EVOLUTION OF COMMERCIAL BANK LENDING TO DEVELOPING COUNTRIES

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ABSTRACT

The evolution of credit terms for developing country borrower's during the expansion stage of the Eurocurrency market is empirically investigated. In particular, the effect of a borrower's repeated experience in the market on the behavior of spreads has been studied over the 1968-81 period. The primary finding is that the experience level of a borrower contributes significantly to the variation of spreads: The spreads are shown to start at high values at low levels of experience and decline to a benchmark rate predicted by default risk considerations.

These findings have important theoretical implications since they can be interpreted to provide support for the view that information imperfections played a significant role during the expansion of the market. This contradicts views that assign a dominant role to agency problems within banking firms.

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I. Introduction

The recent crisis in developing country debt has brought a number of questions to the attention not only of academicians but also of all other involved parties. Among the questions are those related to the pricing of loans, such as whether the lenders considered the economic conditions of the borrowers, or their historical repayment record, in setting the terms on loans. In fact it has been empirically demonstrated that the rates charged on developing country loans reflected both the economic condition of the borrowers and their historical repayment record (Feder and Just (1977), Edwards (1984), Özler (1988a)). None of these studies, however, have explicitly considered that each borrower after initially entering the market, typically borrowed repeatedly thereafter. Did the repeated experience of a borrower affect the evolution of credit terms in the Eurocurrency markets? The purpose of this study is to answer this question by empirically investigating the effect of a borrower's repeated experience in the emerging commercial loans market.

A study of the impact of a borrower's experience on credit terms, and the specific pattern of this impact, has important implications. In particular, it is closely related to the issue of what type of lending behavior predominated during the development of the market.

Banks' lending behavior and the nature of the market have been portrayed in several differing ways in recent years.[1] As a starting point, rational lenders could be assumed to operate in a perfectly competitive market facing default risk (Eaton and Gersovitz (1981), Cooper and Sachs (1985), Sachs and Cohen(1984)). Besides default risk, three imperfections have been considered, termed, for ease of reference,"deposit insurance"

(Kareken and Wallace (1978), Penati and Protopapadakis (1988)), "information imperfections" (Kletzer (1984)), and "agency-problem" (Darity (1986)).[2]

Systematic empirical studies that could evaluate the merits of these characterizations are limited. It has been demonstrated that the rates charged on developing country loans vary according to the risk characteristics of borrowers (Feder and Just (1977), Edwards (1984, 1986)). The evidence is also consistent with the view that banks received implicit insurance from federal deposit insurance agencies for developing country loan losses (James (1988)). The role of information imperfections and the agency-problems have not yet been subject to systematic empirical tests. These remaining two major characterizations have direct implications for the nature of the evolution of spreads with experience.

To see how the relevance of experience may contribute to the debate on bank behavior, consider the implications of some alternative explanations for the behavior of spreads between the interest rate charged to a country and the London Interbank Borrowing Rate (LIBOR).[3] As a benchmark, consider the characterization in which banks face default risk. The variation of spreads will then reflect variations in the perceived risks, but repeated experience of a borrower has no relevance. If, in the presence of default risk, banks also have FDIC deposit insurance, then banks will make loans at rates that do not fully reflect the default risks because of the expectation that they will be protected.[4] Still, the repeated experience with a borrower is not relevant to spread determination.

Additional market imperfections, however, create further deviations from the level of spread that would be charged in their absence. Consider the issues that arise from imperfect information. The poor quality of information on particular countries is considered an important feature of

the market for developing country lending until the debt crisis. Commercial banks, investors, and even the borrowers themselves suffered from a lack of data on the volume and nature of developing country loans. Zaire is given as a classic example, since it had to send questionnaires to its creditors in order to find out how much it owed (Gluck 1984, pp. 23, 24). Borrower attributes can, however be learned by directly investing in information.[5] Assuming that gathering this information has high initial costs (and long-term debt contracts do not exist), the spreads charged are initially higher than the spreads in the absence of such costs. The incremental information required will, however, reduce as experience with a borrower accumulates. This would lead spreads to decline toward the spreads that would prevail in the absence of such costs. Note that this behavior could equivalently be attributed to risk-averse lending: As experience with the borrower accumulates, and the lenders' uncertainty about the borrower declines, the spreads that were initially high because of uncertainty discounts would decline toward the rates that would prevail in the absence of such uncertainty.

Finally, consider the "agency-problem". This view represents the over-expansion of lending to developing countries primarily as a consequence of an agency problem between senior bank managers and their junior loan officers (see Darity (1986) for a discussion). The argument is essentially that junior loan officers are rewarded by the volume of loans contracted.[6] Junior officers who succeed by making many loans, must, however, make loans that meet the approval of their managers. To make the loans appear prudent to the managers, junior officers could package all sorts of guarantees from sources in the borrower's country. The worth of guarantees, of course, would vary across institutions and countries that provide them, about which the junior officers are likely to be more informed than their managers.

Also the managers' ability to give proper incentive to avoid bad loans might be limited. As a consequence, in the early stages of lending to new countries, loans were made by junior officers at rates which were too low in view of the risk involved. (In the presence of credit rationing, agency problems imply that even the borrowers that should be credit constrained get access to the market.) Subsequent experience with a borrower leads the managers to learn the worth of various guarantees, enabling them to provide better incentives for the loan officers. In such cases the spreads will increase with experience to reflect the underlying risks.

Overall then, the various prominent characterizations of bank lending behavior have distinct implications for the evolution of the spreads as the market developed. In situations in which default risk or deposit insurance is present, the spreads are independent of the level of experience with a particular borrower. However, if lenders know little about the attributes of the new borrowers, spreads will be high initially, but decline with repeated experience with the borrower. By contrast, the agency problem implies low initial spreads, in view of the risks involved, but eventually increases with repeated borrowing as managers learn to provide better country-specific incentives for their loan officers.

In an attempt to determine whether the repeated experience of a borrower has been relevant we have analyzed the credit terms on 2148 bank loans made to developing countries from 1968 to mid-1981. Our sample includes monthly data on 55 countries. The primary finding is that the experience level of a borrower contributes significantly to the variation of the spreads. Specifically, the spreads are shown to start at rates that are higher than would be predicted by models in which only default risk and deposit insurance are accounted for. As the level of experience increases,

however, spreads decline. This behavior supports arguments that emphasize the importance of imperfections in the information regarding borrower attributes. It also implies that the agency-problem could not have been the dominant factor in the emerging market's evolution.

II. Empirical Issues

A. Experience and Spread: A Cursory Look at the Data

As indicated above, most developing countries borrowed repeatedly once they entered the commercial bank market. The evolution of spreads with experience is displayed in Figures 1-3, where experience is defined as the cumulative number of prior months in which the country borrowed. (The sources and the characteristics of the data are discussed in Section C). To obtain Figure 1, normalized spreads are constructed from the actual spreads, first, by dividing the actual spreads of each country by the mean spread of all loans to that country. Second, at each level of experience the average of normalized spreads across countries is calculated. Finally, these averages are smoothed by a ten-point averaging routine to aid visualization.[7]

In this figure, two patterns are immediately noticeable. First, the spread at low levels of experience is higher than average (unity). Second, experience increases, the spread tends to decline, but in a very cyclical pattern.

These cyclical patterns can in fact be shown to be a coincidental consequence of the cyclical pattern of spreads over calender time. This can be seen in Figure 2 for which spreads are constructed in the same way to those in Figure 1, except the averages are taken at each calendar time. The cyclical behavior here is significantly more pronounced than in Figure 1. The dampening of the cyclical pattern in Figure 1 is of course due to

Figure 1
Normalized Spreads by Experience

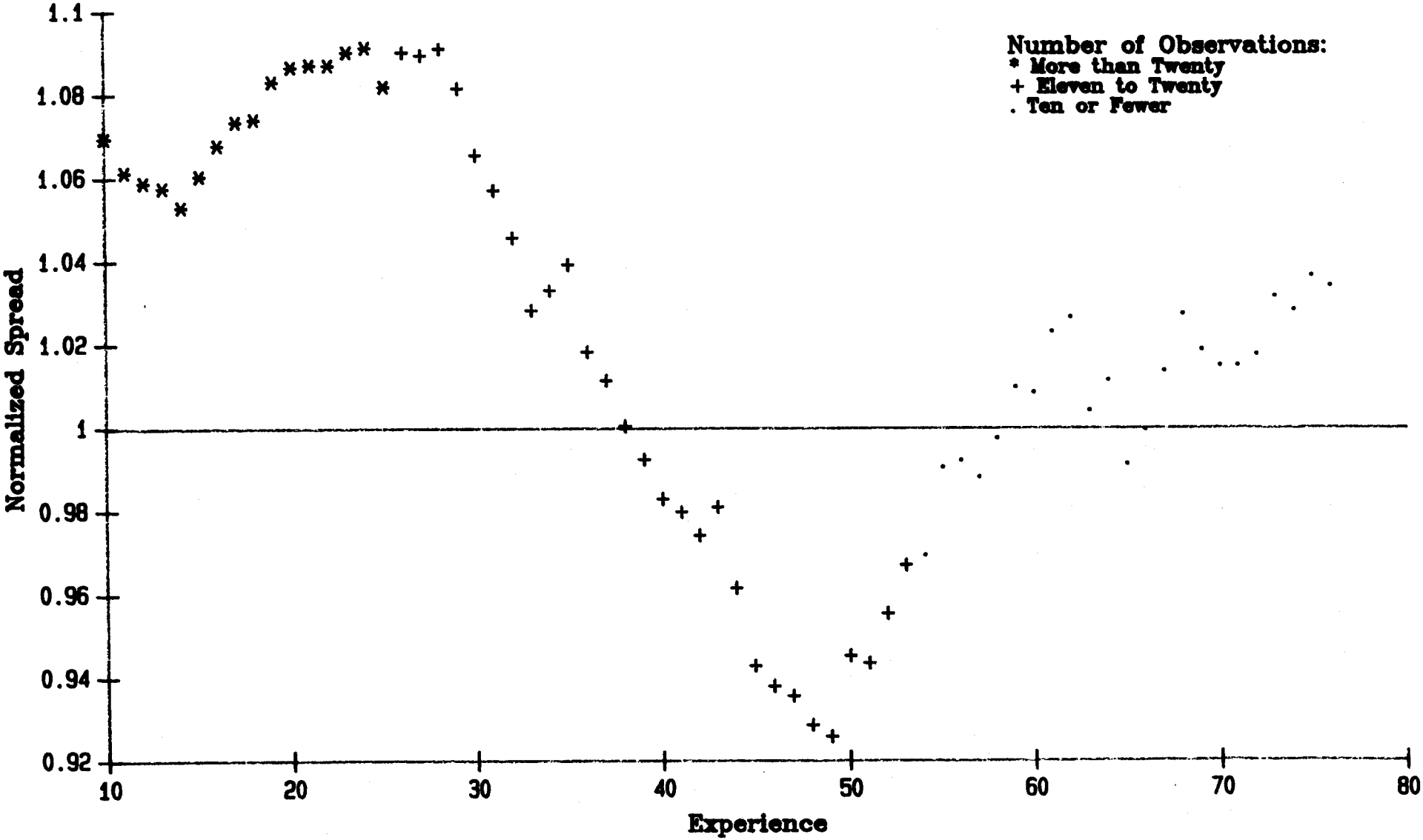


Figure 2
Normalized Spreads by Calender Time

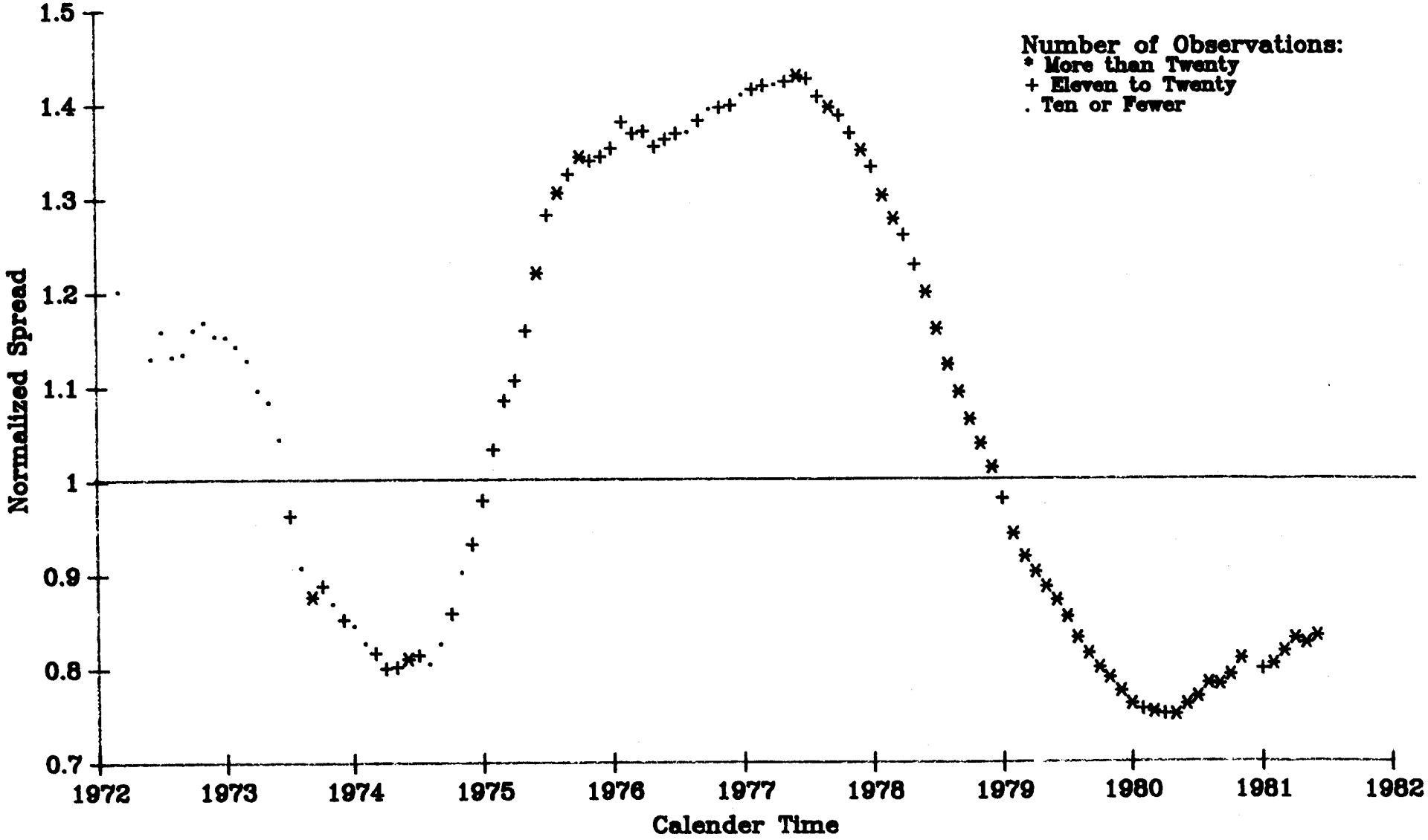
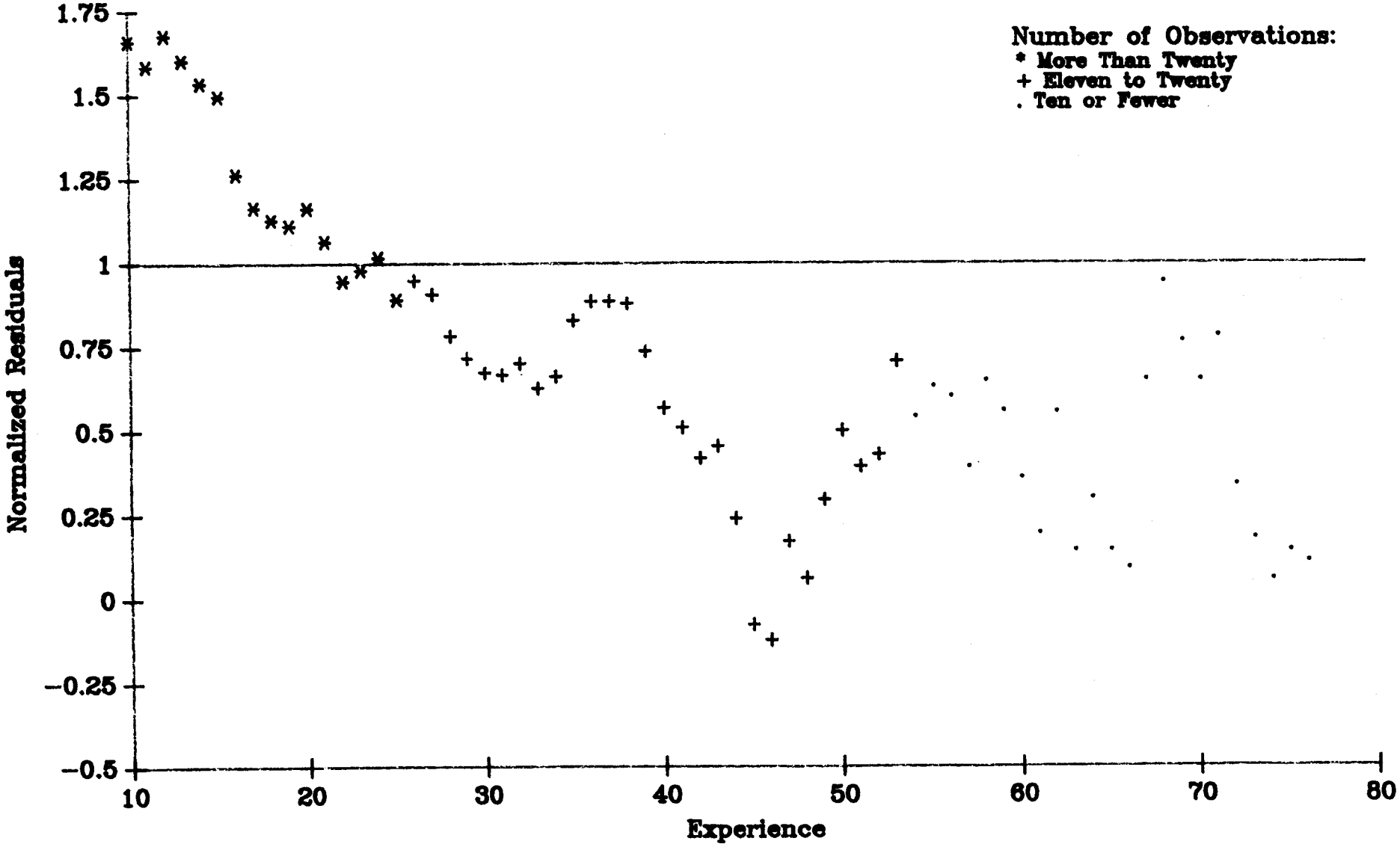


Figure 3
Normalized Residuals by Experience



countries having different entry dates to the market.

To clarify the evolution of spreads with experience, we implemented a simple procedure: a regression is run in which the spread is the dependent variable, and the only explanatory variables are the dummy variables for each month.[8] The residuals from this regression are treated in the same manner as were the spreads for Figures 1 and 2. Figure 3 displays the relation between these constructed residuals and experience.

It is quite interesting to note that the cyclical pattern apparent in Figure 1 is no longer prominent. The normalized residuals initially lie well above unity, declining toward it until the experience level reaches near twenty. This result in itself strongly indicates that experience plays a major role. To eliminate other possible correlations, we next turn to a more systematic investigation of the relation between spreads and experience.

B. Methodology

1. Credit Terms in the Eurocurrency Market

It has been postulated that the spreads reflect the probabilities of default of a particular country (see Feder and Just (1977), Eaton and Gersovitz (1981), Sachs (1981) and see Eaton and Taylor (1986) for a review of others). In these formulations, however, no role for experience has been allowed. Our discussion of the existing models of spread determination will be followed by a discussion of how we employ experience with a borrower to alter the standard specification.

Suppose that the Eurocurrency market is best described as perfectly competitive and that risk-neutral lender banks maximize expected returns by optimally choosing the spreads.[9] Expected returns can be formulated as follows: First, consider the return assuming the loan is repaid according

to the contract. To formulate this suppose that a loan of amount L is made for T periods to be repaid in one installment at maturity and serviced at equal installments until maturity. If s is the spread then the net revenue received each period throughout the duration of the contract is sL. Suppose that the cost of capital is i^*, then discounted future revenue is expressed by (for notational convenience, the subscripts that would indicate country- and time-periods are not employed):

$$\sum_{t=1}^{T} \frac{sL}{(1+i^*)^t} = sLq \tag{1}$$

where $q \equiv q(i^*,T) \equiv \sum_{t=1}^{T} (1+i^*)^{-t}$

If there is a failure to fulfill the contract, then the rate of loss is h, a random variable.

Let $p(\underline{x})$ represent the probability that the borrower will fail to fulfill the contract, with $\underline{x}$ incorporating a set of economic indicators that determines the probability (the specification of the elements of the $\underline{x}$-vector will be left to the data section). The market equilibrium condition yields the following relation:[10]

$$s = \frac{P}{(1-p)} \frac{\bar{h}}{q} \tag{2}$$

where $\bar{h}$ = expected loss rate.

In implementing this model empirically the convention (Feder and Just (1977) and Edwards (1984)) regarding the functional form of p, has been to assume that p has logistic form:

$$p = \frac{\exp\left(\beta_0 + \sum_{j=1}^{k} \beta_j x_j\right)}{1 + \exp\left(\beta_0 + \sum_{j=1}^{k} \beta_j x_j\right)} \tag{2a}$$

where k is the dimension of $\underline{x}$. Equation (2) can, therefore, easily be rewritten in the logarithmic form:

$$\ell n\ s = \beta_0 + \sum_{j=1}^{k} \beta_j x_j - \ell n\ q + \ell n\ \bar{h} \tag{3}$$

The expected loss rate in the event of default is not directly observable. If the expected loss rate is constant over time and countries then the intercept term would capture it. To capture the variations in it across countries and over time, country- and time-specific dummy variables are incorporated. These are also useful in capturing the changes in the supply conditions in the Eurocurrency markets. Hence equation (3) becomes:

$$\ell n\ s = \beta_0^* + \sum_{j=1}^{k} \beta_j x_j - \ell n\ q + \beta_c C + \beta_t T + w \tag{4}$$

where $\beta_0^* = \beta_0 + \ell n\ \bar{h}$

C = dummy variable that is one when country is c

T = dummy variable that is one when time is t

w = error term with zero expected value.

2. Credit Terms and Experience with the Borrowers

Previous investigations of credit terms are based on specifications that are similar to the one discussed in the previous section, and therefore omit the contribution that repeated experience with a borrower in credit markets may have on the determination of the credit terms. Accordingly,

here we modify the above specification to incorporate information about experience.

There are a number of ways in which experience can be measured and incorporated into the model. The alternative definitions of the experience variable will be considered in Section B below. For example, one measure of experience is the cumulative number of prior loans which a borrower received. In incorporating experience into the model we choose specifications that could easily lend themselves to the testing of alternative bank behavior by employing two criteria. First, as experience increases the spreads should come to reflect the spreads predicted by equation (4), s^*. In the context of the information imperfection, this means that the banks fully discover the attributes of the borrowers, whereas in the context of agency problems it means that the managers learn to provide better incentive contracts. Second, spreads at low levels of experience should be allowed to be higher or lower than s^*. This is because imperfect information and agency problems have these two opposite predictions about spreads as discussed before. A simple one-parameter function that satisfies these two criteria, as well as lending itself to be easily estimated with linear models is the general hyperbolic form:

$$s = s^* \left(1 + \frac{1}{X}\right)^{\gamma} \tag{5}$$

where: X = experience measured as a positive integer.

γ = parameter that determines the discrepancy of s from s^* and the rate of change in the discrepancy.

Employing this in equation (4) yields:

$$\ell n\ s = \beta_0^* + \sum_{j=1}^{k} \beta_j x_j - \ell n\ q + \beta_c C + \beta_t T + \gamma\ \ell n(1+1/X) + w \tag{6}$$

If $\gamma = 0$ is found, then spreads are always equal to the spreads predicted by (4), s^*. $\gamma > 0$ indicates that at low levels of experience with a borrower, spreads are higher than the predicted rates while $\gamma < 0$ indicates the opposite.

The hyperbolic form is somewhat unsatisfactory despite lending itself to the linear form in equation (6). This is primarily because the same parameter determines the intercept as well as the slope of the experience term. Furthermore the estimates involving the hyperbolic form will be sensitive to how the experience variable is scaled. A functional form that is not subject to these criticisms is the two parameter Pade' form:

$$s = s^* \left((1+a) - \frac{bX}{1+b/a\ X}\right) \tag{7}$$

The above form has the virtue that as X increases s/s^* smoothly converges from its initial value $(1+a)$ to the asymptotic value unity.[11] (The behavior of these functional forms, which were motivated in part by the pattern found in Fig. 3, based on our estimates is presented later.)

B. Data

1. Sources and description

Models similar to (6) are estimated, employing monthly data for the period of 1968 to mid-1981. The data incorporates information about the loans as well as borrowers' characteristics. Information on the loans consists of the identity of the borrower, the time of the loan, its terms, and some qualitative aspects such as whether the loan is public. Loans data for the 1973-81 period is obtained from the various issues of the World Bank's Borrowing in International Capital Markets. The data for the prior period, however, has been obtained through an exhaustive search of the financial press as well as the central bank reports of the borrower countries. We have

included only $U.S. denominated loans that have variable interest rates and that have LIBOR (London Interbank Offer Rate) as the base rate. These restrictions are incorporated to avoid complications that may arise from comparisons across different types of financial instruments. Furthermore, the data is constrained to include borrowers that have taken at least three loans. Finally, since this paper is concerned with expansion of the market and we want to avoid problems surrounding the debt crisis, we limit the data to the period ending in mid-1981. After these restrictions, the data set contains information on 2148 loans to 55 countries that were made between 1968 and June 1981. Since much has been written on the general nature of these loans they will not be further discussed here. However, the Appendix Table A.1 contains information on some characteristics of our data.

Some information on the loans are among the elements of the $\underline{x}$ vector in equation (6). These include maturity of the loan, a dummy variable that indicates whether the loan is public, and finally a dummy variable that indicates if the loan is syndicated. A possible problem could arise from the inclusion of maturity to the extent that banks determine spread and maturity simultaneously. However, based upon practices in the Eurocurrency market and the previous literature, loan maturity is assumed to be determined prior to the spread determination (see Feder and Just (1977), Edwards (1984)).

Some borrowers' characteristics are also included in the $\underline{x}$ vector. These include information on general economic conditions of the borrower and are presumably important in measuring the riskiness of the borrower. Economic theory does not provide much guidance on which variables to include. The "country risk" literature, however, helps to identify variables that predict occurrence of defaults and hence the riskiness of the borrower. The variables in this study are total debt-to-GNP ratio, debt service-to-

exports ratio, imports to GNP ratio, GNP growth, lagged value of investment to GNP ratio, rate of devaluation and rate of inflation (where monthly data are not available, annual data have been employed).[12] The total debt, and debt service variables are obtained from the World Bank's World Debt Tables. The remaining variables are obtained from IMF's International Financial Statistics.

2. The Experience Variable

The remaining variable, denoted X above, must provide an essential measure of experience. Existing theoretical models fail to define experience in a way that can be implemented empirically, nor is there an obvious unique definition. Therefore, we have attempted every possible definition of X that seemed reasonable, constrained by the fact that only the month, size and specific borrower are known. Accordingly, the following definitions of the experience variable X were employed.

X1 - The cumulative number of loans to a particular borrower.

X2 - The cumulative number of months in which the borrower received a loan.

X3 - Same as 1, except that loans taken in the same month are assigned the same value.

X4 - Cumulative number of months, irrespective of whether a loan was secured in each, since the month of the first lending.

X5 - Same as 2, but also incorporating non-LIBOR and non-U.S. $ loans.[13]

X6. Cumulative loan amount to a particular borrower, divided by the average loan to that borrower across the entire period.

X7 - Same as 3, but on a regional basis: the cumulative number of months in which any borrower in a geographic region (i.e., Latin America, Asia, Middle East, Africa, and Europe) has received a loan.

III. Results

In this section are presented the results of the estimations of equation (6) and an equation based on (7), the two classes of forms selected for spread determination. To ensure that the effect of experience is correctly accounted for, equation (6) is estimated for the alternative definitions of the experience variable and for a number of differing cut-off points. Equation (7) is employed using one definition of experience, in order to compare with results in equation (6). Finally, a number of control estimations are described. Discussion of the major results of all these estimations is postponed to the following section.

Table 1 presents the estimation results of equation (6) employing alternative definitions of the experience variable. (The remaining parameter estimates and their standard errors are in the Appendix.)[14] In this Table, X1-X3, which are all based on counting the number of loans, are near $\gamma = 0.25$ with large "t" values.[15] The "t" values for the remaining experience variables, however are small.[16]

In Table 2, estimations of equation (6) employing the X1 subsamples of the data are presented. Subsamples are based on the cutoff point for the experience variable. For example, the numbers that correspond to $X1 < 11$ are results obtained from constraining our data to the first 10 experience of all the borrowers in our sample. Table 2 indicates that the results are sensitive to the cut-off point, such that γ declines as the cut-off value increases.

Next, in Table 3, the results from a form that employs the two parameter Pade' function (7), are presented (along with the results of equation (6) for comparison purposes). Part A of this table uses the same dummy variable structure for countries and time periods that has been used

TABLE 1

Equation (6): γ For Alternative Definitions of Experience*

	X1	X2	X3	X4	X5	X6
γ	0.26 (2.49)	0.25 (2.19)	0.25 (2.41)	0.09 (1.00)	0.11 (0.64)	0.09 (1.08)

Country and Region Experience Simultaneously

X3	X7
0.25 (2.22)	-0.035 (-1.02)

* R^2 of each equation is near .55.
The numbers in parenthesis are the "t" values.

TABLE 2

Equation (6): Alternative Cutoff Values for X1

	X2 < 11	X2 < 21	X2 < 31	X1 < 41
γ	0.41 (2.71)	0.36 (3.10)	0.33 (3.13)	0.26 (2.46)
R^2	0.75	0.67	0.63	0.61

* The numbers in the parenthesis are the "t" values.

TABLE 3

Alternative Functional Forms*

A			B		
Hyperbola	Pade'		Hyperbola	Pade'	
γ	a	b	γ	a	b
0.25	0.77	1.00	0.43	0.97	1.17
(2.19)	(2.09)	(2.41)	(5.52)	(2.20)	(3.00)

*Part A is estimated from an equation that employs dummy variables that indicate countries and months in each year. Part B , instead, employs dummy variables that indicate only years and the geographic regions in which the countries are located. Both use the X1 experience variable.

The numbers in the parenthesis are the "t" values.

in the paper up to this point. Both the intercept and the slope parameters are estimated statistically significantly. Table 3.B presents the results of equations with less detailed dummy variable structures, which indicate only the year and the geographic region of the countries. The parameter estimates in Part B are consistent with the results presented in Part A.

Finally, in estimating the equations presented in this section we incorporated an additional variable that proxies for competitiveness each borrower faces in the market. Specifically, the number of banks in the market is multiplied by the percentage of loans that each country has borrowed that year.[17] The logarithm of this variable is then included in the regression equations. This variable is estimated with a negative parameter, -.02, and with a "t" value of (-1.95). The remaining parameters did not show notable change. In particular, inclusion of this variable did not alter the estimated magnitude and the standard error of the experience parameter.

IV. Discussion

A. Discussion of the Results

The results in the previous section, when properly analyzed, all point to the following conclusion: Experience, defined by repeated interactions of lenders with a specific borrower, is a highly significant determinant of the spreads charged to that borrower. Namely, spreads start at high values at low levels of experience and decrease to a rate that would be predicted by models in which default risk and deposit insurance are accounted for. We now discuss the important results of the previous section in the order presented.

Experience variables that are defined in various ways as a cumulation of number of loans to a particular country (X1-X3) are estimated

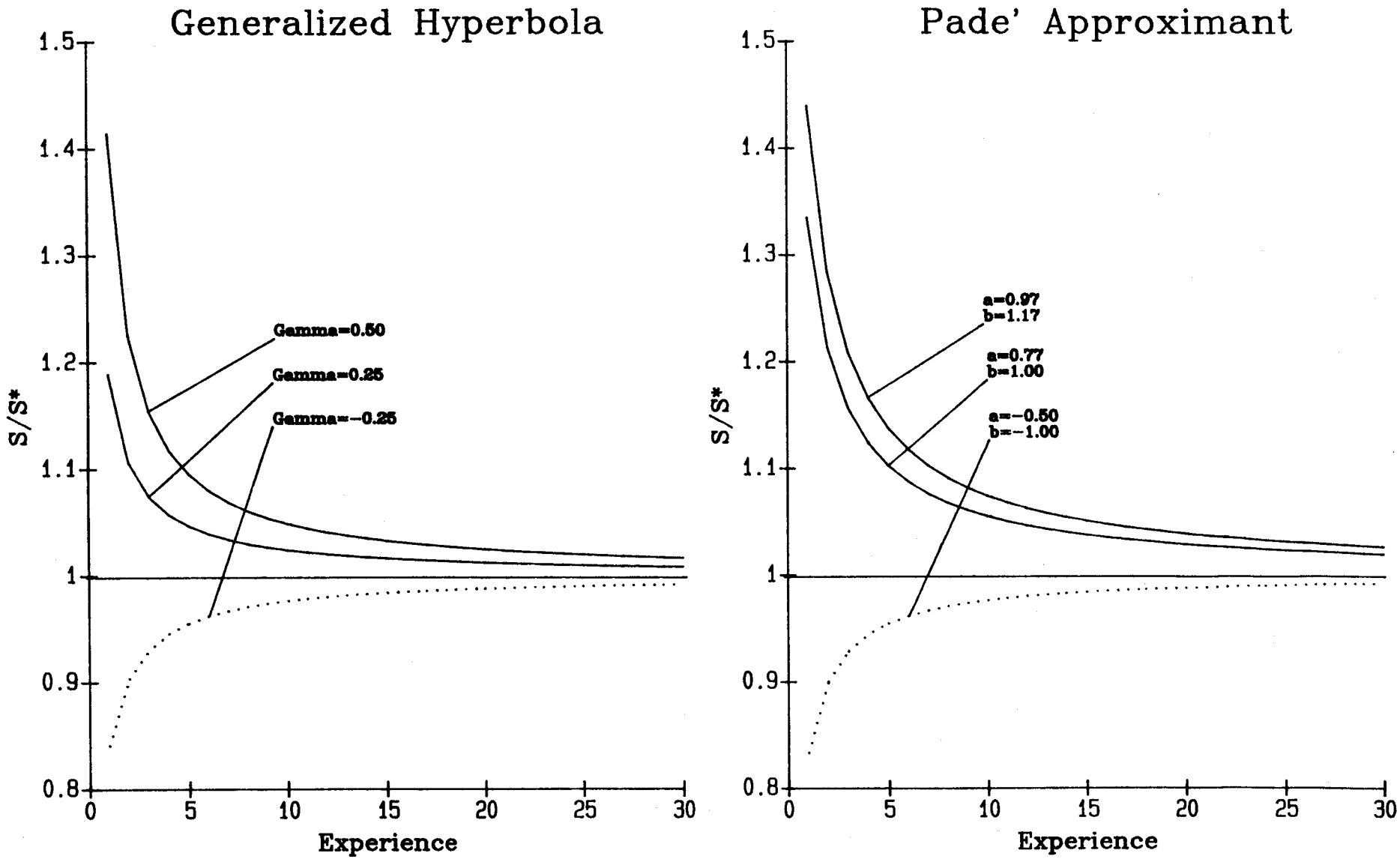
significantly but other experience variables are not. This suggests that the cumulative loan amounts, the total number of months since the first loan of the country, and transactions that took place prior to the system of variable rates did not contribute to the determination of spreads. Furthermore, the experience of the countries that are in the same geographic region has not contributed to the spread determination.

The γ values for X1-X3 are quite similar, near .25. The interpretation of this magnitude for the hyperbolic form employed is best demonstrated in Figure 4. Figure 4 plots s/s^* by experience where s^* is the benchmark rate predicted by equation (4). In this figure, when $\gamma=.25$, at initial levels of experience the spread is 20% higher than the benchmark rate. By the time experience reaches near thirty, however, the spread reaches the benchmark rate.

However, the systematic effect of the cutoff on γ points out the weaknesses of this form for treating the observed evolution. By contrast, the Pade' form which permits the convergence rate and initial value to be independent, starts higher and descends more rapidly to s^*. Figure 4 presents plots of the Pade' form for alternative parameter values. This form indicates even higher spread values for initial experience levels, near 32% above the benchmark. The results obtained with the two functional forms therefore, are quite similar, as evidenced by Figure 4. They both demonstrate that spreads are high at low levels of experience, however, as experience increases to near thirty, spreads reach the benchmark rate.

The parameter values obtained from equations that employ the less detailed dummy variable structure are also plotted in Figure 4. For both functional forms these values indicate higher initial spreads, around 40% higher than the benchmark rate. This is not surprising since it only

Figure 4


Generalized Hyperbola
Pade' Approximant
S/S*
Experience
Gamma=0.50
Gamma=0.25
Gamma=-0.25
a=0.97
b=1.17
a=0.77
b=1.00
a=-0.50
b=-1.00
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0
5
10
15
20
25
30

indicates that the more detailed dummy variable structure is picking up some of the variation that is otherwise measured by the experience variable.

B. Interpretation and Policy Implications

The findings presented and discussed above are important in displaying empirically the significance of experience in affecting the credit terms. By showing that spreads tend to decline with repeated experience we demonstrate that explanations based on imperfect information by lenders about the borrower are important in the analysis of the evolution of the market. Explanations based on agency problems in the banking firm as the primary source of evolution are eliminated since they imply the opposite pattern.

Though an imperfect information structure seems to have contributed more strongly to the expansion of the market, it is not inconsistent with the allegation that banks overlent during the same period. In fact, Kletzer (1984) demonstrates that they can be consistent. This is done by assuming an information structure in which each bank did not know the total amount lent to a country by other lenders. This information structure is incorporated in a model of competitive lending. Kletzer shows that, if an equilibrium exists with a positive level of debt, both the spreads and the level of debt are above the quantities that would prevail in the absence of such an imperfection. This inefficiency arises because lenders are unable to restrict the quantity of loans provided to each borrower at a given interest rate. Each lender is assumed to extend only an insignificant portion of the borrowers demand for credit. The full effect on the probability of debt repayment of an increase in the amount lent is not internalized by an individual lender. It is therefore plausible that high spreads and overlending are consistent.

Our results provide specific evidence supporting the explanations of the market's evolution based on information imperfections. The finding that informational imperfections were important in creating distortions in the loan market has direct policy implications. In particular, it provides support for policy recommendations suggesting that banks (banking syndicates) should provide more accurate information on the level of their lending to countries. For example, if commercial banks had shared information on their total lending to developing countries, overlending, which decreases the likelihood of eventual repayments, could have been avoided. Furthermore, the international agencies should provide greater assistance to the lenders and the borrowers in compiling and disseminating information. Some of these policies have already been implemented since the onset of the crisis. Our finding then provides a justification for continued implementation of such policies.

The empirical evidence we have provided is also important in countering the hypothesis that agency problems within the banks dominated the expansion of the market, at least for the period under consideration. The implication of this finding is that in the search for remedies for the crisis, regulations concerning the internal structure of the banks are not empirically justified.

V. Conclusions

In this study we have empirically examined the evolution of the spreads on bank loans to developing countries for the 1968-81 expansion period. The primary finding of this study is that the experience level of a borrower have significant impact on the spreads: Spreads start at high values at low levels of experience and decrease as experience increases. In particular,

it was found that at initial experience levels spreads are 20-30 percent above the asymptotic spreads. The impact of experience becomes negligible when experience reaches 30 prior loans.

Overall, the findings support the explanations based on information problems. The evidence eliminates the explanations based on the agency problems as the primary source of the expansion of the market, though agency problems may have played a role. This empirical investigation does not provide direct evidence for existence of overlending. It does, however, demonstrate the existence of a significant information imperfection which has been shown by Kletzer to cause overlending. The findings summarized here, thus, are consistent with the overlending hypothesis.

The policy implication that follows from this study is that policies that intend to improve information availability are justified. Regulation of the internal decision making of the banks on the basis of agency problems, however, do not find justification for the period investigated.

FOOTNOTES

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[1]Eaton, Gersovitz and Stiglitz (1986), and Eaton and Taylor (1986) provide an overview of the relevant literature.

[2]Darity (1986) presents a discussion of loan-pushing behavior by the lender banks and argues that this behavior can fit into a number of characterizations of the market, and the agency-problem is discussed as one of them.

[3]In practice, in addition to spreads, borrowers also pay commission and fees to the lenders. Data on these, however, are not systematically available, hence the discussion is focused on spreads. Previous empirical studies such as Feder and Just and Edwards also suffer from this inadequacy. It is noted, however, that these costs are low relative to spreads (see Edwards (1984, p. 728) and Cline pp. 82-83).

[4]FDIC insurance could be explicit or implicit. See Boskin et.all. (1987) for a more complete discussion of federal insurance programs. It is also argued that banks may have expected to receive official international support from IMF funds for debtor countries to protect them from the impact of defaults (Guttentag and Herring (1985)).

[5]Lenders can of course learn about borrowers partially by inferences from their repayment history. Initial high spreads which are the consequences of imperfect information, could show a declining behavior as the borrowers gain "reputation" for being good borrowers (see Diamond (1986)).

[6]An explanation of the existence of volume contracts is in Fershtman and Judd (1987). Their central argument is that in markets where rivalry is important the sales manager of the firm twist their sales people away from profit maximization even though the managers care only about profits.

[7]Explicitly, if the actual spread of the i^{th} country's j^{th} loan is s_{ij}, then the normalized spread $\underline{s}_{ij} = s_{ij}/\langle s_i \rangle$, where $\langle s_i \rangle$ is the mean spread charged to the country over the entire 1968-81 period. Note that the normalized spread is a unitless quantity and can be compared across countries. The average over countries, computed at each value of j, is simply

$$\langle \underline{s}_j \rangle = \sum_{i=1}^{P} \underline{s}_{ij}/p$$

where p is the number of countries having at least j loans. The smoothing routine replaces $\langle \underline{s}_j \rangle$ with the quantity $\hat{s}_j$, where

$$\hat{s}_j = \sum_{k=j}^{j+9} \langle \underline{s}_k \rangle /10.$$

[8]A cursory inspection of the data in fact dictates that the cyclical pattern of spreads over time are related to some global- and macroeconomic events such as the oil shocks and industrialized country growth rates. These two variables are also correlated with the number of banks that entered the Eurocurrency market. Hence a more sophisticated approach would require a model employing such variables to explain the spread behavior over time. Since this is beyond the purpose of this study, we implemented this simpler approach.

[9]The perfect competition assumption is not necessary for the empirical model derived. A very similar model is developed under the monopolistic

competition assumption. See Feder and Just (1977). Devlin (1987) also argues that the market is best characterized as monopolistically competitive or oligopolistic in the 1970s.

[10]To illustrate this assume that loans are for one period, and default means complete loss of both the principal and the interest rate. Let $s = i - i^*$ where i^* is the LIBOR rate and i is the interest rate charged to a country. Then the equilibrium condition is $(1-p)(1+i) = (1+i^*)$. This structure has been implemented by Edwards (1984). Introduction of more realistic assumptions yield a similar structure as in equation (2). See also Feder and Just (1977).

[11]Even though this form is not subject to the problem of scaling it is subject to that of translation which means it is sensitive to changes of the origin for X.

[12]These variables, or similar ones, have been employed in the empirical literature and included as possible determinants of spreads (see Feder and Just (1977), and Edwards (1984)). See McDonald (1982) for a review.

[13]The data for such loans are composed of nearly 1000 additional observations, and has been compiled from the sources described in the text.

[14]We have presented the estimations for only one of these specifications. Others are quite similar to the one presented and are available from the author upon request.

[15]One may suspect that OLS estimates of this relationship may be inconsistent. X and w of equation (6) may be correlated if the borrower's choice of X in part depends on the spread. This, however, is not likely. It is important to recall that most measures of the experience are in terms of the frequency of borrowing. Inconsistency would be a source of concern if the experience variables were measured employing

amounts borrowed.

[16]We have also estimated equation (6) with a sample that is constrained to include borrowers that have at least borrowed 10 times during 1968-81. The results are quite similar to the ones presented in Table 1. For example, for X1, γ is estimated to be 0.29 with a "t" value of 2.19.

[17]The number of banks is obtained from the Banker (November 1983).

APPENDIX

TABLE A.1

Loan Data*

Country	NBOR	Time 1	T.IN	s	T	L
Algeria	68	Mar. 73	83	1.33	7.8	82.8
Argentina	87	July 73	93	1.15	7.8	100.7
Bahamas	5	Oct. 74	80	1.11	7.1	20.0
Bolivia	16	Apr. 74	59	1.90	6.2	39.2
Brazil	289	Dec. 72	102	1.47	8.8	75.6
Burma	4	June 77	35	1.87	4.6	24.0
Cameroon	5	July 74	61	2.00	7.0	21.4
Chile	66	Oct. 68	152	1.22	7.1	53.9
Colombia	36	Aug. 72	105	1.00	9.2	75.8
Costa-Rica	21	Sept. 73	87	1.34	7.7	30.0
Cyprus	7	Apr. 77	48	0.74	7.3	30.0
Ecuador	40	Mar. 75	74	1.10	7.8	61.7
Egypt	10	Feb. 74	87	1.54	6.1	55.2
El Salvador	5	June 74	18	1.73	6.4	19.0
Gabon	12	Mar. 74	84	1.84	7.6	37.0
Greece	49	Feb. 72	112	0.93	8.8	93.8
Honduras	7	Apr. 79	23	1.20	8.4	16.7
India	9	Nov. 77	40	0.74	7.1	122.8
Indonesia	53	Mar. 74	86	1.45	7.5	118.6
Iran	52	Mar. 72	79	1.07	6.8	90.2
Ivory Coast	23	Mar. 74	87	1.68	7.9	41.4
Jamaica	13	June 73	96	1.76	7.3	38.0
Jordan	11	May 77	40	1.14	7.6	55.6
Kenya	4	July 72	93	1.34	5.8	59.2
Madagascar	5	Aug. 78	23	2.00	7.0	11.6
Malawi	5	Sept. 73	79	1.70	6.8	23.4
Malaysia	21	Jan. 71	123	0.90	8.1	159.7
Mauritius	4	Dec. 77	36	1.64	6.0	33.0
Mexico	192	Jan. 73	101	1.09	7.3	143.0
Morocco	17	Aug. 75	68	1.21	7.3	153.5

Table A.1 (cont.)

Country	NBOR	Time 1	T.IN	s	T	L
Nicaragua	7	May 73	30	1.65	7.1	26.6
Nigeria	31	Oct. 74	79	0.98	7.8	122.5
Pakistan	7	June 77	47	1.78	6.4	27.5
Panama	25	Oct. 73	87	1.57	7.2	62.2
Papua New Guinea	6	Dec. 77	41	0.96	8.5	48.0
Peru	40	Apr. 73	98	1.44	7.6	67.2
Philippines	95	Feb. 73	100	1.28	8.5	73.7
Portugal	49	May 73	97	0.94	7.0	71.5
Senegal	5	Jan. 73	100	1.98	8.0	26.5
South Africa	34	Mar. 73	91	1.32	6.0	64.3
South Korea	125	June 69	114	1.20	7.2	67.9
Spain	305	Feb. 73	100	1.05	7.4	55.0
Sri Lanka	6	June 79	21	0.80	7.3	33.7
Sudan	4	Feb. 74	34	1.71	6.7	60.8
Taiwan	46	May 74	82	1.15	7.4	50.6
Thailand	25	Mar. 76	63	0.89	7.8	66.6
Trinidad-Tobago	8	June 74	77	0.86	8.1	62.6
Tunisia	9	Nov. 77	26	0.80	7.7	51.2
Turkey	9	July 75	48	1.56	5.0	135.8
Uruguay	13	Aug. 75	67	1.32	8.3	52.4
Venezuela	72	May 71	120	1.02	5.9	141.7
Yugoslavia	76	May 77	96	1.25	7.7	62.7
Zaire	6	Mar. 73	25	1.75	8.9	36.8
Zambia	4	June 73	76	1.54	8.0	65.7
Zimbabwe	5	Nov. 80	7	1.33	5.6	22.4

*NBOR : number of times the country has borrowed.
TIME 1: first date the country appears
TIN : number of months between the first and last borrowing of the country
s : average spread expressed as percentage point above LIBOR
T : average loan maturity
L : average amount of loan sin $U.S. million.

TABLE A.2

Equation (6)*: Impact of Borrower and Loan Characteristics on Spreads

Parameter			
Intercept	-3.54 (0.11)	Maturity	0.09 (0.003)
Syndicated	0.027 (0.019)	Investment/GNP	-1.51 (0.25)
Public	-0.14 (0.016)	GNP growth	-0.10 (0.086)
Total debt/GNP	0.67 (0.17)	Imports/GNP	-0.005 (0.12)
Reserves/GNP	-0.049 (0.023)	Rate of Devaluation	-0.04 (0.024)
Debt Service/ Exports	0.003 (0.003)	Inflation	0.23 (0.09)
X1	0.25 (0.11)		

$R^2 = 0.54$ nobs. = 2148

*The numbers in parentheses are standard errors. Country and time dummies are not presented here but they are available from the author upon request.

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