1-1-1993

Penalties and Exclusion in the Rescheduling and Forgiveness of International Loans

John A. Carlson
Purdue University

Aasim M. Husain
International Monetary Fund

Jeffrey A. Zimmerman
Clarkson University

PENALTIES AND EXCLUSION IN THE RESCHEDULING AND FORGIVENESS OF INTERNATIONAL LOANS

John A. Carlson
Aasim M. Musain
and
Jeffrey A. Zimmerman

93-104

Center for International Business Education and Research
Purdue University
Krannert Graduate School of Management
1310 Krannert Building
West Lafayette, IN 47907-1310
Phone: (317) 494-4463
Fax: (317) 494-9658

Penalties and Exclusion in the Rescheduling and Forgiveness of International Loans*

John A. Carlson
Purdue University

Aasim M. Husain
International Monetary Fund

Jeffrey A. Zimmerman
Clarkson University

Abstract

When a borrowing country is reluctant to repay an international loan, the lender has few legal remedies but can impose penalty costs that harm the borrower rather than benefit the lender. If the lender can also temporarily exclude the borrower from new loans, the borrower with a sufficiently high time preference will agree to reschedule the loan. If the rescheduling condition is met, a contract which includes a contingency for partial forgiveness can be shown to dominate a contract without forgiveness.

JEL Classification: F34, International Lending and Debt Problems

Correspondence should be addressed to:

John A. Carlson
Department of Economics
Purdue University
W. Lafayette, IN 47906
USA

Telephone: 317-494-4450
Fax: 317-494-9658
Email: carlson@zeus.mgmt.purdue.edu

* The views expressed here are those of the authors and do not necessarily represent those of the International Monetary Fund.

PENALTIES AND EXCLUSION IN THE RESCHEDULING AND FORGIVENESS OF INTERNATIONAL LOANS

1. Introduction

Issues involved in international lending to developing countries hinge around the concept of sovereign immunity, the long established principle of international law which provides that a sovereign cannot be made a respondent in the courts of another sovereign. It is, therefore, extremely difficult to compel a sovereign nation to repay an external debt through purely legal means. Extralegal sanctions, however, can be imposed on a negligent sovereign debtor, ranging from a drop in its international credit standing to political, economic and diplomatic pressures from the lender's national government. See Carvounis (1984). Several issues in analyzing international lending are discussed in Eaton, Gersovitz and Stiglitz (1986).

The literature distinguishes "carrot" from "stick" incentives to avoid outright default on a loan. The carrot is a reputational incentive. Non-default allows the country access to new loans which may have greater present value than the repayments saved by defaulting. The stick involves threat of punishment for default through trade sanctions or other creditor remedies. A good discussion of these penalties can be found in Bulow and Rogoff (1989).

Our model will have both penalties and exclusion. We study how each feature can influence the terms of an international loan when the debtor country finds itself with a debt repayment problem. Within a simple two-period model, we derive a condition under which the country would choose to reschedule rather than default on its loan and then show that if the condition is met, the debtor country will be charged the world interest rate without a risk premium. This result may help explain why lending to sovereign nations that took place in the 1970's, prior to the debt crisis, was at interest rates very close to LIBOR. If the condition is not met, the country will be charged a higher interest rate and will not be able to borrow as much. We also show that the borrower for which the rescheduling condition holds, when obtaining the initial loan, prefers that the lender has the capability of enforcing exclusion from the loan market if the borrower does not reschedule the loan.

With precisely the same enforcement mechanism, the model has the further implication that partial forgiveness of loans under some states of nature can be part of the optimal contract and not necessarily something that needs to be renegotiated because of events that were not foreseen at the time of the initial loan. The condition for this arrangement to be preferred by the borrower is actually weaker than the rescheduling condition. Therefore, as long as the rescheduling condition is satisfied, there must exist a loan contract which incorporates partial forgiveness (in the bad state) with rescheduling and under which the initial loan is larger than in the pure rescheduling contract (with no foregiveness).

The paper proceeds as follows. Section 2 explains what is meant by debt recontracting and discusses why both borrowers and lenders may benefit from it. In section 3 the basic model with default is developed. A repayment problem arises when the borrowing country receives a negative production shock and is thus unwilling to repay the loan in full. If the lender anticipates this contingency, the interest rate on the loan will include a risk premium. If the lender can also temporarily exclude the borrowing country from further credit, the borrower may agree to reschedule the loan. In Section 4 we introduce the rescheduling possibility, derive a rescheduling condition, and show how satisfying the condition can influence the interest rate charged. Section 5 introduces the contingency of forgiveness and shows that this contract dominates the contract with rescheduling but without any forgiveness. Section 6 concludes the paper.

2. Recontracting

Outright default is a rarity in the international loan markets. Rather, when a country finds itself facing a repayment problem, the result is almost always some form of debt recontracting. Thus it appears that both borrowers and lenders find it in their interest to avoid a situation of outright default.

A borrowing country will find it profitable to default if the expected costs of doing so are outweighed by the expected benefits. The borrower who defaults is subject to some form of creditor retaliation. This retaliation may take the form of loss of access to international capital markets for some time in the future, loss of access to international trade credit, lender confiscation of borrower assets held abroad, or other forms of general harassment from the lender. Though the lender has this retaliatory potential when default occurs, the main result of retaliation is to harm the borrower rather than to help the lender. The penalties inflicted on the defaulting borrower, for the most part, do not accrue to the creditor and hence represent a dead weight loss.

When a borrower faces a repayment problem, the lender has two choices. The first is to continue to insist on full, timely repayment, in which case the borrower defaults and receives a penalty, while the lender receives nothing (or close to nothing). The lender may, instead, demand a partial repayment that leaves the borrower at least as well off as in default, in return for not retaliating against the debtor. Clearly, both the borrowing country and the lender have an incentive to avoid outright default.

The borrowing country's motivation for repayment comes from its desire to avoid creditor retaliation and keep access to international capital markets open in the future. The lender's motivation to accept less than full repayment derives from its desire to avoid bad debt losses. While both parties may have an incentive to agree to partial repayments and possible rescheduling, the recontracting process is not straight forward. The borrower, by exploiting its default threat, will try to make the minimum payment necessary to avoid retaliation. The lender, by exploiting its penalty threat, will try to extract the maximum possible payment. The terms of the recontracting will depend upon the outcome of a bargaining game.

Much of the existing literature on sovereign-debt assumes, often implicitly, that the lender's threat is completely credible. Bulow and Rogoff (1989) examine the implications of removing this assumption. Using Rubinstein's (1982) bargaining model, they investigate the subgame-perfect bargaining equilibrium that results from a country and a bank negotiating over how much of an exogenously determined debt is to be repaid. They find a unique subgame-perfect bargaining equilibrium which depends on the rates of time preference of both parties, the bank's ability to impose costs on the country, and the country's terms of trade.

In Fernandez and Rosenthal (1990), the process of debt rescheduling is modeled as a non cooperative game built on a one-sector growth model. The debtor's motivation for repayment is to attain an improved credit standing. They ask the question: Why should the bank be given all the power in the debt reduction bargaining game? Both parties know that a country prefers to repay some portion of its debt to incurring the costs of default and that lenders prefer some payment as opposed to nothing. In the beginning of their game, the creditor forgives exactly the amount of a pre-existing debt that makes the debtor just indifferent between two plans: (a) ignoring the debt and optimizing in the growth model or (b) proceeding along the optimal repayment program leading to ultimate repayment assuming no further debt forgiveness. In two of the three models they consider, the solution in effect gives all of the bargaining power to the lender.

In our model, we assume that the lender does have the power to extract a payment equal to its threat capability. The loans discussed in our model are made to one country but the lender presumably makes similar loans to other developing countries. By allowing one country to bargain down its payment, the lender is opening itself up to similar bargaining with all other debtors with which it is involved. Recognizing this, the lender is willing to "sacrifice" one loan to maintain credibility in the eyes of all other debtor countries.

We also assume that the total amount of borrowing is observable and do not consider the possibility of asymmetric information about total borrowing. Kletzer (1984) has argued that bank lending, often through a consortium, rather than bond financing of international loans, arises because observability is enhanced by bank lending.

3 One Period Loans with Default

As in models by Eaton and Gersovitz (1981) and by Sachs and Cohen (1982), a borrowing country's production technology will be characterized by uncertainty. A loan is to be made to the borrower at time 1 and is due at time 2. We assume that output at time 2 depends on which of two states occurs and that a similar pattern is repeated in future periods:

$$\begin{aligned} yi &= y^* \text{ with probability } 1-\pi \text{ (good state)} \\ &= (1-\theta)y^* \text{ with probability } \pi \text{ (bad state)} \\ &\quad \text{for } i = 2,3,\ldots, \quad 0 < \theta < 1 \end{aligned}$$

where yi represents output at time i, y^* is the good-state production level, supply shocks occur randomly with probability π, and the severity of a shock when it occurs is represented by θ. We assume as in Bulow and Rogoff (1989) that the borrowing country has a high rate of time preference and is willing to borrow all it can to increase current consumption.

The lender in our model is risk neutral and perfectly competitive so that the expected return from lending equals the safe rate of return, ρ, or what might be called the world rate of interest. In the case that the borrower defaults the lender can credibly impose on the debtor country a cost equal to a fraction, λ, of the borrowing country's national product. If the amount due on the loan exceeds the penalty cost, the borrower is assumed, in exchange for the lender not imposing the penalty, to repay the lender an amount equal to the penalty cost and default on the balance.

Now consider the terms on a one-period loan when default is a possible outcome. Even if the good state occurs, the borrower might choose not to repay fully. We have assumed, however, that the lender can inflict a penalty of λ times total output or a total penalty cost of λy^* and that the borrower will pay up to the penalty cost. So to assure full repayment in the good state, the lender will lend an amount that with accumulated interest will come to no more than λy^*. Since the borrower is assumed to borrow all it can, our first condition is that the total loan due after one period equals λy^*:

$$(1+r^D)b^D = \lambda y^*. \tag{1}$$

where b^D is the amount of the loan when there may be partial default and r^D is the interest rate charged on the loan.

If the bad state occurs, the most that the lender can expect to collect is $(1-\theta)\lambda y^*$ and the bad state occurs with probability π. On the assumption that the lender sets the terms of the loan so that the expected return on the loan equals the return on a safe asset, we have a second condition:

$$(1+\rho)b^D = (1-\pi)(1+r^D)b^D + \pi\lambda(1-\theta)y^*$$

or, using (1),

$$(1+\rho)b^D = (1-\pi\theta)\lambda y^* \tag{2}$$

where ρ is the safe rate of return.

The size of the loan can be obtained directly from (2):

$$b^D = \frac{[1-\pi\theta]\lambda y^*}{1+\rho} \qquad \{\frac{\partial b^D}{\partial \pi} < 0, \frac{\partial b^D}{\partial \theta} < 0, \frac{\partial b^D}{\partial \rho} < 0, \frac{\partial b^D}{\partial \lambda} > 0\}. \tag{3}$$

From (1) and (3), the interest rate becomes:

$$(1+r^D) = \frac{1+\rho}{1-\pi\theta} \qquad [\frac{\partial r^D}{\partial \pi} > 0, \frac{\partial r^D}{\partial \theta} > 0, \frac{\partial r^D}{\partial \rho} > 0]. \tag{4}$$

Thus, the greater the probability of a negative supply shock (higher π) or the greater the severity of the supply shock when it occurs (higher θ), the smaller will be the amount loaned and the higher the risk premium in the interest rate charged. An increase in ρ, the lender's risk-free rate, will cause the lender to raise the interest rate and lower the amount that can be borrowed. Further, the stronger is the lender's ability to inflict a credible default penalty (higher λ), the more the lender will be willing to lend. The interest rate, however, is not affected by the size of the default penalty.

Without any rescheduling considerations and on the assumption of costless monitoring of outcomes, these same loan conditions would hold each period whether or not there are supply shocks. If the outcome at time 3 is independent of the outcome at time 2, a risk neutral lender that is willing to make the loan in the first period will be willing to make the same loan in the second period.

4. Rescheduling

Now consider an explicit two-period model in which, when the bad state occurs at time 2, the lender is able not only to exact a payment of $(1-\theta)\lambda y^*$ but also to exclude the borrower from the loan market in the next period if the borrower does not agree to reschedule the unpaid balance of $\theta\lambda y^*$. We shall investigate when the borrower would choose to default rather than reschedule and then examine the terms of the loan if the borrower does choose to reschedule.

The gain to the borrowing country from rescheduling can come from the additional consumption made possible by new loans. Suppose the borrower agrees, when the bad state occurs at time 2, to reschedule $\theta\lambda y^*$ for one period. The total that will be loaned, however, is limited by the fact that the lender is unwilling to have more than λy^* come due at time 3. Assume, as in the analysis of one-period loans with possible default, that the loan at time 2 will be fully repaid at time 3 if the good state occurs and partially repaid if the bad state occurs. This means that the lender will lend a total of b^D as defined in (3). The additional consumption $\Delta c2$ made possible by the loan at time 2 is the difference between b^D and the amount rescheduled, or:

$$\Delta c2 = \frac{[1-\pi\theta]\lambda y^*}{1+\rho} - \theta\lambda y^*$$

This can be rewritten:

$$\Delta c2 = \frac{[1-\pi\theta-\theta(1+\rho)]\lambda y^*}{1+\rho} \tag{5}$$

The present value at time 2 to the borrower of the expected payment at time 3 is given by

$$PV = \frac{[1-\pi]\lambda y^* + \pi\lambda(1-\theta)y^*}{1+\delta} = \frac{[1-\pi\theta]\lambda y^*}{1+\delta} \tag{6}$$

where δ is the borrower's rate of time preference.

In order for the borrower to be willing to reschedule, the additional consumption made possible by the new loan must be worth more than the present value of the expected payment on the total loan. This will be true if $\Delta c2 > PV$, i.e., if:

$$\frac{[1-\pi\theta-\theta(1+\rho)]\lambda y^*}{1+\rho} > \frac{[1-\pi\theta]\lambda y^*}{1+\delta}$$

This rescheduling condition can be rearranged into the following form:

$$1 - \frac{\theta(1+\rho)}{1-\pi\theta} > \frac{1+\rho}{1+\delta} \tag{7}$$

The right side of (7) is less than one since the time preference of the borrowing country is greater than the return on a safe asset ($\delta > \rho$). The inequality can therefore be satisfied if neither the probability of a supply shock nor the severity of the shock is too large. In terms of the severity of the shock and using (4), this rescheduling condition can also be written as:

$$\theta < \frac{\delta - \rho}{(1+r^D)(1+\delta)} \tag{7'}$$

Thus, in order for the borrowing country to agree to reschedule, the severity of the shock if it occurs must be at most somewhat less than the excess of the country's time preference over the safe rate of interest. One other way to write the rescheduling condition is

$$\frac{\delta - \rho}{(1+\rho)(1+\delta)} > \frac{\theta}{1-\pi\theta} \tag{7''}$$

This form will be used later in our analysis of a contract with possible forgiveness.

If this rescheduling condition does not hold, then the borrower would choose to default when the bad state occurs. The lender who knows this would offer a loan at time 1 on the conditions derived in (3) and (4) in which there is a risk premium in the interest rate on the loan.

If (7) does hold, and the lender knows that the borrower will choose to reschedule when the bad state occurs, what sort of terms would the lender set for the loan at time 1? To answer this question, let r^R denote the interest rate charged on the initial loan and let b^R be the size of the loan when rescheduling is possible at time 2. As before, the amount due at time 2 is assumed not to exceed λy^*. Therefore, if the borrowing country will borrow as much as possible:

$$(1+r^R)\,b^R = \lambda y^* \tag{8}$$

By assumption, the expected payoff on the loan should equal the return on a safe investment. The expected payment consists of full payment if the good state occurs with a weight of $1-\pi$ and a partial payment and a rescheduling of the balance if the bad state occurs with a weight of π. This condition can be written as:

$$(1+\rho)\,b^R = (1-\pi)\,\lambda y^* + \pi[(1-\theta)\lambda y^* + \theta\lambda y^*] \tag{9}$$

The last term in brackets needs additional explanation. If the bad state occurs at time 2, the borrower will pay back $(1-\theta)\lambda y^*$, reschedule $\theta\lambda y^*$, and receive a new loan of $\Delta c2$ as shown in (5). With its threat capability assuring at least partial repayment and by limiting its exposure, the lender's expected rate of return on any rescheduled loan at time 2 is ρ. Therefore, the rescheduled amount of $\theta\lambda y^*$ at time 2 has a present value to the lender of $\theta\lambda y^*$.

The right side of (9) can be simplified so that:

$$(1+\rho)b^R = \lambda y^* \tag{9'}$$

A comparison of (8) and (9') reveals that

$$1+r^R = 1+\rho \tag{10}$$

The country that can be counted on to reschedule will in this model get the world rate of interest without a risk premium.

The possibility of rescheduling when bad states occur may have some relevance for the small risk premiums that have been observed in the past. Over the period just preceding the onset of the debt crisis, spreads over LIBOR were not a major element in the cost of developing country external borrowing. For all developing countries, the spreads over LIBOR for external borrowing averaged 1.36 (in percent per annum) in the second half of the 1970's. For the typical industrialized country in the same period, the spreads averaged 0.83. Thus, a developing country could access the external market for funds at a cost of only about one-half of one percentage point more than the typical industrialized country. See the World Development Report (1980).

With no further rescheduling, the borrower would at time 3 either repay fully if the good state occurs or make partial payment and default on the balance if the bad state occurs. In that case, the interest rate charged to a country which reschedules would rise from ρ at time 1 to r^D at time 2.

We can also show that the borrower prefers at time 1 for the lender to have the capability to exclude the borrower from the loan market at time 2 if the rescheduling condition (7') is known to hold. To see this, consider the alternatives of (a) borrowing b^D at a rate r^D at both time 1 and time 2 and defaulting on $\theta\lambda y^*$ whenever the bad state occurs or (b) borrowing b^R at the safe rate of interest at time 1 but agreeing to reschedule $\theta\lambda y^*$ if the bad state occurs at time 2. In (b), the borrower gets more initially but receives less at time 2 when the bad state occurs. The loan under rescheduling at time 1 exceeds the loan under partial default by:

$$b^R - b^D = \frac{\lambda y^*}{1+\rho} - \frac{[1-\pi\theta]\lambda y^*}{1+\rho} = \frac{\pi\theta\lambda y^*}{1+\rho} \quad (11)$$

If the bad state occurs at time 2, the borrower gets $\theta\lambda y^*$ less in loans under the rescheduling option than under the default option because $\theta\lambda y^*$ is the amount that would be rescheduled. Since the bad state occurs with probability π and is discounted by the borrower to time 1 at a discount rate δ, the present value of the expected loss of loans at time 2 under the rescheduling option is:

$$\frac{\pi\theta\lambda y^*}{1+\delta} \quad (12)$$

Since δ is greater than ρ, the gain to the borrower from the rescheduling option, shown in (11), is greater than the present value of the expected loss, shown in (12). Thus, the borrower prefers the rescheduling option at time 1. The rescheduling condition (7) serves as an incentive compatibility constraint so that at time 2, the borrower will actually prefer to reschedule rather than be excluded from the loan market.

5. Forgiveness

With precisely the same enforcement mechanism assumed in our analysis of rescheduling, the model has an additional implication that both rescheduling and forgiveness can be part of the optimal contract. This result can be developed by first introducing the possibility that the borrower be allowed to reschedule even when the good state occurs at time 2 and ask what is the maximum that the borrower would be willing to reschedule.

As before, assume that the maximum loan that the lender will extend at time 2 is b^D, given by equation (3). If R is the amount rescheduled, then the amount of new consumption possible at time 2 is:

$$\Delta c2 = \frac{(1-\pi\theta)\lambda y^*}{1+\rho} - R$$

In order for the borrower to be willing to reschedule at time 2, this has to be at least as great as the present value at time 2 to the borrower of the expected repayment at time 3. This was given by PV in equation (6) above. The condition $\Delta c2 \geq PV$, can be written:

$$\frac{(1-\pi\theta)\lambda y^*}{1+\rho} - R \geq \frac{(1-\pi\theta)\lambda y^*}{1+\delta}$$

or

$$R \leq \left(\frac{1}{1+\rho} - \frac{1}{1+\delta}\right)(1-\pi\theta)\lambda y^*$$

The maximum amount that could be rescheduled is therefore

$$R = \frac{\delta-\rho}{(1+\rho)(1+\delta)}(1-\pi\theta)\lambda y^* \qquad (13)$$

Now consider what the terms of the initial loan would be if R as given by equation (13) were rescheduled at time 2. The amount that comes due at time 2 cannot exceed $\lambda y^* + R$. In the good state, λy^* is the maximum payment that the creditor can extract from the borrower and R is the maximum that can be rescheduled. Assuming the borrower wants to borrow as much as possible at time 1, the terms of the loan can be represented by the following equation:

$$(1+r^F)b^F = \lambda y^* + R \qquad (14)$$

where r^F is the interest rate charged and b^F is the amount lent at time 1 when there may be some forgiveness.

If the bad state occurs at time 2, the lender can obtain a payment of only $\lambda(1-\theta)y^*$. Under these circumstances, the unpaid balance (U) on the loan when the bad state occurs will be

$$U = (1+r^F)b^F - \lambda(1-\theta)y^* \qquad (15)$$

From (14) and (15), we have

$$U = R + \lambda\theta y^* \qquad (16)$$

and $\lambda\theta y^*$ is the amount that must be forgiven in order to induce the debtor to reschedule.

Note that the lender's expected rate of return on R at time 2 is ρ, the world rate of interest. Thus, a loan of R at time 2 has a present value of R to the creditor. At time 1, the risk neutral creditor requires that the expected return on the initial loan be equal to ρ. This can be represented by:

$$(1+\rho)b^F = (1-\pi)(\lambda y^* + R) + \pi[(1-\theta)\lambda y^* + R] \qquad (17)$$

Recall that π denotes the probability that the bad state occurs. In either state, R will be rescheduled at time 2, but less will be repaid if the bad state occurs and some of the loan has to be forgiven. Equation (17) simplifies to

$$(1+\rho)b^F = (1-\pi\theta)\lambda y^* + R \qquad (18)$$

Note from (14) and (18) that

$$r^F = \rho + \pi\theta\lambda y^*/b^F \tag{19}$$

If there is to be a contract with the contingency of some forgiveness of the loan when the bad state occurs, then the interest rate on the loan must have a risk premium to compensate the lender for the possibility of forgiving part of the debt.

By substituting for R from (13) in (18) we can solve for the size of the initial loan. The result is:

$$b^F = [1 + \frac{\delta - \rho}{(1+\rho)(1+\delta)}]\frac{(1-\pi\theta)\lambda y^*}{1+\rho} \tag{20}$$

We need to compare the size of the initial loan under forgiveness (b^F) with the size of the loan under rescheduling without forgiveness (b^R) given by equation (9'). b^F can be shown to be larger than b^R when:

$$\frac{\delta - \rho}{(1+\rho)(1+\delta)} > \frac{\pi\theta}{1-\pi\theta} \tag{21}$$

This is a weaker condition than the rescheduling condition, as can be seen most clearly when the rescheduling condition is expressed as in (7"). Since there is some probability that the good state will occur ($\pi < 1$), the right side of (7") is strictly greater than the right side of (21). In other words, if the borrower can be counted on to reschedule, then the initial loan will be larger under the contract with forgiveness than without forgiveness.

To see if the borrower actually prefers the contract with forgiveness, the following two alternatives must be compared: (1) borrowing b^R at $(1 + \rho)$ at time 1 and rescheduling $\theta\lambda y^*$ at time 2 if the bad state occurs or (2) borrowing b^F at $(1 + r^F)$ at time 1 and rescheduling R at time 2 no matter which state occurs. Defining A and B as the debtor's utility under the first and second alternatives, respectively, the relative attractiveness of the latter option is just the difference:

$$B - A = (1-\pi\theta)\lambda y^* \left[\frac{\delta-\rho}{(1+\rho)(1+\delta)}\right] \left[\frac{\delta-\rho}{(1+\rho)(1+\delta)} - \frac{\pi\theta}{1-\pi\theta}\right]. \quad (22)$$

The derivation of (22) is shown in the Appendix. Clearly, B - A is positive if the last term in brackets in (22) is positive. We know, from our discussion of the condition (21) for the initial loan to be larger under forgiveness than without forgiveness, that the term will be positive whenever the borrower can be counted on to reschedule.

Therefore, a loan contract in which forgiveness is a possibility dominates one in which there may be rescheduling without any forgiveness. There is, however, now a risk premium in the initial loan to compensate the lender for the possibility of some forgiveness.

6. Conclusion

In our model of international loans, when a lender can extract a payment from the borrower equal to the penalty cost for default, we find that the risk premium added to the world interest rate is larger the greater the probability that a bad state will occur and the greater the severity of the supply shock when the bad state does occur.

If the lender can also exclude the borrower from international loans unless the borrower agrees to a rescheduling when a bad state occurs, the borrower will agree to the rescheduling when the anticipated severity of the supply shock is not too large relative to the excess of the borrower's rate of time preference over the world interest rate. The key here is that the value of the new loan to the borrower exceeds the present value of paying back the total (rescheduled and new) loans.

With precisely the same penalty and exclusion enforcement mechanism assumed for the rescheduling result, a contract in which the lender will have to forgive part of the loan if the bad state occurs actually dominates the contract without forgiveness. While much of the real-world forgiveness of international debts may have arisen because of contingencies that were not anticipated at the time the loans were extended, our results indicate that forgiveness can be part of a fully contingent contract. In an analysis of the relative advantages of floating-rate and fixed-rate debt, Detragiache (1992) drops the assumption that contracts are perfectly enforceable when assessing why sovereign loans are often not repaid in full. In effect, this happens in our model. Forgiveness arises as a contingency in which the lender cannot exact enough in penalties for the borrower to be willing to make full repayment, and the risk premium covers this contingency. If there are risk premia, even if very small, then as Calvo (1989, p. 190) comments, "debt contracts may not have ruled out debt relief."

If one wanted to relax our assumption that the lender can extract a payment up to the penalty cost, then the terms of the loan would have to reflect this. If the borrower can bargain away some of its prior commitment when bad states occur, then lenders, knowing this, would presumably offer less favorable terms and include more of a risk premium in the initial loan when some default is possible. One could also extend the number of periods over which the lender can inflict penalties, and thereby increase the size of the initial loan, or introduce other complications in the assumed enforcement mechanism. Our simple model allows us to focus on the importance of exclusion, together with penalties, in inducing rescheduling and in allowing forgiveness to be a contingency in the original contract.

References

Bulow, J. and K. Rogoff, 1989, "A Constant Recontracting Model of Sovereign Debt." Journal of Political Economy, 97, 155-178.

Calvo, Guillermo A., 1989, "A Delicate Equilibrium: Debt Relief and Default Penalties in an International Context," in J.A. Frenkel, M.P Dooley, and P. Wickham, Analytical Issues in Debt, (International Monetary Fund, Washington).

Carvounis, C. C., 1984, The Debt Dilemma of Developing Nations. (Quorum Books, New York).

Detragiache, Enrica, 1992, "Optimal loan contracts and floating-rate debt in international loans to LDC's," European Economic Review, 36, 1241-1261.

Eaton, J. and M. Gersovitz, 1981, "Debt with Potential Repudiation: Theoretical and Empirical Analysis." Review of Economic Studies, 48, 289-309.

Eaton, J., M. Gersovitz and J. Stiglitz, 1986, "The Pure Theory of Country Risk." European Economic Review, 30, 481-513.

Fernandez, R. and R. Rosenthal, 1990, "Sovereign-Debt Renegotiations: A Strategic Analysis." Review of Economic Studies, 57, 331-349.

Kletzer, K. M., 1984, "Asymmetries or Information and LDC Borrowing with Sovereign Risk." Economic Journal, 94, 287-307.

Rubinstein, A., 1982, "Perfect Equilibrium in a Bargaining Model." Econometrica, 50, 97-109.

Sachs, J. and D. Cohen, 1982, "LDC Borrowing with Default Risk." National Bureau of Economic Research Working Paper No.925.

World Development Report, 1980 (International Bank for Reconstruction and Development).

Appendix

Penalties and Exclusion in the Rescheduling and Forgiveness of International Loans

Derivation of expression (22).

From (20) and (9') in the text, the loan under forgiveness (with rescheduling) exceeds the loan under rescheduling (without forgiveness) by

$$b^F - b^R = [1 + \frac{\delta-\rho}{(1+\rho)(1+\delta)}]\frac{(1-\pi\theta)\lambda y^*}{1+\rho} - \frac{\lambda y^*}{1+\rho} \qquad (A.1)$$

This is the added consumption in the first period made possible by the loan with forgiveness.

The cost of this additional liquidity is a lower inflow of loans in the second period. Under the rescheduling loan, the debtor receives a new loan of the amound b^D if the good state occurs and b^D - $\theta\lambda y^*$ if the bad state occurs (with probability π). Under forgiveness the loan in the second period is b^D - R no matter which state occurs.. The additional expected loss in second period consumption under the forgiveness option is therefore R - $\pi\theta\lambda y^*$, or using (13) in the text:

$$\frac{\delta-\rho}{(1+\rho)(1+\delta)}(1-\pi\theta)\lambda y^* - \pi\theta\lambda y^* \qquad (A.2)$$

The first-period gain to the debtor from the forgiveness option (A.1) exceeds the present value of the second-period loss, (A.2) discounted at the rate δ, if and only if:

$$\frac{(1-\pi\theta)\lambda y^*}{1+\rho}[\frac{\delta-\rho}{(1+\rho)(1+\delta)} - \frac{\pi\theta}{1-\pi\theta}] - \frac{(1-\pi\theta)\lambda y^*}{1+\delta}[\frac{\delta-\rho}{(1+\rho)(1+\delta)} - \frac{\pi\theta}{1-\pi\theta}] > 0 \qquad (A.3)$$

This simplifies to:

$$(1-\pi\theta)\lambda y^* [\frac{1}{(1+\rho)} - \frac{1}{(1+\delta)}] [\frac{\delta-\rho}{(1+\rho)(1+\delta)} - \frac{\pi\theta}{1-\pi\theta}] > 0. \qquad (A.4)$$

Expression (A.4) is equivalent to (22) in the text.