

FACTORS IMPEDING BORROWING FROM THE BOLIVIAN
AGRICULTURAL BANK'S SMALL-FARMER CREDIT PROGRAM

by

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I. INTRODUCTION

In 1975 the Bolivian Agricultural Bank (BAB) with the assistance of a loan from the United States Agency for International Development (USAID) established the Small Farmer Credit Program (PCPA) in an effort to improve agricultural production and income distribution in rural Bolivia, which contains about 70 percent of the Bolivian population. Prior to that time, most of the agricultural credit from BAB and the rest of the Bolivian formal market financial institutions had been concentrated in loans to medium- and large-size farmers, especially in the recently developed commercial farming area of the Eastern lowlands.

The PCPA can be judged very successful on a number of grounds. As of December 1980, it had an outstanding loan portfolio of 4,536 loans representing 8,914,150 dollars (exchange rate of 20 Bolivian pesos = 1 U.S. dollar). The delinquency rate (measured as percent of the loan portfolio) was 5.13 percent, and, after its first two years of operation, the program had shown a net excess of income over expenses. Yet, relative to the total number of farm families, relatively few are being served by this program. In 1977, a large sample survey of small farmers in the three southern departments of Chuquisaca, Potosi and Tarija showed that 6.7 percent of the farmers surveyed received agricultural credit from any source (Riorden, 1977). Of these, about half obtained loans from formal market institutions, mostly BAB (38.3 percent). A similar 1978 survey in the departments of Chuquisaca, Cochabamba, La Paz, Potosi, Santa Cruz and Tarija showed that only 2.5 percent of the farmers received credit

(Ladman, 1982 b). Of these, about two-thirds received loans from formal market institutions and 42 percent were clients of BAB.

Although the PCPA has expanded considerably since the time of these surveys, there are still many farmers who would like to obtain bank credit but are unable to do so. Data from both of the above-mentioned surveys showed that at least 80 percent of small farmers would like to have obtained agricultural credit from a bank, such as BAB. In part, this may have reflected an excess demand for bank credit due to the highly concessionary BAB loan interest rate, which still remains. Yet, there are undoubtedly other factors of both supply and demand that limited, and continue to constrain, farmer participation.

On the supply side, there are limited loanable funds as well as human and physical resources that impose constraints on the size of the credit program. Again, the concessionary rate may come into play. Due to the excess demand for credit, Ladman (1982 a) argues that PCPA may have deliberately tried to ration credit to fewer farmers by imposing such large borrower transactions costs that only those farmers wanting large loans would be able to borrow profitably.

On the demand side there are a number of factors. Some farmers may lack a sufficient physical resource base--such as land, family labor, and capital goods -- to enable them to profitably use credit, particularly if borrower transactions costs are high. Risk aversion undoubtedly assumes an important role. Qualitative factors such as lower levels of education, literacy, language spoken (Spanish or Indian) and use of technical assistance may also be important. Profitability may be hindered by lack of access to markets and government pricing policies for agricultural products that favor urban consumers. Some farmers may decide not to

pursue credit to expand their farming operations because they have attractive off-farm employment alternatives.

Miller and Ladman (1982) examined this question in Bolivia using the 1977 survey data to compare borrowers and those farmers who wanted to borrow. Their results showed that non-borrowers were impeded by high transactions costs, a smaller resource base, lower levels of education, and less market integration.

The present study applies discriminant and tabular analysis to sample survey data on PCPA borrowers and non-borrowers to examine the demand factors in greater depth. Whereas the Miller-Ladman research compares borrowers and non-borrowers during the year following credit, this paper has the advantage of comparing both groups of farmers prior to the use of credit, which allows a more clear delineation of differences between them before credit is introduced. The present study also benefits from approximately an equal number of borrowers and non-borrowers; the previous study had many more non-borrowers, because so little of the surveyed small-farm population used credit.

The paper is organized in the following sections: (a) theoretical framework; (b) hypotheses to be tested; (c) sources of data; (d) tabular analysis; (e) discriminant analysis; and (f) conclusions.

II. THEORETICAL FRAMEWORK

The expected profitability of credit will be the principal factor determining whether or not a farmer will want to borrow. As shown by Ladman (1982 a) and Miller and Ladman (1983) expected profitability will depend upon the quantitative and qualitative resource base, technology,

product and input prices, risk and borrowing (interest and transactions) costs. Figure 1 illustrates the role of these factors.

Demand for Credit

Assume the farmer attempts to maximize profits and has a given set of resources, farm enterprises and associated technology from which he can select in order to produce a combination of farm products. His demand for liquidity schedule is shown in Figure 1 as $D_I D'_I$. It consists of the locus of present values of the expected marginal revenue products resulting from the resources employed using successive units of liquidity.¹ Assume the demand is net of risk associated with enterprise selection and that the farmer has OS of available liquidity. Therefore, the portion of $D_I D'_I$ that represents his demand for credit corresponds to the range to the right of S.

Borrowing Costs

If the farmer is considering borrowing from PCPA he must take account of total borrowing costs, BC, which consist of the sum of total interest costs, IC, and total borrower transactions costs, BTC. Since the loan rate of interest, r , is constant, irrespective of loan size, IC corresponds to r times L , where L is the size of loan.

Borrower transactions costs derive from the set of procedures that are required by the lender in the processes of obtaining, implementing and repaying a loan, and are assumed fixed, regardless of loan size, since the requirements are the same, irrespective of the amount borrowed. They consist of both out-of-pocket and time costs. Examples of the former include the costs of documents, lawyer fees, loan registration fees and

expenses of travel to the bank or offices where documents are obtained. The latter consists of the opportunity cost of time required to complete the documents. A farmer's perception of transactions costs may be influenced by his previous experience with credit. Farmers who have used credit, in contrast to first-time borrowers, may feel more comfortable in pursuing credit now that they "know the ropes". Also, it is possible that they might have a greater appreciation for the true costs of borrowing, having previously experienced a credit delivery process.

Ladman (1982 a) has documented the very high borrower transactions costs associated with PCPA loans. Consequently they would be expected to seriously impede credit use among Bolivian small farmers. Indeed, Miller and Ladman (1983) found this to be the case.

Profitability

The farmer will want to borrow if there are positive expected profits, i.e., $\Pi > 0$, or, alternatively, $R > (IC + BTC)$, where R is total revenue.

The profit statement can be expressed in terms of average revenue (AR) and average borrowing costs (ABC) by multiplying and dividing all terms by the size of the loan, L. In this form:

$$\Pi = \frac{L(\Pi)}{L} = \left[\frac{R}{L} - \left(\frac{IC}{L} + \frac{BTC}{L} \right) \right] = L[AR - (r + ABTC)] = L[AR - ABC].$$

As shown in Figure 1, for $D_I D'_I$, the farmer would be willing to borrow at all points to the right of the borrowing threshold, TH_I , where $\Pi > 0$. However, he will want to borrow at L_I where Π are maximized. At this point $AR > ABC$, and profits correspond to the area bcde.

There are two other factors to be considered. First, are the out-of-pocket costs required to complete the loan application process prior to the first disbursement. The sum of these funds is the out-of-pocket threshold. The farmer must have access to these funds, or else he will be unable to complete the application process and will be constrained from borrowing. If he uses part of his available liquidity to meet these expenses, then the amount of his loan would increase by a corresponding amount and S , as shown in Figure 1, would shift to the left accordingly.

The second factor is the risk the farmer runs in investing his time and money in making a loan application, only to have it turned down, thus losing his investment. To account for this the farmer would implicitly weight this cost by a risk factor and would not apply for a loan if the probable loss exceeded an acceptable level. This factor would likely be most important for inexperienced first-time borrowers.

Effect of Resource Base, Technology Markets and Alternative Sources of Income

The profitability of credit use will be affected by the farmer's resource base and available technology. Ceteris paribus, the larger the resource base of useable land, capital goods and/or family labor the greater would be the demand for liquidity. A farm with a small resource base may not be able to generate sufficient revenues to cover total borrowing costs, and, thus, be excluded from borrowing for lack of profitability. In Figure 1, assuming the same BTC and r as above, DD_{II} represents such a case, because at no level of credit use are $ABC < AR_{II}$, i.e., there is no borrowing threshold.

Qualitative factors may influence profitability. Farmers with higher levels of education, greater ease in the Spanish language and those with access to technical assistance might be more productive. If the farmer were able to raise the marginal productivity of liquidity by incorporating technologically improved inputs and/or employing more efficient management practices, the whole demand schedule would tend to be higher and to the right. Therefore, farmers who lack these factors may also find it unprofitable to borrow. Again $D_{II}D'_{II}$ can be used to illustrate a case where a farmer would find it unprofitable to borrow for lack of productivity in resource use.

The degree of market integration should be an important factor. Access to competitive markets should favor the profitability of credit. Moreover, the more a farmer is integrated into markets the greater the likelihood that he would be cognizant of opportunities for access to credit as well as its use. Further, as shown by Brown (1981), government pricing policies for both inputs and products can have important impacts on production.

The existing level of economic activity may have an important influence on a farmer's ability to use credit. If the farmer has a record of successfully undertaking production and accumulating capital he will benefit from this experience in deciding whether or not to seek credit.

Alternative sources of income might also impact on the demand for credit. As shown by J. Mercado (1982), farmers with good opportunities for off-farm employment may choose to work less on the farm, thus reducing the extent of their farming operations and/or their use of technologically improved inputs. In this case, their demand for liquidity might lie in a position like that of $D_{II}D'_{II}$. Moreover, they might also find that the

off-farm income provides them with sufficient liquidity for their agricultural operations such that they do not need to resort to credit, or if they do, to loans that are too small to be profitable, given BTC.

Lender Credit Rationing

Many of the above factors contribute to a farmer's credit worthiness and will consequently affect the supply of credit available to him. Lenders base credit decisions upon the farmer's quantitative and qualitative resource bases as well as demonstrated abilities to use funds prudently. This is one way that lenders ration credit. Consequently, farmers with desirable characteristics may be considered better candidates, whereas, those with less desirable attributes are screened out. The result is that those with the best characteristics get credit and the others do not.

III. HYPOTHESES

Based on the above, it is hypothesized that, among the sampled small farmers stating they would like to receive PCPA credit, those that do not apply for nor receive this credit, in comparison to those who receive credit, will be more impeded in borrowing by:

- A. lower levels of a quantitative resource base, such as useable land, family labor and capital goods;
- B. lower levels of a qualitative resource base, such as education, literacy, language spoken and use of technical assistance;

- C. lower level of market integration for the sale of their products;
- D. lower levels of prior economic activity, as measured by farm and household incomes, the extent of livestock, crop and secondary enterprises; and the use of resources;
- E. higher levels of off-farm employment; and
- F. higher perceived borrower transactions costs and less previous experience with credit.

IV. THE DATA BASE

Data on the borrowers were obtained from a systematic sample of new PCPA clients residing in the three departments of Chuquisaca, Cochabamba and Potosí, which was undertaken in 1978 by the Bolivian ministry of Agriculture and Rural Affairs and BAB. The data correspond the farming operations for the agricultural year (typically ending in May) prior to receiving credit. Data for the non-borrowers come from interviews with a neighbor of each of the borrowers, who was not a PCPA client. These interviews were conducted in 1979 and correspond to the previous agricultural year. There were seventy-one borrowers and seventy-three non-borrowers analyzed. The latter only include those sampled non-borrowers who indicated that they wanted to apply for credit.²

The fact that comparisons must be made between the two groups with data from two years creates some problems. In 1979 the rate of inflation, as measured by the La Paz general consumer price index, was 19.7 percent. Therefore, all monetary values in 1979 were deflated to 1978 values by the best available price index, the La Paz consumer price index for food

products. Furthermore, it is possible that the one-year difference could effect real variables such as the stocks or quality of resources and extent of farming operations. However, since there were no major changes in the rural structure nor the relative profitability of products, none are expected. Thus, it is assumed that the comparisons between the two years are valid.

V. TABULAR ANALYSIS

The above hypotheses are tested using "t" tests for differences in group means and χ^2 tests for differences in distributions for variables. Statistics are considered significant only if there is 10 percent or less chance of making an error in accepting the hypotheses.

Resource Base

As shown in Table 1, non-borrowers have smaller farms (means of 4.4 vrs. 8.2 hectares), less useable land (means of 4.1 vrs. 5.7 hectares) and less family labor (means of 4.6 vrs. 5.5 members of household), than borrowers. Representative capital goods were used to examine holdings of capital since a total monetary figure for capital was not available. No significant differences between groups were found in the mean number of cattle owned (3.7 and 3.5) nor in the percent of farmers owning back-pack sprayers (13.7 and 19.7) or tractors (1.4 and 0).

Qualitative Resource Base

As shown in Table 2, non-borrowers had lower levels of education (means of 2.8 vrs. 4.6 years) and tended to be younger (means of 40.6 vrs.

43.6 years) than borrowers. They were not significantly different in literacy (76.7 and 70.4 percent) and principal language spoken--most used the Indian language of Quechua (86.3 and 88.7 percent) rather than Spanish. The percent of non-borrowers attending short-courses, field days, demonstrations, etc. was notably smaller (12.3 vrs. 22.4) than borrowers and only slightly failed to be significant. However, there was no difference between the groups in terms of receiving technical assistance on the farm (16.4 and 19.7 percent).

Market Integration

Non-borrowers were considerably less integrated into formal product markets than borrowers. As shown in Table 3, they marketed a smaller portion (44.0 vrs. 56.9 percent) of their total agricultural output. Fewer sold their products off the farm (50.7 and 93.0 percent) and at formal market sites (19.2 and 49.3 percent), more sold on the farm to middlemen and truckers (64.4 and 28.2 percent). Fewer stored their crops (16.7 and 50.7 percent), which suggests that they were not able to wait to sell their product when prices were more favorable.

Level of Economic Activity-Farm and Household Income

As shown in Table 4, non-borrowers tended to have lower gross cash farm income, as measured by the χ^2 , although the differences between group means just failed significance. For both groups, most of this income came from the sale of crops, which was followed at considerably lower levels by sale of livestock and sale of animal products, such as cheese and milk, and sale of processed products.

When considering the entire group, most farmers sold crops (83.3 vrs.

95.7 percent), but considerably fewer sold livestock (36.6 vrs. 35.6 percent), processed products (8.3 vrs. 31.4 percent), and livestock products (16.7 vrs. 34.3 percent). Non-borrowers had significantly lower mean sales of livestock, but there were no differences in the means for the sale of other products. Because considerably fewer non-borrowers sold processed products, the χ^2 was significant.

When examining only those farmers who sold the various products, the non-borrowers tended to surpass the borrowers, except in the cases of animal products, for which there was a significant difference, and crops, for which there was no significant difference. The mean value of non-borrower livestock sales was significantly higher. The mean value of non-borrower processed products was much higher, but not significant, principally because sales were undertaken by a few farmers who sold large amounts, whereas among the borrowers there were many more sellers of smaller volumes.

Farmers in both groups tended to use a sizeable portion of their crop production for consumption by family members or animal feed. Non-borrowers, however, used a highly significant lesser amount than borrowers (means of \$b 2,514 vrs. \$b 5,305). No significant differences were observed between the group means for gross and cash net farm incomes.

There was no significant difference between the two groups with respect to off-farm cash income, most of which was derived from off-farm employment. The distributions of gross cash household income and gross household income of non-borrowers just failed to be significantly less than that of borrowers, although the means were shown to be not significantly different. There were no discernable differences between the mean net cash household income nor the net household income.

Level of Economic Activity-Resource Use

Land Use. As shown in Table 5, almost all farmers had sown annual crops (95.9 and 97.2 percent), relatively few had permanent crops (15.1 and 22.5 percent) or land in fallow (19.2 and 33.8 percent), and hardly any had rented land (1.4 and 1.4 percent). Non-borrowers, compared to borrowers, had less land planted to annual (means of 2.951 and 4.059 hectares) and permanent crops (means of .036 and .141 hectares) and less in fallow (means of .466 and .539 hectares).

Crops. In spite of their lesser useable land, non-borrowers were not significantly different from borrowers in the total value of production, nor in the average value productivity per hectare of land in cultivation.

Livestock. Neither group of farmers tended to purchase livestock, but fewer non-borrowers purchased livestock than borrowers (16.4 vrs. 31.0 percent) and their mean expenditure, for those who purchased, was less. There was no significant difference between the groups in the numbers selling livestock (35.6 and 36.6 percent).

Labor. Farmers from both groups tended to hire labor (58.3 and 67.6 percent) and fewer utilized shared labor (33.3 and 26.8 percent). There were no significant differences between groups in the use of nor expenditures for labor of either category.

Power and Irrigation. Most farmers used draft animals (79.0 and 89.6 percent) as a source of power for their various crops, few used tractors (13.7 and 23.1 percent). In both cases, fewer non-borrowers used the sources of power than borrowers and mean expenditures were lower. However, when considering only those farmers who undertook expenditures, there were no significant differences. Likewise, there was no significant difference between the groups in the number of farmers using irrigation on their different crops (38.0 and 38.5 percent).

Seeds, Fertilizers, Herbicides and Pesticides. A majority of the farmers in both groups used some form of fertilizer (manure and/or chemical) on the crops they cultivated (58.1 and 60.4 percent). Relatively few used chemical fertilizers (15.7 and 22.9 percent), hybrid or improved seeds (10.3 and 14.8 percent), or pesticides/insecticides (17.4 and 14.7 percent). There were no significant differences between the two groups in the use of these products, except for chemical fertilizers where non-borrowers used less. However, for both fertilizers and seeds, the mean expenditure for non-borrowers was considerably less than for borrowers.

Cash Farm Operating Expenditures. The sum of all cash farm operating expenditures was considered. Non-borrowers undertook considerably less expenditures than borrowers (means of \$b 2,172 and \$b 5,420 respectively).

Investments (non-livestock). With the exception of purchases of tools, very few farmers in either group (11.1 and 19.6 percent) undertook investment expenditures for physical capital goods. However, when tools

are included, fewer non-borrowers made investments of any kind than borrowers (30.5 vrs. 55.7 percent). The mean level of expenditures, however, was very low, both when considering the entire group (\$b 179 and \$b 292) and only those who undertook investment (\$b 587 and \$b 592). When considering only those farmers undertaking the investments, there was no difference between groups in the mean level of expenditure. Of the several classes of investments, the only ones for which non-borrowers were significantly fewer were tools (28.8 and 43.7 percent) and improvements in constructions (1.4 and 8.5 percent), there were no differences in machinery (1.4 and 4.2 percent) nor construction (0.0 and 2.8 percent).

Off-Farm Income and Employment

As shown in Table 6, few farm households of either group had a member that worked off-farm in either temporary (5.5 and 14.1 percent) or permanent (6.8 and 9.9 percent) employment, however, fewer non-borrower household members held temporary jobs than those of borrowers. As shown in Table 4, there was no significant difference in the levels of cash off-farm income earned by the two groups. Most of this income was earned in off-farm employment.

Credit Experience and Need

As shown in Table 7, few farmers in either group used credit in the year prior to the survey, however, non-borrowers had used significantly less than borrowers (6.8 vrs. 33.8 percent). The borrowers, by definition, had all applied for a bank loan. Of the non-borrowers 22.2 percent had ever applied; of this number 25 percent had been turned down, a significantly larger proportion than the borrowers (6.4 percent).

41

Non-borrowers indicated that they would like to have considerable credit, the mean amount of \$b 25,424 was 87.4 percent of that stated by borrowers, which was significantly less than that of the borrowers.

Factors Impeding Credit Use

As shown in Table 8, non-borrowers were significantly less impeded from borrowing than borrowers for all of the measured reasons, except for the fear that they could not repay a loan, which only slightly failed significance. This means that they were less impeded by transactions costs and other factors associated with credit delivery as well as with the profitability of credit use. The results are completely contrary to the hypothesis. A possible explanation may be that since the borrowers have experienced the cumbersome and costly BAB credit delivery system they are more aware of the costs and difficulties associated with obtaining a BAB loan.

VI. DISCRIMINANT ANALYSIS

Discriminant analysis was used to determine the relative importance of the various factors in distinguishing between non-borrowers and borrowers. The discriminant function is shown in Table 9, where the variables employed are representative of those used to test the hypotheses. In so far as possible, aggregate variables were used rather than the components; for example, total investment expenditures rather than expenditures for machinery, irrigation, tools, etc.

The discriminant function clearly distinguishes between the two groups as shown in the stacked histogram of Figure 2. This is confirmed

by the highly significant χ^2 and a canonical correlation coefficient showing a high degree of correlation between the groups and the function. Wilk's lambda is intermediate in value, suggesting that the variables in the function are reasonably successful in discriminating between the two groups. When the discriminant function is used to classify each farmer according to what group he belongs 84.5 percent of the farmers were correctly placed.

The near equality of the absolute sizes of the group centroids shows that the function equally discriminates non-borrowers from borrowers. Given the signs of the centroid coefficients, variables in the function with a positive sign are associated with borrowers, whereas those with a negative sign are associated with non-borrowers.

The absolute size of the coefficients shows their relative importance in discriminating between the two groups. The results showing that (a) there are not one or two variables with large coefficients compared to others and (b) there are a number of variables with coefficients of about the same magnitude, suggest that several variables carry an important influence in distinguishing between groups. Given that none of these variables have extremely large coefficients means that there is no single or few factors that highly distinguish between the groups. Rather, there are a number of factors, all of which have some importance.

The observed patterns of the relative sizes of the coefficients is revealing. Clearly, the lack of market integration (.46485) differentiates non-borrowers, as do lower levels of cash farm operating expenditures (.37968) less useable land (.33727) and family labor (.25520), lower levels of formal (.27009) and informal (.28161) education, and lesser amounts of credit desired next year (.32220). In contrast,

borrowers are more impeded in borrowing (-.36586) than non-borrowers. The relatively small magnitudes of the coefficients for the other variables show them to be much less important in distinguishing between groups. Moreover, in all cases, except for the head of cattle owned and gross farm income, the coefficients carried the hypothesized sign.

The negative coefficient for the cattle variable is not surprising since the value is near zero and tabular analysis showed no significant differences between the two groups.

The case of gross farm income is more complicated. There were no significant differences in the tabular analysis of group means for gross farm income, although the χ^2 showed that the distribution of borrower incomes tended towards higher levels than that of non-borrowers. However, a few non-borrowers were observed to have considerably larger incomes than any of the borrowers. When establishing a center point for the discriminant function separating the two groups, some variables must have negative and others positive coefficients. Therefore, the function determined that this variable should be negative, given that most of the others were positive. Consequently, its magnitude should not be interpreted as being strongly associated with non-borrowers.

VII. CONCLUSIONS

This paper compares a sample of borrowers of the Bolivian Agricultural Bank's Small-farmer Credit Program (PCPA) with other small farmers, living in the same areas, who are non-borrowers and would like to obtain credit. The comparison is made by testing hypotheses, based upon a theoretical framework, using data for the agricultural year prior to the

borrowers receiving credit, in order to determine what characteristics distinguish borrowers from non-borrowers ex ante.

Analysis of the data showed that most farmers, both borrowers and non-borrowers, would be classified as "traditional", although there was considerable variance within each group. Few were shown to use hybrid seed, agricultural chemicals or mechanization; most planted annual crops but few cultivated permanent crops; few purchased livestock or made investments in other capital goods (with the exception of hand tools); and most did not have family members involved in off-farm employment. Yet, important differences were observed between the two groups that would affect credit demand and credit worthiness. In most instances, the results conformed to those hypothesized, but there were several important exceptions.

As expected, non-borrowers were shown to want less credit in the next agricultural year than borrowers. As hypothesized, non-borrowers and their farming operations, were shown to have specific characteristics that *ceteris paribus*, would lead to a lower demand for credit, and, when considered in combination, would lead to the same conclusion.

Non-borrowers had a smaller quantitative resource base, especially the amount of useable land and available family labor, which would limit their ability to use credit. Their qualitative resource base was also lower--they were younger and had less formal and informal education--which reflects a lesser capacity to absorb demand-raising technological change. Indeed, the data show that they used less of the technologically advanced inputs.

Non-borrowers tended to have lower gross cash and gross farm incomes, although there was no significant difference in net farm incomes. There

was no difference between the groups in the value of crop production, sales of crops, nor in crop productivity per hectare. The differences in farm income were due to livestock-related activities. Non-borrowers purchased and sold fewer livestock, and earned less income from the sale of secondary livestock products. They also were less active in the sale of other processed products.

Non-borrowers were considerably less integrated into markets than borrowers--fewer sold products in off-the-farm markets, many relied upon sales to middlemen and truckers. This suggests that they were less involved in commercial agriculture, and had less access to information about markets and credit, all of which would lower their credit demand. This is reinforced by the results showing them to have less previous credit experience.

Surprisingly, non-borrowers were decidedly less inhibited by borrower transactions costs in their borrowing decision than borrowers. On this basis, *ceteris paribus*, they would have tended to borrow. The fact that they did not borrow suggests that this was not the overriding factor in their borrowing decision. Rather, the other factors associated with the quantitative and qualitative resource base and market integration assumed greater importance. The fact that borrowers were more impeded by factors leading to high borrowers transactions costs probably reflects their recent borrowing experience, during which they became acutely aware of the costliness of borrowing from BAB.

Contrary to expectations, non-borrower families did not have more off-farm income. Moreover, fewer of them experienced temporary off-farm employment. Therefore, alternative sources of income was not shown to be a factor decreasing their credit demand.

In conclusion, although the situation of most of the sampled Bolivian small farmers showed many characteristics of traditional agriculture, there were many factors that tended to distinguish borrowers from non-borrowers. Discriminant analysis showed that lack of market integration, smaller quantitative and qualitative resource bases, less experience with use of improved inputs and smaller livestock activities were the most important. These characteristics would both limit a farmer's credit demand and could be considered, by the PCPA, as factors that would decrease his credit worthiness. The latter is supported by less prior use of credit and a higher loan rejection rate among non-borrowers. Therefore, on one or both accounts the farmer might not use credit.

About 70 percent of farmers from both groups considered the lack of credit as a major constraint to increasing production. The policy implications of this study are that, in order to bring these Bolivian farmers under the umbrella of economic advancement through the use of PCPA credit, attention needs to be directed to improving their resource base and market integration. This implies the need for more formal and informal education, better markets, improved government pricing policy for agricultural goods and access to more land, all of which would enable them to more profitably use credit and become more acceptable clients to the PCPA. Although non-borrowers were not highly impeded in credit use by the transactions costs of borrowing, the experience of PCPA borrowers suggests this can be an important factor in limiting borrowing. Therefore, attention also should be directed to simplify the credit delivery systems. If these are accomplished, more Bolivian small farmers will be able to use credit and economic development in rural Bolivia will be enhanced.

END NOTES

1. For purposes of simplification, this assumes that liquidity is not used for consumption purposes, which is undoubtedly untrue due to the interrelationship between the management of both production and consumption relationships in the farm household. M. Mercado (1982) shows how the farm household would manage liquidity to jointly deal with production and consumption decisions. For lack of data, consumption decisions are not included in the present study, and, therefore, the model is confined to the production relations.
2. Originally, there were 106 borrowers included in the sample. After examining the data, farmers from Santa Cruz were eliminated because they were considerably different from those in the other three departments. Others were eliminated on the basis of incomplete critical data, either in 1978 or in follow-up surveys in 1979 and 1980. Non-borrowers were subjected to the same criteria, with the exception of the follow-up surveys. In addition, others were eliminated on the grounds that they stated they did not want credit.

That the surveys were done in two different years is a result of the survey design, which was done by the Ministry and BAB. It would have been better to have surveyed both groups in the same year. However, as explained in the text, the problems of using the two years can be readily minimized.

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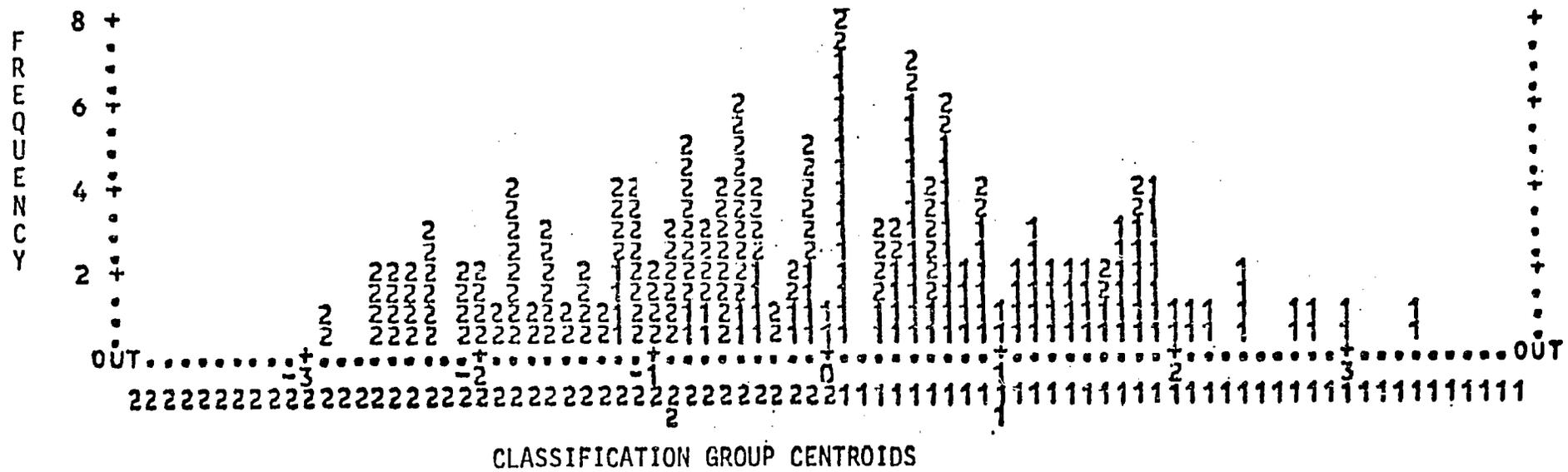


TABLE 1. RESOURCE BASE

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
Total land (has.)	8.180	4.407	2.53784***	102	17.3662***	4
Useable land (has.)	5.736	4.078	1.9400*	140	21.7100***	3
Family labor (persons in household)	5.5	4.6	2.6059***	142	5.7373*	2
Capital goods						
Head of cattle ^a	3.5 (4.5)	3.7 (4.6)	-0.25 (-.0040)	113 (110)	.5096 (.3461)	3 2
Sprayers (%)	19.7	13.7			.9391	1
Tractors (%)	0	1.4			.9794	1

a

Numbers in parentheses correspond to farmers who reported owning cattle.

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

TABLE 2. QUALITATIVE RESOURCE BASE

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
Age-family head	43.6	40.6	1.46856*	142	5.7587	3
Education (yrs.)	4.6	2.8	3.1300***	140	27.0684***	4
Principal language (% Spanish)	11.3	13.7			.1945	1
Literacy (%)	70.4	76.7			.7330	1
Attended short courses, etc. (%)	22.4	12.3			2.4888	1
Received technical assistance (%)	19.7	16.4			.2617	1

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

2-7

TABLE 3. MARKET INTEGRATION

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
Primarily sells off-farm (%)	93.0	50.7			31.5824***	1
Sells to middle-man	28.2	64.4			11.7153***	1
Sells in market (%)	49.3	19.2			14.5434***	1
Percent of crop marketed ^a	56.9	44.0	0.0310	59	8.9633*	4
	(59.5)	(54.0)	(1.3200)	125	(2.2408)	3
Store crops (%)	50.7	16.7			18.5729***	1

^aNumbers in parentheses correspond to those farmers reporting marketing of their crop.

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

28'

TABLE 4. FARM AND HOUSEHOLD INCOME
(1978 Bolivian Pesos)

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
Gross cash farm income	15,644	12,152	1.5400	140	8.9021**	3
Livestock sales ^C	2,658 (7,441)	940 (11,537)	1.8200* (2.0600)**	77 (26)	4.5502 (4.5486)	3 2
Crop sales ^C	10,573 (11,047)	10,601 (12,721)	-.0100 (-.7700)	135 (112)	7.9571 (2.2045)	5
Processed product sales	644 (2,050)	399 (4,786)	.8400 (-1.2200)	133 (5)	13.7910*** (2.7195)*	2 1
Animal products sales	1,718 (5,010)	68 (408)	2.0696** (2.0911)**	140 (34)	10.4896** (5.2500)*	3 2
Other	51	144				
Gross farm income	22,795	18,526	1.4100	133	8.9022**	3
Net cash farm income	10,647	9,992	.3300	140	b	
Net farm income	15,846	12,263	1.5500	140	b	
Off-farm cash income	4,163 (11,209)	3,542 (7,185)	.4100 (1.2100)	118 (36)	2.0681 (.1667)	3 2
Gross cash household income	19,808	15,866 ^a	1.3800	125	4.3347	3
Gross household income	26,959	22,284 ^a	1.3600	139	7.2596	4
Net cash household income	14,241	13,319	.3600	124	b	
Net household income	14,536	13,052	.5600	124	b	

^aMean value is slightly different than the sum of its components because there were missing observations for two farmers for the totals.

^b χ^2 values could not be calculated due to the manner in which depreciation was calculated.

^CNumbers in parentheses correspond to those farmers reporting selling the product, or in case of off-farm income, receiving such income.

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

TABLE 5. RESOURCE USE

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
<u>LAND</u>						
Farmers with annual crops (%)	97.2	95.9			.1795	1
In annual crops (has.)	4.059	2.951	2.0596**	142	12.6871***	3
Farmers with permanent crops (%)	22.5	15.1			1.3172	1
In permanent crops (has.)	.141	.036	2.5289***	94	4.9446*	2
Farmers with land in fallow (%)	33.8	19.2			3.9631**	1
In fallow (has.)	.539	.466	.34967		13.6191***	
Rent from others (%)	1.4	1.21			.0004	1
<u>CROPS</u>						
Production (\$b)	17,724	16,974	.2600	128	3,1914	4
Productivity/ha. (\$b)	5,927	6,887	-0.7700	139	4,4405	3
<u>LIVESTOCK</u>						
Farmers purchasing (%)	31.0	16.4			4.2233*	1
Expenditures in purchase (\$b)	1,662 (5,364)	614 (3,736)	2.0022** (1.98242)**	115 (22)	4.2861 (.0687)	
Farmers selling (%)	36.6	35.6			.0157	1
<u>LABOR</u>						
Farmers using hired (%)	67.6	58.3			1.3176	1
Expenditures for hired (\$b) ^b	905 (1338)	580 (1003)	1.9204 (1.4976)	142 (88)	4.4726 (2.9273)	4 (3)
Farmers using shared (%)	26.8	33.3			.7344	
Value of shared (\$b) ^b	85 (466)	171 (780)	-1.4003 (-1.5382)	142 (27)	2.0480 (1.7753)	3 (2)

TABLE 5. RESOURCE USE (cont.)

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
<u>POWER</u>						
Farmers using draft animals ^a (%)	89.6	79.0			8.6697***	1
Expenditures for hiring draft animals ^b (\$b)	286 (580)	145 (660)	2.0192** (-.4445)	144 (22)	.12.5483*** (.8790)	3 (2)
Farmers using machinery ^a (%)	23.9	13.7			5.8325**	1
Expenditures for hiring machinery ^b (\$b)	223 (634)	111 (672)	1.7807** (-.3383)	142 (13)	6.7763** (.1511)	2 (1)
<u>IRRIGATION</u>						
Farmers using ^a (%)	38.5	38.0			.0155	1
<u>SEEDS</u>						
Farmers using hybrid or improved ^a (%)	14.8	10.3			1.8371	1
Expenditures for ^b (\$b)	1138 (1756)	141 (640)	5.3792*** (5.4945)***	82 (52)	31.5410*** (5.9524)	4 (3)
<u>FERTILIZERS</u>						
Farmers using ^a (%)	60.4	58.1			.2363	1
Use of chemical ^a (%)	22.9	15.7			3.5138*	1
Expenditures for ^b (\$b)	1376 (2506)	680 (1460)	2.1490** (2.7725)***	107 (62)	7.5502 (6.5748)	5 (4)
<u>PESTICIDES AND HERBICIDES</u>						
Farmers using ^a (%)	14.7	17.4			.5418	1
Expenditures for (\$b)	167 (457)	127 (403)	.7247 (1.2052)	142 (39)	5.6492 (5.2487)	4 (3)
<u>TOTAL CASH FARM OPERATING EXPENDITURES</u>						
(\$b)	5,420	2,172	5.2700***	117	25.4380***	3

TABLE 5. RESOURCE USE cont.

(5)

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
<u>INVESTMENTS</u>						
Farmers investing in: (%)						
Construction	2.8	.0			2.0853	1
Machinery	4.2	1.4			1.0867	1
Tools	43.7	28.2			3.4612*	1
Improvements	8.5	1.4			3.9021**	1
Any of the above	55.7	30.5			9.1681***	1
Total amount invested (\$b)	292 (592)	179 (587)	1.4500 (.0300)	139 (38)	9.4551** (.311)	3 :

^aPercent using = (crops for which resource was used divided by total crops grown) x 100

^bNumbers in parentheses correspond to farmers reporting expenditures.

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

2/24

TABLE 6. OFF-FARM EMPLOYMENT

	MEAN		χ^2	d. f.
	BAB	NON-BAB		
Temporary off-farm employment (%)	14.1	5.5	3.0365*	1
Permanent off-farm employment (%)	9.9	6.8	.4269	1

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

TABLE 7. CREDIT EXPERIENCE/FUTURE USE

	MEAN		t	d.f.	χ^2	d.f.
	BAB	NON-BAB				
Used credit in year prior to study (%)	33.8	6.8			16.2584***	1
Have ever applied for bank loan (%)	100.0	21.9			91.7600***	1
Percent turned down of those who applied	6.4	25.0			4.8768**	1
Amount of credit desired next year (\$b)	29,095	25,424	1.2560*	127	7,5820*	3

***significant at the .01 level.

**significant at the .05 level.

*significant at the .10 level.

34

TABLE 8. FACTORS IMPEDING CREDIT USE
(Percent Responding As Impediment)

	BAB	NON-BAB	χ^2	d.f.
No impeding factors	29.6	54.8	9.3740***	1
Don't know how to apply	42.3	28.8	26.3729***	1
Too many procedures and paperwork	14.1	5.5	3.0365*	1
Land title not in order	16.9	2.7	10.4089***	1
Credit is inoportune	14.1	4.1	4.3606*	1
Fear refusal of loan	12.7	5.5	6.7673***	1
Fear couldn't repay	26.8	16.4	2.2701	1
Other	32.4	13.7	21.8896***	1

***significant at the .01 level.
 **significant at the .05 level.
 *significant at the .10 level.

135

TABLE 9. DISCRIMINANT FUNCTION

Variable	Standardized Discriminant Function Coefficients
Useable land	.33727
Head of cattle owned	-.07725
Family labor (size of household)	.25520
Age of head of family	.13369
Level of formal education	.27009
Attended short course	.28161
Percent of value of crop production sold	.09876
Degree of market integration	.46485
Gross farm income	-.31262
Off-farm income	.11554
Cash farm operating expenses	.37968
Investment expenditures (non-livestock)	.06298
Livestock purchase expenditures	.14361
Has title to land	.14266
Amount of a credit desired next year	.32220
Lack of impediments to use of credit	-.36586
Group centroids	
non-borrowers	-0.92376
borrowers	0.93696
Canonical correlation	.68375
Wilks lambda	.53249
χ^2	82.556 ^a

^a χ^2 is significant at 0.001 level (16 degrees of freedom).