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Interlinked Marketing and Credit Arrangements: Some Recent Evidence from Rural Philippines

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Robert R. Teh Jr.

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Philippine Institute for Development Studies

**Interlinked Marketing and Credit
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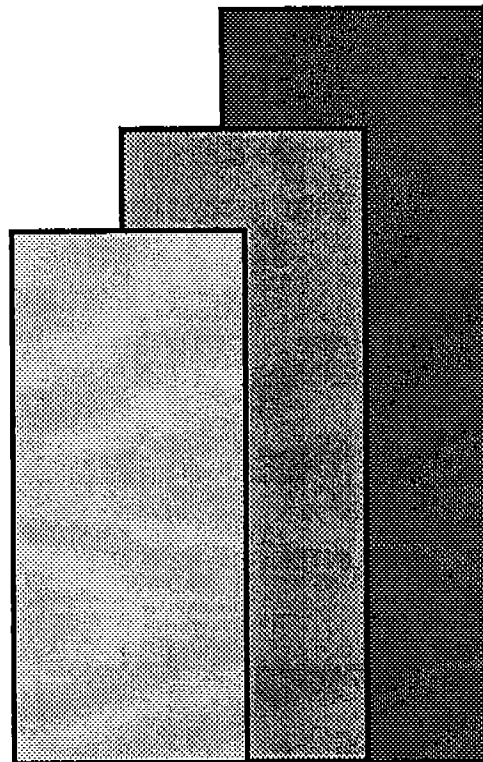
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INTERLINKED MARKETING AND CREDIT
ARRANGEMENTS: SOME RECENT EVIDENCE
FROM RURAL PHILIPPINES*

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November 1994

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**INTERLINKED MARKETING AND CREDIT ARRANGEMENTS:
SOME RECENT EVIDENCE FROM RURAL PHILIPPINES**

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1. INTRODUCTION

Although an extensive literature on interlinking has developed over the past ten years, the focus of this research has been on interlinking of credit and tenancy contracts (Braverman and Srinivasan, 1981; Braverman and Stiglitz, 1982; Mitra, 1984; Kotwal, 1985). Less studied is the interlinking of product and credit transactions, in which the provider of credit also markets the output of the farmer. The literature in this area has also tended to look at interlinking as a means of reducing the problem of asymmetric information between creditor and borrower (Hoff and Stiglitz, 1990). The conventional explanation stresses the ability of such interlinked contracts to reduce the cost of sorting good from bad borrowers and enticing borrowers to behave in ways that reduce the risk of default.

Most small farmers are rationed out of the formal credit market because of the adverse risk selection problem faced by lenders (Stiglitz and Weiss, 1981). Lenders cannot tell from this group of observationally similar borrowers those who are intrinsically good from bad risks. In equilibrium, expected profit maximization lead them to exclude borrowers who may be good risks and willing to pay an interest rate above the level being charged by formal lenders.

On the other hand, because traders deal with many farmers on a regular basis in the market for output, they begin to develop a very detailed knowledge about their personal, social and work habits that may have a bearing on the capability of these farmers to repay debts they may incur. Apart from this informational advantage, their economic dealings with farmers provide some form of control over them since it may be costly for farmers to rupture their economic links with traders through a loan default. So compared to formal financial institutions, the web of economic, personal and social relationships that bind the two agents provide a comparative advantage to the trader in his ability to sort good from bad borrowers, in monitoring the activities of the borrower and in enforcing the terms of the loan contract.

This emphasized the lender side problem of the trader-lender although aspects of his activity that have a bearing on the marketing of output must also matter. This research is an attempt to address this *lacuna* in the literature by emphasizing aspects of trading that provide an incentive for interlinking credit with marketing arrangements. In trying to explain the important role played by traders in rural financial markets, we start with the idea that the provision of credit is an extension of his trading activities. At the same time, we must appeal to some imperfections (either in credit or insurance markets) or high transaction costs to sufficiently explain interlinking.

Floro and Yotopoulos (1991) provide three possible reasons why interlinking lending and marketing may be advantageous to traders. First, there maybe (local) economies of scale in trading, in which case, it is important to secure commitments of output during harvest time. Second, lending provides an alternative use for the trader's working capital during off-seasons. Third, it allows him to procure the farmer's output at a lower price. Note that none of these reasons are sufficient for interlinking and without credit market imperfections, we will not

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observe these types of contracts.

The nature of trading/milling operations usually requires a sizeable amount of investment in fixed assets that include storage facilities, milling equipment and delivery vehicles. On the other hand, the variable costs of procuring and storing crops - labor costs, interest costs and spoilage - will be low by comparison. Suppose we assume that variable cost per unit of output stored (also equal to marginal cost of output storage) is constant, then the average cost of storage will be declining until the storage space constraint is encountered. All things equal, this provides an incentive for the trader to fill his storage capacity at the time of harvest. There is some empirical evidence of these local scale economies. Umali (1990), for example, finds a lower average cost of milling rice as the volume increases.

The seasonal pattern of agricultural production leads to negative covariation of income between traders and farmers. During harvest season, farmers' incomes are at their peak whereas traders tend to be most illiquid at this point as they buy up crops for storage. During planting season when crop prices are at their seasonal peak, traders are very liquid from unloading inventory. On the other hand, farmers tend to experience the greatest demand for credit at this point to finance both consumption and working capital requirements. This creates a niche for trader finance during planting season for the farmer.

Provision of credit by traders can allow him to purchase crops at a discount compared to the spot price at harvest time. In principle, so long as the combined interest payments on the loan and the revenue differential from selling the crop to the trader at a discount is less than the alternative cost of funds faced by the farmer, a commitment to sell his output at a lower price will be rational for the farmer. The farmer may have an instrument for making the interlinked credit contract much more favorable for himself if there is no explicit agreement about the amount of output to be committed to the trader. Here, too disadvantageous a price can be offset by delivering a smaller fraction of the harvest. If it is costly for the trader to monitor the size of the farmer's harvest, there will be room for strategic behavior by the farmer. This will limit the price discount that the trader can obtain for the committed output. The relevant interest rate here is the alternative rate faced by the farmer, which given the usual credit-constrained equilibrium in formal credit markets, will be high. These explanations assume that interlinking is made possible by credit market imperfection that rations out farmers from formal financial sources.

In this research, we focus on two other possible explanations for interlinking. One explanation for interlinking is that the provision of credit to farmers allows traders to avoid the cost of searching for low-priced sources of marketable output. Search costs are bound to be high in agrarian economies characterized by poorly linked markets, underdeveloped infrastructure and communication facilities. The provision of credit is a way of finding a source of marketable output while avoiding the possible high cost of search.

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Another explanation has been advanced by Fabella (1993). He argues that one can look at the issue of bundled and unbundled credit and marketing contracts as a choice between cash-for-cash arrangements versus kind-for-cash arrangements. The unbundled arrangement involves the farmer obtaining a cash loan, a sale of his output in the spot market and repayment of the loan in cash. The bundled contract involves a cash loan and repayment in kind. In an environment where the farmer faces considerable price uncertainty, a tied credit-marketing arrangement possesses the features of a futures contract. Hence for a risk-averse farmer, it provides an attractive instrument for hedging price risk. Furthermore, the trader's expected profits are higher when credit is tied to marketing than if he did not tie credit provision with marketing. This comes about because of two reasons. First, with a bundled contract, the trader captures the insurance premium that the risk-averse farmer is willing to pay to hedge price risk. Second, with a bundled contract, the trader enjoys market power, since he in effect is the only provider of insurance. This explanation does not depend on any credit market imperfection but does require imperfection in insurance markets, i. e., the absence of a well-functioning and competitive futures market.

This paper reports on the results of a two-phase survey conducted in the provinces of Bohol and Iloilo among traders and farmers. The objectives of the study are:

- (i) To provide a comprehensive description of the trader-farmer interlinked arrangements. Such a description will include the duration of these loans, the identity of the lenders, the form of repayment, the method of screening borrowers, the controls that are used (if any) to ensure that loans are utilized for production, the penalty in case of default and late repayment.
- (ii) To provide explanations for these arrangements using the lender's trading activities as the impetus for the interlinking.
- (iii) To examine whether these explanations are supported by the result of the two-phase survey.

2. SEARCH COSTS

One motivation for interlinking is the existence of search costs on the part of the trader. Traders procure output for storage or for immediate processing and sale to consumers. For our purposes, we do not need to distinguish between those motivations. For whatever his purposes, the trader will want to obtain as good a price on the procured crops as possible.

Suppose that he needs to obtain a given lot size q of crops at harvest time. Farmers will be willing to sell their output to him at different prices. There will be a distribution of price offers that the trader faces. To obtain the best deal possible, he will have to do some shopping

around, spending time and other resources to obtain information about these price offers.

Let p be the farmgate price that the trader has to pay to obtain the lot size he needs given his expectation of the future price. Let $f(p)$ be the p.d.f. of p and let $F(p)$ be the cumulative distribution function of farmgate prices, i. e., $F(p)$ gives us the probability of observing a price that is less than or equal to p . So $1 - F(p)$ is the probability of observing a price greater than p . Let us assume that the range of prices is in the closed interval $[a, b]$, where $a \geq 0$.

Let n be the number of independent searches conducted by the trader. The probability that he observes only prices greater than p after n searches is $[1-F(p)]^n$. The probability that he observes at least one price that is less than p after n searches is then $1 - [1-F(p)]^n$. Define $\underline{p} = \min(p_1, \dots, p_n)$. It is the lowest price from the n drawn observations, where p_i is the price observed during the i th search. \underline{p} is of course a random variable with cumulative distribution given by $G(\underline{p}) = 1 - [1-F(p)]^n$. The p.d.f. of \underline{p} is given by $g(\underline{p}) = nf(\underline{p})[1-F(\underline{p})]^{n-1}$. The expected minimum price after n searches $E(\underline{p}|n)$ is:

$$(2.1) E(\underline{p}) = \int_a^b nf(\underline{p})[1-F(\underline{p})]^{n-1} d\underline{p}$$

If we assume that the distribution of p is uniform over $[a,b]$, then:

$$(2.2) E(\underline{p}|n) = a + (b-a)/n+1$$

The expected marginal benefit $v(n)$ for the trader of an additional round of search is the reduction in this expected minimum price times the lot size q . The reduction in the expected minimum price after another round of search is:

$$(2.3) E(\underline{p}|n-1) - E(\underline{p}|n) = a + (b-a)/n - [a + (b-a)/n+1] = (b-a)/[n(n+1)] > 0$$

Hence:

$$(2.4) v(n) = q\{(b-a)/[n(n+1)]\}$$

Note however that $v'(n) = qd[E(\underline{p}|n-1) - E(\underline{p}|n)]/dn < 0$, that is the expected marginal benefit from an additional round of search is subject to diminishing returns. We plot the expected marginal benefits from search as the curve $v(n)$ in Figure 1.

However, search activity is not costless. Search involves the use of the trader's time and other resources. The costs of search will depend on the spatial distribution of farmers, i. e. how distant they are from the trader, the opportunity cost of the trader's time, the state of roads and communication facilities in the area. The trader need not undertake the search himself. He may have a network of agents that undertakes the search in his behalf in which

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case the cost of search will be the expenditures he incurs to keep them in place. Hence one way of looking at the many layers of middlemen that form the long link between farmer and urban consumer is that they represent the resources that society has to allocate in the search for price information. The more dispersed markets are due to the poor state of communication and transportation links, the more resources have to be expended to ferreting out the necessary information. The chain of traders becomes necessary because information in this fragmented world tends to be localized and to be subject to monopoly power by the smaller traders in the villages or barrios. This information becomes available, and only partially, through marketing tie-ups between these small traders and their bigger counterparts in the larger towns.

Let us assume that the direct and indirect costs of an additional round of search is represented by $c(n)$, where the marginal cost of search is $c'(n) > 0$. The marginal cost of search is represented in Figure 1 as the upward sloping curve. The optimal number of searches will be at the point where the expected marginal benefit of search equals its marginal cost. In Figure 1, this occurs at the intersection of the curves $c'(n)$ and $v(n)$, with n^* representing the optimal number of searches. The expected total benefit for the trader of conducting this number of searches is represented by the area under the curve $v(n)$ until n^* . The total cost of conducting n^* searches is represented by the area under the $c'(n)$ curve until n^* .

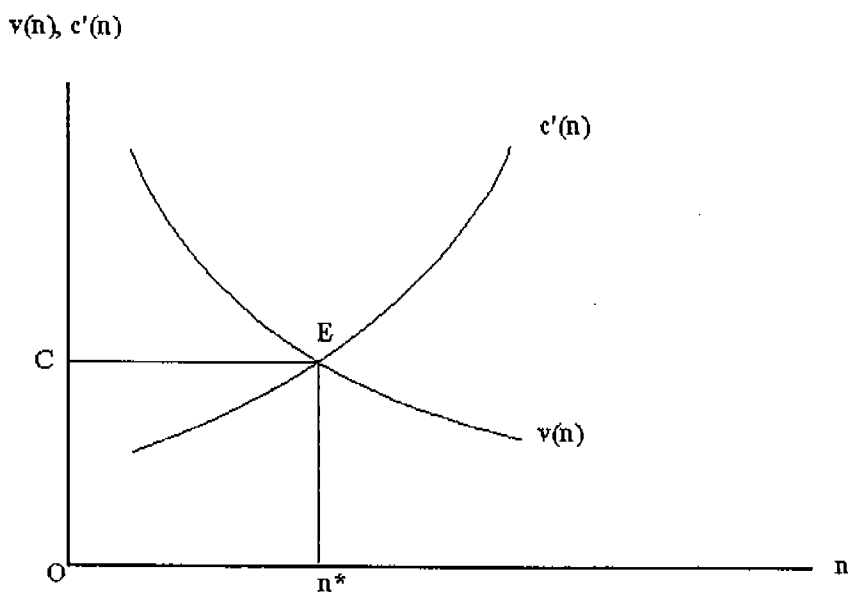


Figure 1: Optimal Number of Searches

In the search cost story we have advanced, the trader's problem was seen primarily as the search for the lowest farmgate price of the crop to market. This may be too simple a story. It is likely that the trader will also be concerned with the reliability of the farmer as a source of marketable output - that is with the availability of crops delivered for sale. The search cost model can be extended to cover this case where the trader cares about both price and availability of the crop offered for sale.

Interlinking and Reduction in Cost of Search

The trader can lower his costs of operation by an amount $OCEn^*$ if without undertaking search activity he could arrange the purchase of the desired lot q at the price that would have arisen if he did conduct the optimal number of searches. Let this price be designated p_{min} . In the absence of credit market imperfections, the trader cannot forego search if he desires to get the best possible price for the crop. However, with fragmentation in rural credit markets, it will be possible for him to link credit provision with a guarantee to be provided by the farmer of a source of marketable output at the price p_{min} . This saving in search cost constitutes both an individual and a societal saving.

The trader's provision of credit to farmers can lead to lower production costs and less variability in marketable output. These outcomes are in the interest of the trader. Lack of financing may prevent the farmer from purchasing the required inputs, in which case, the provision of credit by the trader will relieve the bottleneck in production. Even if the farmer can source loans from other sources for his working capital requirements, if these loans come at high interest rates, then this will ultimately be reflected in higher costs of production. In this situation traders might have an interest in seeing to it that farmers are provided with a cheaper source of credit and will want to provide it himself.

3. SURVEY DESIGN

The unique thing about this survey is that it was designed to obtain information on credit arrangements from both borrower and lender. It was conducted in two phases, spanning a period of about seven months, from August of 1992 to March of 1993. The survey area consisted of the provinces of Bohol and Iloilo.

The sampling list of farm traders in Bohol and Iloilo was generated from the National Food Authority's list of licensed rice and corn traders/millers. There were 225 respondents drawn from Iloilo and some 75 more respondents from Bohol. They were then asked, among other things, to provide the names and addresses of the farmers whom they were lending to. This information became the basis for drawing up the sampling frame of farmer borrowers who are the respondents of the second phase of the survey. The final list of borrowers were then drawn randomly. We were able to generate 100 borrowers from Bohol and 200 borrowers

from Iloilo in the second phase.

Information Requirements

The questionnaires were intended to generate information on the following areas: personal characteristics, distance of trader from farmers, size and composition of assets (both farm and off-farm), liabilities, farm production, revenues and costs, and lending practices. Special attention was paid to the selection of farmers to whom the trader lent credit, whether there was interlinking of credit provision with commitment of output, to the size and maturity of loans extended, to delinquency rates and to penalties exacted upon delinquency or default.

4. Provincial Profile of Bohol

Bohol is located in the Central Visayas Region (Region VII) with a total area of 411,730 hectares. The province is composed of one city (Tagbilaran City, the provincial capital) and 47 municipalities which are further subdivided into 1,103 barangays. Geographically, the land is rolling and hilly and rises to a plateau. The plains along the coasts are utilized as ricelands. Of the total land area, 75 percent are classified as alienable and disposable lands while the remaining 25 percent is classified as forest lands.

TABLE 1
Bohol Economic Profile

A. MAIN CROPS (1980)

Crop	Area (Hectares)	Production (Metric Tons)	Yield (Metric Tons Per Hectare)
1. Rice	90,591	123,745	1.37
2. Corn	26,146	18,560	0.71

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B. EMPLOYMENT BY SECTOR (January 1989):

SECTOR		EMPLOYMENT
1.	Agriculture	189,000
2.	Industry	48,000
3.	Services	79,000
4.	Others	1,000
TOTAL		317,000

C. ANNUAL FAMILY INCOME: P 18,881.00 (1988).

Source: Provincial Profile

Based on National Statistics Office figures, Bohol had a population of about 950,000 in 1990 with an average density of 230 persons per square kilometer. The province is still highly rural, with urban population comprising only 15.25 percent of the total population. The 1988 Family Income and Expenditures Survey estimated that the average annual family income in 1988 was about P 18,881 (see Table 1). The NSO Integrated Survey of Households estimated a total labor force of 317,000 in January of 1989. More than half (about 189,000) were in agriculture; 19,000 in industry and another 48,000 in services. The 1980 Census of Agriculture reported a total farm area of 159,270 hectares cultivated by about 100,462 farms in 1980 for an average farm size of 1.6 hectares. These were mainly planted to rice (90,591 hectares) and corn (26,146 hectares).

5. Provincial Profile of Iloilo

Iloilo is located in the Western Visayas Region. It is the biggest province in the region and occupies the southern and northeastern portion of Panay Island. It is composed of one city (Iloilo City the provincial capital) and 43 municipalities, which are further subdivided into 1,899 barangays. Of the total land area of the province, 24.09 percent is classified as public forest, 74.21 percent is classified as alienable and disposable while 1.07 percent remained unclassified forest land. Iloilo has a total farm area of 246,238.14 hectares which is approximately 46.26 percent of the provincial land. Generally, the province's soil is fertile which is suitable to most types of agricultural crops. The province is out of the country's typhoon belt although tropical storms and occasional typhoons occur in the area. Two types of climate are found in the province. The first prevails over the western and southern portions and is characterized by two distinct seasons: a dry season for six months and a wet season for the rest of the year. The rest of the province has a short dry season of one to three months with no pronounced rainy period.

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Iloilo is highly rural with 72.41 percent of the population residing in the countryside. Agriculture, hunting, forestry and fishing are the leading major industry group of the province. In 1990, Iloilo had a population of about 1.7 million people with the province having an average density of 331.61 per square kilometer. Based on the 1988 Family Income and Expenditures Survey, the average annual family income in 1988 was about P 37,454.00 (see Table 2). The NSO Integrated Survey of Households suggests that in 1989, out of the 648,000 people in the labor force in Iloilo, more than half (371,000) was in agriculture, another 221,000 in services and about 58,000 were in jobs in industry. The 1980 Census of Agriculture reported total farm area in 1980 of about 254,197 hectares distributed over 106,414 farms. The average farm size in 1980 was about 2.4 hectares. Rice, corn and sugar were the crops most widely cultivated in the province. Approximately 206,104 hectares was planted to rice; another 26,028 hectares was planted to corn and about 19,691 hectares to sugar.

TABLE 2
Iloilo Economic Profile

A. MAIN CROPS (1980)

Crop	Area (Hectares)	Production (Metric Tons)	Yield (Metric Tons/hectare)
1. Rice	206,104	410,612	1.99
2. Corn	26,028	13,761	0.53

B. EMPLOYMENT BY SECTOR (January 1989):

SECTOR	EMPLOYMENT
1. Agriculture	371,000
2. Industry	58,000
3. Services	221,000
4. Others	-
TOTAL	646,000

C. ANNUAL FAMILY INCOME: P 37,454.00 (1988).

Source: Provincial Profile

6. Comparison of Provinces

Both agricultural productivity and per capita incomes are substantially higher in Iloilo than in Bohol. Farm sizes are also larger in Iloilo. Iloilo also appears to have a more diversified agrarian economy - with less dependence on a few staple crops like rice or corn. Its economy is also less dependent on agriculture as a source of employment or economic activity than Bohol.

We also have some information on rural infrastructure in both provinces. One set of information we were able to obtain took the form of road length, road density and the proportion of paved to unpaved roads in the two provinces. The information is provided in Table 3 below. Note that Bohol has a longer road system than Iloilo despite having a smaller population and area. It is true though that Iloilo has a better quality road system since more of its roads are paved, but expressed as a proportion of provincial area or population, the paved road density (whether defined as road length/population or road length/area) does not differ significantly between the two provinces.¹

**TABLE 3
Road Length & Density: Bohol & Iloilo**

Province	Population	Area (Sq. Km.)	Total (Km.)	Paved (Km.)	Road Density	
					Length/Pop.	Length/Area
Bohol	950,000	4,117	4463.115	546.043	0.00441893	1.08407
Iloilo	1,742,000	4,719	4227.163	652.343	0.00242661	0.895775

Source: DPWH

The National Food Authority (NFA) was also able to provide a partial listing of postharvest facilities in the two provinces, including their estimates of the holdings of the private sector. These include the number of mills, warehouse space, threshers, dryers and transport equipment, and graders. The estimates are shown in Tables 4 and 5 below. The stock of private-sector holding of postharvest facilities - specially of warehouses, mills and transport vehicles - is significantly larger in Iloilo. The same pattern is observed with regards to NFA-

¹We have a more detailed breakdown of the road network into national, provincial, city, municipal and barangay roads of the two provinces. Still, we have not been able to detect any significant difference in road length and road density even among these subcomponents.

owned facilities as well.

TABLE 4
Private Ownership of Postharvest Facilities as of 1991

ITEM	ILOILO	BOHOL
1. RICEMILLS (UNITS) CAPACITY (BAGS/HR)	662.0 7,876.0	280.0 2,587.7
2. WAREHOUSE (UNITS) CAPACITY (BAGS)	180.0 5,287,518.0	180.0 434,710.0
3. THRESHERS (UNITS) CAPACITY (BAGS/HR)	6.0 70.0	- -
4. DRYERS (UNITS) CAPACITY (BAGS/HR)	4.0 500.0	2.0 300.0
5. TRANSPORTATION (UNITS) CAPACITY (BAGS/HR)	134.0 135,780.0	61.0 6,690.0
6. PROCESSORS (UNITS) CAPACITY (25 KG/BAG)	181.0 1978.1	127.0 606.0

Source: NFA

The high cost of marketing agricultural crops is one of the possible motivation for the interlinking of credit with marketing contracts. However, we have no direct information on the cost of marketing or storage of palay/corn in these two provinces. What we do have is information on the length and quality of the road system and the stock of postharvest facilities (both private and publicly-held). The extent and quality of the road network and the stock of postharvest facilities should have a direct bearing on the cost of marketing farm products. It turns out that there is no significant inter-provincial difference in road density nor in the quality of roads. There are however significant differences in the stock of postharvest facilities, whether held by the public or the private sector. These facilities, specially warehouse capacity and transport vehicles, are more widespread in Iloilo province. They provide some (indirect) evidence of inter-provincial differences in marketing costs which should affect the degree of interlinked marketing and credit contracts found in the two provinces.

TABLE 5
NFA Ownership of Operational Postharvest Facilities as of 1993

ITEM	ILOILO	BOHOL
1. RICEMILLS (UNITS) CAPACITY (Tons Per Hour)	2.0 15.0	3.0 3.0
2. NFA GRADERS (UNITS) CAPACITY (Tons Per Hour)	4.0 10.0	- -
3. THRESHERS (UNITS) CAPACITY (Tons Per Hour)	- -	1.0 0.3
4. DRYERS (UNITS) CAPACITY (Tons Per Hour)	12.0 18.5	4.0 1.0
5. SEED CLEANERS (UNITS) CAPACITY (Tons Per Hour)	1.0 1.0	1.0 1.0
6. UTILIZED WAREHOUSE (As of March 1993)		
NUMBER OF NFA-OWNED UNITS	15.0	1.0
CAPACITY	1,448,000.0	50,000.0
UNITS LEASED	3.0	3.0
CAPACITY	106,800.0	80,000.0
NUMBER OF UNITS FREE	2.0	0.0
CAPACITY	56,000.0	0.0
GRAND TOTAL	20.0	4.0
CAPACITY	1,610,800.0	130,000.0

Source: NFA

7. Trader-Lenders

The traders in our survey had an average number of 25 farmers from whom they bought crops in 1991 (see Table 6). The average value of crops purchased was P 213,267.40 although the median was significantly smaller at P 50,400.00. Two-thirds of all respondents claimed they had regular sellers or "suki". The average number of these "regulars" was 13 per trader. A little more than half of the traders in the sample were also involved in milling. The principal milling equipment was the *coño* with an average milling capacity of 9,270 kg. A smaller number of trader/millers used the *kiskisan*, a smaller milling machine.

TABLE 6
Number of Trader-Lenders, Number and Size of Loans for All Traders

ITEM	Number of Respondents	PROPORTION (or MEAN)
1. Proportion of Traders Granting Loans	191	63.6%
2. Average Number of Farmers that Traders have Dealings	249	25
3. Average Amount of Purchases	267	P 213,267.4
4. Proportion of Traders who are Millers	140	46.7%
5. Proportion of Traders with "Suki"	203	67.7%
6. Proportion Dealings Only with Farmers Within Municipality	255	85%
7. Average Number of Loan Applications	194	22
8. Average Number of Applications Approved	191	17
9. Average Value of Loans	189	P 2,900
10. Proportion of lenders Requiring no Collateral	145	75.9%
11. Average Maturity of Loans	181	3 Months
12. Proportion of Lenders Not Charging Interest	108	56.5%
13. Average Monthly Interest Rate		5%

Lending Activity

About 60% of our trader respondents extended some form of loans to farmers. The traders in this sample received an average of 22 loan applications during 1991 with one particular trader getting 400 requests for finance. The mean number of loans approved was 17 with an average value of P 2,900. To see the implication of this, at this rate the traders who provided loans to farmers in our sample would have granted an average of P 50,000 worth of loans for the year 1991. This information confirms the significant and active role played by traders in informal rural credit markets.

Loans tend to be small. About half of all loans were P 1,000 or less although a loan with a value of P 100,000 was reported in the survey. Only about 8% of all lending respondents granted loans exclusively in kind. Nearly half granted loans exclusively in the form of cash and the rest lent both in cash and in kind. Given the greater flexibility of cash,

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it would appear that traders were not particularly concerned about the use of the loans, whether it be for consumption or for purchasing inputs. Over 80% of the trader lenders did not require any form of collateral. The loans tend to be of short-term with an average maturity of about 3 months.

What is atypical of our survey results is the large number of lenders who did not charge interest. Over 60% of traders extending loans did not require any interest payments. Of those who did insist on being paid interest, the average rate was 5% per month.

Provincial Differences

We attempted to determine any provincial differences in the behavior either of the lenders (see Table 7). There seems to be some significant difference in behavior of lenders across the two provinces. A larger proportion of the traders from Bohol reported making loans (72% in Bohol as against 60.1% in Iloilo). They get a larger number of loan applications (25.35 in Bohol versus 21 in Iloilo) and consequently grant more loans than their Iloilo counterparts (19.1 in Bohol versus 5.6 in Iloilo). A larger proportion of them make no collateral requirements (92.6% in Bohol versus 69.3% in Iloilo) and require no explicit interest payments on loans (81.5% in Bohol versus 46.7% in Iloilo). The traders from Bohol also tend to lend out smaller amounts (P 1,904.70 in Bohol versus P 3,246.40 in Iloilo) and make smaller purchases of crops for trading (P 147,206.70 in Bohol versus P 279,481.79 in Iloilo). They also tend to rely more on established links or "sukis" (84% in Bohol versus 62.2% in Iloilo).

This kind of evidence seems consistent with several hypotheses. First, the prevalence of interlinking and the flexibility of these linked contracts in Bohol is consistent with the transaction costs hypothesis. Lenders in Bohol tend to be less stringent in interest or collateral requirements. Second, close familiarity of the lenders with the farmers that they deal with can substitute for collateral requirements or for explicit interest payments. In Bohol, the traders deal primarily with "sukis" so that their borrowers must be relatively better known to them than the farmers that Iloilo lenders deal with.

TABLE 7
Number and Size of Loans by Province for All Traders

ITEM	N1	ILOILO	N2	BOHOL
1. Proportion of Traders Granting Loans	137	60.1%	54	72%
2. Average Number of Farmers that Traders have Dealings	174	32.44	75	27.15
3. Average Amount of Purchases	193	279,481.79	74	147,206.70
4. Proportion of Traders who are Millers	94	41.77%	46	61.3%
5. Proportion of Traders with "Suki"	140	62.2%	63	84%
6. Proportion Dealings Only with Farmers Within Municipality	198	88%	57	76%
7. Average Number of Loan Applications	139	21	55	25.35
8. Average Number of Applications Approved	137	15.6	54	19.1
9. Average Value of Loans	135	3,246.4	54	1,904.7
10. Proportion of Traders no Requiring Collateral	95	69.3%	50	92.6%
11. Proportion of Traders Not Charging Interest	64	46.7%	44	81.5%

Note: N1 = number of respondents from Iloilo; N2 = number of respondents from Bohol.

Behavioral Difference Between Millers and non-Millers

Since nearly half (46.7%) of the lenders were millers, we also wanted to determine whether they behaved differently than pure traders. On average, millers tend to give out larger loans (see Table 8). The biggest difference we could detect between millers and pure traders is that millers are more likely not to ask for collateral or charge interest on their loans. This may be a reflection of their larger asset sizes as well as the need to sustain a predictable flow of rice to mill. This may well induce them to provide some form of incentive for "repeat" customers. However a smaller proportion of them extended any form of loans and they also tended to have a smaller number of "sukis".

TABLE 8
Number and Size of Loans by Ownership of Mill for All Traders

ITEM	N1	WITH	N2	WITHOUT
1. Proportion of Traders Granting Loans	82	58.6%	109	68.1%
2. Average Number of Farmers that Traders have Dealings With	107	29.1	142	32.2
3. Average Amount of Purchases	112	P 314,983.10	155	P 186,462.20
4. Proportion of Traders with "Suki"	88	62.9%	115	71.9%
5. Proportion Dealings Only with Farmers Within Municipality	119	85%	136	85%
6. Average Number of Loan Applications	83	23.89	111	21.1
7. Average Number of Applications Approved	82	17.6	109	15.9
8. Average Value of Loans	82	P 4,270.70	107	P 1,840.70
9. Proportion of Traders Requiring no Collateral	68	83%	77	70.6%
10. Proportion of Traders Not Charging Interest	55	67.1%	53	48.6%

Note: N1 = respondents with mills; N2 = respondents without mill.

Table 9 shows the results of a logit regression to determine what variables affects a trader's lending decision. The variables we tested include: (i) the quantity of crop purchased by the trader, (ii) the number of farmers that the trader deals with, (iii) his total assets, (iv) a dummy variable for province, (v) another dummy variable for whether the trader was a miller or not, and (vi) a dummy variable for education.

The larger the volume of business of the trader and the larger the number of farmers he deals with, the more likely he is to employ credit-tying. The size of the trader's total assets may also serve as an indicator of his financial capacity to extend loans, so that the larger his total assets, the greater the chances that the trader will be a lender. The dummy variable for province is included to take into account the differences in marketing costs between provinces. The dummy for the millers in our sample is to detect any differences in the behavior of millers as compared to pure traders. We also included education in the regression since it may serve as a proxy for other variables

TABLE 9
Logit Regression for Lending Decision

Variable	Coefficient	T-Statistics
PURCHASE	-1.980 x 10 ⁻⁸	-0.16
NUMBER*	0.01	1.69
PROVINCE*	-0.52	-1.64
MILL*	-0.52	-1.74
E1**	1.06	2.52
E2**	0.97	2.52
E3***	1.23	3.21
ASSET	1.253 x 10 ⁻⁷	0.42

Log Likelihood: -145.55

* Significant at the 10 % level.

** Significant at the 5 % level.

*** Significant at the 1% level.

Variables:

- PURCHASE = quantity of crop purchased by the trader;
- NUMBER = number of farmers that the trader deals with;
- ASSET = total assets of the trader;
- PROVINCE = dummy variable for province-specific variables (ILOILO = 1);
- MILLER = dummy variable for whether trader is a miller (MILLER = 1);
- E1 = with elementary education only.
- E2 = with high school education.
- E3 = with collegiate education.
- ASSET = total assets of the trader.

The results of the regression indicate that having some amount of education increased the likelihood of lending; and the higher the level of education, the more pronounced the probability that the trader will be a lender. Other variables that turned out to be significant were the number of farmers that the trader dealt with on a regular basis. The more farmers from whom he procured crops, the greater was the chance that he would be a lender. It turned out too that a miller is less likely to be a lender than a pure grains trader. Finally, as we expected, Bohol traders were more likely to be lenders than their Iloilo counterparts.

Asset size of the trader turned out to be insignificant in our test. Since the survey asked lenders to provide information about his fixed assets, variable assets and financial assets, we also tried the regression with these components of the trader's total assets. They still ended up

insignificant in all the regressions.²

The finding that millers are less likely to lend than pure traders is really not as disappointing as it seems. Based on the data we have in Table 8, the millers that did provide loans were far more likely to give greater concessions in the form of forgoing interest income or collateral requirements. Hence the results of the logit regression will have to be balanced by the survey results in Table 8.

8. Farmer-Borrowers

The average age of the borrowers is about 51. Nearly 62.2% of the borrowers have at least a high school education. About 45% are owners or CLT holders. Another 49.8% are either shareholders or leaseholders. The mean size of their farm is about 3.37 hectares. Nearly all of our sampled farmers are rice farmers (about 95.8% of them) with the rest dependent on corn or coconuts. The mean level of output is 28.4 metric tons of palay (see Table 10).

How do our respondents compare with the average Boholano or Iloilo farmer captured in the 1980 Census of Agriculture? Our respondents have larger farm sizes and higher yields. Our respondents are also predominantly rice farmers. Since our survey was performed in the third and fourth quarter of 1992, some twelve years have elapsed since the 1980 Census was undertaken. So we expect some differences to emerge at least in terms of yield for example.

However, it is likely that the differences we observe are systematically related to the way we generated the respondents. The respondents were selected from the list of farmers that traders said they dealt with. These traders, randomly chosen from the NFA master list for Regions VI and VIII, were mostly rice traders. Furthermore, only if farmers had something left over for sale, after their own family's consumption was subtracted from his harvest, were we likely to obtain them as respondents. This would tend to rule out subsistence palay farmers who would have both smaller farm sizes and lower yields.

²We also tried adding the age of the trader and whether the trader had "sukis" or not in the regression as explanatory variables. They turned out to be insignificant as well.

TABLE 10
Borrower Profile

I. Personal information

PERSONAL INFORMATION	NUMBER OF RESPONDENT	PROPORTION (or MEAN)
I. Average Age of Borrowers	300	50.6
II. Average Number of Years Residing in the Village	300	34.6
III. Distribution of Respondents by Educational Attainment		
A. No Education	4	1.3 %
B. With Elementary Education	187	62.3 %
C. With Secondary Education	77	25.6 %
D. With Collegiate Education	32	10.6 %
IV. Distribution of Respondents by Tenurial Status		
A. Full Owner	140	42.5 %
B. CLT (Certificate of Land Transfer)	8	2.4 %
C. Share Tenant	50	15.2 %
D. Leasehold Tenant	29	8.8 %
E. Rented	85	25.8 %
F. Other	17	5.2 %
V. Type of Main Crop Planted		
A. Palay	287	95.8%
B. Corn	6	2.4%
C. Sugar	3	1%
D. Coconut	2	0.7%
VI. Mean Size of Farm	232	3.37 Hectares

Borrowing Behavior of Farmers

A significant portion (72.9%) say that they have a "suki" from whom they borrowed on a regular basis. This "suki" was either a relative (30.2%) or a buyer of the farmer's output (39.6%).³ Nearly three-fourths of the respondents say that this relationship with the "suki" has

³In asking what the farmer-borrower's relationship to the lender was, the respondents was given a question with multiple choices. His answers had to rank the choices in order of importance. Hence, if the respondent thought that the lender who, for example was both a relative and a buyer of his output, related to him more as a trader than as a relative, he would assign a higher rank to the choice of trader.

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been going on for more than 5 years. No attempt is made by the lender to monitor the use of the loan. About half of the farmers borrow exclusively from one source.

TABLE 11
Borrowing Behavior of Farmers

ITEM	NUMBER OF RESPONSES	PROPORTION (or MEAN)
1. Size of Farm	232	3.37 Hectares
2. Proportion with "Suki"	167	72.9%
3. Length of Relationship with "Suki"		
Less than a Year	2	0.9%
1 - 2 Years	22	9.8%
3 - 5 Years	34	15.2%
More than 5 Years	166	74.1%
4. Relationship with "Suki"		
Relative	67	30.2%
Principal Buyer of Output	88	39.6%
Supplies Inputs	6	2.7%
Landlord	21	9.5%
Neighbor	7	3.2%
Friend	31	14%
Local Moneylender	2	0.9%
5. Proportion of Borrowers whose Use of Loan is Not Monitored	189	84%
6. Proportion Borrowing Exclusively From One Source	141	50%

Loan Characteristics

The questionnaire had a section that asked the farmer-respondent to provide information about his credit dealings with a lender. The idea is to pin down information about the farmer's credit relationship with a particular lender. It provided a way of validating the information that the farmer was providing.

Only 18.7% of the respondents say their loans are strictly in kind (see Table 12). About 55.8% said their loans was strictly cash. The average size of cash loans was P 4,154.23 while

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the average size of loans in kind was smaller at P 2,551.31. About 58% of the respondents said that they were not charged interest. For those who were charged interest, it hovered between 1 - 10% per month. An overwhelming majority (94%) said no collateral was required. Again, a substantial number (about 96.7%) said they had never defaulted on their loans. About 61.4% said they had fallen behind their payments although they experienced no penalty for those arrears. A majority said their arrears were in the order of about 3 to 6 months. The information provided by the borrowers were remarkably consistent with the answers we were able to obtain from the trader-lenders. This was particularly true in the case of interest and collateral requirements.

TABLE 12
Terms of Credit Arrangements

ITEM	NUMBER OF RESPONDENTS	PROPORTION (or MEAN)
1. Type of Loans Granted		
* Cash Only	155	25.5%
* Kind Only	52	55.8%
* Both	71	18.7%
2. Average Amount of Cash Loan	226	P 4,154.23
3. Average Amount of Loan in Kind	123	P 2,551.31
4. Proportion Charged Interest	118	42%
5. Range of Interest Rates (per month)		
* 1 - 10%	97	84.3%
* 11 - 20%	10	8.7%
* 21 - 50%	8	7%
6. Proportion with No Collateral Requirements	265	94%
7. Proportion who Admitted to Previous Default	9	3.3%
8. Proportion who Admitted to Having Arrears	105	38.6%
9. Length of Arrears		
* 1 - 2 Months	25	23.6%
* 3 - 6 Months	55	51.9%
* 7 - 12 Months	16	15.1%
* More than One Year	10	9.4%
10. Consequences of Arrears		
* Loan is Rolled Over at the Same Terms	96	88.9%
* Loan is Rolled Over with Higher Interest	8	7.4%
* Lending is more Difficult the Next Time	2	1.9%
* Others	2	1.9%

9. Factors Affecting Collateral Requirements

What attributes of lenders could be systematically related to the requirement for collateral from borrowers? We tested a number of seemingly obvious variables: (1) size of purchases, (2) number of farmers that the trader dealt with, (3) asset, (4) length of time that the trader has known the borrower, (5) province and (6) whether the lender is miller or not. The results of a logit regression utilizing these variables are presented in Table 13.

TABLE 13
Logit Regression to Determine Collateral Requirement

Variable	Coefficient	T-Statistics
PURCHASE	5.104×10^{-8}	0.22
NUMBER	0.002	0.63
PROVINCE**	1.75	2.11
MILL	-0.37	-0.66
E1***	-3.28	-3.37
E2***	-3.34	-3.64
E3***	-2.75	-3.37
ASSET	-2.966×10^{-7}	-0.42

Log Likelihood: - 48.93

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

PURCHASE = quantity of crop purchased by the trader;
NUMBER = number of farmers that the trader deals with;
PROVINCE = dummy variable for province-specific variables (ILOILO = 1);
MILLER = dummy variable for whether trader is a miller (MILLER = 1);
E1 = with elementary education only.
E2 = with high school education.
E3 = with collegiate education.
ASSET = total assets of the trader.

Note that neither the amount of lenders purchases, the number of farmers that they dealt with nor asset size helped predict the decision to ask for collateral. The only attributes of lenders that were statistically significantly turned out to be the lender's province and the educational attainment of the lender. Lenders from Iloilo were more likely to ask for a collateral than lenders from Bohol. The higher the educational attainment of the lender, the more likely that he will not ask for a collateral.

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We employed another logit regression to test what attributes of the borrower could predict whether he would be asked to provide collateral or not. The variables that might affect whether a collateral will be required or not are: (i) history of previous default, (ii) length of time that the lender has known the borrower, (iii) size of assets of borrower, (iv) size of loan asked for, and (v) whether the borrower is a "suki" or not. It is likely that a borrower with a previous default, or one asking for a large loan, will be asked for a collateral. On the other hand, a borrower who has been known for quite some time by the lender, or who is considered a "suki" is less likely to be asked for one. There are probably two opposing forces working on borrowers with large assets. On the one hand, lenders may consider them safe borrowers or less likely to default given their deeper pockets so they will not be asked for a guarantee in the form of a collateral. On the other hand, compared to their poorer counterparts, they will have more than their future output to offer in return for the loan. Hence, lenders may require them to put up some more tangible guarantee for the loan than a promise to sell output at harvest time. Table 14 shows the results of the estimation.

TABLE 14
Logit Regression to Determine Who Would be Required to Provide Collateral

Variable	Coefficient	T-Statistics
ASSETS	-2.978×10^{-5}	-0.89
DEFAULT	-18.58	-0.001
LOANSIZE	0.0001	1.51
SUKI	-1.45	-1.53
T1	-1.60	-1.39
T2	-21.03	-0.005
T3***	-2.19	-2.62

Log Likelihood: - 17.56

*** Significant at the 1% level.

Variables:

- ASSETS = value of borrower's total assets;
- DEFAULT = a dummy variable for the occurrence of a previous default (DEF = 1);
- LOANSIZE = amount of loan;
- SUKI = a dummy variable for whether the borrower is a "suki" (SUKI = 1);
- T1 = borrower has known the borrower between 1 and 2 years;
- T2 = borrower has known the lender for between 3 and 5 years;
- T3 = borrower has known the lender for more than 5 years;

Only the length of time that the lender has known the borrower was significant in explaining collateral requirements. If that period exceeded five years, the lender apparently

considered the borrower sufficiently safe not to demand a collateral. Surprisingly neither the size of the loan nor previous default experience mattered in the collateral decision by the lender. The latter result may not be entirely surprising given the very small number of borrowers who admitted having defaulted on a previous loan. The coefficient on asset size of the borrower turned out to be negative although statistically insignificant. The implication seems to be that lenders think borrowers with larger assets are more able to provide them with some guarantee for the loan.⁴

The two logit regressions shown in Tables 13-14 suggest that two characteristics of lenders - the educational attainment of the lender and whether he resided in Iloilo or Bohol, and the length of time that the borrower and lender have known each other, are the principal variables that have a bearing on whether collateral will be required.

10. Factors Affecting the Charging of Explicit Interest Rates

Certainly one of the most interesting feature of the survey is the large number of lenders who did not charge explicit interest rates. Previous surveys have found trader-lenders charged explicit interest rates (Floro and Yotopoulos, 1991; Geron, 1989; Esguerra, 1993). In many cases, these rates were quite high.

The trader, who is also a lender, has a redundant set of instruments since he can set the price at which the committed output is sold to him by the farmer, and he can also set the interest rate on the loan. A trader who lends out B in cash, charges an interest rate of i , and stipulates a purchase price of P obtains at harvest, committed output Q equal to:

$$(10.1) Q = (1+i)B/P$$

The lender can increase the size of the output obtained from the borrower by either charging a high interest rate on the loan or by setting an appropriately low price for the crop. It does not matter then which price the trader sets, whether it is the output price or the price of the loan, since it is the effective interest rate $(1+i)/P$ that really matters.

Given this redundancy of instruments, what kind of empirical pattern should we expect? On the one hand we could expect some uniformity within a circumscribed locality. Tradition or custom might dictate that lenders all charge the same interest rate (which could be zero) and simply recover their return from a low price paid to the committed output. On the other hand,

⁴We also tried a logit regression that included (i) the age of the borrower, (ii) number of years in the village, (iii) and borrower's educational attainment. When these variables were added, all the explanatory variables became insignificant.

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the redundancy of instruments could well lead to a purely random distribution of interest rates and prices. But we should certainly expect that the effective interest rate would not vary too widely across our sample.

But the results of our survey of traders indicated that they did not distinguish between farmers who had outstanding loans with them from those who did not in determining what price to buy farmers' output (see Table 15). Eighty percent (80 %) of the respondents said that they paid the same price for the crop that they purchased in 1991. And among the respondents who said the price they paid to farmers varied, only 15 % said that it depended on whether the farmers from whom they bought their crop had outstanding loans or not.

TABLE 15
Determinants of Prices Paid by Traders for Farm Products

ITEM	NUMBER OF RESPONDENTS	PROPORTION (or MEAN)
1. Price Paid for Crop		
a. Same Price for all Farmers	212	80.3%
b. Varied Among Farmers	52	19.7%
2. Varied with:		
a. Amount of Farm Product Supplied	35	67%
b. Existence of Loan	8	15%
c. Others	9	17%

This seems to be confirmed by the survey results from borrowers. When the borrowers who were charged explicit interest rates were asked to indicate what factors determined the amount of interest they paid, only about 4% percent of the sample said the output price received was a factor (see Table 16). The explicit interest rate depended more on the size of the loan and the prevailing rates charged on other loans.

TABLE 16
Factors Affecting Interest Rate Paid on Loan

FACTORS	PROPORTION
1. Size of Loan	54.9%
2. Amount of Output Committed for Sale	8.8%
3. Price of Output Committed for Sale	3.5%
4. Prevailing Interest Rates Charged on Other Loan	27.4%
5. Size of Output	5.3%

We then employed a logit regression incorporating observable borrower characteristics to determine what might help predict whether he would be charged explicit interest rates or not. The variables we included in the regression were (i) level of farm production in 1991, (2) asset size of farmer, (3) size of loan acquired, (4) whether the borrower defaulted on a loan before, (5) whether the farmer exclusively from the trader, (6) the length of time the borrower has known the lender and (7) the borrower's province. The results are presented in Table 17 below.

TABLE 17
Borrower Characteristics that Affected Explicit Interest Rate Requirement

Variable	Coefficient	T-Statistics
OUTPUT	8.275 x 10 ⁻⁶	0.42
ASSETS	3.685 x 10 ⁻⁶	0.72
LOANSIZE	1.243 x 10 ⁻⁵	0.51
DEFAULT	-0.4267299	-0.57
EXCLUSIVE***	-1.0455099	-3.52
T1	-0.9057457	-1.44
T2	-0.3821719	-0.94
T3	-0.4802259	-1.37
PROVINCE*	0.667986	1.95

Log Likelihood:

* Significant at the 10% level.

*** Significant at the 1% level.

Variables:

OUTPUT = borrower's production in 1991;

ASSETS = value of borrower's total assets;

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LOANSIZE = amount of loan;

DEFAULT = a dummy variable for the occurrence of a previous default (DEFAULT = 1);

EXCLUSIVE = a dummy variable if the farmer borrows from just one source (EXCLUSIVE = 1);

T1 = borrower has known the lender between 1 and 2 years;

T2 = borrower has known the lender for between 3 and 5 years;

T3 = borrower has known the lender for more than 5 years;

PROVINCE = dummy variable for province-specific variables (ILOILO = 1).

Only two variables were significant in the regressions. These were the province of the borrower and whether the trader was the exclusive source of loans. A borrower from Bohol had a greater probability of not being required to pay explicit interest rates on his loan than a similar borrower from Iloilo. Borrowers who relied exclusively on the trader as a source of finance were also less likely to be charged explicit interest rates.

We decided to split our sample of borrowers by province to see whether the other variables could somehow explain the probability that explicit interest rates would be required. For Iloilo borrowers, their output, the size of loan and whether the trader was the exclusive source of loans were significant (see Table 17A). This is consistent with the survey responses provided by the respondents in Table 15. For Bohol borrowers, output and whether the trader was the exclusive source of finance were the only significant variables (see Table 17B). Again, for the most part this is consistent with the responses shown in Table 16. What is somewhat confusing is that the sign on output differed in the two subsamples. Iloilo farmers who had larger outputs were likely to be charged explicit interest rates. On the other hand, Bohol farmers who had larger outputs were more likely not to be charged explicit interest rates.

The survey results seem to indicate that effective interest rates charged by traders differed. Traders did not compensate for higher explicit interest rates with lower prices paid on the farm product procured. Farmers who borrowed exclusively from these traders were very likely to escape from being charged explicit interest rates and therefore to face better terms all around. The larger the loan asked for, the more likely that the trader will begin to charge explicit interest rates on the loan.

TABLE 17A
Borrower Characteristics that Affected Explicit Interest Rate Requirement
(Iloilo Sample Only)

Variable	Coefficient	T-Statistics
OUTPUT***	0.0001483	3.24
LOANSIZE**	8.108×10^{-5}	2.12
DEFAULT	-0.7446763	-0.85
EXCLUSIVE***	-1.5385585	-3.93
T2	0.05405776	1.13
T3	-0.4433862	-1.16

Log Likelihood: - 128.37024

** Significant at the 5% level.

*** Significant at the 1% level.

Variables:

OUTPUT = borrower's production in 1991;

LOANSIZE = amount of loan;

DEFAULT = a dummy variable for the occurrence of a previous default (DEFAULT = 1);

EXCLUSIVE = a dummy variable if the farmer borrows from just one source (EXCLUSIVE = 1);

T2 = borrower has known the lender for between 3 and 5 years;

T3 = borrower has known the lender for more than 5 years;

TABLE 17B
Borrower Characteristics that Affected Explicit Interest Rate Requirement
(Bohol Sample Only)

Variable	Coefficient	T-Statistics
OUTPUT*	-0.0002736	-1.80
ASSETS	-0.8563908	-1.98
EXCLUSIVE*	2.524×10^{-5}	1.53

Log Likelihood: - 39.711464

* Significant at the 10% level.

Variables:

OUTPUT = borrower's production in 1991;

ASSETS = value of borrower's total assets;

EXCLUSIVE = a dummy variable if the farmer borrows from just one source (EXCLUSIVE = 1);

11. Are Trader-Farmer Linkages Forward Contracts?

Fabella (1993) explains interlinking as an arrangement that mimics the outcome of a forward contract written between the risk-averse farmer and the risk-neutral trader. Although the arrangement is framed in terms of a cash-for-kind transaction in Fabella, this is not really essential for the validity of the argument since it is possible for the farmer to have specific input needs or requirements that can be met by payment in kind.

We have some primary data on price dispersion for the year 1991 from the traders in our sample. They were asked to give the minimum, maximum and average prices in 1991 received for the crop that they sold. We shall assume that the price variability faced by traders also represent the price dispersion that individual farmers would have encountered if they decided not to enter into linked contracts. We can then correlate some measure of price dispersion (such as the range for example) with the amount of loans taken by the farmer from the trader.

The distribution of the price range faced by farmers in 1991 is shown in Table 18. We have observations for about 194 farmer-borrowers. Nearly 73 % of the sample faced a range of prices within P 2.00 per kilogram in 1991. The average farmgate price for palay in 1991 was P 5.51 per kilogram in Bohol and P 4.77 per kilogram in Iloilo. There appears to be some basis for the argument that farmers faced significant variation in the farmgate price of their product since this range easily translates to a variation of +20% to -20% of the average farmgate price in 1991.

TABLE 18
Distribution of Price Range

RANGE (Pesos)	FREQUENCY	PER CENT
0.01 - 1.00	63	32.5%
1.01 - 2.00	78	40.2%
2.01 - 3.00	36	18.6%
3.01 - 4.00	9	4.6%
More than 4.01	8	4.1%
Average Farmgate Price of Palay in 1991*		
Bohol: P 5.51 Iloilo: P 4.77		
*Source: Bureau of Agricultural Statistics		

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The average size of farmers' borrowings was P 4,736.46 in 1991. The correlation between total loans and the price range turned out to be small, negative and statistically insignificant: $\rho = -0.008$. The probability of observing a value of a correlation this size under the null hypothesis of zero correlation is about 91 %. We also estimated the correlation between the price variation faced by borrowers and the size of their loans scaled by total sales. This latter variable gives the proportion of their output sold forward. Under certain assumptions, this should give us a more rigorous test of the forward sale theory of interlinking.

Consider a farmer-borrower who maximizes expected utility. If all terms higher than the second-order term of the utility function can be ignored, we can approximate his expected utility by:

$$(11.1) E U(Y) = U(Y') + 0.5U''(Y')\text{Var}(Y)$$

where Y is annual output, Y' is the mean of his annual crop output and $\text{Var}(Y)$ is the variance. Thus the first two moments of the distribution of Y are sufficient to characterize the preferences of the farmer-borrower.

We now establish the mapping between Y' and $\text{Var}(Y)$ and price risk. Let p be the price of output in the spot market. It has mean p' and variance given by $\text{Var}(p)$. For convenience we shall assume that the level of output Q is invariant to the farmer's decision whether to sell his output forward or not. Also a linked contract assures the farmer a price $p^* < p'$ for all output sold forward. Hence if the farmer decides to sell all his output forward to the trader his expected income is given by $Y^* = p^*Q$ and he faces zero risk. On the other hand if the farmer decides not to sell any of his output forward, his expected income is given by $Y' = p'Q$ with variance given by $\text{Var}(Y) = Q^2 \text{Var}(p)$. Let α be the proportion of the farmer's output that he sells forward. Then such a portfolio of hedged and unhedged positions will have mean income $E(Y_p) = [\alpha p^* + (1-\alpha)p']Q$ and variance $\text{Var}(Y_p) = (1-\alpha)^2 Q^2 \text{Var}(p)$.

In Figure 2, we show the set of indifference curves of the farmer-borrower as the upward-sloping UU curves. The variance of Y is measured along the horizontal axis and the mean income on the vertical axis. Point P in Figure 2 gives us the mean income and risk faced by the farmer-borrower if he decides not to sell any part of his output forward (corresponding to the pair $(Y', Q^2 \text{Var}(p))$). Point T on the other hand, gives the risk and expected income from an interlinked contract where he sells all his output forward and hence faces no residual risk (corresponding to the pair $(Y^*, 0)$). We shall assume that the line TP shows the tradeoff set by the trader-lender for lending to the farmer-borrower. The slope of line TP shows what reduction in expected income the farmer-borrower must accept for every percent of output sold forward to the lender. The nature of the interlinked contract is determined at the point of tangency of TP with the highest indifference curve it can reach. This occurs at point E. The proportion of his output sold forward is given by the magnitude ET/PT (hence $\alpha = ET/PT$).

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Given that the farmer-borrowers in our sample faced differing degrees of price risk, some farmer-borrowers would face tradeoffs that are either steeper or flatter than line TP. Consider another farmer-borrower who faces a greater level of price risk than our original farmer-borrower. Point S is the risk-expected income this farmer-borrower faces if he decides not to sell any part of his output forward. Notice that compared to point T, S has lower expected income and higher risk.

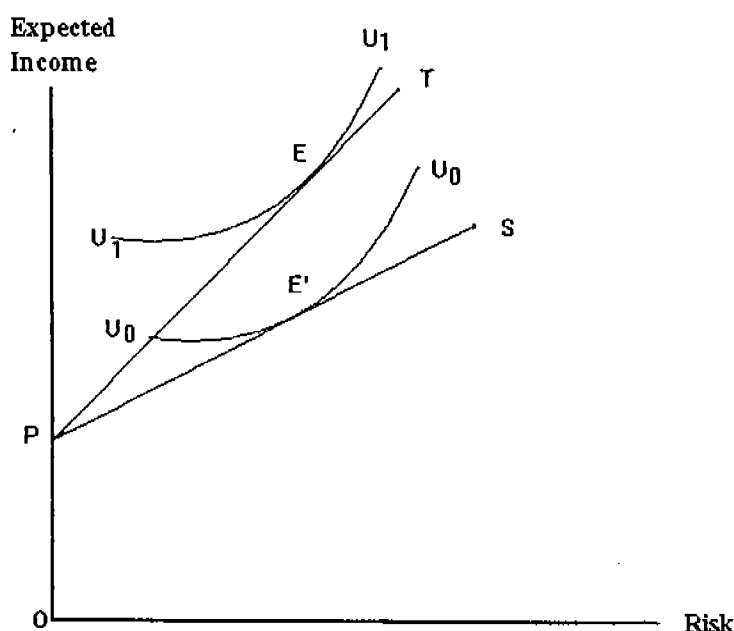


Figure 2: Optimal Amount of Output Sold Forward

Assuming that risk preferences of the two farmer-borrowers are identical, the equilibrium for this farmer-borrower is at E'. The movement from E to E' can be decomposed into a "substitution" and an "income effect." The substitution effect should lead the farmer-borrower to increase the proportion of his output sold forward. This is because he pays a lower penalty in terms of reduced expected return for any given reduction in risk (the slope of ST is less than the slope of TP). The increased risk faced by this second farmer-borrower effectively lowers his real income. The "income effect" now depends on his relative risk aversion. If he has increasing (decreasing) relative risk aversion, then as his real income decreases he should want to increase (decrease) the proportion of his income exposed to price risk. Only if he has constant relative risk aversion will he want to maintain the same proportion of his output

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exposed to price risk (which is the assumption Fabella makes in his paper). Hence the substitution effect and the income effect should reinforce one another for farmer-borrowers with increasing or constant relative risk aversion.

If the farmer-borrowers in our sample have increasing or constant relative risk aversion, then as the price variability they face increases, they will want to sell a greater proportion of their output forward. Even if they have decreasing relative risk-aversion, if the substitution effect is sufficiently strong, then farmer-borrowers who face increased price variability should want to increase their forward commitments. Table 19 gives the distribution of the proportion of farmer-borrowers' loans as a proportion of the value of their sales for 1991.

TABLE 19
Distribution of Loans/Total Sales of Farmer

PROPORTION	FREQUENCY	PER CENT
0.01 - 0.20	106	59.6%
0.21 - 0.40	29	16.3%
0.41 - 1.00	25	14.1%
1.01 - 2.00	11	6.2%
2.01 - 3.00	1	0.6%
3.01 - 4.00	2	1.1%
More than 4.01	4	2.2%

Nearly 60% of the borrowers contracted loans whose value was less than a fifth of their total sales for the year. About 10% of all loans contracted exceeded the value of borrowers' output that year. The mean proportion of output "sold forward" was 81% which is remarkably high.

To determine the relationship between the proportion of output sold forward or hedged and price risk, we took the correlation between the former and the range of price dispersion faced by farmer borrowers during the calendar year 1991. A positive and statistically significant correlation coefficient would be supportive of the forward sale theory of interlinking. The correlation between price range faced by the borrowers and the proportion of output sold forward turned out to be small, negative and statistically insignificant: $\rho = -0.07$. This result is not supportive of the forward contract explanation of interlinking.

There are of course a number of difficulties with this test. First, the range of price variation may not be the appropriate measure of risk. The usual second-order approximation of expected utility is expressed in terms of the variance of income (or variance of price). Second, we were able to ask about the degree of price variation only for a particular year -

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1991, which may not be a representative year. Farmers may be making decisions regarding about how much output to sell forward from their experience with previous year's prices rather than with currently observed prices. So the price variation for the current year will be uncorrelated with the amount of output sold forward.

However, it is virtually impossible to collect price variability data *per respondent* other than the range of prices from a cross-section survey. Hence the price range offers the only reasonable proxy for the price risk faced by the farmer.

12. Do Search Costs Explain Interlinking?

The traders in our sample were very localized in their activities. Nearly 80% of them did not buy crops from farmers who lived outside their (the lender's) municipality. This may be an indication of how rural markets, whether credit or product, are fragmented and isolated from one another. For reasons involving inadequate provision of rural infrastructure and the lack of information networks, the agrarian economy becomes characterized by high transaction costs, and this limits the number of farmers from more distant locations that local traders deal with. From Table 20, it appears that it is the larger traders who have the wherewithal to operate outside of the narrow confine of the local market. Those who operate outside of their own municipality also make larger purchases of palay, receive more loan applications and tend to give out larger loans.

TABLE 20
Geographical Scope of Trader's Activity

ITEM	TRADERS DEALING ONLY WITHIN OWN MUNICIPALITY	TRADERS WITH DEALINGS BOTH WITHIN & OUTSIDE MUNICIPALITY
1. Number	205	67
2. Assets	P 272,489.93	P 803,020.25
3. Number of Farmers Dealt with	37.82	74
4. Purchases	P 196,596.75	P 1,345,957.72
5. Traders who Lend	131	45
6. Number of Loan Applications	14.46	25.64
7. Size of Loans Granted per Borrowers	P 2,358.09	P 4,972.29

Since we had data on the road distance between municipalities in both Iloilo and Bohol province, we attempted to determine what the average distance was between the lender and the farmers for those traders who dealt with farmers living outside their municipality. The average distance was 18.8 kilometers. This distance was longer on average in Bohol (22.2 kilometers) compared to Iloilo (16.6 kilometers).

If distance can serve as a proxy for the transaction cost faced by traders, then it might be used to explain some of the patterns we have observed in Table 20. We expect traders who deal with farmers who are located further away to be more involved in linked lending and marketing arrangements. Distance should therefore be positively correlated with lending activity by traders.

TABLE 21
Correlation Between Distance and Lending Activity

VARIABLES	CORRELATION
1. Distance and Loan Applications	-0.18 (0.22)
2. Distance and Average Amount Lent	0.17 (0.25)

Note: Figures in parenthesis indicate level of significance under the null hypothesis that the correlation coefficient is zero.

The evidence from the survey certainly does not provide convincing evidence that search costs, as proxied by distance, explains interlinking or the terms of the loan. We had expected to see such a pattern emerge from the survey results but we have not been able to find strong support so far. Some caveats are in order of course. Distance may not be the best indicator of the costs of search. The opportunity cost of the trader's time, the amount of time needed to spend on such activities and the resources that have to be mobilized for it represent the best measure of search costs. But we have been unable to derive this very detailed information from the survey itself. We think that future empirical work in this field might stand to benefit significantly from providing detailed information on the trader's search activity, how he builds his network of suppliers and what devices and resources have to be devoted to keep the system in place.

13. Summary and Conclusions

A large proportion of traders provided some form of credit to their suppliers of farm output. These loans tended to be small on average (about P 2,900) but were extended to a big enough pool of farmers (an average of 17). Loan maturity was very short (the mode was 3 months). Traders also said that the price they paid for the crop sold by the farmer was the same whether the farmer owed him money or not. Default rates tended to be very low (only 3.3% said they ever defaulted on any of their loans) but a large number did admit to having been in arrears (about 38.6% of borrowers said they experienced it). But most arrears were simply rolled over by the traders (this was the response of about 88.9% of the respondents who said they had been in arrears). Collateral was hardly required from the borrowers. Based on the logit regressions we performed, the longer the amount of time that the borrower and lender knew each other (five years or more), the greater the likelihood that the collateral requirement would be waived.

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One of the more striking results of the survey was the large proportion of farmers who were not charged explicit interest rates by traders. The proportion was larger in Bohol than in Iloilo province. Since we could find no evidence from the survey that the prices received by the farmer-borrowers was lower on average than those of non-borrowers, this suggested that effective interest rates varied across farmer. Those not charged explicit interest rates enjoyed lower effective interest rates than those who had to pay interest fees. Farmers borrowing exclusively from the trader were those who were able to obtain the better deal. We surmise that these farmers were the most consistent suppliers of marketable surplus to the traders.

We examined in greater detail two alternative hypothesis about interlinked marketing and credit arrangements. The first explanation argues that these contracts represent a forward sale of future output to hedge against price risk. The second explanation is that it represents an attempt at economizing on search or transactions costs. The survey results were not very kind to either of these explanations. In fairness to both these explanations, we did find some corroboration that farmers and traders faced significant price variation and that most traders tend to transact only in very localized markets (indicative of high search or transaction costs beyond the local market).

Still, we think that there are two key pieces of evidence uncovered by this research that points the way to partially answering the question of why we observe such interlinked arrangements between traders and farmers. First, that there are traders willing to extend loans with no explicit interest rates attached. Second, that traders do not distinguish between borrowers and non-borrowers in determining the price that they pay for farm output. This means that traders are willing to pay a premium for the output provided by some farmers; and in exchange for this premium, farmers respond by being regulars or "suki", providing a consistent and reliable source of farm products for the trader.

Efficiency Issues

To what extent do these interlinked contracts represent a second-best optimum? In an environment where farmers face significant price uncertainty, there are gains for society if farmers are able to lower this risk. Since the loans extended to them by traders constitute a forward sale of part of their future output, this allows a transfer of risk from those who wish to shed it to those who are willing to bear it. Another source of welfare gains come from economizing on search costs. Resources that would have been devoted to identifying the cheaper sources of marketable output or the most reliable supplier can be devoted to other ends by linking credit provision with marketing arrangements. This explanation forms part of the entire transactions cost literature that attempts to explain the origins of various economic institutions - the firm, the market, or even the state - in terms of lowering the costs of transactions. Here traders exploit opportunities opened by the imperfection in rural credit markets and the high cost of information in the marketing of output. Finally, traders increase the level of financial flows or liquidity to the rural economy, enabling farmers to obtain vitally-needed working capital. As

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such, they also tend to erode the market power that may be held by traditional village moneylenders.

Policy Issues

Over the past twenty years, government policy has switched from repressing financial markets (through caps on interest rates, etc.) and selective credit subsidies towards greater financial deregulation. For example, this year the Philippines passed legislation that allowed the entry of foreign banks. There is evidence though that over this same period, there has not been a marked improvement in the amount of formal sector finance going to the rural sector. It is unlikely that liberalizing entry of foreign banks into the country will change this dismal picture.

Ultimately, formal credit flows to the rural sector will increase only if the expected returns from the sector is competitive (adjusted for risk) with those generated from other sectors. To some extent, focusing on policies or regulations to change the behavior of financial institutions and agents in the hope of coaxing out more financing to the agricultural sector is like asking the tail to wag the financial dog. This is not to say that greater liberalization of regulations will not be important. But those flows will start to come in significant amount only when the returns from agricultural production are perceived to be competitive with returns from other economic activities.

In turn, improvement in expected returns can come about only after substantial investment in rural infrastructure and agricultural research, things that the government has neglected for years. These investments will have the effect of reducing risk in agricultural production and lowering search and transport costs. Macroeconomic policy changes that involve lowering tariff protection on inputs to agriculture (seeds and planting materials, packaging, etc.), a more realistic foreign exchange rate, taxation and easing regulations on shipping are also required. These policy changes should lead to lower cost of agricultural production and increased revenues from a given level of production. Some reform of the country's agrarian reform laws, specially those that limit the property rights of beneficiaries is also called for. Current laws restricting the transfer of land rights on property subjected to land reform have made beneficiaries very risky from the point of view of formal financial institutions.

The current thrust of government policies on rural credit are in the areas of "institution-building" (i.e. promoting credit cooperatives) and credit guarantees. Government encourages the formation of cooperatives by providing various forms of tax and regulatory exemptions to the organizations. The National Food Authority also procures its rice only from registered farmers' cooperatives. Part of the emphasis on cooperatives reflects an underlying suspicion of the role of informal sources of finance in the rural sector. Our study of traders suggests that they provide an alternative source of liquidity to the farmer and can therefore counteract market power by village moneylenders. Given the generally discouraging performance of past government programs on building successful cooperatives, policies that reduce barriers to entry

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in trading or informal lending might offer a better return to public resources. To the extent that barriers to entry in trading can be linked to underprovision of infrastructure - roads, bridges, ports, telecommunication systems - then that provides further arguments for shifting attention away from cooperatives.

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