilitated the transfer of new technology to small farmers, enhancing productivity, and leading to increased incomes. A joint study of credit recipients conducted by the Philippine Council for Agriculture and Resources Research (PCARR) and the Bureau of Agricultural Economics (BAEcon) in 1976 revealed that 82 percent of their sample were benefited in procurement of needed farm inputs. Fifty-eight percent of these indicated increased farm production and income as direct benefits derived from the loan. Similarly, a study of farmers in Central Luzon (Best 1977) pointed out that farmers who availed themselves of credit used considerably more fertilizer and other inputs and had greater yield and higher total revenue than those who did not borrow in any form.

In general, reports indicate that a great majority of the farmers-borrowers experienced improvement in both yield and income. However, it has never been established up to what extent credit dissemination has taken place. According to Sandoval, "some studies revealed that bank services tend to concentrate on big borrowers in or within urban areas. Farmers living in more remote places or operating farms on a smaller scale allegedly have loans which entail higher servicing costs and

therefore represent less profitable business. Furthermore, small farmers needing production credit more urgently are those who do not qualify for the conventional collateral-oriented credit programs. As a result, many farmers without security are not able to borrow at all. Still, others cannot borrow as much as they need. It can therefore be concluded that the financial structure may have barely served the small farmers despite the significant improvements in the formal agricultural credit delivery system in the Philippines."¹⁴

The most critical problem plaguing the Philippine credit delivery system is the delinquency and non-repayment of loans. One only has to look at the comparison between the annual growth rate of total agricultural loans granted and agricultural loans past due to visualize this problem (Table 7). This presentation clearly shows that the annual growth rate of loans past due has been greater than the annual growth rate of agricultural loans granted. Experiences with the Masagana 99 (Supervised credit program for rice), as a case in point, showed an average repayment rate of only 74 percent as of 1977.¹⁵

Variations in repayment between lending institutions were very much evident. For the Philippine National Bank and the commercial banks, repayment rates averaged about 75 percent of agricultural loans granted in 1971-75. For the rural banks the rate was as high as 80 percent; while the development banks engaged in term credit registered repayment rates of 63 percent (Development Bank of the Philippines) and 53 percent (private

¹⁴Sandoval, "Agricultural Credit," p. 76.

¹⁵Technical Board for Agricultural Credit, Financing Food Production: A Strategy for Survival (Manila, 1976), p. 6.

Table 7

Agricultural Loans Granted and Past Due Loans
(Amounts in Million Pesos)

	1975	1976	1977	1978	1979
Agricultural loans granted	14,095.3	14,113.7	10,540.2	14,908.1	17,445.6
Percent annual increase (decrease)		0.13	(25.32)	41.44	17.02
Agricultural loans past due	12,930.5	15,565.2	16,329.2	21,434.8	29,274.0
Percent annual increase		20.38	4.91	31.27	36.57

Sources: National Economic and Development Authority, Philippine Development 6 (January 15, 1979);
11.

Idem, Philippine Yearbook 1981 (Manila, May 1981), p. 260.

development banks). The repayment experience of the Agricultural Credit Administration (ACA) whose clientele are mostly marginal farmers has also been low at 63 percent in 1975.¹⁶

A wider variation can be observed between and within regions, with Central Luzon exhibiting the highest default rate. Within this particular region the default rate ranged from 21 percent in Bulacan to 49 percent in Tarlac.¹⁷

Several Studies have been undertaken to identify probable causes of non-repayment and delinquency problems. Among the most prevalent reasons discovered are crop failure, misapplication of loans and the farmers' attitude that loans are a government dole-out. A more significant finding is that the problems and causes of delinquency differed among farmers, technicians and credit agencies (Octavio 1976). This suggests some degree of difference in perceptions by the different groups, i.e. the farmers and the institutions.¹⁸

From another perspective, there are indications that low repayment rates can be attributed to the lack of incentives for repayment on the part of the credit beneficiaries such as in the case of non-collateral borrowing (Best 1977). This indicates that improvement of bank management (such as the implementation of more effective collection practices) may substantially increase repayment.¹⁹

¹⁶Technical Board for Agricultural Credit, Financing Agricultural Development, p. 9.

¹⁷Idem., Financing Food Production, p. 7.

¹⁸Sandoval, "Agricultural Credit," p. 88.

¹⁹Ibid.

While numerous studies have been undertaken to ascertain the problems related to delinquency in repayment, such investigations have been concentrated mostly at the institutional level. Although strict collection programs may help, such efforts provide only a stop-gap measure to save the ailing "agricultural lending business." For if, and when, such collection programs prove to be successful the consequences may not all be desirable, i.e., the farmer is less likely to apply for another loan if he felt harassed or pressured in the course of repaying his previous loan. In fact, findings of the Technical Board for Agricultural Credit²⁰ revealed that neither leniency nor severity on the part of the financial institutions over repayment terms and regulations significantly affect the level of loan arrangements and repayment patterns.

It becomes imperative, therefore, that lending institutions formulate well-balanced credit programs, considering not only the collection stage but the loan introduction phase as well --- a critical phase in the "marketing process"²¹ for it is at this stage that the farmers develop

²⁰Technical Board for Agricultural Credit, "Why the Farmer Does Not Pay," Philippine Development 6 (January 15, 1979): 21.

²¹In presenting an analogy between the marketing of a consumer product and the marketing of agricultural credit, the author considered the "exchange system" concept in basic marketing. From the traditional concept of marketing, a marketer is defined as someone seeking a resource from someone else and willing to offer something-of-value in exchange. Thus, the creditor, as the seller, seeks to earn profits (in the form of interest) while at the same time offers financial assistance to the farmer, which is the buyer in this case. The traditional concept of "marketing mix," defined as the set of controllable variables and their levels that the seller uses to influence the target market, is equally applicable in the case of agricultural credit marketing. The seller (creditor) offers a product (agricultural credit) to his market (the farmers) at a particular price, which is made up of the value of the goods and/or services (capital) plus a certain mark-up (interest). He makes the farmers aware of the availability of the product (promotion) at a particular place. (For the theoretical basis of this analogy see Philip Kotler, Marketing Management: Analysis, Planning and Control [New Jersey: Prentice Hall, 1980], pp. 80-90.)

their perception of the product or service under consideration which is, agricultural credit in this case. If the prospective borrowers develop a healthy attitude toward capital borrowing, then the repayment problem may not exist at all. This preventive measure, however, can best be implemented if, and only if, the institutions concerned are aware of the correct manner of introducing the product/service (agricultural credit) to the customers (farmers), and such can only be attained if the creditors have a thorough understanding of the characteristics of the people they have to deal with.

OBJECTIVES OF THE STUDY

In 1980 a joint group of faculty members and researchers from the University of the Philippines at Los Banos (of which this author is a member) in collaboration with a government financial institution, conducted a study on the problems plaguing the agricultural credit delivery system of the Philippines. The goal was to come up with policy recommendations which could improve the effectiveness of the faltering system. The inquiry was approached considering two sectors of the agricultural credit system: the financial institutions and the borrowers. Problems such as delays in loan releases, capital rationing and delinquency in repayment, among others, were explored.

A major part of the study was intended to focus on the formulation and estimation of some concrete indicators of the credit needs of farmers and the institutions' capacity to lend. This was to be a take-off point in the evaluation of the responsiveness of the credit delivery system; the ultimate goal being formulation of recommendations as to how such responsiveness can be improved, if not optimized. However, due to some personnel and financial limitations the study never advanced

farther than the data collection and organization stages.

This author, considering the relevance of the objectives of the aforementioned study, and the time, efforts and financial resources already devoted to the initial stages of the inquiry, undertakes the current research in the hope of developing significant findings from the now available set of data which could contribute to the completion of the project. In light of resource constraints, the research focuses on the borrower level. Specifically, the author attempts to:

1. Determine the significance of some hypothesized determinants of the amount of capital borrowing desired by small farmers which is an indicator of the demand for credit in the rural areas;
2. Establish specific trends in the relationship between each of the significant variables and the amount of loan desired by the farmers with the ultimate goal of coming up with a good segmentation of the rural financial market and drawing a profile of a typical small farmer-borrower in the Philippines;
3. Verify the existence of the problems of capital rationing, delay in loan releases, delinquency in repayment and fungibility tendencies, and to analyze the factors which could have probably led to their existence; and
4. Determine the variables which could discriminate a farmer-borrower as either a high or low credit risk, with the aim in view of providing the creditors insights as to how to evaluate loan applications in the rural setting.

It is expected that the results of this study will provide a take-off point for the rural financial institutions in their attempt to develop a better "agricultural loan marketing strategy" which, hopefully, will lead

to a more responsive agricultural credit delivery system in the Philippines.

METHODOLOGY

This study uses a part of the set of data gathered during a survey conducted in 1980 during the main study discussed in the preceding section of this chapter.

A multi-stage cluster sampling technique was employed in drawing the sample for the main study. Six provinces in the northern part of the Philippines were selected purposively out of which six towns were randomly selected from each. Ten small to medium farmer-borrowers, defined as farmers cultivating a maximum of 10 hectares of farmland, were randomly selected from each town to represent the main sampling units. (An exception to this sampling procedure was the province of Pangasinan which was sampled for ten towns, instead of six, as a consequence of its relatively larger farmer population). These respondents represent the sampling points at the borrower level.

For each town that was selected, a rural bank was randomly selected from a list of the existing banks in that area. These banks represent the sampling points at the institutional level of the study. Since this specific study concentrates on the borrower level, data gathered from rural banks were not used in the course of the analysis.

This particular study focuses on the Central Luzon Region which was composed of three sample provinces: Pampanga, Nueva Ecija and Pangasinan. The selection of this region as the setting of the study was purposive as it ranks relatively high both in the agricultural credit budget of the government and in repayment default rate. Overall, the sample used in the analysis consists of 220 respondents.

In order to insure more valid survey results each interview was conducted on a personal basis. Interviews were administered by trained research assistants and aides of the University. In cases where differences in dialects were predominant, local enumerators were hired but were closely supervised by the research assistants and aides in the process.

The 32-page questionnaire consists of five main sections. The first section deals with the background information of the respondent such as age, educational attainment, and other demographic and psychographic characteristics. The second section contains questions regarding household characteristics such as the background of the household members, household inventories, and sources of income. The third section of the questionnaire deals with farm operations and farm-related activities such as the planting calendar, marketing practices and some productivity measurements. The fourth section contains questions which reflect the farmer's experiences in credit. The last section of the questionnaire contains open-ended questions concerning the respondent's attitudes toward the thrust of the government in the field of agricultural credit.

The bulk of the data used in this study were extracted from the first four sections of the questionnaire responses.

Of the 220 completed questionnaires, 42 were in some way incomplete or not usable for other reasons. Thus, a total of 178 observations were utilized in this study.

The Statistical Analysis System (SAS) was utilized in summarizing the data and in generating the statistical measures necessary to accomplish the objectives of the study. Specifically, the procedures producing frequency distribution and contingency tables, regression and correlation, and discriminant analysis were employed.

Regression and Correlation Analyses

The regression procedure was utilized in an attempt to determine the significance of nine variables which were hypothesized as strong determinants of the amount of capital borrowing desired by small farmers. These variables were age, education, family income, frequency of farming, tenure, the distance between the farmer's residence and the nearest bank, farm size, the presence or absence of irrigation and the main crop being produced. A correlation matrix was then constructed as supplement to the analysis.

Similarly, the capital rationing factor²², which is an indicator designed to measure the degree to which financial institutions met the stated credit desires of farmers, was regressed with the above variables in an attempt to determine their significance in contributing to the existence of a capital rationing problem.

In the same way, the length of time that farmers had to wait before their loan applications were approved and the loan actually released, was regressed with some variables which were hypothesized to be significantly associated with delays in loan releases.

Cross-tabulation

After isolating each significant determinant of the demand for agricultural credit, bivariate frequency tables were constructed and analyzed in order to establish existing trends between each of the significant determinants and the level of capital borrowing desired by the farmers.

²²The derivation and interpretation of the capital rationing factor is discussed in the presentation of the results of the analysis.

Results of these cross-tabular analyses were then utilized in segmenting the agricultural credit market and in drawing the profile of a typical farmer-borrower.

Frequency tables were also analyzed in the process of verifying the existence of the problems of repayment delinquency and loan diversion tendencies.

Discriminant Analysis

Farmer-borrowers were classified into two "credit risk" categories, i.e. the "low" and the "high credit risks", based on their respective past repayment performance. A discriminant function was then estimated.

The variables that were hypothesized as significant discriminators in the model were the age of the farmer, educational attainment, his annual farm income, the availability of supplementary source(s) of income, farm ownership, the distance between the farmer's residence and the bank, the size of the farm, the availability of irrigation facilities and the main crop being raised. After testing for their significance using the stepwise discriminant analysis procedure, an attempt was made to estimate a discriminant function which could be useful in predicting the risk of loans to individual borrowers.

LIMITATIONS OF THE STUDY

This study was intended to focus on the Central Luzon Region. However, the recent governmental action to reclassify one of the provinces which comprise the study's sample, i.e. Pangasinan, into another region, was unintentionally neglected by those conducting the study. Nevertheless, the author deems it appropriate to ignore this development as Pangasinan, due to its proximity to the provinces of Nueva Ecija and Pampanga, has

traditionally been considered a part of the Central Luzon Region.

The most critical weakness of this project is the unusual length and the quality of the questionnaire used. Due to generally accepted practice of past researchers, many detailed data, e.g. detailed household inventories, were asked for in the questionnaire, which contributed so much to the unusual length of the instrument. The questionnaire had an average completion time of at least 2 hours. This could have accounted for the large number of unanswered portions in many questionnaires, which led to a large proportion of unusable surveys. As a result, some variables which could have proven to be useful in the study were not available from the set of data which make up the survey results.

Chapter 2

FACTORS AFFECTING THE FARMERS' DEMAND FOR AGRICULTURAL CREDIT

A multiple regression model was constructed based on the hypothesis that the farmers' demand for agricultural credit depends on demographic, psychographic, and physical factors. The description of each of these variables is discussed in the following section.

A BRIEF DESCRIPTION OF THE DATA INPUTS

Amount of Loan Desired

This variable was used as a rough indicator of the farmers' demand for agricultural credit. The values for this variable represent the amount of desired loan reported by the respondents in the year 1979 and were considered indicators of their average annual credit needs. Expressed in peso terms, this factor serves as the dependent variable in the regression model.

Age (X_1)

The inclusion of this variable in the analysis stems from the fact that age is often considered a useful predictor of product usage rate²³ (under which agricultural credit can be classified), and of changes in behavior which may aid in the explanation of some borrower-related problems

²³Donald R. Lehmann, Market Research and Analysis (Illinois: Richard D. Irwin, Inc., 1979), p. 117.

in the agricultural credit scene. Age was treated as a continuous variable in the study.

Educational Attainment (X_2)

The level of education a person has attained affects his attitudes and may be considered a good predictor of product usage rate. This factor was treated as a discrete variable taking the values of:

- 0 if the farmer has not attended any school
- 1 if he has reached the elementary or grade school level
- 2 if he has reached high school
- 3 if he has gone to college.

Annual Family Income (X_3)

The magnitude of a person's income usually influences his attitudes toward risk---an important consideration in analyzing the farmer's attitude toward credit. Due to the existence of close family ties within a typical Filipino household the total family income is hypothesized as a significant determinant of the amount of capital borrowing desired by farmers.

Frequency of Farming (X_4)

It is not unusual for a small farmer to take up other (non-farm) jobs in order to augment his income. Being a part-time farmer²⁴ can imply either of two possibilities regarding a person's demand for credit: the farmer may be in a better position to earn substantial supplementary income

²⁴A part-time farmer is defined in this case as one who devotes a part of his farm-working time in attending to other jobs not related to his current farming operations.

which makes credit as a source of financing his farm operations unnecessary, or in the process of attending to his other job(s), he might neglect his farm occupation so that productivity is adversely affected resulting in an increase in his demand for credit. On the other hand, a full-time farmer is hypothesized to have a relatively higher demand for credit based on the assumption of the existence of capital shortage in the rural sector of the economy.

This factor was treated as a dummy variable which takes the value of:

0 if the respondent is a part-time farmer, or

1 if he is a full-time farmer.

Tenurial Status (X_5)

The Agrarian Reform Program of the Philippine government has resulted in more equitable distribution of land among farmers. With documented evidence of increased agricultural lending the possible positive association between these two developments is hypothesized.

Tenurial status (or tenure) was also treated as a dummy variable which takes the value of:

0 if the farmer is a renter-cultivator, or

1 if he is an owner-operator.

Distance Between the Farmer's Residence and the Nearest Bank (X_6)

While most of the farm families reside in remote areas where their farms are usually located, most lending institutions concentrate their operations in or within urban centers. The distance (or proximity) factor is therefore perceived as a determinant of the farmers' desire to borrow. This variable takes on continuous values and is expressed in kilometer units.

Size of Farm (X_7)

The size of farmholding is no doubt an indicator of the extensiveness of farm operations. The scale of operations, in turn, is a perceived determinant of credit demand. Thus, farm size, herein expressed in hectare units, has been hypothesized as a determinant of the amount of capital borrowing desired by the small farmers.

Availability of Irrigation Facilities (X_8)

The availability of irrigation facilities affect the scale of farm operations which, in turn, affects the farmer's demand for credit. The irrigation factor is therefore hypothesized as a determinant of a small farmer's demand for capital borrowing.

This factor was treated as a dummy variable and takes the values of:

- 0 if the farmer has no access to irrigation facilities, or
- 1 if his farm is irrigated.

Main Crop Being Produced (X_9)

It is expected that different crops require different types and/or levels of inputs, thus, creating differences in financial expenditure requirements. Since this study concentrates on a rice-producing region, rice was given more significance than any other crop. This dummy variable takes the value of:

- 0 if the main crop being raised is not rice, or
- 1 if the respondent is a rice farmer.

RESULTS OF THE REGRESSION ANALYSIS

Among the nine variables hypothesized as determinants of credit demand among small farmers, five were found to be significant beyond the 10 percent level. These are education, annual family income, tenure, the proximity factor and farm size (Table 8).

The resulting coefficient of determination (R^2) was 0.2203 which means that only 22.03 percent of the variation in the dependent variable is explained by the variation in the independent variables considered in the model. This implies that some other factors which could account for variation in the dependent variable were not considered in the model.²⁵ This, however, presents no problem as the model was not intended to be used as a predictor equation but, rather, as a tool for testing the significance of some hypothesized determinants of the dependent variable under consideration.

Tests on the Individual Coefficients²⁶

The t-test was used to determine whether the regression coefficients are significantly different from zero.

The null hypothesis for this case is

$$H_0: B_i = 0$$

²⁵As there have been not other documented studies dealing with the same topic of inquiry the author can merely hypothesize the other possible determinants of credit demand. These variables may include other indicators of the social status of the farmers, marital status and the size of household, among others.

²⁶Adopted from Teh-wei Hu, Econometrics: An Introductory Analysis (Maryland: University Park Press, 1975), p. 48.

Table 8

Regression Coefficients, T-Values and Levels of
Significance of Nine Independent Variables
Related to Smount of Capital Borrowing
Desired by Small Farmers
Central Luzon, 1979

Variable	Regression coefficient	T-Value	Pr > t	Level of significance
Age (X_1)	-11.77	-1.09	0.2759	N.S.
Education (X_2)	407.21	1.68	0.0942	*
Annual family income (X_3)	0.02	1.74	0.0839	*
Frequency of farming (X_4)	-282.91	-0.49	0.6280	N.S.
Tenure (X_5)	556.32	1.68	0.0955	*
Distance between residence and nearest bank (X_6)	-10.55	-1.81	0.0723	*
Farm size (X_7)	359.15	3.16	0.0019	**
Irrigation (X_8)	-639.36	-1.24	0.2164	N.S.
Main crop (X_9)	248.91	0.15	0.8792	N.S.

d.f. = 155

 $R^2 = 0.2203$

N.S. = not significant beyond
the 10 percent level of
significance

*significant at the 10 percent
level

**significant at the 0.1 percent
level

since we wish to establish the research hypothesis

$$H_1 : B_i \neq 0$$

The test statistic is

$$t = \frac{B_i - 0}{s_{B_i}}$$

Using the 10 percent confidence level, the computer t-test statistic can be compared with the t-test statistic value from the Student's t-Distribution Table.²⁷ Should the computed t-test statistic exceed this table value (which is 1.645 in this particular case) then the null hypothesis is rejected, implying the significance of the independent variable to the model.

Age

The t-value of this variable is -1.09, which is less than the tabular value for the test statistic. This means that the age of the farmer is not significantly associated with the amount of loan he desires.

Education

As shown in Table 8, education has a computed t-value of 1.68 which makes it statistically significant at the 10 percent level. This result is very much in line with a prior expectations since it is widely accepted that a person's product usage rate increases given more positive information about the benefits associated with that particular product. Agricultural credit seems to present no exception to this generalization.

²⁷The Student's t-Distribution Table can be found in any statistic book.

This result can also be explained by the Philippine government's adoption of a policy of introducing supervised farming programs in both agricultural and general high schools in the country²⁸ as part of its thrust toward boosting the national program of food production. Even though this policy applies only to public schools, the impact of the program on the farmers may be considered substantial considering that public schools, to which the rural families generally have access, constitute 89.92 percent of the total number of schools in Central Luzon.²⁹

Further support to the significance of education in affecting the credit demand of the farmers may be drawn from Halim's³⁰ finding that a farmer who has undergone a high level of formal education tends to adopt productive innovations earlier than a farmer with relatively little education. Thus, associating the level of technology adoption with larger capital expenditures leads one to the conclusion that education, indeed, is a significant determinant of credit demand among small farmers.

Annual Family Income

As expected, this variable has been established to be a significant influencer of the amount of capital borrowing desired by the small farmers. This indicates a tendency toward increased demand for credit among small

²⁸Rodolfo Salcedo, "The Supervised Farming Programs in Ten Agricultural Schools in the Philippines," Journal of Agricultural Economics and Development 1 (July 1971): 145.

²⁹National Economic and Development Authority, Philippine Yearbook 1981, p. 183.

³⁰Abdul Halim, "The Economic Contribution of Schooling and Extension to Rice Production in Laguna, Philippines," Journal of Agricultural Economics and Development 7 (January 1977): 33-46.

farmers as a consequence of their increased capacity to pay. This trend is very much applicable to a condition of capital shortage, as in the case of the Philippines, so that given a higher income cushion, a farmer's propensity to borrow increases in his effort to undertake a wider scale of farm operations.

Results of several studies on the relationship between increases in income and family expenditures can also explain the income effect on the farmers' demand for credit.

Alviar and Nasol³¹ found that rising income resulting from an increased farm productivity (as a consequence of the adoption of technological innovation) led farm families to increase production and at the same time to increase consumption slightly. If we are to interpret the term "increased production" to mean either an expansion of the scale of farm operations or increased level of farm input application (which, in fact, was supported by the authors' finding that the purchase of farm equipment such as weeders and hand tractors was one of the significant results of increased income), the increase in demand for credit as a consequence of a higher income is consistent.

Similarly, Goldman and Ranade³² discovered that the income elasticity of food for rural families is higher than that of urban families. The momentum caused by increased spending, be it for food or non-food items,

³¹Nelly Alviar and Ramon Nasol, "Effects of Technological Change," p. 20.

³²H. Warrack Goldman and C. G. Ranade, "Analysis of Income Effect on Food Consumption in Rural and Urban Philippines," Journal of Agricultural Economics and Development 7 (July 1977): 162.

will most probably result in increased levels of spending³³ so that the portion of expenses that cannot be financed by the farmers' income or savings will have to be financed by borrowings. This cause-effect relationships between income, expenses and borrowing may also be one phenomenon worth considering in analyzing the problems of loan diversion and repayment delinquency in the Philippine agricultural credit system.

Frequency of Farming

This variable has a t-value less than 1.645 which points to its insignificance beyond the 10 percent level. Thus, whether a borrower is a full-time or a part-time farmer has not been shown to be statistically associated with his demand for credit.

The expected result is for part-time farmers to exhibit lower credit demand due to the availability of supplementary income from other jobs, as compared to full-time farmers who have to depend solely on their farm productivity for financial support. Alternatively, part-time farmers may be obliged to work part-time for others during crucial time periods

³³This phenomenon can be explained from the point of view of the consumer behavior aspect of marketing. Specifically, this line of thinking reflects the perceived change in motives brought about by changes in circumstances surrounding the consumer. One important theory which explains this change in motive is that of Maslow (See J. F. Engel, R. Blackwell, and D. Kollat, Consumer Behavior [The Dryden Press, 1978], pp. 221-225). Maslow hypothesized that motives are organized in such a way as to establish priorities and hierarchies of importance. The following classification was suggested, proceeding from the lowest order to the highest: physiological, safety, belongingness, esteem and status, and self-actualization. In support of this argument, Engel, Blackwell and Kollat reported that altered family circumstances, specifically a changed financial status, can result in modified requirements for food, clothing, furniture and other needs (See J. F. Engel, R. Blackwell, and D. Kollat, Consumer Behavior, pp. 229-230).

associated with optimum productivity in agriculture. Thus, they may not be able to work their own fields and therefore may desire less credit.

A rationalization of the non-significant association between a farmer's frequency of farming and his consequent demand for credit is possible through an analysis of the cross-classification table involving the frequency of farming and income variables (Table 9). It is hoped that the relationship between frequency of farming and income can help explain possible relationship(s) between the frequency factor and the amount of loan desired by the farmers, income being found to be a significant determinant of credit demand.

Farmers were categorized into one of three income levels: the high income group, meaning farmers who have a total family income of over ₱ 20,000 per year, the medium income group which would include farmers with annual family income ranging from ₱ 8,086 to ₱ 20,000 and the low income group which would include farm families earning less than ₱ 8,086 per year.³⁴

As revealed in Table 9, 53.40 percent of the full-time farmers were classified as low income earners, 37.70 percent were medium income earners and only 8.90 percent were considered to belong to the high income bracket. On the other hand, 28.57 percent of the part-time farmers were considered low income earners, 42.86 percent were medium income earners and 28.57 percent were classified into the high income level. Considering the

³⁴This grouping was based on the average annual expenditures of the rural families in 1979 which was found to be ₱ 8,085 (See National Economic and Development Authority, Philippine Yearbook 1981, p. 553). Thus, those earning a maximum of ₱ 8,085 were considered poor as their earnings are all directed towards mere subsistence and were therefore classified into the low income group. The categorization of the other income levels was arbitrary.

Table 9

Relationship Between Frequency
Of Farming and Income Level

Income level	Frequency of farming			TOTALS
	No response	Full-time	Part-time	
High	1	17 (8.90)	4 (28.57)	21 (10.24)
Medium	0	72 (37.70)	6 (42.86)	78 (38.05)
Low	1	102 (53.40)	4 (28.57)	106 (51.71)
TOTALS	-	191 (93.17)	14 (6.83)	205 (100.00)

^aFigures enclosed in parentheses represent column percentages except for the marginals which represent marginal percentages.

possible non-significant difference in financing needs between low and medium income earners (which dominate the population of both part-time and full-time farmers)³⁵, then we can say that the frequency of farming is not significantly associated with credit demand although the income variable is significantly associated with the latter.

Tenurial Status

This variable was found to be a significant determinant of the small farmers' demand for credit. One would expect landless farm operators to be more hesitant in applying for larger amounts of capital borrowing due to the collateral-orientation of most credit programs currently in existence in the country.

If we consider Sandoval's³⁶ findings that a shift from tenancy to leasehold or full ownership results in increased productivity and income (and considering our earlier finding of a significant positive association between a farmer's income and his demand for credit), then the argument favoring the acceptance of the positive association between farm ownership (tenure) and credit demand is strengthened.

Proximity of a Farmer's Residence to a Bank

This variable takes an estimated regression of -10.55 with a t-value of -1.81 which make the negative association between the capital borrowing desired by a farmer and the distance between his residence and a bank

³⁵This situation may exist when the respondents making up the low and medium income categories have annual earnings which are approximately within the boundary of the two classifications.

³⁶See footnote 8.

significant at the 10 percent level.

There are at least two partial explanations for this result. First, it may imply that Filipino farmers do not have much patience in attending to time-demanding undertakings which, in a way, present a degree of uncertainty in terms of obtaining favorable results (such as loan application rejection), so that they would rather settle for a smaller scale of operations rather than bear the inconveniences of long travel time and frequent trips to and from the bank. Second, it may imply the possibility of these farmers being relatively unaware (or unconvinced) of the potential benefits in financing a wider scale of operations by credit. These implications present significant considerations for the creditors in designing the features of their credit programs. It seems that utmost consideration must be given in providing the farmers with more information on the benefits of credit as an input in farm operations. It may also present some indications as to the need for establishing mobile bank services, if the distribution of banks cannot be widely dispersed, in order to reach the farmers who live in remote areas.

Farm Size

The t-value of this variable is 3.16 which makes it highly significant at the 1 percent level. Since this variable takes a positive coefficient, it confirms the earlier assumption of the existence of capital shortage among small farmers so that a typical farm operator will have to rely on credit in order to support a wider scale of operations.

Irrigation

This variable is insignificant at the 10 percent level since it takes a t-value of -1.24 which is less than the tabular value (1.645). Thus,

the presence or absence of irrigation on a farm was not statistically significant in explaining its operator's demand for agricultural credit.

Despite this result, the correlation matrix (Table 10) presents some interesting relationships between some variables which may prove to be helpful in understanding the prevailing situation on the farm.

As revealed in the matrix, there exists a significant negative correlation between the irrigation and tenure variables, i.e. renter-cultivators exhibit a greater tendency to provide for irrigation water than the owner-cultivators -- a trend which is obviously contrary to what one would normally expect. This controversial result can be explained by considering the similarly significant negative correlation between tenure and frequency of farming, i.e. owner-operators work on the farm less frequently than the renter cultivators. This could be an indication that the owner-operators, due to the demands from their other job(s), tend to sacrifice their farm operations thus exhibiting less need for irrigation.

The methods of irrigation used in the Philippines may be broadly classified as either traditional, i.e. rainfed and gravity irrigation, or modern. The former are obviously more labor intensive while the latter is capital intensive.

An analysis was undertaken to determine which type of farmers, i.e. owner-operators or renter-cultivators, preferred which type of irrigation, i.e. traditional or modern.³⁷ Results of the correlation analysis (Table 11) between these two variables revealed a coefficient of -0.10095

³⁷ In pursuing the analysis, the non-irrigators were dropped from the sample. Farmers who adopt the modern type of irrigation were then assigned a code of 1 while those who stick to the traditional methods were assigned a code of 0.

Table 10

Correlation Matrix for the Variables
Used in the Regression Analysis

	Amount desired	Age	Education	Family income	Frequency of farming	Tenure	Distance Factor	Farm Size	Irrigation	Crop
Amount desired	X									
Age	-0.039 (0.606)	X								
Education	0.247 (0.001)	-0.354 (0.001)	X							
Family income	0.267 (0.0003)	0.087 (0.250)	0.161 (0.032)	X						
Frequency of farming	0.062 (0.416)	0.072 (0.344)	-0.253 (0.001)	-0.084 (0.270)	X					
Tenure	0.164 (0.030)	0.018 (0.812)	0.292 (0.0001)	0.021 (0.782)	-0.124 (0.104)	X				
Distance factor	-0.087 (0.250)	-0.019 (0.798)	0.091 (0.228)	-0.074 (0.329)	-0.119 (0.117)	-0.020 (0.795)	X			
Farm size	0.318 (0.0001)	0.268 (0.0003)	-0.020 (0.793)	0.384 (0.0001)	-0.061 (0.423)	-0.056 (0.460)	0.048 (0.528)	X		
Irrigation	-0.103 (0.173)	0.039 (0.606)	-0.113 (0.136)	0.041 (0.588)	-0.023 (0.764)	-0.180 (0.018)	0.113 (0.137)	0.029 (0.706)	X	
Crop	0.004 (0.960)	-0.020 (0.799)	0.040 (0.614)	-0.006 (0.943)	-0.019 (0.808)	0.140 (0.078)	0.131 (0.099)	0.073 (0.354)	-0.022 (0.778)	X

^aNumbers in parentheses represent values of Prob > |R| under H_0 : Rho = 0.

Table 11
Correlation Matrix for Education, Tenure
And the Methods of Irrigation^a

	Education	Tenure	Irrigation Method
Education	X		
Tenure	0.2802 (0.0001)	X	
Irrigation	-0.1180 (0.0937)	-0.1010 (0.1570)	X

^aNumbers in parentheses represent values of Prob $> |R|$ under H_0 :
Rho = 0.

which is significant at the 15 percent level. It therefore indicates the owner-operators' preference for labor-intensive, traditional methods of irrigation on the one hand, and the renter-cultivators' preference for capital-intensive, modern techniques on the other. This is consistent with our earlier finding that farm owners tend to take other jobs. This being the case, they tend to farm on a smaller scale, the smallness of which would not justify a high capital investment on more sophisticated irrigation facilities.

The result indicating the renter-cultivators' preference for capital-intensive, modern techniques of irrigation can also be justified considering the possibility that these renter-cultivators are leaseholders, meaning that as beneficiaries of the government's land reform program, they are one step closer to being full owners of the land they are cultivating.³⁸ Thus, the common perception that farm owners tend to adopt advanced farming technology, such as irrigation, as a consequence of greater concern for their owned assets (land) is still acceptable.

A similarly controversial result revealed in the analysis of the correlation matrix is the significant negative correlation between irrigation and education. Normally, one would expect the better-educated farmers to exhibit a greater tendency to use irrigation water. However, following the line of reasoning that these farmers have greater opportunities to find off-farm jobs than the less-educated ones (as implied by the highly significant negative correlation between education and the frequency of farming in Table 10), it follows that the former would give less emphasis on their farm operations, leading to a reduced need for

³⁸The main phases a landless farmer usually undergoes in obtaining ownership of the land he tills are as follows: share tenancy, leasehold arrangement and full ownership. Thus, the renter-cultivator classification can be broken down into two stages: share tenancy and leasehold arrangement.

irrigation.

Since the better-education farmers tend to farm on a smaller scale, it might be irrational for them to invest in highly sophisticated, capital-intensive irrigation facilities. Thus, the apparent preference of educated farmers for the traditional type of irrigation and their less-education counterparts favoring the adoption of modern methods of irrigation (as revealed by a correlation coefficient of -0.11796 which is significant at the 10 percent level for the education and irrigation method variables) can at least be rationalized.

Despite the logic used in the above analyses, a word of caution must be taken in applying such results. That is, the payback period for a certain type of irrigation method must be clearly established before such line of analysis could be readily accepted.

Crop

With a t-value of 0.15 this variable is insignificant at the 10 percent level. Therefore, whatever crop a farmer raises does not give any indication of the amount of capital borrowing he desires. This result contradicts the author's expectation that the main crop a farmer raises affects his demand for credit since different crops require different levels of expenditure. This unexpected result may have been caused by a sampling error since the survey was conducted in a rice-producing region where the probability of finding farmers raising crops other than rice is too small. A better approach that could have been taken is to classify the rice crop, maybe in terms of traditional versus improved variety, depending on the level of inputs needed for their maintenance.

The foregoing discussion reveals that among the different variables hypothesized as having significant effects on the farmers' demand for

agricultural credit the following were found to be statistically significant: educational attainment, annual family income, tenurial status, proximity of the farmer's residence to a bank and the size of his farmholding.

As a validity check of the foregoing results, the correlation matrix (Table 10) proves to be helpful. Relatively higher correlation coefficients were exhibited when the dependent variable (credit demand) was paired with each of the significant variables, thus presenting supplementary evidence for the acceptance of the foregoing results of the regression analysis.

Although the regression model is not intended to be used as a predictor equation, it is worthwhile presenting the final model based on the foregoing analysis. In order to arrive at this, another ordinary least squares regression model was fit, considering only the significant variables mentioned earlier. Results are summarized in Table 12.

The final model³⁹ is therefore presented as:

$$Y = 149.05 + 531.90 X_2 + 0.02 X_3 + 582.34 X_5 - 8.90 X_6 + 331.96 X_7$$

where

- Y = a farmer's annual demand for agricultural credit
- X₂ = educational attainment
- X₃ = annual family income
- X₅ = tenurial status
- X₆ = distance between the farmer's residence and the nearest bank
- X₇ = size of farm

³⁹An investigation of the possible reason behind the low R^2 of the model was attempted by plotting the residuals against the predicted Y values. The outliers, i.e. those that lie three or four standard deviations or further from the mean of the residuals, were identified and another regression was conducted without these observations. However, the resulting R^2 was equally low at 0.1927.

In another attempt to improve the R^2 , significant interactions between variables were included in the regression model. Although the R^2 value increased to 0.3645, dropping the insignificant independent variables resulted to a lower R^2 value (0.2992). Transforming this R^2 value into the adjusted coefficient of determination (\bar{R}^2), it was found that this latest model is not better than the original model as they have \bar{R}^2 values of 0.2386 and 0.2019, respectively. Thus, the original model was retained. (For a discussion of the adjusted R^2 , see N. Draper and H. Smith, Applied Regression Analysis [New York: Wiley and Sons, 1980], p. 152).

Table 12

Regression Coefficients, T-Values and Levels of
Significance of Five Significant Independent
Variables Related to Amount of Capital
Borrowing Desired by Small Farmers,
Central Luzon, 1979

Variable	Regression coefficient	T-Value	Pr > t	Level of significance
Intercept	149.05			
Education	531.90	2.4814	0.0040	**
Annual family income	0.02	1.7574	0.1024	*
Tenurial status	582.34	1.8363	0.1143	*
Distance to bank	-8.90	-1.5707	0.0998	*
Farm size	331.96	3.0302	0.0002	***

$R^2 = 0.2037$

d.f. = 155

*significant at the 10 percent level

**significant at the 0.5 percent level

***significant at the 0.05 percent level

Chapter 3

A SEGMENTATION OF THE AGRICULTURAL CREDIT MARKET

A tabulation of the farmers' preferences on the level of agricultural borrowing shows that a slightly larger proportion of farmers desired over ₱ 2,000 than any of the other two categories (Table 13).

One objective of this study is to analyze relationships between the amount of loan desired by farmers and each of the significant variables identified in the preceding chapter. In this chapter, detailed cross-tabular analysis are presented, considering the association of individual independent variables with the dependent variable under consideration.

EDUCATIONAL ATTAINMENT

As shown in Table 14, the majority of the borrowers (68.18%) have reached only the elementary level of education. Within this specific segment of the market, 30 percent desire capital borrowings of over ₱ 2,000. Since there exists a significant correlation between education and family income (Table 10), this market segment may be considered quite risky to deal with, i.e. they opt for greater amount of borrowing and yet their income is low. This implies the need for creditors to implement more extensive credit-education programs and supervised credit schemes in order to minimize this risk. If we associate property ownership with family income (which, in turn, has earlier been established to be highly correlated with education), then it may imply the need for more liberal collateral policies in order to accomodate more farmers, the majority of which will definitely not qualify for the collateral-oriented credit

Table 13

Levels of Borrowing Desired by Small Farmers

	Frequency	Percent
Over ₱ 2,000	65	36.93
₱ 1,001 to ₱ 2,000	59	33.52
₱ 1,000 or less	52	29.55
TOTALS	176	100.00

Table 14

Relationship Between Educational Attainment
And Amount of Loan Desired^a

Amount desired	Educational attainment				TOTALS
	College	High School	Elementary	None	
Over ₱ 2,000	5 (50.00)	23 (57.50)	36 (30.00)	1 (16.67)	65 (36.93)
₱ 1,001 to ₱ 2,000	3 (30.00)	7 (17.50)	45 (37.50)	4 (66.67)	59 (33.52)
₱ 1,000 or less	2 (20.00)	10 (25.00)	39 (32.50)	1 (16.67)	52 (29.55)
TOTALS	10 (5.68)	40 (17.50)	120 (68.18)	6 (3.41)	176 (100.00)

^aFigures inside the parentheses represent column percentages except for those under the row and column labeled "TOTALS" which represent marginal percentages.

schemes. In order to counteract the risk resulting from this relaxation of the collateral requirements for low-income, less-education farmer-borrowers, this policy recommendation must go hand in hand with the earlier suggestion of implementing more extensive credit-education extension programs and concentrating on the supervised credit schemes.

The tabulation shows that college-educated farmers tend to desire large borrowings in the same way that the high school-educated farmers do. The uneducated segment, however, shows a lower credit demand. These findings, therefore, supplement the previous results that the tendency to borrow greater amounts resides among the highly-educated farmers and declines as the level of education decreases.

If indeed the return in productivity made possible through the use of credit is higher than the cost of credit, and less-educated farmers don't understand such opportunity then they will desire lower amounts of borrowing. Also, if they don't expect to qualify for credit then their stated demand may be small.

ANNUAL FAMILY INCOME

Farmer-borrowers were classified into one of three major income brackets: those earning ₱ 8,085 or less per year, those with an annual family income ranging from ₱ 8,086 to ₱ 20,000 and those with an annual family income exceeding ₱ 20,000.⁴⁰

A chi-square test was then conducted to determine whether or not the farmer's annual family income and his demand for credit are significantly related with each other. The chi-square value of 13.724 obtained from

⁴⁰This classification was based on the trend of expenditures observed in the rural setting (See footnote 34).

this two-variable analysis indicates that the amount of capital borrowing desired by a small farmer is highly dependent on his annual family income.⁴¹

A closer look at the relationship reveals that majority of the borrowers (52.84%) fall under the low income classification (Table 15). As such, the level of credit demand exhibited within this particular segment must be given utmost consideration. The same table (Table 15) reveals that most of these low-income farmers (39.78%) exhibit a desire for capital borrowing ranging from ₱ 1,001 to ₱ 2,000. Low-income farmers desiring loans of ₱ 1,000 or less make up the second largest group, while those who desire loans in excess of ₱ 2,000 make up the smallest portion of the low-income category of farmers.

Further analysis of both row and column percentages support the earlier finding that an increase in the farmer's income leads to an increase in his demand for agricultural credit.

TENURIAL STATUS

Table 16 shows the relationship between the tenurial status of a farmer and his consequent demand for credit.

Although both types of farmers, i.e. renter-cultivators and owner-operators, exhibit a slight preference for large amounts of borrowings, the owner-operator group exhibits more of such inclination than the other. It must be noted, however, that the renter-cultivators comprise the minority (25%). This result leads us back to the earlier perception

⁴¹The chi-square test assumes as a basis of comparison that the two variables are not related (H_0 : the two variables are independent). The computed chi-square value (or index) is compared with a table value. If the calculated index is higher than the table value, then the assumption of independence is rejected (and therefore the variables are said to be related).

Table 15

Relationship Between Income
And Amount of Loan Desired^a

Amount desired	Annual family income			TOTALS
	Over ₱ 20,000	₱ 8,086 ₱ 20,000	₱ 8,085 or less	
Over ₱ 2,000	11 (16.92) (61.11)	31 (47.69) (47.69)	23 (35.38) (24.73)	65 (36.93)
₱ 1,001 to ₱ 2,000	4 (6.78) (22.22)	18 (30.51) (27.69)	37 (62.71) (39.78)	59 (33.52)
₱ 1,000 or less	3 (5.77) (16.67)	16 (30.77) (24.62)	33 (63.46) (35.48)	52 (29.55)
TOTALS	18 (10.23)	65 (36.93)	93 (52.84)	176 (100.00)

^aFigures in each cell represent the frequency count, row percentage and column percentage, in that order.

Chi-square = 13.724

Prob = 0.0082

d.f. = 4

Table 16

Relationship Between Tenurial Status
And Amount of Loan Desired^a

Amount desired	Tenure			TOTALS
	No response	Owner-operator	Renter-cultivator	
No response	0	0	2	-
Over ₱ 2,000	0	17 (38.65)	48 (37.21)	65 (36.93)
₱ 1,001 to ₱ 2,000	2	15 (34.09)	42 (32.56)	59 (33.52)
₱ 1,000 or less	1	12 (27.27)	39 (30.23)	52 (29.55)
TOTALS	3	44 (25.00)	129 (73.30)	176 (100.00)

^aFigures inside the parentheses represent column percentages except for those under the row and column labeled "TOTALS" which represent marginal percentages.

of the need for liberalizing the collateral policies of the credit programs in existence, especially in the case of landless farm operators.

PROXIMITY OF A FARMER'S RESIDENCE TO A BANK

Farmer-borrowers were classified based on the distance between their residence and the nearest bank. Those living within the 20-kilometer radius of a bank were classified into one group while those living in places at least 21 kilometers away from a bank were classified into another group.⁴²

Table 17 shows that majority of the borrowers (77.27%) have established in places outside the 20-kilometer limit. Both groups exhibit a slight preference for loan amounts over ₱ 2,000 but the preference is stronger among those who live in places relatively near the lending institution.

SIZE OF FARM

Farmer-borrowers were dichotomized into two groups based on the size of farm they cultivate: one category includes those who till over 3 hectares, while another classification groups those who operate 3 hectares or less.⁴³

⁴²This classification was based on the prevailing method of calculating the transportation fares in the country i.e. the minimum fare is set to cover the first 20 kilometer distance of travel and an additional amount is applied for every additional kilometer travelled in excess of this. Aside from cost consideration, the travel time, which represents an opportunity cost for farmers, has been considered in this arbitrary classification.

⁴³This grouping was based on the government's traditional definition of a small farmer as one who tills no more than 3 hectares of land. Thus, this classification attempts to separate the small farm operators from their bigger counterparts, although this study, in general, does not adopt the same definition of a small farmer, i.e. it considers 7 hectares as the cut-off point in separating the small from the big farm operators.

Table 17

Relationship Between the Proximity
Factor and Amount of Loan Desired^a

Amount desired	Proximity to bank ^b			TOTALS
	No response	Far	Near	
No response	0	0	0	-
Over ₱ 2,000	1	47 (34.56)	17 (44.74)	65 (36.93)
₱ 1,001 to ₱ 2,000	0	44 (32.35)	15 (39.47)	59 (33.52)
₱ 1,000 or less	1	45 (33.09)	6 (15.79)	52 (29.55)
TOTALS	2	136 (77.27)	38 (21.59)	176 (100.00)

^aFigures enclosed in parentheses represent column percentages except for the marginals.

^bFarmers who live not farther than 20 kilometers from a bank were classified under the "near category" while those who live farther away were categorized under the "Far category."

A cross-tabular analysis between these two variables reveals that a majority of the big farm operators have a tendency to desire loan amounts over ₱ 2,000 while the small farm operators tend to desire capital borrowings ranging from ₱ 1,001 to ₱ 2,000. It is also interesting to note that majority of the sample borrowers (84.66%) are small farm operators (Table 18).

DESCRIPTION OF THE RELEVANT MARKET SEGMENTS

A significant finding that has been uncovered in this part of the study is the existence of a strong preference among farmers for large capital borrowing which, in a way, can be interpreted as an indicator of a bright opportunity toward expanding the Philippine agricultural credit market. However, the trends that were established in the process of analyzing the significant determinants of credit demand uncovered some factors which could be considered as inhibitors of the farmers' preferences for larger amounts of capital borrowing. For instance, majority of the farmers (52.84%) are in the low income bracket which tends to lower the desired amount of capital borrowing, as income has been found to be directly associated with the farmers' demand for credit. Similarly, a greater majority of the farmers (73.30%) do not own the land they cultivate -- a factor which prevents them from borrowing larger amounts. Considering the farm size variable, a still greater share (84.66%) own

⁴³This grouping was based on the government's traditional definition of a small farmer as one who tills no more than 3 hectares of land. Thus, this classification attempts to separate the small farm operators from their bigger counterparts, although this study, in general, does not adopt the same definition of a small farmer, i.e. it considers 7 hectares as the cut-off point in separating the small from the big farm operators.

Table 18

Relationship Between Size of Farm
And Amount of Loan Desired^a

Amount desired	Size of Farm		TOTALS
	Over 3 ha	3 ha or less	
Over ₱ 2,000	16 (59.26)	49 (32.89)	65 (36.93)
₱ 1,001 to ₱ 2,000	6 (22.22)	53 (35.57)	59 (33.52)
₱ 1,000 or less	5 (18.52)	47 (31.54)	52 (29.55)
TOTALS	27 (15.34)	149 (84.66)	176 (100.00)

^aFigures enclosed in parentheses represent column percentage except those under the row and column labeled "TOTALS" which represent marginal percentages.

small farms. This may limit the amount of their desired borrowings. These results lead us to the conclusion that the Philippine agricultural credit market can be segregated into two segments: a classification to include farmers desiring to borrow over ₱ 2,000 and another category to include those exhibiting credit demand ranging from ₱ 1,001 to ₱ 2,000.

The "Big Borrower" Segment

This market segment is generally made up of farmers who have reached at least the high school level of education, earn at least ₱ 8,086 per year (in terms of total family income), own the farms they till which measure over 3 hectares in total area, and live not farther than 20 kilometers away from a bank. Farmers making up this segment, as the segment title implies, will opt for capital borrowings over ₱ 2,000.

The "Small Borrower" Segment

Farmers making up this category exhibit annual credit demands ranging from ₱ 1,001 to ₱ 2,000. They are not as highly educated as the farmers under the first category, having reached only the elementary level of education at most. Their annual family income is approximated at ₱ 8,085 or less. These farmers are renter-cultivators of farms not exceeding 3 hectares in size and they have established their residence in relatively remote places.

Such segmentation reveals the existence of two submarkets⁴⁴ for two slightly modified products, i.e. credit packages differing in loan values

⁴⁴A submarket is defined as a homogeneous grouping which is easily reached by the seller because of the characteristics its members have in common (see Kotler, Marketing Management, p. 82).

and some features. Considering the differences in the characteristics of each segment, the modification of the credit packages appropriate for each may be further altered. For instance, the greater amount of loan desired by the big borrowers calls for the implementation of strict collateral policies. This is just appropriate since the "Big Borrower" segment is composed of farmers who own large parcels of land. On the other hand, small borrowers should be able to avail of credit with liberal policy considerations since they do not own any farm lot which they can present as collateral. Due to the risk associated with this policy, farmers availing of the liberal-collateral credit package should be provided with closer supervision in their farm operations. A great majority of farmers fall under the latter classification, indicating a need for financial institutions to strengthen their farm extension worker/farm technician force, i.e. it calls for a more intensive training and dispersion of farm workers and farm technicians.

In the event that a financial institution is incapable of implementing two distinct credit packages for the two identified market segments, an understanding of the profile of a typical farmer-borrower may prove to be helpful.

Although the mean values of the significant characteristics of the market segments may give a more specific profile (Table 19), the inclusion of a discrete variable, i.e. tenure, prevents a comprehensive description of the profile. Thus, a percentage breakdown of the farmers based on the most frequently observed characteristics is useful.

Based on previous discussions in this chapter, it can be said that 68.18 percent of the farmers-borrowers are elementary educated; 52.84 percent are low income earners; 73.30 percent are renter-cultivators; 77.27 percent live in remote places; and 84.66 percent cultivate farms not exceeding 3 hectares in size.

Table 19

Mean Values of the Variables Considered
In the Segmentation Process

	Mean values
Amount of loan desired	₱ 2,044.41
Educational attainment	2.31
Annual family income	₱ 10,565.37
Tenurial status	0.25
Size of farm	2.17 ha
Distance between the farmer's residence and the bank	43.34 kms

Given this description of the majority of farmers, the financial institution may formulate a credit package which will be appropriate for borrowers exhibiting such characteristics, taking into consideration their implications on loan ceilings, the appropriate repayment schedule, interest rates, collateral requirements and the extent of technical assistance the institutions have to provide the borrowers.

Chapter 4

AN ANALYSIS OF SOME PROBLEMS PLAGUING THE PHILIPPINE AGRICULTURAL CREDIT SYSTEM

Certain problems associated with both the borrowers and the institutions have been stressed at the beginning of the paper. To reiterate, these are capital rationing and delays in loan releases at the institutional level, and the diversion (or fungibility) of loans and delinquency in repayment at the borrower level. This part of the paper attempts to verify the existence of such problems in the small farmer credit market and, when possible, tries to analyze some causes of such shortcomings.

CAPITAL RATIONING

Capital rationing in this particular case is intended to mean the failure of the lending institutions to meet the credit demand of the borrowers. In order to arrive at a concrete measurement of this problem an indicator was formulated in the form of the "capital rationing factor."⁴⁵

The computation for the mean value of this indicator for all observations, however, revealed a value of 0.98 which implies the absence of the capital rationing problem.

There are several reasons that this somewhat surprising finding may be invalid. First, the respondents may not have understood the distinction between "amount desired" and "amount applied for." Secondly, the respondents

⁴⁵The capital rationing factor is derived by taking the ratio of the amount of loan actually granted the farmer to the amount of loan he applied for. Thus, a capital rationing factor of 1 indicates the non-existence of the capital rationing problem while any value less than 1 implies otherwise.

may have been biased in answering the question due to the fear that the government may take some legal actions against the financial institution concerned who, in turn, may take harsh actions against the borrowers in their next credit application.

DELAY IN LOAN RELEASE

The average waiting period between the filing of loan application and the actual release of the amount is found to be 10 days in this particular study. In order to determine the factors which could possibly affect the length of waiting period for a borrower, a regression equation was estimated utilizing ten independent variables which are hypothesized to be significant discriminators used by the creditor in processing the loan applications. These are: applicant's age, educational attainment, annual farm income, frequency of farming, tenurial status, proximity of the farmer's residence to the bank, farm size, availability of irrigation facilities, main crop being raised and the amount of loan stated in the application. The results are summarized in Table 20.

Specifically, the regression results show that the amount of loan applied for by the applicant is the only significant determinant of the length of the loan processing period. With an R^2 value of only 0.1558, however, it is evident that factors other than those included in the analysis could lead to variations in the length of the loan processing period experienced by the small farmers. As the author would hypothesize, factors such as the time of the year that the loan application is filed, the past experience(s) of a particular bank regarding delinquencies in repayment, the size of bank and applicant's affiliation with the bank officials, among others, may prove to be significant in explaining the differences in the length of loan processing periods experienced by the

Table 20

Regression Coefficients, T-Values and Levels of
Significance of Ten Independent Variables
Related to Variations in the Length of
Loan Processing Period

Variable	Estimate	T-Value	Pr > t	Level of significance
Age	-0.06	-1.10	0.2735	N.S.
Education	-0.17	-0.13	0.8964	N.S.
Annual family income	-6.38×10^{-5}	-0.97	0.3313	N.S.
Frequency of farming	3.21	1.04	0.2992	N.S.
Tenurial status	-0.72	-0.41	0.6851	N.S.
Proximity factor	-0.02	-0.70	0.4862	N.S.
Farm size	-0.18	-0.29	0.7724	N.S.
Irrigation	1.29	0.47	0.6369	N.S.
Main crop	3.41	0.40	0.6930	N.S.
Amount of loan applied for	0.002	4.59	0.0001	*

d.f. = 155

 $R^2 = 0.1588$ N.S. = not significant beyond
the 10 percent level*significant at the 0.01 percent
level

borrowers. Unfortunately, such data were not collected.

DELINQUENCY IN REPAYMENT

The repayment problem is considered to be the most critical problem plaguing the Philippine agricultural credit system. In view of the proliferation of evidence pointing to the existence of this problem,⁴⁶ the author has chosen to focus on the analysis of some factors which may prove to be helpful in explaining this problem (Table 21).

The respondents in the study were asked the reason for their most recent delinquency in loan repayment. Results show that 81.71 percent did not cite any reason for delinquency. This could give some vague implications: it could either be that those who did not respond were really not delinquent, or that they were just trying to avoid the issue due to the fear that such revelation might affect their future credit rating. It is interesting to note, however, that low production was still cited as a major cause of the problem -- a finding that has been cited in almost all studies dealing with an investigation of the causes of repayment delinquency.

An analysis was also conducted to determine the relationship between the length of the loan processing period and the credit beneficiaries' repayment performance. As shown in Table 22, delays in loan release are significantly associated with repayment delinquency.

Specifically, the analysis reveals that if the loan applied for is released within one week, the associated delinquency rate is 25 percent. However, a loan processing period of 8 to 14 days is associated with a delinquency rate of 37.14 percent. Worst, a loan processing period of

⁴⁶See Chapter 1.

Table 21

Reasons Cited by Small Farmers for
Delinquency in Loan Repayment

	Frequency	Percent
No reason cited	143	81.71
Low production	24	13.71
Unexpected expenses	8	4.57
TOTALS	175	99.99

Table 22

Relationship Between the Length of Loan
Processing and Delinquency in Repayment^a

Delinquency	Loan processing period				TOTALS
	No response	One week or less	One to two weeks	Over two weeks	
No response	0	7	1	0	8 (4.62)
Delinquent	0	27 (25.00)	13 (37.14)	12 (40.00)	52 (30.06)
Non-delinquent	2	74 (68.52)	21 (60.00)	18 (60.00)	113 (65.32)
TOTALS	-	108 (62.43)	35 (20.23)	30 (17.34)	173 (100.00)

^a Figures enclosed in parentheses represent column percentages except in the case of those under the row and column labeled as "TOTALS" where they represent marginal percentages.

over two weeks is associated with a delinquency rate of 40 percent.

These findings could somehow imply a possibility that small farmers do not give much allowance between the time that they file their loan application and the time that they need the farm inputs which are expected to be financed by the loan proceeds. This being the case, any delay in loan release decreases the usefulness of the loan in improving the productivity of the farm. The situation worsens if the delayed amount of credit is diverted to non-farm uses so that the farmer ultimately faces some difficulties when repayment time comes. Alternatively, applications from farmers classified as higher risks get longer scrutiny and the lower repayment rates may indicate that this is justified. Thus, there is no conclusive result in this particular inquiry.

FUNGIBILITY OF LOANS

A simple approach in the verification of the existence of the fungibility problem is the analysis of the frequency table of the actual loan utilization by the credit beneficiaries (Table 23). Based on such investigation, however, the existence of the loan diversion problem cannot be clearly established since only one respondent admitted to have channelled his agricultural loan to non-farm use(s).

The validity of this result may be questioned on two grounds: first, the high incidence of no-response answers and second, the very high possibility of non-admission by respondents of this unacceptable practice (of loan diversion) due to the fear that their credit worthiness might be affected if such situation is uncovered.

As a validity check, Table 21 can again be utilized. With 4.57 percent of the respondents admitting that their repayment delinquency had been caused by unexpected expenses, it shows that more than the 0.56

Table 23

Actual Loan Utilization by Credit Beneficiaries

	Frequency	Percent
Farm inputs	105	58.89
Hired labor	12	6.74
Non-farm use	1	0.56
No response	60	33.71
TOTALS	178	100.00

percent exhibited in Table 23 could have practiced loan diversion to non-farm activities especially if the term "unexpected expenses" is interpreted to mean "non-agriculturally related expenses."

Another approach which could test for the presence or absence of the tendency among small farmers to practice loan diversion to non-farm uses is to solicit their attitudes toward the supervised credit program, specifically the type which grants credit in the form of the needed inputs instead of cash.

As seen in Table 24, only 19.10 percent of the respondents object to receiving credit in kind as compared to those who favor the scheme which comprise 69.10 percent of the borrower population under study. This 19.10 percent figure, however, represents an increase in the tendency toward loan diversion if we are to consider the negative response as an indication that such farmers intend to use the loan for some other (non-farm) purposes.⁴⁷ The argument favoring the existence of the fungibility problem is further strengthened if the no-response answers are considered in the analysis. In addition to this, it is also possible that some of the respondents favoring the "credit in kind" scheme may have experienced diverting agricultural loans to non-farm uses in the past. Having experienced the unfavorable consequence of such malpractice, it is possible that they want to avoid doing it again in the future so that they believe that getting the necessary inputs instead of cash may be of great help.

The foregoing analyses all point out to a high probability of the existence of loan fungibility problems in the Philippine agricultural credit system. Unfortunately, no significant findings were uncovered in

⁴⁷ Some observers may argue, however, that farmers who don't want credit-in-kind simply feel that they can get inputs at a lower cost with cash. Thus, there is a need for a deeper analysis of this particular problem in the agricultural credit system.

Table 24

Attitudes of Small Farmers Toward Credit in Kind

	Frequency	Percent
Favor	123	69.10
Disfavor	34	19.10
No response	21	11.79
TOTALS	178	99.99

the author's attempt to isolate the possible causes of such problems.

CREDIT SOURCE PREFERENCES OF FARMERS

An attempt was made to determine the specific types of credit sources preferred by small farmers and to identify the primary reason for such choice (Table 25). The analysis revealed that rural banks were the most popular choice with 82.08 percent of the borrowers expressing such preference. It is important to consider, however, that whatever the source preference was, the most frequently cited reason for any preference was the ease in dealing with the bank officials in the process of loan application. Incidentally, this reason also considers the length of loan processing period before the amount is released. The proximity factor accounted for the second most popular reason.

These findings supplement the earlier results of the regression analysis which pointed out the significance of the distance factor in stimulating the farmer's interest in agricultural borrowing. The high exposure of the farmers to the rural banks just points out to the strategic location and the proliferation of this particular type of financial institution. In addition, the "ease" category of responses could also be interpreted to include the greater accessibility of farmers to the credit source under consideration so that the heavy volume of responses citing this factor as a reason for preference points out to the significance of considering strategic positioning of credit institutions as a move toward the improvement of the responsiveness of the credit delivery system in general.

Table 25

Relationship Between Reasons for Preference
And the Preferred Sources of Credit^a

Preferred credit source	Reasons for preference				TOTALS
	Ease	Low interest rate	Proximity	No collateral	
Non-institutional sources	1 (1.59)	0	0	0	1 (0.94)
Government banks	1 (1.59)	0	0	0	1 (0.94)
Private banks	12 (19.05)	0	5 (20.00)	0	17 (16.04)
Rural banks	49 (77.78)	9 (100.00)	20 (80.00)	9 (100.00)	87 (82.08)
TOTALS	63 (59.43)	9 (8.49)	25 (23.58)	9 (8.49)	106 (100.00)

^aFigures enclosed in parentheses are column percentages except for those under the row and column labeled as "TOTALS" which represent marginal percentages.

Chapter 5

CRITERIA FOR EVALUATING CREDIT RISKS POSED BY FARMER-BORROWERS

The piling up of loan arrearages in recent years has led the Philippine government to impose stringent rules and penalties for delinquent farmer-borrowers. In addition to the usual 2 or 3 percent penalty on delinquent loans, new rules with varying degrees of severity on the farmer were adopted: withdrawing of the fertilizer subsidy; filing of cases before the courts; and blacklisting the delinquent borrowers to prevent them from being able to obtain another loan. On the other hand, a 2 percent interest rebate for timely repayment was offered by the banks. Very few farmers, though, took advantage of this incentive.⁴⁸ This supports the earlier argument presented in the paper that neither leniency nor severity on the part of the financial institutions can affect the loan repayment performances of the farmer-borrowers.

If such is the case, then it is logical to give more emphasis on the loan evaluation phase in order to present a preventive measure in the context of avoiding the occurrence of the delinquency problem. It is due to this consideration that the author attempted to develop an acceptable model for evaluating the credit risks associated with each agricultural loan application, given a knowledge of the characteristics associated with past borrowers.

The above policy alternative, however, must be taken with caution. It must be realized that in turning down risky borrowers, repayment rate

⁴⁸Technical Board for Agricultural Credit, "Why the Farmer Does Not Pay," pp. 20-21.

may increase but agricultural productivity may drop. Thus, supplementary policy measures must be considered in order to minimize the costs associated with the implementation of such loan evaluation procedure, i.e. decrease in agricultural productivity as a result of turning down (risky) borrowers who could have contributed to a greater overall agricultural production.

HYPOTHESIZED DISCRIMINATORS OF CREDIT RISKS

Past studies dealing with the Philippine agricultural credit system have concentrated mostly on the repayment delinquency problem. Results of such studies have identified the important factors which usually distinguish between the paying and the non-paying farmer. Such factors served as a guide for the author in selecting the variables to be included in this particular study. However, due to data limitations, only the following variables were considered: age of the farmer, educational attainment, annual farm income, availability of other income sources, farm ownership, distance between the farmer's residence and the source of credit, farm size, presence or absence of irrigation and main crop being produced.

Age (Z_1)

The age of a person is usually considered as a chronological indicator of his maturity which, in turn, is an influencer of his attitude toward credit and repayment. This is due to the fact that the more mature a person is the greater the probability that he will act according to the norms of the society he lives in.

This factor was treated as a continuous variable in the course of the study.

Education (Z_2)

Education is among other things, a tool for socialization, i.e. inculcating "good" morals and conduct in a person. Thus, the more educated a person is, the greater the probability that he will act according to the standards of the community.

In addition to this, educational attainment is a very strong force which could help a person land a better job. Thus, a credit applicant who is highly educated would normally be considered a low credit risk.

This factor was treated as a discrete variable taking the values:

- 1 if the respondent has not attended any school
- 2 if he has reached the elementary level of education
- 3 if he has reached high school, or
- 4 if he has gone to college.

Annual Farm Income (Z_3)

Instead of utilizing the annual family income variable, the author deems it more appropriate to consider the farmer's annual farm income as a hypothesized discriminator of credit risk. This is due to the author's belief that no matter how strong the family tie is within a household, loan application and loan repayment are two different activities which could trigger different human responses and actions.

It is expected that farmers having higher farm income would pose a lower degree of risk of non-repayment than farmers who have lower farm income.

This variable takes on continuous values expressed in peso terms.

Availability of Supplementary Source(s) of Income (Z_4)

Supplementary income provides the farmer a greater allowance in terms of repayment ability especially in case of crop failure. Thus, farmers who avail of other (non-farm) jobs may be considered lower credit risks than those who depend solely on farming for their living.

The values of this variable were taken from the "frequency of farming variable" used in the earlier part of the study. Thus, part-time farmers were automatically assumed to have other jobs and were therefore assigned a code of 1, while full-time farmers, having no other source of income, were assigned a code of 0.

Farm Ownership (Z_5)

A farmer who owns the land he tills and presents it as collateral for borrowing is more likely to repay on time. On the other hand, a landless farm operator who has no choice but to avail of non-collateral loans is hypothesized to pose a greater risk of non-repayment.

This variable was derived from the tenure variable discussed in Chapter 2. It was treated as a dummy variable taking the value of:

- 0 if the respondent is a renter-cultivator, or
- 1 if he owns the land he tills.

Distance Between the Farmer's Residence and the Source of Credit (Z_6)

A credit beneficiary living near the source of credit is believed to be punctual in repayment as compared to those who live in remote areas.

This variable is actually the "Proximity factor" used in Chapter 2. It has to be assumed, however, that farmers avail of loans from the nearest bank if the said variable is to be used. There is no difficulty in justifying this assumption as it has earlier been established that the

farmers' credit source preference is usually a result of this proximity factor consideration (Chapter 4).

This variable is considered continuous and is expressed in kilometer units.

Farm Size (Z_7)

The size of farm being cultivated by a farmer is an indicator of the scale of his operations which, in turn, is an indicator of his income-generating capacity. Thus, this variable was considered in this analysis.

Taken as a continuous variable, farm size is expressed in hectare units.

Availability of Irrigation Facilities (Z_8)

Irrigation is one of the major components of the advanced farming technology in rice production. It therefore follows that irrigated farms are more likely to be more productive than non-irrigated farms, thus their operators are more likely to be low credit risks.

This factor was taken as a dummy variable taking the value of:

0 if the farm is not irrigated, or

1 if it is irrigated.

Main Crop Being Produced (Z_9)

The viability of the project being financed by the credit program is a direct indicator of the farmer's capacity to repay. Since the Central Luzon Region is most favorable for rice production, the investment in other crops is considered to present a greater degree of risk. Thus, this variable takes the value of:

0 if the crop being produced is not rice, or

1 if the crop raised is rice.

Since this variable is also an adaptation of the same variable used in the regression analysis in Chapter 2, and there are no available data that could indicate the project (crop) the farmer intends to finance with the credit he applies for, it is just assumed that the farmer will not undertake any shift in terms of the crop he currently produces.

THE SIGNIFICANT DISCRIMINATORS OF CREDIT RISKS

Stepwise discriminant analysis was used to scan the variables hypothesized as significant discriminators of credit risks. The procedure is supposed to select those variables which add most to the explanation of the variance between the group means, given the variables already included in the analysis.⁴⁹ Unfortunately, results of this procedure did not yield any discriminator which was significant at the 10 percent level (Table 26). However five variables were found to be significant

⁴⁹The differences in means between the groups for each variable was tested by the one-way ANOVA F-test:

$$\frac{(\bar{Z}_{1j} - \bar{Z}_{2j})^2}{s_{1j-2j}^2} \text{ is } F_{a,1,N_1+N_2-2}$$

The accuracy of this test is usually considered inferior when compared with that of the test of significance used in regression analysis. In fact, several authors doubt the possibility of testing the real significance of individual discriminant coefficients. As Grablowsky and Tally put it, the discriminant function coefficients are not unique, although their ratios are. Therefore, it is not possible to test individually the significance of these coefficients as is done for regression coefficients (see B.J. Grablowsky and W.K. Talley, "Probit and Discriminant Functions for Classifying Credit Applicants: A Comparison," Journal of Economics and Business 3 [Spring 1981]: 254-261). Rao attributed this non-uniqueness property of discriminant coefficients to the fact that they are the estimates of definite population parameters. What is unique, therefore, is the ratio of any two coefficients, the test of significance of which has been taken care of by the ANOVA F-test discussed above (see C.R. Rao, Advanced Statistical Methods in Biometric Research [New York: Wiley, 1952], pp. 250-251). Thus, the resulting F-test statistic should only serve as a guide as to the relative significance of each variable in the model.

Table 26

Resulting F-Values and Prob > F From
The Stepwise Discriminant Analysis

Variable	F-Value	Prob F
Age (Z_1)	0.556	0.4571
Education (Z_2)	1.411	0.2367
Annual farm income (Z_3)	1.984	0.1610
Supplementary source of income (Z_4)	1.184	0.2781
Farm ownership (Z_5)	1.616	0.2055
Proximity factor (Z_6)	1.516	0.2200
Farm size (Z_7)	1.406	0.2375
Irrigation (Z_8)	0.296	0.5870
Crop (Z_9)	0.143	0.7057

discriminators with a 25 percent probability of rejecting their actual significance.⁵⁰ These are: farm income, farm ownership, the distance factor, education and farm size. These variables were then used in conducting another discriminant analysis which eventually yielded the discriminant function:

$$D = -0.3569 Z_7 + 0.3105 Z_5 + 0.3078 Z_2 + 0.0155 Z_6 + 0.0001 Z_3$$

where

Z_7 = farm size

Z_5 = farm ownership

Z_2 = educational attainment

Z_6 = distance between the farmer's residence and the
source of credit

Z_3 = annual farm income

The discriminant coefficients indicate that farm size is the best discriminator among the five significant variables identified and annual farm income is the worst.⁵¹

The results of the analysis also indicate that these five variables account for only 62.35 percent of the discriminable variance between the two credit risk classifications. The not-so-high value of the "percent

⁵⁰Although the 10 percent level of significance has been established as the threshold of rejection/acceptance in this study, it has been extended to the 25 percent level due to the limitations discussed above.

⁵¹The discriminant coefficients indicate the relative contribution of a unit of each of the independent variables to the discriminant function. A large discriminant coefficient means that a one-unit change in that particular variable produces a change in the discriminant function and vice versa (see Lehmann, Market Research, p. 507). The comparison of the mean value of the discriminators between the two groups could also explain the trend of classification indicated by each of the discriminator in the function (see Table 27).

Table 27

Means of Variables in the Discriminant Function

	Low credit risk	High credit risk
Farm size	2.15	2.41
Farm ownership	0.28	0.18
Education	2.36	2.18
Distance factor	45.33	39.20
Farm income	9,378.08	7,350.08

correctly classified"⁵² indicator can be traced to the low significance levels of the discriminators considered in the function. The inclusion of other more significant discriminators in the analysis could have led to a better fit of the model⁵³.

Farm Size

The inclusion of the farm size variable is not surprising. However, the classification herein exhibited, i.e. farmers with bigger farmholdings being classified as high credit risks, is striking. One would normally expect small farm operators to pose a greater risk of non-repayment than their bigger counterparts due to the perceived association between farm size and productivity.

This finding, however, is consistent with Sandoval's⁵⁴ report that the mean rice yield per hectare (and thus, farm income) is inversely related with the size of farm. This may be explained on the basis of the more intense application of variable inputs to the small farming units. This may also serve as a confirmation of the earlier stated assumption of the existence of capital shortage in the Philippine agricultural scenario so that given limited capital (and therefore, limited inputs), the expansion of the scale of land cultivation fails to increase the overall productivity of the farmer.

⁵²The "percent correctly classified" is analogous to R^2 in regression. In order to arrive at this measure, the number of correct predictions (in this case, $33 + 68 = 101$) is divided by the number of observations (162) and then multiplied by a factor of 100 (see Table 28).

⁵³Variables which could be more significant discriminators might include the applicant's marital status; the number of dependents, amount of savings and the amount of loan outstanding. These factors could have been included in the analysis had the problem of data limitation not been encountered.

⁵⁴Sandoval, "Agricultural Credit," p. 84.

Table 28

Classification by Discriminant Analysis

True Classification	Number (and percent) classified as		Totals
	High credit risk	Low credit risk	
High credit risk	33 (67.35)	16 (32.65)	49 (100.00)
Low credit risk	45 (39.82)	68 (60.18)	113 (100.00)
TOTALS	78 (48.15)	84 (51.85)	162 (100.00)

Percent correctly classified = 62.35%.

Farm Ownership

The inclusion of the farm ownership variable is also not surprising since this is an indicator of a borrower's security which, in turn, serves as a significant influencer of a farmer's attitude toward loan repayment. This is specifically true in the case of collateral-oriented credit programs which are believed to dominate the Philippine rural scene.

Farm ownership is considered a broad indicator of a farmer's social status. This becomes evident if we consider the significant positive correlation existing between this variable and education and the indicator of the availability of other source(s) of income, respectively (Table 29). Thus, it can be said that farmers who are highly educated, own the farm they cultivate and have some other sources of income are less risky to deal with in terms of granting agricultural loans.

Educational Attainment

The relevance of the education variable in discriminating between the two credit risk classification has been mentioned. This argument is further strengthened by considering its inclusion in the resulting function.

Results of the discriminant analysis indicate that farmers who have reached a higher level of education are less likely to fail in repayment than those who have reached a relatively lower level of education. This conclusion is in line with the findings of the Technical Board for Agricultural Credit which revealed that higher educational attainment serves as a significant indicator separating the paying from the non-paying farmer.⁵⁵

⁵⁵Technical Board for Agricultural Credit, "Why the Farmer Does Not Pay," p. 18.

Table 29

Sample Correlations of Included Variables
In the Discriminant Analysis

	Age	Education	Farm Income	Other source(s) of income	Farm ownership	Distance factor	Farm size	irrigation	Crop
Age	X								
Education	-0.5133 (0.0003)	X							
Farm Income	-0.0027 (0.9857)	0.06553 (0.6652)	X						
Other income	-0.3430 (0.0196)	0.2426 (0.1043)	0.0235 (0.8768)	X					
Farm ownership	-0.3068 (0.0381)	0.2482 (0.0962)	-0.0371 (0.8068)	0.3023 (0.0412)	X				
Distance factor	-0.1509 (0.3168)	0.1061 (0.4830)	-0.2746 (0.0647)	0.0886 (0.5583)	-0.0740 (0.6249)	X			
Farm size	0.2333 (0.1187)	-0.0238 (0.8754)	0.0651 (0.6676)	-0.0038 (0.9798)	-0.2337 (0.1180)	0.0863 (0.5686)	X		
Irrigation	0.0865 (0.5675)	0.1382 (0.3596)	0.0880 (0.5610)	0.0521 (0.7312)	-0.1799 (0.2316)	-0.2652 (0.0748)	0.2248 (0.1331)	X	
Crop	-0.0450 (0.7666)	0.0590 (0.6969)	-0.0320 (0.8327)	0.0222 (0.8835)	-0.3023 (0.0412)	0.2073 (0.1669)	0.1674 (0.2662)	-0.0521 (0.7312)	X

^aNumbers in parentheses represent values of Prob > |R| under H_0 : Rho = 0.

Several interrelationships among variables could help in the further explanation of this trend (Table 29).

Since farm ownership has been found to be a significant discriminator of credit risk, and farm ownership and education are positively correlated with each other, then the role of education as a significant discriminator of credit risk is reinforced.

The positive correlation between the availability of other source(s) of income and education also helps explain the significance of education in the model. That is, the highly-educated farmers have a greater opportunity to obtain other jobs thus, augmenting their income, and therefore, can be considered as low credit risks. This is in line with a report (TBAC 1977) that if income from the sale of the farmer's produce is not enough, then other financial assets like income from other sources and savings could get him through.⁵⁶

Distance Between the Farmer's Residence and the Source of Credit

Octavio (1976) found that the probability of repayment is inversely related to the distance between farms and the bank. Similarly, the negative correlation between the distance factor and farm income (Table 29) implies that farmers residing far from the bank suffer from low productivity and income, as may be caused by their relative inaccessibility to the supplier of the needed farm inputs.⁵⁷ Since farm income has been identified as a significant discriminator of risk, i.e. higher farm income indicates

⁵⁶Ibid.

⁵⁷This agrees with Alviar's and Lantican's report that one of the major factors affecting a higher rate of technology transfer in rice production is better road and shorter distance of the farm to the nearest urban center (See Alviar, Nelly and Flordeliza Lantican, "Factors Affecting Technology Transfer in Rice Production at the Regional Level," Journal of Agricultural Economics and Development 10 (January 1980): 66.

a greater probability of repayment, then the inverse relation between repayment and the distance factor is reemphasized. However, the discriminant function resulting from this study points out to the contrary. That is, the resulting function classifies farmers residing near the bank as high risk while classifying farmers residing in remote places as low credit risk.

There are two possible explanations of this result. First, it may indicate the concentration of the banks' collection activities in the remote areas. Second, it is possible that farmers living near the banks (which are mostly situated in urban centers) are more exposed to impulse buying so that the amount reserved for loan repayment are usually diverted to personal consumption expenditures.

Annual Farm Income

The inclusion of the farm income variable in the discriminant function is also in line with a priori expectations that the magnitude of a person's income is a direct indicator of his capacity to pay. Specifically, this result agrees with the findings of the Technical Board for Agricultural Credit that the sufficiency of a farmer's income from his farm operation is a guarantee that he could pay.⁵⁸

AN APPLICATION OF THE DISCRIMINANT FUNCTION

Utilizing the discriminant function for classification purposes calls for the calculation of the mean values for the two groups on the discriminant function.

⁵⁸Technical Board for Agricultural Credit, "Why the Farmer Does No Pay," p. 18.

Denoting the discriminant function for the low credit risk category as D_{lcr} and that of the high credit risk classification as D_{hcr} , the mean value for the two groups on the discriminant function are as follows:

$$\begin{aligned}\bar{D}_{lcr} &= -0.3569 (2.15) + 0.3105 (0.28) + 0.3078 (2.36) + \\ &\quad 0.0155 (45.33) + 0.0001 (9,278.08) \\ &= 1.6864\end{aligned}$$

$$\begin{aligned}\bar{D}_{hcr} &= -0.3569 (2.41) + 0.3105 (0.18) + 0.3078 (2.18) + \\ &\quad 0.0155 (39.20) + 0.0001 (7,350.55) \\ &= 1.2094\end{aligned}$$

The cut-off point⁵⁹ can be derived as

$$\frac{\bar{D}_{lcr} + \bar{D}_{hcr}}{2} = \frac{1.6864 + 1.2094}{2} = 1.4479$$

Given this cut-off point we can predict the credit-worthiness of a farmer-borrower based on his score on the discriminant function. If his score is greater than 1.4479 he would be classified as a low credit risk, and vice versa.

An Illustration

Assuming we wish to classify a farmer (credit applicant) as either a low or high credit risk based on the following information:

Education: College (code = 4)

Residence: 5 km away from the bank

Farm owner?: Yes (code = 1)

Farm size: 2 hectares

Annual farm income: ₱ 6,000.00

⁵⁹See Lehmann, Market Research, p. 515.

In this case,

$$\begin{aligned} D &= -0.3569 (2) + 0.3105 (!) + 0.3078 (4) + 0.0155 (5) + \\ &\quad 0.0001 (6,000) \\ &= 1.5054 \end{aligned}$$

Since his discriminant score (1.5054) is greater than the cut-off point (1.4479), we would classify this applicant as a low credit risk.

It must be realized, however, that the discriminant function alone would be insufficient to base credit decisions upon, especially given that this particular function had a correct classification rate of only 62.35 percent. As has been pointed out earlier, the inclusion of other variables in the model could lead to a more realistic predictive equation. As a final note, one must not overlook the promise offered by probit and linear probability functions in doing similar classifications.⁶⁰

⁶⁰For an application of the probit function, see Garblowsky and Talley, "Probit and Discriminant Function". For more discussions on the probit and linear probability functions, see R.S. Pindyck and D.L. Rubinfeld, Econometric Models and Economic Forecasts (New York: McGraw-Hill, 1981), pp. 273-312.

Chapter 6

SUMMARY AND CONCLUSIONS

A SUMMARY OF RESULTS

The main objectives of this study were:

- 1 - To determine the significance of variables which were hypothesized to be strong determinants of small farmers' demand for agricultural credit;
- 2 - To construct a viable segmentation of the agricultural credit market and, consequently, to draw a profile of a typical small farmer-borrower;
- 3 - To analyze the factors contributing to the prevalence of stubborn problems in the Philippine agricultural credit scene; and,
- 4 - To determine the set of characteristics which could be considered as discriminators of the credit risk classification of a small farmer-borrower.

In order to accomplish these objectives, the data set from a previously conducted survey (in 1980) dealing with a related topic of inquiry was used.

Regression analysis was used in the process of determining the significance of the hypothesized determinants of small farmer credit demand. Cross-tabular analyses were used in segmenting the agricultural credit market and in the analysis of problems plaguing the Philippine agricultural credit delivery system. Finally, discriminant analysis was utilized in the construction of a model which could serve as a basis of classification of the degree of risk posed by individual farmer-borrowers.

Determinants of Demand for Agricultural Credit

The amount of loan a farmer desires was used as an indicator of the demand for agricultural credit. Regressing this variable with nine independent variables led to selection of those which were significant in the model.

Five factors were found to be significant determinants of the demand for agricultural credit: education, annual family income, tenurial status, proximity of the farmer's residence to the bank and farm size. Specifically, the analysis revealed direct significant relationships between the demand for agricultural credit and education, income and farm size, respectively. It was also discovered that farmers who own the land they till tend to opt for greater amounts of borrowing compared to the renter-cultivators. A striking result was the tendency among farmers who live near the financial institutions to be relatively larger borrowers than those who live farther away from the bank.

Segmentation of the Agricultural Credit Market

A strong tendency to desire large amounts of capital was found to exist among farmers. However, an analysis of the factors significantly associated with credit demand revealed that factors which were associated with small credit demand reside in majority of the farmers. Factors such as income, farm ownership and farm size tend to separate the large from the small borrowers. Thus, the segmentation of the agricultural credit market was considered appropriate.

The "Big Borrower" segment is generally made up of farmers who desire capital borrowings of over ₱ 2,000. These farmers have reached at least the high school level of education, are owner-operators of at least 3 hectares of land, and have an annual family income of at least ₱ 8,086.

They reside within the 20-kilometer radius of the bank.

The "Small Borrower" segment, on the other hand, is composed of the elementary-educated farmers who cultivate rented land of a size not exceeding 3 hectares and have an annual family income not more than ₱ 8,085. In addition, they reside in relatively remote places and they exhibit an annual credit demand ranging from ₱ 1,001 to ₱ 2,000.

By contrast, the typical small farmer-borrower in this study can be described as first-year high school-educated, having an annual family income of ₱ 10,567.37, a renter-cultivator of 2.17 hectares of farm, and living in a place 43.34 kilometers away from the bank. His annual credit demand is approximately ₱ 2,044.41.

Problems Plaguing the Philippine Credit Delivery System

Capital rationing: This study did not establish the existence of a problem with capital rationing. Financial institutions appeared to be able to meet the credit demands of farmers. A more valid approach to this verification process could have been undertaken had a more reliable data set been available.

Delays in loan releases: The average length of period a borrower has to wait before he receives the loan he applied for was found to be 10 days.

Among the variables hypothesized to be strong determinants of the variations in the loan processing period, only the amount of loan applied for was found to be significant.

Repayment problem: Majority of the respondents did not comment when asked of the cause of their most recent delinquency in repayment. Thus, the author was unable to draw a conclusion on the factors associated with

the existence of repayment problem. However, a significant association between the length of the loan processing period and tendency toward delinquency was established.

Fungibility of loans: Three different approaches to the verification of the existence of this problem were implemented. The most direct approach, i.e. a direct question as to the farmer's actual loan utilization yielded a negative result. However, indirect indicators of loan diversion tendencies confirmed the existence of this problem.

Unfortunately, data limitations prevented the author from conducting a more in-depth analysis of the possible problems associated with this dilemma in the agricultural credit scenario.

Criteria for Evaluating Credit Risks

Five characteristics were found to be significant discriminators of the degree of risks in repayment posed by farmer-borrowers. These are: farm size, farm ownership, educational attainment, the proximity of the borrower's residence to the bank and his annual income.

Specifically, results indicate that the low credit risk farmers are those who operate smaller farms which they own, are better educated, live far from the bank, and have bigger farm income. On the other hand, farmers who have relatively bigger farmholdings which, in addition, they do not own, are relatively poorly educated, live near the bank, and have smaller farm income, pose more risk of non-repayment of loan. These results, except the classification basis provided by the farm size and proximity variables, are all in line with the author's expectations. The contradictory results, however, were found to be consistent with results of earlier studies dealing with similar topics of inquiry.

The resulting discriminant function was also used to illustrate its applicability in the classification process.

CONCLUSIONS

The findings generated in the processes of identifying the significant determinants of agricultural credit demand and market segmentation provide a useful basis for the formulation of general policy recommendations aimed at improving the responsiveness of the Philippine agricultural credit delivery system.

Foremost among the significant results was the tendency among farmers to desire large amounts of capital borrowing. This may indicate two relevant implications: first, it confirms the earlier assumption of the existence of capital shortage among farmers, and second, it points to a bright opportunity to expand loan distribution which could lead to increasing productivity of the farm sector and increasing profitability of the financial institutions. Eventually, such developments are expected to contribute to a faster economic growth of the country.

Such opportunity, however, was found to be riddled with constraints, i.e. farmer and farm characteristics which tend to suppress the farmers' desire to apply for larger capital borrowings.

One of the significant results was the finding that farmers living in remote areas which, incidentally, comprise the majority of the farmer population, tend to exhibit a lower credit demand as compared to those living near the banks who tend to borrow larger amounts. Since one aspect to consider in the optimization of the agricultural credit delivery system is the extent of credit dissemination, this result points out to the need for more strategic bank locations or, at least, the provision of mobile bank services in order to reach the majority of farmers who are in need of credit support.

In addition to this, the offering of two distinct credit packages based on the characteristics of the market segments herein established, is recommended. Since each particular segment exhibits distinct tendencies and degrees of risk, differences in collateral policies, repayment schedules, and types of bank assistance to be provided. the credit beneficiaries may be stressed in the two credit packages herein proposed. Specifically, the relaxation of collateral policies, more intensive farmer education and bank assistance on technical aspects of production should be featured in the credit package directed to the "Small Borrower" segment. On the other hand, more strict collateral policies should be a part of the credit package for the "Big Borrowers".

The above policy recommendations, when implemented, should make agricultural credit accessible to a larger portion of the small farmer population. As a consequence, the breaking of the "dissaving cycle" mentioned at the beginning of this paper should be facilitated. The analysis of the prevalent problems of the agricultural credit system should enlighten creditors on how such problems can be avoided thus, enhancing the financial institutions' viability. Finally, the discriminant function presented in this study should serve as a basic guide for creditors in evaluating loan applications.

It should be noted, however, that the discriminant function herein presented should not be considered an ultimate basis for risk-classification of agricultural credit applicants. The shortcomings encountered in the study, particularly the defects of the survey, make the results tentative. Thus, the author gives more emphasis on the analytical framework herein applied than the actual results of this study.

Directions for Further Analysis

The principal limitation of the analytical models utilized herein has been discussed but is worthwhile noting once again, i.e. they do not represent complete coverage of the agricultural credit market and thus, can only be considered a partial or preliminary analysis. Further expansion of the models to include other farm and farmer characteristics is needed in order to realistically reflect the situation in the agricultural sector of the economy.

In addition to the analysis of the credit demand and utilization on the farm household level, research focusing on the two other sectors making up the agricultural credit system, i.e. the financial institution level and the financial markets level, should be pursued. Although past studies have concentrated on these two sectors, results of such investigations must be integrated with the findings of studies on the farm level in order to come up with viable, more comprehensive recommendations aimed at improving the agricultural credit delivery system of the Philippines.

The widely diversified physiographic and demographic characteristics among the regions in the country should also be considered, the existence of which understandably contributes to differences in perceptions and attitudes of the people, and product specialization among regions. This situation indicates a need for unique approaches in developing the agricultural credit market in different places and thus, calls for separate studies on a regional scale.

Some of the questions that need to be addressed in future work are as follows:

- 1 - What level of production (and credit support) is needed to transform a typical small farmer from a subsistence producer to an improved self-sustaining economic unit? Alternatively, an

analysis of the cost structure and cash flow system of farmers must be conducted in order to arrive at the optimum credit support needed by them.

- 2 - Have price trends in the market been stable enough to encourage farmers to work on a wider scale of farm operations (and consequently, demand greater agricultural credit support)?
- 3 - What factors contribute to the existence of the "dole-out mentality" (in credit) among borrowers? Has there been any significant difference(s) in the financial institutions' approaches to the introduction of the credit support concept to the farmers which could account for differences in the latter's perception of the idea?
- 4 - Does it pay for small farmers to take other (non-farm) jobs? What are the prospects of concentrating on their farm operations, or alternatively, what is the opportunity cost involved, if there is any, in attending to these non-farm jobs?
- 5 - Have the farm technicians been successful in assisting the farmers in their farm operations? What aspects of the financial institutions' extension arm need improvement?

The integration of results of studies dealing with the aforementioned topics should result to a more comprehensive understanding of the attitudes of small farmers toward agricultural borrowing, their credit requirements and the institutional developments necessary to increase the country's agricultural productivity.

BIBLIOGRAPHY

- Alviar, Nelly and Flordeliza Lantican, "Factors Affecting Technology Transfer in Rice Production at the Regional Level, 1978," Journal of Agricultural Economics and Development 10 (January 1980): 51-74.
- Alviar, Nelly and Ramon Nasol. "Effects of Technological Change on Production, Consumption and Savings of Farmers in Laguna, Batangas and Cavite," Journal of Agricultural Economics and Development 5 (January 1975): 12-21.
- Best, Bruce. "Some Socioeconomic Causes for Loan Repayment Rates of Non-collateral Institutional Rice Loan in the Philippines," Agricultural Economics Staff Paper Series 77-6, International Rice Research Institute, May 21, 1977.
- Draper, Norman and Harry Smith. Applied Regression Analysis. (New York: Wiley and Sons, Inc., 1981).
- Engle, James, Robert Blackwell and David Kollat. Consumer Behavior (Illinois: The Dryden Press, 1978).
- Goldman, H. Warrack and C. G. Ranade. "Analysis of Income Effect on Food Consumption in Rural and Urban Philippines," Journal of Agricultural Economics and Development 7 (July 1977): 150-165.
- Grablowsky, B. J. and W. K. Talley. "Probit and Discriminant Functions for Classifying Credit Applicants: A Comparison," Journal of Economics and Business 3 (Spring 1981): 254-461.
- Halim, Abdul. "The Economic Contribution of Schooling and Extension to Rice Production in Laguna, Philippines," Journal of Agricultural Economics and Development 7 (January 1977): 33-46.
- Hu, Teh-wei. Econometrics: An Introductory Analysis (Maryland: University Park Press, 1975).
- Kotler, Philip. Marketing Management: Analysis, Planning and Control (New Jersey: Prentice Hall, 1980), pp. 80-90.
- Lehmann, Donald R. Market Research and Analysis (Illinois: Richard D. Irwin, Inc., 1979).
- National Economic and Development Authority. Philippine Development, January 15, 1979.
- _____. Philippine Yearbook 1981. Manila, Philippines, May 1981.
- Octavio, Generoso G. "Masagana 99: Loan Repayment and Technical Assistance," Journal of Agricultural Economics and Development 8 (January 1978): 98-111.

- Ott, Lyman, William Mendenhall and Richard Larson. Statistics: A Tool for the Social Sciences (Massachusetts: Duxbury Press, 1978).
- PCARR-BAEcon. "An Analysis of the Agricultural Credit Non-repayment Problem in the Philippines," Final Report, PCARR-BAEcon Project No. 122, Quezon City, 1976.
- Pindyck, Robert and Daniel Rubinfeld. Econometric Models and Economic Forecasts (New York: McGraw-Hill, 1981), pp. 273-312.
- Rao, C. R. Advanced Statistical Methods in Biometric Research (New York: Wiley, 1952).
- Salcedo, Rodolfo. "The Supervised Farming Programs in Ten Agricultural Schools in the Philippines," Journal of Agricultural Economics and Development 1 (July 1971): 145-160.
- Sandoval, Pedro R. "Agricultural Credit and Small Farms: Experiences, Policies and Programs," Journal of Agricultural Economics and Development 10 (January 1980): 75-96.
- SAS Institute, Inc. SAS User's Guide, North Carolina, 1979.
- Technical Board for Agricultural Credit. Financing Agricultural Development: The Action Program, Manila, 1977.
- _____. Financing Food Production: A Strategy for Survival, Manila, 1976.
- _____. Focus on Small Farmer Credit, Manila, 1977.

FACTORS AFFECTING THE RESPONSIVENESS OF THE
AGRICULTURAL CREDIT DELIVERY SYSTEM
IN CENTRAL LUZON, PHILIPPINES

by

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AN ABSTRACT OF A MASTER'S THESIS

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The success or failure of an agricultural credit delivery system depends primarily on the farmers' demand for, use and repayment of credit. Thus, the concern for a research concentrating on the farmer-borrower becomes inevitable.

This study was conducted with the following objectives: (1) to determine the significance of some hypothesized determinants of the farmers' demand for agricultural credit; (2) to come up with a viable segmentation of the agricultural credit market; (3) to verify the existence and analyze the possible causes of some problems plaguing the Philippine agricultural credit machinery; and (4) to identify the factors which discriminate between low risk and the high risk farmer-borrowers.

In order to accomplish the aforementioned objectives, the data set from a 1980 survey dealing with a similar topic of inquiry was used.

The main statistical tools of analysis that were utilized were the regression, cross-tabular and discriminant analyses.

Five variables were found to be significant determinants of the amount of capital borrowing desired by the small farmers: education, family income, tenurial status, the proximity of the farmer's residence to the bank and farm size. All of these factors, except the proximity variable, exhibited positive association with credit demand. The negative coefficient of the proximity factor was attributed to the opportunity costs foreseen by the farmers in going to and from the bank in the process of loan application and follow-ups.

Two relevant segments were found to exist in the agricultural credit market. The "Big Borrower" segment consists of high school-educated farmers with annual family income exceeding ₱ 8,086, are owner-operators with farmholdings greater than 3 hectares and reside in places not

farther than 20 kilometers from a bank. These farmers exhibit an annual credit demand in excess of ₱ 2,000.

The "Small Borrower" segment is composed of farmers who have reached the elementary level of education and whose annual family income does not exceed ₱ 8,085. They are renter-cultivators of farms measuring 3 hectares at most, reside in relatively remote places and exhibit an annual credit demand ranging from ₱ 1,001 to ₱ 2,000.

An investigation of the problems plaguing the Philippine agricultural credit delivery system revealed a strong positive association between delays in loan release and the credit beneficiaries' tendency to become delinquent in repayment. Among the variables hypothesized to have significant effects on the length of the loan processing period, only the amount of credit applied for proved to be significant. The probability of existence of strong tendencies toward diversion of agricultural loans to non-farm uses was also discussed. However, the study failed to verify the existence of a problem in capital rationing, the inability of financial institutions to meet the credit demands of the farmers.

Five variables were found to be significant in separating the high risk from the low risk farmer-borrowers: farm size, farm ownership, educational attainment, the proximity of the farmer's residence to the source of credit and annual farm income. Farmers who operate smaller, owned farms, are better educated, with greater farm income and live far from the bank were found to be low credit risks while those with relatively bigger but rented farmholdings, are less educated, have smaller farm income and live near the bank were found to present a higher risk of non-repayment. The resulting discriminant function was utilized to demonstrate the application of such model for classification purposes.

Although this study presents some significant findings, the author recommends that more detailed studies following the same framework of analysis be conducted, with emphasis on multiple components of the Philippine agricultural credit system, monitoring the incentives for investment in agriculture and the opportunity cost involved.