

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

Geetha Nagarajan, Richard L. Meyer and Leroy J. Hushak

The Ohio State University

1. Introduction

With technological changes accompanied with land reform, demand for loans among farm households in the Philippines has increased (David, 1979). Several studies have estimated the loan demand in developing countries but the estimates 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 deluding because they are usually estimated either with continuous regression models that do not adequately correct for selectivity bias¹ 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 misleading 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.

Economic theory provides tools to examine the loan demand derived by a utility maximizing borrower without any supply constraints.⁴ However, when supply constraints

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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).

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, unless aggregated by household, 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.

2. Estimating Loan Demand: Theoretical and Econometric Framework

2.1 Theoretical Framework

Assume a single lender offering a single contract to maximize his utility function to derive the loan offer schedule, L^*_B . Given an unconstrained loan supply at an interest rate r , the tangency point of the isoexpected 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. The supply is often constrained by incomplete and asymmetric information, restrictions in interest rates and illiquidity. Therefore, the total loan size, L^*_B , obtained through matching demand and supply schedules can be specified as follows:

$$L^*_B = \begin{cases} L^*_B = 0 & \text{if } 0 < L^*_B \leq L^*_S : \text{no rationing} \\ L^*_B = L^*_S & \text{if } 0 < L^*_B < L^*_S : \text{loan size rationing} \\ L^*_B = 0 & \text{if } L^*_B \leq 0 \text{ and } L^*_B > 0 : \text{loan quantity rationing} \\ L^*_B = 0 & \text{if } L^*_B \leq 0 : \text{no demand} \end{cases} \quad (1)$$

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. Until the markets are segmented due to comparative advantages in financial technologies, the competition among lenders will be limited and hence the chances that a lender who makes an inappropriate decision being driven out of the market.

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.

Assume that a borrower has a contract opportunity set, Θ , 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. Suppose, there is no loan size rationing from either of the lenders. Then, the total loan size L_D^* can be satisfied by taking the offer from either one of the lenders (L_1^* or L_2^*) or from both lenders ($L_1^* + L_2^*$). Therefore, total loan size L_D^* is the loan demand, L_D^* and expressed as:

$$L_D^* = \begin{cases} L_1^* & \text{if } 0 < L_D^* \leq L_{S1}^*; \bar{\psi} = \{\psi_1\} \\ L_2^* & \text{if } 0 < L_D^* \leq L_{S2}^*; \bar{\psi} = \{\psi_2\} \\ L_1^* + L_2^* & \text{if } 0 < L_D^* \leq L_{S1}^* \text{ and } 0 < L_D^* \leq L_{S2}^*; \bar{\psi} = \{\psi_1, \psi_2\} \end{cases} \quad (2)$$

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.

Now, let lender 1 be the infra-marginal lender who may credit ration the borrower and therefore may not always satisfy the loan demand, and lender 2 be the marginal lender who always satisfies the loan demand of a borrower. Let ψ_2 be the marginal contract from lender 2. Suppose there is loan size rationing from the infra-marginal lender, lender 1. Under the terms and conditions of ψ_1 the inframarginal lender 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 utility maximization function. Then, the borrower's total loan size, L_D^* and loan demand, L_D^* can either be the sum of maximum loan supplied by lender 1 and the rest from lender 2 or the entire loan taken from lender 2 only. It can be written as:

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

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_D^* .

The framework above provides an interpretation of loan demand from the individual loans taken from various lenders 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.

2.2 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.

The field data that often shows multiple borrowing per household and supply constraints. Therefore, the presence of loan size rationing from an infra-marginal lender can be assumed leading to multiple borrowings. 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 consisting of loan demand and loan supply can be written as:

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

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 Ordinary Least Squares/Two Stage Ordinary Least Squares or Limited Information Maximum Likelihood 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 (Amemiya, 1985):

$$\begin{aligned}
 Y^* &= X_1\beta_1 + u_{1i} & (i) \\
 r^* &= X_2\beta_2 + u_{2i} & (ii) \\
 L_d^* &= L_d^+ = X_3\beta_3 + r^* + u_{3i} \text{ if } L_d^* > 0 \\
 &= 0 \text{ if } L_d^* \leq 0 & (iii) \\
 Y^* &= 1 \text{ if } L_d^* > 0 \text{ and } L_s^* > 0 \\
 &= 0 \text{ if } L_d^* \leq 0 \text{ and } L_s^* \leq 0 & (iv) \\
 r^* &= r^+ \text{ if } L_d^* > 0 \text{ and } L_s^* > 0 \text{ or } Y^* = 1 \\
 &= 0 \text{ if } L_d^* \leq 0 \text{ and } L_s^* \leq 0 \text{ or } Y^* = 0 & (v)
 \end{aligned}
 \tag{5}$$

were, 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. X_1 and X_2 are vectors of exogenous variables affecting both the demand and supply schedules, and X_3 is a vector of exogenous variables that only affect the demand schedule. The variables in vectors, X_1 and X_2 are obtained by combining Z and M in equation 4, and X_3 is obtained from Z in equation 4. In the above model, Heckman's two stage procedure can be used to estimate 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.

3. Estimating Loan Demand in the Philippines

3.1 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 (Table 1).

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

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. Data was not collected for the years 1987 and 1988 due to logistical reasons.

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

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 implicit interest of 25% (explicit interest plus an imputed value for overvaluation of inputs sold and/or undervaluation of borrower's produce, labor services and land pawned) for a five month period, which is the length of a cropping season.

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

Variables	Borrowing decision (Probit) (Y+1)	Int. Rate (Selection equation) (+2)	Loan Demand (Tobit) (L _{it}) ³	
			Coefficients	Elasticity
CONSTANT	2.00*** (0.594)	30.67*** (7.153)	-1.214*** (0.235)	
IHAT ⁴			-0.480*** (0.064)	-1.082
ULABOR	0.964 (0.092)	0.772* (0.451)	0.171 (0.285)	0.032
AGEHH	0.383** (0.189)	0.002 (0.128)	0.261 (0.704)	0.052
AGESQ	0.162 (0.142)	0.071 (0.108)	-0.164*** (0.064)	-0.361
EDUHH	0.889* (0.508)	-0.394 (0.347)		
ASSET	0.701 (0.645)	-0.614** (0.287)	0.126*** (0.018)	0.458
NONFARM	-0.633*** (0.191)	0.011 (0.122)	-0.116* (0.068)	-0.141
LOQUALITY	0.156 (0.277)	0.553*** (0.191)	0.009 (0.118)	0.004
F SIZE	0.236* (0.143)	0.239 (0.987)	0.402*** (0.058)	0.733
REPUTE	0.261 (0.437)	-4.481 (3.184)		
IRRINT	0.013 (0.313)	-0.084 (2.408)		
DCUST	6.965 (101.3)	-7.443*** (2.408)		
DTL	6.518 (84.01)	5.226 (4.414)		
DFL	2.479*** (0.375)	2.242 (4.184)		
DS ²	-0.473* (0.270)	-2.675 (1.942)	0.127 (0.122)	0.037
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: Dependent variable is 1 for borrowers and 0 otherwise. estimated using all exogenous variables affecting loan demand and supply. 2: Implicit interest rates estimated as a selection equation using all exogenous variables affecting loan demand and supply. 3: Aggregate loan size of a household estimated using variables affecting loan demand. 4: Refers to predicted value of interest rates.

3.2 *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 and other exogenous factors, and set M influencing loan supply is composed of borrower characteristics, lender characteristics, other exogenous factors and the information base available to lenders. 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 include farming ability proxied by age of the household head (AGEHH), education of the household head (EDUHH) measured as number of years of schooling, life cycle effects measured as the square of the age of the household head (AGESQ), 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)⁹, 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 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 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 include location specific irrigation facilities (IRRINT) measured by the

9. Land is the most preferred form of collateral accepted and is usually transferred through inheritance in this region subject to intense land reform. An active land market does not exist. Assets earned through retained earnings such as implements, equipments are generally not used as collateral with farmer and trader lenders.

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

irrigation intensity of a borrower's farm¹⁰, 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:

$$\begin{aligned}
 \text{Demand (LSIZE)} &= \alpha_0 + \beta_1 r + \beta_2 \text{ULABOR} + \beta_3 \text{AGEHH} + \beta_4 \text{AGESQ} \\
 &\quad + \beta_5 \text{ASSET} + \beta_6 \text{NONFARM} + \beta_7 \text{LQUALITY} + \beta_8 \text{FSIZE} + \beta_9 \text{DS2} \\
 \text{Supply (LSIZE)} &= \alpha_1 + \gamma_1 r + \gamma_2 \text{ULABOR} + \gamma_3 \text{AGEHH} + \gamma_4 \text{EDUHH} + \\
 &\quad \gamma_5 \text{ASSET} + \gamma_6 \text{LQUALITY} + \gamma_7 \text{FSIZE} + \gamma_8 \text{REPUTE} + \gamma_9 \text{IRRINT} + \\
 &\quad \gamma_{10} \text{DCUST} + \gamma_{11} \text{DIL} + \gamma_{12} \text{DFL} + \gamma_{13} \text{DS2}
 \end{aligned} \tag{6}$$

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 theoretically ambiguous and 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 contract¹¹ 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 loans sizes observed with each lender while total borrowing refers to the aggregate of loan 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

11. 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).

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 life cycle effects, 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 non-farming. 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 2.¹² 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 loan 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.

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

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

Variables	Borrowing decision (Probit) (Y) ¹	Int. Rate (Selection equation) (r) ²	Loan Demand (Tobit) (L) ³	
			Coefficient	Elasticity
CONSTANT	-1.274 (0.978)	30.01*** (6.083)	-2.584*** (6.02)	
IHAT ⁴			-1.950** (0.52)	-0.422
ULABOR	0.041 (0.139)	0.324 (0.431)	3.101 (8.36)	0.082
AGEHH	0.391* (0.216)	-0.403 (0.539)	1.451 (1.59)	0.114
AGESQ	0.114 (0.179)	0.139 (0.865)	-0.624** (0.25)	-0.368
EDUHH	0.656 (0.724)	-0.712** (0.353)		
ASSET	0.998 (0.757)	-0.515** (0.266)	7.146*** (1.48)	0.481
NONFARM	-0.713*** (0.226)	-0.127 (0.107)	-6.036** (2.93)	-0.111
LQUALITY	0.197 (0.322)	0.179* (0.102)	1.329 (2.71)	0.001
FSIZE	0.232 (0.168)	0.047 (0.877)	3.132*** (1.01)	0.543
REPUTE	0.619* (0.384)	-0.362* (0.209)		
IRRINT	0.176 (0.344)	-0.376 (1.188)		
DCUST	44.161 (47.69)	-5.805*** (2.321)		
DTL	45.03 (99.40)	9.826** (4.334)		
DFL	16.977 (44.37)	7.394* (4.314)		
DS2	-0.626** (0.310)	3.474* (1.912)	8.89* (5.37)	0.217
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.

Dependent variable is 1 for borrowers and 0 otherwise; estimated using all exogenous variables affecting loan demand and supply.

2. Implicit interest rates estimated as a selection equation using all exogenous variables affecting loan demand and supply. 3. Individual loan size of a household estimated using variables affecting loan demand. 4. Refers to predicted value of interest rates.

4. 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.

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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.

LA DEMANDE DE PRÊTS AGRICOLES: UNE ANALYSE THÉORIQUE ET ÉCONOMIQUE DU MARCHÉ DE CRÉDIT AUX PHILIPPINES.

Résumé

Les estimations de la demande de prêts sont souvent biaisées et inefficaces à cause de la troncature des données et de l'usage de données relatives aux prêts individuelles caractérisées par l'impossibilité d'identifier les facteurs de la demande et de l'offre agrégées. Cet étude développe un système pour le mesurage de la demande de prêts en tant que somme de tous les prêts reçus pendant une période donnée et applique un modèle Tobit type trois pour l'estimation de la demande de prêts des ménages paysans aux Philippines. Les résultats semblent indiquer que le système d'estimation de la demande de prêts basé sur la mesure du total des prêts est meilleur au point de vue statistique que les systèmes basés sur les données relatives aux prêts individuels.

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