INTERNATIONAL DEBT

An Explanation of the Commercial Banks' Lending Behavior After 1982

Beatriz ARMENDARIZ DE AGHION*

Massachusetts Institute of Technology, Cambridge, MA 02139, USA
Ecole des Hautes Etudes en Sciences Sociales, Paris, France

Received August 1988, revised version received March 1989

This paper shows that whenever banks negotiate sequentially with debtor countries for debt rescheduling, they have an incentive to establish a reputation as tough bargainers in early renegotiation rounds. Typically, the banks face a tradeoff between acquiring reputation for toughness but losing debt repayments, and rescheduling to maintain a positive probability of repayments. This tradeoff explains the empirical fact that only the major debtors have received new loans since 1982.

1. Introduction

Ever since the global debt crisis started in 1982, commercial creditors – acting in a coordinated way – have followed the so-called case-by-case strategy to the debt problem. On the other hand, debtor nations were unsuccessful in their feeble attempts at forming a common front in their negotiations with the creditors. The case-by-case strategy consists of dealing with each debtor country separately whenever a financial crisis in this country arises. This approach has been dictated to some extent by the fact that the financial crises in the major debtor countries did not arise simultaneously. Had they coincided, debtors might have successfully coordinated their actions to form a coalition and confront their creditor banks jointly.

This paper argues that whether banks negotiate to reschedule debt simultaneously with all debtors or sequentially has important consequences for the creditors’ behavior during the negotiations quite independently of whether the debtor nations form a coalition or not. When banks face the debtor countries sequentially, they have an opportunity to establish a reputation for being ‘tough’ bargainers in early negotiation rounds. A case in

*I wish to thank Philippe Aghion, Patrick Bolton, Paul Krugman, Rudi Dornbusch, Richard Eckaus, Elhanan Helpman, and Jacques Mistral for their helpful comments and suggestions. I have been most fortunate to benefit from the useful suggestions of an anonymous referee. All errors are mine.
point is the banks’ behavior with respect to Brazil when it declared a moratorium on its debt payments in 1987, and requested major debt concessions. The banks, fearing that Brazil’s action might be adopted by other debtors, took a tough stance and refused to give in on Brazil’s demands. They thus acquired the reputation for being ‘tough bargainers’ and this may have prevented Argentina from copying Brazil’s action, as an analyst in the *Wall Street Journal* observed:

Brazil’s recent reapproachment with its creditors seems to have stifled – at least temporarily – any plans Argentina had for declaring a unilateral moratorium. They watched closely what happened in Brazil, said a New York banker, and concluded the costs were considerable (*The Wall Street Journal*, 26 February 1988).

The main motivation for writing this paper is to provide an insight into the global debt problem when the reputation of the creditors is brought into the analysis.

The existing literature on the subject emphasizes the role of reputation on the debtor’s side. Such is the case of Suarez (1987) where it is shown that countries have an incentive to sustain the reputation of being ‘good’ debtors since they could not get future lending otherwise.

On the creditors’ side, however, the reputational issue has been ignored. We argue that this is potentially misleading, since absence reputational considerations, banks may appear to be overly inclined in favor of debt-rescheduling or ‘involuntary lending’ [see Sachs (1982) and Krugman (1985)].

In this paper we argue that there is a tradeoff between acquiring reputation for toughness (but losing debt repayments) and rescheduling so as to maintain a positive probability of repayment (but weakening one’s future bargaining position). When the cost of a country’s default is very high for the banks, they will reschedule, as they did with the major debtor countries. And when such a cost is low, banks might wish to let the country default and acquire reputation for toughness. Table 1 indicates that only major debtors have received new loans (involuntary lending) since 1982. This is indeed evidence for the tradeoff described here.

Since the costs of default for the banks are likely to be lowest in the smallest and poorest countries, this raises important issues concerning development aid to these countries. The negative externality imposed on these nations by the larger debtor countries calls for some corrective public intervention. Note also that reputational considerations by banks introduce a potential conflict between the larger and smaller debtors. This may be an additional reason why coordination by debtor nations has proved to be so difficult.

The paper is organized as follows. In section 2 we present a model where the lending decisions of creditors are influenced by their interest both in
obtaining debt services and in preventing future threats of default. The model adopts the formalization of reputation acquisition recently developed by Kreps and Wilson (1982). In section 3 the basic model is extended to consider the particular case where the banks face two debtor countries whose debts are similar in size (e.g. Mexico and Brazil). Section 4 contains a few concluding remarks.

2. The model

We begin by assuming that there is only one lender, namely a bank, who faces two debtor countries, \( c_1 \) and \( c_2 \).
Fig. 1. Payoffs to a debtor country, and payoffs to a bank which can be of two possible types: soft-type and tough-type.

Our single bank assumption can be justified on the grounds that foreign refinacement to trouble-debtor countries since 1982 is generally provided by a coalition of all existing creditors. It is therefore reasonable to assume that the provision of such 'concerted lending' comes from a single creditor.¹

We suppose $c_1$ and $c_2$ owe the bank amounts of debt $D_1$ and $D_2$, respectively. The bank is assumed to face its debtors sequentially: it plays first against $c_1$ and then against $c_2$. $c_1$ will move first by electing to either keep on paying outstanding interests on $D_1$ (which we call $rD_1$) or by threatening default if the bank does not lend $L$. In response to such a threat the bank can choose between lending $\bar{L}$ or $L$, where $\bar{L} > L$.² When the bank accepts to lend $\bar{L}$ it receives $rD_1$ for sure. And when the bank lends $L$ it gets $qrD_1$, where $q < 1$ is the portion of debt services the bank gets from the country who goes on (partial) default.³ The corresponding payoffs to the bank and the country, depending on the moves they select, are illustrated in fig. 1, where we assume the bank can be of two possible types: a soft-type bank or a tough-type bank.

¹Since the creditors' benefits form concerted lending are collective and not individual, a typical free-rider problem arises [see Cline (1983), Sachs (1982), and Krugman (1985)]. However, concerted lending does take place under the pressure from creditor central banks and international institutions [see Krugman (1988)]. Theoretically, concerted lending could be self-enforced in a repeated-game-type framework: individual creditors with diverse interests in many debtor countries will be willing to cooperate for fear of retaliation from other members of the creditors' coalition.

²$L$ can be zero.

³$q$ can also be interpreted as the probability that the debtor country will not default. In a moral-hazard type of framework [see Krugman (1988) and Armendariz de Aghion (1988)], $q$ is an increasing function of $L$ as long as higher refinacement encourages the debtor country to make the required effort for servicing its debt. However, the function $q(L)$ reaches a maximum after which the banks will find it non-profitable to lend more to the country. And in particular, on the right-hand side of Krugman's debt-relief-Laffer curve the banks will find it in their interest to induce effort by forgiving portions of the country's outstanding debt.
The distinction between soft and tough lies in how costly it is for the bank to make use of its cash reserves for new lending. A bank is soft-type when it can make use of large cash reserves ($\bar{L}$) at low cost. We shall assume that, absent reputation considerations, such a bank would always prefer to provide a high level of new lending so as to increase its expected debt repayment. A tough-type bank, on the other hand, is one which faces tighter liquidity constraints so that it faces a higher cost ($\pi > 0$) of lending $\bar{L}$. We shall assume that $\pi$ is sufficiently large that a tough-type bank would always prefer to lend a smaller amount $L$ (or not to lend at all if $L = 0$) even if, as a result, the country defaults with a positive probability (i.e. $q_{rD_1} - L > r_{D_1} - \bar{L} - \pi$).

Finally, we assume that when a country defaults it incurs a penalty, $k$. This could be the country’s exclusion from future borrowing in the international credit system. The country could also suffer from trade-credit restrictions. $k$ can also be interpreted as the country’s loss of investment projects (both domestic and foreign) because a default signals to investors that the country’s economy is badly managed.

In the above payoff matrix it is implicitly assumed that once a country has decided to go on partial default, it cannot change its mind. This assumption can be justified as follows: the Third World debt problem is viewed here as a long-term confrontation between debtor countries and their foreign creditors where the former want to preserve their ability of making credible threats of default in the future.

Let us now assume asymmetric information. And in particular, let us suppose the debtor countries do not know the costs of drawing reserves that the bank faces (i.e. debtor countries do not know whether the bank has a tough-type or a soft-type payoff structure). The payoff structure of the countries and their beliefs about the bank’s type, on the other hand, are assumed to be common knowledge.

Initially, $c_1$ and $c_2$ have a prior probability $\pi$ on the bank being a tough-type, and complementary probability $1 - \pi$ on the bank being a soft-type. Once $c_1$ threatens default, the bank’s response will be observed by the countries who will update their beliefs about the bank’s type.

Let us look closely at how this game is played. It is clear that in the case where $c_1$ does not threaten default initially, $c_2$ will learn nothing about the bank’s type (i.e. $\pi = \pi'$, where $\pi'$ is the updated probability that the bank is a tough-type). When $c_1$ threatens default, however, the bank is forced to move,
and the bank’s response conveys some information about its type to \( c_2 \). Suppose the bank lends \( \bar{L} \) to \( c_1 \), when this country threatens default. This implies that the bank is a soft-type, so that \( c_2 \) will be encouraged to threaten default. However, a soft bank may be better off by pretending to be a tough-type (i.e. the bank can increase \( \alpha' \) by lending \( L \) when \( c_1 \) threatens default) so as to avoid a default threat by \( c_2 \)!

Clearly, a tough-type bank will never lend \( \bar{L} \) because it is a priori non-profitable to do so and because it can only be bad for the bank’s reputation (i.e. when the bank lends \( \bar{L} \) other countries will confront the bank). A soft-type bank, on the other hand, will have to decide between losing reputation when it lends \( \bar{L} \), and losing \( \pi \) and debt services (with some probability) when it lends \( L \). We will show later that a soft-type bank will prefer to lose reputation, so to speak, when the size of a country’s debt is very large.

\( c_1 \) will decide to threaten default whenever

\[
\alpha (L - qrD_1 - (1 - q)k) + (1 - \alpha)(\bar{L} - rD_1) \geq -rD_1.
\]  

(1)

Henceforth we will assume it is profitable for \( c_1 \) to threaten default (i.e. the above inequality holds).\(^7\)

What will be the bank’s response to such a threat? As in any finite extensive-form game, one must reason by backward induction. We first look at how the bank can prevent a default from \( c_2 \), and then we will see whether the bank lends \( \bar{L} \) or \( L \) to \( c_1 \). To discourage \( c_2 \) from threatening default, the bank must make this country indifferent between threatening and not threatening:

\[
\alpha'(L - qrD_2 - (1 - q)k) + (1 - \alpha')(\bar{L} - rD_2) = -rD_2,
\]  

(2)

where \( \alpha' \) is the updated belief on the bank being tough-type. Expression (2) implies:

\[
\alpha' \geq \frac{\bar{L}}{\bar{L} - L + (1 - q)(k - rD_2)} = b_2.
\]  

(3)

Let us now look at how \( c_2 \) updates its beliefs about the bank’s type. Three cases must be considered:

(a) \( c_1 \) does not threaten default. In this case, as we mentioned earlier, no updating takes place: \( \alpha = \alpha' \).

(b) \( c_1 \) threatens default and the bank lends \( \bar{L} \). Then the bank reveals itself as a soft-type.

(c) \( c_1 \) threatens default and the bank fights (i.e. the bank declines the

\(^7\)Expression (1) is the rationality requirement that guarantees \( c_1 \) prefers ex-ante to threaten default to its present situation.
country's request of \( \bar{L} \) and lends only \( L \). Then, assuming Bayesian updating, we have:

\[
\alpha' = \Pr(\text{bank is tough/bank lends } L) \]

\[
= \frac{\Pr(\text{bank lends } L/\text{bank is tough}) \times \Pr(\text{bank is tough})}{\Pr(\text{bank lends } L/\text{bank is tough}) \times \Pr(\text{bank is tough}) + \Pr(\text{bank lends } L/\text{bank is soft}) \times \Pr(\text{bank is soft})}
\]

By assumption it will never be profitable for the tough-type bank to lend more than \( \bar{L} \), therefore:

\[
\Pr(\text{bank lends } L/\text{bank is tough}) = 1,
\]

which implies:

\[
\alpha' = \frac{1 \times \alpha}{1 \times \alpha + (1 - \alpha) \Pr(\text{bank lends } L/\text{bank is soft})},
\]

i.e.

\[
\alpha'(P) = \frac{\alpha}{\alpha + (1 - \alpha)P},
\]

where \( P \) is the probability that the soft bank will lend \( L \) to \( c_1 \) (\( P \) is the strategic variable chosen by the bank to discourage \( c_2 \) from threatening default).\(^8\)

Now let us remember that \( c_2 \) will not threaten default as long as

\[
\alpha' \geq b_2 = \frac{\bar{L}}{\bar{L} - L + (1 - q)(k - rD_2)}.
\]

Let \( P(\alpha, b_2) \) be the minimum value of \( P \) for which a default by \( c_2 \) can be deterred; we have:

If \( \alpha \geq b_2 \), then \( P(\alpha, b_2) = 1 \), i.e. the bank will lend \( L \) to \( c_1 \) with probability 1 so as to sustain its reputation of being tough with probability \( \alpha \), which in this case is equal to \( \alpha' \).\(^9\)

\(^8\)We are looking at a mixed strategy equilibrium where \( P \) may be strictly less than 1. The product \( PL + (1 - P)L \) can then be interpreted as the amount of new lending provided by the bank to \( c_1 \).

\(^9\)Note that \( \alpha \) can be big and \( c_1 \) can still prefer to threaten default to its present situation, i.e. in the extreme case where \( \alpha = 1 \) the debtor country will decide to threaten default when the inequality \( L - qrD_1 - (1 - q)k > -rD_1 \) is satisfied.
\[ \chi'(P = 1) = \frac{\chi}{\chi + 1 - \chi} = \chi. \]

This is the case where the size of \( c_2 \)'s debt is small (i.e. where \( b_2 \) is small). If \( \alpha < b_2 \), then \( P(\alpha, b_2) \) is defined by:

\[
\begin{cases} 
\chi'(P(\alpha, b_2)) = b_2, \\
P(\alpha, b_2) \geq 0,
\end{cases}
\]

i.e.

\[ P(\alpha, b_2) = \frac{\alpha}{1-\alpha} \frac{1-b_2}{b_2} = \frac{\alpha}{1-\alpha} \frac{(1-q)(k-rD_2)-L}{L}, \]

when

\[ D_2 \leq \frac{L}{r} \frac{1}{r(1-q)} \]

and \( P(\alpha, b_2) = 0 \) otherwise. [In this case the soft bank will always lend to country \( c_1 \) since country \( c_2 \) whose debt is very big will systematically threaten default.]

The equilibrium solution \( P^*(\alpha, D_1, D_2) \) is determined by comparing the following: what the bank gets from \( c_1 \) and \( c_2 \) when it lends \( L \) to \( c_1 \) to what it gets when it lends \( L \) to this first country. Given \( P(\alpha, D_2) \) a soft bank will decide to lend \( L \) to \( c_1 \) whenever

\[ rD_2 + P(\alpha, D_2) (qrD_1 - L) + (1 - P(\alpha, D_2)) (rD_1 - L) \geq rD_2 + rD_1 - 2L, \] (4)

i.e.

\[ P(\alpha, D_2) ((1-q)rD_1 + L - L) \leq L, \] (5)

that is, \( P^*(\alpha, D_1, D_2) = P(\alpha, D_2) \) iff (5) is satisfied, and \( P^*(\alpha, D_1, D_2) = 0 \) otherwise.

In particular, for \( D_1 \) big enough (i.e. \( D_1 \gg D_2 \) the bank will prefer to lend \( L \) to \( c_1 \); in this case what matters the most to the bank are the debt services from \( c_1 \) on its large amount of debt, rather than its reputation towards \( c_2 \) whose debt is small compared to \( D_1 \).

Existing evidence of bank behavior is consistent with the reputation story developed earlier in this section: in the negotiations for debt-rescheduling since 1982 big debtors have obtained higher new lending than small debtors (see table 1). However, it might not be entirely realistic to suppose that small
3. The case where the size of the debt is similar in both countries

Keeping the basic set-up of the previous section we can analyse the optimal lending strategies of a bank facing two countries whose outstanding debts, $D_1$ and $D_2$, are of the same order of magnitude. Countries like Brazil and Mexico, where the commercial banks' claims are more or less the same, can be put forward as an example of the theoretical case we will develop in this section.

Suppose the first country, $c_1$, finds it profitable to threaten default. The bank will then have to decide whether it lends $L$ or $\bar{L}$. But this time we assume $D_1 = D_2 = D$. Let

$$P(z, D) = \begin{cases} 
1, & \text{if } z \leq b_2 = \frac{L}{L - L + (1 - q)(k - rD)}, \\
\frac{z}{1 - z} \frac{(1 - q)(rD) - L}{L}, & \text{if } z < b_2 \text{ and } D < \frac{k}{r} - \frac{L}{(1 - q)r}, \\
0, & \text{if } z < b_2 \text{ and } D > \frac{k}{r} - \frac{L}{(1 - q)r}.
\end{cases}$$

We know from the previous section that the following lending strategy is a sequential equilibrium:

If $P(z, D)((1 - q)rD + L - \bar{L}) \leq \bar{L}$ (5), then the bank lends $L$ to $c_1$ with probability $P^*(D) = P(z, D)$.

If $P(z, D)((1 - q)rD + L - \bar{L}) > \bar{L}$, then the bank lends $\bar{L}$ to $c_1$, i.e. $P^*(D) = 0$.

Clearly, for $D = 0$ (or for $D$ very small), we have $P^*(D) = P(z, 0) > 0$, and also condition (5) is automatically satisfied since $P(z, D)((1 - q)(L - \bar{L}) < \bar{L} < L < \bar{L})$.

By continuity, for $D$ small the optimal lending strategy for the bank will be to lend $L$ with probability $P^*(D) = P(z, D) > 0$, and this probability is close to one for $z$ sufficiently large (i.e. $P(z, D)$ close to 1 for $z \geq L/[L - L + (1 - q)k]$).

This result can account for the fact that small debtor countries, like Bolivia and Guatemala, have not received new lending ($L = 0$) in the past six years (see table 1). Theoretically, however, the fact that there can be no new lending in equilibrium contradicts most strategic analysis on international debt. And in particular, in Sachs (1982) and in Krugman (1985) we find that it will always be in the collective interest of the banks to provide new lending as a way of preventing defaults.
Now, to determine the bank's optimal lending strategy for intermediate values of $D$ we must solve the following quadratic equation:

$$f(D) = \overline{L} - P(x, D)((1-q)rD - \overline{L} + \underline{L}) = 0,$$

i.e.

$$f(D) = \overline{L} - \frac{x}{1-x} \left( \frac{(1-q)(k-rD-L)}{\overline{L}} \right) ((1-q)rD - \overline{L} + \underline{L}) = 0,$$

which can be rewritten as follows:

$$f(D) = \frac{x}{(1-x)\overline{L}} \left[ (1-q)^2 r^2 D^2 + (1-q)rD \left( 2L - \overline{L} - (1-q)k \right) A \right. \right.$$

$$+ \left. \overline{L} ^2 \left( \frac{1-x}{x} \right) - \left. \left( 1-q \right) k \right) \left( L - \overline{L} + \pi \right) \right]. B$$

From the above expression the following two cases can arise.

Case 1. $A^2 - 4B < 0$. This case corresponds to a $q$ close to one and/or $\overline{L} \gg L$ (i.e. the country will not default unless the bank provides an $L$ which is very little). The bank's optimal strategies when $A^2 - 4B < 0$ are illustrated in figs. 2(a) and 2(b), where $D^0$ is defined by

$$x = \frac{\overline{L}}{(1-q)(k-rD^0) + \overline{L} - L}$$

and $\overline{D}$ is defined by

$$\overline{D} = \frac{k}{r} - \frac{L}{(1-q)r}.$$

The difference between figs. 2(a) and (2b) lies on the countries' prior beliefs on the bank being tough ($x$). When $x$ is big, the bank has a reputation to sustain, and when $x$ is small the bank has to establish a reputation. By looking at figs. 2(a) and 2(b) we see that it is more likely that the bank will not lend $\overline{L}$ when it has a reputation to sustain. This result is not surprising since a bank which starts with a big $x$ has more reputation to lose had it started with a small $x$.

Case 2. $A^2 - 4B > 0$. This case corresponds to a small $q$ and/or a small $\overline{L}$. In this case the quadratic function $f(D)$ has two possible solutions, $D'$ and
$D'$, such that $f(D) > 0$ iff $D \notin [D', D'']$, i.e. it is not profitable for the bank to lend $\bar{L}$ at middle-sized debt levels. The bank’s optimal lending strategy when $A^2 - 4B > 0$ is illustrated in Figs. 3(a)–3(c). This figure corresponds to the case where $k$ is small; in this case the bank will always lend $\bar{L}$ (as long as the debt level $D$ is not too small). The reason for this is that countries facing a small $k$ will have a high incentive to default and the bank does not find it profitable to pay the cost $\bar{L} - \bar{L} + (1 - q)rD$ which is needed for gaining reputation.

Finally, our model can account for changes in the interest rate. And in particular, when $r$ increases we have the following effects:

(a) $D'(r) - D'(r)$ decreases, and
(b) $D(r)$ decreases.

(a) can be interpreted as follows. When $r$ increases, countries have a higher incentive to threaten default because it becomes too costly to service their debts. Consequently, the bank will have a higher incentive to prevent such threats by becoming tougher (i.e. by reducing the frequency with which it lends $\bar{L}$). (b) on the other hand, can have the following interpretation. When
Fig. 3. (a) $x > [\bar{L}(1 - q)k + \bar{L} - L]$, $D^0 < D'$; (b) $x > [L(1 - q)k + \bar{L} - L]$, $D^0 \in (D', D'')$; (c) $x > [\bar{L}(1 - q)k + \bar{L} - L]$, $D^0 \geq D''$ ($\bar{L}$ very small).
Fig. 3. (d) \( z < \frac{\bar{L}}{c^2} (1 - q) k + \bar{L} - L \); (e) \( k \) very small.

As \( r \) increases, big debtors do not find it profitable to service their debts anymore and most likely they will threaten the bank. Anticipating such an imminent threat of default from big debtors the bank prefers to recuperate debt-service with some probability rather than pay the cost \( L - \bar{L} + (1 - q) r D \) for establishing reputation towards country \( e_2 \).

4. Concluding remarks

The analysis presented in this paper focused on the commercial banks' reputation for being tough bargainers in new-lending negotiations with debtor countries. In practice, the amount of new lending, \( L \), emerges as the outcome of bargaining negotiations between the banks and the debtor country, and is not decided unilaterally by the banks. It will be interesting to see, however, how the reputational considerations discussed in this paper make the bargaining on \( L \) different from Rubinstein's bargaining results under complete information. We could conjecture that reputation in this context will also lead to lower levels of new lending.

Another issue not discussed is that of debt renegotiation with a single
country. In particular, the model presented here does not allow for a country to threaten default more than once. However, reputation effects in this case cannot be ruled out either. In the extreme case we can think of a bank facing a single debtor country (or a debtors' cartel) repeatedly. The fact that there is one instead of many debtors makes no difference: the bank will have an incentive to prevent future threats of default by lending less than what it would have otherwise.

References

Armendariz de Aghion, Beatriz, 1988, Rescheduling and forgiveness in the Mexican debt history (Massachusetts Institute of Technology, Cambridge, MA), Mimeo.


Krugman, Paul, 1985, Market-based debt-reduction schemes (Massachusetts Institute of Technology, Cambridge, MA), Mimeo.


Suarez, Juan J., 1987, Debt, defaults and repudiation under asymmetric information (University of Chicago, IL), Mimeo.