VALUATION OF RESCHEDULED LOANS, 1978-1983:

A RATIONAL EXPECTATIONS APPROACH

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ABSTRACT

The impact of LDC loan reschedulings on the major U.S. banks and their implications for LDC financing has been of interest since the onset of the Mexican crisis. This paper presents an empirical model that calculates the unanticipated revaluation of bank assets in response to news regarding reschedulings. The model incorporates expectation formation and hence, unlike a standard event study methodology, provides a means of computing probability of default of rescheduled loans. The nine largest U.S. banks are estimated to suffer 8.2 percent of their stock returns during 1981-1983 when the default probability was approximately two percent. We also show that these loans have a significant systematically risky component.

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I. Introduction

Over the last decade, commercial banks have evidently become quite vulnerable to the payment problems of developing countries. The ratio of claims on developing countries to capital of U.S. banks reached a high of 198.8% in 1981.[1] During the same period, the number of countries which failed to make timely payment on outstanding debt showed a marked increase. Typically, such failures have led to negotiations over the terms of credit. Successful negotiations culminated in rescheduling agreements. The amount of rescheduled bank debt dramatically increased to $62 billion in 1983 from its annual average of $1.5 billion during the 1978-81 period.[2]

During the 1978-83 period, the spreads on rescheduled loans have typically been higher than the spreads on new loans. Despite these higher spreads, an increased number of reschedulings raised concerns regarding their implications for the banking industry. Have the spreads on rescheduled loans reflected the market's assessment of the risk of these loans? What was the probability of payment assigned by the market to rescheduled loans? Did these loans have a significant systematically risky component?

Systematic study of the effects of reschedulings on banks has been limited, despite the increased occurrence of reschedulings during the last decade. Investigators have previously conducted two types of analyses. One approach has been to examine the relationship between bank exposure to developing countries and bank stock prices (Kyle and Sachs (1984)). Since measures of exposure contain virtually no information on reschedulings, this methodology is inadequate to address all the questions posed above. Another line of research measures the impact of actual announcements of reschedulings (Özler (1986), for 1978-83 reschedulings; Schoder and Vandurke (1986); Cornell and Shapiro (1986); Bruner and Simms (1987) for the Mexican crisis of 1982). These studies, however, are susceptible to errors stemming from the defects inherent in the standard event study methodology. Specifically, by restricting attention to certain types of events, relevant information which would influence the formation of expectations is omitted. Nor does this approach provide a means of computing the expected probabilities of nonpayment; it only produces an estimate of the net effect of reschedulings.

In this paper we develop and implement a method to provide answers to the questions raised by reschedulings. For this purpose the stock price behavior of banks is investigated in greater detail. We assume that financial markets are efficient, because the evidence supporting it has been quite strong (Fama 1970). Efficient market theory implies that security prices in a capital market reflect all available information. Therefore only when new information emerges will security prices differ from the market equilibrium price. This distinction between unanticipated and anticipated changes in variables has also been an important feature of empirical work in macroeconomics (for example, Barro (1977, 1978)).

Accordingly, we have constructed an empirical model of the rescheduling process. In this model, the expected value of international loans is calculated periodically by estimating both the probabilities of loan reschedulings and the conditional values of those loans. In estimating probabilities we follow similar methods to those in the "country risk" literature (surveyed in Eaton and Taylor (1985) and McDonald (1982)). Changes in these expected values from one period to the next are associated with the revelation of new information during that period. We then assume that the market forms its rational expectations according to this model, and extimate the response of bank stock price returns to unanticipated changes. A knowledge of the fraction of changes that are capitalized in stock returns permits the calculation of the average nonpayment probability of rescheduled loans assigned by the market. The capitalized fraction is additionally of interest because it provides insight into the competitiveness and efficiency of the international banking market.

In constructing the empirical model of the rescheduling process, monthly data on forty eight countries between 1975 and 1983 have been employed. We then investigated the monthly behavior of large U.S. bank stock returns during the 1978-1983 period. Our results indicate that the stock returns of the largest nine U.S. banks fell by six percent due to loan reschedulings alone. Futhermore, we find a structural change when the 1978-1980 and 1981-1983 periods are compared. In the earlier period no statistically significant impact of reschedulings on stock prices is found. In the later period, the decline of the top nine banks' stock returns is estimated to be 8.2 percent. Correspondingly, the probability of non-payment of rescheduled loans is found to be nearly two percent. We also show that the systematically risky component of these loans is very significant.

The paper is organized as follows: Sections II and III develop the conceptual framework and the empirical specifications respectively: Section

IV presents the results. A summary of the conclusions is contained in Section V.

II. Bank Stock Prices and Value of Loans

A. Bank Stock Returns and New Information

The capital market efficiency assumption implies that the pricing of stocks incorporates all available information. New information is reflected in the movement of stock prices. By defining a function which maps new information from different sources, such as those related to the rescheduling process of international loans, onto the changes in the stock prices of banks, we decompose the unexpected movements of stock prices.

It is first assumed that the capital asset pricing model characterized in the following equation holds (see Black (1972)):

$$E(R_{jt}|\phi_t) = E(R_{zt}|\phi_t) + \beta_j[E(R_{mt}|\phi_t) - E(R_{zt}|\phi_t)], \tag{1}$$

where

R_{jt} = stock price return of bank j at time t,

R_{zt} = return on an asset whose returns are uncorrelated with R_{mt} at time t,

R_{mt} = return on the market portfolio at time t,

β_j = relative risk of bank j,

ϕ_t = the information set at time t, and

E = expectations operator.

Let $E(R_{mt}|\phi_t) = R_{mt} - \epsilon_{mt}$, and $E(R_{jt}|\phi_t) = R_{jt} - \epsilon_{jt}$ where ϵ_{mt} and ϵ_{jt} are random variables with zero expected values. Assuming that a risk-free asset exists, and that investors borrow and lend at the single risk-free rate, equation (1) can now be rewritten as:

$$R_{jt} = R_{zt} + \beta_j(R_{mt}-R_{zt}) - \epsilon_{mt} + \epsilon_{jt} \quad . \tag{2}$$

If capital markets are efficient, ϵ_{jt} is the ratio of the change in the firm's value from information released at time t to the value in period t-1 (i.e., $\epsilon_{jt} = (V_{jt} - E(V_{jt}|\phi_t))/V_{jt-1}$ where V_{jt} is the market value of firm j at time t).[3] Accordingly, we define a function $I(\Phi_t)$, which maps new information at time t onto a change in the value of the firm:

$$I(\Phi_t) = V_{jt} - E(V_{jt}|\phi_t) \quad .$$

The new information at time t is $\Phi_t = \phi_t - \phi_{t-1}$. Suppose Φ_t has two components (Φ_{Rt}, Φ_{Ot}) and these two components have separable effects on income, i.e., $I(\Phi_t) = I_1(\Phi_{Rt}) + I_2(\Phi_{Ot})$. We wish to focus on Φ_{Rt} and compute the function $I_1(\Phi_{Rt})$. In our interpretation $I_1(\Phi_{Rt})$ is a function that maps new information relevant to international loans onto the change in the value of the bank stock. Equation (2) can be rewritten as:

$$R_{jt} = R_{zt} + \beta_j(R_{mt}-R_{zt}) + \frac{I_1(\Phi_{Rt})}{V_{jt-1}} + u_{jt} \tag{3}$$

where $u_{jt} = I_2(\Phi_{Ot})/V_{jt-1} - \epsilon_{mt}$.[4]

It is important to notice in equation (3) that the function $I_1(\Phi_{Rt})$ deals with unexpected changes in the value of the international loans. The expected, or systematic, changes in the loans' value have already been incorporated into the stock price in the term $\beta_j(R_{mt}-R_{zt})$.

Define the value of the loan as $\omega(\phi_{Rt})$. It has two risky components, one which covaries with the market portfolio and another which does not. We can calculate these components from the equilibrium rate of return on international loans, r_{at}. The equilibrium rate of return on any asset is the risk-free rate of interest plus a risk premium proportional to the asset's systematic risk:

$$r_{at} = R_{zt} + \beta_I(R_{mt}-R_{zt}) \quad , \tag{4}$$

where β_I is the systematic risk of assets representing claims on international loans. Knowing r_{at} and β_I, $\omega(\phi_{Rt})$ can be thought of as a weighted average of its two risky components. The nonsystematic component is $\omega(\phi_{Rt}) R_{zt}/r_{at}$, and therefore the nonsystematic change in the value of the loan, $I_1(\Phi_{Rt})$, is $\Delta\omega R_{zt}/r_{at}$, where $\Delta\omega = \omega(\phi_{Rt}) - \omega(\phi_{Rt-1})$. Hence equation (3) can be rewritten as:

$$R_{jt} = R_{zt} + \beta_j(R_{mt}-R_{zt}) + \frac{\Delta\omega}{V_{jt-1}} \frac{R_{zt}}{r_{at}} + u_{jt} \quad . \tag{5}$$

B. <u>The Expected Value of International Loans</u>

The mapping function $\Delta\omega$ has been defined as that part of the change in the value of the bank assets associated with international loans. Since $\Delta\omega$ is not readily available as data we need to compute it from its various components. Futhermore, data on loan histories are not available. The timing, amount and terms of rescheduling agreements are available, though we do not generally know when each loan was originally made or its terms. Therefore, computation of $\Delta\omega$ will require a conceptualization that relies only upon available data. This conceptual design is now described.

Suppose that in period one $L/(1+r_m)$ is lent for one period. The interest on international loans is typically a base rate (usually LIBOR) plus a spread. Assuming that no spread is charged on the initial loan, amount L becomes due in period two.[5] At this point L may be repaid with probability (1-P) or rescheduled for one period with probability P. Define R as the interest rate on the rescheduled amount L. (R, of course, must be defined for given future probabilities of non-payment of the rescheduled loan.) The expected value on this loan contract in period one can be expressed as:

$$P\ L\ \frac{R}{1 + r_m} \quad ,$$

where r_m is also the discount factor for the lender. Of course the probabilities of rescheduling P, and the conditional value of reschedulings LR are based on the information set available in period one.

Generalizing, the expected value of a loan outstanding at time t can be expressed as:

$$\omega(\phi_{Rt}) = \sum_{\tau=1}^{\infty} P_{t+\tau}(\phi_{Rt})\ A_{t+\tau}(\phi_{Rt}|P_{t+\tau}=1)/(1+r_m) \quad , \tag{6}$$

where

$P_{t+\tau}(\phi_{Rt})$ = the probability that a rescheduling agreement is made in the τ^{th} period from t conditional on ϕ_{Rt},

$A_{t+\tau}(\phi_{Rt})$ = the value of the rescheduling agreement that will prevail in the τ^{th} period from t, conditional on a rescheduling agreement occurring, and given ϕ_{Rt} (i.e. counterpart of RL above),

r_m = discount factor.

By utilizing data on the occurrence of reschedulings, P can easily be estimated. A, however, still needs to be defined. Without loss of generality, we take the parameters of the rescheduled loan to be as follows: the loan size, L, the period in which rescheduling takes place, $t+\tau$, the maturity, M, and the grace period, G, during which only interest is paid. Once the grace period ends, the principal is repaid in equal installments. The rate of interest, r, on rescheduled loans is the sum of r_m and s, the spread determined during bilateral negotiations.

It is assumed that the subsequent probability of nonpayment of a rescheduled loan, π, is the same for each period. If π=1 the lender never receives a payment. The expected discounted present value of the rescheduling transaction can be expressed as:[6]

$$A = \left[\frac{1-\pi}{r_m+\pi} - \frac{1}{r}\right] \quad r \quad Q \quad L \tag{7}$$

where

$$Q = 1 - \frac{1-\pi}{r_m+\pi} \frac{\left[\frac{1-\pi}{1+r_m}\right]^G - \left[\frac{1-\pi}{1+r_m}\right]^M}{(M-G)} .$$

The expression $[(1-\pi)/(r_m+\pi) - 1/r]$ r Q gives the rate of return from the transaction for a given π (i.e. R defined in the one period example above). Absence of data on π, the nonpayment probability of the rescheduled loan, renders it difficult to calculate A, which enters as the dependent variable in the estimation of the conditional value of the rescheduled loan.

To circumvent this difficulty we first assign the value zero to the nonpayment probability, and calculate the value of the rescheduling agreement using this value. We then demonstrate how π is calculated from the stock returns. We introduce A′, the value of the rescheduling agreement calculated using $\pi = 0$:

$$A' = \left[\frac{s}{r_m}\right] \quad Q(\pi=0) \quad L . \tag{8}$$

Here, (s/r_m) $Q(\pi=0)$ is the rate of profit of the transaction if the rescheduled loan is repaid on schedule.[7] Suppose now that in the estimation of the conditional value which enters equation (6), A′ is employed as opposed to A. With this assumption ω' becomes ω.

Finally, the change in the value of the rescheduled loan can be estimated by using ω', our approximation to ω:

$$R_{jt} = R_{zt} + \beta_j(R_{mt}-R_{zt}) + \lambda_u \frac{\Delta\omega'}{V_{jt-1}} + u_{jt} \quad , \tag{9}$$

where λ_u is the coefficient relating the accounting value $\Delta\omega'$ to the economic value of international loans. However, this specification fails to correct for the systematic component of $\Delta\omega'$. Following equation (5), the specification that adjusts for systematic risk is:

$$\begin{aligned} R_{jt} &= R_{zt} + \beta_j(R_{mt}-R_{zt}) + \lambda \frac{\Delta\omega'}{V_{jt-1}} \frac{R_{zt}}{r_{at}} + u_{jt} \\ r_{at} &= R_{zt} + \beta_I\ (R_{mt}-R_{zt}) + \epsilon_t \quad . \end{aligned} \tag{9'}$$

The parameter λ measures how much of the change in the expected accounting value of international loans is capitalized in the bank's stock returns. Now λ (or λ_u) is generally not unity because $\Delta\omega'$ is calculated under the assumption that rescheduled loans will be repaid as contracted upon. To the extent that this assumption is incorrect the market will discount for it. The following relations, which facilitate the calculation of nonpayment probabilities, then hold:

$$\Delta\omega = \lambda\Delta\omega' , \tag{10}$$

and, correspondingly:

$$A = \lambda A' \ . \tag{11}$$

Recall that π is incorporated in A and hence in ω. Employing the estimated value of λ, along with data on other variables relevant to equation (11), numerical values for π and corresponding confidence intervals can be obtained. If the result of this estimation is $\lambda = 1$, then $\pi = 0$, and if $\lambda < 1$, then $\pi > 0$.

The capitalized fraction, λ, is of interest because it shows how the changes in expected accounting returns translate into economic returns. For example, $\lambda < 0$ implies that all news giving positive accounting returns are actually economic losses, indicating that the terms of reschedulings do not fully compensate for the nonpayment probabilities of rescheduled loans.

The parameter λ is also of interest because it provides information on the competitiveness and efficiency of bank lending. In a competitive market one expects excess economic returns to vanish. If $0 < \lambda \leqq 1$, however, this indicates that rescheduling terms are such that the lenders collect rents from such agreements. This could be explained by an increase in the bargaining power of banks in the rescheduling process. If λ is systematically less than zero, however, this would suggest inefficiency in banks' lending decisions: Since the terms of reschedulings do not fully compensate for nonpayment probabilities, lenders suffer losses.

III. Estimation and Data Description

The empirical implementation of the approach is carried out in the following two stages.

A. Stage One

In this part we estimate a discrete choice model of the rescheduling process to predict rescheduling probabilities. Specifically, let $P_{t+\tau} = 1$ if rescheduling takes place in the τ^{th} period from t, and $P_{t+\tau} = 0$ if it does not. Assume that the value of arranging a rescheduling agreement acceptable to creditors in the τ^{th} period from t is given by:

$$P^*_{t+\tau} = \alpha\ \phi_{Rt} + \epsilon_t \tag{12}$$

where

ϕ_{Rt} = the information set,

$P^*_{t+\tau}$ = a latent variable which determines the occurrence of a rescheduling agreement with country i in the τ^{th} period from t,

ϵ_t = a normally distributed random disturbance term.

Assuming that countries act in their own best interest,

$$P_{t+\tau} = \begin{cases} 0 & \text{if } P^*_{t+\tau} < 0 \\ 1 & \text{if } P^*_{t+\tau} \geqq 0 \end{cases} .$$

These equations describe a probit model for the probability of a rescheduling agreement being reached in the τ^{th} period from t.

Rescheduling values V' are estimated by employing the Heckman (1976) two-step procedure. The method is utilized because excluding countries that have not rescheduled would create a sample selection bias. Accordingly, estimates of equation (12) are used to construct $\psi(\hat{\alpha}\phi_{Rt}/\hat{\sigma})$ and $\Psi(\hat{\alpha}\phi_{Rt}/\hat{\sigma})$, where ψ and Ψ are, respectively, the standard normal density and distribution functions, and the following equation is estimated:

$$A'_{t+\tau} = \gamma_0\phi_{Rt} + \gamma_1 \frac{\psi}{\Psi} + \eta_t \tag{13}$$

where

$A'_{t+\tau}$ = value of rescheduling agreement in the τ^{th} period from t if a rescheduling agreement takes place in the same period (i.e., $P_{t+\tau} = 1$),

Ψ/ψ = Mill's ratio, and

η_t = normally distributed random error term.

This equation is estimated using only the observations corresponding to $P_{t+\tau} = 1$, by ordinary least squares.

An important issue here is the methodology in choosing the specification of equations (12) and (13). It is difficult on theoretical grounds to exclude any information at time t-1 as a useful predictor of the occurrence and terms of a rescheduling agreement in time t. Economic theory does not provide much guidance on which variables to include. The "country risk" literature, however, helps to indentify variables that predict occurrence of reschedulings. We borrow the variables employed in the literature on country risk analysis for our estimation of the probabilities and values of rescheduling agreements. In this study four types of variables are employed. Default variables incorporate information related to the failure of a borrower to fulfill a prior loan contract. Regional dummies and time effects have also been incorporated. Macroeconomic indicators specific to the countries constitute the third class of variables. The fourth type consists of interactions of a default variable with the macro indicators. The Appendix provides a description of the variables utilized.

In this study we employ monthly data for 48 countries (see Appendix) over the period of 1975-83 and information on bank rescheduling agreements for the 1978-85 period. For purposes of estimation we utilize forecast intervals, τ, of one year: one set of equations predicts reschedulings that take place between t and $t+12$ (since our data is monthly), a second set of equations predicts reschedulings which take place between $t+12$ and $t+24$, and so forth.[8] A similar construction applies to the estimation of

A'. These estimating equations in turn are used to make predictions of the probabilities of reschedulings and the conditional values employing data for 1978-83 period, the period for which the second stage estimations are conducted.

B. Stage Two

Estimates from part one are employed to construct $\Delta\omega'$, our measure of the changes in the value of international loans resulting from new information at time t. Our estimation of equations (12) and (13) enables us to calculate $\Delta\omega'$ as the change in the value of all bank loans outstanding to a particular country. However, in investigating the bank returns we would like $\Delta\omega'$ to be a bank specific measure. It should reflect the change in the value of all international loans that are relevant for the particular bank. By employing available information we construct such measures.[9] Let this measure be $\Delta\omega'_{jt}$.

In this part, we assume the market formed expectations according to the model above, and estimate how much of $\Delta\omega'_{jt}$ is capitalized as true profits (losses) in the stock returns of the commercial banks participating in reschedulings.[10] For this purpose we employ two specifications, equation (9) or (9').[11] This methodology is analogous to the two step procedure used by Barro (1977, 1979) and others.[12]

Ideally we would estimate equation (9) or (9') using data on the risk-free rate, however, it is not observable. In many studies, R_{zt} is proxied simply by a vector of Treasury bill rates or interest rates on short-term high-grade bonds. We use the Treasury bill rate, but eliminate inflation risk (following Gordon and Bradford (1980)) by setting $R_{zt} = K + HR_{ft}$, where R_{ft} is the Treasury bill rate. β_j is estimated simultaneously with the other parameters. In contrast, the standard approach is to estimate β_j

from earlier data in a regression of the form $R_{jt} - R_{ft} = \beta_j(R_{mt}-R_{ft}) + \epsilon_{jt}$. Then $\hat{\beta}_j$ would be used as an independent variable in estimating (9) or (9′). By estimating β_j simultaneously with equation (9) or (9′) we avoid any inconsistency or bias in the parameter estimates as well as increase the efficiency.

The specification is nonlinear in the parameters β, H, and K, so nonlinear estimation techniques are employed. If it is assumed that $var(\epsilon_{jt}) = \sigma_j^2$ and $cov(\epsilon_{it}, \epsilon_{j\tau}) = 0$ for $i \neq j$ or $t \neq \tau$, then nonlinear least squares estimation is appropriate. The assumption of $cov(\epsilon_{it}, \epsilon_{j\tau}) = 0$ for $t \neq \tau$ can be justified on the grounds of rational expectations. If there is correlation across equations, nonlinear least squares estimates of the parameters remain consistent, though inefficient.

R_{jt} is a monthly series of returns to the securities of the banks, compiled at the Center for Research in Securities Prices (CRISP) at the University of Chicago. R_{mt} is the value-weighted-average return for NYSE securities. V_{jt} is a monthly series of values of total outstanding shares. The price and share series used in the calculation of V_{jt} are taken from the CRISP tapes. Monthly data for January 1978-December 1983 have been used. The sample of firms includes the twenty-one largest U.S. banks.[13]

IV. Results

Our results are presented in two parts. The first part contains the estimates which permit the calculation of changes in the expected value of international loans from new information. We then present results concerning the fraction of these changes capitalized in bank stock returns. These are of two types, one uncorrected for systematic risks and the other corrected. This is important, because when developing country loans have a significant systematic risk, failing to correct for them yields artifically high returns. Furthermore, in discussing bank stock returns, our estimates for the 1978-1980 and 1981-1983 periods are seperately presented. The entire period has been split in this fashion in order to ascertain whether a structural change occurs between the two periods. Many indicators suggest that the structure of bank debt may have been altered in 1981 by developments, associated with the onset of the world economic downturn.[14]

The results of our first stage estimates are provided in the Appendix. Table A-1 contains the probit estimates, equation (12) and A-2 contains the value estimates, equation (13). The estimation of equations (12) and (13) do not constitute the primary concern and/or contribution of this paper, so our discussion of them is brief. First, variables associated with past repayment problems, time effects and regional dummies are found quite important in these estimations. Macroeconomic indicators are also found to be generally consistent with prior studies in the country risk literature. Second, additional specifications that excluded the interactive terms and/or regional dummies and time effect have also been estimated. The direction and significance of the default and macro variables have not been altered in these other specifications. The specification presented in the Appendix, however, has superior performance in terms of a better fit of the equations. Furthermore, our second stage estimates are found to be robust to such changes. Third, calculation of the change in the expected value of international loans from new information, $\Delta\omega$, is based on these estimates.[15] Conceptually, it should be a random process, and Portmanteau tests indicate that it is.[16]

Our discussion of the second stage estimate will focus on the parameters that measure the impact of reschedulings on bank returns. These are λ_u or λ, the uncorrected and corrected values of the capitalized fraction, respectively. (Estimates of other parameters are presented in Tables A-3 and A-4 in the Appendix).

Estimates and standard errors of λ_u from equation (9) for the largest nine and the next largest twelve banks are presented separately in Table 1. Since the larger banks have a greater exposure to foreign loans, rescheduling would be expected to have a more substantial impact on their security prices.[17] Similar results hold however for the entire sample of banks.[18] These results indicate that the stock returns of the top nine banks increased by 26 percent due to loan reschedulings and the returns of the next twelve banks increased by 8.9 percent during 1978-1983. Table 1 also presents the estimates of λ_u for the 1978-80 and 1981-83 periods separately. λ_u is negative but not statistically significant at the 5 percent level of significance in the earlier period. λ_u, however is positive and statistically significant in the later period. The 95 percent confidence intervals for the nine-bank λ_u are as follows:

1978-1980 $\quad -.43 \leq \lambda_u \leq .174$

1981-1983 $\quad .186 \leq \lambda_u \leq .381$

These confidence intervals show that there is a clear difference between the two periods. In fact, using Chow tests we reject the hypothesis that relationship (9) is stable across the two subperiods for each of the bank groups.[19]

Employing the estimated values of λ_u along with other data on rescheduling terms, an estimate of the market's perception of the probability of nonpayment for the rescheduled loans can be calculated. As explained before, we have calculated expected loan values on the assumption that rescheduled loans will be repaid. To the extent that this assumption is not

TABLE 1

Impact of Reschedulings on Bank Returns

Estimated equation: (9)

Nine Banks	1978-1983	1978-1980	1981-1983
λ_u	.26 (.04)	-.13 (.15)	.28 (.04)
π		.018 (.0024)	.0124 (.0007)
Twelve Banks			
λ_u	.089 (.033)	-.23 (.13)	.11 (.04)
π		.0197 (.00196)	.01514 (.00071)

λ_u for nine banks estimated with yearly breakpoints:

1978	1979	1980	1981	1982	1983
.088 (.18)	.13 (.13)	.17 (.10)	.21 (.061)	.255 (.039)	.296 (.054)

valid we expect λ_u to reflect it. In solving for π, (using equation (11)) we employ the period's average values on rescheduling variables.[20] According to these calculations, for the nine bank group, the market perceived a .018 probability of nonpayment of rescheduled loans in the 1978-80 period. At the same time, the spreads charged in reschedulings were not high enough to compensate for this risk. Hence, λ_u is negative, yet the difference between this estimate and zero is not statistically significant. In the 1981-83 period the probability of nonpayment for rescheduled loans was viewed as approximately .012. The estimated value for λ_u suggests that the terms of rescheduled loans were more than enough to compensate for nonpayment risk, and that 28 percent of the accounting returns were capitalized as economic returns. Similar results hold for the twelve bank group, as presented in Table 1.

This specification is based on the assumption that λ_u remains constant (and, therefore, that the nonpayment probabilities are constant) throughout each three year period. Such an assumption is, however, not supported by the data. This is clear from the estimation of λ_u as a piecewise linear function of time (with breakpoints at every year) over the whole sample period of six years. The implied values of λ_u and standard errors at yearly breakpoints are presented in Table 1, in which it is clear that the fraction of changes in value capitalized as economic profits increased steadily between 1978 and 1983. Correspondingly, the nonpayment probability declines.

These results, however, could arise from artifacts associated with not correcting for the systematic risks of the rescheduled assets. In the event that such risks are significant the positive returns above could be merely for compensation.

Table 2 presents the results of the estimation of equation (9′), which corrects for the systematic risks. These results are quite different from the results in Table 1. λ for the nine banks is negative and statistically significant for the 1978-1983 period as a whole. Estimations conducted for the 1978-1980 and 1981-1983 periods separately are also presented in Table 2. In the earlier period the assets of banks have not been revalued significantly in response to news on reschedulings. In the later period, however, the estimated decline in the stock returns of the nine banks is 8.2 percent. The corresponding probability of nonpayment of rescheduled loans is calculated to be approximately .019 for the 1981-1983 period. Implied yearly values of λ from its estimation as a piecewise linear function of time, however, are not significantly different from zero. The twelve-group, on the other hand, lost 1.3 percent during 1981-1983. (This group also is estimated to have gained 8.4 percent in their stock returns during 1978-1980, but this result is statistically insignificant.)

Overall, empirical results of this section indicate that market value of the largest nine U.S. banks were not significantly altered by reschedulings in the 1978-1980 period. In the 1981-1983 period, however, market values of less developed country loans declined. Our results also indicate that there is a significant non-diversifiable risk associated with these loans. Hence, if estimates are conducted without taking this into account, it is possible to reach quite misleading findings. The results are also interesting in pointing out a difference between the nine- and twelve-bank groups. The impact on the latter group is estimated to be less detrimental. Analysis of the interaction among the different classes of lenders in the literature is scarce. But it has been suggested that, during reschedulings, smaller banks free-ride on the larger banks which have

TABLE 2

Impact of Reschedulings on Bank Returns

Estimated equation: (9′)

Nine Banks	1978-1983	1978-1980	1981-1983
λ	-.06 (.03)	-.11 (.13)	-.082 (.041)
π		.0177 (.00211)	.0188 (.00074)
Twelve Banks			
λ	.037 (.042)	.084 (.046)	-.013 (.006)
π		.0145 (.00074)	.0176 (.00011)

λ for nine banks estimated with yearly breakpoints:

1978	1979	1980	1981	1982	1983
-.162	-.138	-.114	-.09	-.066	-.042
(.10)	(.105)	(.118)	(.11)	(.14)	(.15)

greater exposure. Our results from the 1981-1983 period are supportive of this hypothesis.

V. Conclusion

In this article we have developed and implemented a method of analysis to investigate the response of bank stock prices to news pertaining to international loans. This method is an improvement upon the standard event study methodology in that it allows for both the formation of expectations and the investigation of stock price response to the updating of such expectations. Upon implementation, we have been able to calculate the nonpayment probabilities of rescheduled loans and the fraction of the changes in expected accounting value of international loans that are transformed into economic value.

Our findings indicate that stock returns of large U.S. banks were not significantly affected in the years 1978-80; however, they declined by 8.2 percent during 1981-1983. The results for the later period can be compared with those of previous studies which used different methodologies. For example, the market value of 62 large U.S. banks has been estimated (Kyle and Sachs (1984)) to have declined 12.8 percent because of their exposure to Latin American countries.[21] Özler (1986) used a standard event study methodology to find that non-payments of international loans on a timely basis caused a 3.3 percent decline in the stock returns of the nine largest banks.[22] Despite the difference in specific values obtained from various methodologies, reschedulings are found to have had a definite negative impact during the period. The improved methodology presented here is expected to yield the most accurate measurements.

Unlike past methodologies, our method permits the estimation of the systematic risk component of these loans as well, and this component is found to be very significant. Furthermore, we calculate that the probability of nonpayment of rescheduled loans is approximately two percent during the entire period. It seems, therefore, that negative revaluation of bank assets is associated with large losses that would be incurred in the event that a small probability hazard is experienced. In particular, the possibility of numerous major borrowers rescheduling simultaneously, perhaps in response to external, worldwide shocks, would explain such negative revaluation.

The implication of our results for bank management and regulation is of particular interest. The fact that there was indeed a penalty in the marketplace for participating in developing country loans that were being rescheduled, demonstrates the existence of built-in disincentives to continue such lending. This is evidenced in the sharp decline of the bank lending growth to 7 percent in 1983 and to 3 percent in 1984 from previous levels of 15-30 percent per year during 1977-1980. It is not so clear however why this effect was not operative in the earlier years until the experience of the Mexican crisis. Our findings confirm that further analysis of the emergence of the bank lending market to LDCs is an important avenue of research.

The results and methodology of this article assume continued importance in the present environment, when such major troubled borrowers as Brazil and Argentina face more reschedulings. Our methods should be useful for an improved assessment of market value of banks' international loans and hence the future credit worthiness of borrower countries.

Footnotes

[*]This article is based on Chapters four and five of my doctoral dissertation for Stanford University. Certain results differ from those in the dissertation due to improved data series. Special thanks to B. Douglas Bernheim, Timothy F. Bresnahan and John B. Shoven for overall supervision of my dissertation. Kenneth Sokoloff, and the participants in seminars at Stanford University and UCLA made helpful comments. The financial support of ISOP at UCLA and excellent research assistant by Jean Helwege are also gratefully acknowledged.

[1]This figure was 165% in 1978 and 181.4% in 1983, as reported in IMF (1986).

[2]$28 billion of this consists of short-term debt rolled over or converted into medium-term loans (IMF (1985)).

[3]Fama (1976) describes capital markets as efficient if the market capitalizes the true expected value of capital assets. The result follows given the assumption of $E(R_{jt}|\phi_t) = R_{jt} - \epsilon_{jt}$, and the definition of the equilibrium market value of the firm:

$$E(R_{jt}|\phi_t) = \frac{E(V_{jt}|\phi_t) - V_{jt-1+d_{jt}}}{V_{jt-1}} ,$$

where V_{jt} is the market value of firm j at time t and d_{jt} are dividends (which are assumed to be certain), and the other variables are as described in equation (1).

[4]For consistent estimates of equation (3) R_{mt} must not be correlated with ϵ_{mt} and $I_1(\Phi_{Rt})$ must be independent of ϵ_{mt} and $I_2(\Phi_{0t})$.

[5]This obviously is not an accurate assumption. But with this method we at least know the direction of the error. In comparing rescheduled loans to original loans, our method provides larger differences in accounting values. Given the paucity of data, however, other possible interest rates

are more likely to contaminate the results further.

[6]For a more accurate formulation of the value of rescheduling, fees paid to the lenders should be included. However complete data is not available on the rescheduling fees charged on loans between 1978 and 1983. Under the assumptions stated A is defined as follows:

$$A = -L + L \cdot r \sum_{t+\tau=1}^{G} \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau} + L \cdot \sum_{t+\tau=G+1}^{M} \left[\frac{1+r(M+1-t+\tau)}{(M-G)}\right] \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau}$$

$$= L \left[-1 + r \cdot \sum_{t+\tau=1}^{G} \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau} + \left[\frac{1-\pi}{1+r_m}\right]^{G} \sum_{t+\tau=1}^{M-G} \frac{[1+r(M-G+1-t+\tau)]}{(M-G)} \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau}\right]$$

In deriving equation (7) from this expression we made use of the following:

(i) Geometric progression sum rule:

$$\sum_{t+\tau=1}^{G} \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau} = \frac{1-\pi}{r_m+\pi} \left[1 - \left[\frac{1-\pi}{1+r_m}\right]^{G}\right],$$

(ii) $$\sum_{t+\tau=1}^{M-G} (M-G+1-t) \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau} = \frac{1-\pi}{-(\pi+r_m)} \sum_{t+\tau=1}^{M-G} \left[\frac{1-\pi}{1+r_m}\right]^{t+\tau} - (M-G)$$

where (M-G) is an integer.

[7]Feder and Ross (1982) employ the same accounting definition of rescheduled loans and derive the equivalent of A'.

[8]Theoretically, an infinite number of forecast intervals should be employed. Due to data constraints four forecast intervals have been constructed.

[9]In this construction we assume that banks' contribution to relief programs has been proportional to their exposure to individual countries. Due to paucity of public information through out the period, however, we used proxies. These proxies have been constructed employing Fed. Country Exposure Lending Survey and Compustat tapes. The former provides data on

amounts owed to groups of banks (i.e. top nine, next 15 etc.) by each country. For further breakdown within each group we relied on Bank Compustat tapes and employed information pertaining foreign branch loan of each bank.

[10] The estimates of λ and λ_u, will be subject to bias towards zero to the extent that $\Delta\omega'_{jt}$ contains measurement error.

[11] In the empirical implementation of (9'), f_t is employed as a measure of r_{at} :

$$f_t = \frac{\lambda \cdot r_t \cdot L_t^R + r_t^n \cdot L_t}{L_t}$$

where r_t is the spread charged on the rescheduled loan at time t, r_t^n = the average market spread on LDC loans at time t, L_t^R = the face value of rescheduled loans at time t, L_t = total outstanding loans to LDC's at time t. Equations in (9') are estimated simultaneously by constraining β_I and λ to be the same in both.

[12] This methodology will yield consistent parameter estimates. However it can lead to inappropriate inference. This two step procedure implicitely assumes that there is no uncertainty in the estimates of $\Delta\omega'_{jt}$. As a consequence the estimates of the standard errors of the parameters are inconsistent. (See Mishkin (1983) for further discussion and references).

[13] The top nine U.S. banks are: Bank of America, Citicorp, Chase Manhattan, Manufacturers Hanover Corp., Morgan (J.P.) & Co., Chemical N.Y., Continental Illinois, Bankers Trust New York Corp., First Chicago Corp. Following are the twelve banks that are in our sample (these banks are in Fed (E.16) "next fifteen largest banks" category and their stocks are exchanged in the NYSE.): Wells Fargo & Co., Irving Bank Co., Crocker

National Co., Marine Midland Banks Inc., Bank of Boston Corp., Northwestern Corp., Interfirst Corp., Republic Bank Corp., NBD Bancorp. Tex., Texas Comm. Bankshares Inc..

[14]Because of the recession in the developed countries, LDCs experienced a significant deterioration in terms of trade and stagnation in the volume of real exports. Real interest rates increased from -0.8 percent (the average for 1970-80) to 11 percent in 1982. It has been argued that these developments contributed to the unwillingness and/or inability to pay of the borrowers, which in turn altered the value of outstanding bank assets (Ozler 1986).

[15]The mean of $\Delta\omega$ during the 72 month period under consideration is 249.5 million dollars for the nine largest banks. Standard error is 880.1.

[16]For example, the Q statistic calculated from the autocorrelations check are 15.23, 16.31 and 17.66 for 12, 18 and 24 lags respectively. The critical chi-squared at the 5% level are 21.05, 28.86, 36.41 at 12, 18 and 24 degress of freedom respectively.

[17]The largest nine U.S. banks' exposure to Eastern Europe, non-oil developing countries, and noncapital-surplus OPEC countries reached nearly 300% of capital in 1982-83 while the same figure is about 200% for all U.S. banks. Approximately two-thirds of this debt has been subject to debt service interruption (Cline 1984, p. 26).

[18]The asymptotic F-statistics for the Chow test for the stability of coefficients across nine and twelve bank groups for equation 9 are as follows: for 1978-1983, $F(24,1485) = 0.38$, for 1978-1980, $F(24,729) = .117$ and for 1981-1983, $F(24,729) = .254$ which are clearly lower than the appropriate F - table values at 5%.

[19]The Chow tests for the stability of equation (9) across 1978-1980

and 1981-1983 periods produce the following F-statistics for the nine bank and twelve bank groups respectively: $F(12,624) = 1.86$ and $F(15,834) = 2.72$. The critical F values at 5% level of confidence are 1.75 and 1.67 respectively.

[20]Average values during 1978-1980 for r_m(Libor), r, G and M are: 0.118, 0.136, 1.75, 4.4, respectively. For 1981-1983 the corresponding values are: 0.31, 0.151, 2.9, 6.5 respectively.

[21]This result is from a pooled regression estimated for the period between the last quarter of 1982 and the third quarter of 1983.

[22]The same study finds a positive significant impact for the earlier period. The difference in these two results is important in pointing out the differences between the two methodologies. For example, if the news in the market prior to the nonpayment announcement generated expectations of large losses, but the actual default announcement revealed information that the projected losses were exaggerated the default announcement would have a positive coefficient estimate.

APPENDIX

Variables and Data Sources for the First Stage Estimates

The following abbreviations are used for data sources:

ERP - Economic Report of the President

IFS,IMF - International Financial Statistics (tape)

WDT - World Bank, World Debt Tables

Dependent Variables

The dates and the terms of bank debt reschedulings are obtained from IMF (1986).

Independent Variables

1) Default variables:

DEF24: (A dummy variable that becomes one if the borrower has failed to comply with a bank loan contract in the past 24 months, zero otherwise) This data has been collected by the author through search of financial press, and is available upon request.

IMG6: (A dummy variable that becomes one if the borrower has reached a conditionality agreement with the IMF or rescheduled loans with official lenders) The IMF standby Agreements and the use of the IMF Extended Fund Facility are obtained from IMF Annual Reports. Data on official Loan reschedulings is obtained from IMF (1984a).

TDEF: (Time since default indicates the number of months passed -- up to 24 months -- without the signing of a rescheduling agreement since default)

2) Time and regional affects

TIME: (Monthly time indicator which takes the value of 1 in the first month).

AFR: (A dummy variable that becomes one for African countries).

<u>LAT</u>: (A dummy variable that is one for countries in the Western Hemisphere).

3) Macroeconomic Indicators

<u>DSX</u>: (Debt service divided by exports). Debt service is obtained from WDT, and exports is obtained from IFS.

<u>REM</u>: (Total official reserves minus gold divided by imports). Both variables are from IFS.

<u>XGP</u>: (Exports over GNP) Exports in U.S. dollars is obtained from IFS. For GNP see below.

<u>GNP</u>: (Real per capita gross national product) Gross national product in U.S. dollars taken from WDT, is converted to real 1972 dollars using the U.S. GNP deflator from ERP.

<u>TDX</u>: (Total debt divided by exports) Total debt is from WDT. It is the sum of total disbursed public and publicly guaranteed medium and long term debt, and total disbursed private medium and long term debt. For exports see above.

<u>GNPG</u>: (Real Gross national product growth)

<u>PPP</u>: (Purchasing Power Parity) It has been calculated as the difference between the domestic and U.S. Consumer Price Index (CPI) inflation rates and less the rate of domestic currency depreciation vis-a-vis the U.S. dollar. All the relevant variables are constructed from IFS.

<u>RED</u>: (The real Eurodollar rate) The end-of-year 1 year Eurodollar deposit rate r_m from WFM is adjusted using domestic CPI inflation $\dot{p}$ and the rate of exchange rate depreciation (both from IFS) to yield

$$RED = \frac{(1+r_m)(1-e)}{(1+\dot{p})}$$

Countries Included In The Analysis

(Based on IMF classification)

Non-Oil Developing Countries

Europe

Cyprus
Greece
Portugal
Turkey
Yugoslavia

Asia

Burma
Sri Lanka
India
Indonesia
Korea
Malaysia
Nepal
Pakistan
Philippines
Singapore
Thailand

Africa

Burundi
Cameroon
Ethiopia
Ivory Coast
Kenya
Liberia
Malawi
Mauritania
Mauritius
Morocco
Sudan
Tunisia

Middle East

Egypt
Israel

Western Hemisphere

Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Honduras
Jamaica
Mexico
Panama
Paraguay
Peru
Uruguay
Venezuela
Trinidad and Tobago

TABLE A.1

Probability of Reschedulings

Equation (12): Probit Estimation

(numbers in parentheses are standard errors)

	1st forecast interval	2nd forecast interval	3rd forecast interval	4th forecast interval
Constant	.21 (.51)	-1.14 (.41)	-.71 (.38)	-.13 (.53)
DEF24	1.17 (0.20)	.89 (0.18)	0.22 (0.19)	-.69 (0.34)
IMG6	0.32 (0.089)	-.05 (0.08)	-0.002 (0.07)	-.056 (0.080)
TDEF	0.056 (0.008)	0.05 (0.008)	0.06 (0.008)	0.031 (0.01)
TIME	.008 (.002)	.007 (0.001)	.009 (0.001)	.009 (0.001)
AFR	-.27 (0.14)	-.039 (0.11)	-.17 (0.10)	.53 (0.10)
LAT	0.83 (0.10)	0.87 (0.088)	1.03 (0.08)	1.13 (0.082)
DSX	0.35 (0.22)	0.29 (0.16)	0.46 (0.14)	0.44 (0.16)
REM	-.12 (0.028)	-.12 (0.019)	-.10 (0.01)	-.089 (0.012)
XGP	0.063 (0.086)	0.049 (0.041)	0.027 (0.03)	-2.0 (0.35)
GNP	-0.33 (0.15)	-.065 (0.09)	0.048 (0.07)	.23 (0.073)
TDX	0.14 (0.03)	0.042 (0.025)	0.20 (0.023)	-0.061 (0.029)
GNPG	-1.81 (0.36)	-2.39 (0.28)	-1.61 (0.25)	-1.23 (0.26)
PPP	-0.004 (0.003)	0.0008 (0.002)	-0.007 (0.002)	-0.11 (0.003)

Table A.1 (cont.)

	1st Forecast interval	2nd Forecast interval	3rd Forecast interval	4th Forecast interval
RED	-2.97	-1.16	-1.79	-1.82
	(0.51)	(0.40)	(0.38)	(0.53)
DFDSX[a]	0.10	-1.89	-3.17	-2.50
	(0.31)	(0.38)	(0.41)	(0.37)
DFREM	0.028	-0.058	0.072	0.13
	(0.043)	(0.039)	(0.033)	(0.044)
DFXGP	-0.063	0.007	0.028	2.05
	(0.086	(0.059)	(0.054)	(0.35)
DFGNP	0.064	0.34	1.30	1.63
	(0.24)	(0.20)	(0.19)	(0.22)
DFTDX	-0.11	0.035	0.11	0.21
	(0.034)	(0.029)	(0.036)	(0.045)
DFFGNPG	0.89	-0.33	1.58	1.84
	(0.52)	(0.48)	(0.44)	(0.52)
DFPPP	0.006	-0.005	-0.0016	-0.005
	(0.0025)	(0.002)	(0.0015)	(0.003)
Log Likelihood Ratio	967.0	863.66	992.93	795.04

[a]The variables that take the DF prefix are constructed by interacting the default dummy with the macro variables represented after the DF prefix.

TABLE A-2

Conditional Value of Reschedulings

Equation (13): OLS Estimation[a]

(numbers in the parentheses are standard errors)

	1st Forecast interval	2nd Forecast interval	3rd Forecast interval	4th Forecast interval
Constant	-0.76 (0.27)	-0.32 (0.84)	-2.72 (0.59)	-3.28 (0.59)
DEF24	0.38 (0.30)	-0.02 (0.42)	0.66 (0.27)	-0.56 (0.34)
IMG6	0.11 (0.06)	-0.007 (0.05)	-0.22 (0.05)	-0.16 (0.07)
TDEF	0.027 (0.009)	-0.0001 (0.01)	0.05 (0.01)	0.06 (0.01)
TIME	0.008 (0.001)	0.009 (0.002)	0.018 (0.002)	0.02 (0.003)
AFR	-0.05 (0.12)	-0.08 (0.11)	0.15 (0.11)	0.48 (0.20)
LAT	0.55 (0.15)	0.04 (0.31)	1.21 (0.27)	1.42 (0.33)
DSX	-0.75 (0.26)	-0.02 (0.19)	0.34 (0.18)	1.05 (0.25)
REM	0.0014 (0.03)	-0.0056 (0.04)	-0.10 (0.02)	-0.10 (0.02)
XGP	-0.83 (0.56)	-1.37 (0.50)	0.97 (0.50)	-1.09 (0.72)
GNP	0.23 (.14)	0.11 (.09)	0.13 (.09)	0.70 (.13)
TDX	0.04 (0.03)	-0.06 (0.02)	0.03 (0.02)	-0.23 (0.05)
GNPG	-1.12 (0.37)	-0.21 (0.84)	-0.83 (0.46)	-1.11 (0.44)
PPP	0.006 (0.001)	0.003 (0.001)	0.0001 (0.0002)	-0.005 (0.004)

Table A-2 (cont.)

	1st Forecast interval	2nd Forecast interval	3rd Forecast interval	4th Forecast interval
RED	-1.08	0.35	-1.6	-1.18
	(1.60)	(0.43)	(0.53)	(0.78)
DFDSX[b]	0.79	-1.56	-3.44	-2.45
	(0.28)	(0.64)	(0.73)	(0.72)
DFREM	-0.04	0.10	0.16	0.25
	(0.02)	(0.03)	(0.02)	(0.04)
DFXGP	0.83	1.99	-0.56	0.82
	(0.56)	(0.63)	(0.63)	(0.84)
DFGNP	0.014	-0.19	1.38	1.14
	(0.19)	(0.20)	(0.28)	(0.37)
DFTDX	-0.027	0.05	0.08	.34
	(0.02)	(0.02)	(0.02)	(0.06)
DFGNPG	0.39	1.08	0.86	2.5
	(0.23)	(0.029)	(0.51)	(0.66)
DFPPP	-0.009	-0.003	-0.009	-0.01
	(0.002)	(0.002)	(0.002)	(0.003)
M[c]	0.53	0.11	1.67	0.65
	(0.25)	(0.45)	(0.35)	(0.12)
R^2	.52	.41	.44	.39

[a]The dependent variable employed is the value of rescheduling as described in equation (8) divided by the total debt of the country. In the construction of $\Delta\omega'$, however, the forecasted variable obtained from this estimation is multiplied by the total debt of the country.

[b]Same as (a) of Table A-1.

[c]The inverse of Mill's ratio.

TABLE A-3

Returns Equation for the Top Nine Banks[a]

Parameter	Equation (9): Non-linear Least Squares 1978-1980	Equation (9): Non-linear Least Squares 1981-1983	Equation (9′): System of Non-linear Least Squares 1978-1980	Equation (9′): System of Non-linear Least Squares 1981-1983
λ			-0.11 (.13)	-.082 (.041)
β_I			.82 (.07)	.52 (.06)
λ_u	-.13 (.15)	.28 (.04)		
β_1	-.66 (.28)	-.26 (.19)	-.53 (.24)	-.22 (.32)
β_2	-.21 (.27)	-.09 (.17)	-.18 (.24)	-.08 (.30)
β_3	-.25 (.21)	-.31 (.20)	-.19 (.24)	-.23 (.31)
β_4	-.51 (.26)	-.23 (.18)	-.42 (.23)	-.30 (.31)
β_5	-.60 (.28)	-.19 (.18)	-.49 (.23)	-.45 (.32)
β_6	-.48 (.24)	-.13 (.17)	-.39 (.26)	-.31 (.31)
β_7	-.47 (.27)	-.26 (.19)	-.38 (.24)	-.17 (.29)
β_8	-.38 (.25)	-.06 (.16)	-.28 (.22)	-.10 (.19)

Table A-2 (cont.)

Parameter	1978-1980	1981-1983	1978-1980	1981-1983
$\beta 9$	1.03 (.19)	.99 (.15)	.98 (.16)	1.18 (.23)
K	-.004 (.006)	-.16 (.01)	-.08 (.03)	-.063 (.01)
H	7.94 (1.39)	10.93 (3.90)	10.47 (4.8)	8.45 (2.0)
R^2	.26	.36	.26	.29

[a] R_{zt} of equation (9) and (9′) is specified as $K+H\ R_{ft}$.

β's of banks 1-8 are measured relative to β_9

TABLE A-4

Returns Equation for the Next Twelve Banks[a]

Parameter	Equation (9) 1978-1980	Equation (9) 1981-1983	Equations (9') 1978-1980	Equations (9') 1981-1983
λ			.084 (.046)	-.013 (.006)
β_I			.53 (.07)	.28 (.019)
λ_u	-.23 (.13)	.11 (.04)		
β_{10}	.34 (.24)	-.009 (.07)	.45 (.29)	.23 (.36)
β_{11}	.01 (.19)	-.01 (.09)	.024 (.28)	.28 (.35)
β_{12}	.007 (.20)	-.008 (.06)	.022 (.26)	-.18 (.38)
β_{13}	.33 (.25)	-.001 (.01)	.33 (.29)	-.18 (.38)
β_{14}	.89 (.24)	-.008 (.09)	.87 (.17)	.36 (.40)
β_{15}	.05 (.18)	-.005 (.03)	-.008 (.27)	.34 (.39)
β_{16}	-.10 (.20)	-.01 (.08)	-.15 (.19)	.74 (.38)
β_{17}	.04 (.24)	.008 (.02)	.04 (.21)	.27 (.32)
β_{18}	.14 (.26)	-.002 (.04)	.14 (.20)	-.14 (.25)
β_{19}	-.05 (.21)	-.01 (.09)	-.29 (.28)	.39 (.40)
β_{20}	.15 (.19)	.003 (.03)	.17 (.27)	1.03 (.38)

TABLE A-3 (cont.)

Parameter	1978-1980	1981-1983	1978-1980	1981-1983
β_{21}	.64 (.17)	1.00 (0.03)	.65 (.19)	.75 (.27)
K	-.08 (.003)	-.06 (.004)	-.0003 (.005)	.01 (.001)
H	11.42 (1.16)	1.73 (1.2)	.24 (.55)	.27 (.16)
R^2	.35	.33	.32	.33

[a]As stated in section III-B above, R_{zt} of these equations (9) and (9') is specified to be K + H R_{ft}.

β's of banks 10-20 are measured relative to bank 21.

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