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A Theory of Imperfect Competition in Rural Credit Markets

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Credit programs in developing countries have significantly expanded rural credit to large farmers. But they have not succeeded in putting informal moneylenders out of business, and there is some evidence that they have not even reduced the rates that moneylenders charge to the small and landless farmers who continue to rely on them. This paper offers a theoretical model within which this puzzle can be explained. The model is motivated by fields studies of rural areas of Asian developing countries which have documented the importance of credit interlinked with trade and the advantages that the trader-moneylender has in enforcing loan contracts. In the model presented in this paper, the ability to enforce loan contracts provides a return to becoming a trader that induces entry into that activity by those who have funds. Government subsidies that expand bank credit to large farmers may induce further entry by large farmers into the trader-moneylending sector. The induced entry leads to higher excess capacity among trader-moneylenders and higher unit costs. Rather than being passed on to the small farmer and tenant, the credit subsidy may be wholly or partly absorbed in the reduced efficiency of the monopolistically competitive moneylending-trading sector.

Summary

Credit programs in developing countries have significantly expanded credit to large farmers who can offer land as collateral. This paper examines the question: Do the benefits of such programs "trickle down" to the small farmer? Credit markets and related market interlinkages range along a continuum from competitive to monopolistic. We know that at the perfectly competitive end of the continuum, any reduction in formal interest rates would be passed through to the informal sector. At the other end of the continuum, with a perfectly discriminating monopolist, no reduction would be passed through. This paper deals with an intermediate case where enforcement costs lead to a monopolistically competitive structure in the informal credit market. We show that although this structure is characterized by free entry into moneylending (and hence zero profits to the marginal moneylender), it is possible under this structure that none of the benefits of the infusion of credit are passed through to the small farmer.

The market structure explored in this model is motivated by field studies of rural areas of Asian developing countries. Striking empirical regularities revealed by a number of studies of informal rural credit markets are the dominant role of trade-linked credit and the common modus operandi of trader-lenders. In these studies, rural credit markets appear to be a kind of matching system, where different prospective borrowers are sorted across different lenders according to the ability of a given lender to enforce repayment by a given prospective borrower: Only a farmer who markets his surplus through a lender-trader can be matched with that lender-trader; only a farmer with land collateral (or in a group lending program) can be matched with a bank.

In the formal model presented in this paper, the ability to enforce loan contracts provides a return to becoming a trader that induces entry into that activity by those who have funds. Government subsidies that expand bank credit to large farmers may induce further entry by large farmers into the trader-moneylending sector. The induced entry leads to higher excess capacity

among trader–moneylenders and higher unit costs. Rather than being passed onto the small farmer and tenant, the credit subsidy may be partly absorbed in the reduced efficiency of the informal moneylending–trading sector. Indeed, it is even possible that an expansion of formal credit to landowners increases the equilibrium interest rate charged by informal lenders. This paper thus offers a theoretical model within which the puzzle of stable informal interest rates despite large expansions in government–subsidized formal credit can be explained.

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**A THEORY OF IMPERFECT COMPETITION
IN RURAL CREDIT MARKETS IN DEVELOPING COUNTRIES**

Karla Hoff and Joseph E. Stiglitz*

"...[it is a] nearly universal fact that the poorest strata of the peasantry in many underdeveloped countries rely heavily, if not exclusively, on private moneylenders and not on sources of institutional finance. Indeed, financial institutions like banks and credit cooperatives typically do not consider them creditworthy, but paradoxically enough, private moneylenders do consider them creditworthy for advancing loans." (Amit Bhaduri, The New Palgrave)

"Informal lenders are very thick on the ground." (Siamwalla et al., 1990, p. 277)

Throughout the developing world, advancement of credit has been a major strategy of agricultural development and aid to the small farmer.¹ While it has been widely noted that formal sector loans have not, by and large, gone to the small farmer,² policy-makers have taken comfort in the view that a transfer of funds to any set of agents in the rural economy should depress the interest rate for all, and should provide competition with commercial moneylenders, who were perceived as

*The authors' understanding of rural credit markets owes a great deal to the case studies of many researchers, but in particular, Irfan Aleem, Clive Bell, Ammar Siamwalla, and Christopher Udry. Earlier drafts of this paper benefitted from comments by Timothy Besley, Tim Guinnane, Peter Lanjouw, Ronald McKinnon, Nicholas Stern, and Christopher Udry.

¹Government credit policies have included rediscounting of agricultural loans at favorable rates, quotas prescribing the percentage of each bank's total lending that must be for agriculture, regulation of interest rates below market rates, state subscription to the share of capital of agricultural credit agencies, free contributions to augment their liquidity when needed, and creation and funding of new agricultural agencies to redirect lending toward agriculture.

²See, for example, von Pischke, Adams, and Donald (1983), D'Mello (1980), Dreze (1990), Floro and Yotopoulos (1991), Lanjouw (1991), Lipton and Toyé (1985), and Siamwalla et al. (1990). By definition, formal lenders are those regulated by government, but we provide a more extensive characterization below.

usurious. While it is difficult to gather reliable data on rural credit markets in developing countries, the evidence that exists is quite strong that the commercial moneylenders are still thriving (Bell 1990, Siamwalla et al. 1990, Aleem 1990, and Floro and Yotopoulos 1991). In Thailand, where the rural credit system has been subject to exceptionally intense study, there is evidence that the interest rates the moneylenders charge have been stable despite the massive injection of funds into the rural sector (Siamwalla et al. 1990, Oncham 1992).

These results are puzzling: In existing models of credit markets, whether they entail competitive market-clearing, rationing or monopoly, when the supply of credit is increased through provision of loans to any set of agents, there will be some trickle-down effect to other borrowers. Creation of new sources of credit should increase the competitiveness of the credit market. And because those who obtain the credit from the new source would normally borrow less from their initial suppliers of credit, the reduction in demand would further tend to drive down interest rates. By this reasoning, even if the *direct* beneficiaries of government credit programs in developing countries are large landowners, the eventual beneficiaries should include small farmers.

Hence we have a puzzle that current theories of the credit market cannot explain, and a concern that the general equilibrium effects of government credit intervention, as well as the direct effects, are missing their target in the small farmer.

There is another feature of rural credit markets that has also puzzled many observers: the magnitude of the gap between interest rates in the informal commercial sector and in the formal sector. Aleem (1990, p. 344) and Siamwalla et al. (1990, p. 284) report average interest rates of 60-80 percent per year on commercial moneylending for loans typically of six months' duration, when relevant bank rates were 12-14 percent.³ This gap cannot be accounted for by differences in the likelihood of

³Comparable interest rate data are not available for India. Bell reports that the average rate in the informal sector as a whole, which includes loans at zero interest between relatives and friends, was 22 percent in 1981, when formal rates were 10-12 percent (see Hoff and Stiglitz 1991, Table 1). A number of recent Indian village studies suggest that a common interest rate charged by commercial moneylenders is 60 percent.

default, which were much *lower* for commercial moneylending than for formal sector loans. Given the generally low default rates faced by moneylenders surveyed by Aleem and Siamwalla et al., the gap is also too large to be accounted for by a risk premium. Nor can it be accounted for by barriers to entry into moneylending. Entry into moneylending in commercialized areas surveyed by Aleem (1990), Siamwalla et al.(1990), and Bell (1990) was reported to be easy, and villagers generally had their choice among several moneylenders resident in the village and several moneylenders in nearby villages and towns.

This paper is a study of the process of intermediation in rural financial markets in developing countries. In the view presented here, central to the problem of credit provision in developing countries is the problem of enforcement.⁴ Credit markets vary greatly in the particular institutions on which they rely to solve the enforcement problem. But a striking empirical regularity in field studies of a variety of rural areas in Asian developing countries is the dominant role of trade-linked credit in the informal credit market,⁵ as shown in Table 1 and Aleem, p. 332, and the common *modus operandi* of trader-lenders. This paper builds a simple model of an informal rural credit market based on trade-linked credit that is motivated by the findings of these field studies, and then uses the model to trace

⁴Even in developed countries, the cost of enforcement (taking into account the delays) may not be insignificant; and the lender still must worry about the possibility of bankruptcy. Hence, much of what we have to say here has relevance to certain segments of credit markets in developed countries, as well.

⁵In contrast, in developed countries, trading in goods is normally separated from credit activities. In a typical transaction, a farmer who needs working capital sells his output forward to a wholesaler or processor for a promissory note. The farmer then discounts it at a bank, which in turn sells the note to an investor, who ultimately redeems it from the wholesaler. It is evident that such impersonal transactions, requiring a high level of trust, could not take place without a developed legal system.

At the same time, even in more developed countries the importance of trade-credit relations should not be underemphasized. Trade credit is an important source of credit for many firms (either from suppliers or customers), and both information and enforcement issues, which we emphasize in this paper, play an important role. For instance, those who engage in business relations are likely to know considerably more about the day-to-day state of the firm than a bank; and the trade credit often serves as hostage as part of an enforcement mechanism. That is, if the supplier provides the buyer with goods not of the promised quality, then the buyer can refuse to honor the credit.

out the implications of various government policies. The model provides a framework within which the failure of the expansion of the rural banking system to produce the hoped-for dramatic reduction in the small farmer's cost of borrowing can be explained.

The credit market in developing countries needs to be viewed as a system comprised of a *formal* and an *informal* sector. In the *formal sector*, banks, credit cooperatives, and other bureaucratic organizations provide intermediation between borrowers and depositors or the government. In the *informal sector*, private individuals provide credit largely out of their own equity. The informal sector usually has three facets: (1) commercial moneylending by farmers, traders, pawnbrokers, salaried employees, or (rarely) professional moneylenders; (2) arrangements between friends, relatives, and neighbors, often at zero interest rate; and (3) the activities of self-help organizations, such as rotating savings and credit associations. Estimates of the share of informal credit in total sources of credit to agricultural households in 11 low-income countries range from 30 percent to over 80 percent (Germidis 1990, Table 1). In rural areas in which farmers produce cash crops, commercial moneylending is typically the largest part of the informal sector, and will be of principal concern in this paper.

Our analysis looks closely at the rural credit system and at the interlinkages among its various parts. In this analysis, the number of moneylenders is endogenous and entry is affected by government lending programs--in ways that sometimes do not redound to the benefit of landless farmers.

The credit market in developing countries appears to be a kind of matching system, where different prospective borrowers are sorted across different lenders according to the ability of a given lender to enforce repayment by a given prospective borrower. Only a farmer with land collateral (or in a group lending program) can be matched with a bank. In the particular kind of credit market modelled in this paper, where credit is linked with trade, only an individual who markets his surplus

through a trader can be matched with that trader.⁶ ⁷ The ability to enforce loan contracts provides a return to becoming a trader (or miller) that induces entry into that activity by those who have funds. The rents to those who have the ability to enforce credit contracts are dissipated through excessive entry. By the same token, an expansion of funds from banks, with the additional funds going to farmers who can offer titled land as collateral, may induce further entry by landowners into the informal trader-moneylending sector. The induced entry leads to higher excess capacity among trader-moneylenders and higher unit costs. We show that rather than being passed onto the small farmer and tenant, the credit subsidy *may* be partly absorbed in the reduced efficiency of the informal moneylending-trading sector. Indeed, it is even possible that an expansion of formal credit to landowners *increases* the equilibrium interest rate charged by informal lenders. The model that we present thus offers an explanation of the puzzle of high and stable informal interest rates despite large expansions in government-subsidized formal credit.

Our model differs in two crucial ways from earlier models of credit markets. First, it focuses on the problem of enforcement.⁸ In this respect lending within the rural sector of developing countries raises problems similar to sovereign debt, where the borrower is a sovereign country and not subject to the penalty of national law. But unlike the case of sovereign debt, informal rural credit markets are embedded in a social and economic context that provides substitutes for court enforcement

⁶By the same token, a tenant can be matched with his landlord.

⁷Our analysis thus provides an alternative to the theory of the interlinking of credit contracts in Braverman and Stiglitz (1981), which focused on the use of interlinkage as a means of mitigating moral hazard. In a more complete model, the two explanations would be complementary.

⁸For example, Stiglitz and Weiss (1981) assumed that any contract contingent on outcomes observable to a third party was enforceable. If the final return to a debt-financed project was public information, and if it exceeded the principal and interest owed, then the lender would be repaid. Private information held by borrowers regarding the choice of project to be undertaken created an agency problem for lenders, but enforcement of claims contingent on public information did not.

of debt. A trader who markets a farmer's crop, or farmers who live near him and have strong social ties with him, may be in a good position to observe his productivity and to ensure repayment of debt.

Secondly, it focuses on differences among lenders. We have already discussed one aspect of those differences--the ability to enforce contracts. The process of screening a new loan applicant, and observing his productivity over many seasons, creates relationship-specific capital between a borrower and lender that insulates the lender's market from competitors even when his charges exceed the marginal cost of lending. This second aspect concerns ability to identify who are good borrowers.

Thus, while earlier information-theoretic work on credit markets focuses on information asymmetries *between lender and borrower*, this paper focuses on differences *among potential lenders* in the ability to obtain information and enforce loans. Most earlier work assumed that lenders faced the same information problem *ex ante* with respect to a potential borrower, and the analytical problem was to design an indirect mechanism to screen out the riskiest borrowers and the riskiest projects. In contrast, in developing countries some lenders have the ability to obtain virtually complete information about the creditworthiness of a prospective borrower. Our analysis centers on the consequences of differences across lenders in the ability to obtain information and enforce debt repayment, and on externalities across lenders in the costs of obtaining information and enforcing loans.⁹ This appears to be the more relevant issue for the study of rural credit markets in developing countries, as many authors have suggested (see the discussion in Siamwalla et al. 1990, esp. pp. 288-290, and Udry 1990).

The next section of the paper presents a set of stylized facts about the institutions for enforcing debt repayment in commercialized rural areas of developing countries. These stylized facts motivate

⁹Asymmetries across lenders do figure prominently in work analyzing particular institutions, e.g. interlinked credit (Braverman and Stiglitz 1982) and rotating savings and credit associations (Besley, Coate, and Louny 1990). But such asymmetries have not, to our knowledge, been fully taken into account in a formal model of the credit market as a whole. See, however, the perfectly competitive model of Siamwalla et al. 1993.

the formal analyses in Sections III-V. Because the source of imperfections in the credit market is explicitly modelled, we are able to derive predictions about the consequences of alternative government policies that would channel lending to large landowners (Section III), to small farmers through group lending programs (Section IV), or that change the environment in ways that affect enforcement costs (Section V). Section VI presents empirical evidence on financial intermediation between the formal and informal sectors, and Section VII concludes.

I. THREE MEANS TO ENFORCE DEBT REPAYMENT IN RURAL CREDIT MARKETS

We begin our analysis with a discussion of the three principal means by which a lender in commercialized rural areas of developing countries can enforce a debt contract: (1) credit-trade interlinkages, (2) land collateral, and (3) social bonds within a kinship group or self-help group.

1. Informal Credit Interlinked with Marketing

As noted above, case studies of trade-linked credit suggest a common *modus operandi* of trader-moneylenders. A trader who lends money to a client generally requires him to sell all his crops to, or through the trader.^{10 11} Principal and interest are recovered at harvest time from the value of crops sold, and these loans are not secured by collateral. This trade-credit linkage

makes information on the size of the borrower's operations (and their changes) available to the creditor and to no one else. Trade-credit linkage thus closes the borrower's access to other [informal] lenders (Siamwalla et al., p. 282).

¹⁰This requirement is noted in studies of India, Thailand, Pakistan, and the Philippines, respectively, by Bell, p. 306; Siamwalla et al., p. 282; Aleem, p. 348; and Floro and Yotopoulos, p. 78.

¹¹Arnott and Stiglitz.[1989] have noted that such-exclusivity relationships are a standard part of principal-agent relationships when they can be enforced. They emphasize the externality that one relationship has on the returns to other relationships. Within the credit market, exclusivity enhances both the information that the lender has on the borrower, and the ability of the lender to enforce his contract.

There is evidence of two kinds of enforcement mechanisms in interlinked credit. In some towns with well-organized commodity markets, traders cooperate in enforcement. Bell reports that

In Chittoor [India], for example, a commission agent who dealt in *gur* [a sugar product] told me that agents frequently know one another's clients. If a farmer attempted to sell through an agent other than the one with whom he normally dealt, the former would deduct principal and interest on the loan, basing his calculations on the usual rule-of-thumb relating the size of the loan to the quantity to be delivered, and hand over the said sum to the latter. Others doing field research in India have reported similar practices elsewhere in India. (Bell, p. 313)

It is in the interest of each trader-moneylender to perform that service for others, so that they do it for him. For immobile populations of farmers, under this system it would be difficult for a farmer to find an outlet for his crops without also repaying his debt.¹²

The natural question that arises in this context is, if it pays for them to collude to enforce contracts, doesn't it pay them to collude to fix prices and interest rates? We argue that trader-moneylenders will not be able to collude to fix prices as long as there are any individuals in or near the village with sufficient capital to become trader-moneylenders. An attempt to fix prices (at a level above the zero-profit level) would induce entry, and an attempt to create an entry barrier by threatening nonenforcement of debts owed to new entrants would not be in the self-interest of the incumbents. If that threat were carried out, the new entrants would only more surely undermine the position of the incumbents by providing the incumbents' debtors a marketing outlet for their crops by which they could avoid repayment. Thus it is a Nash equilibrium for each trader-moneylender to enforce the debt of every other trader-moneylender, even that owed to new entrants.¹³

There is another way that moneylenders who make seasonal loans can assure repayment. The

¹²Moreover, transportation costs to market are often significant, so that the net return from selling one's crop to a more distant miller may be substantially less. Thus, the natural monopolistically competitive nature of the product market carries over to the credit market.

¹³This game could be modelled either as a supergame or as a finite game under the kinds of imperfect information considered in Kreps, Milgrom, Roberts, and Wilson (1982).

following example comes from Aurepalle, India.

The large moneylenders have regular employees who visit clients to learn the harvest date. The moneylender will then go to the threshing floor himself or send his employee with a bullock out to recover the principal and interest at the threshing floor. (Walker and Ryan, p. 203)

It is consistent with this second mode of operation that Siamwalla et al. (p. 282) reports that traders do not provide credit to producers of cassava, which unlike other crops can be harvested at any time over a period of nearly a year.

Whether the moneylender-trader can rely on other traders to ensure enforcement, or whether he must go directly to the farmer at harvest to ensure repayment, the interlinkage of credit with marketing of output facilitates enforcement of debt and brings the costs of enforcement within practical limits.

Before lending to a farmer, a trader-moneylender normally seeks to assure himself that the farmer is productive and reliable. Aleem (p. 335) found that on average the screening process takes one year (two agricultural seasons) during which the potential borrower, by marketing his output exclusively through the trader-moneylender, demonstrates his productivity. On average, lenders then rejected more than 50 percent of the applicants screened. One measure of the success of that screening process is the very low incidence of bad debt (less than 5 percent according to Aleem, p. 336). For those not rejected as borrowers, the screening process creates relationship-specific capital. It means that the lender has put the potential borrower in the category of acceptable risks who are eligible for both production and consumption credit at short notice. That relationship-specific capital makes any other trader-moneylender an imperfect substitute for the one on which a borrower currently relies.¹⁴ The importance of this capital is suggested by the fact that a borrower's relation with a

¹⁴While the fact that a particular individual is lending money to a particular borrower is likely to be public knowledge (and thus *some* of the information which the lender has gleaned is thus made public), the amount lent is not likely to be public. An essential task of the lender in screening loan applicants is determining the amount to be lent; not only does lending more increase the probability that the borrower will not be able to repay the promised amount, it also increases enforcement problems--borrowers' incentives not to repay increase, as emphasized in the work of Eaton and

single trader-moneylender typically extends over many years.^{15 16}

Of course, more evidence is needed before we can infer that lenders exercise monopoly power over their borrowers. Some evidence can be found in Aleem's study (especially Table 8) of the operations of 14 commercial moneylenders serving a rural money market in Sind, Pakistan. His first finding was that mean marginal costs of lending as a fraction of the amount recovered were much less than the average interest rate reported by borrowers. His second finding was the total average costs of lenders, as a fraction of the amount recovered, were comparable to the average interest rate charged.

These findings strongly suggest that the informal commercial lending market is characterized by monopolistic competition. Each lender faces a downward-sloping demand curve from borrowers tied to him, so that he can price at above marginal cost, but entry of new moneylenders keeps pure profits close to zero by driving the price down to the average cost. Thus, in the usual way of monopolistically competitive markets, each lender operates on too small a scale; he spreads his fixed costs over too small a clientele.

2. Formal Credit and Land Collateral

In contrast to the large amount of information that trader-moneylenders have about their clients, banks and specialized credit agencies typically have very little. Many specialized farm credit institutions, such as India's credit cooperatives, were set up by government to operate as retail agents

Gersovitz [1981].

¹⁵Siamwalla et al. (p. 279) reported that more than 72 percent of informal sector borrowers in a 14-village survey of Thailand had not attempted to borrow from other informal lenders during the past three years, and that of these 72 percent, the average period of contact involving credit transactions was almost 7 years.

¹⁶Long-term relationships also serve to mitigate moral hazard problems. If the failure to get timely repayment in one year reduces access to capital in later years, then the borrower has greater incentives to repay. See Stiglitz and Weiss [1983].

of government loans to agriculturalists (Bouman, 1989, p. 14). Operating only on the credit side of the market limits the local information that they would have if they performed other roles.

When borrowers are little known and formal lenders have limited means to enforce repayment, these lenders have a strong incentive to lend against security that can be easily realized, rather than against the future cash flows expected from the investment project. Banks and cooperatives typically lend to rural borrowers on the basis of land collateral, and only limited amounts with generally inflexible terms.¹⁷ Siamwalla et al. (1990, p. 280) report that 87 percent of Thai commercial bank loans and 43 percent of cooperatives' loans were backed by collateral and that, accordingly, banks and cooperatives operate almost exclusively in villages where farmers have registered land titles. For each of four Thai provinces, the percentage of formal loans backed by collateral, either in the form of land or group guarantee (a form of lending we will discuss in more detail below), ranged from 68 to 100 percent; whereas the comparable statistics on the percentage of informal loans backed by collateral ranged from 14 to 27 percent.¹⁸ In South India, a major form of agricultural lending is so-called "jewel loans," short-term credit given against the physical security of gold held in the branch safe. Since the value of the gold normally exceeds the value of the loan, such lending is in effect pawnbroking. In his survey of 30 branches of banks in Tamil Nadu state, India, Wiggins (1992, p. 51) found that the average lending by each branch in 1985/86 in the form of jewel loans was one-third of its total lending; and that the median share of each bank's agricultural loans that were backed by jewels was 83 percent of its loan advances.

The reliance on collateral, whether gold or land, goes part of the way to explain the well-

¹⁷This explains why many farmers with access to the formal sector also go to the informal sector--especially for consumption loans. Another reason is that formal lending to a given household is normally subject to a ceiling (see D'Mello, p. 42, for an example).

¹⁸Feder et al., 1988, table 11, p. 54, reproduced in Oncham, 1992, table 3, p. 109. For India, see Bouman, p. 111.

documented inequality in access to formal credit among large and small farmers in the rural sector (see references in fn. 2). But they are not the whole story. Political pressures apart, a further factor are the fixed costs of transacting a loan. The smaller a loan, the higher the interest rate required to cover the lender's fixed costs. But since interest rate ceilings are prescribed by the government in most countries, Gonzalez-Vega (1977) and others have argued that banks find lending to small farmers much less profitable than lending to large. In fact, this bias toward large farmers might persist even if interest rate ceilings were removed. As the bank raised its interest rate high enough to recoup its transaction costs, it would also increase the riskiness of its portfolio (Stiglitz and Weiss, 1981), so that there might not exist any interest rate at which lending to small farmers was as profitable as lending to larger farmers. Moreover, it is not only the lender but also the borrower who, given the long process of applying for a formal loan, bears fixed costs (Adams and Nehman, 1979). Sharma (1985, table 1) studied the process of applying for a formal loan in Fiji (the borrower's time lost, his legal fees, etc.), and estimated that the effective cost of a one-year loan was 31 percent to a sugarcane farmer with a farm size below 2 hectares, compared to 13 percent for a sugarcane farmer with 6 hectares. Taking into account the risk of not getting the credit at all, small farmers might be served more cheaply by moneylenders than by banks.

The limited governance structure and high transaction costs of the formal sector appear to be recognized by donor agencies and to shape their policies. Lipton and Toye (1989, Ch. 5) examined World Bank projects involving rural credit in India and found that the majority excluded farmers with less than 2.5 or sometimes 5 acres, or tenants, or both. By this means, several major World Bank-assisted credit projects completed in the 1980s excluded more than half the farm households, although the credit was supposed to be for smallholders.

3. Kinship Groups and Mutual Benefit Institutions

The third principal means for enforcing financial contracts are social institutions. These institutions take various forms. Kinship or village groups may provide reciprocal credit or mutual insurance (see Udry (1990) and Platteau and Abraham (1987)). Self-help groups may be formed in which members make periodic contributions that are pooled in a fund from which loans are made, e.g. Rotating Savings and Credit Associations (ROSCAs). The recent creation of bank programs that lend only to individuals who have formed small groups with other applicants for bank loans, who are then made jointly liable for repayment, has created a third category of mutual benefit institution.

Participants in all three of these institutions normally are small circles of intimates whose members belong to the same income group.¹⁹ The key feature of these groups is that the responsibility of monitoring the use of funds and of ensuring repayment is placed within the group. If anyone defaults, he is cheating the group, not a stranger or an impersonal organization. Moreover, with relatively immobile populations, there is no necessary end to a participant's relationship to (and dependence on the good will of) all the other members of the group, even if the group organization has a fixed term.²⁰ In this way, *social collateral replaces material collateral*.²¹

In the groups formed to borrow from the Grameen Bank of Bangladesh, there is not even a necessary end to the group itself. Members have been known to obtain five individual loans in

¹⁹Groups in bank lending programs without these features have usually failed to repay their loans (Huppi and Feder, 1991).

²⁰Standard theoretical arguments explain why it is easier to design self-enforcing contracts with long term relationships than with short term relationships (cooperative action is more likely to occur with small discount rates than with large discount rates). In the context of sharecropping contracts and debt, see Allen [1985].

²¹But note that so long as the economic relationships are longstanding, one does not need to invoke social sanctions as a mechanism for enforcement.

succession, and then to continue to participate in their group through joint ventures,²² access to house loans in case of flood or fire, primary schools for their children, and savings programs (Fuglesang and Chandler, 1988). In contrast to the culture of delinquency that characterizes much formal lending, where farmers may take pride in overdue loans as a "mark of power and influence" (Bouman, 1989, p. 48), the social stigma attached within such groups to failure to repay loans can be enormous. A member of a Cameroon *tontine* (the vernacular for local informal savings and credit club) put it this way:

'If you don't make your payment to the tontine, you are rejected by the community. If you are banned from one group, you are banned from the others.' (Brooke, 1987)

In the Grameen Bank of Bangladesh, the repayment rate has been 98 percent over the 15-year period of its existence, although the Bank does not bring legal charges for nonrepayment. In cases where a member has financial difficulties, the group normally arrives at a private arrangement to pay a member's debt (Fuglesang and Chandler, pp. 2, 56, 116).

A recent study by Feder, Onchan, Chalamwong and Hongladarom [1988] shows how important these group guarantees can become. Among those borrowers without land titles, group guarantees were part of 77% of all loans by formal lenders in Lop Buri Province of Thailand, 44% in Nakhon Rachasima Province, and 65% in Khon Kaen Province. These group guarantees were far less important to informal lenders. Group-guaranteed loans made by informal lenders represented 9% of the number of loans to untitled borrowers in Lop Buri, 5% in Nakhon Ratchasima, 32% in Khon Kaen. For these informal lenders, evidently the information problems were less and there were ways of enforcing contracting other than through collateral or group guarantees.

²²Loans for joint enterprises (up to about \$15,000) are granted to *centres* that, over 3-4 years, have observed all Bank rules. A *centre* is a collection of six groups that together meet weekly with a member of the Grameen Bank staff to make the weekly loan installments.

II. INTERRELATIONS AMONG LENDERS

We have emphasized that the rural credit market has to be looked at as a whole, as a complicated web of relationships. A simple illustration may be useful, as in Figure 1. The figure shows three classes of borrowers, large landholders, those who own their land which they till ("small landholders"), and those with no titled land ("tenants"). We show funds from the formal lending sector flowing to large landholders.

There are several reasons that formal lenders concentrate their lending on large landholders. Large landholders can provide more secure collateral. The probability of default is lower. And the transaction costs are lower. Since there are fixed costs associated with any loan transaction, it is less expensive to have fewer large transactions than many smaller transactions; for reasons discussed in Section I.2, banks may not be able to recoup their transaction costs with small landholders. There are also a large number of small landholders who have to be screened, to ascertain which are most likely to repay, and formal sector lending institutions are often at a disadvantage relative to the informal sector, not only in enforcement, but also in access to the relevant information to use as a basis of screening. Whatever the reason, except in a few cases involving group lending programs, the bulk of funds from formal sector rural credit institutions are provided to large landholders.

Some of the large landholders set themselves up as trader-moneylenders, using some of their capital which they otherwise would have spent on farming. Funds flow from them to small farmers and those without titled land. While we have emphasized the role of trader-lenders arising from their enforcement advantages, large farmers who are not traders can enforce contracts with their tenants. A tenant who defaults on his loan faces the threat of eviction, and since typically mobility is limited, the tenant who is evicted may not be able to find a tenancy elsewhere. The threat of eviction is obviously especially important for a tenant who has no land at all.²³

²³This is consistent with the findings of Esguerra and Meyer [1992] for the Philippines.

We can use the figure to trace out some of the consequences of an increase in formal sector lending. The direct impact is on the large farmers. But these may lend more to their tenants; or more of them may choose to become trader-lenders. In either case, *some* of the funds will flow down to small farmers and the landless.

There are further ramifications. As the number of lenders changes, the extent of competition in the lending market may change, and this, along with the increased supply of funds, may affect the interest rates charged, and the number of potential borrowers who are screened.

The interrelations among the various parts of the rural credit market are still more complicated. The selection activities of the formal lenders affect the quality mix available to the informal sector, and *vice versa*. As we have noted earlier, the credit system can be viewed as a matching problem, putting together borrowers with those lenders who are most informed about the risk of that borrower and most able to enforce his contracts. In any matching-search model, there are externalities: with more lenders, it may be more difficult to find an appropriate set of borrowers. To lend the same amount of money, with fewer borrowers, the amount lent per borrower must increase, thus increasing the enforcement cost. The selection activities of each of the informal lenders affect the quality mix available to other informal lenders and, thus, the efforts they have to exert to obtain the desired quality mix. There are thus a variety of externality-like effects that arise in this market; and each moneylender is not likely to take into account these externality-like effects.

In the simplified model presented in the next section, we ignore some of these important interrelationships. The factors upon which we focus are, however, sufficiently complex to suggest the range of possible consequences of increased formal sector lending. We prove three propositions. First, we show that as a result of the complementarity between trading and moneylending, a government subsidy to formal credit that is offered only to farmers with collateral may give rise to excessive entry of farmers into the activity of trader-moneylender, and this can explain the apparent

insensitivity of informal commercial interest rates to formal interest rates. Second, even group lending may have ambiguous effects. Third, government policies aimed at lowering enforcement costs have a direct effect in increasing loan availability and lowering interest rates.

III. THE EFFECT OF CREDIT SUBSIDIES

This section explores the effect of credit subsidies under the following assumed enforcement structure:

(A1) Credible promises of debt repayment can be made only between (1) moneylender-traders and their clients, and (2) banks and large farmers with land collateral.

Thus, no farmer can lend to another farmer unless the former is a trader and the latter markets his output through him; and no bank lends directly to a small farmer.²⁴ At the end of section III.4 we also consider the possibility of lending between large farmers on the basis of collateral. Finally, in Section IV we introduce financial market reforms--the establishment of peer monitoring groups--that change the information and enforcement structure. This opens up the possibility of a new set of credible promises of debt repayment between the government-subsidized lending agency and these groups.

1. The Basic Model

There are two types of agents in the rural economy--large landowners and small landowners.

²⁴In this simplified model, we ignore the lending activity between landlords and their tenants. The informal sector loans can be thought of as going to small, perhaps untitled, landholders; the latter cannot get loans from the formal sector either because they do not have secure collateral, or because the formal institutions prefer to lend to large landholders, rather than incurring the high transaction costs associated with making loans to small landholders. Alternatively, the informal sector loans can be thought of as going to the tenants of absentee landlords (a pattern typical of South India), though in this case, the issue arises as to why the absentee landlord cannot send agents to select among his tenants the good risks and cannot enforce the contracts. Evidently, agency problems are sufficiently severe as to give the trader-lender some economic advantage over the absentee landlord.

Within each type, endowments and preferences are identical.²⁵ Large landowners are endowed with labor and liquid capital, K , as well as land. A large landowner allocates his liquid capital between on-farm investment and lending. His output depends on his land, labor, and on-farm investment, but since we will hold his land and labor constant throughout, we can write his production function as $F(K)$, with diminishing returns to K . Individuals trade part of their agricultural output for an importable consumption good, and the price ratio is set at one in world markets. Exchange is assumed to be costly; each trader must have one warehouse. Traders add a distribution charge of p per unit to the world price of output.

Small landowners have a demand for credit denoted $z(i)$, where i is the interest rate paid. A small landowner can borrow only from traders, since only traders can enforce the repayment of debt. A trader-moneylender's costs consist of three components: the fixed cost δ per period of the warehouse,²⁶ the cost of funds foregone from his own farm, and the non-pecuniary cost of effort to obtain information about the productivity of prospective borrowers and to enforce repayment. For simplicity, we assume that there are no marginal costs of storage/trading.

An implication of this assumption is that traders will charge nothing for the services of storage/trading. To see this, observe that rural landowners who are not themselves traders are indifferent between the services of any two traders who charge the same price. Under this assumption, a Bertrand Nash equilibrium will entail $p = 0$ (since marginal costs are zero).²⁷

Moreover, all traders will be moneylenders. We already know that all moneylenders will be

²⁵This assumption is made to enable us to ignore intra-group lending, e.g., among large landowners, or among members of a family.

²⁶The fixed cost may be viewed as including a rental charge for the warehouse if renting is possible, or one may suppose that there is a resale market so that a fixed rent can be imputed.

²⁷In a more general model in which we explicitly modelled transportation costs involved in trading, the market for trading services as well as the informal credit market would be monopolistically competitive. The qualitative nature of our results do not depend sensitively on this simplification.

traders, since only in that way can they ensure repayment. All traders will be moneylenders since only in that way can they cover their fixed costs of trading and still compete with moneylender-traders. We simplify the analysis by assuming that there are only two types of borrowers, "good" borrowers, who, with sufficient attention to repayment, will always repay their loans, and "bad" borrowers, who, with any reasonable level of expenditures on enforcement, still will not repay their loans (e.g., simply because their output is too small). We assume that, with adequate expenditures on screening, that lenders can sort out good from bad borrowers, and that it always pays lenders to incur not only those expenditures, but also the expenditures required to have debt contracts enforced.²⁸ Thus, in this simplified model, the probability of repayment is one. There are N moneylender-traders, and Z good borrowers; the N moneylenders divide the market symmetrically, each getting Z/N .²⁹

We divide the analysis into two cases. In the basic model to be presented in this section, moneylenders do not encroach on each other's territory. One can think of each moneylender as having several small villages, about which he is well informed, with the costs of becoming informed about a village within another moneylender's district being prohibitive. In the second case, presented in Section III.5, moneylenders compete for clients who reside near the boundaries between the different moneylenders' districts. This introduces more effective competition into the lending market.³⁰

Informal rural credit markets in developing countries range along a continuum with moneylenders

²⁸In other words, so long as the probability of repayment is less than one, the marginal return to increased expenditures on screening and enforcement exceed the marginal costs.

²⁹We will assume in this paper that the total number of borrowers, Z , is fixed. We could, alternatively, and perhaps more reasonably, assume that Z represents the total *potential* supply of good borrowers. The actual number to whom the moneylender lends is thus some number $Z^*/N \leq Z/N$. How this alters the moneylender-trader's maximization problem is described in footnotes 34-35 below. We leave to future work how this alters the general equilibrium problem. Presumably at low levels of G , Z^* increases with an increase in G ; at high levels, $Z^* = Z$ and so the analysis is as described above.

³⁰Our analysis may still underestimate the effectiveness of competition, because in many locales, there are several moneylenders within a village, all of whom might be potential competitors.

exercising a greater or less amount of market power. The basic model is intended to describe the monopolistic end of the spectrum; the general model is intended to describe the middle of the spectrum.

The amount borrowed by each borrower is a function of the interest rate charged

$$(1) \quad z = z(i), \quad z' < 0,$$

At higher interest rates, small landowners borrow less.³¹

Each lender insists on an exclusive lending relationship and has the information to enforce such an exclusivity rule.³² The total amount lent by any moneylender is thus L , where

$$(2) \quad L = \frac{z(i)Z}{N} = z(i)m$$

m is the number of borrowers per lender. Equation (2) defines the interest rate as a function of the total amount lent and the number of moneylenders:³³

$$(3) \quad i = i(L, N), \quad \text{with}$$

$$(4) \quad \frac{\partial \ln i}{\partial \ln L} = \frac{\partial \ln i}{\partial \ln N} = -\eta < 0$$

$$\text{where } \eta \equiv - \left(\frac{\partial \ln z(i)}{\partial \ln i} \right)^{-1}$$

³¹We do not explicitly model the production or financial opportunities available to the small farmer. The function $z(i)$ reflects the reduced-form solution to an optimization program where the small farmer may undertake a variety of activities, both on and off the farm. The nature of his opportunities will affect the elasticity of $z(i)$.

³²Such exclusivity provisions were documented in Section I. This form of exclusivity is weaker than that of a "dynamically captive market," where each buyer (borrower) has a fixed cost of switching from a seller (moneylender) with whom he has established a relationship to one with whom he has not, and there is thus very limited effective competition. The term is from Salop (1976, p. 243).

³³If the total number of small landholders who receive credit is endogenous, i.e. where we define a variable $Z^* \leq Z$, then we need to write $i = i(L, N, m)$. The trader-lender will choose m in the manner described in the next footnote. m will depend on N and L , so that we will arrive at the same reduced form relationship.

The proportional price response to an increase in supply is the same whether the increase comes from higher lending by each moneylender or from the entry of new lenders. The change will equal the inverse of the elasticity of each small landowner's demand curve, denoted η . This result is a formal statement of the assumption we make in the basic model that moneylenders do not encroach on each others' "districts."

The costs, C , incurred by a moneylender in screening and enforcement depend on both the amount lent and the number of individuals to whom he lends. We thus postulate that^{34 35}

$$(5) \quad C = C(L, N)$$

We assume that screening and enforcement costs increase with the amount lent, with

$$(6) \quad C_L > 0, C_{LL} > 0$$

The incentive not to repay a loan and the proclivity to engage in risky activities both increase with the amount due (see, for instance, Stiglitz and Weiss 1981). As more is lent, the marginal screening and enforcement costs will therefore tend to increase, and to do so at an increasing rate. For the same reason, it is likely that

$$C_{LN} > 0.$$

³⁴In the formulation with an endogenous Z^* in lieu of Z , (5) would be $C = C(N, L, m)$. The moneylender would solve simultaneously for m and L . Given any optimal solution for L , the moneylender-trader would solve

$$\max_{\{m\}} i(L, N, m)L - C(L, N, m)$$

The solution yields $m = m(L, N)$. Substituting this into the functions for i and C yields

$$i = i(L, N, m(L, N)) \quad \text{and} \quad C = C(L, N, m(L, N)),$$

which are functions of L and N alone.

³⁵It is reasonable also to suppose that screening/enforcement costs increase with the interest rate charged (see Eaton and Gersovitz [1981], Eaton, Gersovitz, and Stiglitz [1986], or Allen [1985]). Thus, we obtain $C = C(N, L, i)$, with $C_i > 0$. Nothing in the later analysis is affected by this generalization.

At a given level of L but fewer clients ($= Z/N$), the amount lent to each client is larger and, hence, the marginal cost associated with enforcing the contract is larger.³⁶ However, an effect operating in the opposite direction is that with a smaller district, each moneylender would tend to have lower costs of obtaining information about his clientele. This effect would tend to reduce the marginal costs associated with lending more to any individual.

For purposes of this section, we do not need to fix the sign of C_N , but we will shortly use a stability argument to place bounds on its magnitude.³⁷

The lender solves the following maximization problem

$$(7) \quad \text{Max } F(K - \delta - L + G) - C(N, L) + iL - rG \\ \{L\}$$

where G is the amount lent by the commercial or government bank to the large landowners, and r is the interest rate charged. This gives rise to the first order condition

$$(8) \quad F' = i[1 - \eta] - C_L$$

In setting the amount lent, the moneylender compares the return he obtains on his farm with the return he obtains from lending, taking into account (a) the fact that to lend more he must reduce the interest

³⁶Moreover, we may suppose that even within the informal commercial sector, prospective borrowers and lenders play a kind of matching game. Some borrowers may be intrinsically more valuable borrowers to a given lender--e.g. because it is easy for him to observe that borrower's traits, or because it is easier for him to enforce repayment by that borrower because they share a wide circle of social contacts. Then the likelihood that any lender is able to match himself with very low-cost borrowers may depend on the number of prospective lenders with whom he is competing.

There is an alternative analysis, where Z^* ($\leq Z$) is endogenous and where there is a continuous distribution of some trait that is correlated with the quality of borrowers. Then the quality of the marginal borrower will be a decreasing function of the number of lenders (holding L fixed), and so again both marginal costs of lending and total costs of lending would rise with entry: C_{NL} and C_N would be positive. The model examined here abstracts from these considerations, and also from the dynamics of short-run adjustment.

³⁷Recall that we make the assumption throughout that all good borrowers are found. By increasing N and thereby shrinking each moneylender's district, there is a presumption that screening/enforcement costs will fall. On the other hand, an increase in N , holding L fixed, implies that more is lent to each borrower (i.e. z rises), and so the argument that we used to sign $C_L > 0$ would also tend to make C_N positive. The net effect of these two opposing tendencies is, however, ambiguous.

rate charged, and (b) the effect on enforcement costs of lending more.³⁸

We can now analyze the effect of an increase in formal credit, G , on the interest rate charged and the amount lent. The two are closely linked. Using (2)

$$(9) \quad Zz' \frac{di}{dG} = L \frac{dN}{dG} + N \frac{dL}{dG}$$

We will show that in the basic model, an increase in G always leads to an increase in N . It is apparent from (9) that this effect tends to decrease i , as one might expect. On the other hand, it is possible that an increase in G leads each moneylender to lend less, so much less that interest rates actually increase, and the total amount lent (NL) actually falls. The reason for this perverse result is that entry induced by government lending raises each lender's marginal cost of screening and enforcement (since $C_{LN} > 0$), raises his average fixed costs per borrower ($\delta N/Z$), and may also reduce the marginal revenue from lending ($i(L,N) + L\partial i/\partial L$). These effects may more than offset the reduction in trader-lenders' opportunity cost of funds, and the resulting contraction in L may more than offset the expansion in N . Before turning to the formal exercise, we provide a heuristic diagrammatic interpretation.

2. Diagrammatic Interpretation

Given a fixed number of lender-traders, each will face a downward sloping demand curve for loans. The fixed costs of being a trader imply that his average cost curve is U-shaped, as depicted in Figure 2. Marginal costs of lending are increasing because (in this simplified version) to enforce contracts when borrowers have more debt outstanding and thus have more to gain by abrogating them,

³⁸The second-order condition requires $F'' - C_{LL} + \frac{2\partial i}{\partial L} + L \frac{\partial^2 i}{\partial L^2} < 0$.

costs more.³⁹

The free entry equilibrium is depicted as the tangency between the demand curve and the U-shaped average cost curve (a standard Chamberlinian equilibrium, where the demand curves drawn are those facing the trader-lender, not the industry). Increased government lending to large farmers reduces the marginal cost of lending (since with more funds, the opportunity cost of funds declines), so the average cost curve shifts down. At the initial number of trader-lenders, the activity now yields strictly positive profits, and so more farmers become trader-lenders. With a smaller customer base facing each one, his demand curve shifts to the left. At the same time, the entry of new trader-lenders may shift the average cost curve. Normally, as we have already suggested, it would shift the average cost curve up, as the smaller number of good borrowers within each market area means that the amount lent to each (for any given total lending activity) will increase; and with more lent, the enforcement costs also increase.

As these shifts occur, eventually a zero-profit equilibrium is attained. It will normally entail each lender lending less, but whether interest rates are lower or higher--i.e., whether each borrower gets more or less funds--is ambiguous, as illustrated in Figure 3. An equilibrium is characterized by the conditions that $AC = i$ and

$$\frac{dAC}{dL} = \frac{di}{dL}$$

Taken together, these two conditions imply that the elasticity of the average cost curve equals the elasticity of the demand curve:

$$-\frac{d \ln AC}{d \ln L} = \eta$$

³⁹In practice, rather than confront these possibly steeply rising costs, lenders may attempt to recruit more "good" borrowers, but this too faces increasing marginal costs. In our simplified model, this possibility is ignored.

If at the initial interest rate, the elasticity of demand is unchanged by changes in N ,⁴⁰ then the RHS of the equation above is, at the initial i , unchanged and what is at issue is only the effect on the elasticity of the AC curve. If the initial increase in N also leaves the elasticity of the AC curve unchanged, then the initial interest rate will still be an equilibrium point (Figure 3A). If the initial increase in N raises the elasticity of the AC curve, then the demand curve at the initial interest rate will cut the new AC curve from below (ie. from the east), and lenders will perceive that they can increase profits by lowering the interest rate. The new equilibrium interest rate, labelled i_1 in Figure 3B, will therefore be less than the initial interest rate, i_0 . If, on the other hand, an increase in N lowers the elasticity of the AC curve, then the demand curve at the initial interest rate will cut the new AC curve from above, and the interest rate will increase, as shown in Figure 3C.

To focus solely on the new elements introduced in this model -- the lender's overhead cost (δ) and screening/enforcement cost (C), let us abstract for the moment from the financial cost of lending by setting $F'(K - \delta - L + G) = 1$, which means that the time value of money is zero. Then the average costs of lending are just

$$\frac{\delta + C}{L}$$

It is easy to check that the elasticity of average costs with respect to L would be unchanged by new entry if enforcement/screening costs were fixed exogenously. With endogenous enforcement/screening costs, the elasticity may either increase or decrease, and hence the interest rate may either decrease or increase.⁴¹

⁴⁰This is the case when the number of borrowers to whom a lender would wish to lend does not change as L changes.

⁴¹A formal proof which is not based on the simplifying assumptions of this section will follow. In our heuristic interpretation, we only need to ascertain what happens to the elasticity of the AC curve, i.e.

$$-\frac{d \ln AC}{d \ln L} = 1 - \frac{LC_L}{\delta + C}$$

3. Effect of an Increase in Formal Credit on the Number of Moneylender-traders

We now show formally that an increase in G, the amount made available through the rural credit program, induces entry into trading. The free entry condition into the moneylender-trader business requires that the returns to being a moneylender-trader (with the residual of one's capital being used in farming) equal the returns to remaining a pure farmer, that is

$$(10) \quad V(N,G,K) \equiv \underset{\{L\}}{\text{Max}} \{ F(K - \delta - L + G) + iL - C(N,L) - rG \} = F(K+G) - rG$$

Applying the envelope theorem to the left-hand side of (10) yields

$$\frac{dV}{dK} = F'(K - \delta - L + G) > F'(K+G),$$

i.e. dollars are more valuable to trader-lenders.⁴² This implies that an *increase in credit availability to large farmers increases the number of trader-lenders*. Implicit differentiation of (10) yields

$$(11) \quad \frac{dN}{dG} = \frac{[F'_2 - F'_1]}{C_N - \left(\frac{\partial i}{\partial N}\right)L}$$

where the subscript 1 refers to the farmer, and the subscript 2 refers to the farmer-moneylender-trader.

We wish to know how this changes with N, where as N changes, we reduce L proportionately so as to keep i unchanged along the demand curve. Thus,

$$\frac{-d \left(\frac{d \ln AC}{d \ln L} \right)}{d \ln N} = - \frac{L [NC_{LN} - LC_{LL} - C_L]}{\delta + C} + \frac{LC_L [NC_N - LC_L]}{[\delta + C]^2}$$

which may be either greater or less than zero.

⁴²Yet given the enforcement structure assumed in (A1) on p. 17, large farmers who are not traders cannot lend to trader-lenders. This assumption is a very strong one, but it is not inconsistent with the evidence available in the rural credit markets cited here--see in particular Aleem's findings cited on p. 37 below.

All terms on the RHS are unambiguously positive except C_N . A stability argument yields the result that $dN/dG > 0$. For if not, then as N increased, the return to being a trader would increase, and the equilibrium would be unstable. That is, assume initially that we were in an equilibrium, with N^* traders, with the return to being a trader equalling that to not being a trader (equation 10 holds). If one more farmer should happen to become a trader, the return to being a trader would exceed that of not being a trader, and hence still more large landholders would be induced to become traders.

Using a Taylor series expansion of (11) we can approximate the proportionate increase in the number of traders:

$$(12) \quad \frac{d \ln N}{dG} \approx -F'' \frac{[\delta + L]}{C [v + \alpha \eta]}$$

where $\alpha \equiv iL/C$, the ratio of revenues from lending to screening/enforcement costs, and where v is the elasticity of C with respect to N . In accord with intuition, the induced entry is greater, the greater the elasticity of demand for credit (i.e. the smaller is η), and the smaller the effect of entry on total screening costs (the smaller is v)

4. Effect of an Increase in Formal Credit on the Volume of Informal Lending

We now totally differentiate the lender's first-order condition in (8) to determine the sign of dL/dG :

$$\text{sign } \frac{dL}{dG} = \text{sign} \left\{ -F'' + \left[-C_{LN} + \frac{\partial i}{\partial N} + L \frac{\partial^2 i}{\partial L \partial N} \right] \frac{dN}{dG} \right\}$$

It is apparent that the volume of loans made by a single lender could fall as a result of government lending. If it fell enough, using (9), interest rates could rise.

To ascertain more precisely the conditions under which these possibilities would occur, we substitute the expression for $d \ln N/dG$ from (12) to obtain

$$\text{sign } \frac{dL}{dG} = \text{sign} \left\{ C [v + \alpha\eta] - [\delta + L] \left[NC_{LN} - N \frac{\partial i}{\partial N} - LN \frac{\partial^2 i}{\partial L \partial N} \right] \right\}$$

The greater the magnitude of the lending activity, L , the greater the storage costs, δ , and the more sensitive the marginal screening/enforcement costs to the number of trader-lenders, the more likely it is that L will decrease. To see whether *total* lending will fall (and so interest rates rise), we use (9) and (12) to obtain

$$\text{sign } \frac{d(NL)}{dG} = \text{sign} \left\{ \frac{1}{C} \frac{\delta + L}{v + \alpha\eta} \left[-F''L + C_{LL}L - \frac{L^2 \partial^2 i}{\partial L^2} - 2L \frac{\partial i}{\partial L} - NC_{LN} + N \frac{\partial i}{\partial N} + \frac{NL \partial^2 i}{\partial L \partial N} \right] + 1 \right\}$$

To simplify this expression, note that the inverse of the borrower demand function, $LN/Z = z(i)$, can be written as $i = \phi(LN)$. Then

$$\frac{\partial i}{\partial L} = N\phi', \quad \frac{\partial i}{\partial N} = L\phi', \quad \frac{\partial^2 i}{\partial L^2} = N^2\phi'', \quad \frac{\partial^2 i}{\partial L \partial N} = \phi' + NL\phi''$$

so that

$$-L^2 \frac{\partial^2 i}{\partial L^2} - 2L \frac{\partial i}{\partial L} + N \frac{\partial i}{\partial N} + NL \frac{\partial^2 i}{\partial L \partial N} = -L^2 N^2 \phi'' - 2LN\phi' + NL\phi' + NL\phi' + N^2 L^2 \phi'' = 0$$

Thus, the sum of the "i" terms is zero and

$$\text{sign} \left\{ \frac{d(NL)}{dG} \right\} = \text{sign} \left\{ 1 + \frac{\delta + L}{C [v + \alpha\eta]} [-F''L + C_{LL}L - C_{LN}N] \right\}$$

We now seek to sign

$$C_{LL}L - C_{LN}N.$$

Assume that the enforcement-screening cost function takes the form

$$C = c\left(\frac{L}{N}\right)h(N), \quad C_L = c' \frac{h(N)}{N} \equiv c'H(N)$$

Then

$$LC_{LL} - NC_{LN} = 2c''H\frac{L}{N} - c'H'N.$$

If h is quadratic, i.e. $h = N^2$, then $H = N$ and $C = c(L/N) N^2$ so that

$$C_{LL}L - C_{LN}N = c''L - c'N > \text{ or } < 0 \quad \text{as} \quad \frac{c''L}{Nc'} > \text{ or } < \frac{1}{2}.$$

We thus have a set of sufficient conditions for LN to increase as G increases, and accordingly for i to decrease: (a) there are a fixed number of borrowers, (b) a trader-lender's total enforcement/screening costs depend only on L/N and the (square of the) number of traders, and (c) the elasticity of marginal screening/enforcement costs, C_L , with respect to the lender's portfolio, L , exceeds one-half.

But under more general conditions, the bracketed term can be negative, and hence the whole expression can be negative: An increase in formal credit G can lead to *higher* informal interest rates and *less* informal lending. This perverse result is more likely to occur if the increase in formal credit has only a small effect on large farmer's shadow price of capital ($-F''$ is small), if nonetheless the induced entry into moneylending is large (because η is small). if there are economies of scale in enforcement ($c''(L/N) < 0$), or if the fixed costs of being a trader-lender δ are large.

Note finally that these results are robust under some alternative specifications of the financial opportunities of moneylender-traders.⁴³ First, suppose that, in addition to lending and farming activities, a moneylender-trader can invest in outside production activities or outside financial assets. If these outside opportunities have decreasing returns to scale, then our qualitative results are unaffected.⁴⁴ If these outside opportunities (such as bank accounts) have constant marginal returns,

⁴³These remarks were stimulated by comments and criticisms by Ronald McKinnon.

⁴⁴Intuitively, the presence of alternative financial outlets for moneylender-traders means that their shadow price of capital would be higher than it otherwise would be and (in effect) ' F'' ' is smaller than it otherwise would be, so that dL/dG is smaller than it otherwise would be.

then the effect is the same as if we fixed F' in the lender's first-order condition (equation 8). By fixing F' , we fix his shadow price of capital, independent of G .⁴⁵ Earlier results on the ambiguity of the sign of $d(LN)/dG$ remain valid. Formal sector lending to large farmers will be reinvested in the constant marginal returns financial asset, and the government intervention through G will be equivalent to a lump sum wealth transfer of $G[F' - r]$ to large farmers.

Finally, one should consider the possibility of lending by large non-trader farmers to trader-farmers. Such lending would mitigate the need for additional expenditures on warehouses and would also mitigate the informational externalities arising from new entrants into moneylending. However, large farmers who lend to traders also need to enforce those loans, and so it is plausible that they will require collateral. Assuming that there is a limit on the amount of collateral that a trader-lender has, then once that limit is reached, any increase in formal sector lending, and thus any increase in the trader's mortgaging of his land to a bank, will crowd out large farmer loans to traders on a one-for-one basis. In this case an increment in G will be offset by a reduction in lending to traders by large farmers, which in turn will tend to induce them to enter into the trader-moneylending sector. In fact, induced entry will be larger in this case than occurred in the absence of the original assumption ((A1) on p. 17) of no intra-large farm sector lending.

What appears to drive the results is thus *not* the restrictive assumption of no lending by large farmers to traders, nor the absence of investment opportunities other than informal lending, trading, and farming, but only the assumption that moneylender-traders have lending/investment opportunities that dominate those of non-trader-lenders. This assumption implies that after government extends formal credit to all large farmers, the marginal utility of money to a trader will exceed the marginal utility of money to a non-trader, so that (from equation (11)), entry into moneylending will occur.

⁴⁵In this case, F'' is in effect zero.

5. A More General Model

The model presented above has limited competition among lenders. In setting interest rates, lenders do not worry about losing customers to rivals. There is a certain realism about this assumption in small villages, where there may be only one lender. Outside lenders are at such an informational disadvantage that they represent no effective competition. The interest rates which they would need to charge to compensate them for the risks associated with being an uninformed outsider⁴⁶ are sufficiently high, that the local moneylender can set his rates according to the equations described earlier.

But in larger villages, there is a potentially important competitive effect. With more firms competing, all of the relevant elasticities are altered. In particular, now the cost of recruiting m good customers depends not only on the number of other moneylenders out seeking borrowers, but also on the interest rate they charge, in comparison with the interest you charge. We postulate that now

$$m = Z(i, i^*)/N \quad \text{and} \quad Z_1 < 0, \quad Z_2 > 0$$

where i^* is the interest rate charged by others. Thus, the total amount of informal credit is

$$LN = Z(i, i^*)z(i)$$

This generalization of demand leaves the lender's first-order condition unchanged, but now he faces a more elastic demand curve than before:

$$\partial i / \partial L = N / (Z_1 z + Z z')$$

In the subsequent comparative statics exercises in the symmetric equilibrium, let

⁴⁶Indeed, the usual "lemons" argument can be used to show that outsiders will not find it attractive to enter the market in the presence of an informed inside lender. Assume the outsider made an offer to an individual in the village at a rate lower than that being offered by the local moneylender. The local moneylender would match the rate if he thought that the risk associated with the borrower merited it, and otherwise would not; thus the outside lender would only succeed in recruiting those to whom he has made offers at such low interest rates that the informed insider judges it no longer profitable to make loans. For a further development of these ideas in the context of labor markets, see Greenwald [1986].

$$i = i^* = i^{**}$$

and we need to replace the expression for $\partial i / \partial N$ with that derived from

$$LN = Z(i^{**}, i^{**}) z(i^{**}),$$

i.e.

$$\partial i^{**} / \partial N = L / [Zz' + z(Z_1 + Z_2)].$$

If we postulate that $Z(i, i^*)$ is homogeneous of degree zero in its arguments, i.e.

$$Z(ki, ki^*) = Z(i, i^*) \text{ for all } k,$$

then

$$iZ_1 + i^*Z_2 = 0,$$

or at the symmetric equilibrium with $i = i^*$,

$$Z_1 + Z_2 = 0,$$

so the derivative $\frac{\partial i}{\partial N}$ is the same as before.

The one major alteration from the basic model is that we can no longer use the envelope theorem in analyzing the effect of G on the free entry condition. L is not chosen to maximize the representative moneylender's income, since he ignores the effect his behavior has on other moneylenders' actions. It is more convenient if we take as the control variable i rather than L , with i^* of other moneylenders taken as given. Each lender's first-order condition is

$$L + \frac{\partial L}{\partial i} [i - C_L - F'] = 0$$

so that (using the implicit function theorem)

$$\text{sign} \frac{di^*}{dG} = \text{sign} \frac{di}{dG} = \text{sign} \left\{ -\frac{\partial L}{\partial i} F'' \right\} < 0$$

From the free entry condition (10),

$$\frac{dN}{dG} = \frac{\left\{ F_2' - F_1' + \Omega \left[\frac{\partial i^*}{\partial G} \right] \right\}}{\left\{ C_N - \left[\frac{\partial i^{**}}{\partial N} \right] \Omega \right\}}$$

where

$$\Omega \equiv \frac{\partial V}{\partial i^*} = [i - C_L - F'] \frac{\partial L}{\partial i^*} = -L \frac{\partial L / \partial i^*}{\partial L / \partial i} > 0$$

Comparing the above expression for induced entry, dN/dG , with equation (11) shows that a sufficient condition to ensure that entry is smaller in the general model than in the basic model is that

$$\frac{\partial L}{\partial i^*} \leq \left| \frac{\partial L}{\partial i} \right|$$

i.e., own changes in the interest rate have greater effects than changes in a competitor's interest rate. This condition is not, however, a necessary one to ensure that dN/dG is lower in the general model than in the basic model. The last term in the numerator of dN/dG in the general model represents the fact that an increase in G leads each firm to lower its interest rate, causing an externality effect on others. The net effect is an aggregate lowering of the profitability of being a trader-lender, which reduces the inflow of trader-lenders. Indeed, it is even possible that there be an outflow, namely, if

$$F_2' - F_1' < -\Omega \left[\frac{\partial i^{**}}{\partial G} \right]$$

The smaller (or negative) inflow makes it less likely that L will be reduced. If $dN/dG = 0$, then L must increase and i must be reduced.

Thus we have established that under general conditions, an expansion of formal credit will be *more* likely to drive down informal interest rates when borrowers have their choice of several moneylenders. This runs counter to the view, often expressed by policymakers, that the benefits to small farmers of an expansion in formal lending will be greatest where the moneylender's grip on his clients is greatest.

IV. SHIFTING THE INFORMATION BASE

The central message of the basic model was that providing funds to the rural sector, intermediated through rural landlords, might be ineffective, since a substantial part of the implied subsidy would be dissipated through excessive entry of trader-lenders.

This section considers an alternative way of trying to affect credit availability within the rural sector, by creating institutions such as peer monitoring groups. The central problem confronting the government lender was that it could not screen the bad from the good borrowers, and could not enforce debt contracts. We simplify by assuming that with peer monitoring, it now becomes possible for the government to lend to a fraction $1 - \beta$ of the small landowners directly. This removes the corresponding number of individuals from the pool of borrowers available to the moneylender-traders.

Thus, we now replace equation (1) with

$$(1') \quad L = \frac{\beta Z z(i)}{N}$$

so that $i = i(L, N, \beta)$. We wish to examine whether an expansion of the government's group lending program (a decline in β) will lower or raise interest rates that moneylenders charge. Differentiating (1') totally yields

$$(9') \quad \frac{\beta Z z' di}{d\beta} = \frac{L dN}{d\beta} + \frac{N dL}{d\beta} .$$

The free entry condition allows us to solve for $dN/d\beta$. In the obvious notation

$$(10') \quad V(N, \beta) \equiv \underset{\{L\}}{\text{Max}} F(K - \delta - L + G) + i(L, N, \beta)L - C(N, L, \beta) - rG = F(K + G) - rG.$$

Now, again using the envelope theorem

$$\text{sign } \frac{dN}{d\beta} = \text{sign} \left(L \frac{\partial i}{\partial \beta} - C_{\beta} \right) .$$

A decrease in β (at fixed L and N) reduces the interest rate along the demand curve since average loan size has increased. But the increase in average loan size will also, in general, increase the costs of

screening/enforcement.⁴⁷ On both accounts, the profitability of lending is reduced as the group lending program expands, and there is exit from the moneylending-trader activity.

Moreover,

$$\text{sign } \frac{dL}{d\beta} = \text{sign } \left\{ \frac{\partial i}{\partial \beta} - C_{L\beta} + \frac{L\partial^2 i}{\partial L\partial \beta} + \left[-C_{LN} + \frac{\partial i}{\partial N} + \frac{L\partial^2 i}{\partial L\partial N} \right] \frac{dN}{d\beta} \right\}$$

Again, it is possible for the effect on lending to be of either sign: there is a direct negative effect, but the exit of moneylenders has a positive effect. Thus, the provision of credit directly to small farmers through peer monitoring groups, benefits those who receive the credit directly, but it has indirect effects on the remainder of the rural credit market which may be hard to ascertain. In particular, it is likely to drive moneylenders out of business, and to the extent that that is one of the intentions, it is likely to be successful. But these moneylender-traders are performing a useful economic function, and unless totally replaced by direct government loans, the reduction in the supply of money lender-traders *may* have an adverse effect on those who do not get loans through peer monitoring groups. Typically, each moneylender will contract his lending activity, and there will be fewer moneylenders; but whether this supply response is smaller or larger than the reduced demand (because fewer borrowers will be seeking funds from the informal sector) is a complicated matter, which depends on properties of the screening-monitoring cost function C , the function $z(i)$, and the production function F .

V. CHANGES IN INFRASTRUCTURE

Studies of Indian rural credit markets (Ghatak 1983 and Iqbal 1988), which have found an inverse relation between average incomes and informal interest rates, have suggested that as

⁴⁷Moreover, in a more general model, it may be more expensive to call out Z "good" borrowers out of a smaller population of potential borrowers. This effect may be reinforced when we recall that we should view lending as a matching activity. In any general model there are important externalities. Beyond some point at least, it may become more expensive to find a fixed number of good matches the smaller the pool ($(1-\beta)Z$) within which one can search, or the larger the number of searchers.

development proceeds, risks and other costs to lenders diminish and, thus, the imperfections in credit markets diminish as well. Iqbal argues that an expansion of credit need not precede, but will follow, an improvement in infrastructure and technology.

Agricultural technical change does influence the supply of loans... Farmers residing in areas characterized by the use and/or provision of new technology appear to benefit in that they face lower moneylender interest rates. This result provides an additional point of leverage for policy-makers: Interest rates can be lowered indirectly through the provision of technical change and investment opportunities and need not be lowered directly through costly subsidies to some borrowers in the formal credit market. (Iqbal, 1988, p. 375)

In an earlier paper (Hoff and Stiglitz 1990, p. 246), we suggested that development may not take care of the imperfection of rural credit markets, since development tends to reduce the strength of local ties and thereby weaken the social sanctions on which the enforcement of many credit contracts depends. Our model of trader-moneylenders, who do not rely on social sanctions for enforcement but rather on the lack of mobility by farmers in marketing their output, suggests a formal basis for the argument quoted above.

Let ζ parameterize the level of infrastructure and technology that influences the lender's screening/enforcement costs, so that $C = C(L, N, \zeta)$. We suppose that an increase in ζ reduces the amount of information that a lender requires about a farmer's abilities, land quality, access to water, and so on, and also decreases the likelihood that a lender will have to return to a farmer's fields on numerous occasions to obtain repayment. Hence, $C_{\zeta} < 0$ and $C_{L\zeta} < 0$. An improvement in infrastructure will also tend to increase the ability of outsiders to compete in a local lending market, which will in turn reduce the local moneylenders' market power.

The basic model above can capture only the effect on C ; the more general model can capture both effects. We consider only the basic model here.

The Basic Model. Differentiating the first-order condition in (8) by ζ yields

$$(13) \quad \frac{dL}{d\zeta} = \frac{-C_{L\zeta} + \frac{dN}{d\zeta} \left[-C_{LN} + \frac{\partial i}{\partial N} + L \frac{\partial^2 i}{\partial L \partial N} \right]}{-\Delta}.$$

where

$$\Delta \equiv F'' - C_{LL} + \frac{2\partial i}{\partial L} + L \frac{\partial^2 i}{\partial L^2} < 0.$$

Differentiating the free-entry condition in (10) yields

$$(14) \quad \frac{dN}{d\zeta} = \frac{-NC_{\zeta}}{C[\alpha\eta + v]}.$$

Substituting (14) into (13) yields

$$(15) \quad \frac{dL}{d\zeta} = \frac{-C_{L\zeta} + \left[NC_{LN} + i\eta - \frac{NL\partial^2 i}{\partial L \partial N} \right] \frac{C_{\zeta}}{C[\alpha\eta + v]}}{-\Delta}.$$

Using (14) and (13) and the fact that $\frac{d(NL)}{d\zeta} = L \frac{dN}{d\zeta} + N \frac{dL}{d\zeta}$ yields

$$(16) \quad \frac{d(NL)}{d\zeta} = -C_{\zeta}N \left[\frac{L}{C[v + \alpha\eta]} + \frac{\frac{C_{L\zeta}}{C_{\zeta}} - \frac{NC_{LN} + i\eta - \frac{NL\partial^2 i}{\partial L \partial N}}{C[v + \alpha\eta]}}{-\Delta} \right].$$

Within the large square brackets are two terms. The first term is strictly positive, but the sign of the second term is the same as the sign of

$$(17) \quad \frac{C_{L\zeta}}{C_{\zeta}} - \frac{\frac{NC_{LN}}{C} + \frac{i\eta}{C} - \frac{NL}{C} \frac{\partial^2 i}{\partial L \partial N}}{v + \alpha\eta}.$$

and is, in general, ambiguous. Suppose that $\frac{\partial^2 i}{\partial L \partial N} = 0$ and $L > 1$. Under these two assumptions (17) is equal to

$$(18) \quad \frac{C_{L\zeta}}{C_\zeta} - \frac{\frac{NC_{LN}}{C} + \frac{i\eta}{C}}{v + \alpha\eta} > \frac{C_{L\zeta}}{C_\zeta} - \frac{\frac{NC_{LN}}{C} + \alpha\eta}{\frac{NC_N}{C} + \alpha\eta}.$$

The improvement in infrastructure and the induced entry into moneylending affect both the marginal cost of screening/enforcement (C_L) and the total cost (C). If the impact is primarily on the marginal cost, so that $-C_{L\zeta} > -C_\zeta$, while $C_{LN} < C_N$, then it follows from the inequality in (18) that the term in (17) is strictly positive, which implies $\frac{d(NL)}{d\zeta} > 0$: an improvement in infrastructure will by itself drive down the interest rates charged by informal moneylenders.

VI. EVIDENCE ON FINANCIAL INTERMEDIATION

New entry into the occupation of moneylender-trader induced by government credit programs is a far cry from their stated objective. In India, for example, the announced purpose of government support for rural banks and cooperatives was to

provide a positive institutional alternative to the moneylender himself, something which will compete with him, remove him from the forefront and *put him in his place* (Reserve Bank of India, 1954, cited in Bell, p. 297).

The model in the last section treats commercial moneylenders as "retailers" of government-subsidized funds as well as lenders out of their own equity; it shows that government subsidies may not reduce moneylenders' costs of funds (including the costs associated with enforcement) at the margin or on average. Unfortunately, direct tests of the model and its assumptions are limited. In his study of the detailed operations of 14 commercial moneylenders serving a rural area in Sind, Pakistan, Aleem found that

on average approximately half of the funds used by the informal lender come from his

own savings, 30 percent from institutional sources either directly or indirectly (from cotton mills, wholesalers, and so forth who have direct access to such funds), and the remainder from other informal lenders as well as from clients who use him as a safe deposit (at zero cost) for surplus cash. (p. 341)

On average, the moneylenders' marginal cost of funds was estimated to be 32 percent (Aleem, Table 6), much higher than the 12 percent interest rate charged by formal lenders. It appears therefore that moneylenders' access to the formal market was rationed. Because it was rationed, there was no direct pass-through of the lower borrowing rate faced by moneylenders to those to whom they lent; the subsidy was entirely infra-marginal.⁴⁸

For other countries, however, there is little recent data on intermediation. Bell reports that in Punjab, India, formal sector borrowings of resident lenders were an insignificant share of total credit extended by resident traders and moneylenders, and that data are not available for the borrowings of nonresident traders and moneylenders. But the fact that bank lending to moneylenders and to certain kinds of traders is illegal in India casts doubt on the reliability of any figures that could be obtained. Harris (1983) observed in Tamil Nadu, India that large farmers were very active as lenders and traders and obtained funds from the formal credit sector:

among larger farmers, money is simultaneously lent and borrowed, with interest rates and relative risks juggled in an effort to make a profit. This is known as "rolling," and the English word is used...

VII. CONCLUSION

Recent field studies of rural credit markets in developing countries shed light on the differences across lenders in their capacity to recover loans. Rural credit markets are fragmented⁴⁹ because of the absence of a low-cost and reliable legal structure and information transmission system.

⁴⁸In Aleem's study, to expand their lending, moneylenders stated that they turned primarily to other moneylenders for funds.

⁴⁹The term is from McKinnon, 1973, p. 5.

The consequence of fragmentation is that there are *great differences between the shadow price of capital for different borrowers*, and this has been used to justify government subsidies to the expansion of formal credit in rural areas. But we showed that if the cause of the fragmentation is the enforcement problem, then subsidies to bank credit channelled to farmers with land collateral may be partly dissipated in excessive entry of farmers into moneylending-trading activities.

We next addressed the question, How can a credit market that behaves badly because of enforcement problems be moved toward a more efficient equilibrium? The answer is not for government to drive the moneylender out of trading. That would shift the lending business to other informal moneylenders with even higher transaction costs. One answer that has been offered is for government to channel credit subsidies directly to trader-moneylenders in order to take advantage of their information capital and comparative advantage in enforcement. But the model of this paper would suggest that such intermediation is already occurring, and that its effects are not altogether benign. It may result not only in partial dissipation of the subsidy through induced entry, but it may even increase informal interest rates.

Instead, we would argue that the solution must lie in designing substitutes for the information and enforcement activities of trader-moneylenders, and in interventions in infrastructure that reduce the cost of those activities. In theory, financial agencies could enter the business of trading themselves. But that approach to the enforcement problem would likely fail if they did not have a monopoly on trade in the farmers' outputs,⁵⁰ and such a monopoly on trade and a reduction in competition would entail bad consequences of its own. One implication of case studies of rural credit markets is that the government sector needs a vibrant private sector to police it; when services of private moneylenders

⁵⁰The kinds of cooperative enforcement among private traders that we discussed in Section I would presumably not extend to a government agency whose objective was to displace all of the private traders.

are not widely available, government lending may be highly corrupt.⁵¹

An alternative approach to the enforcement problem would be to expand government lending to self-formed groups of poor farmers. Those groups, through their reliance on *social collateral*, have a comparative advantage in solving the enforcement problem. The study of the design of such peer monitoring programs is just beginning (see Huppi and Feder [1989], Stiglitz [1990], and Varian [1990]). The results of this paper call attention to the need for such institutional innovation. Absent such innovation, the model that we presented, based on what appears to be the relevant market structure in many informal credit markets, implies that a part of government credit subsidies to landowners is dissipated by new entry into informal moneylending activities, and of that part that is not dissipated, it is possible that none reaches the poorest cultivators. But our paper also raises questions about the full consequences of such innovations, when they are limited to only a part of the market: for the reduction in profitability of trader-lending may lead to less competition in the informal lending market; and while the exit out of the trader-lending market will reduce the dissipation of resources from excess entry, the reduced competition may itself work to the disadvantage of those borrowers who are not part of group borrowing programs.

⁵¹A striking case is the systematic use in one financial institution in Palanpur, India, of phoney record-keeping to squeeze borrowers who lacked political connections and access to funds from other sources. See Lanjouw, 1992, Table 8 (unnumbered chapter on credit).

References

- Adams, Dale, Douglas Graham, and J.D. Von Pischke, Undermining Rural Development with Cheap Credit, Boulder: Westview Press, 1984.
- Adams, Dale and Delbert A. Fitchett (eds.), Informal Finance in Low-Income Countries, Boulder: Westview Press, 1992.
- Adams, D.W. and G.I. Newman, "Borrowing Costs and the Demand for Rural Credit," Journal of Development Studies, 15(2), 1979, pp. 166-175.
- Aleem, Irfan, "Imperfect Information, Screening and the Costs of Informal Lending: A Study of Rural Credit Markets in Pakistan," The World Bank Economic Review 4(3), 1990.
- Allen, Franklin, "On the Fixed Nature of Sharecropping Contrasts," Economic Journal, March 1985, pp. 30-48.
- Arnott, R., and J.E. Stiglitz, "The Welfare Economics of Moral Hazard," in Risk, Information and Insurance: Essays in the Memory of Karl H. Borch, Henri Louberge (ed.), Kluwer Academic Publishers (Norwell, MA), 1989, pp. 91-122.
- Bell, Clive, "Interactions between Institutional and Informal Credit Agencies in Rural India", The World Bank Economic Review 4(3), 1990.
- Besley, Timothy, Stephen Coate and Glenn Loury, "The Economics of Rotating Savings and Credit Associations," RPDS discussion paper # 142, Princeton University, 1990.
- Bouman, F.J.A., Small, Short and Unsecured: Informal Rural Finance in India, Oxford: Oxford University Press, 1989.
- Braverman, A. and J. Guasch, "Administrative Failures in Government Lending Programs," in K. Hoff, J.E. Stiglitz, and A. Braverman (eds.), The Economics of Rural Organization, 1992.
- Braverman, A., and J.E. Stiglitz, "Sharecropping and the Interlinking of Agrarian Markets," American Economic Review, 72(4), September 1982, pp. 695-715.
- Brooke, James, "Informal Capitalism Grows in Cameroon: Grass-Roots Credit System," New York Times, November 30, 1987.
- D'Mello, L., "Lending to Small Farmers: The Indian Case," in Howell, J. (ed.), Borrowers and Lenders, London: Overseas Development Institute. 1980.
- Dreze, Jean, "Poverty in India and the IRDP-Delusion," Economic and Political Weekly, September 29, 1990, pp. A-95-A-104.
- Eaton, Jonathan and Mark Gersovitz, "Debt with Potential Repudiation: Theoretical and Empirical Analysis," Review of Economic Studies, 48(2), April 1981, pp. 289-309.

- Eaton, Jonathan, Mark Gersovitz, and J.E. Stiglitz, "The Pure Theory of Country Risk," European Economic Review, 30(3), 1986, pp. 481-513.
- Esguerra, E. and Richard L. Meyer, "Collateral Substitutes in Rural Informal Financial Markets in the Philippines," in Adams and Fitchett (eds.), Informal Finance in Low-Income Countries, 1992.
- Feder, Gershon, Tongroj Onchan, Yongyuth Chalamwong, and Chira Hongladarom, Land Policies and Farm Productivity in Thailand, Baltimore, Maryland: John Hopkins University Press, 1988.
- Floro, Sagrario and Pan Yotopoulos, Informal Credit Markets and the New Institutional Economics: The Case of Philippine Agriculture, Boulder: Westview Press, 1991.
- Fuglesang, Andreas and Dale Chandler, Participation as Process: What We Can Learn from Grameen Bank, Bangladesh, Dhaka, Pearl Printing, 1988.
- Germidis, Dimitri, "Interlinking the Formal and Informal Financial Sectors in Developing Countries," Savings and Development 14 (1), 1990, pp. 5-21.
- Ghatak, Subrata, "On Interregional Variations in Rural Interest Rates." Journal of Developing Areas 18, 1983, pp. 21-34.
- Gonzalez-Vega, Claudio, "Interest Rate Restrictions and Income Distribution," American Journal of Agricultural Economics, 59(5), 1977, pp. 973-976.
- Greenwald, Bruce "Adverse Selection in the Labor Market," Review of Economic Studies, 53(3), July 1986, pp. 325-347,
- Harriss, Barbara, "Money and Commodities: Their Interaction in a Rural Indian Setting" in J.D. Von Pischke, Dale W. Adams, and Gordon Donald (eds.), 1983.
- Hoff, Karla and J.E. Stiglitz, "Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspectives," World Bank Economic Review 4, 1990, pp. 235-250.
- Hoff, Karla, Avishay Braverman, and J.E. Stiglitz (eds.), The Economics of Rural Organization: Theory, Practice, and Policy, Oxford: Oxford U. Press, forthcoming 1993.
- Huppi, Monika, and Gershon Feder, "The Role of Groups and Credit Cooperatives in Rural Lending," The World Bank Research Observer, 5(2), 1990, pp. 187-204.
- Iqbal, Farrukh, "The Determinants of Moneylender Interest Rates: Evidence from Rural India," Journal of Development Studies 24, 1988, pp. 364-78.
- Kreps, David M., Paul Milgrom, John Roberts and Robert Wilson, "Rational Cooperation in the Finitely Repeated Prisoners' Dilemma," Journal of Economic Theory, 27, 1982, pp. 245-252.
- Lanjouw, Peter, Inequality, Poverty, and Mobility: The Experience of a North Indian Village, Ph.D thesis, London School of Economics, 1992.

- Lipton, Michael and J. Toye, Does Aid Work in India?, London: Routledge, 1989.
- McKinnon, Ronald, Money and Capital in Economic Development, Brookings Institution, Washington D.C., reproduced in part in Meier, Gerald, Leading Issues in Development, Oxford: Oxford University Press, 1973, pp. 792-794.
- Onchan, Tongros, "Informal Rural Finance in Thailand," in Adams, Dale and Delbert A. Fitchett (eds.), Informal Finance in Low-Income Countries, Boulder: Westview Press, 1992.
- Platteau, J. and A. Abraham, "An Enquiry into Quasi-Credit Contracts; the Role of Reciprocal Credit and Interlinked Deals in Small-scale Fishing Communities," Jurnal of Development Studies, 23, 1987, pp. 461-490.
- Salop, Steven, "Information and Monopolistic Competition," American Economic Review Proceedings, 66, 1976, pp. 240-245.
- Sharma, Pravendra, "Borrowing Costs, Debt Capacity and Demand for Agricultural Finance in Fiji," Savings and Development, 9(4), 1985, pp. 459-467.
- Siamwalla, Ammar, C. Pinthong, N. Poapongsakorn, P. Satsanguan, P. Nettayarak, W. Mingmaneeakin, and Y. Tuhpun, "The Thai Rural Credit System: Public Subsidies, Private Information, and Segmented Markets," World Bank Economic Review, 4, 1990, pp. 271-296.
- _____, "The Thai Rural Credit System and Elements of a Theory: Public Subsidies, Private Information, and Segmented Markets," in Hoff, Braverman, and Stiglitz (eds.), 1993, ch. 8.
- Stiglitz, J.E., "Peer Monitoring and Credit Markets", World Bank Economic Review, 4(3), 1990.
- Stiglitz, J.E., and A. Weiss, "Credit Rationing in Markets with Imperfect Information", American Economic Review 71(3), 1981, pp. 393-410.
- _____, "Incentive Effects of Termination: Applications to the Credit and Labor Markets," American Economic Review, December 1983, 73(5), pp. 912-927.
- Udry, Christopher, "Credit Markets in Northern Nigeria: Credit as Insurance in a Real Economy," World Bank Economic Review, 4, 1990, pp. 251-270.
- Varian, Hal, "Monitoring Agents with Other Agents," Journal of Institutional and Theoretical Economics, 146, pp. 153-174, 1990.
- Von Pischke, J.D., Dale W. Adams, and Gordon Donald (eds.), Rural Financial Markets in Developing Countries, Baltimore, Md.: Johns Hopkins University Press, 1983.
- Walker, Thomas S. and James G. Ryan, Village and Household Economies in India's Semi-Arid Tropics, Baltimore, Md.: Johns Hopkins University Press, 1990.
- Wiggins, Steve, "Institutional Reactions to Policy: A Case Study of Rural Banking in South India," Savings and Development, 16(1), 1992, pp. 43-68.

Table 1
Credit Interlinked with Trade

1.	As a percentage of total informal credit to cultivating households, Punjab, India, 1980-81	62%
2.	As a percentage of total informal credit in developed rural areas, Philippines, 1984	47%
3.	As a percentage of credit supplied by nonresident lenders, and as a percentage of total informal credit, in Nakhon Ratchasima province, Thailand, 1984-85	73% 29%
4.	As a percentage of credit supplied by informal moneylenders, Munoz, Nueva Ecija, Philippines, 1992	51%

Sources:

1. Bell 1990, Table 6.
2. Floro and Yotopoulos 1991, Tables 5.1, 5.2, 3.12.
3. Siamwalla et al. 1990, Table 4.
4. Esguerra and Meyer 1992, derived from Table 2

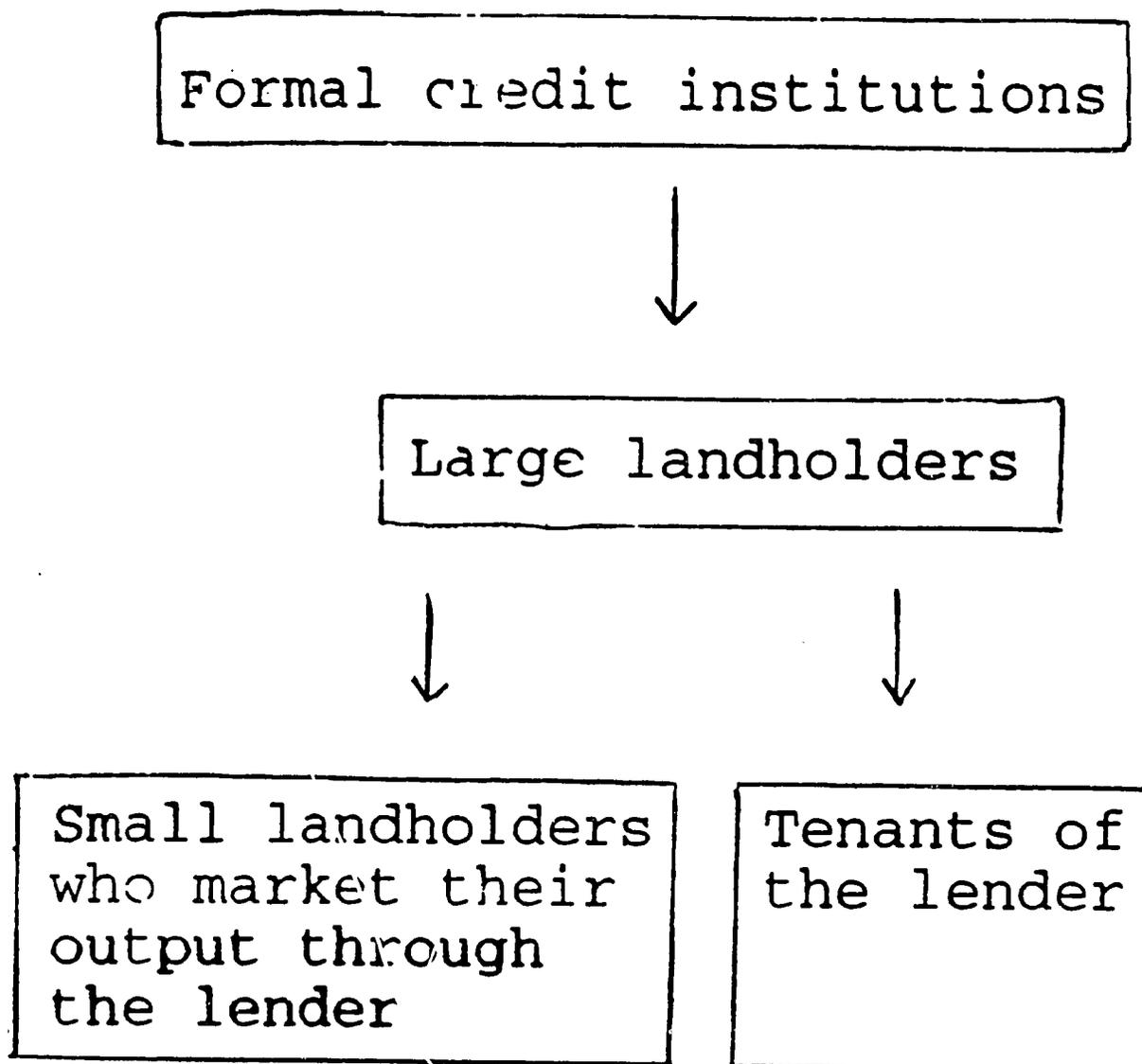


FIGURE 1

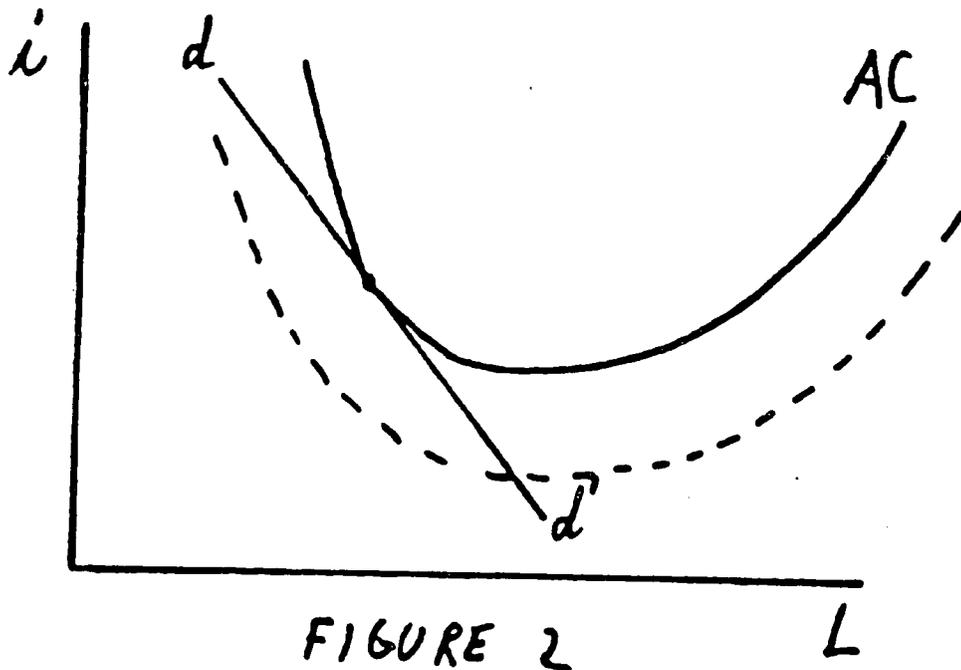


FIGURE 2

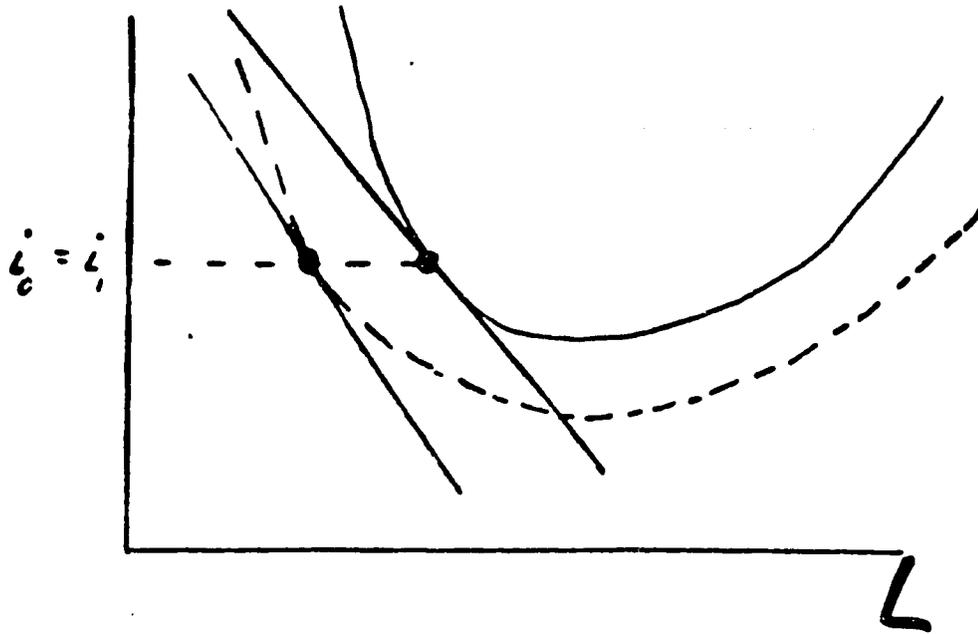


FIGURE 3A

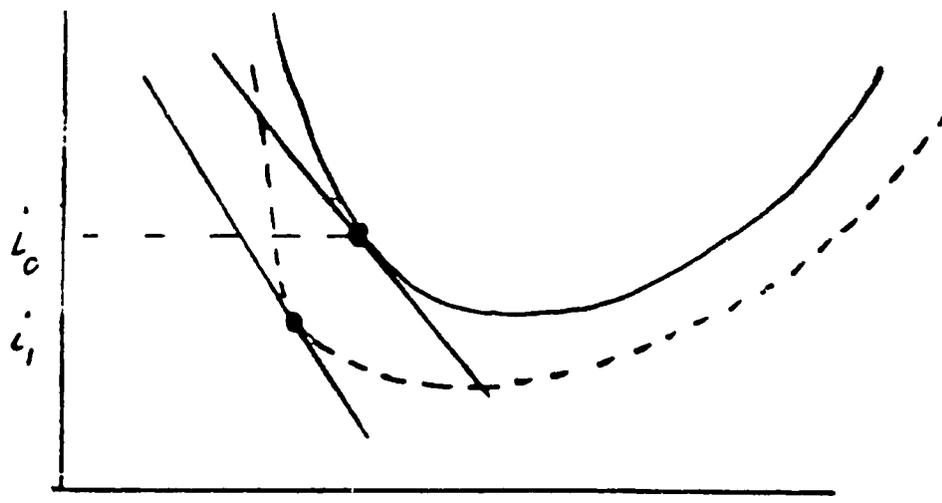


FIGURE 3B

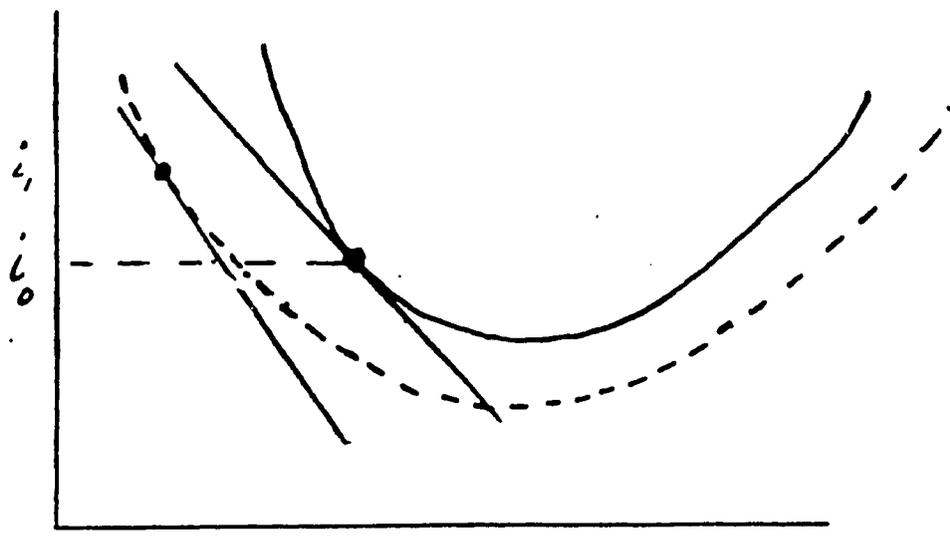


FIGURE 3C