Credit tying as a collateral substitute in informal loan contracts

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CREDIT TYING AS A COLLATERAL SUBSTITUTE IN INFORMAL LOAN CONTRACTS

DISSERTATION

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By

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* * * * *

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To the memory of Cesar A. Ferreros
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CHAPTER I

INTRODUCTION

Until about ten years ago, the microeconomic behavior of borrowers and lenders in the rural informal financial markets of less developed economies received only scant attention from economists studying rural finance. Two distinct, though not unrelated, factors may explain why this was the case. First, rural finance specialists in the 1970s were generally preoccupied with the policy debates surrounding subsidized bank interest rates and special lending programs. The 1970s will be remembered as the period when subsidized credit was considered a crucial element in the rural development strategies of many less-developed country governments, a view that was often encouraged by generous funding support from developed countries and multilateral agencies. Research in rural finance, therefore, addressed mainly the efficiency and equity issues arising from state-sponsored, subsidized credit programs. A substantial volume of publications based on country studies - mostly conducted in Latin America - grew around the Shaw-McKinnon contributions to the finance and development literature and eventually dominated the rural finance field.¹ The main arguments emerging from this body of literature are now familiar to students of rural finance: subsidized credit programs stunt rather than encourage the growth of rural financial systems, worsen rather than improve income distributions, and undermine rather than promote rural development.

¹ The Ohio State University (OSU) Agricultural Finance Program has made significant contributions in this field. See Gonzalez-Vega (1986) for a good summary of the OSU approach to the study of rural financial markets. See also Von Pischke et al (1983) and Adams et al (1984).
In critiques of the "traditional" approach to rural lending, the economics of informal credit transactions was usually taken for granted. It was sufficient for most writers in rural finance - who understandably focused on the formal sector - to casually apply the simple "law" of supply and demand and to claim that the informal credit market, being unregulated, allocated credit more efficiently than its regulated formal counterpart. Against the somewhat extreme, though more popular, view regarding usury and exploitation, the beneficial function of informal moneylenders was stressed, and the view that ascribes monopoly power to village moneylenders was dismissed.² The reason is that these views have been perceived as being the basis for government interventions in rural financial markets. This perspective is evident even in some of the recent work on informal finance³, understandably because of an underlying concern to discredit the alleged premises for various government regulations that result in financial repression.

The relatively undeveloped state of the analytical tools appropriate for the study of institutions and their economic function was perhaps another reason for the tendency to ignore the economics of informal credit transactions in the 1970s. Various scholars who have studied rural transactions in general and rural credit transactions in particular invariably recognize the roles played by the family, social custom, tradition, status, patronage and power in economic exchanges. However, standard economics was not prepared to incorporate institutions into its analytical tool kit even while it recognized their importance. In the 1970s, the contributions to the economics of information and organization were in their germinal states and were yet to make their impact on

² This, however, is a non-argument against the "exploitation" thesis. A contractual arrangement can be both functionally beneficial and exploitative. More recent research has also shown that the "exploitation" thesis does not rest on the existence of monopolistic interest rates [e.g. Basu (1987), (1989)].

economic theorizing, let alone on applied work in less developed economies. Early attempts at modeling credit relations that incorporated features of production relations found in the rural economies of less developed countries were more of the exception, and were mainly limited to economists with a Marxian perspective [e.g. Bhaduri (1973) and (1977), Bharadwaj (1974)]. In practice, the discussion of institutional issues in economics was generally eschewed, and research on informal finance made little progress beyond the description of varied credit arrangements.

Interest in informal credit market research among development finance specialists increased in the 1980s as a result of the failure of a decade of targeted lending programs in developing countries, and the observed resurgence of informal lending activities in these countries. Against the backdrop of failed government-sponsored credit programs and the demonstrated inability of banks - despite some measure of financial liberalization - to meet the small farmer demand for credit, the competitive advantage of informal lenders became acknowledged as fact. Though little was understood about the behavior of these lenders, their potential as conduits for formal credit to the farm sector was explored as policy-makers searched for solutions to the small farmer credit delivery problem outside of the traditional approaches.4

An important stimulus to informal credit market research was the challenge posed by the neo-structuralist school to the Shaw-McKinnon model of financial development. In neo-structuralist models of developing economies, curb markets - where moneylenders and indigenous banks are the primary agents of financial intermediation - take center stage in the analysis. While in the Shaw-McKinnon model, financial liberalization is expected to lead to a greater total real supply of credit, higher quantity and quality of investment and higher rates of economic growth, the neo-structuralist critique argues that financial liberalization may produce the opposite results. This argument is based on the supposition that the curb market is a more efficient intermediary between

4 See Esguerra (1987) for an example based on the Philippines' experience.
surplus and deficit units and that higher deposit rates will cause households to substitute out of curb market loans instead of inflation hedges in unproductive tangible assets [Fry (1988)]. The neo-structuralist critique of financial liberalization is weakened, however, by the fact that it does not have a more elaborate analysis of the microeconomics of informal financial markets.

The contributions made to the analysis of informal credit arrangements in the 1980s evolved mainly from the work of economists interested in models of markets characterized by imperfect information. These economists also criticized the earlier informal credit market models developed by Marxist authors. However, unlike other critics whose criticism stemmed mainly from a concern to avoid unwarranted state intervention in rural financial markets, they offered a more rigorous critique, exposing inadequacies in the microfoundations of the earlier models, and bringing informational and institutional factors to bear on credit relations. The fruitfulness of the dialogue is evidenced by the rapid expansion of a body of literature on the economics of agrarian institutions with contributions from economists of both non-Marxian and Marxian persuasions.

There is no doubt that the information theoretic approach has exerted a powerful influence on current thinking about rural transactions. Following Akerlof's (1970) seminal contribution, models of asymmetric information flourished, leading to useful insights regarding the functioning of markets and other institutions. Essentially the idea is that for many economic transactions, information regarding the quality of the commodity being traded is unequally available between the transacting parties. This is especially the case in labor, insurance and credit markets. Incentives for quality misrepresentation exist for the more informed party to the extent that information is costly to acquire for the less informed one.

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5 This is because, unlike banks, the curb market is unconstrained by legal reserve requirements which the neo-structuralists view as a leakage in the process of financial intermediation. For a contrary view, see Kapur (1992).

6 See for example the volumes edited by Bardhan (1989) and by Nabli and Nugent (1989).
The asymmetric information framework has provided an economically plausible explanation for equilibrium rationing in credit markets [Stiglitz and Weiss (1981)]. Asymmetric information has also been used to explain the organization of economic activity and the design of rural contracts; that is, the provision of incentives to minimize misrepresentation or induce honest behavior. This is the main theme running through the sharecropping literature [Newbery and Stiglitz (1979), Otsuka and Hayami (1988)] which in turn has largely influenced received models of interlinked rural transactions [Braverman and Srinivasan (1981), Braverman and Stiglitz (1982), Mitra (1983)]. The extensive literature spawned by the "new institutional economics" has freed rural credit market analysis from the traditional supply-demand approach and enriched it with an appreciation of the economic role of contracts and institutions. The present research draws from the various strands of the "new institutional economics" literature to analyze some observed features of rural informal credit markets.

1.1 The Research Problem

If lenders had perfect information, they would choose to deal only with loan applicants who are considered "good" credit risks. With unequally distributed information about the characteristics and behavior of loan applicants, lenders have an incentive to sort clients from a heterogeneous pool of potential borrowers in order to identify the "good" customers. Borrowers attempt to maximize their probability of obtaining a loan by revealing information about themselves that

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7 Undoubtedly, the most prominent work on credit markets with asymmetric information is that by Stiglitz and Weiss (1981), although the seminal works by Jaffee and Russell (1976) and Keeton (1979) are also significant contributions. For a review of the credit rationing literature, see Jaffee and Stiglitz (1990) and Clemenz (1986).

8 This term is attributed to Williamson (1985), among others, by Nabli and Nugent (1989). Broadly it refers to the corpus of economic literature where the transaction cost-minimizing role of institutions is explicitly recognized. The asymmetric information literature falls under this rubric. There are differences, however, between the "transaction cost approach" and the "imperfect information paradigm" as discussed in Stiglitz (1986).
lenders positively value. When information is asymmetric, the behavior of credit market participants has ramifications both for the terms at which credit is provided and how it is allocated among different loan applicants.

If lenders could design loan contracts in such a way that they would be perfectly certain of loan recovery when the outstanding debt falls due, then screening of loan applicants would be redundant. This would be the case if lenders could stipulate a collateral requirement equal to the amount of the borrower’s loan obligation, if borrowers possessed an infinitely large amount of collateralizable assets, and if the collateral, when foreclosed, could be costlessly appropriated and marketed if the lender had no direct use for it. In the real world, however, less than ideal conditions prevail. Even if lenders can require collateral equal to outstanding debts, they may be unable to recover their full value upon foreclosure [Bell (1988)]. In many less-developed countries, the insurance and legal environment may be inhospitable to collateral use [Binswanger and Rosenzweig (1986)]. Furthermore, the majority of rural borrowers may not possess sufficient amounts of the asset or assets considered most acceptable as collateral (e.g. land) to secure their loans. Under these circumstances, both parties to a credit contract have an incentive to use collateral substitutes. This is the case in rural informal credit markets which constitute the focus of this study.

1.1.1 Collateral Substitutes

The term collateral substitute was first used by Binswanger and Rosenzweig (1986) to refer to conditions in a loan contract, whether explicit or implicit, which increase a borrower’s incentive to repay. The examples given are third party guarantees, threat of loss of future borrowing opportunities and tied contracts. Other than the above, there does not seem to be a more explicit definition of a collateral substitute, so that it is safe to say that the term is defined (or can be defined) only implicitly in relation to collateral and, more specifically, in relation to the role
ascribed to collateral in a credit contract. Collateral has both screening [Bester (1985), (1987)] and enforcement [Benjamin (1978)] functions. What is suggested in the above method of definition is that the implications of using collateral substitutes in informal credit markets can be analyzed relative to the expected outcome if collateral, in the ideal sense to be defined subsequently, was used. This approach, however, should not be interpreted as implying that collateral is a superior mode of securing a loan agreement against which other modes should be compared. Rather, collateral and the various forms of collateral substitutes should be viewed as alternative technologies for insuring loan repayment. It is only in recognition of the fact that the literature on formal loan contracts developed first in the context of developed market economies that collateral is used presently as an analytical benchmark.

1.1.2 Market Interlinkage as a Collateral Substitute

A common form of collateral substitute in use in many agrarian settings is tied contracts or interlinked transactions. An interlinked transaction is one in which two parties trade in at least two markets on the condition that the terms of all such trades are jointly determined. With the explosion in the literature on asymmetric information in recent years, many papers dwelling on various forms and aspects of market interlinkage have appeared. These papers have invariably focused on the complex relationship between landlord and tenant that encompasses both factor and product markets. The incentive effect of borrowing on tenant effort has been the focus of the analyses of the linkage between consumption or production credit and a tenancy contract in the works of Braverman and Stiglitz (1982) and Mitra (1983). Braverman and Guasch (1984) dwelt on the effect of a linked credit and tenancy contract on the landlord’s screening of potential

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9 A comprehensive survey of the interlinked transactions literature is found in Bell (1988). See also the relevant articles in the volume edited by Bardhan (1989). See also Bardhan and Rudra (1978), Bardhan (1980), Basu (1983), Floro (1987), Geron (1989), and the symposium issue of the *World Bank Economic Review* (1990) on 'Imperfect Information and Rural Credit Markets'.
tenants. Kotwal (1985) and Eswaran and Kotwal (1989) showed how, in the context of production uncertainty, consumption credit acts like insurance for the tenant borrower. Landlords attempt to reduce the "potential risk" of loan default to zero, according to Basu (1983), by lending only to those over whom they have control by virtue of a tenancy or labor contract. More recently, Bell and Srinivasan (1989) showed that the equilibrium contract between a trader who provides a production loan to a farmer in exchange for the latter marketing his product through the trader involves either an interest rate or a commission charge. Fabella (1992) has shown that, within a tied credit arrangement with a trader, loan repayment in-kind Pareto dominates a cash-for-cash scheme when output price is uncertain and farmers are risk averse.

While interlinked contracts have been referred to as collateral substitutes, they have not been explicitly analyzed as such. The theoretical literature on interlinked markets has leaned towards providing an explanation for interlocking rural transactions, and demonstrating the efficiency of interlinked arrangements in agrarian markets characterized by unequally distributed information between two contracting parties. In addition, almost all extant theoretical analyses of interlinked contracts have been conducted within the framework of the sharecropping contract,\(^{10}\) to the relative neglect of possibly more pervasive forms of interlinking, such as the marketing-credit link.\(^{11}\)

1.1.3 The Scope for Government Policy

In rural financial markets, where credit transactions are linked with transactions in land, labor and product markets, and the linked contracts act as collateral substitutes, can government intervention effect a Pareto improvement? If so, what types of policy can lead to improved

\(^{10}\) Otsuka et al (1989) conclude that the linked credit contract plays a role no different from that played by the fixed term found in a linear sharing rule under a sharecropping contract.

\(^{11}\) The few exceptions are Gangopadhyay and Sengupta (1987), Floro (1987), Bell and Srinivasan (1989), Floro and Yotopoulos (1991), and Fabella (1992).
resource allocations? Greenwald and Stiglitz (1986) have shown that when markets are incomplete and information is imperfect, market allocations are, in general, constrained Pareto-inefficient. The implication is that there exist government interventions which can make everyone better-off. The fact that markets are missing or incomplete and societies adapt by evolving institutions to serve the functions of missing markets in no way suggests that those functions are performed optimally. Interlinked transactions only partially internalize the externalities present in agrarian economies. "The pair-wise efficiency of contractual arrangements does not suffice to ensure the general equilibrium efficiency of the economy, except under highly restrictive conditions" [Stiglitz (1989): 24]. Thus, while government policies which outlaw informal lenders or drive them out of business may turn out to be welfare-reducing, the view that governments should not intervene in rural financial markets may equally result in foregone opportunities for increased production, consumption and investment in rural areas. The case is by no means closed, however, in favor of government interventions [Besley (1992)]. The challenge lies in pointing out the specific areas where government policy can make a positive contribution, and in designing the appropriate policy response.

1.2 Objectives and Plan of the Study

This study inquires into the screening and enforcement technologies of informal lenders, with emphasis on the effects of market interlinkage on lenders' competitive advantages in the rural informal credit market. The specific objectives are as follows: (i) to analyze an interlinked contract explicitly as a collateral substitute, (ii) to examine the implications of market interlinkage as a collateral substitute on the pattern of credit allocation in a rural informal credit market, and (iii) to empirically test hypotheses related to the determinants of the pattern of credit allocation predicted from (ii) using informal credit market data from the Philippines. The factors
differentiating the borrowing clienteles of trader-lenders and farmer-lenders constitute the focus of the empirical analysis. A different approach is pursued here in that, unlike the received interlinked markets literature, the present discussion mainly concerns the credit market. While the economic bases for market interlinkage will keep intruding into the discussion, the primary concern here is not to derive any specific form of market interlinkage or to establish that a specific interlinked arrangement is optimal. Instead, this study focuses on the consequences of interlinkage on the ability of lenders to offer borrowers more attractive loan terms (e.g. loan size, interest rate) than pure moneylenders. Given that a lender can use an interlinked transaction, what empirical regularities does one expect to observe in the rural credit market with respect to the pattern of credit allocation? How different would the pattern be without the linked arrangements? Of what consequence is the use of market interlinkages to the organization of rural informal credit markets? Does the use of certain forms of interlinkage lead to predictable patterns of credit allocation in the rural credit market? What policy implications can be derived from the analysis?

The distinction drawn by Jensen (1983) between the "principal-agent" literature on the one hand, and the "positive theory of agency" literature on the other hand, is relevant to the approach adopted for this study. Received models of contractual interlinking have been developed along the first strand of the agency literature, with "focus on risk-sharing and the form of the optimal contract between principal and agent, and on welfare comparisons of the equilibrium contracting solutions in the presence of information costs vis-a-vis the solutions in the absence of such costs" [Jensen (1983):334]. The approach followed in this study is more in keeping with the positive agency literature which "has generally concentrated on modeling the effects of additional aspects of the contracting environment and the technology of monitoring (and bonding) on the form of the contracts (and organizations) that survive" [Jensen (1983):334]. That is, the present study concerns itself with the effects of market interlinkage on credit market outcomes.
In order to accomplish the objectives mentioned above, a theoretical model is required. Chapter II presents a model of rural informal credit for use as a benchmark in analyzing specific informal credit arrangements. Chapter III extends the model to account for the presence of collateral. Market interlinkage, which is shown to be motivated by considerations outside the credit market, is then introduced into the credit model in the form of a credit-marketing link. The condition(s) necessary for the existence of an interlocker's advantage over a pure moneylender is (are) spelled out. The implications of using market interlinkages as collateral substitutes on the pattern of informal credit allocation are discussed in terms of lenders' different abilities to deal with different borrowing clienteles given their screening and enforcement technologies. It is shown that in an informal credit market with traders and farmers as lenders and farmers and landless wage workers as borrowers traders will lend mainly to farmer-borrowers and farmer-lenders mainly to landless wage workers.

Chapter IV examines the empirical relevance of the main propositions advanced in the study. The agricultural rice economy of the Philippines where the green revolution technology has been widely diffused and sharecropping contracts proscribed provides the setting for the empirical analysis of informal credit arrangements. Interestingly, these two features of the agrarian setting under study are important deviations from the stylized rural economies posited in theoretical models in the literature -- poor and backward, predominantly characterized by sharecropping contracts, and with one or few moneylenders -- with crucial implications about the behavior of market agents and the type of loan contracts observed. Government data based on a field survey of four rice-producing villages in the province of Nueva Ecija in the Philippines are used for the analysis.

12 An interlocker is someone who employs an interlinked transaction.
In Chapter V, a multinomial logit model is estimated to test the hypothesis that informal lenders tend to specialize in lending to specific subsets of the rural borrowing clientele based on the type of collateral substitute acceptable to them. Predicted probabilities of obtaining a loan from different lender types are computed for different borrower classes. Chapter V recapitulates the main results of the study, discusses some policy implications and points to some areas for further research.
CHAPTER II
A MODEL OF INFORMAL CREDIT: PURE MONEYLENDING

The objective of this chapter is to present a model of a credit transaction for use as a benchmark for the subsequent analyses of observed rural informal credit arrangements. The increased research interest in the last ten years in rural institutions and economic organization has led to the development of various theoretical models of interlinked transactions in which informal credit contracts have an important economic role. Most of these models, however, do not necessarily have a credit market focus. That is because their development has been motivated by a more general concern, which is to understand why rural agents bundle transactions that otherwise may be undertaken separately. In the formulation of existing interlinked markets models, moral hazard and adverse selection problems in the rural labor market provide the rationale for interlinking. From this perspective, the credit transaction (within a tenancy contract) is treated as an instrument which a landlord employs to minimize shirking by his tenants [Mitra (1983)] or a mechanism for sorting out the high-ability tenants from a heterogeneous pool of applicants [Braverman and Guasch (1984)]. While this framework is valid for understanding the bases for interlinked contracts, it is not sufficient if one's principal objective is an analysis of rural credit markets. In this case, the existing models need to be turned on their heads so that the credit market becomes the focus of the analysis, and the related market transactions are treated as the instruments for enforcing the desired behavior in the credit market.
In an excellent survey article, Bell (1988) developed a fairly general model of an informal credit transaction and used it to analyze the problems of screening, incentives and enforcement in credit markets. The effects of two types of government intervention, namely, the imposition of interest rate ceilings and the introduction of competition through state-owned or regulated commercial banks, are then analyzed within the same framework. Bell also reviewed the interlinked markets literature and discussed the various factors underlying bundled rural transactions. As if to attest to the gap that exists in the literature, Bell’s review gives considerable space to interlinked credit and tenancy contracts. However, the review ends with very little discussion of how the important results derived from market interlinkage relate to the basic credit market model.

Since the objective of this study is to explain empirical regularities in actual credit market settings, an analysis of borrower and lender behavior is the necessary first step. Such an analysis is best carried out within a credit market framework. To do this, a credit market model is required. A characteristic feature of credit markets, in general, is that, unlike the market for goods wherein the supply of and payment for the good or service take place simultaneously, what is exchanged is a good or service for a commitment to pay a specified amount in the future. Uncertainty over the realization of the commitment, which is contingent upon the ability and willingness of the agent making the pledge to pay, is of fundamental importance in credit markets. Because of risk and imperfect information, a credit market cannot be analyzed in the same way that markets for homogeneous goods are analyzed. An important feature of credit markets is that loan terms and conditions reflect the characteristics of both lenders and borrowers.

The basic model of an informal credit transaction is introduced in the next section. This is followed by a discussion of borrowing behavior and the properties of the borrower’s preference map. The lender’s problem is analyzed next, and the factors influencing the shape of the lender’s
iso-expected profit contours are considered. The nature of contractual equilibrium in the informal loan market is then discussed.

2.1 Assumptions of the Model

The model presented in this chapter is essentially the model used by Milde and Riley (1988) to analyze signaling in a formal loan market. Bell (1990), in his discussion of informal loans, shows that the same framework is useful for analyzing informal credit transactions. The properties of the resulting credit market equilibrium in the credit rationing study of Jaffee and Russell (1976) likewise indicate that their model of the credit market is based on the same framework. More recently, Aguilera (1990) obtained similar results although he used more general functional forms for the borrowers' utility and the lenders' profit maximization problems. The common thread in these models is the recognition of the essential features of a credit market transaction: First, information is imperfect, and this gives rise to screening, incentive and enforcement problems. Second, lenders respond to the information problem by designing both direct and indirect mechanisms to reduce the risk of loan default. Third, loans are non-homogeneous goods in that quality (riskiness) varies with price (interest rate and other contract terms) [Stiglitz (1987)].

The Milde-Riley model is general enough to incorporate the fundamental properties of all credit transactions. In order to focus the analysis, however, this study explicitly includes in the basic model features that characterize rural informal credit transactions. Moreover, a number of simplifying assumptions are employed in order to keep the results tractable and to highlight the features or aspects of rural informal credit transactions of interest to the present study. Extensions of the basic model are deferred until the next chapter.

There are several important features of the basic model. First, it abstracts from the problem of choice between borrowing and not borrowing. This issue is not crucial to the analysis. Furthermore, it would seem that, given the subsistence nature of rural households and the seasonal
character of agricultural production, borrowing whether for production or consumption is an important activity of a great majority of these households, as is the case in many developing countries.

Second, the model is basically a one-period model. This simplification precludes an analysis of some issues, such as the role of reputation in the relationship between lender and borrower. However, it greatly facilitates inquiry into the issues of central concern for this study. Moreover, the use of a two-period model seems unnecessary if the objective is simply to describe the equilibrium loan terms that result in a rural credit transaction. For instance, the loan size rationing result in the two-period models of Jaffee and Russell and Aguilera was obtained also by Milde and Riley and Bell using one-period models. A two-period model would be necessary, however, if the role of reputation in contract enforcement is to be explicitly considered in the model. A two-period model may also be required in the case of consumption loans since the very nature of such loans - ensuring the consumption of the borrower when there is a considerable lag between periods when income is received - requires explicit treatment of the time profile of the borrower's income flows in the model. For simplicity, the present model considers only production loans. The main results that are obtained, however, are generalizable to the case of consumption loans [e.g. Bell (1988)].

Third, only one commodity is produced and all loan applicants are restricted to producing this one commodity. As such, the uncertainty of repayment does not arise from different borrowers choosing to undertake different projects of varying riskiness. This assumption implies that the problem of moral hazard does not arise in the present model. Bell notes that the derivation of the distribution function of returns for the borrower's choice of projects can be very complicated. Such computational complexity is not necessary for the purpose at hand.
Fourth, both borrowers and lenders are assumed to be risk-neutral agents maximizing expected income or profit. Both borrowers and lenders also share the same belief about the distribution of returns from the project or activity to be financed by the loan. However, lenders cannot determine borrower creditworthiness without additional information about loan applicants. Lenders make their lending decisions based on their resources and after considering all available borrower information, whether this is based on accumulated experience or the result of actual credit investigation.

Finally, the model assumes away the existence of formal finance as an alternative. In addition, the model considers only the case of the pure informal moneylender. That is, the informal lender modeled here has no income source apart from moneylending. This assumption is relaxed in a subsequent chapter.

2.2 Borrowing Behavior

Consider an agent who produces output \( Q \) according to the production function \( Q = Q(B;N,\alpha,\Theta) \) where \( B \) is non-land inputs, \( N \) is land of a given size, \( \alpha \) is a vector whose elements are quality parameters capturing other production-enhancing attributes associated with the borrower and \( \Theta \) is an uncertainty parameter representing production risk. As is usually assumed, \( \partial Q/\partial i > 0, \partial^2 Q/\partial i^2 < 0 \) and \( \partial^2 Q/\partial i \partial j > 0 \) for any input \( i, j \). Assume that the agent has zero initial wealth and that all non-land inputs are financed from borrowing. Assume further that if \( N \) is zero or if the producer has no access to land, then \( Q(B,0) = 0 \). As is common in the literature, it will be assumed that output risk is multiplicative in nature. Therefore it is possible to write \( Q \) as \( \hat{\Theta} Q(B;N,\alpha) \), where \( \hat{\Theta} \) is a non-negative random variable.

The producer borrows the amount \( B \) from a moneylender in the rural financial market at the rate of interest, \( r \), to finance his production. At harvest time, the producer sells his output at the prevailing post-harvest market price, \( p \), in the relevant locality and repays his loan, \( (1+r)B \), from
the proceeds of the sale. Let \( p = \bar{p} \), a non-negative random variable. The price uncertainty may be due to supply and demand shifts. However, it is also possible to conceive of it as arising from the inaccessibility of the market to the producer, either because of an undeveloped infrastructure (e.g. absence of post-harvest facilities, poor rural road network) or lack of information which may be aggravated by the perishability of the produce.

The present model abstracts from tenurial considerations. The producer is assumed to be an owner-cultivator, whose expected profit from farming during a particular planting season is the difference between his production income and the loan obligation. It is further assumed that all transactions in the land market are closed before contracts in the credit market are made. This assumption does away with the possible complications that may be introduced by variations in farm size in response to credit availability [Bell, Srinivasan and Udry (1988)]. Whenever production income falls short of total production expenses for the planting season \((1 + r)B\), the borrower involuntarily defaults on his loan.

Since the producer commits his resources to the production of \( Q \) prior to the realization of \( \bar{p} \) and \( \bar{\theta} \) which are both outside of his control, there is a non-zero probability that his sales revenue may fall short of his outstanding loan. Involuntary or unintentional default is, therefore, said to occur whenever a borrower's repayment obligation exceeds his revenue at harvest time. The default condition for the "unlucky" borrower may, therefore, be written as:

\[
(1 + r)B > \bar{p} \bar{\theta} Q(B; N, \alpha)
\]

From the above, the producer's returns are subject to both price and output uncertainty. It may be assumed, however, that producers in general are mainly concerned with the consequences of uncertain events or occurrences on their incomes, not with the processes by which they occur. That is, producers are concerned with the product \( \bar{p}\bar{\theta} \) and not with \( \bar{p} \) and \( \bar{\theta} \) individually. Therefore, it is possible to define another random variable, \( \bar{\theta} = \bar{p}\bar{\theta} \), which compounds the effects
of price and output variability.\footnote{See for example Chapter 6 of Newbery and Stiglitz (1981). See also Bell and Srinivasan in Bardhan (1989).} Furthermore, let $\theta$ be a non-negative continuous random variable with density $f(\theta)$ on the support $[0, \infty)$ and cumulative distribution function $F(\theta)$. From (2.1) above, the value of $\theta$ that equates the gross returns from production with the amount of the producer's payment obligations is:

$$\hat{\theta} = \frac{RB}{Q \left( B ; N, \alpha \right)}$$

(2.2)

where $R$ is the interest factor $(1+\tau)$. $\hat{\theta}$ is then the critical value of $\theta$ such that if the realization of $\theta < \hat{\theta}$, unintentional default occurs. Throughout this discussion, it is assumed that the credit contract does not guarantee the borrower a minimum consumption level in the event that returns from the project are insufficient to repay the loan. However, the borrower does not incur any additional cost whenever default is unintentional. It turns out that this is not an unreasonable assumption. Village social custom traditionally frowns upon the "taking advantage" of someone who has had ill fortune [Hayami (1988), Scott (1976)]. It is assumed, however, that the lender takes whatever returns there are from the project when the borrower involuntarily defaults. The case of a collateralized loan is deferred until the next chapter.

The borrower's problem may be summarized as the maximization of his expected income or profit from $Q$ production through the choice of a level of $B$ or borrowing to finance non-land inputs, given his initial endowments and the terms available in the rural informal credit market. The borrower's expected profit equation may, therefore, be written as follows:

$$\pi = Q(B) \int_{\hat{\theta}}^{m} \theta \, dF(\theta) - RB \left( 1 - F(\hat{\theta}) \right)$$

(2.3)

where the arguments $N$ and $\alpha$ in the production function have been suppressed and $m$ is a maximum value of $\theta$, $m < \infty$. 


2.2.1 The Incentive to Default

If the borrower receives a loan, he decides if he will repay or default on it based on a comparison of his expected net income if he repays with that if he defaults. Of course, if the borrower meets with bad luck (e.g. bad harvest or crop failure), he involuntarily defaults, and the lender simply recovers whatever portion of the borrower's income is left to cover the loan. The borrower willfully defaults: (i) if the project for which the borrowed money was used generates sufficient revenues but he does not pay, or (ii) if 0 < 0, but there is a positive return which the borrower chooses to withhold from the lender. The default decision of the borrower must also depend upon the expected cost of defaulting, i.e. whether there exist penalties for default and the ease with which the lender can verify if default was intentional.

Suppose there is a penalty for intentional default. If the borrower can pay but intentionally defaults, he incurs a penalty equal to the amount v, where v could be some tangible asset that is forfeited. Alternatively, v could be the cost to the borrower of moving elsewhere to escape repayment.\(^2\) Suppose for the moment that involuntary default can be distinguished relatively easily from strategic or willful default. This is plausible because in rural areas, information about misfortune that has struck a neighbor, friend or relative travels quickly. With the covariation of yield risks among farms in a particular locality, crop failures, pest infestation and other causes of bad harvests are also not too difficult to verify. This assumption though may fail to hold universally.

\(^2\) Or v could also be the cost of a damaged reputation in the rural credit market. However, reputation is important only in repeated transactions, and the one-period framework employed presently is inadequate for the purpose of dealing with reputation as collateral.
If the borrower chooses to default, his expected profit equation is
\[ \pi^d = [\int_0^\theta \theta Q(B) dF(\theta) + \int_\theta^1 \theta Q(B) dF(\theta)] - v \]

where \( v \) is the cost of default and the bracketed term is the borrower's expected production income. For any given loan size \( B \), the borrower compares \( \pi^d (2.3) \) with \( \pi (2.4) \). If \( \pi^d > \pi \), the borrower defaults. Thus the default condition is, from equations (2.3) and (2.4),
\[ \theta \int_0^\theta Q(B) dF(\theta) + RB(1-F(\theta)) > v \]

The equation (2.5) summarizes what is an economic basis for intentional or strategic default. That is, the (expected) cost of defaulting must be less than the size of the expected gain from defaulting. The latter is the weighted sum of the unpaid loan amounts, the weights being the respective probabilities of \( \theta \) lying below \( \hat{\theta} \) and above \( \hat{\theta} \). Therefore, contract compliance is an economic choice. If (2.5) is an equality, the borrower is indifferent between honoring and reneging on his agreement with his creditor. In the absence of any penalty for default, (2.5) is always positive; a credit transaction is always characterized by a non-zero probability of intentional default. Furthermore, this probability is likely to be higher the more costly it is to verify if default is intentional or not.

Maximizing (2.4) with respect to \( B \) shows that \( B \) should be as large as possible; that is, loan demand would be infinitely large. However, those borrowers who intend to default on their loans will not demand infinitely large amounts if by this action their intentions become obvious to lenders. Thus, they would behave in a manner such that their loan demand is consistent with equation (2.3) rather than (2.4).
2.2.2 Loan Demand

The expression (2.3) may be simplified by using the definition,

$$\theta \int_{\hat{\theta}}^{m} dF(\theta) = m - \hat{\theta}F(\hat{\theta}) - \int_{\hat{\theta}}^{m} F(\theta)d\theta$$

(2.6)

where the right-hand side expression is obtained after integration by parts. Adding and subtracting $\hat{\theta}$ to the above expression, substituting into (2.3) and using definition (2.2) yields the following equivalent expression for the borrower's expected profit:

$$\pi = Q(B)\int_{\hat{\theta}}^{m} (1 - F(\theta))d\theta$$

(2.7)

Maximizing $\pi$ with respect to $B$ results in the following:

$$\frac{\partial \pi}{\partial B} = Q_B \int_{\hat{\theta}}^{m} (1 - F(\theta))d\theta - \hat{\theta}_B[Q(1 - F(\hat{\theta}))] = 0$$

(2.8)

where $Q_B = \partial Q/\partial B$, $\hat{\theta}_B = \partial \hat{\theta}/\partial B$ and $\hat{\theta}_B$ is

$$\hat{\theta}_B = \frac{\partial \hat{\theta}}{\partial B} = \frac{R}{Q} (1 - \frac{\varepsilon_{BQ}}{B/Q})$$

(2.9)

where $\varepsilon_{BQ} = \partial Q/\partial B B/Q$, the loan elasticity of output. The first-order condition for the borrower's expected profit maximum may now be restated as follows:

$$Q_B \int_{\hat{\theta}}^{m} (1 - F(\theta))d\theta - R(1 - \varepsilon_{BQ})Q(1 - F(\hat{\theta})) = 0$$

(2.10)

The first-order condition in (2.10) shows that the loan size which maximizes the borrower's expected profits, $B^*$, may be represented as a function of the rate of interest ($R$) and other exogenous variables such as farm area ($N$) and the borrower's other production-enhancing attributes ($\alpha$). That is, $B^* = B^*(R,N,\alpha)$.

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3 Throughout this paper, partial derivatives will be denoted by subscripted symbols where the subscript is the variable with respect to which the partial derivative is obtained.
Dividing (2.10) by the quantity \((1 - F(\theta))\) yields

\[
\{ Q_{\theta\theta}H(\theta) - R(1 - \epsilon_{R})(1 - F(\theta)), \text{ where } H(\theta) = \int_{\delta}^{\theta} (1 - F(\theta)) d\theta \}
\tag{2.11}
\]

It is obvious that for the first-order condition for an expected profit maximum to be satisfied, \(\epsilon_{\pi} < 1\), or that the loan elasticity of output is less than unity.

The second-order sufficient condition for an expected profit maximum is that \(\partial^{2}\pi/\partial B^{2} = \pi_{BB} < 0\). As shown by Milde and Riley (1988) and Clemenz (1986), additional restrictions need to be imposed on the borrower's production function and the distribution function, \(F(\theta)\), to ensure this result. These restrictions are: (i) \(d\epsilon_{\pi}/dB \leq 0\) or that the loan elasticity of \(Q\) is non-increasing in \(B\), and (ii) \(\partial H(\theta)/\partial \theta = H(\theta) < 0\). For the rural credit market considered in this study, the sufficient condition for a maximum is as follows:

\[
\{ Q_{BB}H(\theta) + Q_{\theta\theta}H_{\theta} + R\frac{d\epsilon}{dB}(1 - F(\theta)) - \frac{\pi_{BB}}{1 - F(\theta)}f(\theta) \delta_{B} \} < 0
\tag{2.12}
\]

The following propositions characterize the farmer's demand for informal loans. The proofs are contained in the notes at the end of this chapter.

**Proposition 1:** Loan demand, \(B^*\), varies inversely with the rate of interest.

**Proposition 2:** Loan demand increases with farm size.

**Proposition 3:** Loan demand is higher in the presence of other productivity-increasing factors \((\alpha)^{5}\) than without them.

**Proposition 4:** The borrower's iso-expected profit curve is concave in \(BR\) space, with a positive slope before intersecting the demand curve and a negative slope thereafter.

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4 For a proof of (ii), see Milde and Riley (1988).

5 Examples are improvements in production technology, farm experience and managerial ability. These factors are both exogenous and endogenous to the farming household.
The relationship between a borrower's loan demand curve and his iso-expected profit curve is shown in Figure 2.1. The figure shows a loan demand curve in BR space for a particular borrower with fixed values of N and α. A family of iso-expected profit curves is also shown, where these curves attain their maximum points on the demand curve. As long as a borrower is on the same iso-expected profit curve, any combination of interest rate and loan size gives him the same expected profit. Iso-expected profit curves to the southeast direction denote higher expected profits for the borrower as they involve combinations of bigger loan sizes and lower interest rates. The direction of increasing borrower welfare is, therefore, to the southeast. Given any two loan offers, the offer that lies on a lower iso-expected profit curve will be preferred by a borrower.

2.3 Lending Behavior

Consider now a rural informal lender operating within a fairly circumscribed geographic area. As stated earlier, this lender derives his income totally from moneylending. In this sense, and only in this sense, is he analogous to a bank or formal intermediary. The pure moneylender grants loans to rural producers during the planting season with the expectation of repayment at harvest time. For lending a specific amount, he charges an interest rate, r, which takes into consideration his opportunity cost of funds, his lending costs, and default risk. For the moment, it is assumed that no collateral is stipulated in the loan contract.6

In general, lenders cannot tell without additional information whether a particular loan applicant is creditworthy, even if they know that there are potential defaulters from the pool of applicants they face. Let ρ be the probability that a borrower will repay his loan. If the borrower

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6 This follows from the assumption that borrowers have zero initial wealth. This assumption is dropped later. However, as will be argued, unless loans can be perfectly or completely collateralized, the basic results do not depend upon the question of whether or not the loan contract includes a collateral term.
Figure 2.1: The Borrower's Demand and Iso-Expected Profit Curves
\[ \pi_1 > \pi_2 > \pi_3 \]

Figure 2.2: The Lender's Iso-Expected Profit Curves
\[ z^2 > z^1 > z \]
repays the loan, the lender receives the loan amount plus interest, \((1+r)B\), or the project’s receipts, whichever is smaller. Otherwise the lender gets nothing. That is to say, the lender recovers less than the full amount of the loan whenever the returns from the borrower’s activity are insufficient, or if the borrower willfully defaults. Since the loan contract contains no collateral term to make default costly to the borrower, \(\rho < 1\).

The moneylender is assumed to have access to an elastic supply of loanable funds. Let his opportunity cost of lending be equal to \(i\), which may be his rate of return in alternative investments, or the interest rate the lender pays if he borrows from the organized market. The informal moneylender incurs lending costs equal to the costs of screening loan applicants and collecting payments when they fall due. These costs are denoted \((S + C)\) and for simplicity are assumed fixed for each borrower.

The informal lender’s expected profit equation with respect to an individual loan applicant may be written as

\[
z = \rho [RB(1-F(\theta)) + Q\int_0^\theta dF(\theta)] - IB - (S+C) \tag{2.13}
\]

The last two terms are the lender’s opportunity cost of funds, \(IB\), where \(I = (1 + i)\), and his lending costs, \((S + C)\). The lender’s expected profit, \(z\), is assumed to be concave in both the rate of interest, \(r\), and the size of loan, \(B\).

### 2.3.1 The Moneylender’s Supply of Loans

The moneylender’s problem is to maximize his returns from moneylending. To this end, the moneylender determines the terms of his loan contract offers, and sets the criteria for determining the creditworthiness of a particular loan applicant. The moneylender must also gather information regarding the character and resource status of loan applicants in order to decide if an applicant should get a loan and, if so, how much. Finally, the moneylender must design a workable loan collection strategy in order to maximize loan recovery.
In describing the economic behavior of the informal moneylender, it is useful to consider his iso-expected profit curve. This curve is derived from the moneylender’s expected profit equation in (2.13), and it shows the various combinations of interest rate (r) and loan size (B) that yield for the lender the same level of expected profit. A discussion of the properties of the lender’s iso-expected profit curve follows.

Differentiating (2.13) with respect to r and B, one finds,

\[ \frac{\partial z}{\partial r} = \rho [B - QF(\hat{\theta})\hat{\theta}_r] + \rho B[1 - F(\hat{\theta})] > 0 \]  

(2.14)

\[ \frac{\partial z}{\partial B} = \rho [R(1 - F(\hat{\theta})) + Q_B\int_0^\theta dF(\hat{\theta})] - I \]  

(2.15)

Since \( F(\hat{\theta}) < 1 \), \( \partial z/\partial r \) is always positive. On the other hand, \( \partial z/\partial B \) may be positive, zero or negative. Since \( dr/dB = -z_a/z_r \), the shape of the lender’s iso-expected profit contour depends upon whether (2.15) is positive, zero or negative. That is,

\[ z_B \begin{cases} > 0 & \text{as } I < \rho [R(1 - F(\hat{\theta})) + Q_B\int_0^\theta dF(\hat{\theta})] \\ < & \end{cases} \]

(2.16)

Now suppose that entry into the moneylending business is relatively costless for would-be informal lenders in the area where the moneylender operates.\(^7\) This implies that there are no substantial fixed costs for starting operations, all moneylenders have access to the same “financial technology”, and there is little “inside knowledge” to deter entry. Any positive profit earned from moneylending, therefore, attracts new moneylenders until all such profit opportunities are competed away. In equilibrium, all pure moneylenders must earn zero expected profit. From (2.13) and the zero-expected profit condition,

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\(^7\) This assumption is not an implausible one especially for potential lenders who are residents of the same geographic area within which the incumbent moneylender operates.
Substituting (2.17) into (2.16),

\[ I = \rho R(1-F(\theta)) + \frac{\rho \int_0^\theta \theta dF(\theta) - (S+C)}{B} \]

By inspection, there exists a \( B > 0 \), say \( B^* \), such that (2.18) is an equality. At \( B^* \), therefore, \( z_0 = 0 \), and the slope of the lender's iso-expected profit curve, \( \frac{dr}{dB} \), equals zero. Now for values of \( B < B^* \), \( z_0 > 0 \) and \( \frac{dr}{dB} < 0 \), while for \( B > B^* \), \( z_0 < 0 \) and \( \frac{dr}{dB} > 0 \). Therefore, in \( BR \) space, the lender's iso-expected profit curve is negatively sloping for \( B < B^* \) and positively sloping for \( B > B^* \). But by (2.15), \( B^* \) is not just any arbitrarily chosen \( B \); it is in fact the value of \( B \) that maximizes the lender's expected profit for a given \( r \). Thus the lender's iso-expected profit curve is convex with its turning point at the level of \( B \) that maximizes the lender's expected profit.\(^8\)

2.3.2 Lending Costs and the Iso-Expected Profit Curve

Expression (2.18) provides an economic interpretation of the factors influencing the shape of the lender's iso-expected profit curve. Suppose that screening and collection costs are negligible so that \( (S+C) = 0 \). Now recall that \( \epsilon_{aq} = Q_aB/Q \). But, from earlier results, \( \epsilon_{aq} < 1 \). Therefore, \( Q_a < Q/B \), and by (2.16) and (2.18) \( z_0 < 0 \). That is, in the absence of fixed costs, the lender's iso-expected profit curve is everywhere upward sloping, \( \frac{dr}{dB} > 0 \). This is the same result obtained by Milde and Riley for a competitive formal credit market.

With positive fixed costs, \( (S+C) > 0 \), the left hand side of (2.18) is less than the right hand side for values of \( B \) less than \( B^* \). Therefore, \( z_0 > 0 \) for small enough values of \( B \) and the iso-expected profit curve is everywhere upward sloping, \( \frac{dr}{dB} > 0 \).

\(^8\) Now when \( \rho = 1 \), which is the ideal case, this turning point occurs at a level of \( B \) that is greater than \( B^* \) since if repayment is fully enforceable, the lender will be inclined to supply a bigger amount. Correspondingly, the lender's zero iso-expected profit curve with \( \rho = 1 \) will involve bigger loan sizes at all interest rate levels.
expected profit curve has a negative slope. As $B$ increases beyond $B^*$, $(S+C)/B$ decreases and for big enough values of $B$, $z_a < 0$. That is, the lender's iso-expected profit curve slopes upward (Figure 2.2). This shows that in the presence of fixed costs, the lender's iso-expected profit contour will have both declining and rising portions, the change in the slope arising from the influence of costs. On the declining portion where loan sizes are relatively small, fixed costs are more important considerations than default costs. Increasing loan size can reduce the effect of these fixed costs. As loan size increases, however, the probability of involuntary default increases since the borrower's repayment obligation increases while his ability to service the debt will be constrained at some point by decreasing returns on his investment. In addition, a larger loan size may increase default if it increases incentives for a borrower to "take the money and run". Default cost is, therefore, the more important cost component influencing the lender's iso-expected profit curve for large values of $B$.

Bell (1990) argues, but does not show, that "the iso-expected profit curves will be U-shaped in the space of the size of the loan . . . and the rate of interest . . .". He continues, "This follows from the usual influence of fixed costs, which include the lender's investments in acquiring inside knowledge about his clients, and the fact that in the presence of moral hazard, the probability of default will at some point increase with the size of loan" (p. 313). While moral hazard is not present in this model, the principle involved is essentially the same. Default risk rises with loan size. As (2.18) shows, Bell is correct.

In order to show the generality of the above result, the zero-expected profit condition is now relaxed. Suppose that entry into the credit market is not costless, and the informal lender is not constrained by competition. This means that he can set the interest rate, $r$, at an arbitrarily high level, such that in equilibrium, $z > 0$ is possible. From (2.13), let $r > r^*$, so that $z > 0$ and $r^*$ is the

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9 For a similar result, see Gonzalez-Vega (1976).
competitive rate. Since any turning point must satisfy the condition \( z_n = 0 \), it follows that at this point, condition (2.16) is satisfied as an equality, albeit at an interest rate higher than \( r^* \). Since \( z > 0 \), however, the left-hand side of expression (2.17) must now be strictly less than its right-hand side. It follows that the turning point of the iso-expected profit curve involving \( z > 0 \) occurs where

\[
\frac{\rho Q \int_0^b \theta dF(\theta) - (S+C)}{B} \bigg|_{z>0} > [\rho Q \int_0^b \theta dF(\theta)]_{z>0}
\]

Compared to the situation when \( z = 0 \), the turning point of the iso-expected profit curve when \( z > 0 \) must occur, therefore, at some \( B = B'' \), where \( B'' > B^* \).

Before generalizing the above results, however, it must be pointed out that in the example above, the source of the lender’s ability to maintain \( z > 0 \) merits some explanation. Recall that the interest rate \( r > r^* \) was simply posited as giving rise to \( z > 0 \). However, this state of affairs cannot persist if the force of competition from other lenders exerts a downward pressure on the interest rate. For \( z > 0 \) to persist, therefore, it must be that potential competitors are not entirely free to enter the credit market. This will be the case if the costs of screening and loan collection are quite high on account of the entrant’s unfamiliarity with loan applicants in the locality. Given these higher costs, a potential entrant may have to charge an interest rate \( r^* > r > r^* \) to break even. Given the incumbent lender’s informational advantage with respect to loan applicants in the village, however, it is easy to see that the entrant will get no clients under this situation. The following proposition characterizes the moneylender’s iso-expected profit curve.

**Proposition 5:** The moneylender’s iso-expected profit curve is U-shaped in BR space. (See notes at the end of this chapter for the proof.)

The diagrammatic representation of the lender’s iso-expected profit curve in BR space is shown in Figure 2.2. The figure shows a family of iso-expected profit curves. The lowest curve, \( z(r^*, B, 0) \), corresponds to the locus of \( r \) and \( B \) combinations that yield zero profits for the informal
lender. No loan contract below this curve will be offered as it is certain to make a loss. The minimum or turning point of $z(r^*, B, 0)$ is $(B^*, r_{\text{min}})$, which corresponds to the loan size that maximizes the lender’s expected profits at the given interest rate $r^*$. Since the cost of granting loan sizes greater than $B^*$ reduces the profitability of lending at $r_{\text{min}}$, the interest rate must rise in order to compensate the lender. This explains the rising portion of the iso-expected profit curve after $(B^*, r_{\text{min}})$. On the other hand, for points on the curve to the left of $B^*$, where average lending cost decreases with loan size, any increase in loan size at the same rate of interest results in positive profits. Hence the rate of interest must go down so that expected profits are again zero. This explains the declining portion of the lender’s iso-expected profit curve. Since a lender derives the same expected profit from any two contract offers lying on the same iso-expected profit curve, he will be indifferent between such contracts.

Higher iso-expected profit curves are associated with loan contracts that offer positive profits for the moneylender. The minimum or turning points on successively higher iso-expected profit curves occur at larger loan sizes as discussed above. Clearly, the direction of increasing profitability for the moneylender is northeast. Therefore, between any two contracts lying on different iso-expected profit curves, the lender will be better off offering the contract on the higher curve. The effects on the lender’s iso-expected profit curve of variations in farm size, productivity-enhancing attributes and the opportunity cost of lending are now discussed.

**Proposition 6:** The lender’s iso-expected profit curve shifts to the right for borrowers with bigger farm sizes and better quality inputs, while it shifts to the left with an increase in the opportunity cost of lending.

**Proof:** Equation (2.15), $z_a = 0$, solves for the level of $B$ that maximizes the lender’s expected profits for any given interest rate level. By differentiating $z_a$ in (2.15) with respect to $N$, $\alpha$ and
i, and combining with the fact that $z_{BB} < 0$, then $dB'/dN$, $dB'/d\alpha$, $dB'/di$ can be found. This is shown in the following expressions:

$$z_{BN} = \rho \left[ Q_{BN} \int_{0}^{\hat{\theta}} \theta dF(\theta) - \hat{\theta}_N R f(\hat{\theta}) \right] > 0 \quad (2.20)$$

$$z_{BA} = \rho \left[ Q_{BA} \int_{0}^{\hat{\theta}} \theta dF(\theta) - \hat{\theta}_a f(\hat{\theta}) R \right] > 0 \quad (2.21)$$

$$z_{RI} < 0 \quad (2.22)$$

The signs of expressions (2.20) - (2.22) suggest the direction in which the lender's iso-expected profit curve will shift in response to changes in exogenous parameters. The results show that for a given rate of interest, a profit-maximizing moneylender is inclined to grant a bigger loan size to borrowers who have large rather than small farms (2.20). Similarly, profit-maximizing moneylenders have more incentive to grant bigger loans to borrowers who are known to possess qualities or to implement farm practices associated with higher productivity (2.21). This is because increasing $N$ and $\alpha$ both increase the productivity of a unit of loan. Finally, an increase in the lender’s opportunity cost of funds will reduce the quantity of lending at the prevailing lending rate (2.22). Since the loan level that maximizes expected profits coincides with the turning point of the lender’s iso-expected profit curve, any movement of such point implies a corresponding shift in the same direction of the lender’s iso-expected profit curve.

### 2.4 Contractual Equilibrium

This section pulls together the results of the discussions about borrower and lender behaviors in the two previous sections and considers the nature of equilibrium in the informal credit market. Figure 2.3 shows families of borrower's and lender's iso-expected profit curves in the space of loan size and rate of interest. Let $\pi = \pi^0$ be the iso-expected profit curve that is consistent with the reservation level of expected profit for the borrower. That is, $\pi^0$ is the lowest level of expected
Figure 2.3: Contractual Equilibrium

Figure 2.4: Contractual Equilibrium With Two Borrower Types
profit that the borrower will accept. Let \( z^0 \) be the lender's iso-expected profit contour that is consistent with the zero-profit condition. Any loan contract below this curve results in losses for the moneylender. The area bounded by \( \pi^a \) and \( z^0 \) then forms a feasible region within which a loan contract acceptable to both borrower and lender may be arranged.

In a competitive credit market, borrowers will maximize their expected profits by choosing a combination of \( r \) and \( B \) subject to the constraint that the moneylender does not make a loss on the contract offer.\(^{10} \) The problem may, therefore, be formulated as follows:

\[
\text{Max: } Q \int_{0}^{\theta} (1 - F(\theta)) d\theta
\]

\[s. t. \quad \rho RB - IB - \rho Q \int_{0}^{\theta} F(\theta) d\theta - (S + C) = 0\]

To determine the interest rate and loan size combination that satisfies (2.23), maximize the following equation with respect to \( r \) and \( B \). That is,

\[
\text{Max } z = Q \int_{0}^{\theta} (1 - F(\theta)) d\theta + \lambda [(\rho R - I)B - \rho Q \int_{0}^{\theta} F(\theta) d\theta - (S + C)]
\]

where \( \lambda \) is the Lagrange multiplier. First-order conditions are:

\[
\frac{\partial z}{\partial B} = Q \int_{0}^{\theta} (1 - F(\theta)) d\theta - (Q(1 - F(\hat{\theta})) \hat{B}) + \lambda [(\rho R - I - \rho Q \int_{0}^{\theta} F(\theta) d\theta - \rho QF(\hat{\theta}) \hat{B}] = 0
\]

\[
\frac{\partial z}{\partial r} = - Q(1 - F(\hat{\theta})) \hat{r} + \lambda \rho [B - QF(\hat{\theta}) \hat{r}] = - [B(1 - F(\hat{\theta}))] + \lambda \rho [B(1 - F(\hat{\theta})]) = 0
\]

\(^{10} \)Theoretically, the lender offers the borrower an entire menu of contracts defined by \( z(r, B) \), the lender's iso-expected profit curve, based on his knowledge of the borrower's characteristics, the available "financial technology" and the given distribution of the states of nature. [Bell (1990)]
From the second part of (2.25), $\lambda = 1/\rho$. Substituting this result into the first equation and making use of definition (2.9),

$$Q_B \int_{\theta} d\theta - Q_B \int_{0}^{m} F(\theta)d\theta = \frac{I}{\rho} - Q_B \tilde{\theta}$$

(2.26)

By combining terms,

$$Q_B (m - \int_{0}^{m} F(\theta)d\theta) = \frac{I}{\rho}$$

(2.27)

Using a similar reasoning as in (2.6),

$$\theta \int_{0}^{m} F(\theta)d\theta = m - \int_{0}^{m} F(\theta)d\theta = \tilde{\theta}$$

(2.28)

which is the expectation of $\theta$. Therefore, in equilibrium,

$$\rho \tilde{\theta} Q_B = I, \quad \rho < 1$$

(2.29)

Graphically, the credit market equilibrium is defined by a point of tangency between the borrower's and lender's iso-expected profit contours. For a competitive credit market, this is shown as point E in Figure 2.3. In the same figure, the equilibrium contract is the interest rate-loan size combination that fulfills simultaneously both borrower's and lender's maximizing objectives, with neither one having the incentive to change to another contract. Furthermore, the equilibrium contract satisfies the property of Pareto efficiency in that any movement away from such contract results in one party becoming worse-off.

Figure 2.3 shows a familiar result seen in more recent credit market literature.\(^\text{11}\) The competitive equilibrium loan size, which corresponds to point E, lies to the left of the borrower's loan demand curve. That is, the borrower receives a loan that is smaller than the size demanded at the prevailing rate of interest. This is referred to in the literature as Type I credit rationing, or...

\(^\text{11}\) See Jaffee and Russell (1976), Milde and Riley (1988), Bell (1988), among others.
loan size rationing [Keeton (1979)]. At the rate of interest that corresponds to point E, the borrower would like to obtain more credit, but no lender will grant him more than what he is receiving at point E.\(^{12}\) The reason is that lenders are not indifferent to the borrower's size of loan since \(\hat{\Theta}_b > 0\) and the lender has no means of recovering the full amount of the loan if the borrower defaults for some reason.\(^{13}\) This result aptly demonstrates the point that a credit market is not a perfect market. An individual with given unalterable and observable characteristics cannot obtain all the credit that he demands at the rate of interest for loan applicants of his type. If an applicant borrows more, he becomes a different borrower "type", since his level of indebtedness is an important personal characteristic [Bell (1988)].

A more general way of formulating the problem is to view the lender as choosing the contract terms that maximize his expected profits subject to the condition that the borrower's expected profit is not lower than his reservation level. The concept of a borrower's reservation expected-profit level in this context simply refers to the borrower's expected profit level using his next best alternative, whether that involves not borrowing at all or borrowing from another source. The question is: what are the borrower's alternatives?

In the Figure 2.3, \(\pi^0\) is the iso-expected profit curve that is associated with the borrower's reservation level of expected profit. Since \(\pi^0\) cuts the vertical axis, the borrower is indifferent

\(^{12}\) This type of credit rationing is different from the credit rationing discussed in Stiglitz and Weiss (1981), which is referred to as Type II credit rationing, or loan quantity rationing. While both types of credit rationing manifest themselves in terms of an excess demand for loans at a given interest rate, the processes that generate them are not the same. See Bell (1988). For a more elaborate discussion, see Aguillera (1990). Milde and Riley (1988), however, do not view this as rationing since to them rationing applies only to a situation when demand for a product of given quality exceeds supply. Since as \(B\) increases, the risk characteristics of an applicant vary, they argue that the term does not apply in this case.

\(^{13}\) Even with \(p = 1\) the same result would obtain since without collateral lenders cannot recover the full amount of the loan, and borrowers demand more than the Pareto-efficient size of loan knowing that the lender shoulders part of the default risk [Clemenz (1986)].
between getting a loan and not getting a loan on \( \pi_0 \). In a situation where there is only one lender and the only alternative for a borrower is to do without a loan, \( \pi_0 \) is the relevant iso-expected profit curve consistent with the borrower's reservation level. The monopolist, therefore, offers the borrower an all-or-nothing deal at a higher rate of interest which is point M in Figure 2.3.

When there are several competing lenders, however, and the borrower is not limited to choosing between accepting one moneylender's terms and having no loan at all, his reservation expected-profit level can lie anywhere in the feasible region. In particular, with many lenders and free entry, the borrower's minimum acceptable level of expected profit is exactly the iso-expected profit contour that is tangent to the lender's zero iso-expected profit curve shown above. Therefore, an equivalent, yet more general way, of formulating the problem is the following:

\[
\begin{align*}
\text{Max } z &= \rho [RB - Q \int_0^\theta F(\theta) d\theta] - IB - (S+C) \\
\text{s.t. } &\pi = Q \int_\delta^m (1-F(\theta)) d\theta \geq \bar{\pi}
\end{align*}
\]

where \( \bar{\pi} \) is the borrower's reservation expected-profit level. It can be shown that (2.30) leads exactly to (2.29) as does (2.23) regardless of how \( \pi_0 \) is defined, i.e. regardless of whether the credit market is monopolistic and the informal lender offers the borrower a contract such that the latter is indifferent between having a loan and no loan at all (the point M in Figure 2.3), or whether the credit market is competitive and borrowers are able to exploit the competition among lenders in order to maximize expected profits (point E).

Implicit in this result is the fact that the equilibrium credit contract is that contract which maximizes the total (expected) surplus produced in the system, regardless of how that surplus is divided up between borrower and lender. That is, regardless of what interest rate is charged the
borrower, the amount of loan granted by the lender is the same.\textsuperscript{14} In order to see that the equilibrium credit contract maximizes the total expected surplus in the system, the problem may be formulated in terms of the maximization of the sum of the borrower's and lender's expected profits for any arbitrarily given rate of interest. That is,

\begin{equation}
\max_{\{B\}} \left( \pi + \frac{Z}{\rho} \right) = \left[ Q \int_{\theta}^{\infty} (1 - F(\theta)) d\theta \right] + \left[ RB - \int Q \int_{0}^{\theta} F(\theta) d\theta - \frac{IB}{\rho} - \frac{(S+C)}{\rho} \right]
\end{equation}

from which it is obvious that the same result as (2.29) can again be obtained. Thus, given the borrower's and lender's characteristics, the "financial technology" and the state of nature, there is a unique loan level that maximizes total surplus independent of the distribution of that surplus. The contract curve (the locus of points of tangency between borrower's and lender's iso-expected profit curves) is a vertical line as has been shown by Milde and Riley (1988) for a model of similar structure. Between the two extremes of monopoly and perfect competition in the credit market, the equilibrium outcome will depend upon the relative bargaining strengths of the two contracting parties.

Expression (2.29) also shows that when the informal credit market is in equilibrium, the expected marginal product of the loan must be equal to the marginal cost of lending. If the moneylender himself, and not the farmer-borrower, had organized Q production, in order to maximize expected profit, he would have utilized B up to that point where its expected marginal product equaled its opportunity cost in Q production (I). As shown in (2.29), this is exactly the

\textsuperscript{14} Note that none of the variables appearing in (2.29) has the rate of interest, r, as an argument. When the lender is a monopolist, this is possible because the lender can make the borrower an all-or-nothing deal while forcing the latter to his reservation frontier.
result implied by the condition for equilibrium in the informal credit market when \( \rho = 1 \). That is, in equilibrium, the marginal social cost of producing a unit of \( Q \) equals its marginal social benefit. However, with imperfect information (\( \rho < 1 \)), the marginal cost of lending to the moneylender is \( I/\rho \). Since \( I/\rho > I \), the lender supplies less credit. The output foregone as a result of the lender providing less credit constitutes an example of an unexploited productive opportunity due to imperfect information. Thus the total surplus available in the system according to (2.31) above is smaller with \( \rho < 1 \) than with \( \rho = 1 \).\(^{15}\)

2.5 The Model With Two Types of Borrowers

This section examines the equilibrium outcome when there exist two types of borrowers, i.e. borrowers with different characteristics. It is shown that different types of borrowers will be offered different contractual terms. The difference in contractual terms depends upon whether the relevant characteristic which the lender uses to differentiate borrower types is public or private information. The case of public or symmetric information is discussed first.

Proposition 7: The equilibrium loan size \( (B^b) \) increases with farm size \( (N) \) and other productivity-enhancing borrower attributes \( (\alpha) \).

Proof: Totally differentiating equation (2.29),

\[
\rho \bar{\delta} [Q_B dB^E + \varrho_{BN} dN + Q_{Bo} d\alpha] = di\tag{2.32}
\]

Then \( dB^E/dN > 0 \) and \( dB^E/d\alpha > 0 \). That is, borrowers with bigger farm sizes and those who are perceived to be more productive (e.g. those who have irrigated farms) demand more loans and receive larger loans because they are presumed to have better ability to pay than other borrowers.

The graphical representation of a credit market equilibrium with two borrower types sorted based

\(^{15}\) This assumes that the farmer has no comparative advantage over the moneylender in farming.
on observable characteristics is Figure 2.4. The interest rate charged on the loan to a bigger and more productive farmer is also lower at point $E_2$ than that charged a smaller and less productive borrower at $E_1$, although this need not necessarily be the general case.\textsuperscript{16} This result seems consistent with what might be ordinarily expected in credit markets. Lenders will generally offer more productive and, therefore, more profitable, clients more favorable terms, while less profitable clients will be treated less favorably.

Thus far, it has been shown that borrowers with characteristics that lenders prefer (in the sense that they positively influence the lender's expected profits) will obtain loans at more favorable terms. In addition, contracts $E_1$ and $E_2$ both break even. The borrower characteristics considered so far are, however, easily observable to the lender. This makes it relatively costless for the lender to differentiate borrowers by type since borrowers have no incentive to misrepresent their type.

Suppose, however, that borrowers differ by some characteristic that is unobservable to the lender. In terms of the present model, this situation can be represented as $\alpha$, or some element of the vector of productivity-enhancing borrower attributes, $\alpha$. For instance, one element of $\alpha$ may represent the farmer's ability or experience which the lender does not observe but considers crucial (in the face of production risk) in determining a loan applicant's ability to repay.\textsuperscript{17} The production function will, therefore, have to be rewritten as $Q = Q(B, \alpha, \theta, \Theta)$, where $\alpha$ and $\alpha$ are:

\textsuperscript{16} The contractual interest rate for the bigger and more productive farmer-borrower may be higher or lower than that of the smaller and less productive borrower depending upon the precise form of the production function and the cumulative distribution function, $F(\theta)$ [Milde and Riley (1988)].

\textsuperscript{17} In Milde and Riley, borrowers differ in terms of a quality parameter relating to the riskiness of their project which is not known to the lender. Their model assumes that borrowers can choose which project to undertake. The present model, however, does not admit that possibility as discussed in a previous section. Since borrowers undertake the same project, differences in project riskiness arise from the characteristics of borrowers unobservable to the lender.
vectors of observable and unobservable borrower characteristics, respectively. For the moment, assume that the observable characteristic is farm size, and the unobservable characteristic is the farmer's ability. Several possibilities then arise. If lenders perceive farm size and ability to be strongly positively correlated, then farm size can be used as a proxy for farmer ability. In equilibrium, therefore, the two contracts, \( E_1 \) and \( E_2 \) as in Figure 2.4, will be observed as before, where the relatively riskier borrower (in this case, a farmer with a small farm size and presumably with less ability) obtains \( E_1 \) and the relatively safer borrower \( E_2 \). If farm size and ability are, however, perceived to be only weakly correlated or not at all, then the pair of contracts, \( E_1 \) and \( E_2 \), cannot be an equilibrium. With farmer ability not costlessly observable to lenders, borrowers with low ability will always choose \( E_2 \) since at \( E_2 \) they are unambiguously better-off. Lenders lose whenever low ability borrowers choose contract \( E_2 \).

Under conditions of asymmetric information about borrower abilities, the lender can separate high- from low-risk loan applicants by taking advantage of differences in their preferences in the design of loan contracts.\(^\text{18}\) As Milde and Riley have shown, with a multiplicatively separable random term in the borrower's production function, the low-risk borrower has a higher marginal willingness to pay for a larger loan than the high-risk borrower. This implies that the slope of the low-risk borrower's iso-expected profit curve is steeper than that of a high-risk borrower whenever the two curves intersect.\(^\text{19}\) The lender can, therefore, offer low-risk borrowers the contract \( E_1 \) which has a higher interest rate than \( E_2 \), but which high-risk borrowers will be indifferent to.

\(^{18}\) The relevant literature in this respect pertains to imperfect information and market signaling. The seminal contributions are those of Spence (1973) in relation to the job market and Rothschild and Stiglitz (1976) in the insurance market. Signaling in the credit market is discussed in Bester (1985) and Milde and Riley (1988).

\(^{19}\) Note that this is consistent with the results established earlier, that borrowers with larger \( N \) and \( \alpha \) have a higher loan demand than borrowers with small \( N \) and low \( \alpha \) at the same rate of interest. This also implies that when the lending rate is increased, the more risky (low-ability) borrowers drop out first.
because it lies on the same iso-expected profit curve. Low-risk (high ability) borrowers, therefore, obtain larger loans with higher interest rates than high-risk (low ability) borrowers. The pair \((E_1, E_3)\) is an equilibrium set of contracts in this credit market with two borrowers of different abilities. Since each contract offers each borrower type the greatest possible gain without generating losses for the lender, the equilibrium pair of contracts is also Pareto-efficient.\(^{20}\)

2.6 Summary

In this chapter, a model of an informal contract for an agricultural production loan has been presented. The model, which incorporates uncertainty as a multiplicative random term in the borrower’s production function, essentially demonstrates why the credit market is not a perfect market. In such a market, not only is credit rationing consistent with equilibrium, but multiple prices (contracts) can also possibly exist in equilibrium. Credit rationing occurs because there is a non-zero probability of default and lenders have no means of fully recovering their loans in the event of default. Because the identity of the borrower is an important consideration in the process of borrowing and lending, the terms of the credit contract vary depending upon which borrower characteristics are used to sort applicants into different risk categories. It is, therefore, possible to associate loan contract terms and conditions with borrower characteristics. The model of informal credit presented in this chapter has shown that, when information is imperfect but symmetric, borrowers considered to be of low risk or high quality and who, therefore, are preferred by lenders, will be given more favorable treatment than their high risk or low quality counterparts, in terms of loan size and interest rate. With private information about borrower quality, however,

\(^{20}\) The conditions guaranteeing that this separating equilibrium is Pareto-efficient among all sets of no-loss contracts are discussed in Riley (1985). Since the properties of the resulting equilibrium set of contracts do not constitute the focus of this study, this issue will not be discussed further here. There is an extensive literature on equilibrium in signaling models. For a good summary, see Clemenz (1986).
lenders may use their knowledge about contrasts in borrowers' preference maps to sort borrowers. For the model presented, the lender charges a higher interest rate for bigger loans, knowing that low quality borrowers have a lower marginal willingness to pay for a larger loan. This, therefore, effectively separates the two risk types. One property of the equilibrium under asymmetric information is that low quality borrowers get the same contract as under symmetric information, while high quality borrowers have to pay a much higher interest rate on their loan when information is asymmetric. It is in this sense that the presence of high risk borrowers imposes a negative externality on low risk ones.

Offering a menu of contracts and letting borrowers "reveal" their risk types through their choice of contracts is, however, only one strategy that lenders may use to sort borrowers. This method relies on the lender's conjecture about loan applicants' preferences, and the existence of the equilibrium set of contracts depends upon the conjecture being confirmed by market data. Lenders may also rely on more direct mechanisms for sorting loan applicants. Unlike indirect mechanisms, however, direct sorting mechanisms entail the expenditure of lender resources to gather information about the quality of loan applicants and their projects. An informal lender's ability to gather and evaluate information about the riskiness of his loan applicants depends upon the means available to him. In addition to gathering information about loan applicants, lenders must also be able to compel repayment. Because not all the instruments for screening and loan enforcement that are available to one informal lender may be available to another, informal lenders will vary in their abilities to screen various types of loan applicants and enforce loan contracts. Consequently, any discussion of screening and loan enforcement in informal credit markets must of necessity consider the technology used by the lender. Examining the implications of differences in lender screening and enforcement abilities is the task of the next chapter.
Notes to Chapter II

**Proposition 1:** Loan demand, $B^*$, varies inversely with the rate of interest.

**Proof:** Differentiating (2.11) with respect to $R$,

$$\frac{\partial^2 \pi}{\partial B \partial R} = (Q_B H_\theta \hat{\theta}_R - (1 - e_{BQ})) (1 - F(\hat{\theta})) - \frac{\pi_B}{1 - F(\hat{\theta})} f(\hat{\theta}) \hat{\theta}_R < 0$$

(A.1)

It is easily verified that $\hat{\theta}_R > 0$. Therefore (A.1) is unambiguously negative. Combining this with the concavity of $\pi$, $dB^*/dR = - (\partial^2 \pi/\partial B \partial R)/\partial^2 \pi/\partial B^2 < 0$.

**Proposition 2:** Loan demand increases with farm size.

**Proof:** Differentiate (2.11) with respect to $N$.

$$\{Q_B H_\theta \hat{\theta}_N + R \frac{de}{dN} \} (1 - F(\hat{\theta})) - \frac{\pi_B}{1 - F(\hat{\theta})} f(\hat{\theta}) \hat{\theta}_N > 0$$

(A.2)

The first term of (A.2) is positive since by assumption, $Q_{BN} > 0$. The second term is also positive since $\hat{\theta}_N < 0$ (and $H_\theta < 0$), or the critical level of income risk, $\hat{\theta}$, is reduced by an increase in $N$. Finally, the loan elasticity of output must be non-decreasing in $N$, or $d\varepsilon_{eq}/dN \geq 0$, which is intuitive. Combining this with the concavity of $\pi$, $dB^*/dN = - (\partial^2 \pi/\partial B \partial N)/\partial^2 \pi/\partial B^2 > 0$. Therefore, loan demand increases with farm size.

**Proposition 3:** Loan demand is higher in the presence of other productivity-increasing factors $(\alpha)^{21}$ than without them.

**Proof:** Differentiate (2.11) with respect to each $\alpha$, element of the vector $\alpha$ and combine with the fact that $\pi$ is concave.

$$\{Q_{B\alpha} H(\hat{\theta}) + Q_B H_\theta \hat{\theta}_\alpha + R \frac{de}{d\alpha} \} (1 - F(\hat{\theta})) - \frac{\pi_B}{1 - F(\hat{\theta})} f(\hat{\theta}) \hat{\theta}_\alpha > 0$$

(A.3)

---

21 Examples are improvements in production technology, farm experience and managerial ability. These factors are both exogenous and endogenous to the farming household.
It is easily verified that $\hat{\theta}_a < 0$. Therefore, (A.3) is unambiguously positive and loan demand increases with a higher $\alpha$.

**Proposition 4:** The borrower’s iso-expected profit curve is concave in BR space, with a positive slope before intersecting the demand curve and a negative slope thereafter.

**Proof:** First, differentiating (2.7) with respect to $R$ yields

$$
\frac{\partial \pi}{\partial R} = -(1-F(\hat{\theta})) \hat{\theta}_R = -B(1-F(\hat{\theta}))
$$

From $\pi(R,B) = 0$, it follows that

$$
\frac{dR}{dB} = -\frac{\pi_B}{\pi_R} > 0 \quad \text{as} \quad \pi_B < 0
$$

Since the denominator is negative from (A.4), the slope of the iso-expected profit curve of the borrower depends entirely upon the numerator. Note that when expected profit is at a maximum, the iso-expected profit curve of the borrower has a zero slope. It now remains to be shown how the slope changes. Differentiating (A.5) again by $B$ yields

$$
\frac{d}{dB} \left( \frac{dR}{dB} \right) = -\frac{\pi_B^2 + \pi_B \pi_R^2 - 2 \pi_R \pi_B \pi_{BR}}{\pi_R}
$$

By inspection, the denominator of (A.6) is unambiguously negative. The sign of (A.6), therefore, depends entirely upon the two terms in the numerator. The first term is negative from the second-order condition, while the second term is uncertain. However, $dR/dB$ is the slope of the iso-expected profit curve which equals zero whenever expected profit is at a maximum. Since the condition $\partial \pi/\partial B = 0$ defines the borrower’s loan demand function, this means that the slope of the iso-expected profit curve equals zero whenever it coincides with the loan demand curve. At
this same point, according to (A.6), the second derivative is negative. Moreover, the point of
intersection between the iso-expected profit and demand curves of the borrower must be the only
turning point. If it were not, then other points could possibly be found with zero first derivative
and positive second derivative. This possibility, however, is explicitly ruled out by (A.6). Thus
the iso-expected profit curve is concave.22

**Proposition 5:** The moneylender’s iso-expected profit curve is convex in BR space.

**Proof:** Differentiating \( dr/\partial B \) with respect to \( B \),

\[
\frac{d}{dB} \left( \frac{dr}{dB} \right) = \frac{z_r(z_{BB} + z_{BR} \frac{dr}{dB}) - z_B(z_{rB} \frac{dr}{dB} + z_{rB})}{z_r^2}
\]

\[
= - \frac{z_{BB} - \frac{dr}{dB}(z_{rB} \frac{dr}{dB} + 2z_{rB})}{z_r} > 0
\]

The sign of \( A.7 \) depends entirely upon the numerator because the denominator, by definition,
is positive. By the concavity of \( z \), \( z_{rB} < 0 \). The sign of the second term is ambiguous since as
demonstrated above, \( dr/\partial B \) changes signs from negative to positive. However, \( dr/\partial B = 0 \) when \( z_{n} \)
= 0, and \( dr/\partial B > 0 \) when \( z_{n} < 0 \). That is, beyond the level of \( B \) that maximizes the lender’s
expected profits, the iso-expected profit curve slopes upward. But this is what expression (A.7)
is saying: at \( dr/\partial B = 0 \), the lender’s iso-expected profit curve has a positive second derivative.

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22 The same essential properties of iso-profit or iso-utility curves are shown to apply in the
CHAPTER III
A MODEL OF INFORMAL CREDIT WITH MARKET INTERLINKAGE
AS A COLLATERAL SUBSTITUTE

In this chapter, the model of pure informal moneylending developed in the preceding chapter is modified to account for differences in the informal lenders' sorting mechanisms. Since lending is fundamentally risky, lenders strive to minimize default risk by screening loan applicants and devising strategies to ensure contract enforcement. These two tasks are interrelated, and both involve costs. To effectively screen borrowers, lenders must gather information about loan applicants, and use that information in evaluating their creditworthiness. Good and reliable information about loan applicants facilitates contract enforcement, but increases lenders' screening costs. Conversely, the fewer the resources spent on screening, the more costly contract enforcement is likely to be because lenders have more reason to guard against previously undetected high risk borrowers. In general, the effectiveness by which lenders are able to accomplish these two tasks determines the proportion of bad loans in their portfolios, as well as their net returns from lending.

In an agrarian setting where there is a high degree of social interaction, the network of existing social relationships acts as an important mechanism that can reduce the cost of screening loan applicants and enforcing informal loan contracts [Hayami (1988)]. Yet even within such an environment, there may exist non-trivial differences in lenders' abilities to benefit from the information produced by this network. These differences, which derive from an individual agent's position or occupation in the rural economy, can be a source of comparative advantage when the
same agent acts as a lender and deals with a particular borrower or class of borrowers in the credit market. Because of kinship or long-standing business relations with their customers in product and factor markets, some lenders possess better information about some loan applicants than do other lenders, and are in a superior position to evaluate their creditworthiness. The informational advantage that an informal lender has about a given loan applicant or class of loan applicants imparts a cost advantage to that lender relative to other lenders in meeting the demand for credit of the given borrower or class of borrowers. Moreover, because different lenders may have different reasons for offering loans in the rural informal credit market, they may interpret and value differently the same observed borrower characteristics. When lending is done primarily to promote a related economic activity (e.g. trading or farming), the borrower's attributes that contribute to the profitability of that activity become crucial screening variables.

This chapter shows that the use of specific forms of market interlinkage stems from differences in the informal lenders' motivations for lending. In turn, the interlinked transaction acts as a collateral substitute, and bestows an advantage to the lender or interlocker under conditions characterized by potential loan default. The presence of a collateral substitute, moreover, allows the interlocker to offer a more attractive loan package, compared to a pure moneylender, in terms of loan size and the rate of interest. In a credit market with heterogeneous borrowers and with more than one type of informal lender, this advantage has important implications for the pattern of credit allocation and the organization of the informal credit market.

The motivation behind lending and the interlinking of contracts in the case of farmer-lenders and trader-lenders is discussed in the next section. It is shown that interlinked contracts are motivated by interlockers' concerns in the non-credit market, and these concerns influence the design of contracts offered by these lenders. Since the analysis of interlinkage as a collateral substitute requires reference to the role of collateral in credit markets, Section 3.2 modifies the
model in Chapter 2 by adding a collateral term to the loan contract. The features that make an asset ideal as collateral are then discussed in the following section, together with the reasons that render most collateral forms imperfect. The consequences of imperfect collateral on the loan contract are then considered in Section 3.4. In Section 3.5, collateral is replaced by a collateral substitute in the form of a marketing link. The results obtained are then contrasted with the outcome of the no-collateral, pure moneylender case discussed in the previous chapter, and a generalization of these results is attempted in Section 3.6. Section 3.7 examines differences in informal lenders' screening and enforcement mechanisms and the implications for their iso-expected profit curves. It is shown how differences in lenders' technologies and lending costs may lead to the observed "specialization" of lenders toward specific borrower classes. The last section provides a summary of the important results and discusses some caveats regarding the empirical testing of these ideas.

3.1 The Motivation for Lending

This section draws from the existing literature on interlinked rural transactions to show the different agents' motivations behind interlocking contracts. A general model of interlinked transactions in agrarian economies is provided by Braverman and Stiglitz (1982). In this section, that general model is specialized for the purpose of showing the emergence of two prevalent types of interlinked transactions. Two types of interlockers are considered, namely, the trader-lender and the landlord-lender or farmer-lender. The appearance of credit contracts tied to the sale of output and labor services can be traced to these agents' reasons for lending.

3.1.1 Trader-Lenders

Consider an agent who produces output $Q = Q(B; N)$ where $B$ represents non-land inputs and $N$ is land assumed fixed in size. Since production uncertainty is not crucial to the main results in this section, it is ignored in this model. Assume that the producer's non-land inputs are all
financed from borrowing; hence \( B \). At harvest time, he sells his marketable surplus at a given price \( p \) and repays his loan \((1+r)B\), where \( r \) is the contractual rate of interest on loans from a pure moneylender operating in the rural financial market. Let the household consumption of \( Q \) be \( x \), a constant. The producer’s expected profits from cultivation may, therefore, be written as:

\[
\pi' = p[Q(B,N) - x] - (1 + r)B
\]

where the bracketed expression \([Q(B;N) - x] = q\), the producer’s marketable surplus. Maximizing (3.1) with respect to \( B \) yields the first-order condition for the producer’s profit maximum,

\[
p \frac{\partial Q(B,N)}{\partial B} = (1 + r)
\]

which solves for the profit-maximizing level of borrowing, \( B^* \), as a function of the exogenous variables, \( r \) and \( p \), denoted by \( B^*(r, p) \). Any \( B^* \) for a given value of \( x \) is associated with a \( q^*[B^*(r)] \) which is the level of marketable surplus that \( B^* \) can support. It will now be shown how the trader may influence this surplus.

The commodity trader is a buy-and-sell agent who purchases the product \( q \) and resells it to processors or end-users, profiting from the price differential. Let \( P \) be the price at which the trader sells the product, and \( c \) the cost incurred for performing the trading function. The trader’s profit function may then be written as

\[
z^T = (P - p - c) \sum q^*_i
\]

where as before \( p \) is the trader’s buying price, \( \sum q^*_i \) is the total quantity of \( q \) purchased from producers \( i = 1 \ldots n \) and each producer sells his \( q^*_i \). Clearly trader profits are positively related to \( q^*_i \). With respect to the \( i^{th} \) producer,

\[
z^T = (P - p - c)q^*_i
\]
If there are many traders competing in the market, the trader is unable to use \( p \), the purchase price of output, as an instrument for maximizing profits. Treating \( p \) as largely outside the trader's control, the only way to maximize profits is to increase his volume of trading, \( \Sigma q_i \). However, total volume bought and sold is the sum of the individual producers' \( q^* \)'s, over which the trader does not have any control. The trader can, of course, try to increase \( \Sigma q_i \) by increasing the number of producers from whom he buys the product. But without an instrument to attract existing sellers, an increased market share may not be realized. With many traders, there is no certainty either that any new producer will sell to him. The trader's problem is, therefore, how to induce producers to sell their output to him as well as to influence the quantity of \( q_i \) purchased from each producer.

From (3.4) trading profits are affected through \( q_i^* \) by the producer's borrowing behavior as embodied in \( B^*(r) \), his loan demand function. Differentiating the trader's profits by \( r \) gives

\[
\frac{dz^n}{dr} = (P - p - c) \frac{\partial q_i^*}{\partial B^*} \frac{\partial B^*}{\partial r} < 0
\]

which shows that the terms at which the producer is able to obtain credit affects the trader's profits. However, where the trader has no control over \( r \), he cannot do anything about \( q_i \). This provides the motivation for the trader's involvement in the credit market. By providing farm producers a credit line, the trader can then require his borrowers to market their output through him.\(^1\)

Suppose now that the trader provides loans to farmer-cultivators at rate \( r_T \). The farmer's maximization problem yields his loan demand \( B^*(r_T; p) \) which is a function of the terms available

\(^1\) The tie-in sale provision in the loan contract does not necessarily guarantee that the borrower will make good on his promise to sell his output to the trader. To keep the results tractable, however, it is assumed that sufficient incentives exist for the borrower to honor the tie-in sale provision.
from the trader, where \( p \) is again assumed to be parametric. Then the farmer chooses to deal with

the trader in both the output and credit markets if his profit under the marketing cum credit

contract offered by the trader at least equals that in a situation where he has to make separate
deals in the two markets. Let the farmer’s maximized profit at the terms given by the trader be

represented by

\[
\text{Max } p [Q(B;N) - x] - (1 + r_T)B = \pi^* (r_T, p)
\]

(3.6)

Let the trader-lender’s profit equation in relation to farmer \( i \) be

\[
z^T = (P - p - c)q_i [B^*(r_T)] + (r_T - \bar{r}) B^*(r_T)
\]

(3.7)

where \( q_i \), the quantity purchased from producer \( i \), is a function of the farmer’s profit-maximizing

loan size \( B^*(r_T) \) at the rate of interest charged by the trader, \( r_T \), and \( \bar{r} \) is the lender’s opportunity
cost of lending. The trader then chooses \( r_T \) subject to the constraint that he be able to attract

producers to sell to him. That is,

\[
\text{Max } z^T \text{ s.t. } \pi^* (r_T, p) \geq \pi^* (r, p)
\]

(3.8)

The first-order condition for the trader-lender’s profit-maximization problem is given by

\[
(P - p - c) \frac{\partial q_i}{\partial B^*} \frac{\partial B^*}{\partial r_T} + (r_T - \bar{r}) \frac{\partial B^*}{\partial r_T} + B^* + \lambda \frac{\partial \pi^*}{\partial r_T}
\]

(3.9)

where \( \lambda \) is the Lagrange multiplier associated with the constraint specified in (3.8). The second

and third terms in expression (3.9) show the effect of changing the contractual interest rate on the

trader’s return from lending. The first term shows that varying \( r_T \) also affects the trader’s profits

through \( q_i \), the producer’s marketable surplus. The trader therefore not only has an incentive to

lend to the producer, but to set his loan terms in such a way that his combined income from

trading and lending is maximized.
3.1.2 Farmers and Landowners

Two important features of agricultural economies motivate the following model of credit tying. One is the existence of a stratum of the agricultural or rural population whose members, because they do not possess ownership rights to land, earn their living through the sale of their labor services to agricultural producers. The other feature is the existence of contractual arrangements between agricultural employers and workers which combine risk-sharing and work incentives. Due to the riskiness of agricultural production and the generally risk-averse nature of rural agents, a worker will prefer an employment contract with the least amount of risk associated with it. On the other hand, because the worker's effort in agricultural production is costly to monitor and difficult to measure, the employer must ensure that appropriate incentives are in place to minimize the worker's shirking on the job. The role of credit provision within a sharecropping contract is discussed from this perspective in the elaborate models of interlinked credit and tenancy contracts that dominate the interlinked markets literature. The following model merely provides a sketch of the argument that motivates a contract of this type.

There are two classes of rural agents, namely landowners and agricultural laborers or "landless" workers. The former hire the services of the latter for farm production. Laborers are assumed to be identical, each with a utility function defined by $U = u(c,e)$, where $c$ is consumption and $e$ is effort. The utility function is assumed to be concave in $c$ and decreasing in $e$. Let consumption be net of outstanding borrowing, i.e. $c = ay(e; N/L)-(1-r)B$, where $ay(e; N/L)$

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2 "Landless", as the term is currently used, is a category that describes those who not only do not own land, but also are not cultivating land under either a leasehold or share tenancy contract. The term, which is more descriptive than analytical, probably derives from the condition of the rural agent who, unlike leaseholders and sharecroppers, is not bound by a contractual agreement to operate a specific farm on behalf of its owner. While the more common usage of the term "landless" refers to a category distinct from share tenant, such distinction is not crucial for the present theoretical discussion. The essential point is the role of credit provision by the farm employer as a mechanism for eliciting more labor or work effort on the part of the laborer regardless of the nature of the employment contract.
is the worker's income defined as a fixed share, \(0 < \alpha < 1\), of output, \(y(e; N/L)\). Output, \(y\), is a function of the worker's effort level and a given land-labor ratio, \(N/L\), on his employer's farm. Further assume that consumption and effort at one date are separable from consumption and effort at any other date. This allows the treatment of \(B\) as a fixed amount that the agent must repay without inquiring into the determination of \(B\).\(^3\) Letting \(\hat{B} = (1 + \tau)B\), the agent's utility is written as

\[
U(c, e) = U(\alpha y(e; \frac{N}{L}) - \hat{B}, e)
\]

Maximizing (3.10) with respect to \(e\) yields the first-order condition

\[
\alpha U_c \frac{\partial y}{\partial e} - U_e = 0
\]

where the subscripted \(U\)'s are marginal utilities and (3.11) solves for the level of effort as a function of exogenous variables, that is \(e^*(\alpha, r, B)\). A useful result is that \(de/d\hat{B} > 0\), or that a higher repayment obligation induces an increase in the effort level of the rural wage worker [Braverman and Stiglitz (1982)].

The employer who is a farmer-landowner produces output \(Q\) according to a constant returns to scale production function \(Q = y(eL, N)\), where \(N\) is land of a fixed size, \(L\) is hired labor and \(eL\) is hired labor in efficiency units. Since land size is fixed, it may be assumed without loss of generality that \(N\) equals 1 and that \(Q = Ly(e; 1/L)\) where \(y(e; 1/L)\) is output per unit of hired labor. At any given quantity of \(L\), say \(\bar{L}\), that the farmer chooses to employ, his profit is

\[
z^L = (1 - \alpha)Ly(e^*, \frac{1}{\bar{L}})
\]

\(^3\) \(B\) could, of course, be a fixed, minimum level of consumption in a prior period which is financed purely by borrowing.
where $e^*(\alpha, \tilde{B})$ is the hired worker's utility-maximizing level of effort unobservable to the employer. With respect to the $i^{th}$ worker, (3.12) is

$$z_{Li} = (1 - \alpha) y(e^*)$$

(3.13)

Clearly an exogenous change affecting the individual worker's level of outstanding loans will affect his productivity and consequently $z^L$. In agrarian settings where rural households normally demand credit to finance their consumption in the slack season, and where such households typically do not possess sufficient collateral to secure loans from institutional sources, farmer-landowners may find it worthwhile to take advantage of the credit demand by providing consumption advances. Consumption credit tied with the land-labor contract acts as an instrument for enforcing the labor contract since the farmer-landowner cannot costlessly monitor the worker's expenditure of effort [Otsuka et al (1989)]. The loan may also save on labor recruitment cost, if this is an important consideration, by cementing the relationship between employer and worker [Bardhan (1984), Srinivasan (1989)].

The farmer-lender's problem is then to maximize $z^L$ by maximizing $z_{Li}$ from each individual worker. This involves a choice of $r_L$, a loan rate of interest, in addition to $\alpha$ if this is a choice variable, such that $z^L$ is maximized and workers accept the contract offer. Thus,

$$\text{Max } z_{Li} \text{ s.t. } V^*(\alpha, \tilde{B}) \geq U^*(\alpha, \tilde{B})$$

(3.14)

where $z^L = (1 - \alpha) f(e^*; 1/L) + (r_L - \bar{r}) B$, $V^*$ and $U^*$ are the worker's maximized utilities for the given parameter values and $\tilde{B} = (1 + r_L) B$. Differentiating $z^L$ with respect to $r_L$ yields the following:

$$\frac{\partial z_{Li}}{\partial r_L} = (1 - \alpha) \frac{\partial y}{\partial e^*} \frac{\partial e^*}{\partial B} + B + \lambda \frac{\partial V^*}{\partial r_L}$$

(3.15)
where $\lambda$ is the Lagrange multiplier associated with the constraint specified in (3.15). From the above expression, the effect of a change in the farmer-lender's interest charge affects not only his income from lending (the second term) but also farm income (the first term).

The foregoing exposition of the trader's and farmer's motivations for lending suggests that the immediate economic reasons for the interlinked contracts discussed thus far do not emanate from the credit market. From the inter locker's viewpoint, the credit transaction is necessary to the extent that it promotes his main activity (e.g. trading or farming). It is this underlying reason that endows the interlinked credit transaction with a relationship-specific character. As a separate activity, moneylending has no value to the trader or the farmer. It is the role of moneylending within the trader's or farmer's business activity that makes it -- from the traders' and farmers' viewpoints -- worthwhile to pursue.

From the borrower's viewpoint, the attractiveness of informal credit arrangements lies in part in the inaccessibility of the organized or formal credit market to asset-poor borrowers who do not possess what is generally considered acceptable collateral. The interlinked arrangement, by ensuring the double coincidence of wants between the inter locker and the borrower, can fulfill the role of a collateral substitute, without which credit may be prohibitively costly. However, it is one thing to claim that rural credit contracts are tied to the sales of output or to labor services simply because lenders want to insure against default, and another thing to claim that the presence of loans linked to output or labor helps alleviate the costs of screening and enforcement in rural credit markets. In the first case, one is bound by logic to show that the probability of default will indeed lead lenders to adopt a particular form of interlinkage, and not just any generic mechanism for reducing default risk. To be able to do this, however, one has to assume that the lender is someone besides just a pure moneylender. But it is not difficult to see how this leads directly to questions regarding motivations for credit market involvement. In the second case, meanwhile, it
is sufficient to simply assume the existence of interlinkage in whatever form, or accept it as arising from considerations outside of the credit market such as the trader’s interest in the farmer’s marketable surplus, and to show its effect on observable credit market outcomes. This study pursues the second approach.

3.2 Informal Credit with Collateral: A Polar Case

The role of collateral in debt contracts has been analyzed by a number of researchers [Barro (1976), Benjamin (1978), Bester (1985 and 1987), Plaut (1985), Binswanger and Rosenzweig (1986), Besanko and Thakor (1988), Lacker (1991)]. A collateral is any asset that a debtor agrees to forfeit ownership of to his creditor in the event of default. The use of collateral in debt contracts is a risk-reducing measure that (i) by making default costly to the borrower, lowers its likelihood; and (ii) by transferring the cost of default from lender to borrower, reduces the lender’s losses in case the project financed is unable to pay for the loan. Given the lender’s imperfect information about a borrower’s ability and intention to repay, the inclusion of collateral in a loan agreement increases the lender’s expected return, *ceteris paribus*, from the transaction.

As a deductible, collateral substitutes for missing information when lenders are not fully informed about the abilities and repayment intentions of borrowers. Collateral aids in loan screening to the extent that the willingness of borrowers to enter into a collateralized debt contract reveals to the lender a borrower’s estimate of his own ability to repay the loan either through the returns of the loan-funded project or other resources. Collateral also obviates monitoring of the borrower’s actions by the lender. The borrower who attempts to escape repayment through misrepresentation of his true ability to repay the loan when due (e.g. underdeclaring his harvest, feigning insufficient income) knows that the collateral must compensate for any difference between the loan outstanding and payments made from project returns. Clearly, if lenders can recover the equivalent of principal plus interest from the collateral whenever a borrower defaults,
then information about the riskiness of loan applicants and their projects would be superfluous.

Not all loan contracts include collateral, however, and even when they do, lenders still expend resources to screen borrowers. The reasons are related to the costs, to both borrowers and lenders, of using particular assets as collateral, as well as to differences in the valuation of collateral between borrowers and lenders.

Ignoring for the moment the complications arising from the costs of employing collateral, the model presented in Chapter II is now modified. Suppose that lenders impose a collateral requirement on all their loans, and that the amount required, \( K \), always equals the amount of debt contracted by the borrower, i.e. \( K = RB \). As before, the borrower repays the lender the amount \( RB = (1+r)B \) if the project returns are adequate. If returns are not adequate to repay the principal and interest, the borrower keeps the returns but compensates the lender by surrendering the amount \( K = RB \). Let \( \delta \) be a factor which determines how much the borrower values the collateralized asset. If \( \delta > 1 \), the borrower values the collateral at higher than its market price and will, therefore, never default on the loan. If \( \delta \leq 1 \), the borrower values the asset at par with or less than its market price so the loan is characterized by a positive probability of default. The borrower’s expected profit equation may now be written as

\[
\pi = Q \int_0^\infty \theta dF(\theta) - RB[1-F(\hat{\theta})] + Q \int_0^\infty \theta dF(\theta) - \delta K F(\hat{\theta})
\]

\[
= Q \int_0^\infty \theta dF(\theta) - RB[1-F(\hat{\theta})(1-\delta)]
\]  

(3.16)

where as before \( \hat{\theta} = RB/Q \) and \( 0 < \delta \leq 1 \). Differentiating (3.16) with respect to \( B \) results in the following first-order condition,

\[
\hat{\delta} Q_B = RB[1-F(\hat{\theta})(1-\delta)]
\]  

(3.17)
which yields the borrower's loan demand as a function of the interest rate, his endowments and his subjective valuation of the collateralized asset. All results previously obtained in relation to the properties of the borrower's demand and iso-expected profit curves hold.

Consider first the case when $\delta = 1$. A comparison of (3.17) with the first-order condition for an expected profit maximum without collateral, (2.10), shows that the optimal loan size demanded is lower when, holding interest constant, the loan is collateralized. Thus, the quantity of loans demanded with collateral is less than that without collateral at all interest rate levels, and the loan demand curve with collateral, $D(r,K)$, lies to the left of the loan demand curve without collateral, $D(r)$, as shown in Figure 3.1. The difference stems from the requirement in the loan contract that the borrower must pay the lender the amount $RB$ regardless of the outcome of his project, while if the loan is not collateralized, the borrower pays the loan fully only if the project revenues are sufficient, with the chance of always paying lower than the full amount of his debt if he can get away with claiming insufficient project returns. The borrower's expected profits are lower because the presence of collateral has shifted the cost of default from the lender to the borrower.

Since the leftward shift of the loan demand curve is true across-the-board, one implication of the imposition of a collateral requirement on loans is that loan applicants with the least initial endowments in land or productive abilities may exit the market.

Expression (3.17) shows that the loan demand that maximizes the borrower's expected profits is inversely related to the borrower's personal valuation of the collateralized asset. When the borrower's valuation of the collateralized asset is low, he demands a larger loan since his expected cost of default - in terms of the forfeited asset - is also low. In the case where $\delta < 1$, the profit-maximizing loan demand will still be less than that with a non-collateralized loan, although the magnitude of the reduction will be smaller than when $\delta = 1$.
Figure 3.1: Contractual Equilibrium With "Perfect" Collateral

Figure 3.2: Contractual Equilibrium With "Imperfect" Collateral
Let there be no costs associated with collateral use for the lender. Since the lender can require that $K = RB$, screening and collection costs are zero. Assume that the lender has the same opportunity cost of funds as in Chapter II. The lender’s expected profit equation is

$$z = RB(1-F(\tilde{\theta})) + KF(\tilde{\theta}) - IB \quad (3.18)$$

The following proposition results:

**Proposition 8:** With full collateralization, the equilibrium loan size, $B^k$, is greater than with a non-collateralized loan. However, with full collateralization, there is no loan size credit rationing in equilibrium.

**Proof:** Maximizing the sum of (3.16) and (3.18) yields

$$Q_B \int_0^{\delta} \theta dF(\tilde{\theta}) = I - RF(\tilde{\theta})(1 - \delta) \quad (3.19)$$

which is the equilibrium condition for a loan transaction involving collateral. When $\delta = 1$ or when both borrower and lender attach the same value to the collateralized asset, (3.19) is exactly the same condition as that for contractual equilibrium without collateral (2.29) when there is no incentive for strategic default ($\rho = 1$). That is, if borrowers have no incentive to willfully default on their loans, there would be no role for collateral in debt contracts. Thus, in equilibrium, a fully collateralized loan contract involves a larger loan size than a non-collateralized loan contract ($B^k > B^0$).\(^4\)

Differentiating the lender’s expected profit equation in (3.18) with respect to $B$ yields $R = I$. That is, the lender’s expected profit is maximized at the loan size that, for a given interest rate, equates the marginal revenue and marginal cost of lending. As shown in the previous chapter, the lender’s iso-expected profit curve takes on a zero slope at the level of $B$ where expected profit is maximized. If the zero-profit condition obtains, however, dividing (3.18) by $B$ yields exactly

\(^4\) It follows that with $\delta < 1$ the same conclusion holds.
the same result, $R = I$, which implies that the lender's iso-expected profit curve in RB space is everywhere horizontal when the loan is fully collateralized. This is shown as the curve $z^x(0)$ in Figure 3.1. The lender may, therefore, choose to lend at any level of $B$ and charge the same rate. On the other hand, borrowers will strive to maximize expected profits subject to the constraint that lenders make no losses. Because the borrower's iso-expected profit contour has a zero slope whenever it coincides with the loan demand curve, the point of tangency between the borrower's and lender's iso-expected profit curves occurs on the borrower's demand curve. With full collateral, therefore, there is no credit rationing in equilibrium. This is true whether $\delta = 1$ or $\delta < 1$. Furthermore, a fully collateralized loan has a lower interest rate ($r^x$) than a non-collateralized loan ($r^p$) because full coverage allows the lender to charge an interest rate close to the opportunity rate. This is shown in Figure 3.1.

Collateral use is not costless, however. The inclusion of collateral in a debt contract involves additional contractual stipulations specifying the asset offered, defining what constitutes default and delimiting the rights of the contracting parties over the asset while the contract is in force [Benjamin (1978)]. For example, borrowers may be deprived either partially or totally of their rights over the pledged asset. Use may be allowed, but the asset may not be leased out, and certainly not sold. But even when collateral has been foreclosed, its transferability to the creditor may be disputed, the creditor may not find buyers for the acquired asset, or may discover that he has taken over a worthless piece of property. The fact that the pledging of assets is still a generally recognized way of default prevention indicates that the benefits from using collateral,

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5 This shows that loan size credit rationing derives from the lender's inability to fully recover the loan given a positive probability of default.

6 Bell (1988) notes these problems to emphasize why lenders generally strive to minimize the occurrence of default even in the presence of collateral.
in terms of default prevention or lower loan losses, exceed its costs. It also suggests that the costs of utilizing collateral may be attenuated in a number of ways.

3.3 Why is Collateral "Imperfect"?

The effectiveness with which collateral can function as a risk-reducing mechanism in credit markets depends upon the characteristics of the collateral asset in question. To the extent that collateral cannot fully guarantee the lender against default risk, it may be described as "imperfect". Binswanger and Rosenzweig (1986) enumerate three conditions that any asset must satisfy to be acceptable as a collateral: (i) appropriability, (ii) absence of collateral-specific risk, and (iii) accrual of the returns of the asset to the borrower. However, these characteristics are as much a product of the institutional environment as they are a function of the material attributes of physical assets.

Appropriability has to do with the possibility of transferring control over the asset from debtor to creditor. All physical assets satisfy this condition in that they may be physically separated from their holders, whether by mutual agreement or by the exertion of force. The ease with which various assets may be alienated from their holders differs, however. Some assets - financial assets, jewelry, gold and consumer durables - simply require physical transfer to the creditor. This condition is sufficient to deprive the debtor access to the asset and its benefits. The creditor, to whom control over the foreclosed asset has passed, can evade claims by the former holder by selling the asset, concealing it, moving it to a different location, or by changing

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7 The credit market, even if competitive, cannot be regarded as perfectly competitive in the standard sense unless borrowers possessed infinitely large amounts of "perfect" collateral [Bell (1988), underscoring supplied].

8 Human capital does not satisfy this condition.
residences. Immovable property such as farmland and real estate require more than just physical transfer of control to consummate the process of alienation. Documentation to establish the identity of the new holder normally accompanies acquisition of these types of assets. The debtor will usually be required to present proof of ownership over the asset pledged as collateral, without which the creditor would be uncertain about the integrity of the collateral and the security of his claim. It is conceivable that in some villages in low-income countries, locals will not buy foreclosed land, or will not recognize the validity of a transfer.

The second condition - absence of collateral-specific risk - requires that the asset be reasonably protected from any depreciation in value (during the loan period, i.e. prior to the creditor's taking possession of it) arising from physical damage or loss out of natural or man-made causes (e.g. theft). In this respect, land and financial assets are the most acceptable since financial assets may be deposited with the lender, while land is immobile (it cannot be stolen or claimed to be so) and damage due to neglect or misuse is detectable. On the other hand, some assets like real estate and motor vehicles are acceptable when insurable against fire, theft and accidents. The insurance environment thus influences the acceptability of various collateral forms.

Accrual of the returns of the asset to the borrower means that borrowers must continue to derive benefits from using the pledged asset for the duration of the loan. If not, their expected cost of borrowing increases. The repayment ability of borrowers may also be impaired, thus increasing the probability of asset forfeiture, a prospect unacceptable to borrowers in most cases. However, for most movable assets and those that are not revenue-earning short of sale, the first two...
conditions are difficult to fulfill without violating the third. The physical characteristics that facilitate appropriation of the asset by the creditor may also be used to the advantage of the debtor resulting in the inability of the creditor to enforce his claim. Hence, consumer durables and jewelry are generally not good collateral in the sense defined by Binswanger and Rosenzweig. By implication, pawning, or the practice of depositing an asset with one's creditors as security for a loan is not technically equivalent to collateralization of a loan. To Binswanger and Rosenzweig, this third condition is critical in the distinction between a collateral and a collateral substitute.\textsuperscript{10}

While the suitability of particular assets as collateral primarily depends upon their physical properties, these physical properties take on operational significance only in the presence of certain institutional requisites. If the defining characteristic of collateral vis-a-vis collateral substitutes were merely the product of the material qualities of assets, then agricultural land would everywhere be acceptable as a collateral. There is ample evidence to the contrary, however, and sufficient empirical basis to believe that the existing institutional framework exerts a profound influence on the extent to which collateral is used as a standard mode of enforcing debt contracts.

The appropriation of the collateral in favor of the creditor when default occurs is incomplete if the creditor's control over the use and disposal of the asset is open to challenge. This implies that the asset transfer must not simply be a physical one; it must simultaneously be a transfer of ownership or rightful claim over the asset to the creditor. Such ownership right grants the owner the exclusive power of decision regarding use and disposal of the asset, as well as entitles him to the fruits of the asset's use. By the same right which has been transferred, the creditor may be able to effectively deny the debtor the rights previously exercised by the latter over the asset. But for this process to occur, the fact of ownership over the collateral by the debtor must have been established first. More importantly, the ownership right must be absolute in the sense that it

\textsuperscript{10} See footnote number 8 of Binswanger and Rosenzweig (1986).
includes the exclusive right to transfer such ownership or to cause its loss to the creditor. Otherwise the transfer would not be valid, and if disputed, may cause the creditor to end up with nothing.\(^\text{11}\) Collateral use thus presumes the prior existence of a set of well-defined property rights over the pledged asset. These rights should include the right of private ownership, the right of the owner to use the asset and derive benefits from its cultivation and improvement, and the right as well to dispose of the property through sale, bequest or legal transfer.

It follows that the establishment of property rights necessitates institutional arrangements for safeguarding those rights and guaranteeing the enforcement of claims. These include formal as well as non-formal procedures: systems of titling and record-keeping, law and law enforcement, social custom, legitimacy and recognition [Feder and Feeny (1991)].\(^\text{12}\) From an institutional economics viewpoint, private property rights did not "just happen", but evolved through a long historical process.\(^\text{13}\) For example, the emergence of private property rights in land - which is a popular form of collateral - was historically a response to its increasing scarcity value which made the benefits to be derived from well-defined and secure land rights more attractive. Because transaction costs are involved in establishing and enforcing property rights, the demand for a precise definition of these rights arises only in those settings where the benefits from doing so (e.g. protection from unjust claims or unfair valuation) exceed the costs. For this reason, the evolution of property rights may be viewed mainly as a concomitant of historical developments which increased incentives to privately take possession of certain forms of property. To cite the case of agricultural land once again, higher man-land ratios, improvements in agricultural terms-

\(^\text{11}\) This is the reason creditors check on the status of a loan applicant's offered collateral, and insist that the title be 'clean' which means that there should be no existing claims on the property pledged to the creditor.

\(^\text{12}\) See also the references cited in this paper.

\(^\text{13}\) The work of North (1981) as cited in Feder and Feeny (1991) is important in this respect.
of-trade and new productive technologies have been important factors in raising the returns to land, and thus the rewards to property rights in land [Feder and Feeny (1991)]. Absent these potential rewards, private property rights in land would be superfluous. But for the same reason, land will have less value as a collateral.

The establishment of well-defined and enforceable rights over the ownership, utilization and disposal of certain property forms underlies the acceptability of collateral as a standard mode of enforcing debt contracts. The use of a wide range of assets as collateral in more advanced economies implies that the institutional mechanisms - financial, goods, and insurance markets, registry of deeds, laws and courts of law - necessary to support contractual agreements and make them binding are sufficiently developed. Collateral use will be inhibited or suppressed in economies where these institutions are missing or underdeveloped or where traditional norms and other forms of social sanctions are not effective means for enforcing the desired behavior. The fulfilment of the third condition specified by Binswanger and Rosenzweig -- which they claim is crucial in the distinction between a collateral and a collateral substitute -- should therefore be seen as the result of two factors: (i) the physical properties of the pledged asset or assets that facilitate transfer and minimize erosion of value through either natural causes or non-monitorable actions of the borrower, and (ii) a well-defined system of property rights that gives lenders the confidence and ability to enforce their claims on the pledged asset whenever those claims are challenged. If for some reason property rights are curtailed or claims cannot be effectively enforced, the asset pledged loses value as a collateral. In the ensuing adjustment, substitutes may be devised or the

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14 For example, a leasehold tenant's property rights to land are limited to its use and his entitlement to a contractually agreed share of the output; therefore he cannot use the land as a collateral. In some countries, as in the Philippines, land reform legislation restricts the right of land reform beneficiaries to transfer their acquired plots. They are allowed to do so only by bequest to heirs. Therefore even owned land cannot be collateralized. Property rights cannot be effectively enforced where, because of the possibility of moral hazard, the absence of collateral-specific risk cannot be guaranteed.
same asset may be accepted with additional stipulations, some of which may result in a loss of utility to the debtor while the loan is outstanding. These institutional adjustments resulting in the use of collateral substitutes in a specific rural economy are discussed in the next chapter. What is clear from the foregoing is that the acceptability of various assets as collateral depends as much on the institutional and legal environment as on the material attributes of the assets themselves. The implications of having less than "perfect" collateral are now discussed.

3.4 The Model with "Imperfect" Collateral

The model with collateral developed above is slightly modified in this section to reflect an imperfection in the collateral offered by the borrower. Collateral imperfection may result from different factors. It may be due to the costs of marketing the asset if the lender has no direct use for it. It may also arise from the difficulty of appropriating the asset itself, whether that is due to legal challenge or social custom [Bell (1988)]. Or it may come in the form of lost asset value because of the borrower's failure to maintain the asset in a desired state. Regardless of the source of imperfection, imperfect collateral results in the lender capturing a value of K lower than RB when the borrower defaults.\footnote{It can be argued, however, that the lender can stipulate a value of K much higher than RB, the differential intended to cover costs incurred in the process. In this case, the no credit rationing result in the previous section holds, at the cost, however, of a smaller equilibrium loan size since the larger collateral requirement will reduce loan demand. This result presumes that when the lender sets K>RB, he knows how much higher to set K. The problem is that the costs attendant to appropriating a foreclosed asset may not be known in advance. All that the lender can do is form an estimate of such costs, and build it into the value of K he requires. The ensuing complications are ignored in the present discussion.} When the costs of using collateral become exceedingly high for any of these reasons, lenders will cease to use it in their loan agreements.

Let the borrower's expected profit equation be as in (3.16). As for the lender, expected profit when collateral is imperfect is
where $0 \leq \gamma \leq 1$ is a factor that determines how much of the collateral’s market value is recovered by the lender.\textsuperscript{16} Note that screening cost, $S$, is again present. If the lender cannot be fully compensated whenever a borrower defaults, he has an incentive to choose only those loan applicants who are less likely to default based on his evaluation. With positive fixed costs ($S > 0$), the lender’s iso-expected profit curve will have both a rising and a declining portion, as shown in the preceding chapter. As before, the equilibrium loan size is that which maximizes the total surplus available to both borrower and lender. Differentiating the sum of (3.16) and (3.20) with respect to $B$ yields the condition for contractual equilibrium with "imperfect" collateral,

$$Q_B \int_0^\infty \theta dF(\theta) = I + (\delta - \gamma)RF(\delta)$$

(3.21)

Obviously, whenever $\gamma < 1$ the lender is unable to recover the full amount of the loan by taking possession of the collateral. In this case, equilibrium will be characterized by loan size rationing regardless of whether $\delta = 1$ or $\delta < 1$, and the point of tangency between the borrower’s and lender’s iso-expected profit curves must occur to the left of the relevant loan demand curve. The equilibrium loan size with "imperfect" collateral is less than that with "perfect" collateral, $B^\gamma < B^\kappa$. Moreover, the interest rate on the loan with "imperfect" collateral is higher than the rate on the loan with "perfect" collateral, $(i^\gamma > i^\kappa)$, as shown in Figure 3.2.

3.5 The Model with a Collateral Substitute

In this section, the basic model presented in the previous chapter is analyzed with a collateral substitute present in the loan contract. The particular form of collateral substitute considered is a marketing-credit link. In a linked contract of this type, the creditor extends a loan, $B$, to a

\textsuperscript{16} $\gamma$ in effect captures transaction costs associated with collateral use.
borrower and expects to be repaid with interest, \( r \), at the end of the period. The contract also specifies that the borrower sell all his output, \( Q \), to the creditor at a mutually acceptable price during harvest time.

The marketing link serves as a collateral substitute in two ways. First, it acts as a screening device. The requirement to sell output to the creditor has the effect of sorting loan applicants into two groups, one composed of borrowers who need marketing services, and the second made up of borrowers who have less need of the service. To the extent that the demand for marketing services is positively related to the size of the marketable surplus, producers with bigger marketable surpluses will be attracted to the marketing link feature of the credit contract because the credit cum marketing arrangement reduces the cost of searching for a buyer of the output. From a credit market viewpoint, borrowers with bigger marketable surpluses will also tend to have a better ability to repay their loans. Thus, by indirectly screening out those loan applicants of lesser ability to produce a marketable surplus, the linked output arrangement in effect also indirectly screens out the applicants of lower ability to repay loans.

Second, the marketing-credit link is an additional instrument for enforcing the loan contract. By acting as the buyer of the borrower's produce, the lender can more directly verify the borrower's repayment ability at harvest time, as well as simultaneously satisfy his claim on a portion of the proceeds of the output sale. The degree to which the lender can make the credit

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17 The incentive to use the services of a trader or marketing middleman stems from the savings in hauling, transport and storage costs which increase with the size of the marketable surplus.

18 In Bester's model (1985 and 1987), borrowers reveal their risk type by choosing a credit contract with a given interest rate collateral combination. Borrowers for whom the expected cost of losing the collateral asset is lower will choose the contract with a higher collateral requirement. Since borrowers with a higher ability to repay are unlikely to forfeit their collateral, it is the safe borrowers who choose the contracts with a larger collateral requirement. That is, the expected cost of offering collateral is inversely related to borrower quality. Somewhat analogously, in the present model with a collateral substitute, borrowers who expect to benefit most from the marketing services will be attracted to the credit cum marketing contract.
contract enforceable depends, however, upon the incentives that exist so that the borrower makes good on his promise to deliver the output to the creditor. If the creditor is the only outlet through whom the borrower can market his product, then enforcement of the credit contract is facilitated by the interlinkage of credit with marketing. If the creditor is not the only marketing outlet available to the borrower, repayment is not necessarily guaranteed, as the borrower may sell his output elsewhere and pocket the amount that his creditor would have deducted from the sales proceeds had the output been sold through the creditor. The possibility of this occurrence can be minimized, however, by several factors. Lenders may engage in close monitoring of their borrowers’ actions. They may informally employ village residents for the purpose of informing them about the timing and size of their borrowers’ harvests. In most cases, they will be present at harvest time to provide the means for hauling and transporting the borrower’s output to the market, which gives the borrower little opportunity to escape repayment. At the extreme, buyers of the output may share information about their clientele, and knowledge that a co-worker in the trade is being cheated by a seller could result in their refusal to do business with that seller. On the borrower side, the savings in transaction costs resulting from the credit-marketing linkage may be significant enough to deter selling through channels other than the creditor. In addition, the linked transaction makes the possible discovery of undesirable behavior in one market too costly for the borrower-seller because of spillover effects that threaten the other transaction(s) [Bardhan (1989)]. For instance, if the borrower does not repay or sell his product through his lender, not only may he find himself without any credit source in the next cropping season; he may also incur a higher cost of marketing his output, having lost a ready buyer in his former creditor. Under the circumstances discussed above, the marketing-credit link makes the credit contract enforceable and, therefore, acts as a collateral substitute.
As a collateral substitute, however, the marketing link is necessarily an "imperfect" form of collateral in that it does not always assure the lender that he will be fully repaid. Since the produced crop is the collateral in this case, the presence of production uncertainty makes the returns from lending subject to chance occurrences. In addition, as discussed above, the possibility exists that a borrower may choose to sell his output elsewhere unless there are incentives strong enough to discourage this action. The marketing link therefore fails to qualify as an ideal form of collateral because it easily violates the requirement concerning the absence of collateral-specific risk.

2.5.1 Assumptions

The farmer-borrower's problem involves the choice of a bundled marketing and credit contract with a trader-lender versus separate marketing and credit transactions, the latter with a pure moneylender. The pure moneylender is assumed to offer the borrower exactly the same loan terms as described in Chapter II. Let the post-harvest wholesale market price of the output be \( P = 1 \). If the farmer markets his output directly, the net price he receives is \( p = 1 - c \), where \( c \) is the cost incurred for marketing. It is assumed that, since he is not actually involved in commodity trading, the pure moneylender cannot do better than the farmer in the product market; that is, he cannot obtain a net price higher than \( p \). If the farmer uses the services of a trader or middleman, the net price he receives for his output is \( r > p \). This must be the case for otherwise there is no incentive in the first place for the farmer to deal with a trader. The trader charges an interest rate \( r \) for the loan. Let \( \bar{R} = (1 + r) \).

3.5.2 Loan Demand and Output Price

If the farmer borrowed from a pure moneylender, his expected profit from making separate credit and marketing transactions would be
The pure moneylender's expected profit equation may be written as

\[ z = pQ \int_{\delta}^{\theta} \theta dF(\theta) - RB(1 - F(\hat{\theta})) \]  

(3.22)

Following the discussion in Chapter II, it can be shown that the contractual equilibrium given this unlinked credit contract is characterized by the condition

\[ \rho p \delta Q_b = I \quad , \quad \rho < 1 \]  

(3.24)

Maximizing (3.22) with respect to B yields the borrower's loan demand as a function of the rate of interest and the price received for his output, \( B'(r, p) \). Furthermore, it can be shown that \( dB'/dp > 0 \). Thus, for any price \( p' > p \), \( B'(p') > B'(p) \), i.e., the borrower demands more loans at all interest rate levels.

Under the credit cum marketing arrangement, the borrower sells his output to the trader-lender at a price equivalent to \( \tau \), his net proceeds from the sale being \( \tau \) times the quantity sold minus his loan obligation, \( \tilde{RB} \) times \( (1 - F(\tilde{\theta})) \). If \( \theta > \tilde{\theta} \), the borrower receives a positive amount from the sale of his output. If not, the lender takes the entire output, if any. It is assumed that sufficient incentives exist for the borrower to always deliver his output to the lender. The stipulation that \( \tau > p \) assures this. The borrower's expected profit equation is written as

\[ \pi^T = \tau Q \int_{\delta}^{\theta} \theta dF(\theta) - \tilde{RB}(1 - F(\tilde{\theta})) \]  

(3.25)

All the results relevant to loan demand obtained in Chapter II continue to apply. In particular, since \( \tau > p \), the borrower demands a bigger loan from the trader-lender than from the pure moneylender. This is shown in Figure 3.3 where the \( D(\tau) \) lies to the right of \( D(p) \).
Figure 3.3: Contractual Equilibrium With A Marketing Link

Figure 3.4: Contractual Equilibrium For Two Lenders With Different Technologies, $\beta^2 > \beta^1$
3.5.3 The Trader’s Iso-Expected Profit Curve

Let the creditor’s expected profit with respect to an individual loan applicant be

\[ z^T = (1 - \tau) \int_0^\theta \theta dF(\theta) + \int_0^\theta \theta dF(\theta) + \tilde{R}B(1 - F(\theta)) - T - IB \]  \hspace{1cm} (3.26)

The trader-lender is assumed to resell in the product market the output purchased from the
borrower at the market price \( P = 1 \). The first two terms in (3.26) make up the lender’s net income
from his buying and selling operation. The third term is income from moneylending which comes
in the form of the borrower’s payment of principal and interest whenever the project returns make
this possible. The lender’s total costs cover both moneylending and trading in the product
produced by the borrower. \( IB \) is the lender’s opportunity cost of funds and \( T \) is a fixed component
of the lender’s total costs that is allocated among his clientele. Any variable component of the
lender’s cost is assumed to be taken care of by \( \tau \). As in the "imperfect" collateral case, the lender
has an incentive to screen because default results in less than full recovery of the total amount
lent. This cost is necessarily shared with the lender’s trading costs, so that any fixed and variable
components of screening costs would be captured by \( T \) and \( \tau \), respectively. Likewise, the lender’s
loan collection cost is assumed to be subsumed under \( \tau \) since purchasing the borrower’s output
in effect accomplishes the job of collecting payments. Because of scope economies implicit in the
interlinked transaction, the joint fixed cost of trading and lending, \( T \), is less than the stand-alone
cost of lending which is represented by the screening and collection costs \( S + C \) of the pure
moneylender \( (T < S + C) \).

By assumption, \( p < 1 \) so that there is an incentive for the farmer to deal with the trader who
pays \( \tau > p \). It must the case, too, that \( \tau < 1 \) because otherwise the trader-lender will have no
trading margin. Since the trader’s involvement in the credit market is motivated by his objective
to secure the farmer’s output for his trading business, then he would have wasted his time, effort
and money if he did not make a positive margin from trading, i.e. if \( \tau = 1 \). In order to show that
this is the only case that makes sense, suppose that \( \tau = p = 1 \) and that \( R = \bar{R} \). Then from (3.26) and (3.23),

\[
Z^T - Z = (1 - \rho p) Q \int_0^b \theta dF(\theta) - [T - (S + C)] > 0
\]

(3.27)

The expression above which shows the difference between the trader-lender’s and pure moneylender’s expected profits makes sense to the trader-lender only to the extent that he can attract farmers to deal with him. This will not be the case if \( p = 1 \). Suppose instead that the trader offered \( \bar{R} < R \). In this case, the trader will attract borrowers but he faces the risk of attracting even those borrowers who may have little potential to supply the marketable surplus he needs. The marketing-credit link then fails as a screening mechanism and the trader could be faced with a higher default probability on his loans. It must be the case, therefore that \( p < \tau < 1 \).

It can now be shown that, in the presence of a collateral substitute, the lender’s iso-expected profit curve lies to the right of the pure moneylender’s curve. Differentiating (3.23) and (3.26) with respect to \( B \) results in

\[
\frac{\partial z}{\partial B} = \rho [R(1 - F(\theta)) + p Q_B \int_0^b \theta dF(\theta)] - I = 0
\]

(3.28)

\[
\frac{\partial z^T}{\partial B} = (1 - \tau) Q_A \int_0^b \theta dF(\theta) + Q_B \int_0^b \theta dF(\theta) + R(1 - F(\theta)) - I = 0
\]

(3.29)

which gives the loan size that maximizes the lender’s expected profit for a given rate of interest.

Assuming the rate of interest to be parametric for the trader-lender and the pure moneylender, a comparison of the marginal conditions (3.28) and (3.29) indicates that the loan size that maximizes expected profits under a credit cum marketing arrangement exceeds that under pure moneylending.\(^{19}\) Consequently, given the U-shape of the lender’s iso-expected profit curves, the

\(^{19}\) Subtracting (3.28) from (3.29) yields a positive quantity with \( \tau < 1 \) and \( p < 1 \).
turning point of the iso-expected profit curve in a credit cum marketing arrangement must lie to the right of that for an iso-expected profit curve under pure moneylending without collateral. Moreover, because \( T < (S+C) \) as a result of the joint activity of marketing and lending, this turning point also occurs at a lower interest rate than that associated with the minimum point of the pure moneylender's iso-expected profit curve. This means that, for any given rate of interest, lenders are willing to lend a bigger loan size when they can employ a collateral substitute. The relative positions of the zero iso-expected profit curves of both the pure moneylender (\( z \)) and the trader-lender (\( z' \)) are shown in Figure 3.3.

### 3.5.4 Contractual Equilibrium

The condition that characterizes contractual equilibrium with interlinking as a collateral substitute may be derived using any of the approaches outlined in Chapter II. Adding (3.25) and (3.26) and then maximizing the total surplus from the system with respect to \( B \) results in

\[
\int_0^\theta \theta Q_B dF(\theta) = \bar{Q}_B = I
\]

The expression (3.30) can be best understood in relation to (3.24) which is the condition for contractual equilibrium with neither collateral nor collateral substitute. Note that if \( p = 1 \) and \( \rho = 1 \), (3.24) is exactly equal to (3.30), which means that interlinking makes no difference if it has no value to the borrower and no borrower has an incentive to default willfully. However, if borrowers can benefit from dealing with the trader (\( \tau > p \)), if the lender gains as well from buying and selling the borrower's output (\( \tau < 1 \)), and if interlinking performs the role of a collateral substitute in enforcing repayment (\( \rho < 1 \) with pure moneylending), the left-hand side of (3.30) is unambiguously greater than the left-hand side of (3.24). For (3.30) to be satisfied, \( Q_B \) must then

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20 As shown in Chapter II, this approach is equivalent to the lender maximizing expected profit subject to the constraint that the borrower is not worse off than if he had chosen to borrow from the pure moneylender. That is, the lender chooses \( r \) and \( B \) to maximize (3.26) subject to \( \pi^T \geq \pi \).
be lower in (3.30) than in (3.24). This implies that the equilibrium loan size will be larger with
than without a collateral substitute. In other words, $B^T > B^B$.

In Figure 3.3, the point $(B^B, r^B)$ refers to the contractual equilibrium under pure
moneylending, and the point $(B^T, r^T)$ under the credit-marketing link. The loan contract $(B^T, r^T)$
involves a bigger loan size; however, without further analysis, the level of $r^T$ in relation to $r^B$ is
indeterminate. Under the credit cum marketing arrangement, the trader-lender can offer the
borrower various combinations of interest rate and output price, constrained only not to let the
borrower be worse off than his situation under the unlinked contract with the pure moneylender.
Thus point C in Figure 3.3 is a potential equilibrium with a bigger loan size and a higher rate of
interest than the unlinked contract at point U. At C the borrower is just as well off as at U since
both points lie on the same iso-expected profit curve. However, at C the interlocker attracts only
those borrowers who are willing to pay the higher interest rate based on their estimate of their
ability to productively use the bigger loans demanded in response to the higher output price
offered by the interlocker.

Two points should be unambiguously clear from the foregoing results. First, the use of a
collateral substitute increases the lender's expected profits and enables him, compared with a pure
moneylender, to lend a larger amount at the same rate of interest, or the same amount at a lower
rate of interest. Note that, for loan sizes greater than $B^B$ in Figure 3.3, the pure moneylender
cannot compete in interest rate with a linked loan because lowering his rate will result in losses.\(^{21}\)
This result is consistent with the proposition of Ray and Sengupta (1989) regarding the advantage
of an interlocker over a pure moneylender.

\(^{21}\) On the other hand, depending upon the extent of competition among lenders who use the
credit-marketing link, the rate of interest may be increased to a level just slightly below the pure
moneylender's minimum rate for each possible loan size, thereby enabling the interlocker to
appropriate for himself the gains arising from the profit differential.
Second, the potential exists for borrowers to be better-off with a credit cum marketing arrangement compared with a pure credit contract even if, in equilibrium, the interlinked contract may have a higher interest rate than the unlinked contract. That is because the high interest rate may be bundled with a higher output price which may lead to higher incomes for borrowers depending upon their capacity to respond to the higher output price. In this way, the interlinked credit and marketing contract also acts as a screening device which separates borrowers who can supply the trader with their marketable surplus from those who cannot. Only borrowers of the former type would choose the credit cum marketing contract.

3.6 A Generalization

In this section, a generalization of the above results is attempted. The effect of screening and enforcement on a lender's expected profits is examined. It is shown that lenders with better screening and enforcement devices are better able to offer loan contracts that leave borrowers better off.

The borrower with an associated set of known characteristics, \(X\), is assumed to have a well-defined loan demand function, with the related map of iso-expected profit (or utility) curves displaying certain well-behaved properties in the space of interest rate and loan size. A credit contract \(\Omega\) is defined as a combination of interest rate, loan size and a given screening and enforcement mechanism, that is, \((r,B;\beta)\), where \(\beta\) is the screening and enforcement instrument. Compared with \(r\) and \(B\), which are allowed to vary across borrowers, \(\beta\) is assumed fixed or subject to less variability across borrowers for reasons discussed below. \(\beta\) is associated with the means by which the informal lender determines the creditworthiness of loan applicants. It is related to the instruments available to the lender whereby he ensures that the borrower abides by

\[22\text{ On the other hand, borrowers could also lose flexibility in marketing their output.}\]
the terms of the credit contract. The more powerful $\beta$ is, the less prone to mistakes in judgment a lender will be vis-a-vis a given loan applicant and the more likely will be loan recovery. $\beta$ also reflects the effect of existing institutional arrangements on the ability of lenders to discriminate among loan applicants and to minimize default. The existing institutional arrangements may not - need not - necessarily be responses to the credit market problem. Nevertheless, their existence can be taken advantage of to reduce problems caused by opportunistic behavior in the credit market. Thus, $\beta$ may be broadly referred to as the lender's "technology" in that it defines the boundaries of his actions or decisions in the credit market with respect to the variables $r$ and $B$. \textsuperscript{23} The higher is $\beta$, the higher is the lender's expected return.

Define an informal lender's gross expected return from a credit contract $\Omega$ with a borrower of given $X$ as $G(\Omega;X)$. More specifically, $G(\Omega;X) = G(r,B;\beta,X)$. That is, the lender's expected gross return from a loan to a borrower with $X$ characteristics is a function of the terms of his loan offer, $r$ and $B$, given his ability to screen loan applicants and enforce the loan contract. Screening and loan enforcement are effected through the available "technology", $\beta$. Since the lender's ability to reap the returns from his loan offers depends upon the magnitude of $\beta$, it is possible to treat $\beta$ as a shift factor and write the lender's expected gross return, $G(\Omega;X)$, as $\beta G(r,B;X)$. \textsuperscript{24} The informal lender's expected profit in relation to a borrower may now be written as

\textsuperscript{23} In this sense, $\beta$ need not be limited to just a single instrument for screening and enforcement. It may in fact embody a set of instruments, aside from $r$ and $B$, that a particular lender can use to screen borrowers and enforce loan repayment. Examples are various forms of interlinkage, loan repayment in-kind, third party guarantees, the threat of social ostracism, future exclusion from the credit market, etc. The degree of effectiveness of these instruments is to a certain extent socially determined, so that the lender's ability to use them may be more limited or inoperative in some settings than in others. The type of borrower who is involved in the transaction also determines the effect of $\beta$ on expected profit.

\textsuperscript{24} $\beta$ may therefore be regarded as some sort of technological coefficient, very much analogous to the way this term is used in relation to production functions.


\[ z = \beta G(r, B; X) - iB - \Phi \]  

(3.31)

where \( i \) is the opportunity rate and \( \Phi \) is a fixed component of lending costs. From \( z \) in (3.31), the lender's iso-expected profit curve may be derived. Let this curve possess the same properties as the lender's iso-expected profit curve derived in the previous chapter. Suppose there are two informal lenders, \( M^1 \) and \( M^2 \), differentiated by their technologies. Let \( \beta^1 \) and \( \beta^2 \) describe, respectively, the technologies of these two informal lenders. Now suppose \( \beta^2 > \beta^1 \). The relative locations of the two lenders' iso-expected profit curves can now be shown. Taking the interest rate as parametric, maximize (3.31) with respect to \( B \). This gives

\[ \beta G_B(r, B; X) = i \]  

(3.32)

Clearly, if both lenders are maximizing expected profit, and if \( \beta^2 > \beta^1 \), the loan size that maximizes \( M^2 \)'s expected profit must exceed that of \( M^1 \)'s. But since this profit-maximizing loan level coincides with the turning point of each lender's iso-expected profit curve as shown earlier, \( M^2 \)'s iso-expected profit curve must be to the right of the \( M^1 \)'s curve. Superimposing the borrower's loan demand curve and indifference map on the lenders' profit curves in the space of \( r \) and \( B \) leads to the conclusion that, for a given loan demand, loan size will be bigger and the interest rate will be lower in equilibrium for loans offered by lenders with more effective screening and enforcement technologies. This is shown in Figure 3.4. In Figure 3.3, this is also illustrated in terms of the pure moneylender's contract \( F \) which, relative to the borrower's loan demand at \( D(r) \), is inferior to the interlocker's contract at \( C \).

In an interlinked credit contract, \( \beta \) is related to the fact that the lender operates in another market, and that such activity influences the terms of his contract offer in the credit market. At this level of analysis, the nature of the interlocker's activity in the other market as well as the specific terms of the exchange in that market are not consequential for the main result. The point that must be emphasized is that the ability to discriminate between types of credit risk and to
compel repayment, both incorporated in \( \beta \), is increased by the interlocker's dealings with his borrower in another market. Recall that in the above example of the credit cum marketing contract, only those borrowers who can provide the collateral substitute required by the lender have access to loans from this interlocker type. This requirement, by screening out those loan applicants with less ability to produce a marketable surplus, in effect also screens out the applicants with a lower ability to repay loans. Moreover, by acting as the buyer of the borrower's output, the lender employing the credit-marketing link is able to effectively enforce repayment.

The source of the interlocker's advantage in the credit market is his ability to combine his lending activity with his trading activity in the market for the commodity which the borrower produces with the loan. The economies of scope realized in undertaking this joint activity translate into lower lending costs which allow the interlocker to offer loans at lower rates of interest than the pure moneylender. The trader is able to profitably combine trading with moneylending because of his access to the higher price in the output market from which he earns a return that is not available to the pure moneylender. Note that in the credit-marketing link example above, the condition \( p < \tau < 1 \) is important if the use of the credit cum marketing contract is to be more profitable for the lender than pure moneylending. That is, the lender engaged in both lending and marketing must receive a pure trading profit from his marketing activity, and that furthermore, such profit possibility is not available to the pure moneylender. In general, if the possibility for interlinkage is not available to the pure moneylender, he cannot make his contract offers as attractive for borrowers as the interlocker.\(^{25}\)

\(^{25}\) For example, since the pure moneylender is not equipped to do trading on a regular and sustained basis (he may not have storage and transport facilities), he cannot do as well as the trader in his transactions in the product market. The pure moneylender may also not have access to information about the commodity market and prices. Being limited by his lack of storage and transport facilities, he can only deal in small volumes of the traded commodity and, thus, may not obtain as good a price for the commodity as a regular trader would.
For any interlocker, $\beta$ is a compound of two factors. The first factor is the interlocker's involvement in another market in which he must have a clear advantage over the pure moneylender. If the moneylender can mimic the strategy of the interlocker, the latter's advantage disappears. The second factor is the interlocker's enhanced ability to screen applicants and enforce repayment which derives from an informational advantage due to the first factor. This reduces transaction costs. These two factors combined enable the interlocker to offer bigger-sized or lower-interest loans to a borrower who would otherwise borrow from a pure moneylender. Thus, given a pure moneylender and an interlocker and their respective screening-enforcement "technologies", $\beta^1$ and $\beta^2$, it must be the case that $\beta^2 > \beta^1$.

In a theoretical paper that analyzes the pattern of competition arising from interlinked credit arrangements, Ray and Sengupta (1989) argue that two assumptions are necessary for an interlocker to have an edge in the credit market. These are: (i) that interlockers face better terms than pure moneylenders in the market in which the former are active, over and above their ability to be active in such market, and (ii) that interlockers can condition their returns under an optimal contract on more variables than just the loan itself. The first assumption precludes any possibility of the moneylender pursuing the same strategy as the interlocker, i.e. no moneylender involvement in the market where the interlocker is active. The second has to do with differential observability, that is, the interlockers' activities in other markets beside the credit market allow them to observe other variables (e.g. timing and quantity of harvest, output prices, rural wage rates, borrower's historical productivity) on which they can condition repayment. But these two assumptions are precisely the reasons advanced above for the claim that $\beta^2 > \beta^1$. Thus, the claim that $\beta^2 \cdot \beta^1$ is a very reasonable one. The main result that derives from this assumption is that, compared with those of a pure moneylender, loan contract offers made by interlockers will be characterized by bigger loans sizes and lower interest rates.
There is nothing in the foregoing discussion about the interlocker's advantage over a pure moneylender that suggests a scenario where pure moneylenders are driven out of business by interlockers. This might be the case in a credit market regime where informal lenders can insist on exclusive contracts. The difficulty of enforcing such a clause in credit agreements, however, does not make such an assumption a plausible one. If contracts are non-exclusive, the borrower may still resort to the pure moneylender if his dealings with the interlocker leave him with an unsatisfied demand for credit, which is always a possibility when collateral is imperfect. However, even in the unlikely situation wherein exclusive contracts can be enforced in the rural informal credit market, the pure moneylender may be the only other source of loans for borrowers who are not served by interlockers because they do not possess the collateral substitute required by the interlocker. The advantage conferred by the interlinked contract on the interlocker is limited to borrowers who are within the scope of the interlocker's non-credit market activity. For instance, the trader in good X reaps the advantage of scope economies by being a creditor to producers of good X. However, with respect to producers of good Y, the trader in good X may not be able to do better than the pure moneylender since the scope economies enjoyed in interlinking are specific to transactions with good X producers. The presence of lenders who can offer interlinked loans, therefore, does not necessarily drive pure moneylenders out of the rural credit market.

In informal credit markets, informal lenders typically engage in various forms of interlinked arrangements.26 Those who have extensively examined informal credit markets have observed that pure moneylenders are hard to find. The informal lender assumes various guises to different borrowers in different geographical settings and social situations [Bell (1990)]. In this light, the question arises: how can the interlocker's advantage argument made above still be valid? More

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specifically, can any meaningful statement be made about one interlocker’s β in relation to another interlocker’s β? Assuming that two interlockers’ β’s can be compared, can such comparison yield any predictions or testable hypotheses? Can the argument about an "interlocker’s advantage" be used to predict how informal credit will be allocated among the rural borrowing population?

The answer to these questions lies in the lender’s occupational specialization, which somehow circumscribes β. In Section 3.1, the relationship-specific character of interlinked contracts was shown. Note that in each of the two examples discussed, a different class of borrower is involved with each interlocker type. If traders and farmers engage in moneylending because it is deemed necessary for the sustenance of their principal activities, then the act of extending loans is essentially an investment whose benefits for the lender extend beyond the returns from the lending activity alone. What this implies for the analysis of screening in relation to the credit market transaction is that an informal lender’s clientele will come generally from the set of loan applicants who have the potential to contribute to the furtherance of the lender’s occupational specialization. In other words, some sorting of loan applicants already occurs outside the credit market.

The credit market framework developed in the preceding sections must, therefore, account for differences among borrowers as well as len. Since dealings in either the product or labor market reduce the cost of screening and enforcement for lenders, it has been argued that an interlocker’s advantage relative to a pure moneylender emerges in the credit market. However, this competitive advantage needs to be further qualified in light of the differences that exist among borrower classes and informal lenders’ primary occupations. Informal lender T, for instance, may have an advantage over other lenders in dealing with borrowers of class F, but not with borrowers from say, class W. A more complete description of the lender’s screening-enforcement technology, β, must, therefore, consider the specific class of loan applicants confronted by the informal lender.
In the presence of diverse classes of borrowers, informal lenders' occupational specializations provide a clue regarding the relative magnitudes of their $\beta$'s and, therefore, their competitive advantage in the credit market vis-a-vis a specified borrower class.

3.7 Specialization by Collateral Substitutes

In this section a specific pattern of credit allocation in the rural financial market is discussed in light of the interlocker's advantage argument demonstrated earlier. The manner in which different classes of rural borrowers are sorted among different lender types is referred to as a pattern of credit allocation.\(^\text{27}\) The specific pattern of credit allocation examined in this study pertains to the observed specialization of informal lenders in lending to specific borrower classes. Floro (1987) showed, for instance, that trader-lenders lend mainly to big farmers and farmer-lenders to small farmers. Nagarajan (1992) also observed that trader-lenders prefer borrowers with bigger marketable surpluses of the traded product. This section shows how the interlocker's advantage argument can be used to derive similar predictions that are testable based on actual credit market observations.

Returning to the credit market framework developed in the preceding sections, suppose that there are two informal lender types, and two classes of borrowers. Let the two lender types be traders, denoted $T$, and landowners or farmers, denoted $L$. Let the two borrower classes be farmers, denoted $F$, and landless agricultural workers, $W$.\(^\text{28}\) Farmers are distinguished from agricultural workers in that the former operate farms and are in charge of all decision-making on the farm, while the latter are hired to assist the farm operator and perform specified farm tasks. In terms of the distribution of returns, farm operators are residual claimants (i.e. owner-cultivators

\(^\text{27}\) Ray and Sengupta (1989) refer to this as a "pattern of competition".

\(^\text{28}\) The present model distinguishes between farmer-lenders ($L$) and farmer-borrowers ($F$).
or lessees), while farm workers are paid a contractually-determined wage or output share for contributing their labor services.

Assume further for simplicity that traders cannot be landowners or farmers at the same time and vice versa, and that farmers cannot simultaneously be agricultural workers. The borrowers' expected utilities are functions of their respective incomes (or consumptions, as the case may be), \( \pi \), which in turn depend upon the sizes of their loans, \( B \), and the rate of interest, \( r \). This may be written compactly as \( U(\pi(r,B;X)) \). A credit contract is defined as before as \( \Omega(r,B;\beta,X) \). In the presence of two lender types and two borrower classes, the lender's ability to screen loan applicants and enforce the loan contract, as reflected in \( \beta \), is more completely described by \( \beta^h \), \( h = T, L \) and \( j = F, W \). That is, \( \beta^h \) is type \( h \) lender's ability to screen loan applicants and enforce the loan contract given that the loan applicant belongs to class \( j \). The informal lender's expected profit equation is therefore

\[
z^h = \beta^h G^h(r,B) - iB - \Phi, \quad h = T, L \quad \text{and} \quad j = F, W
\]

Maximizing (3.33) subject to borrower \( j \) obtaining at least his reservation utility, \( \bar{U} \), yields the following condition for contractual equilibrium,

\[
\frac{\beta^h G_B - i}{\beta^h G_r} = \frac{\pi^j_B}{\pi^j_r}
\]

The left-hand side of (3.34) is the slope of the lender's iso-expected profit curve, and the right-hand side is the slope of the borrower's iso-utility or iso-expected income curve. When the lender \( h \) agrees to deal with a loan applicant \( j \), contractual equilibrium is established at the point of tangency of their respective iso-expected profit curves. Condition (3.34) is, therefore, just a generalization of an earlier result.
Assume an agricultural laborer, W, with a well-defined loan demand function and the associated iso-expected utility curve in the space of loan size and the interest rate as in Figure 3.5. Let the two lenders' technologies be such that $\beta^{T,W} < \beta^{T,W}$. This follows from the fact that landowners or farmers regularly deal with agricultural workers in the labor market, and can make use of the loan applicant's commitment of labor services on their farms as a collateral substitute. Traders cannot do the same. In addition, since traders usually operate from town centers, they have less intimate knowledge of village residents, and are less able to use the informal network of village social relations for information gathering about applicants belonging to class W. Given the trader-lenders' relatively high cost of lending to agricultural workers, farmer-lenders have an advantage over traders in lending to borrowers of class W.

This situation is depicted in Figure 3.5 which shows the location of the trader-lender's and farmer-lender's zero iso-expected profit curves relative to the borrower's indifference curve. The trader-lender's zero iso-expected profit curve ($z^{T,W}(0)$) lies to the northeast of the worker's demand curve, showing that dealing with an agricultural laborer in the credit market is not profitable for the trader. If the trader chooses to lend to agricultural workers, he can do so only if, at the minimum, he offers the terms described by his zero iso-expected profit curve in Figure 3.5. Obviously, the worker will not choose to borrow from the trader if he can get a better contract from a farmer-lender. Here the interlocker's advantage emerges once again. The farmer-lender is in a better position to screen loan applicants from class W and can, through interlinkage, more effectively enforce the loan contract.\(^{29}\) This is indicated by the location of his zero iso-expected profit curve ($z^{L,W}(0)$). A landless agricultural laborer will, therefore, choose to deal with a farmer-lender than a trader-lender in the rural credit market.

\(^{29}\) The farmer-lender's position is strengthened if the laborer resides in the same village and he values his reputation.
Figure 3.5: The Farmer-Lender’s Advantage With Landless Borrowers

Figure 3.6: The Trader-Lender’s Advantage With Farmer-Borrowers
Next consider a farm cultivator with a well-defined loan demand function and the associated indifference curve in the space of r and B, with the properties discussed in the previous chapter. Again there are two types of informal lenders, T and L, and their comparative advantage in dealing with a farmer borrower depends upon the technologies available to both. Suppose that $\beta^{LF} < \beta^{TF}$; that is, the trader-lender has a superior technology for screening loan applicants who are farmers, as well as enforcing loan repayment. As the immediately preceding section has shown, trader-lenders regularly deal with farmers in the product market. This activity produces information for traders regarding various farmers' resource statuses and abilities to pay. Traders can then condition loans on their right to exclusively purchase the borrower's output, and through such linkage, insure the farmer's repayment on his loan.

This situation is depicted in Figure 3.6, where the zero iso-expected profit curves of the trader-lender ($z^{TF}(0)$) and the farmer-lender ($z^{LF}(0)$) vis-a-vis a farmer-borrower are drawn in the space of r and B. The relative positions of $z^{TF}(0)$ and $z^{LF}(0)$ show the comparative advantage of the trader in dealing with farmer borrowers. If the farmer-borrower decides to take a loan from a farmer-lender, the contract $(B^L,r^L)$ is the best he can get without the lender making any losses. However, if the farmer takes a loan from a trader, he gets the contract $(B^T,r^T)$ which involves a lower interest rate and a bigger loan size. In this case, the trader loan will always be chosen. The farmer-lender is in no position to make a better offer. He cannot offer loans of any size greater than $B^L$ without raising the rate of interest, because doing so increases his cost of lending. Any loan contract below $z^{LF}(0)$ will be unprofitable for the farmer-lender.

The same result shown in Figure 3.6 can be generated if, instead of assuming differences in the trader’s and farmer’s screening and enforcement technologies, it is assumed that these lenders face different opportunity costs of lending to farmer-borrowers.
Farmer-lenders have a higher opportunity cost of lending to farmer-borrowers than do trader-lenders. Since \( d/B/di|_{\omega} < 0 \), it is obvious that a higher opportunity cost of funds implies a steeper slope for the rising portion of a lender's iso-expected profit curve. Thus, the lender with the higher opportunity cost of lending to a particular borrowing clientele is constrained to lend at higher rate of interest compared with a lender facing a lower opportunity rate, *ceteris paribus*.

The competitive advantage of the trader-lender in lending to farmer-borrowers becomes evident when, in addition to interlinkage possibilities, the material environment of agricultural production is considered. The seasonality of production and the synchronic timing of crop growth cycles and farm operations [Binswanger and Rosenzweig (1986)] are two characteristics of agriculture which are relevant here. On the one hand, the weather-dependent nature of most crops imparts a seasonal character to agricultural production, leading to seasonal demands for credit in order to bridge the gap between agricultural households' incomes and expenditures. Thus, farm operators usually borrow to finance production expenses at the beginning of the crop growth cycle, and agricultural workers borrow for consumption between harvests. Since the trader's funds are usually idle during the planting season, the seasonality of agriculture puts the trader in an excellent position to meet the credit demand of rural borrowers.\(^30\) On the other hand, because seasonality also leads to the concurrent timing of crop growth cycles and farm operations within an ecologically circumscribed agricultural region, a farmer will generally be constrained in his ability to lend his funds to co-farmers during the planting season. Synchronic timing causes the farmer-

\(^{30}\) The assumption is that traders have no other profitable investment opportunity during the slack agricultural season. This assumption is plausible in view of the usually limited menu of financial instruments offered by the formal sector in low-income countries, as well as the relatively low rates of interest available on bank savings deposits.
lender's own demand for finance capital to compete with the credit demand of farmer loan applicants.\(^{31}\)

The above suggests that farmer-lenders incur a higher opportunity cost of lending than trader-lenders whenever they lend to farm cultivators. With \(\frac{dB}{di}|_{\infty} < 0\), loan contract offers by farmer-lenders will involve loan sizes smaller than those of trader-lenders, a result consistent with Figure 3.6. Thus, even if the trader's screening-enforcement technology were not strictly better than the farmer's, the latter's relatively higher opportunity cost of funds bestows an advantage to the trader, and enables him to offer farmer-borrowers more favorable loan terms.

3.8 Summary

This chapter has developed a model of informal credit where market interlinkage originates from the objective of trader-lenders to secure their borrowers' marketable surpluses as well as from the objective of farmer-lenders to reduce labor monitoring and recruitment costs. From a credit market perspective, an interlinked contract acts as a collateral substitute which can facilitate the screening of loan applicants and repayment enforcement. In a situation characterized by potential loan default and limited opportunities for collateral use, an interlinked contract endows the interlocker with an economic advantage over a pure moneylender. This makes it possible for an interlocker to offer borrowers more favorable loan terms.

The pattern of credit allocation in an informal credit market can be explained as a predictable outcome of the economic behaviors of interlockers. This chapter has shown that if rural agents lend primarily to promote their trading or farming activities, these considerations are bound to be

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\(^{31}\) In contrast, no such competition exists between the farmer-lender's demand for funds and the landless worker's demand for loans, especially if the worker is employed by the farmer-lender. That is because the consumption loan to a landless worker may be considered as part of the farmer's production outlay to the extent that it forms a part of the employment contract, i.e. as a mechanism to minimize the worker's shirking on the job or to reduce the cost of recruitment.
reflected in their choice of borrowing clienteles. Under somewhat restrictive assumptions about the economic activities of both lenders and borrowers, the theory predicts that in the credit market, trader-lenders will specialize in lending to farmer-borrowers, and farmer-lenders will specialize in lending to landless agricultural laborers. This chapter has demonstrated that the economic advantage of the interlocker, when dealing with a specific class of loan applicants, is crucial to this result. While the model presented considers only two types of interlockers, the major implication of this result is that, depending upon the relative importance of various informal lender types, the mechanisms by which lenders screen borrowers and enforce loan contracts account for the organization of informal credit markets into various niche markets. This makes the case for segmented rural credit markets a plausible one.

Specialization in lending to a specific borrower group is, however, a tendency whose strength, according to the model presented above, depends upon the degree of occupational specialization of rural agents. In the theoretical model, it was assumed that rural agents are highly specialized with respect to their occupations. This assumption was both convenient and necessary for the purpose of being able to state the lender specialization hypothesis in an empirically testable form. In an actual rural setting, however, the trader may also be a farmer or landowner. The farmer-cultivator who borrows to finance his production inputs may be another farmer-cultivator’s wage worker. These multiple economic roles or activities broaden the range of alternatives open to agents on both sides of the credit market. The trader who is also a farmer now has an incentive to invest in a credit relationship with a landless worker because the latter’s labor services are directly useful to him. Similarly, the farmer cultivator who has the time to spend at work on another farmer’s plot can obtain a loan from a farmer-lender on the basis of his surplus labor as a collateral substitute. Obtaining a loan from another farmer is also facilitated when other members of a farm household work as wage laborers on other farm plots. This suggests that
depending upon its time allocation between own-farm and off-farm activities, a farm household can have access to both trader and farmer credit. In a scenario where rural households are involved in multiple economic activities, the tendency toward lender specialization, as described above, may therefore be less pronounced.

The multiplicity of rural household economic activities, however, implies only that traders need not strictly limit their lending to farmers, and farmer-lenders to landless laborers. It means that because borrowing agents can offer more than one type of collateral substitute (i.e. the marketable surplus of their output and their labor services), and lending agents can accept both, it is possible to have a mix of both borrower types in the lenders' loan portfolios. This fact does not alter the essential feature of the informal credit market with interlinked contracts; the type of lender the borrower deals with remains crucial to the credit transaction. That is because the collateral (substitute) offered by the borrower must have direct use value for the lender. Where collateral assets can be relatively easily marketed, the lender's type need not be a consideration for the credit transaction to take place. This requirement for a *double coincidence of wants* to exist between borrower and lender basically distinguishes an informal credit transaction with market interlinkage from a pure credit transaction with a financial intermediary. More importantly, this observation points to potential savings in transaction costs associated with search in the presence of institutions which can perform the specialized function of intermediating funds between surplus and deficit units.\(^{32}\)

\(^{32}\) See Benston and Smith (1976) for a transaction cost explanation for the existence of financial intermediaries.
CHAPTER IV
DATA FROM VILLAGE SURVEYS

This chapter and the next examine the empirical relevance of the main propositions derived from the credit transaction model developed in the preceding chapter. To accomplish this, some descriptive statistics on informal credit arrangements are presented in this chapter. The data are taken from a survey of the informal credit markets in four rice-growing villages in Central Luzon, Philippines.

In general, diversity among participants characterizes the Philippine rural financial market (RFM). On the demand side, farms, firms and households of different sizes and income levels demand financial services for various uses. On the supply side, both formal and informal institutions provide a variety of financial services. The formal institutions include rural banks, savings banks, and branches of commercial and development banks. These institutions provide loans and accept savings deposits. The informal sector of the RFM is composed of various surplus units that extend direct finance to deficit units. Informal credit sources include landlords, farmer-cultivators, traders, input dealers, grain warehouse owners, millers, retail storeowners and so-called "professional" moneylenders. Unlike banks, informal lenders generally do not maintain deposit-taking facilities.

The Philippine RFM has undergone significant changes in the past twenty years. Yet the proportion of rural borrowers served by the informal sector continues to exceed that served by the formal sector. In the 1970s, the Philippine government embarked on a number of subsidized credit
programs targeting small rural borrowers. The most massive of these programs - the Masagana 99 - was launched as part of a nationwide campaign to diffuse the high-yielding rice technology.¹ While these specialized credit programs were able to reach nearly 20 to 25 percent of the small rice and corn farmers and to increase the share of formal credit going to agriculture, they were soon burdened with arrearages problems.

The 1980s witnessed a drastic contraction in formal credit, especially in rice-growing areas. This developed as a consequence of: (i) the financial reforms undertaken in the 1980s which phased out of a number of special credit programs, (ii) the closure of several rural banks on account of insolvency and the contractionary monetary policy precipitated by the economic crisis of 1983-85,² and (iii) the inability of many borrowers to obtain new loans from the banks because of poor repayment performance under the special credit programs [Adams and Sandoval (1989)]. In this scenario, the role of informal credit loomed large once again.

Unfortunately, it is difficult to give an exact figure for the total volume of rural credit because of the incompleteness of informal credit data. There is no mechanism in the Philippines' statistical system at present which provides for the collection of informal credit data on a regular and systematic basis. This has made longitudinal studies of informal credit markets very difficult. Most informal credit market studies have relied on specific field surveys. From 1950 to 1982, there were at least fifteen primary surveys of rural informal credit markets conducted in various geographic areas of the Philippines [Sacay et al (1985)]. Since previous survey results have been summarized by other researchers [Sacay et al (1985), Bautista and Magno (1990)], they will not be discussed here unless they are of immediate relevance. It should be noted that, because of the

¹ An analysis of this credit program is provided in Esguerra (1981). See also Sacay et al (1985).

uneven and non-uniform coverage of the various surveys, conclusions about developments in the informal credit market through time must be made with caution.

This chapter is organized as follows: the next section provides an overview of the data set used in this study. This is followed by a general description of the rural villages and characteristics of the sample households. To put the discussion of informal credit transactions in proper perspective, the material and institutional environment in the rural villages is described in terms of the effects of the high-yielding rice technology and land reform on product and factor markets. The third section describes the informal credit market in the study areas. The extent of the use of credit contracts linked with marketing and labor contracts is then discussed in the fourth section. In the fifth section, the pattern of credit allocation is described. It will be argued that this pattern is the predictable outcome of the sorting behavior of the dominant lenders in the informal market based on their motives for lending. In particular, the importance of farmer-lenders and trader-lenders in the rural financial market will be established in this chapter. The groundwork is laid for the formulation of testable hypotheses regarding the pattern of credit allocation resulting from the use of collateral substitutes as sorting mechanisms. These hypotheses are tested in the next chapter.

4.1 The ACPC-RICM Data

In 1988 the Agricultural Credit Policy Council (ACPC) of the Philippines' Department of Agriculture conducted a study of rural informal credit markets in selected areas in the Philippines. The objective was to determine the extent of rural household indebtedness to the informal sector and the changes that had transpired in rural financial markets since the implementation of financial
reform and other policy measures in the early 1980s and the change of government in 1986. The Rural Informal Credit Market Survey of 1988, hereafter RICM, covered eight villages in four municipalities of four provinces in the major island of Luzon. The four provinces include Nueva Ecija in Central Luzon and Batangas, Laguna and Quezon in Southern Luzon. Each of these provinces corresponds to a major crop area - Nueva Ecija for rice, Laguna and Quezon for coconut and Batangas for sugar. This study is based on the data set from Nueva Ecija province only.

The basic sampling unit for the RICM survey is the rural household. The Nueva Ecija data set covers 171 randomly selected households classified by principal economic activity. Information was collected on credit transactions entered into by the households during the survey reference period. Respondents were asked about the sources and the terms and conditions of every loan they obtained during the main or wet (May-October) and the second or dry (November-April) cropping seasons for 1987-88.

While relatively less extensive in coverage when compared to previous informal credit market surveys, the RICM data set contains more information on individual informal loan contracts than most previous surveys. This makes it a suitable data base for this study. Because differences among villages are bound to influence credit market data, the sample villages were chosen in such a way that inter-village differences would not be the major factor explaining the rural agents’ observed behaviors in the credit market. In particular, the data were drawn from several villages producing the same crop and located within the same municipality. While this feature does not make the sample villages exactly physically and ecologically homogeneous, it lessens the degree

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3 The ACPC is the governmental body charged with formulating credit policy for the agricultural sector. It was created in 1986. Its predecessor, the Technical Board for Agricultural Credit (TBAC), had been responsible for a number of rural household surveys on farm indebtedness in the 1970s.
to which diversity in the material environment may introduce "noise" into statements regarding agents' behaviors in the credit market. The relatively commercialized agrarian setting from which the data were drawn also provides a picture of an active informal credit market wherein a variety of credit contracts thrive. This allows for a cross-sectional analysis of loan contracts in relation to the characteristics of credit market participants.

The credit market data in the RICM data set are based primarily on borrower-supplied information. This is a limitation in the sense that the data can provide only indirect evidence of lender behavior. The information on loans granted by a specific informal lender is limited only to the sampled borrowers. If the informal lenders have other borrowers not covered by the survey, then the information cannot be strictly interpreted as the lender's portfolio. A common problem with short period surveys, such as the RICM survey, is the refusal of informal lenders to provide detailed information about individual contracts. Another limitation of the RICM data set is that it captures only two succeeding cropping seasons. No historical production and incomes data are included. Neither does the data provide information on the credit history of the respondents (e.g. previous repayment performance for a specific lender). As such the measurement of reputational variables which are crucial in the determination of a loan applicant's riskiness has to rely on indirect methods.

4.2 The Study Villages

4.2.1 Overview

Nueva Ecija is the primary rice growing province in Central Luzon, accounting for more than half of the region's rice output. More than 90 percent of the cultivated area in Nueva Ecija is planted to rice.

Nueva Ecija provides an ideal site for the study of rural credit markets because it possesses most characteristics presumed to be associated with a relatively developed or active rural financial
market. First, the province has attained a fairly high degree of commercialization, being one of several provinces where yield-increasing rice technology has been widely diffused. Second, the agricultural nature of household production in the local economy underscores the role of credit as a mechanism for smoothing intertemporal consumption. This role has assumed greater importance in light of the dependence of the modern rice technology on commercially produced inputs. In addition, the implementation of a land reform program in this province in the 1970s has led to changes in production relations which are expected to be reflected in credit relations.

The RICM survey was conducted in four villages in the township or municipality of Muñoz. These were Villa Nati, Sapang Cauayan, Villa Cuizon and Mangandingay. Figure 4.1 is a sketch of the municipality of Muñoz with the relative locations of the study villages indicated. Commercial activity is centered in the town proper of Muñoz where most grain-buying stations, rice mills, warehouses and input dealers are situated. The first three villages are each about 8-9 kilometers from Muñoz. They are well-irrigated, drawing their water supply from one of the country's major irrigation systems. This has made two croppings possible within a year. Mangandingay is about 15 kilometers from Muñoz and is less accessible from the town center than the three other villages. Because it is not irrigated and few households own water pumps to irrigate their farms, rice is produced only during the rainy or wet season. In the dry season, most of the work force in this village temporarily migrates to neighboring villages for employment.

4.2.2 General Characteristics of Household Respondents

Table 4.1 provides a breakdown of the Nueva Ecija sample by village and household type. Fifty-three percent of the sample of 171 households is composed of farm households, while the rest are broken down into landless agricultural (30%) and landless non-agricultural or non-farm households (17%). Throughout this discussion, the term "landless" will be used exclusively to refer to landless agricultural households, while "non-farm" will be used for the latter type. In
Figure 4.1: The Municipality of Muñoz And Its Villages
subsequent analyses, this study uses 170, and not 171, household observations because one household was considered an outlier and was deleted from the list.

Farm households are those whose primary income source is the operation of a farm regardless of the farm operator's tenurial status. Table 4.2 provides information on the tenurial status of the 91 farm households in the sample. The information was collected based on the households' operational holdings. The category "mixed" refers to households with more than one farm plot on which different tenurial contracts are in force. Fifty-nine percent of the farm households reported having leasehold contracts. Owner-cultivators comprised 22% of the total. Amortizing owners numbered 13, or about 14% of the entire sample. The predominance of leasehold contracts reflects in part the extent of agrarian reform in Nueva Ecija. Philippine land reform programs made share tenancy illegal in rice areas, thus converting sharecroppers to leaseholders or amortizing owners.

Landless non-agricultural households are defined as those engaged primarily in non-farm activities. Most heads of non-farm households work as blue-collar employees at the nearby Central Luzon State University. Others are self-employed as pedicab operators or retail storeowners. Some members of non-farm households may be working as agricultural workers on other households' plots. The defining characteristic of a non-farm household, however, is that the household does not operate a farm plot and household income derives largely from non-farm work. Landless agricultural, or simply landless, households are those who do not operate a farm and derive more than fifty percent of their income from hiring out their labor services to farm operators. They are hired either as "permanent" workers or as "casuals". The latter are hired for specifically defined

4 In the only rainfed area, 50% of the farm households interviewed were owner-cultivators. Given the diverse production environment across villages in the same municipality, this suggests that the market for tenancies is less active in the relatively unfavorable areas. Since sharecropping is considered illegal and leasehold contracts shift the risk burden to the tenant, potential tenants tend to avoid areas where production uncertainty is higher.

5 These are land reform beneficiaries amortizing their acquired lands with the Land Bank.
### Table 4.1: DISTRIBUTION OF SAMPLE HOUSEHOLDS BY TYPE AND BY VILLAGE

<table>
<thead>
<tr>
<th>Household Type</th>
<th>Villa Nati</th>
<th>Sapang Cauayan</th>
<th>Villa Cuizon</th>
<th>Mangan-dingay</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm</td>
<td>28</td>
<td>31</td>
<td>8</td>
<td>24</td>
<td>91</td>
<td>53</td>
</tr>
<tr>
<td>Landless</td>
<td>22</td>
<td>20</td>
<td>5</td>
<td>4</td>
<td>51</td>
<td>30</td>
</tr>
<tr>
<td>Non-farm</td>
<td>3</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>62</td>
<td>24</td>
<td>32</td>
<td>171</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>31</td>
<td>36</td>
<td>14</td>
<td>19</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4.2: DISTRIBUTION OF FARM HOUSEHOLDS BY TENURE TYPE IN RAINFED AND IRRIGATED AREAS

<table>
<thead>
<tr>
<th>Tenure Type</th>
<th>Rainfed</th>
<th>Irrigated</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner Cultivator</td>
<td>12</td>
<td>8</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Amortizing Owner</td>
<td>3</td>
<td>10</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Share Tenant</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Leasehold Tenant</td>
<td>7</td>
<td>46</td>
<td>53</td>
<td>59</td>
</tr>
<tr>
<td>Owner Leased Out</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mixed</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>67</td>
<td>91</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>26</td>
<td>74</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
farm tasks (e.g. weeding or planting) and are paid mostly on a piece-rate basis. "Permanent" workers are usually employed to perform a set of farm tasks (e.g. land preparation or crop care activities) including assisting the owner in managing the farm and supervising other hired laborers. They are paid a fixed share of the paddy, with 10 percent of the output being the amount commonly observed in the four villages. Because the scope of work of "permanent" workers is generally not limited to a single activity, they have greater flexibility than casual laborers in input use and labor allocation. "Permanent" labor contracts under which the landless are employed typically cover a cropping season, but are renewable based on the worker's performance.

The majority of farm households (87%) operated farms of under three hectares in size (Table 4.3) reflecting the general pattern for Nueva Ecija rice farms. Almost all farm households (88 of 91) reported some income from off-farm, non-farm and other sources during the survey reference period. A common characteristic of most farm households is the involvement of family members in own-farm cultivation. When the labor-intensive operations are completed, most family members hire out their services to other farm operators in need of labor. Other income sources include backyard poultry or livestock raising as well as transfers and remittances from household members working in cities or overseas. Similarly, the majority of landless and non-farm households had more than one income source.

4.2.3 Factor and Product Markets

The adoption of the yield-increasing rice technology in the Philippines probably had its most far-reaching impact in the commercialization of rural rice-based economies. The induced adoption of commercially produced inputs and the production of larger marketable surpluses hastened the development of both input and output markets. Increased labor requirements, especially for crop-

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6 The average size of a rice farm in Nueva Ecija is 2.19 hectares [Census of Agriculture (1980)].
Table 4.3: DISTRIBUTION OF FARM HOUSEHOLDS BY SIZE OF FARM

<table>
<thead>
<tr>
<th>Area (in hectares)</th>
<th>Villa Nati</th>
<th>Sapang Cauayan</th>
<th>Villa Cuizon</th>
<th>Mangan-dingay</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>1 to &lt; 2</td>
<td>11</td>
<td>13</td>
<td>4</td>
<td>13</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>2 to &lt; 3</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>3 to &lt; 4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4 to &lt; 5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5 and above</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>31</td>
<td>8</td>
<td>24</td>
<td>91</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>31</td>
<td>34</td>
<td>9</td>
<td>26</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
care activities and post-harvest operations, along with changes in tenurial arrangements, induced partly by legislation, have also contributed to the emergence and growth of a rural market for wage labor. All these changes have had an impact on rural financial markets.

4.2.3.1 The Labor Market

Hayami and Otsuka (1988) have examined the evolution of the type of permanent labor contracts found in Nueva Ecija. The *porsyentuhan* (meaning a percentage or sharing rule), as the wage contract is called, became popular in Nueva Ecija only within the last decade and especially in irrigated areas. The popularity of this type of contract, which resembles share-tenancy, can be attributed to the yield-increasing rice technology introduced in the late sixties, and the illegalization of share-tenancy as part of land reform legislation in the 1970s. The higher yields made possible by the new rice technology, combined with the fixed rents and amortization payments stipulated by law, resulted in increased incomes for leaseholders and amortizing owners. The income effects consequent to the technical and institutional change have resulted in the withdrawal from farming of some of the beneficiaries and their children, thereby inducing a substitution of hired labor for family labor. At the same time, the farm tasks associated with the new technology required the expenditure of *quality* effort on the part of the laborer, implying greater supervision and monitoring costs for the employer. The prohibition against sub-tenancy, however, precluded what would have been an incentive-compatible contract under the circumstances. As Hayami and Otsuka conclude: the permanent labor arrangement of the *porsyentuhan* type "plays a role similar to tenancy contracts, while it can be easily disguised as a labor employment contract" (p.11).

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7 For an excellent discussion of Philippine land reform programs see Hayami, Quisumbing and Adriano (1990).
Because the worker has relative autonomy in labor allocation decisions under a permanent labor contract, the resulting employer-worker relationship implies a principal-agent problem of the type discussed in existing models of share-tenancy. This problem provides the motivation for the farm employer to get involved in his worker's credit transactions as suggested by models of interlinked credit and tenancy contracts and shown in the preceding chapter. Under this arrangement, the demand for consumption credit by landless workers can be met by their employers. While the landless worker's lack of collateral precludes access to formal loan sources, an informal credit transaction is possible because of the employer's personal knowledge of his workers and his ability to enforce repayment of the loans simply by deducting the outstanding amounts from the wages paid. Farm operators are also willing to provide consumption advances for casual laborers during slack months in exchange for their commitment to provide labor services for the months of peak labor demand when farm labor is usually more expensive to recruit. Thus, an important form of collateral substitute in use in the informal financial market of Muñoz is the rural household's ability to supply its agricultural labor power to landowners and farm operators.

4.2.3.2 The Land Market

Expectations of higher farm incomes accruing to successful farmer-cultivators as a result of improved yields and the fixing of rents and amortization payments have also increased the demand for cultivable land. At the same time, the increased operating expenses associated with the new rice technology implied a greater loan demand by farmers with few own-resources. With the demise of subsidized credit programs in the late 1970s and a lack of acceptable collateral, farmer-borrowers had no alternative other than the informal credit market. In this market, land usufruct rights became an attractive collateral substitute for lenders eager to benefit from farming. The incentive to create a market for land usufruct rights derives from the "protected" status of land
reform beneficiaries, on the one hand, and the demand for cultivable land induced by the gains from the new technology, on the other hand. The land reform law, by imposing restrictions on the transfer of ownership and use rights over rice lands, in effect put a premium on usufruct rights. Farm operators with financial surpluses but insufficient farm land "purchased" cultivation rights through land pawning contracts from households unable to cultivate their farm lands because of liquidity shortages. Land market transactions, therefore, became closely linked with informal credit market transactions. In fact, credit contracts involving the pawning or mortgaging of cultivation rights became widely used in Nueva Ecija only in the 1980s when access to formal credit sources became increasingly difficult and farm incomes were falling [Otsuka and Marciano (1988)].

Land pawning has several variants, and the incidence of these transactions in some Nueva Ecija villages is reported in Rivera and Mangalindan (1987). More recent evidence on the economics of pawning transactions is reported in Nagarajan et al (1991). Otsuka and Marciano report that, based on their survey of two villages in Muñoz, the parties to a pawning contract are usually small farmers as pawners, and farmer-lenders or trader-lenders as pawnees. Moreover, the latter often reside in another village. In a pawning contract the cultivator temporarily gives up cultivation rights on a parcel of farm land in exchange for a loan with a creditor. The amount of the loan varies depending upon the quality of land and its size. The highest amount encountered

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8 Land pawning was also a convenient way of disguising de facto land transfers in the case of individuals who wanted to shift from farming to another occupation.

9 Land pawning has also been observed in areas not covered by agrarian reform for such purposes as obtaining the funds necessary for job placement in the Middle East. No comprehensive study has yet been conducted in the Philippines to determine the magnitude of pawning under various production conditions.

10 Floro (1987) also reports several variants of pawning based on her field work in different areas in the Philippines.
in this survey was 20 thousand pesos, or about US$1,000 for roughly a hectare. All income earned from the farm accrues to the creditor who also assumes all operating expenses for the duration of the loan. Upon repayment, the borrower recovers the cultivation rights to the land.

Under the pawning contract, it is possible for a farmer to lose his land completely and it may pass from one individual to another. In most cases, the temporary surrender of cultivation rights takes place only after a farmer-borrower has accumulated a certain level of debts from an informal lender. That is, farmers failing to repay previous debts may obtain additional loans only by turning over their cultivation rights to the lender. Pawning is also resorted to in certain cases involving substantial one-time expenditures (e.g. schooling of children, hospitalization, or financing overseas migration, notably to the Middle East for employment). An inability to repay over an extended period results in the *de facto* transfer or permanent surrender of tenancy rights. The issue of whether the pawning contract is principally a credit market transaction or a land market transaction is more extensively explored in Nagarajan et al.

4.2.3.3 The Product Market

The increased yields resulting from the modern rice varieties have created profit opportunities in output marketing. The rice marketing functions include storing the paddy, milling it and transporting the rice for distribution to end-users. Recent studies of the rice marketing system in the Philippines [Umali (1987); Umali and Duff (1988)], also using survey data from Muñoz, show that these functions are carried out by different private agents. Traders and commission agents buy paddy (*palay*) directly from farmers for resale to rice millers who store and mill it into rice. Milled rice is then sold to wholesalers and retailers. Since 1981, the government has also been

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11 Equivalence is based on the prevailing peso-dollar exchange rate at the time of the survey which was roughly 20 pesos to the dollar.
involved in these rice marketing functions, including importation, in the pursuit of its rice price stabilization policy.

Focusing on the *palay* trader in Muñoz, Umali reports that trader profits as a percentage of marketing costs exceed 50 percent, and the return on investment ranges from 10% to 257 percent. However, given the generally small volume of grain handled by traders and the seasonal nature of their activity, the profitability of buying and selling is confined to the harvest season which is only two to three months long. Most owners of grain-buying stations in Muñoz report that their profits greatly depend on the volume they handle and the rate of turnover. Because of this and the competition caused by many *palay* buyers, individual paddy traders find it in their interest to maintain regular and secure sources of *palay* during the harvest. Lending to farmers during the cropping season on the condition that they get first claim to the borrowers' harvest helps assure the traders of a stable paddy supply. This implies that traders evaluate the creditworthiness of loan applicants on the basis of ability to supply paddy at harvest time. The size of the borrower's marketable surplus is, therefore, an important screening variable for trader-lenders in their lending activity.

In summary, the decline of formal lending due to, among other factors, the failure of the supervised credit programs left a void in the rural financial market that was easily filled by informal credit. Technical change and the implementation of land reform in the 1970s, however, dramatically changed the composition of rural informal creditors [TBAC (1981)]. As may be deduced from the preceding discussion of contractual arrangements in the labor, land and product markets, farmer-lenders and trader-lenders had emerged as the dominant lender types in the informal credit market of the rice-based economy.
4.3 The Informal Credit Market

4.3.1 Borrowers

Comparative statistics on selected characteristics of 170 borrower and non-borrower households in the four survey villages are presented in Table 4.4. Few households were non-borrowers. Of 170 respondent households, 139 reported borrowing from some source during one or both cropping seasons in 1987-88. Sixty percent of all borrowers were farm households, while landless and non-farm households comprised more than 70% of non-borrowers.

Heads of borrower households were generally younger than heads of non-borrower households. On average, borrowers also had resided fewer years in the village, had larger households and more dependents than non-borrowers. Across household types, mean income was higher for borrowers than non-borrowers, but because of the large variances these differences are not statistically significant. Among farm households, borrowers also had larger farms than non-borrowers. It is difficult to ascertain from the data if the direction of causality is from income to credit access, or vice versa. If lenders stress the importance of repayment ability as a criterion for granting loans, however, then borrowers are more likely to have higher incomes or collateralizable assets than non-borrowers. By household type, means-difference tests yielded significant results between borrowers and non-borrowers only with respect to years of residence for farm households, household size and number of dependents for landless households, and age of the household head for non-farm households.

Among the 139 borrower households, landless and non-farm households had statistically different means for household characteristics (age and education of head, household size and number of dependents), but not for income, loan size and rate of interest paid on loans. On the

\[12\] At the 5% level using the appropriate t-test that accounts for possible differences in variances.
Table 4.4: SELECTED CHARACTERISTICS OF BORROWERS AND NON-BORROWERS BY HOUSEHOLD TYPE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Farm</th>
<th>Landless</th>
<th>Non-farm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>139</td>
<td>82</td>
<td>41</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Age of Household</td>
<td></td>
<td>44.6</td>
<td>40.8</td>
<td>32.9</td>
<td>42.1</td>
</tr>
<tr>
<td>Head</td>
<td></td>
<td>(13.5)</td>
<td>(9.7)</td>
<td>(8.5)*</td>
<td>(12.6)</td>
</tr>
<tr>
<td>Residence (Yrs.)</td>
<td></td>
<td>28.2</td>
<td>23.1</td>
<td>24.8</td>
<td>26.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(15.2)*</td>
<td>(15.6)</td>
<td>(12.2)</td>
<td>(15.1)*</td>
</tr>
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<td>Household Size</td>
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<td>5.3</td>
<td>6.0</td>
<td>4.6</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(2.1)</td>
<td>(2.1)*</td>
<td>(1.2)</td>
<td>(2.0)*</td>
</tr>
<tr>
<td>Dependents</td>
<td></td>
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<td>4.7</td>
<td>3.6</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.0)</td>
<td>(2.0)*</td>
<td>(1.0)</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Farm Size (has.)</td>
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<td>1.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income¹ humiliation</td>
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<td>32,579</td>
<td>13,123</td>
<td>31,706</td>
<td>25,980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(33,198)</td>
<td>(9,398)</td>
<td>(42,727)</td>
<td>(30,236)</td>
</tr>
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<td>Off/Non-farm Income²</td>
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<td>16,789</td>
<td>13,123</td>
<td>31,706</td>
<td>17,434</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(15,981)</td>
<td>(9,398)</td>
<td>(42,727)</td>
<td>(20,137)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Farm</th>
<th>Landless</th>
<th>Non-farm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>51</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>Age of Household</td>
<td></td>
<td>51.2</td>
<td>40.8</td>
<td>43.8</td>
<td>44.7</td>
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<tr>
<td>Head</td>
<td></td>
<td>(16.7)</td>
<td>(19.8)</td>
<td>(15.5)*</td>
<td>(17.2)</td>
</tr>
<tr>
<td>Residence (Yrs.)</td>
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<td>40.6</td>
<td>32.4</td>
<td>29.9</td>
<td>33.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(17.9)*</td>
<td>(13.2)</td>
<td>(15.7)</td>
<td>(15.6)*</td>
</tr>
<tr>
<td>Household Size</td>
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<td>4.5</td>
<td>4.3</td>
<td>5.1</td>
<td>4.7</td>
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<td></td>
<td></td>
<td>(2.2)</td>
<td>(1.7)*</td>
<td>(2.0)</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Dependents</td>
<td></td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
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<tr>
<td></td>
<td></td>
<td>(2.2)</td>
<td>(1.8)*</td>
<td>(1.9)</td>
<td>(1.9)*</td>
</tr>
<tr>
<td>Farm Size (has.)</td>
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<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income¹ humiliation</td>
<td></td>
<td>30,461</td>
<td>10,227</td>
<td>27,678</td>
<td>22,767</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(38,211)</td>
<td>(7,437)</td>
<td>(30,609)</td>
<td>(28,472)</td>
</tr>
<tr>
<td>Off/Non-farm Income²</td>
<td></td>
<td>19,652</td>
<td>10,227</td>
<td>27,678</td>
<td>19,989</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18,435)</td>
<td>(7,437)</td>
<td>(30,609)</td>
<td>(23,120)</td>
</tr>
</tbody>
</table>

* Standard deviations are in parentheses.

¹ Number reporting may be less than number of observations.

² In Philippine pesos; 21.07 pesos = 1 dollar based on the prevailing exchange rate in 1988.

³ The Philippine poverty threshold in 1988 has been computed at 32,500 pesos.

* Indicates statistically significant difference in means between borrowers and non-borrowers for the household type.
other hand, between farm and landless households, the differences in the means of household income, loan size and interest rate paid on loans were statistically significant. However, no significant differences aside from age were found with respect to their household characteristics. Between farm and non-farm borrower households, a statistically significant difference was found only for the rate of interest on loans. The foregoing suggests that the terms of obtaining credit are more sensitive to differences in incomes than to differences in other borrower characteristics. However, because income may not be directly observable to lenders, borrower characteristics that are observable and known to be associated with income are used as proxies (e.g. farm size, land tenure, employment, etc.). Because income is also closely related to the nature of economic activity of the borrower household, the household type of a loan applicant is likely to be an important screening variable.

Table 4.5 shows the distribution of loan transactions in the four villages by household type and type of loan. Pawning transactions, which are more in the nature of long-term loans, are treated separately from the rest of the loans. The total volume of loans amounted to a total of 1.01 million pesos. Farm households accounted for 772.1 thousand or 72 percent. In contrast, landless and non-farm households accounted for 10 and 5 percent shares, respectively. The remaining 13 percent is accounted for by pawning contracts entered into mainly by farm households. Seventytwo percent of the total loans were in cash while the remaining 28 percent were in-kind loans. Cash loans were mostly granted to farmer-borrowers. The data also confirm that loans taken by landless borrowers are oriented towards consumption. Thirty-three percent of these households’ total indebtedness was in the form of milled rice. While both farm and landless households equally shared in the total volume of rice loans, the latter still accounted for 64 percent of the total number of such loans. The average size of loans taken by landless households, 846.2 pesos, was also comparatively small, indicative of the nature of consumption advances as well as the limited
Table 4.5: DISTRIBUTION OF LOANS BY HOUSEHOLD TYPE AND LOAN TYPE

(All Amounts in Current Pesos)

<table>
<thead>
<tr>
<th>Household Type</th>
<th>Cash Mean Loan Size</th>
<th>Milled Rice</th>
<th>Fertilizer</th>
<th>Other Inputs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,665.4 (3,033.3)</td>
<td>989.5 (1,070.3)</td>
<td>2,154.7 (3,929.7)</td>
<td>374.6 (256.4)</td>
<td>2,318.5 (3,043.9)</td>
</tr>
<tr>
<td></td>
<td>7.9 (8.9)</td>
<td>15.6 (16.0)</td>
<td>17.0 (28.3)</td>
<td>20.5 (34.2)</td>
<td>11.2 (16.0)</td>
</tr>
<tr>
<td></td>
<td>238</td>
<td>30</td>
<td>47</td>
<td>18</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>772,060.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-Term Loans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>2,665.4 (3,033.3)</td>
<td>989.5 (1,070.3)</td>
<td>2,154.7 (3,929.7)</td>
<td>374.6 (256.4)</td>
<td>2,318.5 (3,043.9)</td>
</tr>
<tr>
<td>Monthly Interest(b)</td>
<td>7.9 (8.9)</td>
<td>15.6 (16.0)</td>
<td>17.0 (28.3)</td>
<td>20.5 (34.2)</td>
<td>11.2 (16.0)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>238</td>
<td>30</td>
<td>47</td>
<td>18</td>
<td>333</td>
</tr>
<tr>
<td>Total Volume</td>
<td>772,060.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>959.2 (815.7)</td>
<td>683.0 (519.2)</td>
<td>-</td>
<td>-</td>
<td>846.2 (720.2)</td>
</tr>
<tr>
<td>Monthly Interest(b)</td>
<td>4.9 (6.0)</td>
<td>7.9 (19.3)</td>
<td>-</td>
<td>-</td>
<td>6.1 (13.2)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>78</td>
<td>54</td>
<td>0</td>
<td>0</td>
<td>132</td>
</tr>
<tr>
<td>Total Volume</td>
<td>111,698.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-farm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,396.3 (3,259.9)</td>
<td>900.0 -</td>
<td>865.0 -</td>
<td>-</td>
<td>1,368.5 (3,170.3)</td>
</tr>
<tr>
<td>Monthly Inter.</td>
<td>7.2 (7.7)</td>
<td>14.7 -</td>
<td>15.0 -</td>
<td>-</td>
<td>7.6 (7.7)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>35</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Total Volume</td>
<td>50,634.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Long-Term Loans

<table>
<thead>
<tr>
<th>Pawning Contracts</th>
<th>Mean Size Mean Loan Size</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>12,045.4 (5,515.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Transactions</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Total Volume</td>
<td>132,499.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a\) Standard deviations are in parentheses.

\(b\) For loans requiring repayment in kind, rates were imputed from product prices. See Section 4.3.3 of the text.

\(c\) Includes pesticides and rice seedlings.
ability of landless households to secure larger loans. In general, all borrower types paid a higher rate of interest on in-kind loans (milled rice, fertilizer and other inputs) than on cash loans. This is because almost all loans made in kind required repayment in kind. The implication of repayment in kind on interest rates is discussed in a later section.

4.3.2 Informal Lenders

The evolution of the current types of informal lenders in Muñoz is discussed in the anthropological study of Ferrer (1985). Most informal lenders trace their roots to land-owning families. Their principal economic activity at present is the combined result of the break-up of the big estates in the late sixties and the 1970s - whereby landed families distributed their lands to their children to comply with land retention limits - and the emergence of new commercial opportunities made possible by the 'green revolution' technology.

The informal lenders identified by the borrowers in the four study villages were classified originally into eight categories based on the informal lender's principal economic activity. For the purposes of this study, however, some categories were combined on the basis of similarity of their economic activity and the relative importance of each category. The data are shown in Table 4.6.

The biggest category of informal lenders is comprised of farmer and landowner lenders\(^{13}\) (hereafter farmer-lenders). These informal lenders reside in the farming villages where they conduct their lending operations. In contrast the private moneylenders, paddy traders and millers are based mainly in the town proper unless they or their families reside in the villages or also happen to operate rice farms in the villages. Paddy traders or rice middlemen who operate palay-buying stations in the town center together with a few rice millers constituted the most

\(^{13}\) Landowners are differentiated from farmers in that the former derive a portion of their total income from land rentals. However, like farmer-lenders, the landowner-lenders are also involved in cultivation either directly, or indirectly through hired farm labor that they supervise. This makes their motivation for lending similar. Thus they were grouped together for analytical purposes.
### Table 4.6: THE RELATIVE IMPORTANCE OF INFORMAL LENDERS IN FOUR VILLAGES OF MUÑOZ, NUEVA ECÚJA

<table>
<thead>
<tr>
<th>Informal Lender Type</th>
<th>Number of Lenders</th>
<th>Percent Share in Number of Loans</th>
<th>Percent Share in Total Loan Volume</th>
<th>Average Monthly Interest Rate (%)</th>
<th>Average Loan Duration (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>48</td>
<td>34</td>
<td>24</td>
<td>7.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Moneylender</td>
<td>6</td>
<td>12</td>
<td>12</td>
<td>14.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Trader/Miller</td>
<td>16</td>
<td>31</td>
<td>35</td>
<td>9.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Others(^a)</td>
<td>45</td>
<td>17</td>
<td>19</td>
<td>10.4</td>
<td>3.2</td>
</tr>
<tr>
<td>All Informal Types</td>
<td>115</td>
<td>94</td>
<td>90</td>
<td></td>
<td>3.2</td>
</tr>
<tr>
<td>Formal Sources(^b)</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>3.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

\(^a\) Includes retail storeowners, input dealers, civil servants and occasional lenders.

\(^b\) Includes a rural bank, a commercial bank branch and a cooperative.

\(^c\) For loans requiring repayment in kind, rates were imputed from product prices. See Section 4.3.3.

\(^d\) Duration was not reported for a few loans. These averages apply only for those with available information.
important source of loans in terms of their share in the total volume (35 percent) and the total number of reported credit transactions (31 percent). While farmer-lenders made up more than 40 percent of the informal lenders, their share in the number of loans (34 percent) did not greatly exceed that of traders. Moreover, farmer-lenders provided only 24 percent of the total volume of loans transacted, second to traders. Since farmer-lenders engage in pawning transactions which involve relatively big amounts, the inclusion of pawning contracts would have increased the share of farmer-lenders in the total volume of loans. The "others" category - composed mainly of village residents employed in fixed-salaried, non-farm occupations and a few retail storeowners and input dealers - seems important in terms of numbers, but their transactions are relatively few and small in size. Private or professional moneylenders made up about five percent of the number of informal lenders, but accounted for 12 percent of all credit transactions and 12 percent of their total value.

Considering loan volume, frequency of transactions and lender class size, traders and farmers constituted the major sources of informal loans in the rice producing villages. Together these two lender types made up 56 percent of all informal lenders reported in the survey and 59 percent of the total amount of all reported loan transactions, excluding pawning contracts. Moreover, they accounted for 69 percent of the number of informal loans excluding pawning transactions, and 66 percent of the value of such loans. Farmer-lenders and trader-lenders are thus clearly the dominant lender types in the agricultural rice economy. In light of the conditions prevailing in the factor and product markets, this pattern was rather expected. As early as the latter half of the 1970s, Bardhan and Rudra (1978), writing about India, had already noted the trend towards self-cultivation with the help of hired labor. They attributed this trend to the profitability of self-cultivation because of advances in technology, and tenure legislation. The apparent importance of traders as informal
lenders is also consistent with the observations of other analysts regarding the tendency for the share of trader-lender loans to grow with increasing commercialization [Bell (1988)].\textsuperscript{14}

\textbf{4.3.3 Informal Loan Transactions}

The last two columns of Table 4.6 show the average monthly interest rates and duration of informal loans classified by type of lender. Invariably the loans reported were of short duration, usually for a cropping season which lasts anywhere from four to six months. Loan duration varies depending upon the length of time between the granting of the loan and harvest time when repayment is expected. The mean duration in the sample is three months.

Interest rates on informal loans are generally quoted on a per season basis so that the monthly interest rate on a loan is lower the longer the length of time between its disbursement and harvest time when it is expected to be repaid. Monthly interest rates were computed by simply dividing the per season quoted rate by the number of months between disbursement and harvest time. In the case of informal loans granted in kind and requiring repayment in kind, the method employed in this study for computing interest rates involved using product prices at the time the loan was granted and at the time of harvest. For such type of loan, the required repayment is based on a fixed ratio of the quantities of the commodities loaned and used for repayment. For instance, a bag of fertilizer must be replaced by three sacks of paddy at harvest time. Or a sack of milled rice requires repayment of two sacks of paddy at harvest.

Loans in kind are generally more expensive than cash loans. To compute the interest charge, the total amount of the loan is determined first from the quantity of the good loaned out and its unit price at the time it was borrowed. The total required repayment can be computed from the post-harvest unit price of the commodity required for repayment and its quantity, given the

\textsuperscript{14} This tendency has been empirically observed in India by Bell (1990), in Thailand by Siamwalla et al (1990), and in the Philippines by TBAC (1981), Sacay et al (1985), Floro (1987) and Geron (1989).
stipulated exchange ratio. Then based on the example above, a loan consisting of three bags of fertilizer each priced at 200 pesos carries a 125 percent interest if the harvest price of paddy is 150 pesos per sack. If loan duration is four months, the monthly interest rate is 31 percent. Note that the borrower would have paid a lower implicit rate in an abundant year, and a higher rate in a bad year, if he did pay. Since the cropping seasons included in this study were generally considered to be normal, however, the interest rates calculated were not unduly affected by abnormal output prices. Notwithstanding this, in-kind loans were still generally expensive.

Due to the informal lenders’ practice of quoting interest rates on a per season basis, borrowers who obtain loans very close to the harvest period implicitly expect to pay a much higher monthly interest rate than those who borrow at the beginning of the cropping season. Basu (1989) noted the same case in India and argued that when lenders are constrained by social norms to charge all borrowers the same interest, the loan duration can be used as an instrument for discrimination and surplus extraction. Borrowers who take loans closer to harvest time have a relatively inelastic demand for credit. Thus, by charging a fixed interest per season, lenders can still price-discriminate without being openly discriminatory.

Table 4.6 also shows that interest rates were lowest for farmer-lender loans (7.4 percent) and highest for moneylender loans (15 percent). Generally one would expect moneylender loans to carry a higher rate of interest compared to loans from most other informal lenders. As shown in the previous chapter, if moneylenders depend mainly upon moneylending as their source of income, they may not have the flexibility to offer borrowers lower interest rates. The claim that

\[ ^{15} \text{Unless explicitly stated, all interest rates presented in this study are monthly rates. These have been computed from the survey data by dividing the interest rate per season with the duration of the loan after calculating the implicit total interest charge.} \]

\[ ^{16} \text{Ray and Sengupta (1989) also provide a formal argument for the proposition that a pure moneylender must charge a higher rate of interest than other informal lenders with interlinked contracts in order to make a profit in the credit market. That is because the pure moneylender has} \]
lenders who have the potential to engage in interlinked transactions have an advantage over pure
moneylenders, therefore, seems to be partly supported by these data.

Table 4.7 gives the distribution of informal loan transactions by lender type and village. Farmer-lenders accounted for the major share of loans in Villa Nati (38 percent), while trader-lenders had the largest share in Sapang Cauayan (56 percent). Aside from attributing this observation to a possibly better information network for lenders in these villages than in others, it is difficult to provide a more specific reason for the observed distribution of loans by village. It is noteworthy, however, that (i) the interest rates on farmer-lender and trader-lender loans had little variation across the three irrigated villages, and that (ii) loans in Mangandingay, the non-irrigated village, were fewer, smaller and more expensive across lender types. The smaller marketable surplus available from this village does not make it attractive for traders to lend. Furthermore, its distance from the town center and the poor road condition make trading operations more costly. In general, the lower productivity of farms in this village makes the risk of lending to its residents high, while it leaves few resident farm households with available surpluses for lending.

The nature of the loans made by farmer-lenders and trader-lenders may be inferred from the information supplied by borrowers regarding the use or purpose of the loans obtained from the different informal lenders. Of the total loans made by farmer-lenders amounting to 226 thousand pesos, 31 percent were reported as consumption loans and 19 percent were production loans (Table 4.8). On the other hand, 55 percent of the 328 thousand pesos lent by traders was for production, while the share of consumption loans was 15 percent. Farmer-lenders were also reported to have lent more than traders for human capital related expenditures of households (e.g. schooling of children, hospitalization and other emergencies, etc.). The category "General

no other instrument for maximizing his gain from the transaction with the borrower.
Table 4.7: DISTRIBUTION OF INFORMAL LOAN TRANSACTIONS BY LENDER TYPE AND BY VILLAGE

<table>
<thead>
<tr>
<th>Lender Type</th>
<th>Village</th>
<th>Villa</th>
<th>Sapang</th>
<th>Villa</th>
<th>Mangan-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nati</td>
<td>Cauayan</td>
<td>Nati</td>
<td>dingay</td>
</tr>
<tr>
<td>Farmer</td>
<td>Mean Loan Size</td>
<td>1,237.3</td>
<td>1,539.1</td>
<td>1,310.9</td>
<td>1,123.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1,486.0)</td>
<td>(3,040.5)</td>
<td>(2,303.4)</td>
<td>(1,754.5)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>7.2</td>
<td>7.2</td>
<td>7.1</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(9.6)</td>
<td>(6.1)</td>
<td>(10.3)</td>
<td>(9.4)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>80</td>
<td>58</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>Moneylender</td>
<td>Mean Loan Size</td>
<td>997.6</td>
<td>1,458.3</td>
<td>5,847.1</td>
<td>716.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(933.8)</td>
<td>(980.0)</td>
<td>(7,592.5)</td>
<td>(587.9)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>17.4</td>
<td>13.3</td>
<td>8.7</td>
<td>14.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(32.1)</td>
<td>(8.6)</td>
<td>(4.5)</td>
<td>(6.4)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>31</td>
<td>6</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Traders/Millers</td>
<td>Mean Loan Size</td>
<td>1,821.6</td>
<td>1,891</td>
<td>6,937.5</td>
<td>1,227.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1,719.4)</td>
<td>(2,433.8)</td>
<td>(5,833.6)</td>
<td>(1,533.1)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>8.5</td>
<td>8.1</td>
<td>8.6</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.6)</td>
<td>(10.5)</td>
<td>(2.7)</td>
<td>(19.8)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>33</td>
<td>104</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Others</td>
<td>Mean Loan Size</td>
<td>2,523.0</td>
<td>2,014.9</td>
<td>1,810.0</td>
<td>1,220.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3,218.4)</td>
<td>(3,269.2)</td>
<td>(1,888.0)</td>
<td>(781.0)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>10.1</td>
<td>5.6</td>
<td>9.8</td>
<td>23.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(19.0)</td>
<td>(21.6)</td>
<td>(7.8)</td>
<td>(47.9)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>28</td>
<td>27</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

* Standard deviations are in parentheses.
Table 4.8: DISTRIBUTION OF INFORMAL LOAN TRANSACTIONS BY LENDER TYPE AND PURPOSE OF LOAN

<table>
<thead>
<tr>
<th>Lender Type</th>
<th>Purpose of Loan</th>
<th>Production (^b)</th>
<th>Consumption</th>
<th>Human Capital Related(^e)</th>
<th>General Household(^d)</th>
<th>Others(^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>Mean Loan Size</td>
<td>1,761.8</td>
<td>728.2</td>
<td>3,900.0</td>
<td>2,383.5</td>
<td>800.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3,143.4)</td>
<td>(628.3)</td>
<td>(6,598.1)</td>
<td>(1830.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>11.0</td>
<td>6.4</td>
<td>4.3</td>
<td>7.5</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.4)</td>
<td>(9.5)</td>
<td>(4.2)</td>
<td>(6.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>25</td>
<td>95</td>
<td>8</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Moneylender</td>
<td>Mean Loan Size</td>
<td>2,188.4</td>
<td>1,166.0</td>
<td>500.0</td>
<td>3,150.0</td>
<td>500.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4,568.3)</td>
<td>(1,390.3)</td>
<td>(785.8)</td>
<td>(4,568.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>16.9</td>
<td>12.5</td>
<td>10.0</td>
<td>4.9</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(29.6)</td>
<td>(6.2)</td>
<td>(1.1)</td>
<td>(29.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>34</td>
<td>20</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Traders/Millers</td>
<td>Mean Loan Size</td>
<td>2,673.1</td>
<td>1,074.0</td>
<td>1,483.3</td>
<td>2,598.4</td>
<td>833.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3,569.0)</td>
<td>(992.8)</td>
<td>(1,621.6)</td>
<td>(2,300.0)</td>
<td>(288.7)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>10.5</td>
<td>6.0</td>
<td>7.9</td>
<td>10.6</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(9.8)</td>
<td>(14.6)</td>
<td>(8.1)</td>
<td>(5.7)</td>
<td>(4.3)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>68</td>
<td>46</td>
<td>6</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>Mean Loan Size</td>
<td>2,705.7</td>
<td>887.1</td>
<td>466.7</td>
<td>2,394.4</td>
<td>6,370.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3,293.4)</td>
<td>(604.2)</td>
<td>(251.7)</td>
<td>(1,560.7)</td>
<td>(7,278.3)</td>
</tr>
<tr>
<td></td>
<td>Monthly Interest (%)</td>
<td>12.3</td>
<td>14.0</td>
<td>2.5</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(33.9)</td>
<td>(20.8)</td>
<td>(4.3)</td>
<td>(14.6)</td>
<td>(4.1)</td>
</tr>
<tr>
<td></td>
<td>No. of Loans</td>
<td>28</td>
<td>34</td>
<td>3</td>
<td>18</td>
<td>4</td>
</tr>
</tbody>
</table>

\(^a\) Standard deviations are in parentheses.

\(^b\) Loans for purchase of production inputs and payment of hired labor.

\(^c\) Loans incurred for schooling of children, health and health-related expenses and expenditures incidental to job search.

\(^d\) This category includes both production and consumption loans, the proportions of which the sampled households could not specify.

\(^*\) Includes loans incurred for purposes such as the purchase of farm equipment, marketing or processing of output, investment in other businesses and repayment of past loans.
Household* in Table 4.8 includes loans that borrower households reported they could use for either production or consumption or a combination of both. Thirty-six percent of farmer-lender loans and 26 percent of trader loans went to this category. The nature of the clientele of these two lender types should provide an indication of the relative weights of production and consumption loans in this general category. If farmer-lenders cater principally to landless workers and small farmers, then their loans in this category would consist mostly of consumption loans.

The numbers in Table 4.8 nevertheless confirm the empirical relevance of the proposition that trader-lenders have an advantage over other lenders in lending to farmers, while farmer-lenders have the comparative advantage in lending to landless workers. Compared with farmer-lenders, traders provided more production loans (68 vs. 25) at lower interest (10.5 percent vs. 11 percent) and in larger quantities (mean size of 2,673 vs. 1,762). With reference to loans for consumption, farmer-lenders provided more than traders (95 vs. 46). However, the average size of consumption loans granted by traders exceeded that granted by farmer-lenders (1,074 vs. 728), and trader loans had lower interest rates than farmer-lender loans (6 percent vs. 6.4 percent). Still, the fact that consumption loans comprised only 15 percent of the total volume of trader loans suggests that traders generally preferred to lend to farmers and for production. Furthermore, most, if not all, traders are descendants of land-owning families and a few of them are still landowners with permanent workers managing their farms in the villages. It is highly possible, therefore, that the consumption loans granted by these traders were actually loans to workers on their farms. If so, then this merely reinforces the proposition that farmer-lenders have a competitive advantage in lending to landless workers. That is, if these traders were not also landowners, they would have less likely lent to landless loan applicants.
4.4 Market Interlinkages and the Extent of Their Use

Very few informal loans involved the explicit pledging of collateral. In the few cases (10) reported, the assets pledged included mainly farm implements and work animals. Under these arrangements, the borrower usually turns over to the creditor the ownership title for the pledged asset.\(^{17}\) The creditor in turn retains the title in his possession until the loan is fully repaid. In this way, the informal lender attempts to deny borrowers the opportunity to borrow from other lenders, thereby preventing the former’s loan obligations from increasing and jeopardizing repayment of earlier loans. Surrendering the proof of ownership over the pledged asset to the creditor also prevents the sale of the asset to a third party before the lender is compensated. It also is a convenient way for the creditor to determine the borrower’s ability to repay the loan to the extent that loan applicants with assets to pledge and with low expectations of losing the asset will more likely find such arrangements acceptable. Little evidence was found of land titles being used as collateral, however, in part because most borrowers do not own land, and also because agrarian reform laws disallow legal ownership transfers except to heirs of the beneficiaries of land reform.

The economic bases for using specific types of collateral substitutes in the rice-growing villages have been discussed in Section 4.2.3. Table 4.9 shows the distribution of informal loan contracts by lender type and the form of collateral substitute used. Ten pawning transactions - mostly involving land usufruct rights - were reported for the Nueva Ecija villages.\(^{18}\) The majority of these contracts were made with farmer-lenders and all of them carried zero interest.

\(^{17}\) This practice applies especially in the case of farm animals.

\(^{18}\) There were actually 11. However, the data could not account for the lender type of the eleventh source. The fewness in the number of pawning transactions may be attributed to two factors. First, the data exclude pawning transactions made previous to the survey reference period. Second, households may have intentionally withheld information about their pawning transactions because of the illegal nature of these land deals. Moreover, information of this type is generally considered to be too sensitive to be shared with outsiders, considering the social stigma that attaches to having to pawn one’s assets, let alone having creditors foreclose on them.
### Table 4.9: DISTRIBUTION OF INFORMAL LOAN TRANSACTIONS BY LENDER TYPE AND TYPE OF INTERLINKAGE

<table>
<thead>
<tr>
<th>Lender Type</th>
<th>Output Sales</th>
<th>Labor Services</th>
<th>Pawning Contracts</th>
<th>Unlinked Loans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farmers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>800.0</td>
<td>648.5</td>
<td>11,583.3</td>
<td>1,659.0</td>
</tr>
<tr>
<td>(141.4)</td>
<td>(543.2)</td>
<td>(4,152.3)</td>
<td>(2,561.8)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>20.0</td>
<td>5.5</td>
<td>0</td>
<td>7.8</td>
</tr>
<tr>
<td>(14.1)</td>
<td>(8.5)</td>
<td>(0)</td>
<td>(8.4)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>2</td>
<td>42</td>
<td>6</td>
<td>119</td>
</tr>
<tr>
<td><strong>Moneylenders</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>2,929.5</td>
<td>-</td>
<td>15,000.0</td>
<td>1,082.0</td>
</tr>
<tr>
<td>(5,384.7)</td>
<td>(7,071.1)</td>
<td>(987.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>12.2</td>
<td>-</td>
<td>0</td>
<td>16.8</td>
</tr>
<tr>
<td>(8.1)</td>
<td>(0)</td>
<td>(29.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>24</td>
<td>0</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td><strong>Traders/Millers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>2,658.2</td>
<td>902.9</td>
<td>15,000</td>
<td>1,942.8</td>
</tr>
<tr>
<td>(3,100.0)</td>
<td>(802.3)</td>
<td>(7,071.1)</td>
<td>(2,669.2)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>9.5</td>
<td>2.4</td>
<td>0</td>
<td>12.3</td>
</tr>
<tr>
<td>(4.7)</td>
<td>(16.9)</td>
<td>(0)</td>
<td>(11.7)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>76</td>
<td>28</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>7,333.3</td>
<td>904.0</td>
<td>-</td>
<td>1,676.0</td>
</tr>
<tr>
<td>(4,131.2)</td>
<td>(687.4)</td>
<td>(2,238.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>9.2</td>
<td>2.0</td>
<td>-</td>
<td>11.1</td>
</tr>
<tr>
<td>(1.3)</td>
<td>(4.5)</td>
<td>(25.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>76</td>
</tr>
</tbody>
</table>

* Standard deviations are in parentheses.

* Includes retail storeowners, input dealers, civil servants and occasional lenders.
Furthermore, these loans involved an average amount of at least 10 thousand pesos regardless of the source. The use of the pawning contract indicates that land is still an important consideration for informal lenders, even though it is seldom used as collateral in the conventional sense. When borrowers are unable to meet their loan obligations, the pawning option gives informal lenders a measure of protection against loan losses. Most lenders who enter into pawning contracts are farmers who either cultivate the land themselves or hire permanent workers as farm managers. In certain cases, the permanent workers hired are the original cultivators who pawned their rights.

Interlinkage is reported in the data set on the basis of the sampled borrowers’ responses to the question on whether the informal lender "required" the sale of output or the rendering of labor service as a condition for the loan. This manner of framing the question leaves a lot of room for the individual borrower’s interpretation of what constitutes a "requirement" based upon his perception of his relationship with his creditor. Consequently, it should be expected that the reported interlinkage of loans in this study has a downward bias.

Farmer-lenders accounted for 56 percent of the number of labor-linked loans (Table 4.9). Again, the consumption orientation of these loans can be inferred from their relatively small average size, which is less than a thousand pesos for a period of three to five months. In a labor-credit type of linkage, repayment is enforced through the deduction of outstanding loans from wages earned under the labor contract.

Table 4.9 also shows that trader-lenders provided 70 percent of all product-linked loans. Quite surprisingly, about one-fifth of the number of these loans came from moneylenders. Upon closer scrutiny, however, it was found that one of the moneylenders was acting as a marketing agent on behalf of a trader who is a relative. Under a product-linked loan arrangement, the lender enforces repayment by purchasing the borrower’s output and subtracting the loan principal and interest from the total value of purchases.
The information in Table 4.9 generally supports the view expounded in the previous chapter that the market interlinkages or collateral substitutes observed derive from differences in the informal lenders' motivations for lending. Since the use of collateral or its substitutes entails a cost to lenders, they will accept only those collateral substitutes in which they have a comparative cost advantage. Therefore, one should expect to see more tied paddy sales among trader-lender loans than among loans of farmer-lenders who are not involved in trading. Similarly, the labor-credit linkage should be more pronounced in farmer-lender loans than in trader loans since farmer-lenders are engaged in cultivation and employ farm labor.

Informal loans linked with transactions in other markets also carried lower interest rates and, with some exceptions, involved bigger amounts than unlinked loans (Table 4.9). This empirical observation is consistent with the result of the theoretical model in the previous chapter. However, since the theoretical model was constructed with the view to demonstrate how an interlocker's edge emerges in the credit market, the conditions under which the same lender type may also offer unlinked loans were not examined. Thus while the theoretical model presupposes a pure moneylender and an interlocker who each offer only one type of loan contract, the data show that all informal lenders offered both linked and unlinked loans.

One explanation for this observation relies on the screening role of collateral in credit markets with imperfect information. In the presence of adverse selection problems in a credit market, lenders may offer loan contracts with varying combinations of interest rate and collateral [Bester 19].

It is possible for interlinked loans to have interest rates higher than unlinked loans depending upon how the interlocker sets the terms in the non-credit market. For instance, a trader-lender may buy the farmer's output at a higher than usual price but charge a higher interest rate. As shown in Chapter III, the interlocker can do this as long as the borrower is not made worse off than his next best alternative. The fact that interest rates on linked loans are on average lower than on unlinked loans in the four villages suggests that trader-lenders are not paying farmer-borrowers output prices higher than what farmers would on average otherwise get, or that farmer-lenders are paying their workers the prevailing wage rate.
According to this model, holding the loan amount constant, high-risk borrowers take the high interest-low collateral combination while low-risk borrowers take the low interest-high collateral contract. With some modification, it is possible to develop an analog to this model for an informal loan market with interlinking as a collateral substitute. The model would be difficult to test empirically, however, in the absence of information regarding the credit histories (especially repayment performance) of borrowers. Therefore, such an approach is not pursued in this study.

The fact that the greatest share of product-linked and labor-linked loans came from trader-lenders and farmer-lenders, respectively, is nevertheless consistent with the expectation that these specific types of interlinkage will be observed among lender types who have the means to use them, and who stand to benefit the most from using them. Interlinking was reported in less than half of all informal credit transactions, however. This fact suggests that a lender's interest in the farmer's marketable surplus or the landless worker's labor services need not necessarily lead to an interlinked contract. This would be the case if there exist other ways of achieving the lender's objectives. For instance, through reciprocity, social custom and kinship ties, parties may mutually agree to exchange credit for labor services or the commitment of future output. However, it may also be the case that these facilitating factors conceal the contractual nature of interlinkage if, as a result of them, borrowers fail to perceive either the tied sale of output or the commitment of labor services as a formal requirement of the credit agreement. In addition, as already pointed out above, an inadequate survey questionnaire may lead to reporting problems. If this is true, then the incidence of interlinked transactions could be underreported.20

20 In response to the same question that was asked borrowers (cf. preceding footnote), trader-lenders who were interviewed invariably said that output sale was a requirement for taking out a loan from them.
4.5 The Pattern of Credit Allocation

Notwithstanding the fact that less than fifty percent of informal credit transactions were reported to involve product and labor linkages, the resulting distribution of informal loans lends support to the allocational pattern predicted by the theoretical model based on interlinking. Table 4.10 shows the allocation of credit in the four rice-growing villages according to borrower and lender types. Loans from banks and cooperatives went mainly to farm households. Seventy-four (74) percent of all trader loans went to farmer-borrowers. This represents 89 percent of the total volume of loans granted by traders during 1987-88. On the other hand, 44 and 22 percent of the number and volume, respectively, of farmer-lender loans went to landless workers. The latter percentages are significant in view of the fact that landless farm laborers are generally poor, possess no collateralizable assets and are normally considered bad credit risks. The figures suggest the comparative advantage of farmer-lenders in lending to this particular group of rural loan applicants.

From the borrower’s perspective, traders provided 35 percent of the total number and 38 percent of the total amount of loans received by farm households. Therefore, traders lent primarily to farmers, and farmers borrowed mainly from traders. Farmer-lenders also lent more to farmer-borrowers than landless borrowers based on the number and value of loan transactions. But given that the farmer-lender’s own demand for funds covaries with the demands of other farmers - thus making lending to farmers relatively expensive - it seems unlikely that all these loans were production loans. It is possible that these loans included consumption advances extended to members of farm households that the farmer-lenders may have employed as farm labor. Given the generally small sizes of farms in the rice villages under study, few farm households are totally dependent on farm income. Farm operators or their family members typically hire out their labor services to other farm operators to augment their income. Small farmers are not unlike landless
Table 4.10: DISTRIBUTION OF LOANS BY LENDER TYPE AND BORROWER TYPE

<table>
<thead>
<tr>
<th>Lender Type</th>
<th>Farmer</th>
<th>Landless</th>
<th>Non-farm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formal/Semi-formal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Banks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>3,133.1</td>
<td>-</td>
<td>-</td>
<td>3,133.1</td>
</tr>
<tr>
<td>(2,743.1)</td>
<td>(2,743.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>1.8</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>(0.6)</td>
<td>(0.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>17</td>
</tr>
<tr>
<td><strong>Cooperatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>5,200.1</td>
<td>880</td>
<td>-</td>
<td>4,720.0</td>
</tr>
<tr>
<td>(1,450.6)</td>
<td>(1,978.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>6.6</td>
<td>3.0</td>
<td>-</td>
<td>6.2</td>
</tr>
<tr>
<td>(1.9)</td>
<td>(2.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td><strong>Informal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Farmers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,912.3</td>
<td>670.9</td>
<td>1,488.9</td>
<td>1,338.8</td>
</tr>
<tr>
<td>(2,814.1)</td>
<td>(530.2)</td>
<td>(3,210.7)</td>
<td>(2,222.8)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>9.1</td>
<td>5.9</td>
<td>5.0</td>
<td>7.4</td>
</tr>
<tr>
<td>(7.5)</td>
<td>(9.8)</td>
<td>(4.1)</td>
<td>(8.6)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>85</td>
<td>75</td>
<td>9</td>
<td>169</td>
</tr>
<tr>
<td><strong>Moneylenders</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,919.0</td>
<td>1,650.0</td>
<td>573.0</td>
<td>1,773.4</td>
</tr>
<tr>
<td>(3,957.3)</td>
<td>(1,232.0)</td>
<td>(163.2)</td>
<td>(3,547.6)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>16.2</td>
<td>8.4</td>
<td>13.7</td>
<td>14.9</td>
</tr>
<tr>
<td>(25.6)</td>
<td>(5.2)</td>
<td>(9.7)</td>
<td>(22.9)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>48</td>
<td>8</td>
<td>5</td>
<td>61</td>
</tr>
<tr>
<td><strong>Traders/Millers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>2,491.8</td>
<td>956.6</td>
<td>550.0</td>
<td>2,078.0</td>
</tr>
<tr>
<td>(2,042.8)</td>
<td>(672.9)</td>
<td>(345.0)</td>
<td>(2,736.0)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>10.6</td>
<td>3.9</td>
<td>9.9</td>
<td>9.1</td>
</tr>
<tr>
<td>(8.6)</td>
<td>(15.4)</td>
<td>(7.7)</td>
<td>(10.8)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>117</td>
<td>35</td>
<td>6</td>
<td>158</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>2,298.4</td>
<td>1,063.1</td>
<td>1,827.6</td>
<td>2,021.8</td>
</tr>
<tr>
<td>(2,526.5)</td>
<td>(672.9)</td>
<td>(4,090.5)</td>
<td>(2,744.2)</td>
<td></td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>11.3</td>
<td>12.1</td>
<td>6.3</td>
<td>10.4</td>
</tr>
<tr>
<td>(27.6)</td>
<td>(23.6)</td>
<td>(7.9)</td>
<td>(24.3)</td>
<td></td>
</tr>
<tr>
<td>No. of Loans</td>
<td>57</td>
<td>13</td>
<td>17</td>
<td>87</td>
</tr>
</tbody>
</table>

* Standard deviations in parentheses.

b Includes retail storeowners, input dealers, civil servants and occasional lenders.
households in their need for consumption credit to finance unanticipated cash shortfalls, and other farm households for whom they work may be an important source of credit for small farm households. For landless households, farmer-lenders were the most important source of informal loans, accounting for 57 percent of the total number and 45 percent of the total volume of loans received by landless households.

Table 4.11 shows how informal lenders allocated their loans according to their relationship with their borrowers. Loans based on personal relations, i.e. where borrowers and lenders were either relatives or friends, dominated the credit transactions. Most of these loans (101) were from farmer-lenders, about 60 percent of whose transactions were with relatives and friends. This is not surprising given the highly personalized nature of credit transactions in particular, and village social relations in general. Loans based on an employer-hired laborer relationship numbered only 57 (of which farmer-lenders had 35) although a higher number is suggested by the figures on labor-credit linkages reported in Table 4.10.2 The problem is that production relations may be hidden under social or familial relations, and therefore are included in the "relatives and friends" category. In rural villages, it is not unusual for farmers to hire their own relatives and friends if this partly reduces problems associated with shirking. Similarly, from the borrower’s viewpoint, one’s lack of ability to borrow from commercial sources leaves no one other than relatives or close friends to turn to for emergency or consumption loans. This situation is more likely to occur for small farm and landless households who are asset-poor relative to other rural households.

The greater percentage of trader-lender loans was made to regular business clients or frequent suppliers of paddy (22 percent) and borrowers covered by an element of third party guarantee (37 percent). By the latter is meant those borrowers who were able to obtain a loan through a third

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21 The difference between Tables 4.9 and 4.11 is that in Table 4.9, respondents were asked if the marketing or labor linkage was required in order to take out a loan, while in Table 4.11, they were asked how they are related to the lender or initially got acquainted with the lender.
Table 4.11: DISTRIBUTION OF INFORMAL LOAN TRANSACTIONS BY LENDER TYPE AND BORROWER’S RELATION TO LENDER

<table>
<thead>
<tr>
<th>Lender Type</th>
<th>Friend or Relative</th>
<th>Regular Business</th>
<th>Hired Laborer</th>
<th>Guaranteed by Third Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,454.0 (2,592.0)</td>
<td>1,500.0 (866.0)</td>
<td>807.8 (634.2)</td>
<td>1,865.2 (2,197.6)</td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>8.4 (8.6)</td>
<td>6.5 (4.1)</td>
<td>3.9 (7.3)</td>
<td>8.4 (10.1)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>101</td>
<td>3</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Moneylenders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>892.8 (992.0)</td>
<td>-</td>
<td>862.5 (349.7)</td>
<td>2,575.2 (4,710.5)</td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>18.5 (35.8)</td>
<td>-</td>
<td>10.8 (6.7)</td>
<td>12.9 (7.5)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>25</td>
<td>0</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Traders/Millers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,435.0 (1235.6)</td>
<td>4,522.23 (4258.45)</td>
<td>1,121.4 (886.4)</td>
<td>1,424.3 (1,872.9)</td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>8.0 (14.0)</td>
<td>8.6 (4.9)</td>
<td>4.4 (5.6)</td>
<td>11.5 (11.0)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>49</td>
<td>35</td>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Loan Size</td>
<td>1,761.7 (2,571.4)</td>
<td>5,866.7 (4,226.1)</td>
<td>880.0 (791.3)</td>
<td>1,346.8 (1,244.5)</td>
</tr>
<tr>
<td>Monthly Interest (%)</td>
<td>14.5 (30.2)</td>
<td>9.2 (3.7)</td>
<td>0 (0)</td>
<td>5.1 (15.4)</td>
</tr>
<tr>
<td>No. of Loans</td>
<td>48</td>
<td>9</td>
<td>4</td>
<td>26</td>
</tr>
</tbody>
</table>

* Standard deviations are in parentheses.

b Includes retail storeowners, input dealers, civil servants and occasional lenders.
party who is known to the lender. In this case, the loan is guaranteed directly by the assets or indirectly by the reputation of the third party. About one-third the total number of trader loans went to relatives and friends, making trader-lenders the least likely informal lender type to lend on the basis of close personal or family relations.

Ben-Porath (1980) and Hayami (1988), among others, have discussed the importance of the family as an institution capable of accommodating practically all types of transactions. However, the different market environments in which farmer-lenders and trader-lenders operate make them interpret loans to relatives and friends quite differently.

Just as traders are better able to lend than farmer-lenders during the planting season when they have some idle cash, the liquidity requirements of their buy-sell operations, which peak at harvest time, make the costs of delayed repayments and defaults intolerably high. The nature of the trader's business, therefore, imposes a more commercial orientation to lending operations. The more personal and open-ended type of transactions between relatives and close friends are seen as disincentives to prompt repayment, inasmuch as transactions based on close personal relations often blur the distinction between a loan and an entitlement. Trader-lenders may be able to avoid lending to relatives more easily than farmers because their lending is perceived by borrowers as being more business-like. Thus trader-lenders confront the trade-off between possibly lower screening costs but more difficult and costly enforcement for relatives and friends, and vice versa for other borrowers.

For farmer-lenders who are not primarily in the business of lending and have no pressing need for cash at harvest time, lending to relatives and friends may provide a good enough strategy for solving the asymmetric information problem in the credit transaction. As for enforcing repayment, the flexibility and open-endedness of the exchange is not necessarily unwelcome. In the context of exchange within a family or circle of friends, the loan is considered as an investment, or part
of a total package of benefits concomitant to friendship or family membership. Repayment is treated as a reciprocal act from the other party, to be expected when the opportunity to call on the "debt of gratitude" presents itself. Moreover, repayment need not involve cash. Helping on the creditor's farm at planting time or during harvest appears to be a popular way of "repaying" debts among relatives and friends. This, therefore, fits in nicely to the requirements of the farmer-lender.

4.6 Summary

Trader-lenders and farmer-lenders have emerged as the dominant informal lender types in the rural financial market of the rice economy. These lenders participate in the informal credit market primarily to promote their principal economic activities. Trader-lenders are motivated by the imperative to secure grain from farmers for their trading business. Farmer-lenders, on the other hand, are interested in economizing on the costs of monitoring and recruiting farm labor. These considerations lead these lenders to link loans made to output sales or the commitment of the borrowers' labor services. In turn, these conditions act as collateral substitutes in that contract enforcement is facilitated and borrowers are screened based on their attributes that contribute to the lenders' objectives.

From a credit market perspective, the specificity of the screening-enforcement technology as embodied in the interlinked contract results in a tendency among farmer-lenders and trader-lenders to specialize towards certain subsets of the borrowing clientele. The outcome is a pattern of credit allocation in the informal credit market whereby trader-lenders lend predominantly to rice farmers with marketable surpluses, and farmer-lenders lend to landless and small farm households with labor "surpluses".

The data obtained from a survey of four rice-producing villages in the Philippines generally support the argument about the interlocker's advantage over a pure moneylender in the credit market. Although the extent of interlinked transactions found was less than expected, possibly due
to reporting problems, the observed pattern of credit allocation generally conformed with expectations based on a model of informal credit with interlinked transactions.

It now remains to be shown that the observed pattern of credit allocation in the informal credit market is the result of economic behavior depicted in the theoretical model. To do this, there is a need to examine the determinants of the observed allocation, and to ascertain if the inferences derived are consistent with the economic behavior implied in the model. This is the subject matter of the next chapter.
CHAPTER V
THE PATTERN OF CREDIT ALLOCATION:
AN EMPIRICAL ANALYSIS

This chapter presents the results of an econometric analysis of the pattern of credit allocation that emerges if informal creditors are guided by different motives when choosing their borrowers. Conventional economic reasoning holds that lenders will screen borrowers on the basis of characteristics associated with repayment ability such as income and the possession of tangible collateral. These standard indicators of repayment ability may not be directly applicable in an informal market setting, however, especially when lending is undertaken as a secondary activity of the lender. Instead, a borrower’s creditworthiness may be measured in terms of his potential to contribute to the lender’s primary occupation. In this case, repayment ability per se becomes subsumed under the personal attributes which lenders consider important for maximizing gains from their occupational specializations.

In Chapter III, the economic bases for a rice trader’s and a farmer’s lending activities were discussed. It was argued that the trader’s objective of having a secure and stable supply of paddy leads him to provide loans that require the borrower to sell to him the harvested crop. Analogously, the farmer’s objective of reducing his labor recruitment and monitoring costs results in loans tied to the commitment of labor services by the borrower. The economic advantage that market interlinkage confers on the interlocker in turn enables him to outbid other lenders in offering more attractive terms to borrowers with the requisite collateral substitute. The predicted outcome is a pattern of credit allocation mainly characterized by exchanges between trader-lenders
and farmer-borrowers with marketable surpluses of rice, and between farmer-lenders and landless households with surpluses of labor.

The empirical relevance of the above proposition was shown in the previous chapter using survey data from four rice villages in the Philippines. The use of percentage shares to examine the pattern of credit allocation in the informal market is quite restrictive, however. Its principal drawback is that only a limited number of variables (e.g. borrower attributes) can be simultaneously analyzed in a descriptive table. For instance, borrower access to a farmer-lender loan may be analyzed in terms of the borrower’s household type and village residence, but any conclusion based on this analysis implicitly assumes that the influence of other factors on loan access is the same across household types and their village locations. An econometric approach which allows the simultaneous variation of any number of variables is, therefore, pursued in this chapter to complement the descriptive analysis in the previous chapter.

A multinomial logit model is estimated in this chapter to determine if the observed allocation of trader-lender and farmer-lender loans among the different types of rural borrowers is a predictable outcome of the economic behaviors of these agents. More specifically, the multinomial logit model proposes to test the hypothesis that: borrower households with marketable surpluses of rice (farm households) are more likely to receive loans from trader-lenders, and borrower households with surpluses of labor (landless households) are more likely to receive loans from farmer-lenders. If this hypothesis is supported, then the observed pattern of credit allocation is consistent with the underlying economic behavior suggested by the model developed in Chapter III.

5.1 The Multinomial Logit Model

The multinomial logit model belongs to the general class of qualitative response models now widely used in empirical economic research. Qualitative response models have gained ascendency
in econometrics in view of the fact that many economic variables - such as those gathered from sample surveys - are qualitative in nature, and thus take only discrete values. A non-exhaustive list of examples includes labor force participation, occupational choice, migration and transport mode choice, among others.¹

Logit analysis is concerned with the determinants of the probability that a particular event occurs.² In economic applications, the occurrence of the event of interest is usually the outcome of a decision of an economic unit. This provides the logical link between logit analysis as a statistical procedure and the utility-based economic theory of choice. Alternatively, economists assume the existence of an underlying latent variable for which only a discrete realization is observed. Discrete realizations of the latent variable for each individual observation are then defined in terms of the propensity or ability of an economic unit to realize any one of the discrete states observed.³ Unlike the well-known logit and probit techniques, which deal with situations involving only two alternative responses or outcomes, multinomial logit estimation considers an arbitrary number of outcomes greater than two.⁴

A multinomial logit model is particularly appropriate for analyzing the pattern of credit allocation in the rural informal credit market. The manner in which heterogeneous borrowers are divided among the different informal lender types basically defines the pattern of credit allocation

¹ Amemiya's survey article (1981) provides an extensive, though not comprehensive, listing of applications of qualitative response models in economics. See also Maddala (1983).

² This statement is also true for probit analysis. The main difference between these two techniques lies in the assumption regarding the distribution of the error term. In probit, the error term is assumed to be distributed normally, while in logit, the error term is assumed to follow a logistic distribution.

³ For a more detailed discussion, see Amemiya (1981). See also Chapter 8 of Maddala (1992). A brief history of the logit model may be found in Cramer (1991).

⁴ The generalization of the logit model to more than two states and with continuous right-hand side variables is attributed to Theil (1969).
in the rural financial market. The economic rationale which motivates this pattern has been discussed in two previous chapters. The multinomial logit model provides a method for predicting the probability that a borrower with given characteristics obtains a loan from a particular lender type. More importantly, from the standpoint of economic theory, it is the relation between borrower characteristics and the probability of getting a loan from a specific lender type that is the focus of attention. If the credit allocation pattern observed in the market is consistent with the economic rationale for informal lending suggested in the theoretical discussion, then borrower attributes preferred by a particular lender type should have a non-zero effect on the probability of dealing with that lender type.

5.1.1 General Formulation

The multinomial logit model considered in this chapter follows the formulation of Schmidt and Strauss (1975). Suppose there are s+1 possible states for each i\({ }^{th}\) observation, with probabilities \(P_0, P_1, \ldots, P_s\). Let the probability that a particular state, \(P_p\), is realized be defined as a function \(P_p(x^{*}, \theta), i = 1, 2 \ldots n\) and \(j = 0, 1 \ldots s\), where \(x^{*}\) and \(\theta\) are vectors of independent variables and unknown parameters, respectively. Furthermore, by the definition of a probability, it is required that

\[
P_p(x^{*}, \theta) \geq 0
\]

\[
\sum_{j=0}^{s} P_j(x^{*}, \theta) = 1
\]

In the standard multinomial logit model, the probability function \(P_j(x^{*}, \theta)\) is written as follows:

\[
P_j(x^{*}, \theta) = \frac{\exp(x_j^T \beta_j)}{\sum_{j=0}^{s} \exp(x_j^T \beta_j)}
\]
where, for the $i^{th}$ observation, $x_i$ is a $(k \times 1)$ vector of characteristic attributes which is invariant across alternative states, and which usually includes a constant term. $\beta_j$, $j = 0, 1 \ldots s$, is a parameter vector with $s_i + 1$ $(k \times 1)$ sub-vectors lumped together into $\theta$. Each of the $s_i + 1$ $(k \times 1)$ sub-vectors in $\beta_j$ corresponds to an alternative-specific parameter vector since the explanatory variables in $x$ are hypothesized to have differential effects on the odds of realizing one alternative rather than another.

Define the odds of realizing the $j^{th}$ alternative relative to the first one as

$$
\frac{P_{yj}}{P_{y0}} = \frac{\exp(x_i' \beta_j)}{\exp(x_i' \beta_0)} = \exp[x_i'(\beta_j - \beta_0)]
$$

For estimation purposes, it is convenient to adopt a normalization rule and assume that $\beta_0 = 0$. This assumption fixes the observed state, $j = 0$, as the reference state in relation to which the probability of observing the other states may be compared. The standard multinomial logit model can therefore be written as follows:

$$
\log_e(\frac{P_{yj}}{P_{y0}}) = x_i' \beta_j \quad j = 1, 2 \ldots s.
$$

The choice of a reference state is purely arbitrary for the case where the alternatives do not follow any natural ordering. Moreover, the formulation in (5.4) makes it possible for any two states to be compared. For example, since

$$
\log_e(\frac{P_{yi}}{P_{yi}}) = \log_e(\frac{P_{yi}}{P_{y0}}) - \log_e(\frac{P_{yi}}{P_{y0}}),
$$

then it follows that
The parameters of the multinomial logit model as specified in (5.4) can be estimated using the method of maximum likelihood. The likelihood function may be written as follows:

\[
\mathcal{L} = \prod_{i=1}^{n} \prod_{j=0}^{s} P_{ij}^{y_{ij}}
\]

where \( y_{ij} = 1 \) if alternative \( j \) is chosen by individual \( i \), and 0 if not, for the \( s+1 \) alternative outcomes. Using definition (5.2) for \( P_{ij} \) and letting \( \beta_0 = 0 \), the expression (5.7) may be rewritten as

\[
\mathcal{L} = \prod_{i=1}^{n} \left[ \frac{1}{1 + \sum_{j=1}^{s} \exp(x_{ij}' \beta_j)} \right]^{y_{ij}} \prod_{i=1}^{n} \sum_{j=1}^{s} \frac{\exp(x_{ij}' \beta_j)}{1 + \sum_{j=1}^{s} \exp(x_{ij}' \beta_j)}^{y_{ij}}
\]

Maximizing the logarithm of (5.8) with respect to \( \beta_j \) yields the following

\[
\frac{\partial \log \mathcal{L}}{\partial \beta_j} = \sum_{i=1}^{n} \left[ y_{ij} - \frac{\exp(x_{ij}' \beta_j)}{1 + \sum_{j=1}^{s} \exp(x_{ij}' \beta_j)} \right] x_{ij}
\]

\[
= \sum_{i=1}^{n} [y_{ij} - P_{ij}] x_{ij}, \quad j = 1, 2, \ldots, s
\]

where the \( y_{ij} \)'s equal 1 only for the observations, \( i \), in state \( j \), and (5.9) denotes \( s \) vectors each of length \( k \) since \( x_i \) is \((k \times 1)\). For the maximum likelihood estimator, \( \hat{\beta}_j \), equation (5.9) must equal zero, so that the predicted sample frequency equals the actual sample frequency. The maximization of the likelihood function, or its logarithm, to obtain parameter estimates for the \( \beta_j \)'s entails a non-linear optimization procedure which is iterative in nature. In practice, parameter estimation is done
with the use of some computer program package.\textsuperscript{5} Moreover, in order to test hypotheses about \( \beta \), it is necessary to obtain the asymptotic variances of the maximum likelihood estimates \( \{ \hat{\beta}_1, \hat{\beta}_2, \ldots, \hat{\beta}_m \} \). These may be obtained from the asymptotic covariance matrix which is formed by taking the inverse of the information matrix\textsuperscript{4}, whose diagonal and off-diagonal blocks are, respectively,

\[
\frac{\partial^2 \log L}{\partial \beta_j \partial \beta_j} = \sum_{i=1}^{n} P_y[1 - P_y]x_i'x_i',
\]

\[
\frac{\partial^2 \log L}{\partial \beta_j \partial \beta_k} = - \sum_{i=1}^{n} P_jP_kx_i'x_i', \quad j, k = 1, 2, \ldots, s, \quad j \neq k,
\]

and \( P_j \) and \( P_k \) are defined as in (5.2) with \( \beta_0 = 0 \). A likelihood ratio test can also be performed to test the overall goodness of fit of the model.

\subsection*{5.1.2 Limitations of the Model}

The standard multinomial logit model treats alternative states or outcomes as if they were symmetrically similar or dissimilar. This means that the model is basically indifferent to the possibility that, for any set \( S = \{A, B, C\} \), A may be a close substitute for B but not for C. This assumption carries the implication that the probability of realizing outcome B relative to C remains unchanged were A to be replaced by D which is a substitute for neither. In terms of the model stated in (5.4) or (5.6), the assumption implies that the log odds ratio, or the ratio of the probabilities of two alternatives being compared, depends only upon these two alternatives, regardless of the number and nature of all other alternatives being simultaneously considered. This

\textsuperscript{5} The econometric software package LIMDEP Version 5.1 (1989) was used for this study. This package employs the Newton-Raphson iterative technique, among others, for obtaining the maximum likelihood estimates of the parameters.

\textsuperscript{6} The information matrix is formed by taking the expected value of the matrix of second derivatives of the log-likelihood function and reversing the sign. Standard econometric software packages usually compute the covariance matrix of the parameter estimates.
is known as the assumption of the *independence of irrelevant alternatives* (IIA). The IIA is a consequence of assuming independence among the error terms.\(^7\)

While the IIA property is a convenient assumption from the viewpoint of estimation, it is sometimes difficult to justify from an economic standpoint. Moreover, its violation results in inconsistent parameter estimates. There is a statistical test for testing the validity of the IIA assumption, however.\(^8\) Failing this test, other multinomial probability models which bypass the defect inherent in the multinomial logit model ought to be used. In particular, the multinomial probit model relaxes the assumption of uncorrelated error terms. Another option, the nested logit model, does not treat alternatives symmetrically, but as ordered sets and subsets. The results, therefore, do not have to rely on the IIA assumption. It is widely acknowledged in the literature, however, that the generality gained from using these other multinomial probability models does not justify their additional computational cost.\(^9\) Despite its weakness, the advantage of the multinomial logit model lies in its conceptual and computational simplicity [Amemiya (1981)]. To the extent that the alternatives under consideration are distinct or dissimilar enough, the IIA feature in the multinomial logit model need not be a major drawback.

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7 See Judge et al (1985) and related references cited therein.

8 The test is due to Hausman and McFadden (1984). They suggest that if a subset of the alternatives set is truly irrelevant, no systematic change in the parameter estimates will occur as a result of omitting it from the model. However, if the remaining odds ratios depend upon these alternatives, then omitting them from the model produces inconsistent estimates. The test is a chi-square test and is based upon a comparison of the parameter estimates with and without a subset of alternatives.

9 For a general discussion of these approaches and their shortcomings, see Amemiya (1981), Maddala (1983), Judge et al (1985), Cramer (1986), Greene (1990) and the original papers cited in these references.
5.2 The Empirical Model

For any household, i, there exists a probability of being in borrower category j, the category
defined by the type of lender the household deals with, including the possibility of having no
lender. The following empirical analysis focuses on the determinants of the probability that a
household belongs to a specific category of borrowers. The empirical model to be estimated is the
following:

\[ P[y_i = j] = \alpha_j + x_i' \beta_j + \epsilon_i, \quad i = 1,2,\ldots,n, \]

\[ j = 0,1,\ldots,4, \]

where \( i \) is the observation index, \( n \) the number of observations, \( x_i \) a vector of household
characteristics, and \( \alpha_j \) and \( \beta_j \) are vectors of parameters to be estimated. The index \( j \) refers to
borrower category as defined above. Five borrower categories are considered, namely: \( j=0 \) if there
is no lender, i.e. the household is a non-borrower, \( j=1 \) if the lender is a farmer, \( j=2 \) if a trader, \( j=3 \)
if any other informal lender and \( j=4 \) if a formal lender. The dependent variable, \( y_i \), takes on the
value of unity whenever \( y_i = j \), for \( j = 1, 2, 3 \) and \( 4 \); otherwise it is zero. That is, the non-
borrower status of a household is used as the reference state. Any \( j \) may, however, be used as
such.

The empirical model as formulated in (5.11) may be interpreted as a model for predicting
a household’s preference for a creditor. Accordingly, the household’s characteristics influence its
choice of a credit source. However, the data used in the estimation are actual credit market
transactions between borrowers and lenders. Given that lenders screen their loan applicants, it
should be obvious that the observed transactions also incorporate the effects of lender
discrimination. In this light, the empirical model can provide an indication of the relative
importance different lenders attach to borrower attributes in their lending decisions. This means
that the results obtained from the estimation can be interpreted as evidence of the sorting behavior of lenders, which is the main concern of this study.

Since credit market outcomes are influenced by both the borrower's choice of lender, as well as the lender's decision to deal with a particular borrower, it is difficult to determine exactly, using credit market data, to what extent the observed pattern of credit allocation is due to borrower preferences or to lender discrimination.\(^\text{10}\) It is reasonable to argue, however, that the process generating the observed differences in lender types among households is driven mainly by the screening behavior of lenders rather than by borrower preferences. Consider the typical rural credit market setting with heterogeneous households and several types of lenders. It pays for each lender, with his given screening and enforcement technology, to make known to all potential borrowers the terms at which they may be able to obtain a loan from him. To the extent that this discourages applicants who have a high probability of being turned away by the creditor, the lender spends less time in screening borrowers than he otherwise would. In effect, this is what happens in village credit markets where lenders have been operating for some amount of time. Borrowers choose their loan sources knowing the terms and conditions on alternative loan contracts available in the credit market, as well as the likelihood of receiving a loan from a particular lender type. A loan applicant's choice of creditor thus reflects his calculations of his chances of getting a loan from that lender based on his qualifications and what he knows about the lender's screening criteria. In other words, a loan applicant truly interested in obtaining a loan will choose that lender type with whom the likelihood of his getting a loan is the highest. Clearly this behavior manifests a recognition on the loan applicant's part of the various lenders' sorting criteria. It is valid to say, therefore, that the manner in which borrowers are allocated among the

\(^{10}\) Schmidt and Strauss (1975) encountered the same problem in a labor market context since occupational differences are simultaneously outcomes of worker preferences and employer discrimination.
different lender types is due less to borrower preferences and largely to the sorting behavior of lenders.\textsuperscript{11} That is, the lender's decision process principally determines the market outcome, which, in terms of the empirical model, is summarized by the specific borrower-lender pair observed. While not ruling out the role of borrower preferences, the analysis that follows puts emphasis on the screening considerations of lenders. Subsequent references to a household's "probability of borrowing" or the "probability of dealing with a specific lender" should be interpreted in this context.

\textbf{5.2.1 Model Specification}

The vector $x_j$ of explanatory variables consists of household characteristics that informal lenders can directly observe or, if not, easily collect information about through the variety of means available in a rural village setting. These characteristics may be categorized broadly as (a) those that describe the household, and (b) those that describe the production or physical environment of the household. These variables influence a household’s decision to borrow, but they also provide the lender information about a loan applicant’s riskiness and profit potential. From the variables that describe the household, lenders infer the repayment capacity of loan applicants as well as their ability to provide the collateral substitute (e.g. labor services, marketable surplus of the output, land usufruct rights) of interest to the lender. The variables that describe the production or physical environment determine the general willingness of informal lenders to service a particular location based on its relative riskiness or the degree of competition due to the presence of other lenders. If lenders are profit-maximizers, they will find it more attractive to lend only in villages which have a high productive potential, so that there will expectedly be more lenders in irrigated villages than in non-irrigated villages.

\textsuperscript{11} The same observation was made by Siamwalla et al (1990) in their study of the rural credit market in Thailand.
The regressor variables used to estimate the empirical model and the way they are specified in the multinomial logit equation are listed in Table 5.1. Alternative specifications of the multinomial logit model (5.11) are estimated to test hypotheses regarding the pattern of credit allocation.

5.2.2 Specific Hypotheses

As stated earlier, the main hypothesis to be tested is the following: borrower households with marketable surpluses of rice (farm households) are more likely to receive loans from trader-lenders than from farmer-lenders, and borrower households with surpluses of labor (landless households) are more likely to receive loans from farmer-lenders than from trader-lenders. This hypothesis focuses attention on the determinants of the probabilities of borrowers dealing with trader-lenders and farmer-lenders. To operationalize the testing of this hypothesis, the following subsidiary hypotheses are advanced:

(i) Since trader-lenders are mainly interested in the borrower's marketable surplus of rice, the size of the borrower's marketable surplus positively determines the probability of getting a loan from a trader-lender. In the absence of direct measures of marketable surplus, variables associated with the ability of the household to be a reliable source of paddy may be used. Farm size is one such variable. Land quality as proxied by irrigation is another. The household's command over the disposition of the output as proxied by the nature of the tenur contract is also indicative of an ability to commit output for sale to the creditor.

(ii) Since farmer-lenders lend primarily to reduce their ls or recruitment and monitoring costs, the extent of a household's participation in the rural labor market is an important determinant of the probability of getting a loan from a farmer-lender. Variables that increase the tendency for a rural household to sell its labor services in the rural labor market increase its chances of dealing with
Table 5.1: VARIABLE DEFINITION

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
</tr>
<tr>
<td>( P_jP_k ) ( j,k=0,1,2,3,4, j\neq k )</td>
<td>( j,k=0 ) if household is a non-borrower, ( j,k=1 ) if household borrowed from a farmer-lender, ( j,k=2 ) if household borrowed from trader-lender, ( j,k=3 ) if household borrowed from other informal lenders, and ( j,k=4 ) if household borrowed from formal credit sources, ( j\neq k )</td>
</tr>
<tr>
<td><strong>Regressor Variables</strong></td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>Age of the household head (in years)</td>
</tr>
<tr>
<td>DSTAY</td>
<td>Years of residence of the household in the village</td>
</tr>
<tr>
<td>EDHHYR</td>
<td>Number of years of schooling of household head</td>
</tr>
<tr>
<td>NODEP</td>
<td>Number of dependents in the household</td>
</tr>
<tr>
<td>TAREA</td>
<td>Total rice area farmed by household (in hectares)</td>
</tr>
<tr>
<td>OFFSHARE</td>
<td>Share of income from off-farm work to gross household income (in annual terms)</td>
</tr>
<tr>
<td>FARMDEP</td>
<td>Share of income from farming to gross household income (in annual terms)</td>
</tr>
<tr>
<td>NP0</td>
<td>Number of persons in household who work as farm laborers in other farms</td>
</tr>
<tr>
<td>NP1</td>
<td>Number of persons in household who are employed in non-farm activities</td>
</tr>
<tr>
<td>IRR</td>
<td>Irrigation dummy: 1 if farm is irrigated, 0 otherwise</td>
</tr>
<tr>
<td>SEASON</td>
<td>Cropping season dummy: 1 if wet, 0 otherwise</td>
</tr>
<tr>
<td>VDUM1</td>
<td>Village 1 dummy: 1 if Villa Natl, 0 otherwise</td>
</tr>
<tr>
<td>VDUM2</td>
<td>Village 2 dummy: 1 if Sapang Cauyan, 0 otherwise</td>
</tr>
<tr>
<td>VDUM3</td>
<td>Village 3 dummy: 1 if Villa Cuizon, 0 otherwise</td>
</tr>
<tr>
<td>OWNER</td>
<td>Land tenure dummy: 1 if farmer is owner, 0 otherwise</td>
</tr>
<tr>
<td>A-OWNER</td>
<td>Land tenure dummy: 1 if amortizing owner, 0 otherwise</td>
</tr>
<tr>
<td>LEASE</td>
<td>Land tenure dummy: 1 if leasehold tenant, 0 otherwise</td>
</tr>
<tr>
<td>TYPE2</td>
<td>Household type dummy; 1 if landless household, 0 otherwise</td>
</tr>
<tr>
<td>PERMTYP2</td>
<td>Labor contract dummy: 1 if landless household under a permanent labor contract, 0 otherwise.</td>
</tr>
<tr>
<td>CASTYP2</td>
<td>Labor contract dummy: 1 if landless household under a casual labor contract, 0 otherwise.</td>
</tr>
<tr>
<td>TYPE1OFF</td>
<td>Share of off-farm income in farm household's gross income. Interaction term between OFFSHARE and household type, where TYPE1=1 if farm household and 0 otherwise</td>
</tr>
<tr>
<td>TYPE1NP0</td>
<td>Number of persons in a farm household with off-farm work. Interaction term between NP0 and TYPE1</td>
</tr>
</tbody>
</table>
a farmer-lender in the credit market. These variables will generally be related to the household’s landlessness or near-landlessness.

5.2.3 Data

Survey data on 170 rural households over two cropping seasons are used in the estimation of the empirical model, thus making a total number of 340 observations. Since the empirical analysis is mainly concerned with the probability that a borrower receives a loan from a particular lender, the unit of observation used is a household and its associated lender during a particular season. Thus, a household with multiple transactions with the same lender during one cropping season is treated as a single observation. Since some households borrowed from more than one source, the data set had to be purged of those observations pertaining to the additional lenders in order to insure the mutual exclusivity of choices per household as required by the empirical model.\footnote{In the model, $\sum y_{ij} = 1$ over all $j$ for each observation $i$.}

In deleting observations, some criteria had to be employed so that the lender chosen for inclusion in the estimation reflected as closely as possible the household’s preference.\footnote{A different approach is used in Nagarajan (1992) based on a prior determination of the borrower’s marginal loan. However, as that same study shows, the results between that approach and the approach used in this study are not expected to be substantially different.} First, the lender involved in the most senior credit transaction, based on the month when the loan was incurred by the borrower, was retained and all others excluded. Second, in the event that two or more transactions with different lenders took place during the same month, the lender involved in the credit transaction with the largest amount was retained. Third, in the event of another tie, the criterion used was the frequency of dealing with the lender. That is, the lender who transacted with the household for two successive seasons was included, the premise being that this lender was the most preferred from the viewpoint of the household. In practice, this selection rule was not difficult to implement. In many of the cases involving multiple lenders, the lender associated
with the most senior transaction also lent the largest amount. The lender granting the largest amount also tended to engage in repeat business with the same household.

5.3 Estimation Results

Table 5.2 shows one set of estimates for the multinomial logit model. The results are presented with $P_0$, non-borrowing, as the reference category. The succeeding tables present results for alternative specifications of the model. These specifications all have reasonably good fit based on their log-likelihood statistics and the associated chi-square test. A positive (negative) coefficient indicates a higher (lower) probability of realizing the state specified in the numerator relative to the reference state, the denominator. General results with respect to the probability of getting a loan from any source, relative to not getting a loan, are discussed first. The focus then turns to factors differentiating the trader-lender from the farmer lender borrowing clientele.

5.3.1 Determinants of Access

The results show that farm size is an important determinant of access to credit in the rural financial market. The highly significant and positive signs for the farm size variable (TAREA) with respect to all the alternative credit sources indicate that creditors are generally more inclined to lend money to borrowers with big, rather than small, farms and, by implication, to farm operators than to non-cultivators. This is as one would expect, since in a rural farm-based economy, ownership of, or mere access to, cultivable land is a measure of one's economic potential, however this is interpreted by the different lender types. Conventionally, land is the most acceptable form of collateral. To formal financial institutions, it is the most tangible form of security for a loan. Thus, the effect of farm size on the probability of getting a loan, relative to non-borrowing, was largest for formal credit sources. The size of one's farm could also be interpreted as an indication of farming ability, given that the choice to engage in farming (as against being a wage worker on other farms) in itself indicates a propensity for managing
Table 5.2: MULTINOMIAL LOGIT COEFFICIENT ESTIMATES

<table>
<thead>
<tr>
<th>Coefficient*</th>
<th>( P_1/P_0 )</th>
<th>( P_2/P_0 )</th>
<th>( P_3/P_0 )</th>
<th>( P_4/P_0 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
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<td>-3.1157</td>
<td>-4.1088</td>
<td>-11.5621</td>
</tr>
<tr>
<td></td>
<td>(1.1503)**</td>
<td>(1.2729)**</td>
<td>(1.1694)**</td>
<td>(3.4062)**</td>
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<tr>
<td>AGE</td>
<td>-0.0105</td>
<td>-0.0284</td>
<td>0.0128</td>
<td>0.0211</td>
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<tr>
<td></td>
<td>(0.0168)</td>
<td>(0.0194)</td>
<td>(0.0166)</td>
<td>(0.0322)</td>
</tr>
<tr>
<td>DSTAY</td>
<td>-0.0249</td>
<td>-0.0096</td>
<td>-0.0131</td>
<td>0.0103</td>
</tr>
<tr>
<td></td>
<td>(0.0134)</td>
<td>(0.0152)</td>
<td>(0.0136)</td>
<td>(0.0326)</td>
</tr>
<tr>
<td>EDHYHR</td>
<td>0.0385</td>
<td>-0.0037</td>
<td>-0.0139</td>
<td>0.0862</td>
</tr>
<tr>
<td></td>
<td>(0.0701)</td>
<td>(0.0796)</td>
<td>(0.0745)</td>
<td>(0.1486)</td>
</tr>
<tr>
<td>NODEP</td>
<td>0.1247</td>
<td>0.1254</td>
<td>0.2326</td>
<td>-0.0398</td>
</tr>
<tr>
<td></td>
<td>(0.1009)</td>
<td>(0.1137)</td>
<td>(0.1018)**</td>
<td>(0.2124)</td>
</tr>
<tr>
<td>TAREA</td>
<td>0.6502</td>
<td>0.9736</td>
<td>0.6140</td>
<td>1.5969</td>
</tr>
<tr>
<td></td>
<td>(0.2416)**</td>
<td>(0.2323)**</td>
<td>(0.2254)**</td>
<td>(0.4008)**</td>
</tr>
<tr>
<td>SEASON</td>
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<td>1.0538</td>
<td>1.5553</td>
<td>1.6637</td>
</tr>
<tr>
<td></td>
<td>(0.3525)**</td>
<td>(0.3806)**</td>
<td>(0.3620)**</td>
<td>(0.7025)**</td>
</tr>
<tr>
<td>OFFSHARE</td>
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<td>-1.1316</td>
<td>-0.2869</td>
<td>-1.0973</td>
</tr>
<tr>
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<td>(0.5812)*</td>
<td>(0.7234)</td>
<td>(0.6504)</td>
<td>(2.1235)</td>
</tr>
<tr>
<td>NP0</td>
<td>0.3239</td>
<td>0.4122</td>
<td>0.1524</td>
<td>0.6187</td>
</tr>
<tr>
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<td>(0.1691)*</td>
<td>(0.2019)*</td>
<td>(0.1785)</td>
<td>(0.3473)*</td>
</tr>
<tr>
<td>NP1</td>
<td>0.0179</td>
<td>-0.6593</td>
<td>0.0851</td>
<td>0.5666</td>
</tr>
<tr>
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<td>(0.0299)</td>
<td>(0.3201)*</td>
<td>(0.3001)</td>
<td>(0.5033)</td>
</tr>
<tr>
<td>VDUM1</td>
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<td>1.7379</td>
<td>2.0166</td>
<td>5.7501</td>
</tr>
<tr>
<td></td>
<td>(0.5715)**</td>
<td>(0.7491)**</td>
<td>(0.5632)**</td>
<td>(1.7430)**</td>
</tr>
<tr>
<td>VDUM2</td>
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<td>4.0064</td>
<td>1.4535</td>
<td>4.0060</td>
</tr>
<tr>
<td></td>
<td>(0.5968)**</td>
<td>(0.6828)**</td>
<td>(0.5820)**</td>
<td>(1.8135)*</td>
</tr>
<tr>
<td>VDUM3</td>
<td>1.4255</td>
<td>2.3163</td>
<td>1.7634</td>
<td>-12.0871</td>
</tr>
<tr>
<td></td>
<td>(0.7452)*</td>
<td>(0.8724)**</td>
<td>(0.6748)**</td>
<td>(1.762.49)</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-383.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-Squared (48)</td>
<td>239.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Asymptotic standard errors are in parentheses.

* Significant at 5 percent level.

** Significant at 1 percent level.
production amidst risk and uncertainty. A bigger farm size also translates into a bigger marketable surplus, *ceteris paribus*, which is an important criterion for trader-lenders. In the informal credit market, farm size is also indicative of available collateral for farmer-lenders since it is possible for cultivation rights to be mortgaged or pawned.

The extent of a household's participation in the rural labor market is measured by the variable OFFSHARE, which is defined as the share of off-farm income to the household's gross income. This ratio is highest for landless households and so is expected to have a positive effect on the probability of households borrowing from a farmer-lender, relative to not borrowing. A priori, however, the effect of this variable on the odds of borrowing from other sources cannot be predicted. The results show that OFFSHARE indeed has a positive sign and is significant in relation to \( P_1/P_0 \). The sign of OFFSHARE for \( P_2/P_0, P_3/P_0, P_4/P_0 \) is, however, negative and not statistically significant. These results can be interpreted in either of two ways. First, the negative sign indicates that households whose incomes largely depend upon the sale of their labor services are more likely to be non-borrowers than recipients of loans from traders, private moneylenders, and formal credit sources. Only farmer-lenders are willing to lend to these households. That the OFFSHARE variable is insignificant for \( j = 2, 3 \) and 4 suggests that traders, other informal sources and formal sources, at least do not use this variable to sort loan applicants. That is because these lenders have no direct interest in the household's agricultural labor supply. An alternative interpretation then is the following: if OFFSHARE were the only criterion for lending, households whose incomes derive largely from participation in the rural labor market (e.g. landless households) have an equally likely chance of being rationed or being granted a loan by sources \( j = 2, 3, \) and 4. In contrast, these households are more likely to obtain loans from farmer-lenders who are interested precisely in their labor supply as shown by the positive and significant sign of OFFSHARE for \( P_1/P_0 \). Both interpretations in effect lead to the same inference which supports the
It is possible to interpret the number of household members employed in off-farm activities (NPO) as a signal of a household's additional income-earning capacity. NPO furthermore indicates labor power that households can offer as a collateral substitute in labor-linked credit contracts. If NPO is interpreted mainly in terms of household earning capacity, then it should have a positive effect on the probability of borrowing from any source versus not borrowing. However, if it is interpreted primarily as an indication of the ability to provide a collateral substitute, then it should have a positive influence on \( P_1/P_0 \) only. Table 5.2 shows that NPO is positive and significantly related to the probability of borrowing relative to non-borrowing in the case of farmers, traders and formal lenders. In the case of farmer-lenders, the result is consistent with either interpretation. For banks, the result can be consistent only with the first interpretation. As for trader-lenders, the result can be explained in terms of household earning capacity. The second interpretation that NPO is a screening variable can be justified only if the trader is also a landowner who needs to hire farm workers.

The number of household members engaged in non-farm activities (NP1) may be interpreted similarly to NPO as indicating additional income-earning capacity for a rural household. NP1 is positive but insignificant for all lender types except for trader-lenders where it is negative and significant. This result reflects a close association between farm activities and trader-lender loans. That is, trader-lender financing may be limited only to households engaged in farm-related activities. Also, to the extent that trader-lenders prefer to lend to farm households, the result captures what is probably a common feature among these households, namely, the tendency among household members to be engaged in farm and farm-related activities. This tendency may be explained by the economic importance attached to land and the long-held practice among farm
families of keeping within the family the ownership of, or cultivation rights to, the farm land.\(^{14}\) Farm household members get involved in farm activities not only to augment the labor input, but also in anticipation of taking over the management of farm operations in the future. Compared to members of landless households who are totally dependent on seasonal farm employment, farm household members have less incentives to engage in non-farm activities.

Borrowers' personal characteristics such as age (AGE) and years of schooling (EDHHYR) of the household head, years of residence in the village (DSTAY), and number of dependents (NODEP) did not generally turn out to be significant factors differentiating borrowers from non-borrowers. The signs of the coefficient estimates, however, seem to be reasonably consistent with economic intuition. Wealth effects attendant to accumulated human capital through years of schooling (EDHHYR) show up in terms of a better chance to get a bank loan. To the extent that number of dependents indicates a household’s propensity to borrow for consumption, the opposite signs for NODEP with respect to formal and informal credit sources reinforce views regarding the flexibility of informal lenders’ policies on loan use on the one hand, and the preference of banks for income-generating investments on the other hand. The results, moreover, say something about the consumption-saving behaviors associated with the demographic composition of the different borrower categories, and the implications of these on observed credit market outcomes. Young\(^{15}\) households have little or no savings and they tend to borrow more compared to older households. Likewise, young households tend to have more dependent, non-working members than older households, so that total borrowing will be comprised of a greater portion devoted to consumption. For these reasons, young rural households gravitate more towards informal, rather than formal, credit sources which more readily acknowledge the fungibility of credit and the jointness of

\(^{14}\) On this point, Binswanger and Rosenzweig (1986) is a good reference.

\(^{15}\) The word "young" is used with reference to the age of the household head.
production and consumption decisions within the household. As households grow older, however, the number of economically dependent members decreases, and a larger percentage of loans can then be allocated to productive investment. Through time, a household’s assets also accumulate, its savings increase and its reputation in the community gets established. Older rural households, therefore, will tend to be more bankable than younger households. The signs of AGE, DSTAY and NODEP, though statistically insignificant, obviously tell a story that is quite consistent with a life-cycle explanation of household consumption-saving behavior.

Finally the results show that all lenders are more willing to lend during the main or wet cropping season when the harvest is usually expected to be more abundant and loan demand is higher. On the other hand, the significant and positive signs of the village location dummy variables indicate (i) the general willingness of lenders to do business in irrigated rather than non-irrigated villages, and (ii) the greater presence of all lender types in these villages relative to the non-irrigated village, both of which result in a higher chance of borrowing from these lenders in the specified villages relative to the reference village.

An alternative specification of the model is presented in Table 5.3. The original specification is essentially preserved except that the variable OFFSHARE has been excluded. The reason for exclusion is that this variable is not informative enough in distinguishing between farm and landless households, even while it shows the extent of a household’s participation in the rural labor market. Five additional variables are included in the re-specified multinomial logit equation which attempts to capture more directly the effect of difference in household type on the way borrowers are sorted among different lender types.

The two dummy variables, OWNER (with value of 1 if the household is an owner-cultivator, 0 otherwise) and A-OWNER (1 if amortizing owner, 0 otherwise), are sub-categories of the farm household category, and are included to determine the influence of land ownership on the type
Table 5.3: MULTINOMIAL LOGIT COEFFICIENT ESTIMATES

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>( P_1/P_0 )</th>
<th>( P_2/P_0 )</th>
<th>( P_3/P_0 )</th>
<th>( P_4/P_0 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>-4.7971</td>
<td>-2.6043</td>
<td>-4.2973</td>
<td>-10.1599</td>
</tr>
<tr>
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<td>(1.3574)**</td>
<td>(1.2392)</td>
<td>(1.2772)**</td>
<td>(3.3076)**</td>
</tr>
<tr>
<td>AGE</td>
<td>-0.0010</td>
<td>-0.0420</td>
<td>0.0049</td>
<td>0.0066</td>
</tr>
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<td>(0.0180)</td>
<td>(0.0207)*</td>
<td>(0.0180)</td>
<td>(0.0400)</td>
</tr>
<tr>
<td>DSTAY</td>
<td>-0.0234</td>
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<td>-0.0089</td>
<td>-0.0034</td>
</tr>
<tr>
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<td>(0.0141)</td>
<td>(0.0161)</td>
<td>(0.0140)</td>
<td>(0.0371)</td>
</tr>
<tr>
<td>EDHYHYR</td>
<td>0.0730</td>
<td>-0.0598</td>
<td>-0.0315</td>
<td>0.0338</td>
</tr>
<tr>
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<td>(0.0727)</td>
<td>(0.0823)</td>
<td>(0.0781)</td>
<td>(0.1666)</td>
</tr>
<tr>
<td>NODEP</td>
<td>0.1208</td>
<td>0.1194</td>
<td>0.2589</td>
<td>-0.2109</td>
</tr>
<tr>
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<td>(0.1036)</td>
<td>(0.1220)</td>
<td>(0.1051)*</td>
<td>(0.2479)</td>
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<tr>
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<td>(0.2291)**</td>
<td>(0.2236)*</td>
<td>(0.4561)**</td>
</tr>
<tr>
<td>A-OWNGR</td>
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</tr>
<tr>
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<td>(0.8900)</td>
<td>(0.8138)*</td>
<td>(0.8339)</td>
<td>(1.1695)**</td>
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<td>(0.3871)**</td>
<td>(0.3698)*</td>
<td>(0.7592)**</td>
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</tr>
<tr>
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<td>(0.1779)</td>
<td>(0.2156)**</td>
<td>(0.1831)</td>
<td>(0.4520)*</td>
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<td>0.0024</td>
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<td>(0.6196)</td>
<td>(1.5763)</td>
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<td>-1.5574</td>
<td>-16.2016</td>
</tr>
<tr>
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<td>(0.5911)</td>
<td>(0.7417)*</td>
<td>(0.7923)*</td>
<td>(3155.68)</td>
</tr>
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<td>-3.0257</td>
</tr>
<tr>
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<td>(1.3624)**</td>
<td>(3.5155)**</td>
<td>(1.7441)</td>
<td>(6.4849)</td>
</tr>
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<td>(0.3051)</td>
<td>(0.5607)</td>
</tr>
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</tr>
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<td>(0.6569)**</td>
<td>(1.5768)**</td>
</tr>
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<td>(0.8769)**</td>
<td>(1.6504)*</td>
</tr>
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</tr>
<tr>
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<td>(0.9039)*</td>
<td>(0.9203)**</td>
<td>(0.7670)**</td>
<td>(2873.97)</td>
</tr>
</tbody>
</table>

Log-Likelihood | -366.63 |
Chi-Squared (64) | 274.57 |

* Asymptotic standard errors are in parentheses.

* Significant at 5 percent level. ** Significant at 1 percent level.
of lender from whom a borrower gets a loan. Among the various tenurial groups of farm households, owner-cultivators have the greatest command over the disposition of their entire harvest. Amortizing owners and leaseholders have to satisfy the prior claims of the government bank or their landlords, and this may inhibit entering into tied-in crop sale arrangements with trader-lenders. Thus, it is hypothesized that being an owner-cultivator rather than a non-owner increases the chances of trader-lenders lending to a particular household. On the other hand, because of the special consideration given by law to land reform beneficiaries, amortizing owners may find bank loans relatively more accessible.

To determine directly the effect of landlessness on the probability of getting a loan, dummy variables for landless households have been included. These variables are PERMTYP2 (which equals 1 if the household is landless and the head is employed as a permanent laborer, 0 otherwise) and CASTYP2 (which equals 1 if the household is landless and the head is employed as a casual worker, 0 otherwise). This specification is also intended to detect differences in the observed borrower-lender relations which may be due to the nature of rural employment contracts.

Lastly, an interaction term TYPE1OFF (OFFSHARE multiplied by 1 if the household is a farm household, by 0 if otherwise) is included to account for the extent to which farm households participate in the labor market. The inclusion of this variable, in combination with PERMTYP2 and CASTYP2, is intended to separate the effect - on the probability of getting a loan - of being landless from that of being a farmer, while recognizing that participation in the rural labor market is a characteristic common to both household types. Controlling for production environment, the tendency of a farm household to engage in off-farm employment is inversely related to its farm size because of the necessity to augment its production income with income from other sources. It is hypothesized, therefore, that farm households with higher values of TYPE1OFF have a greater propensity to transact with farmer-lenders, since their activity in the labor market makes
these borrowers or their household members better known to other farmers, and credit relationships are built on these social interactions. The same should be true for farm households in non-irrigated villages, independent of farm size, because these households resort to selling their services to other farms (in near-by villages) to add to their relatively small farm income.

The results in Table 5.3 are essentially the same as those in Table 5.2. As for the additional regressors, PERMTYP2, CASTYP2 and TYPE10FF all had the expected positive signs for \( P_x/P_0 \), with only CASTYP2 lacking in statistical significance. Note, however, the negative and significant sign for CASTYP2 with respect to traders and other informal lenders. Overall, the results support the hypothesis that farmer-lenders are more likely to lend to landless workers and small farm households than are all the other lender types. Small farm households are also more likely to find trader-lender loans inaccessible as shown by the negative and significant sign of TYPE1OFF for \( P_2/P_0 \). The small marketable surplus available from these farm households presumably does not make it attractive for trader-lenders to lend to them. Conversely, these households may choose not to borrow from traders knowing that their ability to deliver their output to these creditors is rather limited. Land ownership does not appear to be a crucial variable separating borrowers from non-borrowers, although, as hypothesized, being an amortizing owner improves one's chances of getting a bank loan given the existing legislation on agrarian reform in the Philippines.

\[ \text{5.3.2 Differentiating the Clienteles of Farmers and Traders} \]

A more direct test of the proposition that trader-lenders cater primarily to farmer-borrowers and farmer-lenders to landless workers entails identification of the factors that differentiate the borrowing clienteles of farmer-lenders and trader-lenders. To do this, a direct comparison of the categories \( j = 1 \) and \( 2 \) has to be made by re-specifying the model such that \( \beta_1 = 0^{16} \) and the dependent variable is \( P_x/P_x \). Since this study is mainly concerned with differences in the clienteles

\[ ^{16} \text{Alternatively, it may also be the case that } \beta_2 = 0. \text{ The choice is purely arbitrary.} \]
of trader-lenders and farmer-lenders, Tables 5.4 and 5.5 present only that portion of the econometric results which show the probability of borrowing from a trader-lender relative to borrowing from a farmer-lender, $P_2/P_1$. Each column in the two tables corresponds to a different specification of the model in terms of the regressor variables included.

The regression results generally support the main hypothesis advanced in this study. Table 5.4 shows that, under alternative specifications, variables related to a household's ability to provide farm labor differentiate the clientele of farmer-lenders from that of trader-lenders. The variable OFFSHARE has a negative sign and is highly significant for both specifications where it has been included (Table 5.4). This indicates that households largely dependent on the labor market for their incomes (i.e. landless and small farm households) are more likely to get their loans from farmer-lenders rather than trader-lenders. Introducing the interaction term TYPE1OFF does not change the basic result; the coefficient estimates for TYPE1OFF in the second, third and fourth columns are all negative and significant. TYPE2OFF, an interaction term measuring the percentage of a landless household's income derived from farm labor, is also negative and significant. In the third and fourth columns of Table 5.4, OFFSHARE is replaced by FARMDEP which measures the degree of dependence of a household on farm income. The sign reverses as expected, and is significant in the third column, indicative of the preference of trader-lenders for farm households.

Households with more members engaged in non-farm activities have a higher probability of obtaining a loan from farmer-lenders than trader-lenders as shown by the sign of NP1. This is probably due to the fact that landless households, who borrow mainly from farmer-lenders, have

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17 In the first columns of Tables 5.4 and 5.5, the estimated equations are specified exactly as in Tables 5.2 and 5.3, respectively, except that the reference category is now $j = 1$.

18 The household level data on total income can be broken down into farm, off-farm, non-farm and other income.
Table 5.4: MULTINOMIAL LOGIT COEFFICIENT ESTIMATES UNDER ALTERNATIVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>$P_2/P_1$</th>
<th>$P_2/P_i$</th>
<th>$P_3/P_1$</th>
<th>$P_3/P_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>0.2542</td>
<td>2.3238</td>
<td>1.3894</td>
<td>2.2986</td>
</tr>
<tr>
<td></td>
<td>(1.3675)</td>
<td>(1.5134)</td>
<td>(1.4279)</td>
<td>(1.4874)</td>
</tr>
<tr>
<td>AGE</td>
<td>-0.0179</td>
<td>-0.0234</td>
<td>-0.0264</td>
<td>-0.0223</td>
</tr>
<tr>
<td></td>
<td>(0.0198)</td>
<td>(0.0196)</td>
<td>(0.0198)</td>
<td>(0.0200)</td>
</tr>
<tr>
<td>DSTAY</td>
<td>0.0153</td>
<td>0.0074</td>
<td>0.0092</td>
<td>0.0074</td>
</tr>
<tr>
<td></td>
<td>(0.0154)</td>
<td>(0.0157)</td>
<td>(0.0157)</td>
<td>(0.0157)</td>
</tr>
<tr>
<td>EDHHYR</td>
<td>-0.0422</td>
<td>-0.0864</td>
<td>-0.0689</td>
<td>-0.0695</td>
</tr>
<tr>
<td></td>
<td>(0.0791)</td>
<td>(0.0791)</td>
<td>(0.0785)</td>
<td>(0.0781)</td>
</tr>
<tr>
<td>NODEP</td>
<td>0.0007</td>
<td>-0.0191</td>
<td>-0.0286</td>
<td>0.0193</td>
</tr>
<tr>
<td></td>
<td>(0.1076)</td>
<td>(0.1070)</td>
<td>(0.1062)</td>
<td>(0.1044)</td>
</tr>
<tr>
<td>TAREA</td>
<td>0.3234</td>
<td>0.3383</td>
<td>0.2807</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.2034)</td>
<td>(0.2050)</td>
<td>(0.2602)</td>
<td></td>
</tr>
<tr>
<td>SEASON</td>
<td>-0.0811</td>
<td>-0.1047</td>
<td>-0.0536</td>
<td>-0.1006</td>
</tr>
<tr>
<td></td>
<td>(0.3715)</td>
<td>(0.3759)</td>
<td>(0.3738)</td>
<td>(0.3763)</td>
</tr>
<tr>
<td>OFFSHARE</td>
<td>-2.2800</td>
<td>-2.0536</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.6988)**</td>
<td>(0.6773)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP0</td>
<td>0.0882</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.1849)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP1</td>
<td>-0.6772</td>
<td>-0.7469</td>
<td>-0.2883</td>
<td>-0.6637</td>
</tr>
<tr>
<td></td>
<td>(0.3257)*</td>
<td>(0.3334)*</td>
<td>(0.3080)</td>
<td>(0.3474)*</td>
</tr>
<tr>
<td>FARMDEP</td>
<td>-</td>
<td>-</td>
<td>1.5566</td>
<td>0.9237</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.7677)*</td>
<td>(0.7443)</td>
</tr>
<tr>
<td>TYPE1OFF</td>
<td>-</td>
<td>-9.2859</td>
<td>-9.2295</td>
<td>-9.8968</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.0140)**</td>
<td>(3.9280)**</td>
<td>(3.8131)**</td>
</tr>
<tr>
<td>TYPE1NP0</td>
<td>-</td>
<td>0.1780</td>
<td>0.2329</td>
<td>0.1125</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2504)</td>
<td>(0.2512)</td>
<td>(0.2516)</td>
</tr>
<tr>
<td>TYPE2OFF</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.9024</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.8055)**</td>
</tr>
<tr>
<td>VDUM1</td>
<td>-0.9676</td>
<td>-2.0075</td>
<td>-2.6508</td>
<td>-2.5690</td>
</tr>
<tr>
<td></td>
<td>(0.7837)</td>
<td>(0.9104)*</td>
<td>(0.9584)**</td>
<td>(0.9972)**</td>
</tr>
<tr>
<td>VDUM2</td>
<td>2.0387</td>
<td>0.9965</td>
<td>0.3656</td>
<td>0.5031</td>
</tr>
<tr>
<td></td>
<td>(0.7403)**</td>
<td>(0.8544)</td>
<td>(0.8776)</td>
<td>(0.8342)</td>
</tr>
<tr>
<td>VDUM3</td>
<td>0.8908</td>
<td>-0.1905</td>
<td>-0.4128</td>
<td>-0.4187</td>
</tr>
<tr>
<td></td>
<td>(0.9410)</td>
<td>(1.0209)</td>
<td>(1.0307)</td>
<td>(0.9959)</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-383.97</td>
<td>-378.75</td>
<td>-377.76</td>
<td>-373.52</td>
</tr>
<tr>
<td>Chi-Squared</td>
<td>239.89</td>
<td>250.33</td>
<td>252.32</td>
<td>260.79</td>
</tr>
</tbody>
</table>

* Asymptotic standard errors are in parentheses.

* Significant at 5 percent level. ** Significant at 1 percent level.
a greater incentive to diversify into non-farm activities. In addition, farm households whose members are attracted to non-farm activities (e.g. employment in urban centers as well as overseas) often pawn the cultivation rights to their lands to other farmers to raise funds for their job search and relocation expenses.

Village location affects not only the probability of borrowing, as Table 5.2 has shown, but also the source of credit as Table 5.4 shows. However, nothing can be said a priori about how village location will affect the relative probabilities of receiving a loan from the different creditor types. The results show that residents of Villa Nati (VDUM1) are more likely (than residents of Mangandingay, the reference village) to obtain their loans from farmer-lenders, while residents of Sapang Cauayan (VDUM2) have a higher probability of dealing with trader-lenders (than residents of Mangandingay). Two factors are incorporated in these results, namely, (a) the fact that both villages represented by VDUM1 and VDUM2 are irrigated and therefore have a better production environment than the reference village which is non-irrigated, and (b) the fact that differences among the villages exist in terms of, among others, the number of lenders of each type operating in these villages, their relative distances to the town proper, and the existing configuration of social ties between and among the residents.

The first fact implies differences in farm productivity and employment opportunities, which affect both the demand for and supply of loanable funds and thus differentiate the credit market situation obtaining in each of these villages from that in the reference village. The second fact implies that the chances of dealing with one lender type relative to the other differ depending on the village of residence of the sampled borrower. The transactions data in Chapter IV indicate a greater presence of farmer-lenders in Villa Nati (VDUM1) and trader-lenders in Sapang Cauayan (VDUM2). This explains the difference in the signs of the coefficients. The importance of village location as an explanatory variable varies, however, depending upon the other variables included
in the model. For example, the introduction of additional variables, specifically TYPE1OFF, into the equation reduces the importance of VDUM2 and increases that of VDUM1. This means that accounting for off-farm employment among members of farm households increases the probability of farmer-lenders lending to these households in Villa Nati, where such probability is already high, relative to the non-irrigated village, because of the presence of more farmer-lenders. Conversely, in Sapang Cauayan where trader-lenders have a greater presence and the probability of farm households dealing with them is higher than in the non-irrigated village, the effect of trader-lender presence is neutralized by the effect of off-farm work among farm households on the probability of borrowing from farmer-lenders, i.e. TYPE1OFF. In other words, accounting explicitly for borrower characteristics in the empirical model separates the effect of exogenous village characteristics on the dependent variable from the effect of borrower characteristics which may be specific to certain villages. If it were possible to account for all relevant borrower characteristics in the model, then the pure effect of village differences on the dependent variable could be isolated.

Table 5.5 likewise presents results for different specifications of the model where the OFFSHARE variable has been excluded. Invariably, the factors that turn out significant are those related to the household’s ability to supply farm labor to other farms. The variable representing landlessness, whether identified by employment contract type (PERMTYP2/CASTYP2) or not (TYPE2), is consistently negative and statistically significant. The variable TYPE1OFF is also negative and highly significant.

Farm size (TAREA) which is used as a proxy for marketable surplus is positive and significant as expected, although not so in the absence of the village location dummies. The difference in the results with respect to TAREA in Tables 5.4 and 5.5 also shows that farm size can perform well as a proxy for marketable surplus provided that the ability to commit the surplus
<table>
<thead>
<tr>
<th>Coefficient</th>
<th>( P_j/P_1 )</th>
<th>( P_j/P_1 )</th>
<th>( P_j/P_1 )</th>
<th>( P_j/P_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>2.1929 (1.5384)</td>
<td>2.0114 (1.4495)</td>
<td>0.8500 (1.4346)</td>
<td>0.6113 (1.5463)</td>
</tr>
<tr>
<td>AGB</td>
<td>-0.0409 (0.0213)*</td>
<td>-0.0345 (0.0183)*</td>
<td>-0.0074 (0.0178)</td>
<td>-0.0017 (0.0144)</td>
</tr>
<tr>
<td>DSTAY</td>
<td>0.0139 (0.0163)</td>
<td>0.0087 (0.0045)</td>
<td>0.0036 (0.0044)</td>
<td>0.0008 (0.0044)</td>
</tr>
<tr>
<td>EDHHRY</td>
<td>-0.1328 (0.0828)</td>
<td>-0.1229 (0.0737)</td>
<td>-0.0249 (0.0730)</td>
<td>-0.0170 (0.0730)</td>
</tr>
<tr>
<td>NODEP</td>
<td>-0.0014 (0.1151)</td>
<td>0.0072 (0.1111)</td>
<td>-0.0350 (0.1009)</td>
<td>-0.0344 (0.1009)</td>
</tr>
<tr>
<td>TAREA</td>
<td>0.3596 (0.2095)*</td>
<td>0.3553 (0.2100)*</td>
<td>0.2658 (0.1926)</td>
<td>0.2726 (0.1935)</td>
</tr>
<tr>
<td>A-OWNER</td>
<td>0.7072 (0.8136)</td>
<td>0.7135 (0.7452)</td>
<td>0.7729 (0.7455)</td>
<td>0.7334 (0.7455)</td>
</tr>
<tr>
<td>OWNER</td>
<td>1.7578 (0.8380)*</td>
<td>1.7268 (0.8495)</td>
<td>0.6797 (0.8439)</td>
<td>0.6482 (0.8439)</td>
</tr>
<tr>
<td>SEASON</td>
<td>-0.0720 (0.3769)</td>
<td>-0.0755 (0.3466)</td>
<td>-0.0241 (0.3448)</td>
<td>-0.0278 (0.3448)</td>
</tr>
<tr>
<td>NP0</td>
<td>0.2553 (0.2004)</td>
<td>0.2238 (0.1678)</td>
<td>0.0684 (0.1661)</td>
<td>0.0338 (0.1661)</td>
</tr>
<tr>
<td>NP1</td>
<td>-0.6708 (0.3247)*</td>
<td>-0.6764 (0.3249)*</td>
<td>-0.1657 (0.2857)</td>
<td>-0.1602 (0.2857)</td>
</tr>
<tr>
<td>TYPE2</td>
<td>-1.7637 (0.6039)**</td>
<td>-1.7637 (0.6039)**</td>
<td>-1.3645 (0.5266)**</td>
<td>-1.3645 (0.5266)**</td>
</tr>
<tr>
<td>PERMTYPE2</td>
<td>-1.6177 (0.6554)**</td>
<td>-1.3043 (0.5676)**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CASTYPE2</td>
<td>-2.1901 (0.7452)**</td>
<td>-1.8679 (0.6820)**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>VDUM1</td>
<td>-1.5832 (0.9188)</td>
<td>-1.5989 (0.9150)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>VDUM2</td>
<td>1.5087 (0.9026)</td>
<td>1.4968 (0.8956)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>VDUM3</td>
<td>0.3763 (1.0563)</td>
<td>0.3383 (1.0489)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IRR</td>
<td>-</td>
<td>-</td>
<td>0.0609 (0.8403)</td>
<td>0.0694 (0.8567)</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-366.63 (64)</td>
<td>-370.23 (60)</td>
<td>-400.05 (56)</td>
<td>-403.80 (52)</td>
</tr>
<tr>
<td>Chi-Square (df)</td>
<td>274.57 (64)</td>
<td>267.37 (60)</td>
<td>207.74 (56)</td>
<td>200.24 (52)</td>
</tr>
</tbody>
</table>

* Asymptotic standard errors are in parentheses.

* Significant at 5 percent level.
** Significant at 1 percent level.
in a credit cum marketing contract is accounted for in the model. This ability is captured by the land ownership variable (OWNER) which, as hypothesized, increases the probability of borrowing from a trader rather than from a farmer. This variable is positive and significant. Its importance, however, is diminished by the absence of the village location dummies in the third and fourth columns. NP1 is also negative, but significant only with the village location dummies included.

Since there is no a priori reason to expect borrowers in irrigated villages to differ from borrowers in non-irrigated villages with respect to the probability of borrowing from traders versus farmers, no specific hypothesis about the signs of the village location dummies can be stated. Accordingly, using a two-tailed test, none of the village location dummies is significant. It appears that accounting for other borrower attributes not earlier considered reduces the importance of differences between irrigated and non-irrigated villages. This implies that the dummy variables for village location were actually picking up the effects of some borrower characteristics which happen to be more pronounced in the irrigated villages than in the non-irrigated ones. Thus, making the relevant borrower characteristics more explicit in the model reduces the explanatory power of the locational variables. A Wald test of the null hypothesis that the village dummy coefficients equal zero resulted in a rejection of the null hypothesis, however, indicating that village location is a relevant variable that should be retained in the specification of the multinomial logit model.

5.4 Accuracy of the Model

From the log-likelihood statistics and the corresponding results of the chi-square tests, the different specifications of the multinomial logit model all have reasonably good fit. This implies rejection of the null hypothesis which, with all coefficients equal to zero, says that all alternatives are equally likely. Not all alternatives are equally likely, as will be shown by computing from the estimated model the predicted probabilities of each alternative. However, the chi-square test
provides no indication about the accuracy of the model's predictions. On the other hand, the pseudo-$R^2$ or the likelihood ratio index, while a convenient measure, has no intuitive interpretation between its limits [Judge et al (1985)], i.e.

$$\rho^2 = 1 - \frac{\mathcal{L}(\hat{\beta}_m)}{\mathcal{L}(\hat{\beta}_e)}$$

(5.12)

where the numerator expression is the log-likelihood of the unconstrained model with the values of $\beta_j^*$ that maximize the log-likelihood and the denominator is the log-likelihood of the model corresponding to the null hypothesis. Expression (5.12) is zero when the log-likelihoods of the constrained and unconstrained models are equal, and it equals unity when the model is a perfect predictor. It is not clear, however, what (5.12) means between 0 and 1.

An alternative measure of the accuracy of the model's predictions that is both simple and has intuitive meaning is based on the concept of expected information or entropy [Theil (1971)]. Basically the concept is founded on the notion that information and uncertainty are complements. The informational content of a message that says an event $y$ has occurred depends upon the probability $P$ of the event. If the probability of the event is high, say, almost certain, then its occurrence should be no cause for surprise. On the other hand, if $P$ is small and $y$ occurred, then the message about the occurrence of $y$ is highly informative. The relationship between the informational content of a message about $y$ and the probability of $y$ may, therefore, be represented as a decreasing function,

$$I(P) = \ln \frac{1}{P}$$

(5.13)

which decreases from infinity (infinite surprise when $P = 0$) to zero (no information when $P = 1$ and the occurrence of $y$ was certain).
Suppose that \( y_j, j = 0, 1, \ldots, s \), are mutually exclusive events, each with probability \( P_j \) before receiving any message about \( y_j \). Since it is known with certainty that one of the \( y_j \)'s will occur, the sum of the \( P_j \)'s equals unity. Then the expected informational content of the message about \( y_j \), or entropy, is

\[
H = \sum_{j=0}^{s} P_j \log(P_j) = \sum_{j=0}^{s} P_j \ln\left(\frac{1}{P_j}\right)
\]

(5.14)

Note that the measure \( H \) is non-negative. It takes a value of zero when one of the \( y_j \)'s is certain to occur, and \( \ln(s+1) \) when all the prior probabilities are equally likely, \( 1/(s+1) \). The more alternative outcomes there are, the greater the uncertainty about \( y_j \) prior to receiving any message about its occurrence. The greater the uncertainty, the higher the informational content of the message. Thus the entropy or expected information, \( H \), is a measure of uncertainty associated with the distribution of events \( y_0, \ldots, y_s \), with probabilities \( P_0, \ldots, P_s \) [Judge et al (1985)].

With a slight modification, the concept of expected information can be used to test the accuracy of predictions from a multinomial logit model. Suppose that instead of a message about the occurrence of \( y_j \), the message received causes a change in the probabilities of the \( y_j \)'s. Let the prior probabilities be represented by \( P_j \) as before, and the posterior probabilities \( Q_j, j = 0, 1, \ldots, s \). In the general case with \( s+1 \) mutually exclusive events, the information on each event is \( \ln(Q_j/P_j) \) and the probability of \( y_j \) is \( Q_j \), so that the expected information contained in the message is

\[
I(P) - I(Q) = \sum_{j=0}^{s} Q_j \ln\left(\frac{Q_j}{P_j}\right)
\]

(5.15)

where \( P \) and \( Q \) are vectors of the \( P_j \)'s and \( Q_j \)'s, respectively. The complementary relation between information and uncertainty is again evident. The expression (5.15) will be large if some \( Q_j \) is large and the corresponding \( P_j \) equals zero; that is, there is an infinite increase in information if \( y_j \) was previously believed to have a zero chance of occurrence, but now has a positive
probability. Conversely, if the prior and posterior probabilities are nearly equal or equal for all events, then little or no information is added.

The expression (5.15) may be used directly to obtain an indication about the relative accuracy of predictions based on the multinomial logit model. The test involves a comparison of the observed sample shares of each alternative, \( q_j \), with their predicted shares, \( p_j \). The closer (farther) the result is to (from) zero, the more (less) accurate are the predictions of the model. The intuition is that, if the model is a good one, then actual observations carry little or no information that is not already contained in the model. Thus, in this context, expected information is an inverse measure of the accuracy of the model’s predictions. Theil (1971) calls it the \textit{information inaccuracy of the forecast}, which may be regarded as a measure of lack of fit.

Table 5.6 compares the observed sample share \( q_j \) of each of the five mutually exclusive lender types with its predicted \( p_j \) share of the borrowing clientele based on four specifications of the multinomial logit model. The second row of Table 5.6 shows predictions based on the the model specified in Table 5.2; the third row reports predictions based on the model in Table 5.3; the fourth row corresponds to the model in the last column of Table 5.4, and the last row to that in the last column of Table 5.5. Statistics on the information inaccuracy of the models’ forecasts are computed by plugging in the values of \( p_j \) and \( q_j \) for each jth alternative into the expression (5.15). The results are reported in the last column of Table 5.6. Since the model specification in the third row has the informational expectation closest to zero (.0093), the test indicates that the specification in Table 5.3 is the most informative. Consequently, predicted probabilities generated from this empirical model can be considered the best available forecasts from the alternative specifications.

\[19\] The observed sample shares \( q_j \) may be interpreted as the share of the credit market being served by each lender type.
### Table 5.6: ACTUAL AND PREDICTED SHARES OF RURAL BORROWERS SERVED BY DIFFERENT LENDER TYPES

<table>
<thead>
<tr>
<th>No Lender</th>
<th>Farmer</th>
<th>Trader</th>
<th>Other Informal</th>
<th>Formal</th>
<th>Information Inaccuracy of Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q_j</td>
<td>.303</td>
<td>.250</td>
<td>.209</td>
<td>.200</td>
<td>.038</td>
</tr>
<tr>
<td>P_j*</td>
<td>.329</td>
<td>.276</td>
<td>.232</td>
<td>.129</td>
<td>.032</td>
</tr>
<tr>
<td>P_jb</td>
<td>.318</td>
<td>.259</td>
<td>.238</td>
<td>.156</td>
<td>.029</td>
</tr>
<tr>
<td>P_jc</td>
<td>.329</td>
<td>.288</td>
<td>.206</td>
<td>.153</td>
<td>.024</td>
</tr>
<tr>
<td>Pjd</td>
<td>.326</td>
<td>.291</td>
<td>.191</td>
<td>.173</td>
<td>.018</td>
</tr>
</tbody>
</table>

* Predictions based on model specified in Table 5.2.

b Predictions based on model specified in Table 5.3.

c Predictions based on model specified in last column of Table 5.4.

d Predictions based on model specified in last column of Table 5.5.
Tables 5.7 to 5.10 present predicted probabilities of getting a loan during the main cropping season from the different lender types for farmer and landless household borrowers, sorted by tenure or employment contract. These probabilities were generated from the multinomial logit model specified in Table 5.3. In computing the probabilities, village sample means shown in Table 5.11 were used for the continuous variables. The estimates are to be interpreted as probabilities of getting a loan from lender j for the "average" household residing in a specific village, such household being either a farm operator (in which case, an owner-cultivator, amortizing owner or leaseholder), or a landless worker on someone else's farm (in which case, a permanent or casual worker).

The model invariably predicts landless workers to have a higher probability of obtaining loans from farmer-lenders than from trader-lenders, which was expected. In the villages of Villa Nati and Sapang Cauayan in particular, the probability of landless workers receiving a loan from farmer-lenders exceeds that of receiving a loan from any other lender type.

As for farm households in general, the model predicts a higher probability of borrowing from trader-lenders than from farmer-lenders only in the case of Sapang Cauayan. The model predicts, however, that leaseholders in both Villa Nati and Villa Cuizon and amortizing owners in Villa Nati have higher chances of getting loans from farmer-lenders than from traders. In Mangandingay which is non-irrigated, only farmers who are owner-cultivators are predicted to have a higher probability of successfully borrowing from traders than from farmers. It was pointed out earlier that this possibility may arise because of the limited ability of leaseholders and amortizing owners, compared with owner-cultivators, to enter into ed-in sales arrangements with trader-creditors. In addition, the average farm sizes in Villa Nati and Villa Cuizon are smaller than in Sapang Cauayan, which may cause farm households in the two former villages to have a higher dependence on off-farm income than farm households in the latter village. These mixed results
Table 5.7: PREDICTED PROBABILITIES OF RECEIVING A LOAN FROM DIFFERENT LENDER TYPES IN THE VILLAGE OF VILLA NATI

<table>
<thead>
<tr>
<th>Borrower Type</th>
<th>Lender Type</th>
<th>No Creditor</th>
<th>Farmer</th>
<th>Trader</th>
<th>Other Informal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>Owner</td>
<td>0.0681</td>
<td>0.1303</td>
<td>0.1773</td>
<td>0.5869</td>
<td>0.0374</td>
</tr>
<tr>
<td></td>
<td>A-Owner</td>
<td>0.0298</td>
<td>0.2457</td>
<td>0.1169</td>
<td>0.2186</td>
<td>0.3890</td>
</tr>
<tr>
<td></td>
<td>Leaseholder</td>
<td>0.0966</td>
<td>0.3779</td>
<td>0.0886</td>
<td>0.3968</td>
<td>0.0402</td>
</tr>
<tr>
<td>Landless</td>
<td>Permanent</td>
<td>0.0495</td>
<td>0.6469</td>
<td>0.0301</td>
<td>0.2040</td>
<td>0.0695</td>
</tr>
<tr>
<td></td>
<td>Casual</td>
<td>0.0964</td>
<td>0.7991</td>
<td>0.0210</td>
<td>0.0835</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Multinomial logit estimates

Table 5.8: PREDICTED PROBABILITIES OF RECEIVING A LOAN FROM DIFFERENT LENDER TYPES IN THE VILLAGE OF SAPANG CAUAYAN

<table>
<thead>
<tr>
<th>Borrower Type</th>
<th>Lender Type</th>
<th>No Creditor</th>
<th>Farmer</th>
<th>Trader</th>
<th>Other Informal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>Owner</td>
<td>0.0494</td>
<td>0.0370</td>
<td>0.7035</td>
<td>0.2058</td>
<td>0.0042</td>
</tr>
<tr>
<td></td>
<td>A-Owner</td>
<td>0.0320</td>
<td>0.1034</td>
<td>0.6869</td>
<td>0.1135</td>
<td>0.0641</td>
</tr>
<tr>
<td></td>
<td>Leaseholder</td>
<td>0.1042</td>
<td>0.1596</td>
<td>0.5227</td>
<td>0.2068</td>
<td>0.0066</td>
</tr>
<tr>
<td>Landless</td>
<td>Permanent</td>
<td>0.0859</td>
<td>0.4393</td>
<td>0.2853</td>
<td>0.1709</td>
<td>0.0185</td>
</tr>
<tr>
<td></td>
<td>Casual</td>
<td>0.1709</td>
<td>0.5544</td>
<td>0.2031</td>
<td>0.0714</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Multinomial logit estimates
Table 5.9: PREDICTED PROBABILITIES OF RECEIVING A LOAN FROM DIFFERENT LENDER TYPES IN THE VILLAGE OF VILLA CUIZON

<table>
<thead>
<tr>
<th>Borrower Type</th>
<th>No Creditor</th>
<th>Farmer</th>
<th>Trader</th>
<th>Other Informal</th>
<th>Formal Sources</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer Owner</td>
<td>0.1086</td>
<td>0.0353</td>
<td>0.1898</td>
<td>0.6663</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
<tr>
<td>A-Owner</td>
<td>0.0975</td>
<td>0.1364</td>
<td>0.2568</td>
<td>0.5093</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
<tr>
<td>Leaseholder</td>
<td>0.1923</td>
<td>0.1275</td>
<td>0.1183</td>
<td>0.5618</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
<tr>
<td>Landless Permanent</td>
<td>0.1527</td>
<td>0.3380</td>
<td>0.0622</td>
<td>0.4472</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
<tr>
<td>Landless Casual</td>
<td>0.3139</td>
<td>0.4409</td>
<td>0.0521</td>
<td>0.1932</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: Multinomial logit estimates

Table 5.10: PREDICTED PROBABILITIES OF RECEIVING A LOAN FROM DIFFERENT LENDER TYPES IN THE VILLAGE OF MANGANDINGAY

<table>
<thead>
<tr>
<th>Borrower Type</th>
<th>No Creditor</th>
<th>Farmer</th>
<th>Trader</th>
<th>Other Informal</th>
<th>Formal Sources</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer Owner</td>
<td>0.5171</td>
<td>0.0407</td>
<td>0.0721</td>
<td>0.3674</td>
<td>0.0027</td>
<td>1.00</td>
</tr>
<tr>
<td>A-Owner</td>
<td>0.4384</td>
<td>0.1486</td>
<td>0.0922</td>
<td>0.2653</td>
<td>0.0554</td>
<td>1.00</td>
</tr>
<tr>
<td>Leaseholder</td>
<td>0.6441</td>
<td>0.1035</td>
<td>0.0316</td>
<td>0.2181</td>
<td>0.0026</td>
<td>1.00</td>
</tr>
<tr>
<td>Landless Permanent</td>
<td>0.5203</td>
<td>0.2791</td>
<td>0.0169</td>
<td>0.1766</td>
<td>0.0071</td>
<td>1.00</td>
</tr>
<tr>
<td>Landless Casual</td>
<td>0.7026</td>
<td>0.2391</td>
<td>0.0082</td>
<td>0.0501</td>
<td>0.0000</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: Multinomial logit estimates
Table 5.11: SAMPLE MEANS OF REGRESSOR VARIABLES USED IN COMPUTING BORROWING PROBABILITIES OF HOUSEHOLDS PER VILLAGE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Villa Nati</th>
<th>Sapang Cauyen</th>
<th>Villa Cuizon</th>
<th>Mangandingay</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>40.56</td>
<td>41.81</td>
<td>44.92</td>
<td>45.75</td>
</tr>
<tr>
<td>DSTAY</td>
<td>24.75</td>
<td>25.69</td>
<td>25.83</td>
<td>37.41</td>
</tr>
<tr>
<td>EDHHYR</td>
<td>6.15</td>
<td>7.14</td>
<td>5.33</td>
<td>6.53</td>
</tr>
<tr>
<td>NODEP</td>
<td>4.33</td>
<td>3.89</td>
<td>4.42</td>
<td>3.22</td>
</tr>
<tr>
<td>TAREA</td>
<td>0.71</td>
<td>0.77</td>
<td>0.02</td>
<td>0.15</td>
</tr>
<tr>
<td>TYPE1OFF</td>
<td>0.03</td>
<td>0.02</td>
<td>0.96</td>
<td>1.34</td>
</tr>
<tr>
<td>NP0</td>
<td>1.88</td>
<td>1.26</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>NP1</td>
<td>0.25</td>
<td>0.73</td>
<td>1.04</td>
<td></td>
</tr>
</tbody>
</table>
for the farm household borrower again underscore the potentially important influence of village-specific factors on the pattern of credit allocation in the rural financial market. These factors are related to, among others, the production environment, the distribution of farm sizes and of lender types among the villages, and existing social ties among residents within each village — all of which interact and affect the probabilities of households dealing with the various lender types. Unfortunately, with the available data, not all these factors could be explicitly incorporated into the empirical model.

An important observation is that the probability of not borrowing was highest for all borrower types in Mangandingay. This is consistent with the expectation that formal and informal lenders compete more aggressively in relatively progressive villages, while few would want to lend in a poor village.

Finally, despite the relative commercialization of economic relations in the sample villages, the model predicted cases wherein farm and landless households have higher probabilities of receiving loans from other informal lenders than from traders or farmer-lenders. In the first place, it should be understood that the category "other informal lenders" subsumes four different types of informal lenders according to the classification used in this study (Chapter IV). This reflects the fact that moneylenders and other occasional lenders still occupy a niche in the informal credit market of specific villages. This point is not explored at any length in this study, but two plausible reasons for the importance of these lenders come to mind. The first is that credit relations, which are basically founded on the principle of trust between the contracting parties, tend to have a lock-in effect. It is possible, therefore, for borrower-lender relations to span successive generations of households, either because the credit relations have hardened into personal ties, or the cost of building one's reputation with new creditors makes switching difficult, if not risky. This line of reasoning presumes that the moneylenders and other occasional lenders are hold-overs from the
traditional type of informal lenders. The second reason assumes the opposite, i.e., that there exists a new class of rural moneylenders distinct from farmers and traders. Whereas the latter two trace their evolution to the "green revolution" and changes in Philippine tenancy laws, the new generation of private moneylenders is a by-product of excess household liquidity arising from the income remittances of rural household members employed overseas, notably in the Middle East. While these moneylender households may not be directly involved in farming activities, the size of their loanable funds as well as the regularity of flow from the source make these lenders an attractive credit source for all types of borrowers. In fact, borrowers rationed by the traders and farmers have this type of informal lenders as an alternative source. The problem is that the data set does not contain any information about the history of borrower-lender relations in the villages. Neither does it provide any indication about the relative importance of informal lenders lending money from income derived from overseas employment of household members.

5.5 Summary

In this chapter, a multinomial logit model was estimated to empirically test the twin propositions that (i) trader-lenders in the rice-growing economy lend on the basis of a borrower’s ability to produce a marketable surplus of rice for the lender’s rice trading business, and (ii) farmer-lenders lend to reduce their monitoring and recruitment cost of farm labor. It was hypothesized that if (i) and (ii) are true, then borrower characteristics preferred by trader-lenders and farmer-lenders are critical determinants of the probabilities of rural households obtaining loans from these lender types.

The econometric results generally support the hypotheses. In particular, very strong support was found for the hypothesis that farmer-lenders lend on the basis of a borrower household’s ability to supply farm labor. High probabilities of being able to obtain loans from farmer-lenders were consistently reported for landless households. Regarding the hypothesis that trader-lenders
lend based on a borrower household's potential as a reliable paddy source for the marketing business, the results conformed with expectations but were not as robust. The variable used to represent the borrower's ability to produce a marketable surplus (farm size) was significant in differentiating clients of trader-lenders from non-borrowers. However, as a characteristic distinguishing clients of trader-lenders from those of farmer-lenders, it was significant only in the presence of a land ownership dummy variable which represents a household's ability to decide on the disposition of the marketable surplus. The predicted probabilities of farm households dealing with the different lender types showed mixed results. The probability of dealing with farmer-lenders was sometimes higher than the probability of dealing with trader-lenders rather than the converse. This result may be attributed to the fact that, by virtue of their small average farm size, the majority of farm households are also participants in the rural labor market. This makes farmer-lender loans equally, if not more, accessible. While this result does not necessarily invalidate the hypothesis relating to the propensity among farmer-borrowers to be clients of trader-lenders, it does reinforce statements made about the rationale behind the farmer's role as a lender in the rural informal credit market. The point is that farmer-lenders view a borrower's ability to supply agricultural labor as a collateral substitute, regardless of whether the borrower is a farmer or a landless worker. On this basis, the model suggests that the clienteles of traders and farmers are differentiated not so much in terms of the sharp dichotomy between farm household and landless household, but more in relation to the extent to which the household participates in the rural labor market or produces a marketable surplus. In other words, it is the ability of the borrower household to make the collateral substitute available to the informal lender that is crucial in obtaining a loan.
CHAPTER VI
CONCLUSION

Ever since the publication in 1978 of Bardhan and Rudra’s account of interlocking land, labor and credit relations in India, the theory of interlinked rural transactions has attracted a good deal of attention in the economics literature. Yet much of the theorizing about interlinked transactions has focused on tenancy and rural labor markets, so much so that ten years after the Bardhan and Rudra article, it was noted that the "interlinking of credit and output needs more specific attention than it has received so far" [Bell (1988): 327]. In addition, while there seems to be growing recognition of interlinked contracts as a prominent feature of some rural economies, the current evidence remains fragmented such "that the gathering of simple facts on the nature and incidence of interlinking in different regions would make a valuable contribution" (p. 327).

In a number of ways, this study has been an attempt to narrow some of these gaps and to explore some of the unexplored themes emerging from the interlinked markets literature. The approach chosen, however, departs from what is commonly found in the interlinked markets literature. Whereas most of the preceding work was motivated by incentive and enforcement problems attendant to a sharecropping contract, the starting point in this study is a credit market transaction characterized by a positive probability of default. Whereas much of the previous research was directed at investigating the optimal design of various interlinked contracts, this study concentrates on the effect of market interlinkage on the lender’s ability to screen borrowers and enforce repayment. It is shown that market interlinkage implies interlockers sorting of loan.
applicants according to their ability to supply the input necessary for the sustenance of the interlockers' main economic activity. The results are important to an understanding of the organization and structure of rural informal credit markets.

Starting from the asymmetric information feature of credit markets, an interlinked rural transaction was analyzed in this study as a collateral substitute. Specifically, a credit contract tied to output marketing was analyzed in terms of how it fulfills the screening and enforcement functions of collateral in a loan contract. Credit market equilibria without collateral, with "perfect" collateral, and with a marketing link as collateral substitute were compared to demonstrate the economic advantage of the trader-lender over the pure moneylender in the credit market. A major concern was the effect of using credit contracts tied to output marketing and the commitment of labor services by the debtor on the distribution of credit among the rural borrowing clientele.

Survey data from four rice-growing Central Luzon villages in the Philippines were used to show the relative importance of trader-lenders and farmer-lenders in the informal credit market of a rural economy. An empirical analysis was undertaken to determine if the data supported the hypotheses that: (i) trader-lenders lend mainly to farmer-borrowers because of their interest in the marketable surplus of rice, and (ii) farmer-lenders lend mainly to landless rural households to reduce their labor monitoring and recruitment costs. If (i) and (ii) are true, then borrower characteristics which are associated with the ability to deliver a large marketable surplus and to provide farm labor should have a significant influence on the probability of receiving a loan from trader-lenders and farmer-lenders, respectively. The empirical results should be able to provide policy makers with a more informed basis for formulating policies aimed at improving rural financial market performance.
6.1 Summary of Main Results

A model of informal credit involving a pure moneylender was presented in Chapter II as a benchmark for the subsequent analysis of more specific informal credit arrangements. In this model which incorporates uncertainty as a multiplicative term in the borrower's production function, no collateral is stipulated in the loan contract and the lender has no means of fully recovering the loan in case the borrower defaults because of insufficient income or opportunistic behavior. It is shown that if default probability increases with loan size, the credit market equilibrium will be characterized by loan size rationing because lenders will not be indifferent to the borrower's size of loan. When there is more than one type of borrower, the credit market outcome depends upon whether borrower type, defined by the risk characteristic of the borrower, is public or private information.

The introduction of "perfect" collateral into the model allows the lender to fully recover the loan regardless of the outcome of the project, and results in a higher equilibrium loan amount and a lower interest rate than the case analyzed in the basic model. Moreover, as was shown in Chapter III, loan size credit rationing disappears because of reduced loan demand when the cost of default is totally shifted from lender to borrower. The prevailing institutional environment in a developing country setting, however, may inhibit collateral use. Credit market participants, therefore, employ a variety of collateral substitutes (e.g. tied contracts, third party guarantees, threat of loss of future borrowing opportunities) which often do not completely satisfy the properties associated with collateral in the ideal sense. When collateral is "imperfect", lenders have an incentive to screen borrowers and loan size rationing re-appears.

While loans linked to marketing and labor contracts are motivated by the lenders' economic objectives in the product and labor markets, the linked contract is a natural collateral substitute in a situation characterized by potential loan default and limited opportunities for collateral use.
Credit tying acts as a collateral substitute in that it performs both the screening and enforcement functions ascribed to collateral in organized or formal credit markets. The borrower’s decision to enter into a credit cum marketing arrangement provides the creditor with a signal of the borrower’s ability to produce a marketable surplus, and thereby his repayment ability and resource status. At the same time, the credit cum marketing contract is an instrument for enforcing loan repayment because the trader-lender, by acting as the medium for the sale of the borrower’s marketable surplus, in effect has first claim on the proceeds of the sale, and thus, is in a position to directly collect the amount owed from the proceeds. Similarly, a labor-linked credit contract accomplishes at once the functions of screening and enforcement; farmer-lenders lend only to those with whom they deal in the labor market, and loan repayment can be costlessly enforced through the deduction of the amount owed from the wages paid.

As a collateral substitute, the tying of credit with other transactions bestows on the interlocker an economic advantage in the credit market over the pure moneylender. This was demonstrated in Chapter III for the case of the trader-lender. In this case, the competitive advantage derives from the activity of the trader in the product market where he can obtain a higher price for the product sold than can both the farmer and the pure moneylender. This advantage allows the trader-lender to offer farmer-borrowers a bundled contract which is more attractive than the loan contract offered by the pure moneylender. If the moneylender and the borrower had access to the same terms as the trader in the product market, then the trader’s advantage in the credit market would disappear.

The advantage of the trader is evident in the greater flexibility with which he can design the terms of the loan contract. In Chapter III, it was shown that at all interest rate levels (loan sizes) where the zero-profit condition obtained, the trader’s loan size (interest rate) offer is always greater (less) than that of the pure moneylender. That occurs because the trader can take advantage
of the scope economies implicit in the joint activity of moneylending and marketing the borrower's output. These lower costs allow the trader to offer loan terms more attractive to borrowers than the pure moneylender's. While the pure moneylender is confined to interest rate and loan size adjustments, the trader-lender can, in addition to these, adjust his price offer in order to make the bundled contract financially rewarding for himself. The trader is constrained only not to make the borrower worse off than when dealing with the pure moneylender. For example, the linked contract may involve a higher equilibrium interest rate than the unlinked contract, but it may provide for a higher output price which some borrowers may find more beneficial than an interest rate discount, depending upon their capacity to respond to the higher output price.

At a more general level, this study argued that the specificity of the screening and enforcement technology as embodied in the interlinked contract implies differential advantages for different interlocker types in dealing with particular clienteles in the credit market. From a credit market perspective, the interlinked contract is a technology for screening borrowers and enforcing loan repayment in an informal credit market. However, the use of this technology is circumscribed by the nature of the economic activities of both borrower and lender. A trader-lender cannot employ a marketing link to enforce loan repayment from a landless farm laborer whose marketable surplus is expected to be negligible. Neither can he condition a loan granted to a landless worker on the latter's commitment of farm labor services unless he himself were also engaged in farming or another activity for which he needs labor. Similarly, securing a loan given by one farmer to another farmer by means of a marketing contract can be done only at a high cost unless the farmer-lender has the capacity for hauling, storing and transporting the product to the wholesale market. The competitive advantage of informal lenders that derives from their ability to engage in interlinked transactions is, therefore, limited to loan applicants who, by the nature of their economic activities, are within the scope of the informal lender's non-credit market activities.
It follows that the pattern of credit allocation in the rural informal credit market reflects the various lenders' motivations for lending as well as their differential advantages resulting from the screening and enforcement technology employed. Lenders will specialize in lending to borrowers who can provide the collateral substitute acceptable to them. In an informal credit market composed of traders and farmers as lenders and farmers and landless laborers as borrowers, the use of interlinking as a collateral substitute implies that trader-lenders will specialize in lending to farmers and farmer-lenders will lend mainly to landless borrowers. This argument suggests that interlinked contracts constitute a possible source of monopolistic advantage for informal lenders and may be one reason for the apparent segmentation of rural credit markets.

The propositions advanced in this study about the pattern of credit allocation generally found empirical support in the relatively commercialized setting of four rice-growing villages in the Philippines. Farmer-lenders and trader-lenders were found to be the dominant informal lender types. Together these two lender types accounted for 56 percent of all informal lenders reported in the data set and 59 percent of the total amount of all reported loan transactions, excluding pawning contracts. Their share of the total volume of informal loans reported was 66 percent. The figure would be closer to 80 percent if pawning contracts are included. The data further show that traders lent mainly to farmer-borrowers, while farmer-lenders were the principal credit source for landless households. Moreover, more than one-half of the total volume of trader loans was for production while the biggest portion of farmer-lender loans (31 percent) was for consumption purposes. Trader-lenders provided 70 percent of all product-linked loans and farmer-lenders accounted for 56 percent of labor-linked loans. Credit transactions tied to the sale of output and commitment of labor services by the borrower were important but did not dominate all informal credit transactions. It is possible that other types of collateral substitutes or technologies for loan screening and repayment enforcement were being used. Examples of these are kinship, social
custom and reciprocity. However, it is also possible that interlinked transactions were underreported due to an inadequate survey questionnaire.

The multinomial logit estimation in Chapter V yielded results that generally supported the hypothesis about lender specialization based on collateral substitutes. The borrowing clientele of farmer-lenders was differentiated from that of trader-lenders mainly by the extent of participation of the household in the rural labor market and its capacity to produce a marketable surplus of paddy. Based on various indicators of readiness to supply farm labor (e.g. landlessness, labor contract type, degree of dependence on labor income), borrowers from farmer-lenders tended to participate more in the labor market than did borrowers from trader-lenders. The inference, therefore, is that these borrowers are basically small farmers and landless rural workers. Farm size which was used as a proxy for the ability to produce a marketable surplus also discriminated the customers of trader-lenders from those of farmer-lenders. Borrowers from traders tended to have larger farm plots. However, the farm size variable performed best as a predictor of the probability of transacting with a trader-lender in the presence of dummy variables for different tenurial arrangements and village location. The dummy variables for tenure status indicate the borrowing household’s command over the disposition of the output. That such is crucial for entering into a contract with trader-lenders is indicated by the positive and significant sign of the dummy variable for land ownership. The general conclusion is that the data support the hypothesis that farmer-lenders and trader-lenders sort borrowers based on ability to supply their labor services and marketable surplus, respectively, which are key inputs in these lenders’ farming and trading activities.

The results of the econometric estimation also revealed a pattern of borrowing among rural households that is generally consistent with a life-cycle interpretation of consumption-saving behavior. On the one hand, young rural households with more dependents and whose expenditures
are skewed towards consumption tend to gravitate towards informal sources. On the other hand, older households with less dependents and presumably better established reputations have better access to formal sources as well as informal sources that emphasize reputation and direct knowledge of the borrower for granting loans. The effects of credit history and other factors bearing on a household's reputation in the credit market on the probability of receiving a loan proved difficult to detect, however, as the available data were inadequate for the purpose of constructing measures for these variables.

Finally, village-specific factors seemed to be an important factor determining the pattern of credit allocation. The predicted probabilities of farmers and landless households receiving loans from the different lender types based on the model varied by village. This suggests that there are additional factors specific to the villages which affect the credit market but were not explicitly accounted for in the model. Unfortunately, little information could be gathered from the available data about specific factors associated with the villages that would help explain credit allocation patterns.

Overall, the results of this study support a view of informal finance that is sensitive to differences in informal lender types, to differences in the lenders' technologies for screening and loan enforcement specifically, and to the implications of these differences on the structure of the informal credit market and credit availability. For farmer-lenders and trader-lenders, these differences are based on the motives for credit market involvement which derive from the concerns of their occupational specializations. Differentiating informal lender types is important because the large number of lenders and the rich variety of credit contracts found in informal credit markets tend to give rise to the mistaken notion that, lacking barriers to entry, the conditions for the realization of monopoly profits do not exist in informal finance [Adams (1992)]. Such arguments ignore the market segmentation that can arise from information imperfections in
credit markets and the potential market power informal lenders can acquire from their "inside knowledge" about a subset of the borrowing population. The evidence presented in this study from rural rice-growing villages in the Philippines support the view that informal credit markets are segmented.

While more persuasive evidence of monopoly profits in specific rural credit market settings remains to be revealed, the results of this study nevertheless cast doubt on the assertion that informal finance is competitive. Considerations of imperfect information alone should imply that imperfect competition is a better description of informal financial markets. Moreover, competition among informal lenders is likely to be limited to those segments of the informal financial market in which lenders have access to the same screening and enforcement technology. In this case, the possibility for above normal lender profits depends upon how many lenders of the same type exist in a given market segment, the nature of their interaction within that segment, and the degree to which the market segment of a specific lender type can be penetrated by other lender types.

As the findings in this study indicate, an essential feature of informal credit is the importance of lender type in the credit transaction. In the context of interlinked contracts, the collateral (substitute) offered as security for the loan must have direct use value to the lender. The rice trader lends only to rice praters or the farmer-lender extends consumption credit only to farm laborers. The requirement for a double coincidence of wants between borrower and lender imposes a rigidity on borrowing and lending. It restricts the borrower to those lender types who will accept the collateral substitute he can offer. Depending upon the borrower's reservation utility level, therefore, a lender may be able to exploit a monopoly advantage that exists in the process.

At a more basic level, however, the double-coincidence-of-wants requirement suggests a situation wherein the market for collateral assets is thin, either because the majority of households are not favorably endowed with collateralizable assets, or that the legal and insurance environ...
is not conducive to collateral use. While credit tying as a collateral substitute makes borrowing possible for rural households who would otherwise go without credit, the fact that interlockers pursue lending only to support their main economic activities (e.g. trading or farming) imposes a limit on the extent to which informal finance can be relied upon as a source of investment or working capital. For instance, a rice farmer who decides to diversify into a non-farm activity may not find his regular rice-trading creditor willing to finance this activity. The farmer must find either another lender or a rice trader who is willing to diversify into this same non-farm activity. The necessity for a double coincidence of wants between borrower and informal lender in order for a credit transaction to take place implies that resources are expended in the process of search for partners who will find the exchange mutually beneficial. Alternatively, productive opportunities may remain unexploited if the search process fails to yield a match.

6.2 Scope for Future Research

The theoretical model developed in this study is admittedly a simple one. The behaviors of borrowers and lenders under different conditions affecting their abilities and preferences are incorporated in their respective iso-expected profit curves. The arguments presented were based essentially upon comparisons of the positions of the relevant iso-expected profit curves in the space of interest rate and loan size. Other loan terms were not given sufficient explicit treatment in the model. Ideally, there should be room for these other terms to appear and be analyzed in the model. The model also did not allow the explicit analysis of enforcement mechanisms (e.g. future exclusion from credit market) which appear to be of crucial importance in informal credit markets. In part, this limitation was self-imposed, being influenced by the inability to obtain good data on repayment performance. However, considerations of empirical testability should not pose as an impediment to theoretical analysis. It is hoped that future efforts will address these concerns. The relevant issues in a situation where a lender offers both linked and unlinked loan contracts also
merit some attention. Furthermore, greater rigor could be given to the modeling of interaction between different lender types in the informal credit market than it has received in this study.

On the empirical side, the problem of directly obtaining data from lenders precluded a more rigorous examination of the different lenders' choice of clientele. Another limitation was the lack of information about variables that can proxy for a household's credit market reputation. Since the data were obtained only for two seasons, they were not good enough to provide an indication about a household's credit history. Ideally the data should have been for at least four cropping seasons. This would also allow discernible enough changes to show up in a household's asset-debt position. Then it would have been possible to analyze a household's behavior as it shifted from being lender to being borrower and vice versa¹, or as it shifted from one lender to another. More detailed village information -- with respect to material environment (amount of rainfall, frequency of typhoons, flooding, pests and other types of exogenous shocks) and social relations (political hierarchy, existence of village associations and other possible sources of social pressure) -- was also lacking. This information would have allowed the model to explicitly account for other factors incorporated in the village dummy variables which obviously influence the pattern of credit allocation across the four villages.

On the matter of market interlinkage, an operational definition is crucial for purposes of gathering more accurate information. In the Rural Informal Credit Market (RICM) survey, the definition employed was based on the household's response to the question of whether the sale of output or the provision of labor services was a requirement of the lender for giving out a loan. This left the definition of interlinkage to the interviewee's subjective interpretation of what constitutes a requirement. An alternative would have been to look at the terms and conditions

¹ A striking observation was that the list of informal lenders generated from household interviews about loan sources contained no names in common with the list of borrowers. That is, none of the borrowers was also a lender.
(output prices and wages in the linked transactions and determine from there the existence of interlinkage based on what the theory of interlinked transactions predicts. The problem with this approach, however, is that the theory is also not very explicit about loan terms and conditions to the extent that such terms (e.g. interest rate, output price, wages, output shares, etc.) are substitute instruments in the lender's maximization problem. That is, the terms can be manipulated by the lender depending upon the circumstances faced. This emphasizes once again the importance of institutional detail in settling ambiguities in theoretical results. Many interesting issues indeed remain unexplored in this area of rural finance research.

There remains the fact that this study concentrated on the analysis of trader-lender and farmer-lender loans, while the empirical results predicted that some borrower types in the villages had the highest probabilities of receiving loans from other informal lender types. Thus, the account of the informal credit market given in this study is not complete. In part this was due to the lack of more detailed information about lenders and the borrowers' credit histories. However, the use of the theory of interlinked rural transactions as a starting point for the analysis also proved restrictive in that it immediately confined the locus of attention to developments in the agricultural sector and the resulting institutional responses. This left out consideration of developments in the non-agricultural sector of the Philippines (e.g. the program to export Filipino manpower overseas for foreign exchange reasons) which definitely affected the borrowing and lending opportunities in the Philippine rural areas. Thus, more information on the origin and operations of the other informal lenders would complete the picture of the informal credit market. Are these lenders holdovers from the past and is their importance on the wane as traders and farmers become more dominant with the commercialization of the rural economy? Or are these lenders the products themselves of new opportunities brought about by commercialization and other exogenous developments in the national economy? What sustains the operations of these lenders? What is
their scope of operations? Do they lend as well to rural non-farm enterprises? The nature of the technology employed by these lender types for screening their borrowers and enforcing loan repayment deserves equal research attention to that given so far to farmer-lenders and trader-lenders. Other research issues as they relate to policy questions are discussed in the final section of this chapter.

6.3 Some Policy Issues

In view of the crucial role of finance in economic development, the delivery of financial services to the greatest number of people at the least possible cost is an important policy concern. With this consideration in mind, this final section explores some qualitative implications of the findings reported in this study that are relevant for rural financial market policy.

At the outset it should be pointed out that the scope for government policy in rural financial markets depends upon the structure of the market and the nature of the informational problems that lenders face [Bell (1988)]. In general, while imperfect information constrains markets from working efficiently, there is also no immediately evident direction for policy insofar as improving the functioning of such markets is concerned. This suggests the need to look into the specifics of a particular rural credit market in order to determine if there exists a strong case for public intervention.

The striking characteristic of the Philippine rural credit market investigated in this study is the seemingly relatively wide array of contractual arrangements available to borrowing households as evidenced by the numerous types of informal lenders operating in the villages. The acceptability of various forms of collateral substitutes makes credit accessible to otherwise collateral-poor borrowing households who are certain to be rationed out by formal lending institutions. To these

2 See Besley (1992) for a good discussion of how market failures may justify government intervention in rural credit markets.
observations may be added the other standard virtues of informal finance such as its convenience, low information cost for lenders, high loan recovery rates, and the ability to provide other services to borrowers [Adams and Ghate (1992)]. However, nominal interest rates in the order of 7-8 percent a month are still high considering that the annual inflation rate during the period covered by the survey (1987-88) did not exceed 15 percent. Given the low administrative cost involved in informal lending, this fact suggests that either the opportunity cost of the lender’s principal is high or default risk is quite significant as to require a substantial premium. In addition, as already noted, credit market segmentation may imply less competition than appears to be the case even with the large absolute number of lenders. Moreover, the fact that the major informal lenders are motivated to lend only for activities that promote their principal occupations restricts the set of possible transactors in the credit market and limits the possibilities for further increasing output in the economy.

In light of the above, there is reason to ask what contribution public policy can make to improve the situation. Two alternatives, not necessarily mutually exclusive, are briefly discussed below. These are (i) a general policy of expanding formal finance, and (ii) a specific policy of increased linkage between formal and informal finance by involving traders as conduits for bank loans. While conducted in very general terms, the following discussion will attempt to relate some of the issues taken up to the Philippine case.

It is generally recognized that banks, whether private or government-owned or regulated, will not normally possess superior information about rural borrowers that will enable them to replace or compete effectively with private moneylenders. In a situation of free entry into moneylending and high lender costs, government-sponsored attempts to increase the flow of formal finance into rural areas cannot be expected to improve borrower welfare unless banks enjoy tremendous cost advantages. What then might justify a general policy of expanding formal finance in rural areas?
The main advantage of formal over informal finance is that formal institutions have a larger resource base than informal lenders because of their deposit-taking function. This makes it possible for banks to intermediate funds over large groups of savers and investors and also to provide long-term financing. In addition, the scale of bank operations makes risk diversification possible, while informal lending must reckon with covariate default risks attendant to lending within a limited geographic area where the covariation of yield risk in production is high. Because of its specialized nature, a financial intermediary is able to reduce transaction costs associated with search (i.e. in the matching between borrower and lender) which, in the case of informal finance, restricts borrowing and lending to a smaller set of transactors. By rendering the double coincidence of wants between borrower and lender unnecessary, formal financial intermediaries can overcome the segmentation inherent in informal finance and potentially raise the level of investment. There is merit, therefore, in a policy that tries to expand the reach of formal financial institutions. The crucial question, however, is how to do it.

Given the spatially dispersed and ecologically diverse nature of agricultural small farm production, the cost of information gathering about and monitoring of borrowers will normally be higher for the bank compared with village moneylenders of all types. Lacking the "inside knowledge" of the village moneylender, the bank will be more vulnerable to strategic default by borrowers. Furthermore, the bank's ability to enforce loan repayment will be limited to the extent that a well-functioning market for collateral is absent due to administrative and legal restrictions or to poverty. There is also the added burden of administrative overhead and staff salaries which increase the bank's costs of operations. Given the small average size of loans transacted in rural

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3 In addition, a bank's opportunity cost of funds will tend to be lower than the moneylender's to the extent that it has access to a much wider pool of loanable funds. In addition, it can turn to the central bank for funds. However, experience has shown that the latter situation should not be encouraged.
areas, the foregoing implies higher lending costs per borrower for the bank relative to the moneylender.

Two possibilities arise. In the absence of interest rate restrictions, the bank will have to charge a high enough rate of interest to fully cover its costs. In terms of the diagrams employed in previous chapters, the bank's zero iso-expected profit curve will be higher than the informal lender's. With an interest rate restriction that is enforceable, the bank will ration credit using criteria most likely biased against small borrowers who are more expensive to serve. Either way it is doubtful that the welfare of small borrowers will be served. Other related issues pertain to the long-term viability of rural financial intermediaries depending upon the prevailing policy environment and the internal organizational incentives that will be used to sustain the policy intervention.\textsuperscript{4} The Philippines' experience with the supervised credit programs of the 1970s has shown that attempts to expand formal finance into rural areas without considering its limitations can have negative consequences on the rural financial system.

The case for introducing competition in the credit market through state-owned or regulated banks is another possible reason for a policy of expanding formal finance in rural areas. The case for such a policy appears strong if it can be shown that, because of imperfect information, informal lenders are able to exploit monopoly advantages. One drawback is that while most of the older, descriptive studies about informal credit have either been shown to be inadequate or have been discredited because of their theoretical weakness, most of the recent studies based on the information theoretic framework do not directly address the question of market structure and the feasibility of realizing monopoly rents from informal lending.\textsuperscript{5} To what extent does market segmentation make these rents possible? What is the nature of the interaction among lenders of

\textsuperscript{4} For a more extensive discussion of these issues, see Bell (1988).

\textsuperscript{5} An exception, however, is Aleem (1990).
the same type within a market niche? How susceptible are specific market niches to penetration by other lender types? What is the nature of the interaction between lenders of different types once a particular market niche has been successfully penetrated by lenders of a different type? Thus far competition between institutional and non-institutional lenders has been analyzed as if informal creditors constituted a collection of undifferentiated economic agents [Bell (1988 and 1990)]. This study as well as those of Floro (1987), Geron (1989) and Nagarajan (1992), however, provide evidence that significant differentiation exists among certain types of informal lenders in the Philippines. While the market structure implications of these findings have not been fully sorted out, they suggest that the interaction of formal and informal lenders might be more complicated than analyzed to date in the literature. These are important issues that must be dealt with if policy decisions regarding what to do with informal credit are to be adequately informed. The data requirements for undertaking such a study are, however, enormous, the most crucial of which is obtaining detailed information about the costs and returns of individual informal lenders.

A related question pertains to the efficacy of the competition offered by formal finance. If the majority of informal credit transactions are interlinked with transactions in other markets, then the possibilities for successfully competing with informal creditors may be even more remote unless the entrant state bank can compete in all the services offered by trader-lenders and farmer-lenders. The lesson in the interlinkage literature is that "the opening of a market which adds to an incomplete set of contingent markets, without however completing them, may generate Pareto-inferior outcomes" [Mitra (1983): 169]. Alternatively stated, partial reforms in credit markets alone may reduce efficiency without improving income distribution. Simultaneous reform in several markets is required if public policy is to make a dent in the monopoly position of informal lenders. Thus, policies on agricultural production and prices, the exchange rate, land transfers, and the allocation of expenditures for rural infrastructure development are equally important. But
reforms of this sort are best formulated in the context of an overall policy package for the
development of the agricultural or rural sector in consonance with broader policies for the
macroeconomy. The point is that the effects of rural financial market policy are either diminished
or enhanced by the prevailing macroeconomic environment.

More recent attempts to improve credit delivery and increase competitiveness in rural lending
have turned to the use of various existing organizational forms -- private rural banks and other
types of financial institutions, cooperatives, credit unions, non-governmental organizations
(NGOs), informal arrangements -- operating in rural areas. This strategy is premised on the fact
that there exist institutions and organizations doing financial intermediation of one form or
another, that these institutions and organizations can be reformed, re-designed, or re-oriented, and
that these institutions and organizations can be used to expand the delivery of financial services
(even to poor households) in a cost-effective manner and on a permanent and self-sustaining basis.
The use of these alternative institutions or organizational forms, while overcoming the
informational problems faced by a bank, is not without its own set of problems, however.

It is from this perspective that the specific policy to use informal lenders, particularly traders,
as conduits for government or private bank loans to rural farm operators is now considered. This
policy which attempts to link formal with informal finance has been implemented in a number of
developing countries including the Philippines. It is essentially based on a recognition that
although banks may have access to a large pool of loanable funds, informal lenders are better than
banks at screening small borrower loans and enforcing repayment. The role of incentives is critical
here for without the appropriate incentives for the informal lender, who may have different
objectives from the bank, such a policy will not achieve its objective of expanding bank credit in
rural areas. There are other questions, too.
First, how is the "additionality" of such a program to be determined? If trader-lenders already borrow from banks and extend loans to borrowers in whose marketable surplus of the traded commodity they are interested, what will be the marginal effect of a scheme that makes an official policy out of something that private agents do anyway? Second, what incentives do lenders have to participate in such a program? Surely, government guidelines for participants will include reporting requirements for purposes of monitoring loan disbursement. This can be time-consuming for the trader unless he can be compensated in other ways. The question, however, is why he should be additionally compensated for something he would have done without any compensation in the first place. The crucial question then is whether such a program of using trader-lenders as conduits for formal loans can really be expected to result in wider access to credit among rural households such that the pay-off to compensating the trader-lender is positive. If trader-lenders continue to confine their lending to their regular clientele, then no such expansion in rural credit will be forthcoming from the program. It is even possible that trader-lenders will simply substitute government funds for their own funds, releasing the latter to fund their own businesses. What incentives will prevent them from diverting funds?

As a number of successful rural finance institutions\(^6\) show, the ability to deliver financial services to as broad a clientele as possible depends upon: (i) the technology for the delivery of financial services to small operators, and (ii) the structure of incentives within the institution (i.e. in its system of rewards and punishment) and outside it (i.e. nature of government support, regulation and supervision). These two points essentially capture the important factors that lie behind the apparent comparative advantage of informal over formal lenders in rural financial markets. For a financial institution to be competitive in the rural areas, its technology must be

\(^6\) See for example the studies on several rural financial institutions in Indonesia [Gonzalez-Vega and Chaves (1992)]. See also Yaron (1992).
based on local inputs. This means it must use local knowledge about the conditions and residents within a geographical area for the screening of loan applicants. It must recognize the existing political and social network of relations and utilize this in creative ways to enforce loan repayment. As for the structure of incentives, they should be designed in such a way that the direct implementor of a program satisfies his private objectives while fulfilling the objectives of the organization or institution. This is essentially a principal-agent problem and it is present in the relation between government and lending institution, as well as in the relation between the owners of the institution and the manager, and between the manager and the institution’s employees.

It is obvious from what has been discussed so far that there is no single approach or answer to the problem of credit delivery for small rural borrowers. Attempts to solve problems of one type, such as improving small borrower access to formal credit by using informal lenders as conduits, present new problems, i.e. the incentive problem of the informal lender. What is clear, however, is that failure has been avoided in those cases where due attention has been given to the informational and organizational requirements of credit delivery programs. It is in the search for the appropriate institutional forms and technologies for credit delivery where the greatest challenge lies. Here research can play an important role in clarifying how informal lenders behave and how rural markets function. Proposals abound for promoting formal-informal sector linkages in rural financial markets. Pilot projects of one type or another to improve rural credit delivery are being implemented in developing countries in various parts of the world. Policy makers would do well not to think of driving the informal lenders out of business before stable and permanent alternative institutions for credit delivery to small borrowers are in place.

A final point in this discussion of policy issues is the need to be sensitive to different conditions obtaining in different rural villages. These differences may emanate not only from the physical environment, but may also have bases in the ways that village residents respond or cope
with their situations given prevailing social norms and cultural patterns. This calls for caution in the formulation and design of rural finance policies and programs. For example, the failed credit programs of the past imposed credit ceilings per hectare of farm land based on some recommended package of inputs (seeds, fertilizer, pesticide, etc.) per hectare. The same recommended package applied without regard for geographic location and the attendant dissimilarities in circumstance with respect to water supply, soil quality and agro-climatic conditions. Policies and programs that work in one village may not be feasible in a neighboring village. This reinforces the concern for attention to the design of credit policies and programs and for consulting and cooperating with local personnel, institutions and organizations in implementing them.
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