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Segmentation in The Philippine Informal Credit Markets: A Multinomial Logit Analysis

Abstract: The paper explains the market segmentation that occurs in the Philippine informal credit markets through the matching of borrowers and lenders by their occupational specializations which internalizes transaction costs and facilitates economic activity. The regression results support a predictable pattern of matching farmer lenders with borrowers specialized in non-farm activities and trader lenders with borrowers specialized in farming.

INTRODUCTION

The informal credit market has reemerged in the 1980s as an important source of rural credit in the Philippines. The formal credit market was active during the 1970s but suffered a severe contraction in the 1980s due to the insolvency of many rural banks (Blanco and Meyer, 1989). The reemergence of the informal credit market has been accompanied by a change in the composition of informal lenders. Traditional moneylenders and landlords have been replaced by specialized farmer and trader lenders. Currently, they are the primary sources of credit in rice growing areas. They offer differentiated credit contracts usually involving linkages of credit with labour, land and product markets (Adams and Sandoval, 1992; Esguerra and Meyer, 1992; Floro and Yotopoulos, 1991; Geron, Nagarajan, 1988).

The existence of different credit contracts offered by various types of lenders would seem to imply competitive credit markets. It has been observed, however, that trader lenders tend to offer loan contracts to large, asset rich farmers, while farmer lenders tend to lend to small, asset poor farmers and landless labourers (Esguerra and Meyer, 1992; Floro and Yotopoulos, 1991). This paper argues that these observed patterns based on occupational specializations indicate a segmented market in which specialized borrowers and lenders are matched through loan contracts designed to internalize transaction costs. The two way matching of borrowers and lenders has two effects: (a) it reduces information problems inherent in credit markets and enhances borrower screening and contract enforcement mechanisms for lenders, and (b) it increases the quality of services received by specialized borrowers with specialized lenders rather than with non-specialized lenders. On the one hand, the risk and transaction costs associated with the contracts that suit the occupational specialization of utility maximizing lenders influence the type of borrowers preferred by them and hence the type of contracts offered to borrowers. On the other hand, the qualitative attributes of the contracts and the costs and risks involved in negotiating the contracts that suit the occupational specialization of utility maximizing borrowers determine their contract choice. Consequently, a one-to-one matching often occurs between specialized borrowers and lenders resulting in segmentation.

This paper rationalizes the observed segmentation based on occupational specialization and empirically tests the determinants that match informal lenders and borrowers in

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informal credit markets in a major rice growing area in the Philippines. These determinants help predict contract access and choice given lender and borrower characteristics, and provide evidence of market segmentation due to the occupational specializations of borrowers and lenders. The informal credit market is comprised of various types of lenders including traders, farmers, moneylenders, input dealers, rice millers, retail store owners, and friends and relatives. This paper concentrates on rice traders and farmer lenders because they are the primary sources of credit.

DESCRIPTION OF THE SAMPLE

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 period 1985–86 and 1989¹ The sample includes 127 randomly selected rice farming households and 29 lower income landless households that operated no farms. The majority of farms are irrigated by gravity irrigation systems and grow two rice crops a year. Furthermore, the farms are small and 83 percent of the land is under land reform beneficiary status². Before land reform, the farms were large rice haciendas and the majority of farmers were share tenants. Land use and income source indicate that the occupational specialization of farm households is farming, but the observation of more than three non-farm employment sources per landless household suggests that their specialization is non-farm (Table 1).

Table 1 *Socio-Economic Characteristics of the Sample Households*

Items	FHH ^a	LHH ^b
Sample farm households (number)	127.0	29.0
Area irrigated (%)	72.0	-
Rice cropping intensity (%)	179.0	-
Average farm size (Ha.)	2.1	-
Area under beneficiary status (%) ^c	83.0	-
Area under non beneficiary status (%) ^d	15.0	-
Area under share tenancy (%)	2.0	-
Average farm income ('000 P/Yr)	17.4	-
Average no. of off and non-farm Employment sources/season	1.6	2.8
Average non and off farm income ('000 P/Yr)	8.20	3.28

Notes: FHH = Farm households; LHH = Landless households.

For the 156 households interviewed, 774 loan contracts were reported in three seasons from 191 different lenders; 131 different trader and farmer lenders accounted for 529 of the loans. In general, trader lenders specialized in agricultural trading while farmer lenders tended to be large, rich farmers specialized in farming. Table 2 shows that a higher proportion of farm households than landless households borrow from trader lenders and they provided larger sized loans to farm households than do farmer lenders. While the average seasonal interest rates were similar across both lender types, it was higher with trader than farmer lenders for landless households.

Collateral in the form of buildings, livestock, jewels etc., were seldom used to secure loans but a variety of collateral substitutes were used including tied contracts and guarantors. The majority of the loans were tied with product, labour and land markets. The frequency of linking credit with product markets was higher with trader than with farmer lender loans.

Table 2 *Loan Contracts of the Sample Farm and Landless Households, by Lender Type*

Item	Trader		Farmer	
	FHH ^a	LHH ^b	FHH ^a	LHH ^b
No. different lenders	26	8	85	19
No. of loan contracts	247	16	233	33
No. loans per lender	9.5	2.0	2.7	1.7
Ave. loan size ('000 P/contract)	6.01	1.03	2.11	0.72
Ave. seasonal interest rate (%/season) ^c	25.6	26.2	24.3	20.1
% Contracts with collateral	2	2	4	5
Contract linkages (% of contracts)				
Product link	84	47	58	14
Labour link	4	22	9	43
Land link	2	0	8	2
Land+labour+product links	0	11	1	14
No links	10	20	24	27
Information base for lenders (% of contracts)				
Friends and relatives	16	23	79	59
Business partners	55	28	3	17
Neighbours	29	2	16	14
None	0	47	2	10

Notes: ^a FHH = Farm households; LHH = Landless households; ^b Refers to land with Certificate of Land Transfer (CLT) or Leasehold (LH) tenurial status; ^c Refers to Owner Cultivator (OC) tenurial status; ^d Refers to Certificate of land transfer (CLT) or Leasehold (LH) tenurial status; ^e Season = 5 months.

Although the majority of loans received from farmer lenders were also linked with farm products, land and labour links were frequently used to secure these loans. The majority of loans made by traders to landless households involved product links while labour and land links were involved in farmer lender loans³. A typical loan contract from a trader lender required borrowers to repay with farm products, and a stipulation 'tampa' additionally required them to sell their entire marketable surplus to the lender so that economies of scale can be realized⁴. The trader lenders usually specialized in rice so their contracts were specified in terms of rice. On the other hand, since farmer lenders were directly involved in farming requiring land and labour, loan repayment was accepted in kind or linked to land and labour markets. They did not insist on 'tampa' and supplied loans to landless households by linking loans to labour and land markets⁵. Land linked contracts involved the pawning of cultivation rights in which the borrower (pawner) temporarily transfers cultivation rights to the lender (pawnee) for a loan and redeems the rights upon loan repayment. In labour linked contracts, borrowers were required to provide lenders with permanent or temporary labour services.

There were many farmer loans, however, with no explicit factor market links, but with an implicit promise of reciprocity. This phenomena is explained by the large percentage of loans made to friends, relatives and neighbours. On the other hand, the majority of trader loans were made to business partners and borrowers with no familial ties. In the absence of formalized contracts, long term familial and business relations assure a well established informational base that enhances the lender's operational efficiency in loan screening and contract enforcement.

MATCHING OF BORROWERS AND LENDERS

The lenders use collateral substitutes to screen their borrowers and enforce contracts. However, a lender's technology to assimilate the information that a collateral substitute reveals about the borrower and his ability to enforce contracts varies with his occupational specialization. An occupation specific collateral substitute performs three functions: (a) it promotes a specialized lender's primary economic activity, (b) it provides a specialized lender with a relatively low cost technology to decipher information on borrower creditworthiness, and (c) it assists a specialized lender to more effectively enforce contracts compared to non-specialized lenders.

Let us assume two specialized lenders: trader lenders primarily specialized in agricultural trading and farmer lenders primarily specialized in farming. Trading is enhanced by marketing a large quantity at a low cost, while farming is facilitated by using enough land and labour to operate an economically viable farm. It can be postulated that trader lenders prefer to deal with farmer borrowers with the capacity to produce a marketable surplus large enough to help them to maximize their returns through economies of scale. Farmer lenders, on the other hand, require land and labour for farming. Therefore, they prefer to lend to farmer borrowers with secure land tenure status because cultivation rights can be transferred in the event of loan default. Also these households can offer family labour as collateral in labour linked contracts.

The supply of loans provided by trader and farmer lenders depends upon the information they have about borrowers that is obtained through long term business and familial relationships. This information is important in screening borrowers. Lenders have different technological abilities to acquire and utilize information. Although this information may be incomplete, the cost of obtaining it in the informal credit market is low compared to the formal credit market due to the physical proximity of the participants (Stiglitz, 1990). Related transactions in factor and product markets provide information that lenders can use to evaluate the borrower creditworthiness and repayment type⁶.

Borrowers in rural areas tend to specialize in farming or in non-farm activities. Utility maximizing borrowers with access to multiple contracts tend to choose contracts perceived to be most advantageous. A borrower's occupational specialization provides resources that can be used as a collateral substitute with specialized lenders. For instance, we consider that a borrower has access to non-exclusive product linked contracts from both a trader lender and a farmer lender, and that there is no loan size rationing. The borrower can choose either contract to satisfy his loan demand. The majority of farmer lenders offer an advantage by charging lower interest rates than trader lenders, but trader lenders offer marketing services in addition to credit. These marketing services are especially important for farmers who specialize in farming and produce a large marketable surplus. Therefore,

a farmer specialized in intensive farming and facing an imperfect product market will prefer borrowing from a trader lender rather than a farmer lender if product market access can be guaranteed.

Furthermore, in the absence of contingent markets, a risk averse borrower in an uncertain production environment will prefer a risk sharing contract. Trader lenders more often than farmer lenders offer loans with a built-in risk sharing mechanism in terms of loan rollover to the next season. A farmer lender would more likely request the borrower's cultivation rights in the event of loan default. In other words, there is a demand for risk-sharing contractual arrangements that act as insurance in the absence of contingent markets. Therefore, a borrower primarily specializing in farming will prefer a trader lender while a borrower specializing in non-farm activities will prefer a farmer lender because of his ability to offer land cultivation rights as collateral in exchange for loans.

The lender's flexibility in providing loans for borrower-specific purposes also influences contract choice. While the product tied loans from trader lenders allow little flexibility to divert loans to consumption purposes, farmer lender loans can be explicitly used for consumption provided the borrowers implicitly tie loans to land or labour services. Whereas loans are often fungible, the close monitoring by lenders or peers and penalties for default reduce fungibility in informal credit markets (Stiglitz, 1990).

For these reasons, the matching of lenders and borrowers can be explained by (a) the borrower's ability to offer collateral that is valued by lenders resulting in differential access to specialized lenders, and (b) the lender's ability to provide borrower specific services leading to the borrower's contract choice from among the accessible set of contracts. Consequently, a predictable pattern of loan contracts emerges that matches heterogeneous borrowers and lenders. It can be posited that trader lenders are matched with borrowers who specialize in farming by operating larger farm sizes that produce a larger marketable surplus. Farmer lenders, however, tend to be matched with borrowers who specialize in non-farm activities, who operate smaller farm sizes and possess fewer total assets, but can provide more labour and secure land ownership rights to the lender. In the following section, these propositions are tested using the cross sectional data described above.

ECONOMETRIC ANALYSIS AND RESULTS

Since borrowers are matched with more than one type of specialized lender, a multinomial logit model is used to test the propositions stated above. The multinomial logit model helps predict the probability of matching heterogeneous lenders and borrowers with particular characteristics. A general multinomial logit model with normalization of $\beta_1 = 1$ can be written as follows:

$$(1) \quad \frac{P_{ij}}{P_{i1}} = \alpha_0 + \beta_j' X_i + u_{ij}$$

for $j = 2, 3, 4$ outcomes, where, $j = 4$ observed outcomes including no matching (NB), or match with either traders (TL), farmers (FL) or other type of lenders (OT), $i = 1, 2, \dots, n$ represents the borrower households, β is a vector of parameters to be estimated, and X is a vector of explanatory variables.

Table 3 Matching of Informal Lenders and Borrowers: Multinomial Logit Estimates

Variables	Multinomial Logit : FI/TF		
	Model 1	Model 2	Model 3
	(Probabilities with respect to denominator)		
CONSTANT	1.934*** (0.743)	1.289* (0.786)	2.049*** (0.859)
ASSET	-0.204*** (0.069)	-0.210*** (0.075)	-0.146*** (0.059)
EDUHH	0.149*** (0.058)	0.170*** (0.059)	0.104* (0.057)
CLTLH	-1.202** (0.554)	-1.257** (0.558)	-0.976* (0.603)
OC	-0.810 (0.710)	-1.067 (0.679)	-1.152 (0.732)
DCUST	-2.63*** (0.459)	-2.388*** (0.474)	-2.989*** (0.430)
REPUTE	0.985* (0.542)	1.202** (0.561)	0.566 (0.522)
FSIZE	-0.148 (0.185)	-0.066 (0.186)	-0.055 (0.173)
RETURNS	-0.257* (0.142)	-0.277* (0.152)	-0.252** (0.121)
LABOR	-0.079 (0.102)	-0.073 (0.102)	-0.025 (0.101)
NONFARM	0.359 (0.232)	0.236 (0.240)	0.178 (0.211)
Log-likelihood	-343.64	-327.38	-337.35
Chi-square	269.94	252.39	252.56

Notes: Asymptotic standard errors are reported in parentheses.
 ***, **, * represent significance at 1, 5 and 10 percent levels, respectively.
 Model 1 uses interest rate as criterion for selecting marginal contracts.
 Model 2 fixes trader lenders as marginal lenders.
 Model 3 fixes farmer lenders as marginal lenders.

The independent variables are represented by the borrowing household's occupational specialization indicated by farm size in hectares (FSIZE), annual gross returns per hectare from rice farming (RETURNS) and annual nonfarm income (NONFARM). Human capital is denoted by the years of schooling of the household head (EDUHH) and the number of eligible labourers in the family (LABOR). The value of physical capital is measured by the market value of nonland assets (ASSETS) owned by the household. Security of tenure for land operated that can be used as collateral is captured by the proportion of total land operated by the household to land area under land reform beneficiary status (CLTLH) and under ownership status (OC). The ratio of number of years of residence in the village of the household head to his age (REPUTATION) and a dummy variable that captures the business customer relationship with the lender (DCUST) are proxies for the information available to the lenders. The variable DCUST refers to 1988-89, while all other variables refer to the year 1985 to avoid endogeneity problems⁷.

A correctly specified multinomial logit model estimated by maximum likelihood methods gives consistent and efficient estimates. It is necessary, however, to ensure mutual exclusivity among the matching outcomes for correct model specification. This characteristic of the multinomial logit model is called Independence from Irrelevant Alternatives (Amemiya). Data indicate that about 23 percent of the FHH and 7 percent of the LHH were matched with more than one type of lender to satisfy their loan demand. An approximate mutual exclusivity among the outcomes can be ensured if matching observed only at the margin is considered for the analysis. Three criteria were used to select the marginal contract: contract with the highest implicit interest rate, trader lender as marginal lender, and farmer lender as marginal lender⁸.

Three multinomial logit models were estimated, one for each criterion used to select the marginal contract. The results that compare traders with farmer lenders (FL/TL) are presented in Table 3. The results are consistent across the three models, and the significance of the likelihood ratios indicate a good fit⁹. The estimates are interpreted as the probability of observing the outcome in the numerator, FL, compared to the outcome in the denominator, TL. The negative and significant coefficients for ASSET and RETURNS variables show that poorer households with smaller marketable surplus tend to be matched with farmer rather than trader lenders. Conversely, borrowers who specialize in farming and have the ability to produce a larger marketable surplus are matched with trader lenders. The information variable REPUTE has a positive sign while DCUST has a negative sign. This shows that better reputation is more important than long-term customer relationships in a matching with farmer lenders, while it is the opposite with trader lenders. Farmer lenders use reputation as an information base when lending to poorer borrowers. This is not surprising since by their proximity the farmer lenders can accumulate better information about borrower creditworthiness through means other than customer relationships.

While the variable NONFARM is insignificant, a positive sign shows that borrowers who specialize in non-farm activities tend to be matched more with farmer than trader lenders. If the significant and positive coefficient for education, EDUHH, is an indication of borrower capacity to engage in education specific non-farm activities, there is some support for the borrower specialization hypotheses. The significant and negative coefficient for CLTLH indicates that land reform beneficiaries are matched with traders rather than farmers due to eviction risk but the negative sign for OC gives the opposite interpretation. This may imply that in practice there is little collateral specific risk due to tenurial status in the sample.

CONCLUSIONS AND POLICY IMPLICATIONS

The informal credit market is dominated by rice traders and farmer lenders in Philippine rice growing villages. They employ factor and product market ties and social relations to secure their loans with borrower households. We tested the argument that the matching of informal lenders with borrowers is based on their occupational specializations using primary data collected from rice growing villages. The regression results supported the argument. Trader lenders tend to be matched with borrowers who have a large rice production capacity, while farmer lenders tend to be matched with borrowers who use land, labour and product linked credit contracts and are engaged in non-farming activities.

This observed pattern in the matching of lenders with borrowers suggests that market segmentation occurs in rural informal credit markets based on occupational specialization. This segmentation limits the effective functioning of a particular type of lender to his/her specialized field where there exist adequate borrower screening technologies and contract enforcement mechanisms. Furthermore, access to loans from rice traders is limited to large farms specialized in rice production. There is a need for crop diversification due to environmental and income risks but these specialized lenders will find it difficult to service diversified farms. Lenders will have to incur high transaction costs to evaluate the creditworthiness of diversified farmers with whom they did not have other business transactions. Consequently, the core of eligible borrowers for the specialized lenders and the set of accessible lenders for diversified borrowers may be small unless the current specialized lenders develop information substitutes to service diversified farmers.

It would also be difficult to successfully introduce a formal credit institution to improve borrower access to credit. Formal institutions would have to solve borrower screening and contract enforcement problems in order to effectively compete with specialized lenders to provide borrower specific services. Since formal credit institutions cannot compete with informal lenders that specialize in trading, farming, etc., they must develop other mechanisms to provide borrower specific services at lower borrower screening and contract enforcement costs. The well documented failure of the Philippines rural banking system in the early eighties was due in part to its inability to develop financial technologies to meet this challenge. The experiments now underway in linking formal institutions with various types of informal financial arrangements may prove to be a more promising method to increase access to financial markets than the targeted credit approach of the earlier decades.

NOTES

¹ The primary data on farm production, household income and demographic characteristics of the sample households were collected in 1985–86 and in 1988–89, while the data on the credit market transactions were collected in 1989.

² Under the land reform of rice and corn lands in 1972, share tenants were supposed to be converted to Leaseholders (LH) by Operation Leasehold when the landlord owned less than 7 ha of land, or to Certificate of Land Transfer (CLT) holders under Operation Land Transfer when the landlord owned more than 7 ha of land (Hayami, Quisumbing and Adriano, 1990).

³ The majority of trader lenders owned and operated farms. Therefore, they provided loans to landless labourers who were employed on their farm. The loans were linked to either labour services or to earnings paid in rice.

⁴ While the 'tampa' condition is not explicitly stated in most of the product linked contracts from trader lenders, it is implicitly assumed by lenders and borrowers.

⁵ Although landless households in our sample refer to those that did not operate any land during the survey period, some previously owned land but pawned the land rights to the lender during the study period.

⁶ While familiar relationships and proximity reduce the endogenous risk of default due to borrower character, long term business relationships help a lender to form expectations about a borrower's ability to manage exogenous risks due to random shocks.

⁷ The variable DCUST is 1 if the borrower had a business customer relationship with the lender sometime during the previous 4 years and 0 otherwise.

⁸ See Nagarajan (1992) for details.

⁹ The Hausman and McFadden test (HM test) was performed on the above models to ensure absence of specification errors due to violation of the IIA property. The test statistic obtained for the three models was

4.99, 5.32 and 6.02, respectively. The null hypotheses that IIA holds could not be rejected at 0.90 confidence level indicating an absence of violation of IIA and confirming consistency of the estimates.

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DISCUSSION OPENING — John Sanders (*Purdue University, USA*)

This is a very nice paper showing how informal credit substituted for the breakdown of the formal Philippines rural sector financial institutions. This formal sector broke down at the start of the 1980s after a boom period in the 1970s. I had assumed that the bank failure was associated with the structural adjustment most developing countries were experiencing in the 1980s. At the end of the paper we are told that a principal factor in the insolvency of the formal rural financial sector were the high costs of the formal sector for borrower screening and contract enforcement. The informal sector could reduce the default risk and the transaction costs by knowing their borrowers and by tying loans to product delivery or to labour inputs to be provided by the borrowers. The emphasis of the paper then was on the identification of the characteristics of the borrowers associated with two principal types of lenders, larger farmers and traders. The statistical results then nicely separated the two classes of borrowers by farm and farmer characteristics.

As a discussant I would like to raise a conceptual issue in these types of studies and make a general observation about the evolution of institutions when there is rapid technical change in agriculture. First, is an important issue on diffusion studies in general. The theoretical underpinning of these studies is a demand function derived from the utility of credit, fertilizer, seeds or whatever is being evaluated, assuming that the supply is completely elastic. In many cases the price of the input is controlled in some way by the public sector and the input is then rationed to those demanding it. Diffusion studies identifying farmer characteristics are normally used in policy to attempt to facilitate the marketing of the input to the identified purchasers. With input supplies rationed the regressions can be identifying those able to obtain the rationed input. For example, larger

farms would be expected to be able to work the system better to obtain subsidized inputs. The policy implications with input rationing then are very different. Rather than promote policies to facilitate those already getting the subsidized input, the results point to stopping the subsidies and letting the market function to allocate the input. And, if the government has equity goals, do something to increase the ability of the target group to purchase the input rather than subsidized inputs. By not specifying the theoretical assumptions in diffusion studies we can thus get into trouble when we get down to making policy recommendations. The Ohio State group is well aware of these issues of the inefficiency of subsidized inputs in resolving income equity problems. Moreover, the underlying assumption in this segmentation study is that credit costs are not controlled by the state. The segmented markets show who is able to get the credit and which market various types of borrowers access. The clear implication is that the segmentation then stresses the access problems and indicates the borrowers of choice in these informal markets.

Now there is a general issue of the role of credit in the process of rapid introduction of technological change. It is often argued that a fundamental requirement or even prerequisite for the technological change process is to have formal credit markets and some even argue for subsidized inputs. This study takes place in an area of rapid technological change in rice production and rapid technology introduction. It shows how when the formal credit markets broke down, the informal markets evolved and provided this input. This type of institutional evolution facilitating the process and responding to the new opportunities for increased income streams coming from technological change is exactly the types of operating mechanisms we would expect from the theory of induced innovation when it is also applied to induced institutional change.

Now if we could try to apply this to another region of the world which I know a little better, the Sahelian countries of West Africa. Here it is often argued that small farmers have no cash or access to formal or even to informal credit markets and therefore they cannot buy the new inputs associated with technological change. However, closer observation of these extended households shows that they receive remittances from relatives in other areas and that they acquire savings, which are kept in their animal stocks. They cash in these animal stock to use these remittances for certain consumption and social expenditures and could use them for input purchases. Hence, the problem of the failure to utilize technology does not appear to be associated with the supply of credit but with other factors discouraging them from investing in the new technologies. We treat these factors in some detail in a forthcoming book from Johns Hopkins Press entitled, *The Economics of Agricultural Technology in Semi-Arid Sub-Saharan Africa*. But the bottom line is that certain institutions such as the land tenure situation and the growth of the credit market are expected to evolve in the process of technological change with the pressure from the new income streams available with the use of these technologies. This makes the technological change processes much easier than if institutional credit and land reform from the communal system were prerequisites to the technological change process as is argued by some. This credit study in the Philippines illustrates nicely how institutions evolve and specialize to respond to the weaknesses in the previous system and by implication that there is substantial potential for institutional evolution where there is rapid technological change.