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A TRANSACTION COST MODEL OF FORMAL AND INFORMAL MARKETS FOR RURAL CREDIT

By James A. Roumasset and Scott Simons*

Abstract

A model is developed that describes formal and informal rural credit markets in terms of transaction costs of lenders. Stimulating agricultural investment with subsidized formal loans is shown to incur significant efficiency costs by drawing credit away from high productivity investments in the unsubsidized sector.

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Credit, Agricultural

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I. INTRODUCTION

It is widely believed that since rural credit is important for agricultural development and since participants in the informal credit market pay exhorbitant interest rates, that policies which increase borrowing from formal lending sources are warranted. Policies which shift borrowing from informal tc formal sources may take a number of forms including greater budgetary allocations to public credit agencies and policies to facilitate farmer eligibility for formal loans. [1]

In this paper we attempt to analyze the effects of subsidizing credit by adding the formal sector to a transaction cost model of agricultural credit. We find that though cheap credit may benefit individual loan recipients, loans tend to be poorly distributed and are achieved with significant efficiency costs. We also show that formal sector subsidies may reallocate funds away from high productivity farm investments.

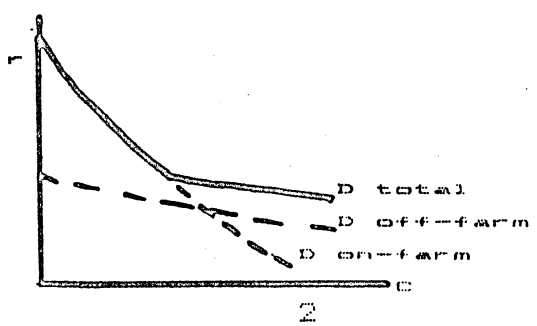
The following section develops a model of the informal credit market focusing on the demand and supply of credit to individual borrowers and on transaction costs of lenders. Section III introduces a formal credit sector co-existant with the informal sector. The final section provides a brief discussion of the welfare economics of rural credit and preliminary policy conclusions regarding the role of public credit subsidies.

II. A TRANSACTION COST THEORY OF RURAL CREDIT

For simplicity we will focus on two borrowers with identical demand for credit. [2] Each farmer's demand for credit is determined by his marginal efficiency of investment schedule minus the internal savings function for the household (including the extended family). Farmers are assumed to utilize borrowed capital for either on-farm or off-farm investments. On-farm investments yield initially high returns and experience relatively sharply decreasing marginal value with greater quantities of credit. On the other hand, off-farm investments are less profitable for farmers at low levels of investment but absorb large quantities of capital more efficiently. Off-farm interests include investing in farm equipment for renting out, transportation services, petty retailing, marketing, storage, and investing in financial instruments.

Total demand for credit is the horizontal sum of the on- and off-farm investment schedules as shown in Figure 1 where C is borrowed credit and r is the interest rate. The important feature to note in the figure is the high elasticity of total demand at lower interest rates compared to the elasticity of farm demand alone. We will see that failing to account for these off-farm investments could significantly alter the analysis of credit. [3]

Figure 1.

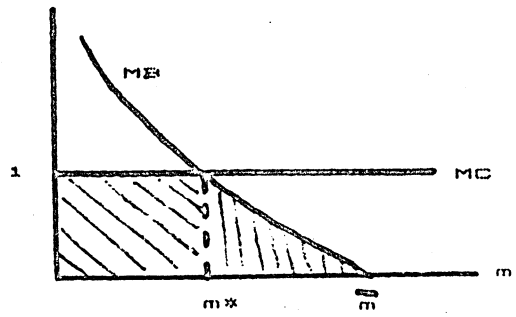


On the supply side, we first consider the credit market without a regulated formal sector. Assume initially that this informal, private market is competitive and that all suppliers have access to the same technology for generating information about borrowers. The identity of the supplier is therefore a matter of indifference. [4]

As financial intermediators, the role of moneylenders is to economize on the transaction costs that inhibit full functioning of the integrated lending market of neoclassical economics. The informal lender is therefore assumed to acquire information about prospective borrowers, to provide a mapping of this information information into an offer schedule (relating terms and amounts) to each borrower, and to administer the loan chosen by the borrower.

Lenders will undertake activities to place, supervize, and enforce loans based upon the benefits and costs of such activities. In this paper we classify all such "monitoring" activities as transaction costs of lending. [5] The determination of transaction costs for a private lender is depicted in Figure 2. Optimal monitoring expenditures for a particular borrower are at m* where marginal benefits of monitoring equal the (unit) marginal cost.

Figure 2.



The benefits of monitoring are related to the avoided expected losses of non-performance as:

$$(1) \qquad B = \int_{0}^{m^*} p(m)\ L(C,m)\ dm.$$

We assume that monitoring reduces both the amount of losses, should they occur, L, and the probability of their occurrence, p. The loss function is also increasing in the principal, C. The shaded area in Figure 2 is total transaction costs, TC, and is the sum of monitoring costs, to the left of m^*, and the residual expected losses to the right of m^*, i.e.

$$(2) \qquad TC = m^* + \int_{m^*}^{\bar{m}} p(m)\ L(C,m)\ dm$$

where $\bar{m}$ is the amount of monitoring that reduces losses to zero.

The equilibrium condition is that the nominal rate of interest charged by informal lenders must be high enough such that the net rate of return, after transaction costs borne by the lender, is equal to the opportunity cost of funds to the informal sector. Thus for the informal credit market:

$$(3) \qquad (1 + r_w)C_i = (1 + r_w + z_i)C_i - TC$$

where r_w is the competitive risk-free rate of return and z_i is the premium that must be added to r_w in order to cover the transaction cost associated with loan i.

The two borrowers introduced earlier in this section have identical demand curves for investment credit. We now assume

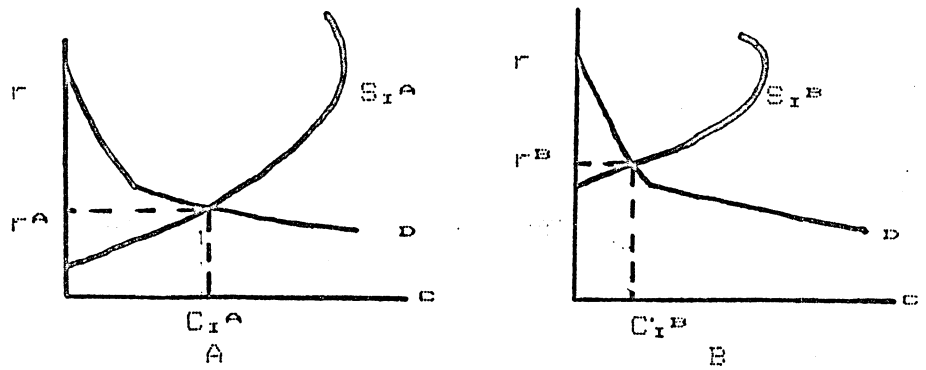
that they differ with respect to monitoring costs and benefits. Equal expenditures by a lender to monitor loans will yield varying supervisory and enforcement returns for various farmers. Thus Equations (1), (2), and (3) above require indexes for each farmer. The effect of differences among borrowers in (3) is that farmers with high transaction costs must pay larger premiums to obtain loans:

$$z_i^B(TC^B) > z_i^A(TC^A)$$

where $TC^B > TC^B$.

The simple model of rural credit described above is depicted in Figure 3 for the two borrowers. The curves S_I in Figure 3 are offer curves of the informal sector. They represent the nominal rates of interest ($r_m + z_i$) that must be charged at various levels of credit such that the lender is just indifferent between the loan contract and a riskless and transaction cost-free rate of return, r_m. The backward bending portion of S_I represents nominal rates sufficiently high as to increase repayment difficulty to the extent that equal profitability of the loan can only be restored by lowering the amount lent. This portion of the curves are superfluous, however, since the borrower will not locate on the backward-bending sections. [6] Figure 3 is drawn to show borrower A obtaining credit for both on- and off-farm investments and borrower B using credit for on-farm investments only.

Figure 3.



For administrative reasons, we would not expect lenders to actually offer borrowers the entire schedule. Rather we expect a process of negotiation that locates a single point on the schedule. [7]

III. CO-EXISTANT FORMAL AND INFORMAL CREDIT MARKETS

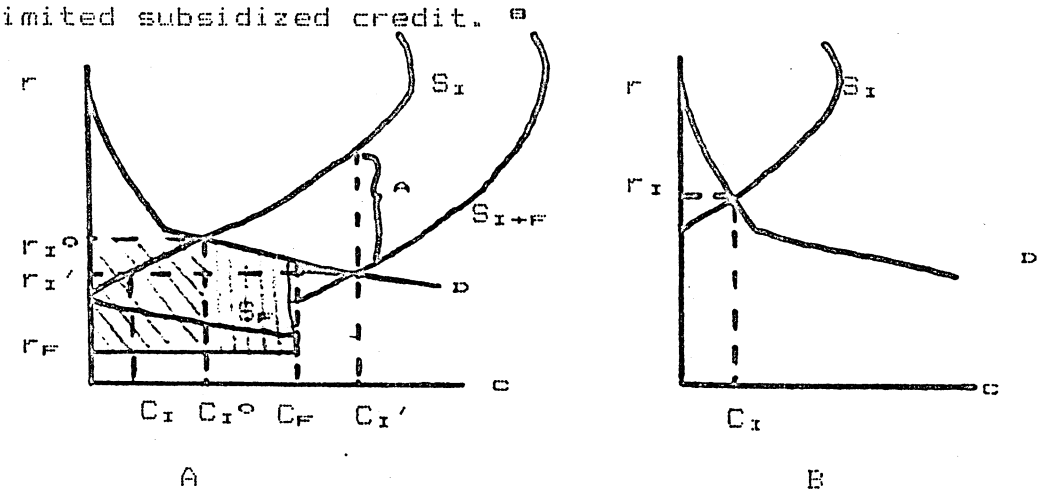
The formal credit sector is defined in this paper as any lender operating under government auspices and regulations and thus includes commercial banks and cooperatives along with governmental credit agencies. Types of regulations of interest in the context of the present model are interest rate ceilings, limits to amounts loaned, and collateral requirements. If none are binding, the equilibrium may be depicted as in Figure 3. If all three regulations are binding, then the lender's only remaining instrument of control is the selection of borrowers.

The structure of credit policy in most developing countries is such that interest rate ceilings make it impossible for formal lenders to charge a competitive rate of return on their loan portfolios. However, formal lenders also typically have privileged access to a window of subsidized credit, operational cost subsidies, and public assistance in the enforcement of loan contracts. This access to subsidies is conditional on holding a

suitable portfolio of agricultural loans that do not violate the rate ceilings. To maintain financial viability, the bank will seek to make loans with low transaction costs and high "float" periods. The longer the bank can delay the disbursement of funds and the sooner they can effect repayment, then the longer time they have to hold high return financial instruments instead of agricultural loans. Because of the low regulated interest rate, formal lenders may choose among prospective borrowers and select the those with lowest costs.

Supply of formal sector credit, S_F, is added to the transaction cost model in Figure 4. S_F lies above r_F, which is the regulated interest rate on formal loans to account for additional borrower costs of obtaining the loan. The negative slope reflects the assumption of economies of scale in borrowing costs. These costs usually take the form of loan fees or time consuming application procedures but may also include under the table kickbacks or bribes to obtain loans. The formal lender is shown as having chosen the low transaction cost farmer, A, to receive the limited subsidized credit.

Figure 4.



The farmers total supply of credit is the sum of formal and informal supply and is shown as the discontinuous curve composed

of S_F and S_{I+F}. At the new equilibrium, C_F is borrowed from the formal sector at the nominal rate r_F and C_I comes from informal sources at r_I'. Total borrowing and investing increases by $C_I' - C_I^o$. Note that the additional credit is directed primarily to off-farm investments in the figure. Borrowing for the excluded farmer, B, is unaffected. [9]

The welfare gain to recipient farmers is the shaded area of Figure 4. The shaded area to the left of C_I is a direct transfer arising from lower interest charged on credit that would have been obtained otherwise from the informal sector. The shaded area between C_I and C_F are gains due to additional investments with credit acquired from the formal lender. Finally, the shaded area between C_F and C_I' are new benefits from informal sector borrowing. From the social welfare perspective, if we assume that transaction costs of lending are true social costs, then formal sector subsidies add the area below S_I and between C_I^o and $C_I'$to social costs. If we also assume that private benefits from investing equal social gains, then social benefits grow by the area below D and between C_I^o and C_I'. Consequently, the formal subsidies result in a welfare loss bounded by S_I, D, and the line segment A.

In this model, rationing can result from government imposed ceilings on interest rates for loan sizes or from the backward-bending portion of the loan offer curve. The self-selection motive for rationing discussed e.g. by Stiglitz and Weiss (1981) can only occur in highly truncated models. Even if lenders are unable to discriminate among borrowers, they can increase profits

above the rationing solution by offering a slightly more complex menu of contracts, e.g. one involving collateral (Bestor, 1985). In our model, the ability of lenders to offer individualized supply schedules renders self-selection by rationing a redundant instrument.

In designing development policies, governments typically focus on the new investments by farmers shown in Figure 4 as $C_1' - C_1^o$. To increase aggregate agricultural investment, governments often choose to allocate more funds to public lending programs or to encourage more farmers to participate in formal borrowing, for example, by titling lands which can then be used as collateral.

An alternative approach to stimulate investment arising from this model focuses on policies to reduce transaction costs of lending. Lower transaction costs could lower gross interest rates in the informal sector. When formal sectors exist, lower costs could increase eligibility for formal sector lending. However, it is not clear that formal sector lending results in welfare gains with either type of policy.

IV. FORMAL SECTOR LENDING AND EFFICIENCY IN RURAL CREDIT MARKETS

A primary effect of usury laws and subsidies to formal credit is to increase the extent of segmentation between the formal and informal sectors. This segmentation creates a distortion in the economy by driving a wedge between the marginal efficiencies of investments financed by formal and by informal sector loans. Increasing subsidies to the formal sector increases the wedge and draws loanable funds away from high

productivity investments to low productivity ones. Unequal distribution of formal sector subsidies magnifies this efficiency loss.

Not only is credit directed to lower productivity investments ($r_I^A < r_I^B$) but concentrating subsidies to selected borrowers increases the marginal efficiency cost of investment credit (marked as line segment A in Figure 4). In addition to efficiency costs, formal sector subsidies may serve to divert credit away from intended uses. We have seen that rather being utilized for on-farm needs, cheap credit may instead be directed to off-farm investments or even out of agriculture.

The combination of interest rate ceilings and formal sector subsidies results in large welfare losses. First, the policy draws resources, especially savings, from the informal sector into the less productive formal sector. Subsidies are largely financed with both direct and indirect taxation of private agriculture. Second, the policy lowers both the quantity of savings and the suppliers surplus to savers. Savings are discouraged by controls on deposit rates to support cheap credit. The surplus loss is the difference in Figure 4 between the area above S_I and below r_I and the area above S_{I+F} and below r_I'. Third, the policies decrease the technical efficiency of both sectors. The formal sector expends additional resources in order to conform to binding regulations that constrain efficiency in production. The informal sector expends resources in order to avoid these same regulations.

The transaction cost model of credit does not imply that

credit markets should be entirely privatized but that public programs should be directed at specific market failures. In particular, public credit programs may be usefully employed to modify private incentives in order to coordinate interdependent agricultural investments. The principle of market failure in the presence of interdependent investments have been established (e.g. Chenery, 1961; Arrow, 1974) but not been developed to the point of prescribing the form of credit incentives and other policy instruments needed to promote appropriate coordination of investments. Further developments of the theory is needed in order to promote a more efficient form of credit market intervention.

FOOTNOTES

(1) Our focus in this paper is on the effects of government regulations and subsidies in the credit market. Thus the designation of a loan as formal or informal depends on whether the loan is subject to public regulation.

(2) Adding demand effects of small and large farms does not alter the basic conclusion of this paper.

(3) Internal savings which are not shown in Figure 1 also act to increase demand elasticity at low interest rates.

(4) The model could, of course, be extended to allow for different types of lenders (e.g. landowners, traders, specialized moneylenders.) Notice too that we have abstracted from "oportunistic" behavior commonly associated with specific investments in idiosyncratic exchange (Williamson, 1985; Goldberg, 1979; Crawford, Klein, and Alchian, 1978).

(5) For simplicity we use "monitoring" in a very broad sense to include the value of all resources expended to reduce both adverse selection and moral hazard problems.

(6) Note that while the model is purely neo-classical and maintains the assumptin of perfect competition, the existence of a backward-bending portion of the offer schedule gives rise to a phenomenon that is observationally indistinguishable from rationing. That is, the lender is unable to obtain more than the maximum amount of credit even by offering a higher interest rate.

(7) The occurence of negotiation does not, as often assumed in economics imply the absence of competition and the division of rents. It may simply be a process by which parties locate equilibrium.

(8) As drawn, the borrower must pay an illegal premium of at least $S_F(C_F) - r_F$ in order to obtain the loan. For illustrative convenience, the graph embodies the implicit assumption that regulatory policy on loan size is binding. Alternatively, the backward-bending portion of S_F could be assumed to begin at C_F (see footnote 6).

(9) We are assuming here that the acquisition cost of capital is exogenous and thus unchanged with the introduction of formal lending. Alternatively, subsidies in the formal sector may lead to shifts in the informal sector supply curve. A transfer of capital out of the informal sector could shift the supply curve to the left raising informal sector interest rates and reducing lending.

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