A LOGIT MODEL OF FARMERS' DECISIONS ABOUT CREDIT

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Most of the research in agricultural credit in the United States is related to large-scale commercial farming. A number of such studies have tried to estimate the demand for credit (Hesser and Schuh) and/or supply of credit (Melichar). Other major areas of research in agricultural credit have been (a) the functioning of rural financial markets, (b) the effects of national monetary and credit policies on investment and production in agriculture, (c) capital formation in agriculture as affected by national economic policy, and (d) the sources-and-uses-of-funds approach in the analysis of agricultural financing. A brief review of studies related to these four areas is given in Brake. However, the subject of small-farm credit in the United States has been little explored.

A few studies which have dealt with the credit problems of limited-resource (small) farms have basically studied their attitudes toward borrowing, without exploring the economic validity of such attitudes (McManus; Otto; Snell, Hopkins, and Barnett; Spitze and Bevins; Spitze and Romans; Wise; Woodworth, Comer, and Edwards). The general consensus that emerges from these studies is that relatively few operators of small farms use credit, and those who do use only small amounts. This has led some social scientists to believe that limited-resource farmers do not want to borrow.

Conventional methods of estimating the demand for credit use information from only those farmers who have actually used credit and neglect the information from farmers who have not borrowed. Such studies cannot account for farmers' initial decisions about whether or not to borrow; consequently, valuable information is wasted. Omitting nonborrowers from the sample also distorts the properties of the original sample. Furthermore, not considering the initial decision to borrow or not to borrow can lead to biased estimates (Heckman; Tobin). Fortunately, we have quite detailed information on economic aspects of the farm-firm households, and on the personal characteristics of farm operators who have borrowed as well as on those who have not borrowed. Therefore, the objective of this study was to predict the odds of a farmer using short-term and long-term credit, conditional upon information about personal characteristics of the farm operator and economic aspects of the farm-firm household.

The plan of the paper is as follows. Data used for analysis is described in the next section. The estimated model is presented in section three. Empirical results are discussed in section four, while the last section contains a brief summary and concluding remarks.

DATA

The data used in this study were collected as part of a larger farm management study carried out in western Tennessee. Since the objective of the study was to focus on the limited resource farms, only those farms whose gross farm sales were between $2,500 and $20,000 during each of the previous three years were included in the sample. No hobby farmer was included.[1] In 1979, a randomized block design was used to select a sample of 89 limited-resource farmers who agreed to participate in a long-term record-keeping program. The data were collected by trained enumerators who lived in the two selected counties. Every selected farm household was visited by the enumerators twice a month during 1980 in order to collect reliable data about farm outputs and inputs. The first and last interview, respectively, comprised an opening and closing inventory of all resources. Land was categorized into cropland, pasture, woodland, improvable, and waste land groups to identify the potential use of different types of land. An exhaustive inventory of all farm machinery and equipment was taken. Regular records of all inputs used for each crop and every type of livestock were kept separately. Similarly, separate records were kept for outputs and farm sales.

All farmers in the sample were asked whether or not they had used short-term and/or long-term credit during 1980. Pretesting of the questionnaire indicated that farmers considered the amount of borrowing a very personal matter. Therefore, no effort was made to record the actual amount of short-term and/or long-term credit used by the individual farmers in the sample. Only yes or no answers were recorded. However, the farmers who indicated that they had used short-term

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I am grateful to the anonymous referees for their helpful comments and suggestions. However, they are not responsible for any remaining errors.

The research was funded, in part, by CSRS-USDA, through Tennessee State University.

[1] There were three criteria used to exclude hobby farmers from the selected sample. First, the farmer must have been farming for at least 5 years. Second, during the previous 3 consecutive years his farm sales must have been above $2,500. Third, he plans to continue farming in the foreseeable future.

and/or long-term credit were asked the rate of interest paid on the two types of credit.

It is important to know how representative this sample is. This sample of 89 farms includes 7.75 percent of the farms of less than 260 acres and 5.80 percent of all farms in the two selected counties (Table 1). The percentage of farms selected in each farm size is quite representative of similar farms in the sample area, as well as in the entire state of Tennessee. Furthermore, the average farm sales for each farm size class are quite similar in the sample and the state of Tennessee. Unfortunately, the comparable information for the sample area is not available. Finally, 74.85 and 87.72 percent of all farms in the sample area and the state of Tennessee, respectively, are below 260 acres in size (Table 1). It should be noted, however, that the farms between 220 and 259 acres in Tennessee have average farm sales of more than $20,000. Therefore, at least some of the farms in this size class cannot be considered limited-resource farms, according to the criteria used in this study.

It is also important to have an idea of the crop and livestock enterprises on the sample farms. Of the sample farms, 42 (47.19 percent) are pure crop farms, 6 (6.74 percent) pure livestock farms, and the remaining 41 (46.07 percent) are mixed (crop and livestock) farms. Soybeans is the major crop in middle and western Tennessee, and 54 (60.67 percent) of the sample farms had some area in soybeans. The average area in soybeans on these 54 farms was 46.23 acres, with a minimum of 5 acres and maximum of 152 acres. Cotton is the second most important crop, and 23 (25.84 percent) of the sample farms had, on an average, 19.69 acres of cotton. The third largest number of the sample farms (21) had, on an average, 12.08 acres of hay crops. Corn ranked fourth, with 16 (17.98 percent) farms growing, on an average, 18.64 acres of corn. Six (7.87 percent) of the sample farms had grown wheat for grain, and the average area in wheat was 24.56 acres. Only 5 (5.62 percent) of the sample farms grew any vegetables; the main vegetable crops were tomatoes and green peas. Of the sample farms, 40 (44.94 percent) had beef cattle and calves, with an average of 12.60 head per farm, and 29 (32.58 percent) of the sample farms raised hogs and pigs, with an average of 29.38 head. Unfortunately, the *Census of Agriculture* does not have comparable data for farms of less than 260 acres at the county or the state level. Therefore, comparison cannot be made between the crop and the livestock enterprises on the sample farms with those of the sample area and the state.

Table 1. Distribution of Farms According to Size and Sales in the Sample, Sample Area, and Tennessee[a]

Farm Size Class (Acres)	Distribution of Farms			Distribution of Farm Sales[b]	
	Sample	Sample Area[c]	Tennessee[c]	Sample	Tennessee[c]
1 - 9	7 (7.87)	84 (7.31)	10800 (12.69)	3575	5097
10 - 49	39 (43.82)	417 (36.29)	26984 (31.70)	5016	4601
50 - 69	14 (15.73)	167 (14.53)	10536 (12.38)	9451	5775
70 - 99	12 (13.48)	166 (14.45)	11402 (13.39)	10290	7458
100 - 139	9 (10.11)	117 (10.18)	10799 (12.69)	13905	10152
140 - 179	3 (3.37)	78 (6.79)	7005 (8.23)	14999	13104
180 - 219	2 (2.25)	71 (6.18)	4504 (5.29)	18501	19886
220 - 259	3 (3.37)	49 (4.27)	3094 (3.63)	19910	21241
Total	89 (100.00)	1149 (100.00)	85124 (100.00)		
Total Number of Farms	89	1535	97036		

[a] Numbers in the parentheses are the percentages.
[b] The information about farm sales for each farm size class in the sample area is not available.
[c] Source: U. S. Department of Commerce: Bureau of the Census. *Census of Agriculture 1978*. Volume 1, State and County Data, Part 2 Tennessee, Washington, D. C.: U. S. Government Printing Office.

ESTIMATED MODEL

Demand for a factor of production depends on its own price. Credit is not a direct factor of production, but it is generally used to buy other factors of production. Therefore, the probability of a farmer using credit is hypothesized to be negatively related to the prevailing rate of interest. However, there are some other relevant factors which are likely to affect the probability of a farmer using credit.

Size of farm is likely to influence the probability of a farmer using credit for a number of reasons. First, the larger the size, the larger the amount of inputs needed to operate the farm. Also, large farmers may tend to use relatively more purchased inputs, due to the relatively more commercial nature of their operations. Therefore, an operator of a relatively larger farm may have to use credit in order to buy an adequate amount of inputs. Second, land is generally the main collateral the farmer can offer to a credit institution. Therefore, we expect *a priori* that the probability of a farmer using credit will be directly related to the size of his farm.[2] However, it is possible that with increasing farm size, internal savings may also increase, and hence the probability of a farmer using credit may decrease with increasing farm size.[3]

Age of the farm operator may also affect the probability of his using credit. The probability of a farmer using credit, especially long-term credit, is hypothesized to follow a life cycle pattern, with greater probability during the middle-age years than during the younger or older-age years. Young owners may be less likely to borrow because of cash flow problems, and older landowners may tend to have shorter planning horizons and be more risk-averse. However, one can argue alternatively that probability of using credit is likely to be higher during younger and older-age years than during the middle-age years. Younger farmers

[2] The value of land is more relevant for the purpose of collateral than the size of the farm because value is likely to reflect the quality of land and its location. We experimented with both size and value of land. For empirical results, see footnote 5. We decided to use size in the final model rather than land value because there is generally more interest in the effect of size on the demand for credit.

[3] Furthermore, the size of the farm should be included in the model in order to account for the economies of size in farming (Farris and Armstrong; Hall and LeVeen; Ziemer and White).

entering into farming have to purchase a "critical mass" of land, machinery, and equipment to establish a viable enterprise (Boehlje; Ziemer and White). Young farmers may be less risk-averse and financially more aggressive regarding farm enterprise expansionary plans. On the other hand, older farmers may like to increase the size of the farm through borrowing, if grownup children remain on the farm as business partners (Ziemer and White). In brief, the probability of a farmer using credit, especially long-term credit, is likely to follow a life cycle pattern. But whether the probability of using credit is higher or lower during middle-age years is not certain (Ziemer and White).

Full-time and part-time farmers may have different probabilities of using credit. A part-time farmer is expected *a priori* to be less likely to use credit for two reasons. First, he may have less time to devote to farming, and hence may not be able to expand the farm operation. Second, off-farm employment may provide adequate internal funds to meet financial needs. However, an opposite argument can also be advanced that off-farm income can provide a relatively stable flow of funds and the part-time farmer will be in a better financial position to make loan payments. Therefore, he may be willing to use a larger amount of credit. In brief, whether the farmer is full-time or part-time seems to have an important effect on the demand for credit, but the direction of this effect is not clear.

The perception of the farmer concerning whether or not additional credit can increase farm profits is likely to have an important influence on the demand for credit. The farmers who do not believe that additional credit can increase their farm profits are less likely to borrow. However, they may borrow to expand the operational size of the farm or for other reasons.

Farming experience, education, and frequency of contact with an extension service are treated as indicators of the managerial ability of a farmer (Müller). An increase in the levels of these personal characteristics of a farmer is likely to improve his managerial abilities. He should be better able to formulate and execute farm plans. Better information is also likely to improve marketing ability. Therefore, all these managerial traits are likely to be positively related to the probability of a farmer using credit.

The number of children below 14 years of age is likely to increase the probability of a farmer using credit for two reasons. First the expected future expenses of children may force the parents to improve and expand their farming enterprise now. Second, the increased use of the family income for the growing children may leave limited funds for meeting farming expenses, and parents are more likely to borrow to meet farm expenses.

The race of the farm operator can have an important impact on the probability of using credit for at least two reasons. First, the black farm operators may have relatively lower managerial abilities due to historically segregated education and agricultural extension services in the South (Huffman; Welch). Consequently, black farmers may be less able to make efficient use of credit. Lower levels of managerial expertise are also likely to make them relatively more risk-averse. Second, there is some evidence that in the South black farmers have been discriminated against by public as well as private institutions, including banks (Huffman). If this is true, then the probability of black farmers using credit could be lower compared to white farmers.

The farmers who are contemplating an improvement in the farm operations or increase in the farm enterprise are expected *a priori* to use credit to meet the increased need for cash. Conversely, it may be argued that the farmers who are contemplating change may have saved sufficient internal funds to finance such improvements and/or expansion and, therefore, may be less likely to borrow.

Rate of return to farm investment, measured as profit per dollar of total farm assets, can affect the probability of using credit. Logically the probability of using credit should be directly related to the rate of return on investment. However, the farmers enjoying high rates of return may be making an optimal use of all existing factors of production and may not need additional credit. On the other hand, the farmers who are experiencing relatively low returns on investments may be under-utilizing some or all factors of production due to inadequate operating capital. These farmers may be able to increase their rates of return if additional credit becomes available. Therefore, the probability of a farmer using credit is hypothesized to be inversely related to the rate of return.

Current demand for credit may be affected by a previous experience with credit. A farmer, due to his previous experience with credit, may start making farm plans that anticipate certain amounts of credit. In other words, the probability of a farmer using credit is likely to be directly related to previous experience with credit. But it can be argued that the farmers who have already borrowed may still be repaying the installments and may be less likely to borrow again. However, this effect is likely to be less strong in the case of short-term credit, which generally has to be paid within two years. Unfortunately, we do not have information about their prior experience in using short-term or long-term credit. Since we have data only for a single year, we are limited to testing whether or not short-term and long-term credit are complementary to each other.

If we had data about the actual amounts of funds borrowed by farmers, we could have estimated a Tobit model of the demand for credit. But since we do not have such information, we have estimated a logit model[4] to predict the odds of a farmer using short-term and long-term credit conditional upon information about the above-mentioned individual attributes of the farm operator and the economic aspects of the farm-firm household.

[4] Although most of the properties of a logit model also hold for a probit model, the theoretical justification for employing the probit model is generally limited, while the logit specification is theoretically more appealing (Pindyck and Rubinfeld, pp. 245–47). Furthermore, the properties of the estimation procedure of the logistic function (which results in a logit model) are more desirable than those associated with the choice of a normal probability distribution, which results in a probit model (Rubinfield, p. 32). For further details, see Amemiya, Berkson, and Chambers and Cox.

The following logit model has been estimated separately for short-term and long-term credit:

$$(1)\quad \log\left(\frac{P_i}{1-P_i}\right) = B_0 + B_1 CINP_i + B_2 SIZE_i + B_3 AGE_i + B_4 (AGE_i)^2 + B_5 EXP_i + B_6 EDU_i + B_7 NCONT_i + B_8 RC_i + B_9 FT_i + B_{10} CHANGE_i + B_{11} PD_i + B_{12} NC_i + B_{13} IR_i + B_{14} CRDT_i + u_i$$

where

P_i = probability that a farmer will choose to borrow

CINP = 1 if the farm operator believes that additional credit can increase profits from his farm enterprise, 0 otherwise

SIZE = size of the farm in acres[5]

AGE = age of the farm operator in years

EXP = number of years the farm operator has been farming

EDU = number of years of formal education completed by the operator

NCONT = number of contacts with extension agents during the year (includes visits paid by extension agents, contacts made with extension agents by the farmer, and his participations in group meetings organized by the extension service)

RC = 1 if farm operator is white, 0 otherwise

FT = 1 if farm operator is a full-time farmer, 0 if he is a part-time farmer

CHANGE = 1 if farmer is planning to increase the size of farm enterprise over the previous year, 0 otherwise

PD = rate of net return per dollar of total investment in the farm enterprise (calculated as a ratio of farm profits[6] to the total farm assets, that is, the market value of owned land, livestock, farm machinery and equipment, and farm buildings)

NC = number of children under 14 years

IR = interest rate paid on short-term/long-term credit

Table 2. Maximum Likelihood Estimates of the Logit Models of the Demand for Short-Term and Long-Term Credit by the Limited-Resource Farms in Western Tennessee

Explanatory Variables	Expected Signs	Demand for Short-term Credit		Demand for Long-term Credit	
		Coefficients	Derivatives at Mean	Coefficients	Derivatives at Mean
Constant		-25.4647 (1.6806)	-6.0120	-25.3047 (-0.6533)	-5.4567
CINP	+	2.6757 (1.7924)	.6317	2.2612 (1.3286)	.4876
AGE	+	.5305 (1.0818)	.1252	.7356 (0.7690)	.1586
$(AGE)^2$	-	-.0047 (-0.9689)	-.0011	-.0075 (-1.7146)	.0016
EXP	+	.0296 (0.4854)	.0070	.4381 (0.6846)	.0945
EDU	+	.5332 (1.7750)	.1259	.3061 (1.7418)	.0660
NCONT	+	.2714 (0.9287)	.0641	.2791 (0.8039)	.0602
SIZE	+	.0240 (1.9368)	.0057	.0219 (1.2441)	.0016
PD	-	-10.9209 (-1.8358)	-2.5780	10.4464 (0.4237)	2.2530
NC	+	.6106 (1.5589)	.1442	1.4683 (1.2126)	.3166
RC	+	3.3810 (1.6785)	.7982	7.3694 (1.9649)	1.5890
FT	+	.6106 (0.5187)	.1441	.6074 (1.3816)	.1310
CHANGE	+	2.0133 (1.3829)	.4753	-7.5184 (-0.7320)	-1.6210
SIR	-	-.5603 (-3.6387)	-.1323		
LIR	-			-.8922 (-1.8088)	-.1924
SC	+			1.6580 (0.7152)	.3575
LC	+	.5152 (0.4249)	.1216		
R^2		.7949		.9179	
Log-Likelihood		-17.4340		-5.7393	
$\chi^2(14)$		83.5100		93.3690	
% of Predictions Correct		93.26		98.88	

Numbers in the parentheses are the estimated t-ratios.

CRDT = 1 if any short-term/long-term credit is also borrowed, 0 otherwise

and u_i is a random error.

RESULTS AND DISCUSSION

The maximum-likelihood estimates of the logit model for both short-term and long-term credit have been obtained by using a version of the Davidson-Fletcher-Powell iteration process. The maximum likelihood estimates, derivative at mean for every parameter, and other statistics for both short- and long-term credit models are given in Table 2.

The signs of the estimated parameters in the case of short-term as well as long-term credit models are generally as expected according to *a priori* reasoning. Furthermore, the sign of every parameter is the same in both models, except that of PD and CHANGE. In the case of short-term credit, the sign of the parameter of PD is negative and statistically significant. It probably indicates that the farms with high rates of return to their farm investment have adequate internal funds to meet the farm operating expenses. Therefore, the rate of return to farm investment is inversely related to the probability of using short-term credit. The corresponding parameter, in the case of long-term credit is positive, though it is not significant. It means that farmers enjoying high rates of return have a slightly higher probability of using long-term credit.

The sign of the parameter associated with CHANGE,

[5] This is the operational size of the farm and includes rented land. It is hypothesized that short-term credit is needed to meet primarily the operational farm expenses, and as more land is rented the amount of operational capital needed and hence the demand for credit is likely to increase. We also used owned land instead of the operational size. But because only 13.48 percent of the farms had rented any land, the estimated coefficients and corresponding t-ratios for both short-term and long-term credit remained basically unchanged.

[6] Farm profits should exclude interest payments on credit. Since we do not have information on the amounts of credit and interest payments, profits have been overestimated for credit-using farms.

in the case of long-term credit, is negative, though not significant. This may suggest that the farmers who have decided to expand their farm operations have sufficient internal funds to make long-term investments. It should be mentioned that expansion of farm operations did not necessarily mean buying more land and/or machinery and equipment. In most of the cases, the farmers planned to rent some land or to increase the size of the livestock activities. In other words, expansion plans did not necessarily involve long-term investments. The positive parameter of CHANGE in the case of short-term credit indicates that these farmers will need short-term credit to meet the increased demand for farm-operating expenses due to expansion of farm operations.

The probability of using short-term as well as long-term credit is directly related to the length of farming experience (EXP), level of formal education (EDU), frequency of contact with the extension agent (NCONT), number of children below 14 years of age (NC), farm size (SIZE),[7] experience of using long-term (short-term) credit in the case of the short-term (long-term) credit model.[8] The probability of using either type of credit is higher for white, full-time farmers and those who think additional credit can increase profits from their farm operations than for black farmers, part-time farmers, and those who do not believe additional credit can increase profits, respectively. The probability of using short-term or long-term credit is inversely related to the respective rate of interest. Furthermore, the probability of using either type of credit follows the life cycle pattern, as expected.

The interpretation of the individual estimated parameters given in Table 2 must be done with care, since the left-hand side of equation (1) is the logarithm of the odds of choice, not the actual probability. For example, a 1 percent increase in the number of contacts with extension service will lead to an increase of 0.2714 in the logarithm of the odds that the farmer will choose to use credit. To interpret the effect of a change in NCONT on the probability of using short-term credit, we need to solve for the change in probability (ΔP_i) as follows:

$$(2)\quad \Delta\log\left(\frac{P_i}{1-P_i}\right) = .2714\ \Delta NCONT$$

To simplify, we utilize the fact that for any explanatory variable X, $\Delta\log X \approx \Delta X/X$, and the fact that $\log(X/Y) = \log X - \log Y$, then

$$(3)\quad \Delta\log\left(\frac{P_i}{1-P_i}\right) = \left(\frac{1}{P_i} + \frac{1}{1-P_i}\right)\Delta P_i = \left[\frac{1}{P_i(1-P_i)}\right]\Delta P_i$$

Since we have chosen NCONT = 1, it follows that

$$(4)\quad \Delta P_i \approx .2714\,[P_i(1-P_i)]$$

This shows that the change in probability is a function of the probability itself. If P_i were equal to 0.5, for example, then ΔP_i would equal 0.06785. Perhaps the single most useful value of P_i to choose for this interpretation is the mean. However, an examination of the response in the choice to borrow at a number of points on the probability distribution can provide quite useful information.

This logit model of the demand for credit can be used to make predictions and hence locate some points on the probability distribution. Let us assume that we wish to predict the probability that a 30-year-old white, full-time farmer with the following economic and personal characteristics will indeed use short-term (long-term) credit. Other characteristic values are assumed: CINP = 1, EXP = 5, EDU = 6, NCONT = 1, S = 50, PD = 0.1, NC = 1, CHANGE = 1, IR = 6, CRDT = 1. In order to predict the odds of borrowing, we evaluate the right-hand side of the estimated equation (1) by substituting the above values of explanatory variables and the corresponding estimated coefficients from Table 2. The calculated P_i values are 0.0264 and 0.0453 for short-term and long-term credit, respectively.

It will be interesting to see how the probability of a farmer using either type of credit would change with increasing farm size (SIZE), education level (EDU), frequency of contact with extension agents (NCONT), or age (AGE). The calculated P_i for different values of SIZE, EDU, NCONT, and AGE for short-term and long-term credit (models) are given in Table 3.

The effect of farm size on the probability of a farmer using either type of credit is quite similar. A farmer is almost certain to use both types of credit once the farm size reaches 300 acres. The level of formal education has a slightly higher impact on the probability of a farmer using short-term credit than of him using long-term credit. A farm operator with a master's degree is almost certain to use short-term credit, even if he operates only a 50-acre farm. Frequency of contact with the extension agent has a slightly stronger effect on the probability of using long-term credit as compared to

[7] One of the reviewers suggested that it might be better to replace farm size with the value of owned land, farm sales, or owned assets. We substituted the above three variables, one at a time, in equation (1) for farm size, and got the following results:

Variable Substituted for Farm Size (SIZE)	Short-Term Credit	Long-Term Credit
Value of Owned Land	.000032	.000019
	(1.5421)	(1.7576)
Value of Owned Assets	.000040	.00020
	(1.9679)	(1.0185)
Value of Farm Sales	.000084	.0011
	(0.7232)	(2.0290)

Estimated t-ratios are in the parentheses.

[8] This shows that the demand for short-term and long-term credit is complementary. In other words, the probability that a farmer will use short-term (long-term) credit is higher if he has also used long-term (short-term) credit.

short-term credit. The probability of using either type of credit follows the life cycle pattern. However, this pattern is relatively stronger for long-term credit use than for short-term credit, as one would expect. The inflection points in the case of short-term and long-term credit are at 56 and 49 years of age, respectively. That is, the cut-off date is 7 years earlier for using long-term credit than for using short-term credit. Furthermore, the probability of using long-term credit is virtually zero once the farm operator is 65 years old.

SUMMARY AND CONCLUDING REMARKS

In this study, a logit model has been used to predict the odds of small-farm operators using short-term (long-term) credit, conditional upon information about economic attributes of the farm and personal characteristics of the farm operator. The model has been estimated separately for short-term and long-term credit, using farm-level data from operators of limited-resource (small) farms in western Tennessee. The results show that the probability of a farmer using short-term as well as long-term credit is directly related to the size of the farm, farm experience, level of formal education, frequency of contact with extension agents, perception that credit can increase farm profits, and the number of children below 14 years of age. But, as expected, the probability of borrowing is inversely related to the prevailing interest rate.

The probability of borrowing is higher for white and full-time farmers than for black and part-time farmers, respectively. The probability of borrowing follows the life cycle pattern. This probability increases up to the age 49 and 56 in the case of long-term and short-term credit, respectively, and thereafter decreases at an increasing rate. The probability of using short-term (long-term) credit is positively (negatively) related to the plans of improving and expanding the farm operation, but the opposite is true in the case of rate of return to farm investment. Furthermore, the demand for short-term and long-term credit is complementary.

The empirical results of the study do not show any marked difference in the nature of the short-term or long-term credit-demand function for the limited-resource farms than that one would anticipate for the large commercial farms. It is quite possible that the coefficient values might be different for these two types of farms, but there is little reason to believe that the signs of the respective coefficients would be different.

This study provides quite detailed information about the impact of different personal characteristics of the farm operator and economic aspects of the farm-firm household on the odds of a farmer using short-term and long-term credit. This is one of the few studies analyzing both short-term and long-term credit models. Furthermore, the study explains in detail the methodology for calculating the probability of farmers using short-term/long-term credit, given various levels of independent (personal and farm-firm household characteristics) variables. Such empirical results are important from a policy perspective. However, due to the lack of information about actual loan amounts and interest payments, we could not estimate the credit demand elasticities. Inclusion of this financial information would contribute to future farm credit research.

Table 3. Calculations of the Probability of Farmers Using Short-Term/Long-Term Credit at Various Levels of Some Selected Variables

FARM SIZE		EDUCATION		CONTACTS WITH EXTENSION AGENT		AGE OF THE FARM OPERATOR	
Acres	Probability of Borrowing	Years of Formal Schooling	Probability of Borrowing	Number of Contacts	Probability of Borrowing	Age in Years	Probability of Borrowing
Short-Term Credit							
50	.0264	6	.0264	1	.0264	30	.0264
100	.0825	7	.0441	2	.0343	35	.0770
150	.2299	8	.0730	3	.0445	40	.1689
200	.4979	9	.1183	4	.0576	45	.2812
225	.6437	10	.1861	5	.0743	50	.3732
250	.7670	High School	.3991	6	.0952	55	.4174
275	.8571	2 Years of College	.6586	7	.1213	56	.4195
300	.9162	3 Years of College	.7668	8	.1533	60	.4053
325	.9522	4 Years of College	.8486	9	.1919	65	.3388
350	.9732	M.A.	.9421	10	.2376	70	.2335
Long-Term Credit							
50	.0453	6	.0453	1	.0453	30	.0453
100	.1242	7	.0635	2	.0590	35	.1409
150	.2977	8	.0905	3	.0766	40	.2805
200	.5589	9	.1062	4	.0988	45	.3890
225	.6866	10	.1390	5	.1266	49	.4184
250	.7911	High School	.2294	6	.1607	50	.4167
275	.8675	2 Years of College	.3545	7	.2020	55	.3553
300	.9188	3 Years of College	.4272	8	.2508	60	.2261
325	.9514	4 Years of College	.5032	9	.3067	65	.0924
350	.9713	M.A.	.6514	10	.3691	70	.0259

Note: The above P_i values are based on the specific values of the explanatory variables assumed in the example given in the text. These P_i estimates will change if different values for explanatory variables were assumed. However, the basic trend of P_i values given here will hold for any values of the explanatory variables.

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