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DEMAND FOR AGRICULTURAL LOANS: A THEORETICAL AND ECONOMETRIC ANALYSIS OF THE PHILIPPINE CREDIT MARKET

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Abstract

Estimates of loan demand are often biased and inefficient due to data truncation and the use of data on individual loans that suffers from non-identifiability of aggregate demand and supply factors. This paper develops a framework to measure loan demand as a sum of all loans received during a period and applies a type three Tobit model to estimate it among farm households in the Philippines. The results suggest that the framework using total loans to estimate loan demand provides a statistically better fit than loan demand estimated using data on individual loans.

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Estimates of loan demand are often biased due to: (i) data truncation by omitting non-borrowers, (ii) non-identifiability of demand and supply factors, and (iii) non-separability of production and consumption decisions among farm households (David, 1979; David and Meyer, 1980; Iqbal, 1983, 1988). The New Household Economics framework described in Singh, Squire and Strauss (1989) and used in econometric models, such as Heckman's method, truncated/censoring and switching regression models, have been developed to address these problems.

Estimates of loan demand are, nonetheless, often biased because they are usually estimated either with continuous regression models that do not adequately correct for selectivity bias [1] and/or use data collected through field studies that typically report single loan transactions which are derived by matching an individual lender's loan offer with the borrower's loan demand [2]. These estimates are irrelevant in the presence of data censoring and credit rationing, and when a single loan is inadequate to satisfy all of the borrower's credit requirements. Non-borrowers, and loan quantity and loan size rationing are prevalent in rural financial markets [3]. Furthermore, borrowers often report multiple loans borrowed from several types of lenders offering different types of contracts. Therefore, the estimation of loan demand from individual loan transactions without accounting for credit rationing and multiple borrowing, despite the absence of or correction for data censoring, the use of new household models and advanced econometric techniques, may lead to erroneous results.

Economic theory provides tools to examine the *loan demand* derived by a utility maximizing borrower without any supply constraints [4]. However, when supply constraints exist and multiple loans are observed per household, estimates based on single loan transactions do not measure the quantity demanded. In other words, individual loan transactions cannot be used to estimate a demand function when multiple loans are observed. It is important, therefore, to develop a definition of loan demand and obtain data so that all loans obtained during a reference period can be measured. This will facilitate deriving theoretically plausible and empirically robust estimates of loan demand. This paper argues that while loan demand is usually unobservable, it can be inferred under certain behavioral restrictions by aggregating individual loans received from various types of lenders. Therefore, loan demand can be estimated consistently and efficiently from surveys that carefully collect data on all loans. The paper develops a theoretical and econometric framework to estimate loan demand from field data and applies it to examine the demand for loans among Philippine farm households.

I. Estimating Loan Demand: Theoretical and Econometric Framework

A. Theoretical Framework

Assume a single lender offering a single contract to maximize his utility function to derive the loan offer, L^*_S. Given an unconstrained loan supply at an interest rate r, the tangency point of the iso-expected utility curves of the borrower and the lender will provide the loan demand, L^*_B. However, with constrained supply, both loan quantity and loan size rationing are possible outcomes. Therefore, the total loan size, L^+_B, obtained through matching demand and supply schedules can be specified as follows:

$$L_B^+ = \begin{cases} L_B^* & \text{if } 0 < L_B^* \le L_S^* \quad : \textit{no rationing} \\ L_S^* & \text{if } 0 < L_S^* < L_B^* \quad : \textit{loan size rationing} \\ L_S^* = 0 & \text{if } L_S^* \le 0 \text{ and } L_B^* > 0 \quad : \textit{loan quantity rationing} \\ L_B^* = 0 & \text{if } L_B^* \le 0 \quad : \textit{no demand} \end{cases} \tag{1}$$

While there may exist some unsatisfied loan demand under a single lender, it can be satisfied by borrowing from more than one lender when individuals have access to non-exclusive loan contracts from multiple lenders [5]. Let us consider that borrowers maximize their expected utility and derive their loan demand, L^*_D, from the terms and conditions of an accessible marginal contract [6]. Therefore, the loan demand is identified (satisfied) at the margin. A marginal lender is the one who satisfies the loan demand of a borrower, while an infra-marginal lender will credit ration the borrower.

Assume that a borrower has a contract opportunity set, ϖ, that consists of two non-exclusive contracts from two lenders (1 and 2) such that Ψ_1 is from lender 1 and Ψ_2 is from lender 2. Let Ψ_2 be the marginal contract from lender 2. Suppose, there is no loan size rationing from the infra-marginal lender, lender 1. Then, the total loan size L^+_D is:

$$L_D^+ = \begin{cases} L_D^* = L_1^+ & \text{if } 0 < L_D^* \le L_{S1}^* \; ; \; \overline{\psi} = \{\psi_1\} \\ L_D^* = L_2^+ & \text{if } 0 < L_D^* \le L_{S2}^* \; ; \; \overline{\psi} = \{\psi_2\} \\ L_D^* = L_1^+ + L_2^+ & \text{if } 0 < L_D^* \le L_{S1}^* \text{ and } 0 < L_D^* \le L_{S2}^* \; ; \; \overline{\psi} = \{\psi_1, \psi_2\} \end{cases} \tag{2}$$

where, Ψ_1 and Ψ_2 are the loan contracts and L^*_{S1} and L^*_{S2} are the supply of loans from lender 1 and lender 2, respectively; L^+_1 and L^+_2 are the individual loans from lender 1 and lender 2, respectively.

Suppose there is loan size rationing from the infra-marginal lender. Under the terms and conditions of Ψ_1, lender 1 supplies a loan up to L_1 such that L_1 is less than L^*_D. The determinants of the supply of loans varies with the type of lender's expected profit maximization function. Then, the borrower's total loan size, L^{+}_{D} and loan demand, L^{*}_{D} are:

$$L_D^{+} = \begin{cases} L_D^{*} = L_{S1}^{*} + L_2^{+} \quad \text{if } L_D^{*} > L_{S1}^{*} \text{ and } 0 < L_D^{*} < L_{S2}^{*}; \quad \overline{\psi} = \{\psi_1, \psi_2\} \\ L_D^{*} = L_2^{+} \quad \text{if } L_D^{*} > L_{S1}^{*} \text{ and } 0 < L_D^{*} < L_{S2}^{*}\ ; \quad \overline{\psi} = \{\psi_2\} \end{cases} \tag{3}$$

Therefore, loan demand can be interpreted from the individual loans that are often supply constrained. In this way, theoretical predictions on loan demand can be applied to verify the validity of empirical estimates. The next section discusses an econometric specification to estimate loan demand from observed individual loans.

B. Econometric Specification

The discussion above indicates that the observed borrowing is obtained by matching the demand for and supply of loans, and is associated with determinants of loan demand and determinants of loan supply. Total borrowing can be obtained through field surveys by carefully enumerating the total amount of loans obtained by a household over some period of time.

In order to keep the model estimable from the field data, the presence of loan size rationing from an infra-marginal lender can be assumed. It follows that households with only one loan choose the marginal lender to satisfy their entire loan demand. Therefore, the specification of a structural model to estimate the loan demand essentially follows equation three. The structural model for loan demand and loan supply can be written as:

$$\begin{aligned} L_D^{*} &= \alpha_0 + \alpha_1\, Z + \alpha_2\, r + u_1 && (i) \\ L_S^{*} &= \beta_0 + \beta_1\, M + \beta_2\, r + u_2 && (ii) \\ L_D^{*} &= L_S^{*} && (iii) \\ E(Zu_1) &= E(Mu_2) = 0\ ;\ [E(ru_1) = E(ru_2)] \neq 0 \end{aligned} \tag{4}$$

where, Z and M contain sets of observed exogenous variables that affect loan demand and supply, respectively. Let Z and M be asymptotically uncorrelated with the stochastic residuals u_1 and u_2. By the clearance condition 4iii, the interest rate r is endogenously determined and is correlated with u_1 and u_2. This is true because the observed interest rates in rural financial markets are often lender and borrower specific and are related to the loan size.

Since the censored nature of data due to the presence of non-borrowers in a sample will lead to biased and inconsistent OLS/2SLS or LIML estimates, a Tobit model that can provide consistent and efficient estimates on censored samples needs to be applied. Furthermore, a Tobit model is developed from a utility maximization framework which is consistent with the theoretical model used in this study. Therefore, the loan demand equation, (L_D^{*}), can be estimated consistently using Tobit models from the observed total loan size, L_D^{+}. Since interest rates are observed only for positive loan sizes, the basic single equation Tobit model needs to be extended to accommodate simultaneous estimations. Following Amemiya's extension of the type three tobit model, we can specify the model as:

$$
\begin{aligned}
&Y^* = X_{1t}\beta_1 + u_{1t} && (i)\\
&r^* = X_{2t}\beta_2 + u_{2t} && (ii)\\
&L_D^* = L_D^+ = X_{3t}\beta_3 + r^* + u_{3t} \;\; if\; L_D^* > 0 &&\\
&\qquad\qquad = 0 \;\; if\; L_D^* \le 0 && (iii)\\
&Y^+ = 1 \;\; if\; L_D^* > 0 \;\; and\; L_S^* > 0 &&\\
&\quad = 0 \;\; if\; L_D^* \le 0 \;\; and\; L_S^* \le 0 && (iv)\\
&r^+ = r^* \;\; if\; L_D^* > 0 \;\; and\; L_S^* > 0 \;\; or\; Y^+ = 1 &&\\
&\quad = 0 \;\; if\; L_D^* \le 0 \;\; and\; L_S^* \le 0 \;\; or\; Y^+ = 0 && (v)
\end{aligned}
\qquad (5)
$$

where, Y^* is the potential index that affects the decision to borrow, and Y^+ is the observed index that indicates the matching of the borrower's decision to borrow with the lender's decision to offer loans; L^{*D} is the demand for loans and $L^+{}_D$ is the total loan size; r^* is the interest rate related to the loan demand while r^+ is the observed interest rate. In the above model, Heckman's two stage procedure can be used on 5iv and 5v to obtain the predicted value of interest rate. Later, the predicted value of interest rate can be used in a well identified loan demand equation, 5iii, and estimated by Tobit.

II. Estimating Loan Demand in the Philippines

A. Description of the Data

The data used in this study were collected from two villages located in the major rice growing Nueva Ecija province in Central Luzon by the International Rice Research Institute during the periods 1985-86 and 1989-90.[7] The sample includes 127 randomly selected rice farming households. The 1989-90 survey covered three cropping seasons for all the 127 farm households. The majority of the sample farms have adopted modern rice growing technology, are irrigated by gravity irrigation systems and grow two rice crops a year. In general, the farms are small and 83 % of the land is under land reform beneficiary status. Before land reform, the farms were large rice haciendas and the majority of farmers were share tenants. The household heads' average residence in the villages is over 22 years and they have an average of six years of schooling.

Of the 127 households interviewed, only five were non-borrowers during the entire 1989-90 period covering three cropping seasons. However, there were 17, 27 and 10 non-borrowers in each of the three seasons. There were a total of 180 different lenders under seven different lender types that provided a total of 688 credit contracts [8]. Informal lenders accounted for 92 % of the total credit contracts. Trader and farmer lenders were the primary sources of loans; 502 contracts (73 % of the total) were observed with 132 different trader and farmer lenders (74 % of all lenders). The above data indicate multiple loans per borrower household from several types of lenders.

The majority of the credit contracts reported by the households were interlinked with product, labor or/and land markets. The frequency of linking credit with farm products was higher with traders than other lenders. Although the majority of loans from farmers were linked with farm products, land and labor links were also used to secure loans. There were many loans, however, with no factor market links, but with an implicit promise of reciprocity. This phenomena is explained by the large percentage of contracts to friends, relatives and neighbors, while the majority of trader loans were with business partners and borrowers with no familial ties. The frequency of loans reportedly obtained for production purposes was higher with traders than with other lenders. The average loan size per transaction was reported to be P 3,500 ($180); the average total loan size per borrower household was P 7,250 ($372) and P 17,550 ($901) per season and all three seasons, respectively. Whereas the loan sizes observed with trader lenders were higher than other types of lenders, interest rates were relatively similar among lender types with an average interest of 25 % for five months, which is the length of a cropping season.

B. Econometric Estimation

In order to estimate loan demand, equation 4 above can be modified to include the following: set Z affecting loan demand is composed of borrower characteristics (BC) and other exogenous factors (EF), and set M influencing loan supply is composed of borrower characteristics (BC), lender characteristics (LC), other exogenous factors (EF) and the information base available to lenders (I). In the absence of a formal loan contract, long term familial and business relations guarantee a well established informational base for the lenders.

The dependent variable, total borrowing/loan size (LSIZE), is measured as the sum of all loans reported by a borrower household in a given agricultural season. The borrower characteristics (BC) include farming ability proxied by age of the household head (AGEHH), education of the household head (EDUHH) measured as number of years of schooling, risk aversion parameter (AGESQ) measured as the square of the age of the household head, and borrower's farming capacity proxied by the number of hectares of land operated by the household (FSIZE), land quality (LQUALITY) measured as net returns per unit of land per annum, collateral value represented by the value of physical assets inherited by the household (ASSET), family labor endowment given by the total number of household members engaged in farming one hectare of land operated by the household head (ULABOR), and annual net income earned through non-farm enterprises (NONFARM). Lender characteristics (LC) include lender type given by the dummy variables representing trader lenders (DTL) and farmer lenders (DFL). Loan characteristics include interest rate (r) measured as the sum of explicit interest rate per season plus implicit interest rate measured as total transaction costs and losses due to overpricing of inputs and underpricing of outputs by the lender. Information variables (I) include the reputation of the borrower measured as the ratio of the number of years of stay in the village by the household head to his age (REPUTE), and business relationship between borrower and lender measured as a dummy variable, DCUST. The dummy variable takes on the value of 1 if the borrower has more than five years of customer relationship with the lender, and 0 otherwise. Other exogenous factors (EF) include location specific irrigation facilities (IRRINT) measured by the irrigation intensity of a borrower's farm [9], and a seasonal dummy, DS2, that takes on the value of 1 for dry season and 0 otherwise, for the year 1989-90. The variables FSIZE, LQUALITY and NONFARM are measured for the year 1985 to avoid endogeneity problems. Using the above explanatory variables, loan demand and loan supply are specified as:

$$\begin{aligned} Demand\ (LSIZE) &= \alpha_0 + \beta_1\, r + \beta_2\, ULABOR + \beta_3\, AGEHH + \beta_4\, AGESQ \\ &\quad + \beta_5\, ASSET + \beta_6\, NONFARM + \beta_7\, LQUALITY + \beta_8\, FSIZE \\ Supply\ (LSIZE) &= \alpha_1 + \gamma_1\, r + \gamma_2\, ULABOR + \gamma_3\, AGEHH + \gamma_4\, EDUHH + \\ &\quad \gamma_6\, LQUALITY + \gamma_7\, FSIZE + \gamma_8\, REPUTE + \gamma_9\, IRRINT \\ &\quad + \gamma_{10}\, DCUST + \gamma_{11}\, DTL + + \gamma_{12}\, DFL + \gamma_{13}\, DS2 \end{aligned} \tag{6}$$

We postulate that loan demand is negatively related to interest rates. While farming ability and capacity are expected to affect loan demand, the direction of causality is subject to empirical verification. Since loan demand is satisfied at the margin, it is influenced by the terms and conditions of the marginal loan contract. Therefore, loan demand is estimated using the terms and conditions of the marginal contract observed with a borrower household. However, the selection of the marginal contract for a household is difficult due to the multiplicity of loans and the heterogeneity in terms and conditions of the loan contracts. For this paper, the contract with the highest implicit interest rate is chosen as the marginal contract [10] and a type three Tobit model following the specification in equation 5 is estimated. In addition, an alternative specification using individual loan transactions is also estimated by the type three Tobit method. The individual loans refer to loan sizes observed with each lender while total borrowing refers to the aggregate of loans received by a household in a given period. A comparison of the demand estimates obtained by using individual loans and the aggregate of individual loans by the type three Tobit method will help establish the validity of our framework.

The estimates for loan demand obtained using total loans and the type three Tobit model are presented in Table 1. Significant log-likelihood functions represent a good model fit and the results are consistent with theoretical expectations. Generally, the results demonstrate that loan demand is elastic with respect to interest rates, and is influenced by the ability and capacity of the borrower to specialize in farming. The positive and significant coefficients for ASSETS and FSIZE, and the positive coefficients for ULABOR, AGEHH, and LQUALITY indicate that loan demand is influenced by the ownership of physical and human assets that can be used in farm production. Loan demand is significantly and negatively affected by the risk aversion, AGESQ, of borrowers. The negative coefficient for NONFARM can be interpreted in two ways. It indicates, on the one hand, that loan demand decreases with an increase in specialization in nonfarming. On the other hand, an increase in non-farm income increases household income and opportunities for self-financing, thereby reducing loan demand

The demand estimates using individual loans and the type three Tobit method is presented in table 2.[11] While these estimates generally conform to theoretical expectations and are similar to the estimates of loan demand using total loans in the direction of causality, they are not elastic with respect to interest rates. The difference in the elasticity of interest rates lead to diverse conclusions with respect to loan demand. For example, using estimates based on individual loans, it is often argued that small farmers are interest rate inelastic and they accept high interest rates for timely, non-rationed and low transaction cost loans. The use of total loans to estimate loan demand gives a different result, however, since it incorporates information on the multiplicity of loans received from various lenders who may ration loans.

Furthermore, although the type three Tobit includes information on nonborrowers to estimate the loan demand using individual loans and gives consistent and efficient estimates, the model fit is not as good compared to the estimates obtained using total loans also estimated by the type three Tobit model. This is confirmed by the better R-square value and the smaller mean square errors obtained for loan demand. The relatively poorer model fit for the loan demand equation using individual loans compared to total loans can be attributed to the incorrect definition used for loan demand which leads to an improper identification of aggregate supply from demand factors. The loan demand estimated using total loans and the type three Tobit model specified in this study, therefore, provides a statistically better fit compared to the traditional definition used to estimate loan demand using individual loan transactions.

III. Conclusions

Estimates of loan demand are often biased and inefficient due to data truncation and the use of data on individual loan sizes that suffer from non-identifiability of aggregate demand and supply factors. This paper presents a framework to relate the sum of all loans with the loan demand of a household and applies a type three Tobit model to estimate loan demand among farm households in the Philippines.

Loan demand is observed to be influenced by the ability and capacity of a borrower to specialize in farming. However, the sum of multiple loans available from several lenders as total loan demand has resulted in a more elastic loan demand with respect to interest rate at the margin than the traditional approach in estimating loan demand using individual loans. The framework proposed in this paper also provides a statistically better fit than the traditional method that estimates loan demand using data on individual loans. The study, therefore, suggests that the specification of a correct theoretical and econometric framework is essential for deriving reliable estimates that are important in formulating appropriate policies for economic development. It also demonstrates the importance of carefully collecting data on all loans received by a borrower during the study period.

Table 1. Loan Demand Estimated Using Total Loans and Type Three Tobit Method

Variables	Probit (Y^+)	Selection (r^+)	Tobit L.DEMAND (L^*_D)	Tobit Elasticity
CONSTANT	-2.00***	30.67***	-1.214 ***	
	(0.594)	(7.153)	(0.235)	
IHAT[1]			-0.480 ***	-1.082
			(0.064)	
ULABOR	0.964	0.772*	0.171	0.032
	(0.092)	(0.451)	(0.285)	
AGEHH	0.383**	-0.002	0.261	0.052
	(0.189)	(0.128)	(0.704)	
AGESQ	0.162	0.071	-0.164 ***	-0.361
	(0.142)	(0.108)	(0.064)	
EDUHH	0.889*	-0.394		
	(0.508)	(0.347)		
ASSET	0.701	-0.614**	0.126 ***	0.458
	(0.645)	(0.287)	(0.018)	
NONFARM	-0.633***	-0.011	-0.116 *	-0.141
	(0.191)	(0.122)	(0.068)	
LQUALITY	0.156	0.553***	0.009	0.004
	(0.277)	(0.191)	(0.118)	
FSIZE	0.236*	0.239	0.402 ***	0.733
	(0.143)	(0.987)	(0.058)	
REPUTE	0.261	-4.481		
	(0.437)	(3.184)		
IRRINT	0.013	-0.084		
	(0.313)	(2.408)		
DCUST	6.965	-7.443***		
	(101.3)	(2.408)		
DTL	6.518	5.226		
	(84.01)	(4.414)		
DFL	2.479***	2.242		
	(0.375)	(4.184)		
DS2	-0.473*	-2.675	0.127	0.037
	(0.270)	(1.942)	(0.122)	
Log-likelihood	-63.67	-932.65	-3452	
Chi-square	179.89			
Rho		0.17		
R-Square			0.32	
Mean Square Error			665,228	

Asymptotic standard errors are reported in parentheses; ***, **, * represent significance at 1, 5 and 10 % levels, respectively; 1: Refers to predicted value of interest rates.

Table 2. Loan Demand Estimated Using Individual Loans and Type Three Tobit Method

Variables	Probit (Y^+)	Selection (r^+)	Tobit: L.DEMAND (L^*_D)	Tobit: Elasticity
CONSTANT	-1.274	30.01***	-2.584 ***	
	(0.978)	(6.083)	(6.02)	
IHAT[1]			-1.950 **	-0.422
			(0.52)	
ULABOR	0.041	0.324	3.101	0.082
	(0.139)	(0.431)	(8.36)	
AGEHH	0.391*	-0.403	1.451	0.114
	(0.216)	(0.539)	(1.59)	
AGESQ	0.114	0.139	-0.624 **	-0.368
	(0.179)	(0.865)	(0.25)	
EDUHH	0.656	-0.712**		
	(0.724)	(0.353)		
ASSET	0.998	-0.515**	7.146 ***	0.481
	(0.757)	(0.266)	(1.48)	
NONFARM	-0.713***	-0.127	-6.036 **	-0.111
	(0.226)	(0.107)	(2.93)	
LQUALITY	0.197	0.179*	1.329	0.001
	(0.322)	(0.102)	(2.71)	
FSIZE	0.232	0.047	3.132 ***	0.543
	(0.168)	(0.877)	(1.01)	
REPUTE	0.619 *	-0.362*		
	(0.384)	(0.209)		
IRRINT	0.176	-0.376		
	(0.344)	(1.188)		
DCUST	44.161	-5.805***		
	(47.69)	(2.321)		
DTL	45.03	9.826**		
	(99.40)	(4.334)		
DFL	16.977	7.394 *		
	(44.37)	(4.314)		
DS2	-0.626**	-3.474 *	8.89 *	0.217
	(0.310)	(1.912)	(5.37)	
Log-likelihood	-50.32	-820.91	-3348	
Chi-square	132.43			
Rho		0.24		
R-Square			0.28	
Mean Square Error			995,258	

Asymptotic standard errors are reported in parentheses; ***, **, * represent significance at 1, 5 and 10 % levels, respectively; 1: Refers to predicted value of interest rates.

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End Notes

1. For example, Ubogu (1988) used ordinary least squares (OLS) and obtained a positive relationship between the cost and amount of mortgage loans. He attributed this theoretically contradicting result to poor quality data. In fact, the above problem can be due to improper definition used for loan demand and omission of data censoring problems.

2. See Clar de Jesus (1988) and Olufemi (1983) for estimations of loan demand using individual loans. Although they corrected for selectivity bias due to the exclusion of non-borrowers by using a censored regression model, Tobit, they used individual loans and their related terms and conditions to estimate loan demand. While the causal relationship between the loan amounts and explanatory variables were theoretically correct, the model fit was not good due to an improper definition for loan demand.

3. Loan quantity rationing arises when potential borrowers are denied credit while loan size rationing arises when borrowers are supplied loans smaller than demanded.

4. The total demand is synonymous to the notional demand or Walrasian demand derived under no supply constraints (see Gourieroux et al. 1980; Drazen, 1980).

5. Lenders have different financial technologies and comparative advantages in solving information problems of lending so borrowers may be able to borrow from multiple sources to satisfy total loan demand.

6. The demand for loans under multiple lenders will be denoted by L^*_D, to differentiate from the loan demand under one lender/contract, L^*_B.

7. The primary data on farm production, household income and demographic characteristics of the sample households were collected in 1985-86 and in 1989-90, while the data on the credit market transactions were collected in 1989-90.

8. The lender types include formal lenders, traders, farmers, money lenders, friends and relatives, landlords and retail store owners.

9. Irrigation intensity is considered exogenous since the irrigation structures required for flood irrigating rice crops are built and maintained by the government.

10. Two alternative criteria were also used to select the marginal contracts: trader lender as marginal lender, and farmer lender as marginal lender. Type three Tobit model results revealed no significant differences in total loan demand based on the alternative criteria used to select the marginal contracts indicating that interest rates adequately represent the informal lender types. Therefore, only the results using the interest rate criteria are presented and discussed (for details refer to Nagarajan, 1992).

11. The estimates are obtained using the computer package LIMDEP, 1992.