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# TRANSACTION COSTS OF BORROWING AND CREDIT RATIONING IN DEVELOPING COUNTRIES

by

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## Introduction

In a recent article, Helmut Bester contrasts two definitions of credit rationing. On the one hand, "credit rationing is said to occur when some borrowers receive a loan and others do not, although the latter would accept higher interest payments or an increase in collateral" (Bester, p. 850, my underlining)[1]. This notion of rationing is clearly different from that proposed by Jaffee and Russell: "credit rationing occurs when lenders quote an interest rate on loans and then proceed to supply a smaller loan size than demanded by the borrowers" (Bester, p. 850, my underlining). The latter could be labeled quantity rationing, while the first definition could be called credit denial and in practice could be considered an extreme case of quantity rationing, i.e., when the loan amount granted is zero. Bester then proceeds to show that "no credit rationing will occur in equilibrium if banks compete by choosing collateral requirements and the rate of interest to screen investors' riskiness" (Bester, p. 850), based on the assumption that banks' decisions on interest rate and collateral are simultaneous.

Two other important assumptions condition Bester's model: first, that low-risk borrowers are "able to raise sufficient collateral to distinguish themselves from high risk ones" (Bester, p. 854); second, not explicit in Bester's article, is the assumption that banks can freely adjust the interest rate on loan contracts, to offer different combinations of interest and collateral[2]. Exogenous factors can (and do) violate these two basic assumptions in rural areas of developing economies. On the one hand, restrictions on the resource endowment of "honest" borrowers may not allow them to reveal their low-riskiness through offering sufficient collateral, (i.e., the small-farmer/micro-entrepreneur syndrome). On the other hand, financial regulations usually constrain the range of (explicit) interest-rates that banks can charge on loans.

Under these constraints, lenders establish mechanisms and procedures to allow for collateral substitutes, (e.g., additional information and/or inter-linked contracts), and engage in

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1 This definition follows the discussion of adverse selection and incentive effects in Stiglitz and Weiss.

2 A good review of this literature, including a thorough discussion of Bester's model, is found in Esguerra.

"regulatory avoidance" or implicit-price setting (Kane), to compensate for the restrictions on loan-rate differentiation. This involves establishing different procedures for credit allocation, monitoring, supervision and recovery that create both lender and borrower transaction costs. Thus the discriminatory application of loan procedures substitutes for explicit-interest rate differentiation between borrowers of different riskiness. As a consequence, transaction costs (implicit pricing) become an important rationing mechanism under interest-rate restrictions.

The end result of the violation of Bester's two basic assumptions in the real world of developing countries is that all forms of rationing can be observed: credit refusal (i.e., the Stiglitz and Weiss prediction), quantity rationing (Jaffee and Russell's model), and rationing through the imposition of borrowing transaction costs (implicit pricing).

This paper investigates the role and determinants of transaction costs of borrowing as a rationing mechanism in developing countries. A summary of findings and discussion of recent research on borrowing transaction costs is presented first. It is shown that these costs are usually substantial, and regressively distributed in spite of the intended distributional goals of low-interest rate credit policies. Next, a conceptual framework and a model for the analysis of loan transactions and borrowing costs are set forth. Empirical results of the application of this model in three developing countries (Honduras, Costa Rica and the Philippines) are analyzed. The discussion highlights the major determinants of borrowing transaction costs and the observed trade-offs between these and the different components of the loan contract. Some concluding remarks follow.

## Recent Cross-Country Evidence

This section draws upon results from field surveys reported in nine studies of rural credit undertaken between 1981 and 1988. Two of these studies correspond to Asian countries (Bangladesh and the Philippines), six of them to Latin-American countries (Costa Rica, Ecuador, Honduras in two different years, Panama and Peru), while the ninth study was carried out in Niger (West Africa). These surveys documented the explicit and implicit non-interest costs incurred by farmer-borrowers in the process of securing and repaying loans. Explicit costs consist primarily of transportation, lodging and meal expenses associated with trips to the bank office, and fees and other cash payments for documents and legal procedures. Implicit costs correspond to the opportunity cost spent by farmers in negotiating their loans.

All studies referred to in this section share similar research methods. Furthermore, with the exception of Bangladesh,

survey questionnaires in all studies were identical or slightly modified versions of the instrument first developed in Honduras. Another important common feature of all case studies, with the possible exception of the Philippines, is the presence of low nominal interest rates intended to provide subsidized credit to small and medium-sized farms.

Table 1 summarizes the results reported in the nine case studies. Panel A presents the magnitude of transaction costs as a percent of the loan amount, while in panel B these transaction costs have been expressed as a proportion of the explicit-interest charges documented in the case studies. This proportion indicates the relative importance of transaction costs as a tax on the price of liquidity. In both panels, these indicators are reported for the sample average of each case, and for three loan-size categories defined according to the loan-size classification of each study.

On average, transaction costs as a percent of the loan amount vary between about 1 percent (Niger) and almost 22 percent (Bangladesh). The magnitudes across countries and loan-size categories range from 0.2 percent to almost 30 percent.

There is a striking contrast between the results shown for Bangladesh and those reported for the other countries. This contrast is accounted for by the unusually small loan sizes characteristic of the Bangladesh survey in comparison to those recorded elsewhere. This contrast is also reflected in panel B, where transaction costs are expressed as percent of explicit-interest charges. Here transaction costs for Bangladesh are on average almost twice as large as the explicit interest charged on loans, whereas in the other countries the transaction costs tax represents (at the sample average) between 4 percent and 85 percent of explicit interest. It is important to note that these findings for Bangladesh were obtained towards the end of the "two-for-one" branching policy in effect between 1977 and 1981 [3] which, it has been argued, would have reduced customer-incurred transaction costs in the rural areas (Srinivasan and Meyer).

Another special case is that of Niger where the low borrowing transaction costs observed in Table 1 are better explained by an undeveloped and deficient credit delivery system, where conventional loan processing practices do not exist (Cuevas, Graham and Masini). Here the burden of transaction costs in the system lies heavily on the institutions involved, rather than on the ultimate borrowers. Nevertheless, even in this case the level of transaction costs as a proportion of explicit-interest charges is certainly non-negligible.

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[3] Ahmed's survey covered loans granted in 1980-1981.

In Latin-America, Costa Rica shows transaction costs of borrowing substantially higher than every other country (panel A), particularly when these costs are expressed as a tax over explicit interest charges (panel B). These results appeared rather surprising given the development of the nationalized banking system, road infrastructure, and educational level of bank customers in the country (Gonzalez and Gonzalez). The high transaction costs measured here could be explained by the rigidities dominating the operations of the branches of the "Banco Nacional de Costa Rica", the institution where the sample was drawn from (Gonzalez).

With the exception of Peru and the Philippines, the findings presented in Table 1 suggest that borrowing transaction costs play an important role as implicit prices in these credit markets. Their magnitude certainly cannot be ignored by prospective borrowers.

The figures reported in Table 1 also show the regressive distributional effects of borrowing transaction costs. In all cases the incidence of transaction costs by loan-size category is clearly regressive with small loans bearing high costs and large loans entailing the lowest transaction costs as a percent of the loan. The tax imposed (via transaction costs) on the explicit price of liquidity was thirty times as high for small loans as for large loans in the Honduras (1981) study, and ranged between 3 times and 12 times as high in the other countries. Hence, the intended effect of credit policies promoting a low and relatively uniform interest rate among borrowers is not attained in practice. Instead, a skewed, regressive structure of total credit costs (interest rate <u>plus</u> transaction costs) is obtained. Even when the administered rates are set so that small loans are charged a lower rate than medium or large loans, as was the case in Costa Rica and Ecuador, transaction costs more than offset the explicit interest-rate differential resulting in higher total credit costs for the intended beneficiaries of the policy.

## A Model of Loan Transactions and Borrowing Costs

Five of the studies reviewed above have gone beyond the descriptive analysis of borrowing transaction costs, and investigated the determinants of these costs using econometric models. In all cases, a transaction-costs equation has been specified where transaction costs are a function of other elements of the loan contract (interest rate, collateral, loan amount), and a vector of risk-related characteristics of the borrower and/or the investments assumed associated with the loan. The latter represent the "observable" characteristics of the borrower, with which the lender can construct a subjective probability of repayment. This interpretation is consistent with the theoretical framework proposed in two of these studies

(Cuevas, Cuevas and Graham, 1985). Conceptually, this approach is based on a credit-rationing framework that considers lenders as price-setters of explicit and implicit charges. A revised version of this model is outlined below.

Lenders are assumed to maximize the expected value of their profits from each loan operation ($\pi$). Expected profits can be written as follows[4]:

$$E(\pi) = rLp + [C - L(1+r)](1-p) - L(d+a) , \qquad (1)$$

where, r is the interest rate,
L is the loan amount,
p is the probability of repayment,
C is value of collateral,
d is the per unit cost of loanable funds, and
a is the (per unit) transaction costs of lending.

The loan amount, L, is a point in the borrower's demand for liquidity, which can be written as:

$$L = L(r, W, H) , \qquad (2)$$

where W is a vector of variables representing the firm's resource endowment, which conditions the potential size of its investments, and H stands for household characteristics influencing the liquidity demand for consumption.

Finally, the probability of repayment, p, is assumed associated with a set of observable characteristics of the borrower denoted by a vector Z, such that,

$$p = p(Z) . \qquad (3)$$

The terms of the loan contract, i.e., r, L, and C, are the endogenous variables, while the vectors W, H and Z summarize the pre-determined variables in the model comprised by equations (1) to (3).

Borrowing transaction costs (implicit price) are incorporated in the model by interpreting the interest rate, r, in the broad sense of including explicit and implicit interest. The rate r will thus consist of an explicit rate (i), and an implicit element (t) which result from expressing borrowing transaction costs as a percent of the loan amount. It is this component (t) of the total price of liquidity that will be affected by the variables in the model, since the explicit rate (i) is bounded by existing regulations.

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4 A similar definition of the expected revenue component in this equation has been proposed by Binswanger.

Ex-post, explicit and implicit interest can be added to measure the total costs of borrowing, but ex-ante they cannot be specified as a sum (i.e., i+t), since there is no reason to assume that they are perfect substitutes. Moreover, the trade-off between these two components of the total costs of borrowing is an empirical question. Therefore, a general expression for r is the following:

$$r = \Phi(i,t) \quad . \tag{4}$$

With these changes, the model can be written in general reduced form as

$$[i,t,L,C] = \Omega(W,H,Z) \quad , \tag{5}$$

where the vector on the left-hand side of the equation summarizes the endogenous elements of the loan contract[5].

All econometric studies reviewed in this section are (purposively or not) consistent with this model. They differ in the treatment of the endogenous variables in (5), and the components of the vectors of pre-determined components of W, H and Z.

The single-equation models of borrowing transaction costs (Ahmed, Cuevas, Gonzalez) have specified the explicit-interest rate (i) as pre-determined[6], and taken as given the profile of loan demand such as loan amount, farm size, enterprise type, and other characteristics of the borrower that indicate the magnitude of risk involved in individual loan transactions. Thus single-equation models can be described in terms of the general model set forth above by the following expression:

$$t = t(i,L,C,Z) \tag{6}$$

The specification of the loan amount as a pre-determined variable on the right-hand side of the transaction costs function (6) has been questioned in other studies (Cuevas and Graham, Abiad), which have specified a loan-demand equation along the lines of equation (2) above. If indeed the true model involves a loan-demand function where the loan amount depends on the magnitude of transaction costs, then the single-equation estimation of a transaction costs function would yield biased and inconsistent estimates of the parameters in the model. Under the

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5 Note that the explicit-interest rate (i) may still be considered endogenous, although constrained to take on values within an exogenously determined range.

6 Omitted in Ahmed.

assumption that borrowers do consider transaction costs as part of the loan total price, the model is then specified as a system of simultaneous equations in which transaction costs and loan amount are the endogenous variables:

$$t = t(L, i, C, Z)$$
$$L = L(t, i, W, H) \quad . \qquad (7)$$

The following section summarizes the major findings of the five econometric studies referred to here.

## Selected Empirical Results

As indicated above, econometric studies of borrowing transaction costs have focused on investigating the trade-offs between transaction costs and other elements of the loan contract, notably interest rate and loan amount. The specification of risk-related characteristics of the borrower, and the treatment of the loan demand function has varied across case studies depending on the specific approach (see models (6) and (7) above), and on data availability.

The definition and measurement of borrowing transaction costs, interest rates, and loan amount is comparable and consistent across the different studies reviewed here. Collateral, when included in the estimation, has been defined as a dummy variable to distinguish real estate collateral from other types of loan guarantees. Special attention has been given to the variables and proxies included in the risk vector (Z). Area of the farm (as a proxy for wealth), previous delinquency status, bank-client relationship (deposit reciprocity), end-use of the loan, are among the variables specified in different studies as components of the Z vector.

The simultaneous-equations models (Abiad, Cuevas and Graham) have used area of the farm, hired labor, and livestock as proxies for the resource endowment of the borrower (the W vector in model (7)). Household size, and education were used by Abiad to represent the liquidity demand for consumption (the H vector in model (7)). In most studies, other control variables have been included to account for different types of lender (public banks, commercial banks, rural banks, credit unions), or specific types of borrower (individuals, cooperatives).

Different logarithmic specifications have been adopted in these econometric studies: double-log forms (Abiad, Ahmed, Cuevas and Graham), generalized power functions (Cuevas), and translogarithmic (Gonzalez). Estimation of single-equation models has been undertaken using ordinary least squares, while simultaneous-equations models have been estimated by two-stage

least squares. Other estimation techniques such as limited-information maximum-likelihood, and three-stage least squares do not appear to improve either the overall goodness-of-fit or the significance of the individual coefficients of the model (Cuevas and Graham).

The elasticities between (per unit) borrowing costs and two other elements of the loan transaction, loan amount and interest rate, are reported in Table 2 for three of the case studies reviewed here. These correspond to results of the single-equation model described by equation (6), applied to Bangladesh, Costa Rica, and Honduras (1981 survey). The findings indicate a consistent negative elasticity between transaction costs per unit (e.g., per dollar) and loan size. The figures in Table 2 show that a 10 percent increase in loan size will reduce borrowing transaction costs (per dollar borrowed) by 6 to 7 percent.

On the other hand, the single-equation results in Table 2 indicate the existence of a clear trade-off between transaction costs and interest rate: a one percent (<u>not</u> a one percentage <u>point</u>) increase in the interest rate would be compensated, ceterisparibus, by a 0.8 or 0.9 percent reduction in transaction costs. These results have been interpreted as supportive of interest rate reforms, since it implies that increases in interest rates will not necessarily increase the total costs of borrowing (interest rate + transaction costs) by the same amount of the interest-rate increase.

The key role of transaction costs as price signals in loan transactions is clearly supported by the results of the simultaneous-equations models (i.e., including a loan demand equation). As seen in Table 3, loan amount is inversely and significantly related to the magnitude of transaction costs, whereas the estimated coefficients for the interest-rate variable are not significantly different from zero. A test for the "total-price" elasticity (i.e., the sum of the estimated coefficients for transaction costs and interest rate) did not reject the hypothesis of a zero elasticity. This is an interesting finding in light of the controversy regarding farmers' response to changes in the interest rate.

The existence of a trade-off between transaction costs and interest rates is not supported by the results of simultaneous-equations models (Table 3). Indeed, explicit-interest rates do not appear to affect the behavior of lenders or borrowers, since the estimated parameters are not significantly different from zero in either the transaction costs (price-setting) equation or the loan demand equation. The interpretation of this result in the Honduras study (1983 survey) was that the range within which interest rates could vary was too narrow to elicit any meaningful response by the participants in the market (Cuevas and Graham).

All empirical models reviewed here have provided strong support to the specification of a vector (Z) of risk-related variables in the transaction costs equation. In addition, the results of the simultaneous equations models have supported the relevance of resource endowment (the W vector) and household characteristics (the H vector) as elements of the loan demand function. Other results of importance are that real-estate collateral reduce transaction costs of borrowing, and that transaction costs vary and respond differently across lending institutions[7].

## Concluding Remarks

This paper has shown that transaction costs of borrowing play an important role as implicit prices in rural credit markets. Their magnitudes are significant and their regressive distributional effects are substantial. Hence, the intended effect of subsidized credit policies are not attained in practice.

The econometric studies reviewed here support the approach to modeling loan transactions set forth in this paper. These studies have clearly shown the key role of transaction costs as price signals in loan transactions. At the same time, the results reported here indicate that the total price of credit is not an important determinant of loan demand in rural areas.

Two important caveats need to be considered when analyzing the studies discussed here. First, these studies have included loan transactions in institutional credit markets that effectively occurred, i.e., they have omitted intended transactions that never took place (unsatisfied loan demand). Research currently in progress in the Philippines has found that the most important stage in credit rationing is never documented. Most credit refusal occurs before the prospective borrower even fills in a single form.

The second important remark refers to the "partial" nature of the empirical studies reviewed here. The theoretical framework outlined in this paper indicates that all components of the loan transaction should be treated as endogenous variables in the empirical models. In particular, the simultaneous determination of loan price and loan collateral proposed by Bester deserves careful applied research.

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7 The results regarding the effect of the loan source appear to be sensitive to model specification (single-equation versus simultaneous equations).

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Table 1

Borrowing Transaction Costs at the Farm Level in Selected Countries, by Loan Size

| Transaction Costs by Loan Size | Country | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Bangladesh | Philippines | Costa Rica | Ecuador | Honduras 1981 | Honduras 1983 | Panama | Peru | Niger |
| **A. Transaction Costs as Percent of Loan Amount** | | | | | | | | | |
| Sample Average | 21.7% | 1.2% | 11.5% | 2.8% | 3.0% | 3.5% | 5.2% | 1.2% | 0.9% |
| Small Loans | 29.4 | 2.4 | 15.6 | 5.3 | 5.9 | 5.7 | 5.7 | 3.9 | 5.8 |
| Medium size Loans | 17.5 | 0.8 | 4.4 | 2.0 | 1.6 | 3.0 | 3.0 | 1.3 | 1.8 |
| Large Loans | 7.0 | 0.6 | 2.9 | 0.6 | 0.2 | 1.6 | 2.0 | 1.0 | 0.5 |
| **B. Transaction Costs as Percent of Explicit-Interest Charges[a]** | | | | | | | | | |
| Sample Average | 180.8% | 6.7% | 84.6% | 22.9% | 23.1% | 22.0% | 46.4% | 4.0% | 7.5% |
| Small Loans | 245.0 | 13.3 | 124.8 | 47.7 | 45.4 | 35.9 | 50.9 | 13.0 | 48.3 |
| Medium-size Loans | 145.8 | 4.4 | 32.8 | 17.3 | 12.3 | 18.9 | 26.8 | 4.3 | 15.0 |
| Large Loans | 58.1 | 3.3 | 17.7 | 4.1 | 1.5 | 10.1 | 17.9 | 3.3 | 4.2 |

Sources: Bangladesh - Ahmed; Philippines - Abiad; Costa Rica - González; Ecuador, Panama and Peru - Inter-American Development bank; Honduras 1981 - Cuevas; Honduras 1983 - Cuevas and Graham, 1985; Niger - Graham, Cuevas, and Negash.

a Computed as (Transaction costs/Interest charges)*100, using the explicit-interest rates reported in the different sources, e.g., for Bangladesh, the interest rate reported by Ahmed is 12%, hence, for the sample average, (21.7/12)*100 = 180.8%.

**Table 2**

**Elasticities of Borrowing Transaction Costs with respect to Selected Variables Estimated in Single-Equation Models in Three Case Studies**

| Explanatory Variable[a] | Case Studies | | |
|---|---|---|---|
| | Bangladesh | Costa Rica | Honduras |
| Loan amount | -0.56 | -0.68[b] | -0.66 |
| Interest rate | n.a. | -0.81 | -0.91[c] |

Sources: Bangladesh - Ahmed; Costa Rica - González; Honduras - Cuevas.

a All estimated elasticities significantly different from zero.
b Estimate for basic-grains loans. Estimate for export-crop loans was -0.79.
c Not significantly different from one.

**Table 3**

**Estimated Parameters of Selected Variables in the Transaction Costs Equation and the Loan Demand Equation in Two Case Studies**

| Right-hand Side Variable[a] | Jointly-dependent Variables / Case Studies | | | |
|---|---|---|---|---|
| | Transaction Costs | | Loan Amount | |
| | Honduras | Philippines | Honduras | Philippines |
| Loan amount | 0.297<br>(0.698) | 0.607<br>(0.886) | -- | -- |
| Transaction costs | -- | -- | -1.584*<br>(-4.481) | -0.327*<br>(-2.205) |
| Interest rate | 0.239<br>(0.521) | 0.587<br>(0.454) | 0.984<br>(1.564) | -0.292<br>(-0.444) |

Sources: Honduras - Cuevas and Graham; Philippines - Abiad.

a T-ratios in parenthesis.
* Significant at 0.01 level.