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EXTERNAL DEBT, ADJUSTMENT, AND BURDEN
SHARING: A UNIFIED FRAMEWORK

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AND

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INTERNATIONAL FINANCE SECTION

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1 INTRODUCTION

The debt crisis initiated in August 1982 by the Mexican moratorium on debt service has gone through many phases. Policymakers focused first on the banking aspect of the crisis. A concerted response, led by the International Monetary Fund (IMF) and the U.S. Federal Reserve, allowed the commercial banks to reduce their exposure over time and to boost their loan loss reserves. By 1985, the banking sector was no longer in a state of imminent collapse, and attention turned to the economic crisis in the highly indebted countries. Official intervention concentrated on generating incentives and support for policies that would allow the debtors to grow out of their debt problem.

By 1989, although several debtor countries were beginning to grow again, it became clear that adjustment policies alone would not resolve the debt crisis. The burden of providing new money had shifted considerably to the International Financial Institutions (IFIs; see Tables 1 and 2), and a multilateral lending crisis loomed on the horizon. The IFIs had begun to reduce their involvement, and adjustment programs were failing for lack of sufficient financial support.¹ The Brady Plan, announced in 1989, emphasized for the first time the need for commercial-bank debt reduction, to be undertaken simultaneously with adjustment programs financed by additional loans from the IFIs. Several debt packages based on these principles have since been negotiated for Mexico, Costa Rica, the Philippines, Venezuela, and Uruguay.

The debt crisis and the efforts to resolve it have raised three sets of analytical issues. The first of these relates to the question of the debt overhang, defined by Krugman (1988, p. 82) as “the presence of an existing, ‘inherited’ debt sufficiently large that creditors do not expect with confidence to be fully repaid.” The existence of a deep market discount on the debt of a highly indebted government is *prima facie*

We would like to thank—without incriminating—Giuseppe Bertola, John Wilton, and an anonymous referee for helpful suggestions, and Dany Cassimon and Juergen Oedinius for research assistance. The study reflects the views of the authors and not those of the institutions with which they are affiliated.

¹ Net transfers to the IMF turned positive by 1986, when the credits granted in 1982 came due. Net transfers to the World Bank turned positive by 1988.

TABLE 1
COMPOSITION OF DEBT STOCKS OF THE SEVERELY INDEBTED
MIDDLE-INCOME COUNTRIES (SIMICS), 1982-1990
(billions of dollars and percentages)

Year	Total Debt	Share of Total Debt			
		IFIs	Official Bilateral	Commercial Banks	Others
1982	294	7.4	18.9	63.3	10.4
1983	348	7.1	18.2	64.5	10.3
1984	376	7.0	18.4	65.7	9.0
1985	416	8.3	22.7	60.0	9.0
1986	456	10.0	23.2	58.2	8.6
1987	500	11.6	25.1	55.2	8.1
1988	501	11.3	24.8	55.9	8.1
1989	496	11.9	25.7	53.3	9.1
1990	482	13.8	26.1	44.6	15.5

NOTE: The SIMICS are Argentina, Bolivia, Brazil, Chile, the Congo, Costa Rica, Côte d'Ivoire, Ecuador, Honduras, Hungary, Mexico, Morocco, Nicaragua, Peru, Philippines, Poland, Senegal, Uruguay, and Venezuela.

SOURCES: World Bank, *World Debt Tables*, and authors' computations.

evidence of a debt overhang of this sort. The full resolution of the debt crisis requires that the debt overhang be eliminated and (in what amounts to the same thing) that full repayment is expected by lenders. Under what circumstances is this likely to come about?

It is widely recognized that the elimination of an overhang requires the adoption of adjustment policies by the debtor country. The second set of analytical issues therefore revolves around the question of adjustment. There is little disagreement about the nature of the domestic policies required: budgets must be brought under control, prices liberalized, and exports stimulated by exchange-rate and other policies. But when will governments have the incentive to undertake such measures, and will adjustment be enough to eliminate the overhang?

The third set of issues has to do with the sharing of the burden of debt relief among creditors. Under the Brady Plan, IFIs have borne the brunt of new lending, while commercial banks have provided debt and debt-service reduction (DDSR). What does this division of labor imply for the distribution of the burden between these two kinds of creditors? Further, what does any particular burden-sharing arrangement imply for the elimination of the overhang and for returning the

TABLE 2
COMPOSITION OF NET TRANSFERS TO THE SEVERELY INDEBTED
MIDDLE-INCOME COUNTRIES (SIMICS), 1982-1990
(billions of dollars)

Year	Total Net Transfers	IFIs	Official Bilateral	Commercial Banks	Others
1982	8.1	3.8	3.9	-3.9	4.3
1983	-2.4	8.5	3.1	-13.1	-1.0
1984	-12.0	5.2	1.4	-16.5	-2.2
1985	-19.5	2.7	0.5	-21.1	-1.7
1986	-23.9	0.7	-1.1	-21.1	-2.4
1987	-23.1	-3.1	0.0	-16.9	-3.1
1988	-30.2	-3.6	-0.2	-23.9	-2.5
1989	-24.4	-2.7	-2.3	-15.9	-3.5
1990	-39.6	0.4	-5.0	-25.3	-9.7

SOURCES: World Bank, *World Debt Tables*, and authors' computations.

debtors to creditworthiness?

These issues, and especially the first two, have been analyzed extensively. The typical research strategy, however, has been to take one question at a time and to work with minimodels designed to make particular minipoints. In view of the interrelationship among the issues, we take a different approach here. We present a unified framework in which all three sets of issues can be addressed in an internally consistent manner. We use this framework to develop our arguments, and we answer a sequence of questions along the way:

- (1) What inefficiencies, if any, are caused by the presence of a debt overhang?
- (2) Under what circumstances are new lending, debt reduction, or both required to resolve the crisis?
- (3) Under what circumstances is the presence of IFIs required to arrange efficient deals between commercial creditors and debtors?
- (4) Why do debtor governments need conditionality to undertake reforms that are good for them?
- (5) How is burden sharing accomplished under Brady Plan arrangements?

Our objective is to clarify the issues and analytics, rather than to present a solution to any specific model of bargaining.

It might be useful to state at the outset some of our main points. The literature on the debt overhang has focused on the overhang's

disincentive effect; it is alleged to discourage investment and income-increasing adjustment measures because any increase in the debtor's income is likely to lead to an increase in its debt-service payments. We argue that this disincentive effect is generally small, so that debt reduction does not lead to important efficiency gains on this account. Instead, we highlight the inefficiency created by the liquidity constraint faced by overly indebted countries. This constraint is a natural consequence of the overhang, because (1) new creditors are deterred from lending because they expect to be "taxed" by the old creditors, who stand to gain disproportionately, and (2) even if some new money is available, debtor governments will be unable to commit themselves credibly not to spend the additional resources on consumption. The result is that investment and adjustment opportunities that are profitable at the shadow (world) interest rate go unexploited.

Conditional lending by IFIs can, under certain circumstances, untie the knot. The ability to exercise conditionality is a source of comparative advantage for IFIs relative to the old creditors. Conditionality can overcome the time inconsistency introduced in the debtor government's policy by the shortage of liquidity and can prevent the debtor government from squandering new money on consumption. The resulting efficiency gains can be shared between the debtor, the old creditors, and the new creditors. In the absence of debt reduction by the commercial banks, however, new lending by IFIs would transfer a disproportionate amount of these gains to the banks. Hence, the role of debt reduction is to create the "headroom" needed for these new and more efficient creditors to step in without subsidizing the old creditors.

Put differently, we argue that the presence of the overhang necessitates a three-sided bargain: the debtor government will undertake adjustment policies only if additional resources are provided; the IFIs can safely lend those resources only if commercial banks undertake debt and debt-service reduction (DDSR); commercial banks, in turn, will provide debt reduction only if, through conditionality, the IFIs can make the debtor government adjust. These considerations provide a plausible rationale for the tripartite arrangements among commercial banks, IFIs, and debtor governments that we are now observing under the Brady Plan.

Our framework has some implications for the design of such arrangements. First, the higher the prior exposure of IFIs to the debtor country, the smaller the debt and debt-service reduction that must be provided by commercial banks. Second, under a certain "fairness" criterion for burden sharing among creditors (which we call the pro-

portional-distribution rule), efficiency-enhancing packages will generally fall short of completely eliminating the overhang. Third, deals with “fair” burden sharing cannot rely on market buybacks and must involve concerted debt reductions, because the price paid for debt in market-based buybacks is the equilibrium price after debt reduction. Fourth, presenting commercial banks with a menu of debt-reducing options can fruitfully combine the desirable characteristics of both concerted and voluntary debt-reducing mechanisms. We shall discuss and illustrate these points using a unified analytical framework.

We begin with the problem of a government that has a debt overhang and that must decide whether or not to undertake an adjustment program (Chapter 2). Adjustment could eliminate the overhang, but, in the absence of external financing, the immediate costs would be too high relative to the future benefits. We then look at the set of strategies available to the commercial banks and characterize the types of arrangements that the creditors and debtor could work out, with and without conditionality (Chapter 3). Next, we turn to the design of debt-relief packages, asking how the basic parameters of the package affect the distribution of the burden between commercial creditors and IFIs (Chapter 4). We also analyze the burden-sharing issue in the context of arrangements of the Brady type, in which debt is repurchased at a price (Chapter 5) and creditors are offered a menu of options (Chapter 6).

2 THE ADJUSTMENT DECISION

It is the interdependence between the actions of foreign creditors and the investment decisions in the debtor country that renders the debt problem complicated and conceptually interesting. From the creditors' perspective, it is desirable that the debtor undertake all appropriate investment projects, as this increases the likelihood that the debt will be repaid. The overhang and the constraint on foreign borrowing, however, distort the intertemporal relative prices faced by the debtor and result in inefficient investment decisions. Understanding how this inefficiency comes about is critical, for any "solution" to the debt crisis is in large part an attempt to deal with this problem.

The existing literature has focused largely on the role of the debt overhang as a tax on future output. In this particular explanation, the disincentive effect of the overhang arises from the likelihood that an increase in the output of a country in overhang will lead also to an increase in its debt service. Therefore, the proceeds of domestic investment will be shared with foreign creditors. In principle, this acts just like a tax on investment, decreasing the social return to domestic investment (see Krugman, 1988; Sachs, 1984; Cohen, 1990; Helpman, 1989; and Corden, 1989).

Conceptual and empirical problems with this story greatly diminish its relevance. There is no compelling conceptual reason to believe that an aggregate "tax," if it exists, will be internalized in private investment behavior: from the perspective of an individual investor, the aggregate transfer to creditors is an exogenous constant and is thus unaffected by the investor's decisions. Consequently, even if the social disincentive were large, the private disincentive would still be small.

Furthermore, the importance of the overhang "tax" on investment is much in doubt empirically. From all indications, both the average and marginal tax rates implied by debt service are small. Net transfers to creditors rarely exceed 4 to 5 percent of gross national product (GNP). The marginal tax rates are, if anything, even lower. Table 3 shows the results of regressing net transfers on gross domestic product (GDP) and other variables. We find that, on average, less than two cents of any dollar increase in income is actually captured by creditors (see also Eaton, 1990). Moreover, this tax seems to be imposed by official creditors rather than commercial creditors. Single-country investment

equations (for example, Borensztein, 1990, for the Philippines, Schmidt-Hebbel, 1989, for Brazil, and Morisset, 1991, for Argentina) and panel regressions (for example, Ozler and Rodrik, 1992) often find a negative relation between indebtedness and investment. Such regressions, however, do not shed light on the precise channel of causality that links high debt to low investment.

In light of these considerations, we think it is appropriate to de-emphasize the tax-on-future-output aspect of the overhang. We highlight, instead, the factor of illiquidity, which we believe has much greater empirical relevance. The real cost of the overhang is that many high-yielding investments in debtor countries go unexploited because

TABLE 3
BEHAVIOR OF NET TRANSFERS BY THE SEVERELY INDEBTED
MIDDLE-INCOME COUNTRIES (SIMICS), 1982-1990
(billions of dollars)

Independent Variables	Dependent Variables		
	Total Net Transfers	Net Transfers to Commercial Banks	Net Transfers to Official Sector
Total Debt	0.1251 ^a (0.0159)	—	—
Commercial Debt	—	0.0997 ^a (0.0177)	—
Official Debt	—	—	0.0835 ^a (0.0172)
GDP	0.0182 ^a (0.0041)	0.0020 (0.0034)	0.0164 ^a (0.0020)
Exports of Goods and Services	-0.1336 ^a (0.0470)	-0.0896 ^a (0.0378)	-0.0291 (0.0268)
Dummy for IMF Program	80.6 (246.9)	223.9 (198.1)	-232.6 ^b (103.5)
<i>N</i>	171	171	171
<i>R</i> ²	0.84	0.79	0.57

NOTE: Positive net transfers indicate transfers to the creditors (see also Table 1). Standard errors are in parentheses. Regressions include country and year dummies.

^a Significant at 1-percent level

^b Significant at 5-percent level

SOURCE: World Bank, *World Debt Tables*.

these countries are shut out of credit markets and cannot borrow. One particular set of such investments is called “adjustment policies.” Just like other investments, adjustment policies have benefits in the long run but costs in the short run (see below).

The first step in our analysis focuses on the interaction between the adjustment decision and the actions of creditors. We consider a debtor government that has to decide whether or not to adjust. For the moment, we treat parametrically the extent of debt reduction and/or new lending that creditors grant this government. For each combination of debt reduction and new lending, we seek to determine whether the government undertakes adjustment policies and whether the country remains in overhang. In other words, we trace out the adjustment and overhang consequences of every possible debt-relief package offered by the creditors. To emphasize the difference made by conditionality, we work out in parallel the cases of both nonconditional and conditional lending.

Our view of adjustment policies followed by debtor countries has two key features. The first, primarily for analytical convenience, is that adjustment is an all-or-nothing affair. Governments choose either to adjust or not. This rules out the possibility, which certainly exists in reality, that the amount of adjustment effort may vary depending on the circumstances. Because we will view the adjustment decision as the consequence of rational cost-benefit calculus, however, practical benefits flow from treating the adjustment decision as a binary one. For one thing, this treatment leads to more realism than the smooth case in which the marginal costs and benefits of the adjustment effort are continuously balanced, and the country gains nothing—thanks to the envelope theorem—from an increase in adjustment induced by a change in, say, external lending. Moreover, our formulation will allow us to downplay the “tax” aspect of the debt overhang, which, as we argued above, has limited empirical content.

The second feature, which is critical to the story that follows, is that adjustment requires incurring some fixed costs immediately, whereas the benefits of adjustment come, not immediately, but over time; in the context of a two-period model, they arrive in the second period. This is a realistic representation of most policy reforms. Any stabilization program that works is likely to be recessionary in the short run. Structural reforms likewise create costs in the short run, either economic or political costs. It is this feature that makes adjustment programs formally

identical to investment; in each case, a cost is incurred immediately to reap a reward in the future.²

Some support for this view is provided in Table 4, which shows that economic performance typically follows a U-shaped pattern in countries undergoing adjustment. Countries that have undertaken adjustment programs with intensive support from the IMF and the World Bank have lost on average 3.1 percent of output in the year before the program, 5.1 percent in the first year of the program, 4.7 percent in the second year, and 2.0 percent in the third year. These estimates correct for trend growth and for terms-of-trade shocks. Nevertheless, they

TABLE 4
ADJUSTMENT COSTS FOR EARLY-ADJUSTMENT COUNTRIES
(percentage points)

Period Dummies	Loss in GNP
$t = -2$	-2.4
$t = -1$	-3.1
$t = 0$	-5.1
$t = 1$	-4.7
$t = 2$	-2.0
$t = 3$	-2.3
$N = 125$	$R^2 = 0.119$

NOTES: The independent variable is the deviation of annual growth in GDP per capita, adjusted for terms-of-trade shocks, from the trend of growth in GDP per capita during 1960-1980. The adjusted annual growth rate of GDP per capita is from Summers and Heston (1988). The trend of growth in each country was computed by regressing growth in GDP per capita on a time variable.

Period dummies: $t = 0$ refers to the year in which an IMF program was first signed between 1977 and 1987; $t = -i$ refers to i years and $t = j$ refers to j years after.

Data set: Early-adjustment countries are those having received two structural-adjustment loans from the World Bank, the first in or before 1985. All had IMF standby agreements.

SOURCE: World Bank, *Adjustment Lending Policies for Sustainable Growth*, 1990.

² This view is consistent with the justification often provided for adjustment lending by IFIs. Ernest Stern (1991, p. 4), the World Bank vice president who played a key role in initiating structural-adjustment loans, writes: "We provide quick-disbursing loans because the actions being undertaken by the government have some balance of payments impact, some additional costs that we can help defray." See Gavin (1991) for a coherent exposition of this view in a well-specified theoretical model.

should be taken with a grain of salt. On the one hand, they are biased upward, because these countries would have lost growth opportunities by not adjusting. On the other hand, countries that choose to adjust are likely to be those for which adjustment costs are the lowest, and this selection bias is likely to lower our estimates of the short-run costs.

We now turn to a more formal analysis of the adjustment decision. The government starts out with an inherited debt that carries a face value D . In the first period, it is offered a package from the commercial banks that consists of debt reduction in amount B and new loans in amount L . We shall look more closely at the banks' incentive to offer some debt relief in the next chapter; for the moment, we take B and L as given. Confronting this package, the government decides whether or not to undertake an adjustment program. Adjustment "costs" a fixed amount, K , in period one but increases output from Y to $Y(1 + \theta)$ in period two. The government enters period two with an existing stock of debt amounting to $R(D - B + L)$, in which R is 1 plus the world interest rate. If it fails to repay the debt in full, creditors are able to penalize the country by a fraction, ϕ , of output. At this point, we do not have to take a stand on whether ϕ represents a transfer to creditors or is a dead-weight loss. The essential point is that the debtor suffers a cost when it interrupts debt service.³ The presence of an overhang at the outset is ensured by assuming that the country would not choose to repay the debt in full in the absence of adjustment and/or debt reduction because the cost of repaying it in period two exceeds the penalty for default, that is, $RD > \phi Y$.

We assume that the government seeks to maximize a conventional welfare function, in which second-period utility is linear in consumption. Following Froot (1989), we represent the government's problem as follows:

Government's decision problem (without conditionality)

$$\begin{aligned} \max W &= U(C_1) + \beta C_2 & (1) \\ \text{s.t. } C_1 &= \begin{cases} Y + L - K, & \text{if adjust,} \\ Y + L, & \text{otherwise.} \end{cases} \end{aligned}$$

³ These costs can include exclusion from international borrowings and interference with international trade flows. Much has been written showing how international lending can be supported by indirect sanctions and how the severity of such sanctions determines credit ceilings. See, in particular, the seminal work of Eaton and Gersovitz (1981), Kletzer (1984), and Bulow and Rogoff (1989a). For surveys of the literature on sovereign lending, see Eaton, Gersovitz, and Stiglitz (1986) and Kletzer (1988).

$$C_2 = \begin{cases} \max [Y(1 + \theta) - R[D - B + L], (1 - \phi)Y(1 + \theta)] , & \text{if adjust,} \\ \max [Y - R(D - B + L), (1 - \phi)Y] , & \text{otherwise.} \end{cases}$$

$U(\cdot)$ is assumed to be concave to guarantee an interior solution. Because the government can always choose not to repay the debt when that choice is profitable, second-period consumption is the larger of the levels with and without default. For completeness, we allow for the possibility that the overhang may be eliminated even in the absence of adjustment (thanks to sufficient debt relief B), even though banks will have no incentive to provide DDSR in such a case.⁴ In what follows, we assume that the government remains credit rationed in all relevant cases, so that it views increased borrowing as always desirable. This is guaranteed by assuming $U' > \beta R$ throughout (that is, for all relevant C_1).

The formulation above assumes that creditors have no control over what the government chooses to do with the new loan, L . This can be seen by noting that C_1 equals $Y + L$ rather than Y when the government chooses *not* to adjust. Under conditional lending, however, the government is forced to adjust whenever $L > 0$. Therefore, conditionality changes the problem faced by the government, which now reads as follows:

Government's decision problem (with conditionality)

$$\begin{aligned} \max W &= U(C_1) + \beta C_2 && (1') \\ \text{s.t. } C_1 &= \begin{cases} Y + L - K , & \text{if adjust,} \\ Y , & \text{otherwise.} \end{cases} \\ C_2 &= \begin{cases} \max [Y(1 + \theta) - R(D - B + L), (1 - \phi)Y(1 + \theta)] , & \text{if adjust,} \\ \max [Y - R(D - B), (1 - \phi)Y] , & \text{otherwise.} \end{cases} \end{aligned}$$

This is different from the problem defined by (1) in that L is set to zero in the nonadjustment states.

There are four possible outcomes in the second period, each of which describes a different zone in (B, L) space:

Zone I: no adjustment, no overhang;

Zone II: adjustment, no overhang;

⁴ The overhang will not be eliminated unless $R(D + L - B) \leq \phi Y$, which cannot be true unless $B > L$, because $RD > \phi Y$ by assumption. Note, also, that no debt payments are due at the end of the first period in this model. In the presence of first-period debt repayment, new money will be equivalent to debt-service relief in the first period.

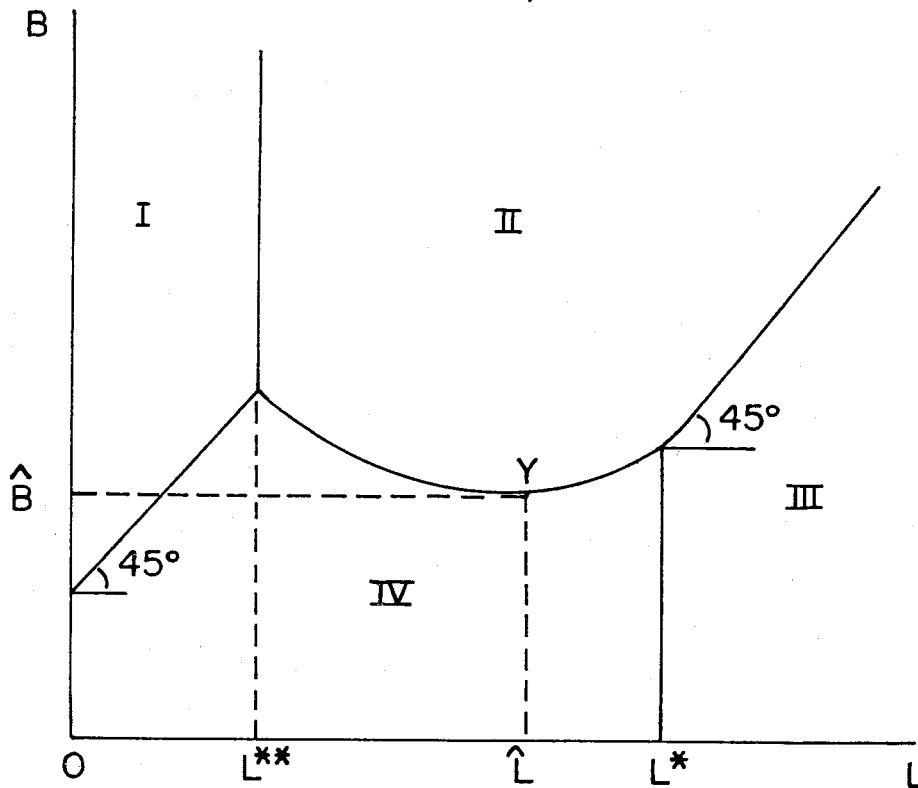
Zone III: adjustment, overhang;
 Zone IV: no adjustment, overhang.

For each combination of B and L , the government's adjustment decision puts it in one of these four zones. The complete characterization of the zones is provided in the Appendix. Here we provide an intuitive explanation of the outcomes with the help of Figures 1 and 2.

Without Conditionality

As discussed above, adjustment transfers income from the present to the future. Borrowing from abroad does the opposite. It follows that, if the government is provided with a sufficiently high level of external lending, L , it will always choose to adjust—provided, of course, that adjustment is a “good” investment at the world interest rate, which we assume throughout). In Figure 1, the minimum level of L that will prompt the

FIGURE 1
 SECOND-PERIOD OUTCOMES WITH NO ADJUSTMENT AND NO OVERHANG

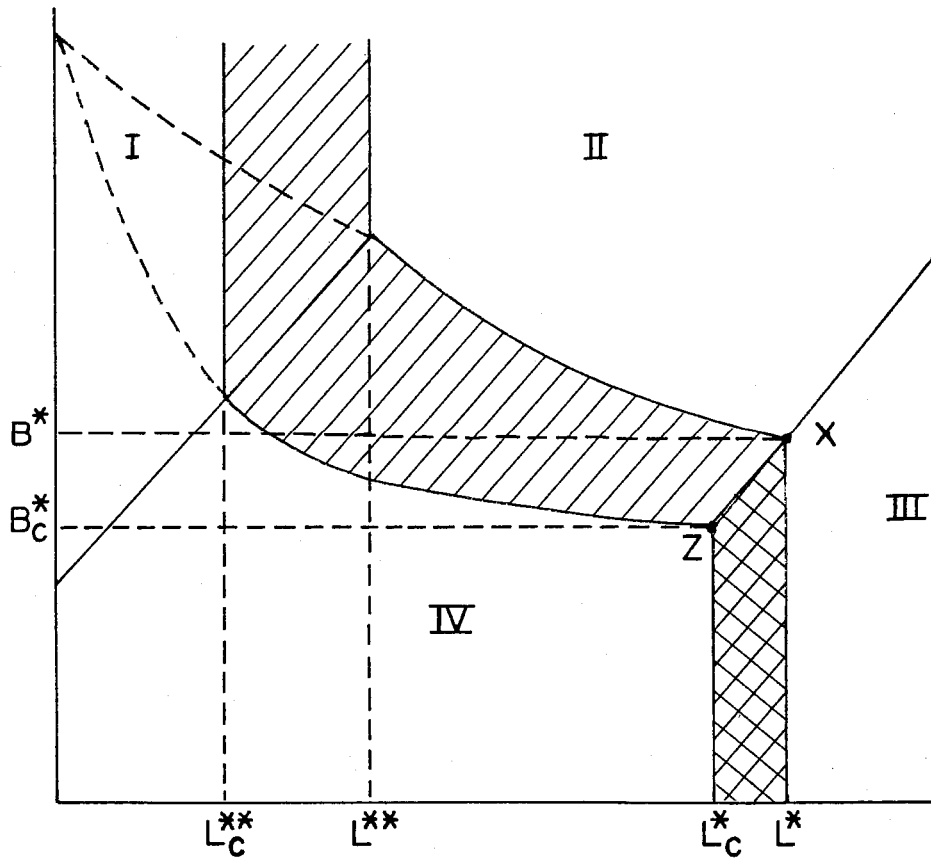


government to adjust irrespective of the country's overhang status is given by L^* . The Appendix shows that L^* is linked to the parameters of the model in a determinate manner:

$$L^* = L^*(\phi^+, \theta^-, \beta^-, K^+) \quad (2)$$

Naturally, the smaller the productivity benefit of adjustment θ is, and the higher its short-run costs K , the larger will be the adjustment-triggering level of lending. Note that L^* is increasing in ϕ , the cost of default; the reason is that ϕ sets the maximum debt service the government is willing to undertake and therefore determines the net return to investment in the second period.

FIGURE 2
SECOND-PERIOD OUTCOMES WITH ADJUSTMENT BUT NO OVERHANG



If the debtor is provided with less than L° in new lending, it may still choose to adjust. But it will do so only if it also receives enough debt reduction to eliminate the overhang. This is shown in Figure 1. When $L^{**} \leq L < L^\circ$, a B high enough to eliminate the overhang will push the debtor from zone IV (no adjustment and overhang) to zone II (adjustment and no overhang). Debt reduction enhances the adjustment incentive in this region because the implicit investment tax (discussed previously) goes away when the overhang disappears. In the absence of the overhang, the productivity benefit of adjustment appears larger.

When the availability of new lending falls below L^{**} , however, no amount of debt reduction will be enough to prompt the debtor to adjust.⁵ In this case, the inability to smooth consumption through borrowing shows its bite. In the absence of borrowing, the marginal utility of consumption stays high enough in the first period relative to the second period to leave adjustment a bad bargain. The magnitude of B can then determine only whether or not the debtor remains in overhang.

To summarize, we note some of the key features of the outcomes depicted in Figure 1. First, debtor government will always choose to adjust for a sufficiently large amount of new lending, even in the absence of conditionality. The primary reason is that adjustment is assumed to be a good bargain for the country when it can borrow at world interest rates. Second, a sufficiently large amount of debt reduction will always eliminate the overhang. Still, the country generally needs both new money and debt reduction to eliminate the overhang and get the government to adjust (that is, to reach zone II). One alone will not always do the trick. New money tends to enhance the incentive to adjust by alleviating the short-run costs, but it renders overhang more likely down the line. Debt reduction works against the overhang but has uncertain effects on the incentive to adjust. In terms of Figure 1, debt reduction increases the likelihood of adjustment only when L lies between L^{**} and L° . The appropriate strategy, therefore, must involve a bit of both.

With Conditionality

The results under conditional lending are qualitatively very similar to those just discussed. In particular, the basic geometry of the partitions in Figure 1 remains unchanged (save for some second-order differences discussed in the Appendix). Once again, both debt reduction and new

⁵ Formally, there is no guarantee that L^{**} will be positive. We assume for this discussion that it is.

lending are required to achieve debt reduction and simultaneously to eliminate the overhang.

Conditionality, however, has important effects on the sizes of the various zones in Figure 1. Conditionality enlarges the set of (B, L) combinations under which the debtor government finds it advantageous to adjust. Therefore, the no-adjustment zones (I and IV) shrink in favor of the adjustment zones (II and III). The enlargement is indicated in Figure 2 by the shaded areas: zone II (adjustment with no overhang) is now larger by the single-hatched area, and zone III (adjustment with overhang) is now larger by the double-hatched area.

The reason is easy to understand. Conditionality changes the nature of the bargain between creditors and the debtor government by making the package conditional on adjustment being undertaken. It therefore alters the cost-benefit calculus of the government, which has now to compare the cost of adjustment against the cost of having to give up external financing. When the choice is between adjusting with new money and not adjusting without new money, it will take a lower amount of external financing to purchase adjustment compared to the case in which new money is disbursed unconditionally. Moreover, we shall show that the debtor could end up being better off with conditionality, as the alternative may be no deal at all once the creditors' behavior is endogenized. For similar discussions of conditionality, see Sachs (1989) and Claessens and Diwan (1990).

As in the previous case, we can define the minimum amount of new lending required to purchase adjustment, irrespective of overhang status. It is denoted by L_c° in Figure 2, with the subscript indicating that it applies to the case of conditional lending. In the Appendix, it is shown that L_c° has the same qualitative properties as L° , except that it is always smaller:

$$L_c^\circ = L_c^\circ(\overset{+}{\phi}, \overset{-}{\theta}, \overset{-}{\beta}, \overset{+}{K}) < L^\circ. \quad (3)$$

Once again, the debtor will adjust for $L_c^{\circ\circ} \leq L < L_c^\circ$, but only if sufficient debt reduction is provided to eliminate the overhang. For any given L , however, less debt reduction is necessary for this purpose, just as less new money is now required to prompt adjustment (see Figure 2). Note, finally, that $L_c^{\circ\circ} < L^{\circ\circ}$.

The presence of conditionality therefore reduces the magnitude of lending required to elicit adjustment policies from the debtor. We shall show in the next chapter that this greatly increases the likelihood that there will be efficiency-enhancing bargains between debtors and creditors.

3 WHAT KINDS OF CREDITOR-DEBTOR DEALS ARE POSSIBLE?

In the previous chapter, we looked at the debtor's behavior in response to combinations of new money and debt reduction offered by creditors. The debtor's decision on adjustment, together with the package offered by the creditors, determined whether the overhang would be eliminated. We now turn to the behavior of the creditors themselves. We focus, first, on the case without conditionality and ask under what circumstances commercial banks will have the incentive to offer a package of new money and debt reduction and what such a package would look like. In other words, we ask under what circumstances the debtor government and the banks can reach mutually advantageous bargains in the absence of conditionality. The answers to these questions will provide the benchmark against which to evaluate the possible bargains with IFI conditionality.

Without Conditionality

Let us assume that commercial banks can overcome the coordination problem inherent in their interactions with the debtor government and can thus act collectively. We should expect them to be aware of the possibility, portrayed in Figure 1, that they can influence the behavior of the government by offering an appropriate package of new money and debt reduction. Let us first discuss the returns to banks in different zones of Figure 1.

When the country is in overhang, the face value of the debt outstanding is irrelevant to the banks' payoffs. We denote by α the net transfer, expressed as a proportion of the debtor's GDP, that creditors receive in the case of overhang. As discussed earlier, this transfer is probably small at the margin. The regression results in Table 3 suggest that α is around 1.8 percent for creditors as a whole. The transfer is bounded above by the cost incurred by the debtors, ϕ , because that cost includes deadweight losses such as the loss of trade credits and foregone trading opportunities. The banks' payoff in period two can therefore be written as

$$\pi(B, L) = \begin{cases} \alpha Y(1 + \theta) - RL, & \text{when the country adjusts (zone III)} \\ \alpha Y - RL, & \text{otherwise (zone IV)}. \end{cases} \quad (4)$$

Note that banks' payoffs are independent of B as long as the overhang prevails, because B affects only the face value of the debt in this case. Also note that the opportunity cost of the new money, RL , should be subtracted from period-two payoffs. Giving new money makes sense to the banks only if it makes the country adjust. Such "defensive lending" is meant to increase the share of the old debt that will be repaid (Krugman, 1985). Expression (4) makes it clear that the banks' iso-profit loci are vertical lines in zones III and IV, where there is overhang. For lower L (less new lending), bank payoffs are higher.

In the no-overhang zones, the analogous expression for bank payoffs is

$$\pi(B, L) = R(D - B) \text{ (zones I and II) .} \quad (5)$$

L does not enter this expression because we assume that the interest charged on the new loans matches the opportunity cost of funds, making banks indifferent to lending when they can recover their money. We could have assumed that banks receive excess payoffs on their loans to creditworthy clients without altering qualitatively any of the subsequent results. In any case, expression (5) makes bank iso-profit curves horizontal lines in zones I and II, with lower lines representing higher payoffs.

To abstract from bargaining issues, let us suppose that banks move first and can make a take-it-or-leave-it offer to the debtor country. What will they do? By inspecting Figures 1 and 2 in conjunction with the bank iso-profit lines, we can see that there are three possibilities:

(1) No deal. This outcome is represented by the origin in Figures 1 and 2, with $B = L = 0$. In this case, the government chooses not to adjust, and the country remains in overhang. Incidentally, a small amount of debt reduction (small in that it does not push us into zone I) would not hurt the banks or benefit the country, as it would not affect the country's decision concerning repayment in the second period.⁶

(2) The banks offer a package that consists of L^* new money and debt reduction ranging between zero and B^* . One such package is indicated by point X in Figure 2. The country gets enough financing to adjust, but the banks are indifferent as to whether or not the overhang

⁶ This is due to the absence of uncertainty in this model. When period-two outcomes are uncertain, hanging on to the higher face value has an option value for the banks, arising from the possibility that the debt will be serviced fully in some good state of nature.

is eliminated, because they can extract no more than $\alpha Y(1 + \theta)$ from the country; they get the same return whether they provide debt reduction (the minimum needed to eliminate the overhang), no debt reduction at all, or something between the two.

(3) The banks offer a package that consists of $\hat{L} < L^*$, and $\hat{B} < B^*$, but just enough to eliminate the overhang and induce the country to adjust. This package is shown as point Y in Figure 1. It puts us just inside zone II, eliminating the overhang while ensuring adjustment. Such a package is feasible only when the border separating zones II and IV has an interior minimum, as in Figure 1, or is positively sloped throughout.⁷ Banks want to ensure that the overhang is eliminated in this case, unlike case (2) above; otherwise, the country would rationally choose not to adjust, reducing the banks' payoff. A slight reduction in B starting from point Y would put the country in a no-adjustment zone.

In summary, the alternative offers are (1) no deal, (2) a package that ensures adjustment but may or may not eliminate the overhang, and (3) a package that ensures both adjustment and return to creditworthiness. One of these three will dominate all other possible deals.

We have next to determine whether packages like (2) and (3) dominate the no-deal option. The critical consideration here is the fact that, even when the overhang is eliminated, banks can extract no more than the fraction, α , of the increment in domestic output, θY , resulting from adjustment. Consequently, they will have no incentive to spend more than this amount to "purchase" adjustment.

This can be put a bit more formally. Consider bank payoffs when the package (B^*, L^*) is offered. They are $\pi(B^*, L^*) = \pi(0, L^*) = \alpha Y(1 + \theta) - RL^*$. With no deal, banks get $\pi(0, 0) = \alpha Y$. Therefore, the condition for the package to be offered is $\alpha Y(1 + \theta) - RL^* \geq \alpha Y$, implying

$$L^*(\phi, \theta, \beta, K) \leq \alpha \theta Y / R . \quad (6)$$

The right-hand side is the discounted value of the fraction of the productivity increase captured by the creditors. The left-hand side is the amount of new lending. This condition has a straightforward intuitive explanation. The minimum amount of new money required to induce the country to adjust must be less than the additional payment to the creditors when the debtor does adjust. If L^* falls short of this value, banks will offer a deal.

⁷ See the Appendix for a discussion of this issue.

It can be shown that an increase in the effectiveness of adjustment policy, θ , and in the share of the debtor's income transferred to creditors, α , make it easier for this condition to be fulfilled. Correspondingly, an increase in the cost of default, ϕ , and in the short-run cost of adjustment, K , render the condition more stringent.

What kind of practical guidance does expression (6) provide as to the likelihood of a mutually advantageous deal? The right-hand side of the inequality depends on two critical parameters, α and θ , both of which are observable in principle. For α , a range of 1 to 4 percent of GDP would seem reasonable for most highly indebted countries. The marginal α , as estimated in Table 3, is about 1.8 percent, while the average α is somewhat larger. An estimate of θ , which measures the permanent productivity benefit of adjustment, can be made by conventional techniques, such as those used at the World Bank and the IMF. Let us assume, to be generous, that adjustment can increase the level of output permanently by something in the range of 10 to 40 percentage points. Further, we take R to be 1.1.

Putting all these pieces together, we get the numbers shown in Table 5. These numbers satisfy the sufficient condition (6). The table should be read as follows: For example, when α is 2 percent and adjustment provides a 20-percent permanent increase in the debtor's income, the largest increase in exposure banks are willing to accept during the whole adjustment period is 0.36 percent of the country's GDP. If this amount of new money is enough to make the country undertake the required adjustment once the money is disbursed, then banks will be willing to offer such a package. Because adjustment episodes cannot be expected to succeed in fewer than three to five years, the numbers in the table must be divided by a factor of three to five to yield the maximum annual disbursement that banks will be willing to offer. This translates into very small annual flows, much smaller than the amounts countries regularly obtain from the IFIs in exchange for adjustment programs.

Hence, these illustrative calculations are not encouraging with respect to the likelihood that banks and debtor countries will discover mutually advantageous bargains on their own. The main problems are twofold. First, when the creditors' share of the productivity gain from adjustment is small, their incentive to put up new money to "purchase" adjustment is correspondingly low.⁸ Second, when debtors are credit

⁸ In fact, taken literally, the results in Table 3 suggest that, at the margin, α may not be different from zero for commercial creditors. This would rule out the possibility that banks, acting on their own, would be willing to offer any new money.

TABLE 5
UPPER BOUNDS ON L^*/Y
(percentage points)

Creditors' Share of Income (α)				
θ	1	2	3	4
10	0.09	0.18	0.27	0.36
20	0.18	0.36	0.54	0.73
30	0.27	0.54	0.82	1.09
40	0.36	0.73	1.09	1.45

NOTE: θ is the permanent increase in the level of GDP due to adjustment.

constrained, a lot of new money is needed to induce them to undertake adjustment; they would rather use the money to increase consumption.⁹

With Conditionality

The inclusion of IFIs in creditor-debtor arrangements may help with both problems mentioned above. It will help with the first if the IFIs are somehow better than commercial banks at capturing part of the increase in the debtor's income. The regressions results in Table 3 suggest that this may be the case. More importantly, thanks to conditionality, IFI participation will help with the second problem. The presence of conditionality relaxes substantially the constraint embodied in expression (6).

To see this effect, consider the type of package that creditors might be willing to offer the government when conditionality is present. The relevant options are (1) no deal ($L = B = 0$) and (2) a package that consists of $L = L_c^*$ and (B between 0 and B_c^*). Other options are dominated by one of these two because creditors' profits are increasing in the southern direction in zone II and because the slope of the border separating zones II and IV is unambiguously negative under conditionality (see the Appendix).

The creditors will prefer a debt package to inaction under a condition analogous to the previous one, namely,

$$L_c^*(\phi, \theta, \beta, K) \leq \alpha\theta Y/R . \quad (7)$$

⁹ There is also a distinct possibility that the creditor group as a whole would not be able to provide an efficient level of new money because of coordination problems within the group. Each bank has an incentive to free ride on other banks' contributions without providing a fair share of the burden (see, for example, Sachs, 1986).

But $L_c^\circ < L^\circ$, as shown previously, so this is a less restrictive condition than the one in the absence of conditionality. In other words, conditionality expands the range of mutually beneficial bargains between banks and the debtor government. This is because less new money is required to purchase adjustment when lending is conditional.

For conditionality to make much difference in practice, however, the gap between L_c° and L° has to be a meaningful number. Can we say anything about the size of the gap?

We can arrive at some rough approximations by undertaking a few manipulations. Remember that L° is defined as the level of new lending that makes the debtor indifferent between adjusting (thereby incurring the short-term cost K) and not adjusting (thereby foregoing the productivity improvement θ). Therefore, L° is implicitly defined by

$$U(Y + L^\circ - K) + \beta(1 - \phi)Y(1 + \theta) = U(Y + L^\circ) + \beta(1 - \phi)Y .$$

Similarly, L_c° is implicitly defined by

$$U(Y + L_c^\circ - K) + \beta(1 - \phi)Y(1 + \theta) = U(Y) + \beta(1 - \phi)Y .$$

(Note that $L = 0$ in the conditional case if the debtor chooses not to adjust.) Combining these two equations, we can write

$$U(Y + L^\circ) - U(Y + L^\circ - K) = U(Y) - U(Y + L_c^\circ - K) .$$

Now assume that utility is logarithmic. Rearranging terms, we get

$$\log(Y + L^\circ) - \log Y = \log(Y + L^\circ - K) - \log(Y + L_c^\circ - K) .$$

We can interpret each side of this equation as approximating a percentage change. As long as L° , L_c° and K are small relative to Y , this will not be a bad approximation. Hence,

$$L^\circ/Y \approx (L^\circ - L_c^\circ)/(Y + L_c^\circ - K) ,$$

and simplification yields

$$L_c^\circ/L^\circ \approx K/(Y + L^\circ) . \tag{8}$$

This is an interesting result, showing that the ratio of L_c° to L° is roughly of the order of the short-run adjustment cost relative to GDP. As it is difficult to imagine that adjustment costs will exceed 10 percent of income, L_c° will normally be a very small fraction of L° . In fact, the evidence in Table 4 suggests that K may be of the order of 2 percent of GDP. Correspondingly, L_c°/L° must be very small. If this illustrative calculation is any guide, conditionality can make a big difference indeed. By greatly reducing the requisite inflow of new money, it

considerably enlarges the parameter space within which a mutually advantageous bargain between creditors and debtors becomes possible.

An important caveat, of course, is that conditionality must be relatively effective or at least be perceived as such. There is a vast literature on conditionality that makes it clear the process rarely operates in the idealized fashion we have modeled here.¹⁰ World Bank and IMF studies tend to claim limited success for adjustment programs, but other analysts have raised questions about these conclusions. The main empirical difficulty is that it is not easy to isolate the effect of adjustment lending from other phenomena affecting a country's performance, such as external shocks, prevailing distortions, and the extent of involvement of other lenders.

Because conditionality cannot be perfect, the IFIs are exposed to two sources of risk. The first is the risk that conditionality will not work because of weak monitoring or faulty design. We say nothing in this study about the ways to reduce this type of risk. The second risk is that the IFIs' loans will not be fully repaid because the line of creditors is too long relative to the debtor's repayment capacity. The core of our analysis is concerned with the reduction of this second risk.

IFIs as Sources of Economic Information

IFI participation can have other advantages besides conditionality. In particular, IFIs can play a positive role by acquiring and disseminating useful economic information. Mutually advantageous bargains can be ruled out not only by the inability of governments to commit themselves credibly to adjustment, but also by asymmetric information.

In general, commercial banks are poor judges of the cost of adjustment, K , or the productivity enhancement, θ , in individual countries. Under asymmetric information of this sort, they are likely to be more conservative in spending new money than they would have been under complete information. This is all the more likely because debtors will have the incentive to "cheat" by claiming low K or high θ , factors that make adjustment more likely and profitable, in order to qualify for new loans. In a "pooling" equilibrium, deserving countries will be denied mutually beneficial packages. In a "separating" equilibrium, countries

¹⁰ Particularly informative are Polak (1991), Kenen (1986), Sachs (1989), Finch (1989), and the reports on adjustment lending by the World Bank (1988, 1990, and 1992). For a game-theoretic treatment of conditionality, see Mosley (1987).

will have to invest in costly signals to qualify for those packages.¹¹ In either case, some efficient outcomes will be ruled out.

The IFIs themselves cannot observe perfectly all of the relevant debtor characteristics. They can be somewhat better than the banks at monitoring debtors, however, in view of the specialized skills and different incentives of their staff.¹² Debtor countries are subject to almost continuous analysis by desk economists in the IFIs. To the extent that IFIs can disseminate “harder” information, they will allow some deals to be struck that may have otherwise been missed.

Distributional Implications of Conditionality

Consider the effect of conditionality on the debtor’s welfare. The debtor’s welfare is increasing in L as long as the debtor remains credit constrained, and it is also increasing in B in the no-overhang regions (in the presence of an overhang, changes in B have no effect). Therefore, the debtor becomes better off as we move in the northeasterly direction in Figures 1 and 2. This leads to the important conclusion that, as long as banks choose not to offer a deal in the absence of conditionality, the debtor country will always be at least as well off with conditionality as without. In this instance, conditionality benefits the debtor because it provides it with the ability to precommit and therefore avoid the damage caused by the dynamic inconsistency of adjustment policy. Note, however, that, when creditors move first and can make a take-it-or-leave-it offer, they can skim off the entire surplus from the debtor; when the debtor is offered (L_c^*, B_c^*) , it is indifferent between adjusting and no deal. In practice, the surplus is likely to be shared between the creditors and the debtor.

There is another possibility. Suppose that banks offer a package that includes both debt reduction and new money, even in the absence of IFI involvement. In terms of Figure 2, the point X will offer a higher return to the banks than if they do nothing. With conditional lending, the banks can do better; they can offer a package consisting of lower L and lower B . The banks will now be better off, whereas the debtor government will be worse off. In this case, banks will have been willing to “bribe” the government to adjust, and conditionality will have

¹¹ Acharya and Diwan (1989) study the possibility that market-based debt buybacks are used to signal the willingness of a country to undertake adjustment. Rodrik (1989) analyzes the case of a well-meaning government attempting to distinguish itself from a purely redistributive government that is not interested in reform.

¹² See Gwyne (1986) for a now classic account of the short-sightedness in commercial-bank lending practices.

reduced the needed bribe. Note that banks in this situation will now have the incentive to “game” against the IFIs, trying to draw them into the action. The debtor will be harmed if they succeed, however, which was not so in the previous case.¹³

Our second conclusion is, therefore, that conditionality and IFI involvement will not always improve the outcome from the combined perspective of the banks and the debtor. The debtor, in particular, can be made worse off. The essential criterion is whether the banks are willing to offer a package in the absence of IFI involvement. If not, IFI involvement will improve matters for both sides as long as there are genuine efficiency gains initially. If the banks offer a package without IFI involvement, the IFIs would have to set conditions to ensure that the gains are not appropriated disproportionately by the banks. Remember, however, that the second situation is unlikely in view of the illustrative calculations given above. Hence, the chance that IFI involvement will actually hurt the debtors is perhaps not great.¹⁴

Does Conditionality Require Lending by IFIs?

One point has thus far been finessed in the discussion. Why could IFIs not simply put their imprimatur on adjustment programs and monitor program implementation, without lending money? We have seen, after all, that, once conditionality is in place, commercial banks should be willing to come up with the requisite new lending, provided there are efficiency gains.

A situation in which IFIs provide only conditionality and no money of their own, however, is unlikely to be acceptable to either the banks or the debtor government. Consider the banks first. Commercial banks are apt to be suspicious of the quality of the monitoring done by the IFIs if the latter have little incentive to do a good job. They will naturally want the IFIs to put their own resources at risk alongside those of the banks. The debtor governments, for their part, are less likely to accept conditionality imposed by a foreign institution, with all the meddling in domestic policy that this entails, when it comes without any resources directly attached to it. The IFIs are often suspected of doing the commercial banks’ dirty work for them; if conditionality

¹³ This point is developed in Claessens and Diwan (1990).

¹⁴ Bulow and Rogoff (1989b) argue that, because creditor-country taxpayers have a vested interest in maintaining normal trade with the debtor country, they can sometimes be bargained into making side payments to both lenders and borrowers through disbursements by the IFIs.

comes without money, what better proof can there be that this is indeed the case?

Another reason why IFIs provide money is to protect their previous exposure. Remember that the primary motive for banks to lend good money after bad is to improve the chances of recovering previous debts. The IFIs may have a similar incentive.

4 THE DESIGN OF DEBT-RELIEF PACKAGES

In their roles as creditors, commercial banks and IFIs differ in at least two respects. First, the prior exposure of the IFIs to the debtor may be substantially different from that of the bank group. Second, IFIs do not, as a rule, provide debt and debt-service reduction. These differences between the two groups raise questions regarding the distribution of the burden of debt relief between them. What is an appropriate burden-sharing rule when the two classes of creditors differ in these respects? How do the basic parameters of the debt-relief package—the share of new money coming from IFIs, the magnitude of DDSR—relate to the distribution of the burden between the two classes? When is a “fair” distribution of the burden compatible with the elimination of the debt overhang?

Answers to these questions are critical for designing packages that achieve their objective. To provide a framework, we build on the results of the previous chapters and proceed step by step to consider the various elements of a package. Starting in this chapter with the simplest case, we consider a package in which the proportion, τ , of the new money L is supplied by IFIs and $(1 - \tau)L$ is provided by the commercial banks. In addition, banks undertake to write off B amount of debt. This is tantamount to a portion of the debt being retired at a price of zero. In the next chapter, we shall consider arrangements more reminiscent of actual Brady deals, in which debt is retired at a positive price and IFIs provide the resources necessary for the repurchase.

The IFIs will not provide conditional loans unless they are assured of receiving some minimum repayment. In general, this repayment may be smaller than the cost of capital if the IFIs’ objective function also includes other elements such as the welfare of the debtor countries or the preservation of international trade. Still, some measure of profitability must certainly be one of the IFIs’ objectives in the long run.

An important ingredient of the analysis is the relative seniority of IFI and commercial debt. Our crucial assumption is that the repayment to the IFIs will be reduced in the presence of a large commercial debt. As a result, the IFIs will not make loans to over-indebted countries unless the previous creditors provide some debt relief. This assumption is satisfied when IFIs are not senior to commercial creditors in a

strictly me-first sense. There is no firm evidence on the issue of seniority, but recent work casts serious doubt on IFI seniority. Demirguc-Kunt and Fernandez-Arias (1992) find that the disbursement of IFIs' loans to noncreditworthy countries does not have any significant effect on the price of commercial debt in the secondary market, suggesting that such loans are in fact junior. By contrast, official bilateral debt significantly reduces the price. Bulow and Rogoff (1992) argue that IFIs will be treated as senior as long as their claims on a country are small enough to allow for positive future net disbursements and as long as bilateral donors find the services rendered by the IFIs valuable enough for the donors to earmark disbursements to the debtor so the debtor can meet his obligations to the IFIs. In other cases, however, they argue that IFIs are unlikely to be repaid first.

We can see from Tables 1 and 2 that the IFIs' and bilateral lenders' share of new money was larger than that of commercial lenders proportional to exposures. As a result, the former's share of total debt increased over time. To understand how different types of arrangements divide the burden and the future payoff between the two categories of lenders, we begin with the case in which the IFIs have no prior exposure to the problem debtor.

When IFIs Have No Prior Exposure

In the case of no prior exposure, IFIs have no interest in defensive lending. If they are nonetheless compelled to lend, they must be guaranteed full repayment. Otherwise, they would end up subsidizing commercial banks. Full repayment, in turn, can be guaranteed only when the debtor's overhang is eliminated. A debt package in this case therefore requires that the commercial banks provide enough DDSR to eliminate the overhang and return the debtor to full creditworthiness.

To understand these points, consider the return to the IFIs when they provide $L = L_c^*$, the minimum amount of new money needed to induce the debtor to adjust. When the overhang is eliminated, which occurs when the commercial banks provide DDSR of exactly B_c^* , the IFIs are repaid in full. They receive τRL_c^* . If banks provide DDSR smaller than B_c^* , the country still adjusts but remains in overhang. Because IFIs are unlikely to be treated in practice as fully senior to commercial banks, assume that they receive only a prorated share of total repayments. This works out to be

$$[\tau L_c^*/(D - B + L_c^*)][\alpha\theta Y(1 + \theta)] ,$$

which falls short of full repayment.

In the latter case, IFIs effectively end up subsidizing the banks. To see this, note that the return to the banks when the overhang is eliminated through debt reduction is

$$R(D - B_c^*) = \alpha Y(1 + \theta) - RL_c^* .$$

The appropriately prorated return when the overhang remains is

$$\{[D + (1 - \tau)L_c^*]/(D + L_c^*)\}[\alpha Y(1 + \theta)] .$$

With a bit of algebra, it can be shown that

$$\alpha Y(1 + \theta) - RL_c^* < \{[D + (1 - \tau)L_c^*]/(D + L_c^*)\}[\alpha Y(1 + \theta)]$$

for any feasible value of τ , because $R(D + L) > \alpha Y(1 + \theta)$. Therefore, banks will actually prefer to maintain the debtor in overhang when IFI conditionality buys adjustment, as this is a way of transferring resources from the IFIs to themselves. For this to happen, however, the IFIs must be willing to accept less than the market (or normal) return on their lending to the debtor.

To avoid a cross subsidy from the IFIs to the banks, it is thus necessary that banks provide sufficient debt reduction (here B_c^*) so as to eliminate the overhang completely. In other words, IFIs can make the normal return on their loan only if the banks complement the IFI lending by debt reduction large enough to eliminate the overhang. By doing this, banks will be worse off than if they are subsidized by IFIs but better off than if IFIs stay entirely on the sidelines.¹⁵ Moreover, if $L > L_c^*$, so that the debtor also shares in the efficiency gains, we must have $B > B_c^*$ to ensure elimination of the overhang. In this case, each additional dollar of new money has to be matched by an extra dollar of debt reduction (see Figure 2).

When IFIs Have Prior Exposure

In more realistic cases, IFIs will also have some prior exposure to the problem debtor. Consequently, they will be asked to partake in the net burden of the debt package. When they do so, some of the logic of the previous argument survives in an appropriately amended fashion. Under an intuitive “fairness” criterion defined below, commercial banks have to provide a certain amount of debt reduction as long as the IFIs’ share of new money exceeds their share of the existing debt. An impor-

¹⁵ To see that banks are still better off having a deal even when IFIs require them to undertake sufficient debt reduction to eliminate the overhang, note that $R(D - B_c^*) = \alpha Y(1 + \theta) - RL_c^* > \alpha Y$, because $L_c^* < \alpha \theta Y/R$ as long as efficiency gains exist from a debt package; compare expression (7).

tant corollary, however, is that the debtor will have to remain in overhang after the deal is completed.

To clarify these points, we derive the set of feasible bargains that can be struck between the commercial creditors and IFIs. We start by noting that, when conditionality is imposed, debt reduction does not affect the adjustment behavior of the debtor country. It only changes the distribution of future debt service between creditors. Creditors that offer debt reduction in effect reduce their future claim on the pool of resources to be paid out, $\alpha Y(1 + \theta)$. Unless the IFIs get a large enough return on their involvement, they can threaten to withhold support. Similarly, unless the banks get a large enough share, it will be in their interest to remain on the sidelines. Generally, there are many arrangements that satisfy these two constraints.

We first derive the IFIs' participation constraint. The IFIs will not impose conditionality and finance a share of the new money required if their payoff will be decreased by the operation. We argued above that this rule is likely to apply even when taken with a grain of salt. We simply assume that IFI participation occurs whenever

$$\omega\alpha Y \leq \omega'\alpha Y(1 + \theta) - \tau RL ,$$

where ω is the proportion of debt initially held by IFIs and $\omega' = (\omega D + \tau L)/(D - B + L)$ is the post-deal IFI exposure. The inequality is satisfied whenever the net return to IFIs with the package exceeds or equals the net return without the package. This defines the combination of minimum debt relief, B , and maximum share in new money, τ , that is necessary for IFIs to get involved. Treating the inequality as an equation, we get the IFIs' indifference frontier shown in Figure 3:

$$B^{\min} = B(\tau, L, \omega, \alpha, \theta) .$$

Note that B^{\min} can be zero when ω is large enough or L and τ are small enough.

Similarly, the banks' participation constraint requires that they do better with the package than without it, that

$$(1 - \omega)\alpha Y \leq (1 - \omega')\alpha Y(1 + \theta) - (1 - \tau)RL - RBp' ,$$

where p' is the expected ex post price of debt given by

$$p' = \alpha Y(1 + \theta)/R(D - B + L) .$$

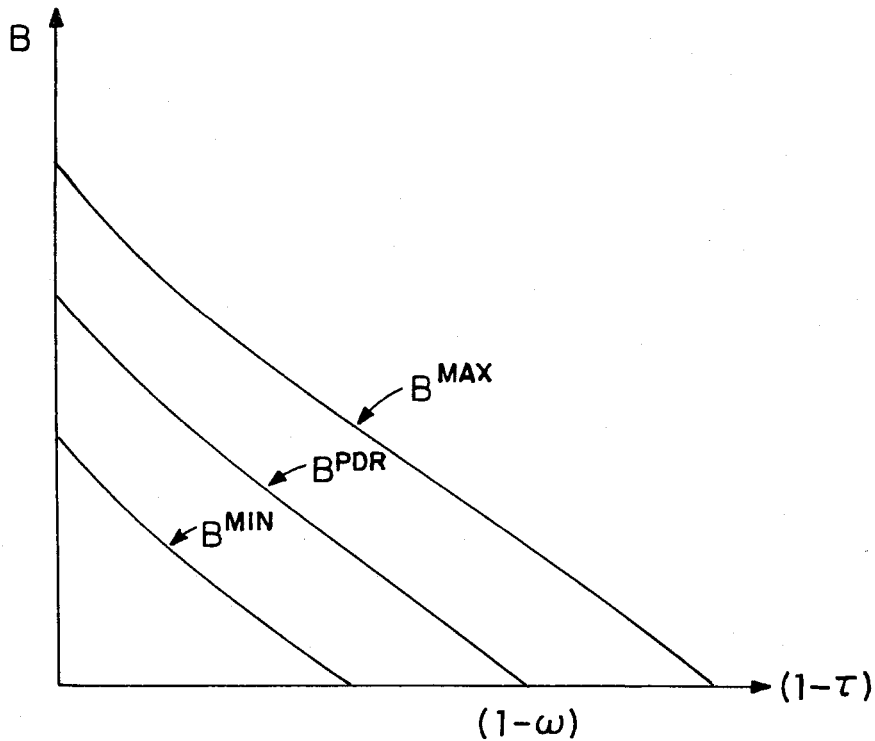
This defines the maximum combination of DDSR, B^{\max} , and new loans, $(1 - \tau)L$, that can be offered by banks:

$$B^{\max} = B(\tau, L, \omega, \alpha, \theta).$$

The acceptable combinations of (B, τ) are represented in Figure 3. All the points between the banks' (B^{\max}) and the IFIs' (B^{\min}) reservation constraints are feasible a priori. In general, the higher the share of new loans financed by the IFIs, the larger the required debt reduction from the banks.

We now investigate a particular division of the gains from the program between the two classes of creditors, called the proportional-distribution rule (PDR). Under PDR, payoffs to the creditors must be shared in proportion to initial exposure. This may also be viewed as a "fair" burden-sharing rule, although the meaning of fairness in the present context is not at all clear; the efficiency gains generated by IFIs' conditionality have to be split among three parties: the country, the banks, and the IFIs themselves. Nonetheless, we find PDR to be a useful intuitive benchmark when discussing fairness in burden sharing.

FIGURE 3
SECOND-PERIOD OUTCOMES WITH ADJUSTMENT AND OVERHANG



Define p as the pre-deal secondary-market price, $p = \alpha Y/RD$. The net financial gains from the program, T , are given by the difference between the capital gain on the existing stock of debt, $RD(p' - p)$, and the capital losses on the new loans, $RL(1 - p')$, and on the forgiven debt, RBp' . It can be shown that the net financial gain, $T = RD(p' - p) - RL(1 - p') - RBp'$ is equal to the real gain, $\alpha Y - RL$, using the definitions of p and p' . Because the IFIs do not engage in debt relief, the net payoff to them, I , is given by the difference between a share ω of the total capital gain and a share τ of the loss on new loans. PDR requires that

$$\omega = \frac{I}{T} = \frac{\omega D(p' - p) - \tau L(1 - p')}{D(p' - p) - L(1 - p') - Bp'} , \quad (9)$$

which can be rewritten as

$$\frac{B}{L} = \frac{(\tau - \omega)}{\omega} \frac{(1 - p')}{p'} . \quad (10)$$

Because all creditors share proportionally in the net financial gain under PDR, the net payoff per dollar of exposure is the same for all of them. To see this, note that the payoff to the IFIs per dollar of exposure is given by $(I + \omega Dp)/\omega RD$, and, under fair burden sharing (that is, using [9]), this is equal to

$$(T\omega + \omega Dp)/\omega RD = [\alpha Y(1 + \theta) - RL]/RD \equiv f . \quad (11)$$

Similarly, it is easy to show that the banks also receive f per dollar of initial exposure. Thus f can be interpreted as the “fair” exit price, equal to the future payoff per dollar of debt if the country adjusts, net of the present value of the required new loans.

Equation (10) can be used to derive the following implications of PDR: First, when $\tau = \omega$, that is, the share of the new loan provided by the IFIs is equal to their initial exposure share, debt reduction is unnecessary, that is, $B = 0$. The reason for this result is simple. When the sharing of the burden of providing new loans is “fair,” the sharing of the future payoff will also be “fair.” In these circumstances, it will be “unfair” to ask the commercial creditors for some further contribution in terms of debt relief.

Second, when $\tau > \omega$, that is, when the IFIs provide a more-than-proportionate share of the new money, then B must necessarily be positive. In this situation, banks must bear an additional burden to make up for their proportionally smaller loss on the new loan. This can be done by restricting the banks’ share of the future payoff, and DDSR

will do that. This rule can be also turned around. When banks offer debt relief, PDR requires that their loss be made up by reducing their share of the new loan.

Third, as long as $\omega > 0$ and $\tau > \omega$, the debtor *must* remain in overhang after the debt deal is completed. The reason is that the IFIs must share the burden when $\omega > 0$, but they do not provide DDSR and will thus remain whole unless the new price of debt, p' , remains below unity. The point can also be made by using equation (9). As p' goes to 1, the right-hand side goes to $\omega D(1 - p)/[D(1 - p) - B]$, which is larger than ω . For the same reason, banks cannot be asked under PDR to provide enough debt reduction to return the debtor to full creditworthiness.

In practice, the secondary-market discount has rarely disappeared following deals of the Brady type. This is consistent with the third point above, in that the overhang should disappear under PDR only in the limiting case in which the IFIs have no initial exposure. There may be other reasons, however, for the failure of the debt price to go to unity after a debt deal is completed. One possibility is that IFIs *are* subsidizing the banks by not asking for enough debt reduction. Moreover, we have so far assumed that IFI participation buys conditionality with certainty. In practice, doubts may remain as to the quality of the conditionality, and these will be reflected in the secondary-market discount.

Finally, consider the debtor country's welfare. As argued above, the country may lose if unconditional lending occurs in the absence of IFI involvement. It may thus try to bargain for more new money than L_c° (possibly as much as L°). Note, further, that, although debt reduction does not directly affect economic behavior in the debtor economy, but rather redistributes the burden of financing between different creditors, it may still have indirect effects. When the creditors are locked together in bargaining, there is uncertainty in the debtor country as to whether an adjustment program with external financial support will materialize. This may depress economic activity. A debt-reduction agreement signals that the burden-sharing issue has been resolved and that an adjustment program with adequate support will materialize. The announcement effect then has positive value for the debtor.

5 BRADY DEALS

We now turn to schemes that are closer to actual Brady deals, in which IFIs provide the resources to retire a portion of the debt at some price below par and also provide additional adjustment loans.¹⁶ In the “pure” debt-reduction schemes discussed above, this debt repurchase took place at a zero price. More generally, the repurchase will take place at a negotiated price, δ . We shall show that the efficiency gains of the debt package can be divided between the banks and the IFIs in any desired manner by appropriately selecting the price and the level of debt repurchase. Under “fair” burden sharing, however, the repurchase price must be below the post-deal market price. That in turn necessitates a concerted approach to debt reduction rather than a voluntary approach.

We suppose that the debt package has three components: (1) an adjustment loan of τL_c° from the IFIs, in return for conditionality; (2) an IFI loan to the country of δB , to be used to retire B debt at price $\delta < 1$; and (3) agreement by the banks that they will put up $(1 - \tau)L_c^\circ$ of new money and will sell off B debt at price δ . We shall take τ as given here and look at different pairs of δ and B to see how the deal can be structured to split the gains. We assume that $\tau > \omega$.

The “participation” constraints of the IFIs and the creditor banks, discussed in the previous chapter, now depend on the exit price δ . The IFIs will not participate unless $B \geq B^{\min} = B(\tau, L, \omega, \alpha, \theta, \delta)$, with $\partial B^{\min}/\partial \delta > 0$ as long as δ is small enough. When δ is close enough to p' , the IFIs will be losers. This is discussed more formally below in the context of the proportional-distribution rule. The analogous participation constraint for the banks is given by $B \leq B^{\max} = B(\tau, L, \omega, \alpha, \theta, \delta)$, with $\partial B^{\max}/\partial \delta > 0$ for $\delta < p'$. When δ exceeds p' , banks will of course be happy to sell more debt. Note that the minimum price at which banks are willing to sell the *entire* debt stock is the pre-deal market price, $p = \alpha Y/RD$. The range of feasible, mutually advantageous programs is shown by the shaded area in Figure 4. The closer we move to the B^{\min} schedule, the more the banks benefit from the program. The

¹⁶ For a description of the Brady deals signed by the time of writing this study, see Claessens and Diwan (1992).

figure shows the general tendency for the requisite amount of debt reduction to increase as the repurchase price rises. We also note from Figure 4 that banks are willing to “sell off” as much as B^b of debt at a zero price (that is, to provide B^b of pure debt reduction). Debt buybacks at any price above B^{\min} transfer resources to the banks.

Finally, we repeat the application of the proportional-distribution rule (PDR) to this case of costly debt reduction. The cost of debt reduction, $B\delta$, is financed by the IFIs in addition to their contribution of a share τ of L . In practice, there are limits on the ratio $B\delta/\tau L$, which the World Bank and the IMF set at between 20 and 25 percent. Following the logic of the previous chapter, the PDR now requires

$$\omega = \frac{\omega D(p' - \delta) - \tau L(1 - p') - B\delta(1 - p')}{D(p' - \delta) - (L + B\delta)(1 - p') - B(p' - \delta)}, \quad (12)$$

in which p' is now given by

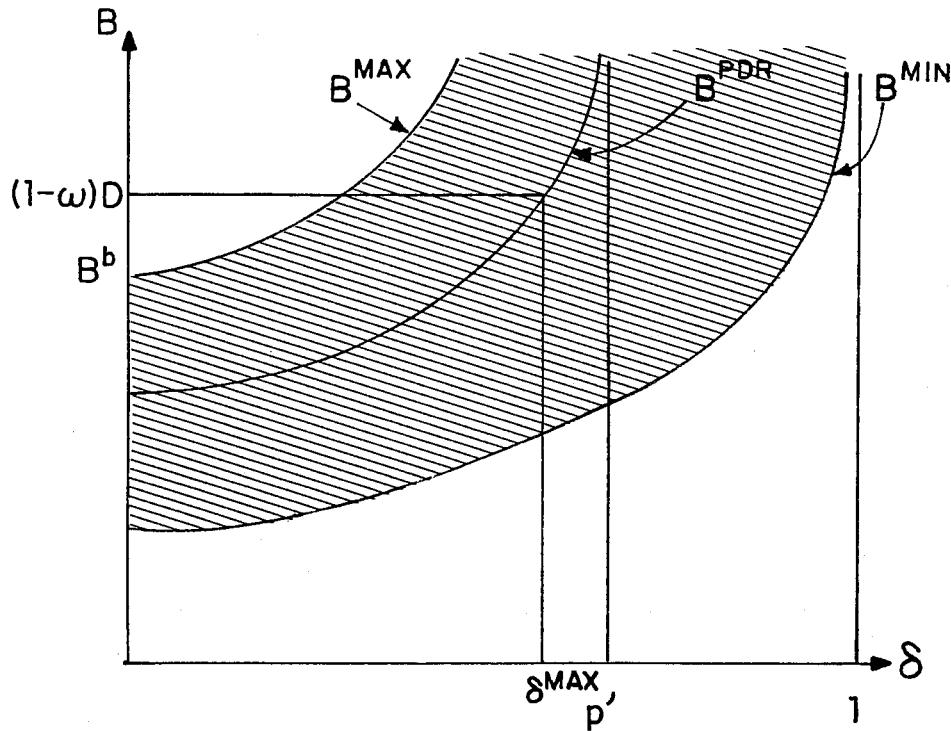
$$p' = \frac{\alpha Y(1 + \theta)}{R[D - B(1 - \delta) + L]}. \quad (13)$$

Some algebra leads to

which is equal to (10) when $\delta = 0$. This expression shows that, under PDR, B must increase as δ increases. That is because banks are now getting an early payoff compared to the pure relief case. As a result, the IFIs require a larger share of the future payoff, and this is achieved with larger buybacks. This arrangement can work, however, only as long as $\delta < p'$ and the implied B is smaller than $(1 - \omega)D$. At some $\delta^{\max} < p'$, the whole commercial debt will have to be retired.¹⁷ One important implication is that PDR is incompatible with δ being set equal to p' . *The “fair” exit price for debt must lie below the post-deal market price.*

¹⁷ Rewriting (14) as $G(B, \delta) = -p'(B)[L(\tau - \omega) + B\omega(1 - \delta) + B\delta] + L(\tau - \omega) + B\delta = 0$, we have $\partial B/\partial \delta = -G_p/G_B$, where $G_p = B[1 - p'(1 - \omega)] > 0$, and $G_B = -(\partial p'/\partial B)[L(\tau - \omega) + Bd(1 - \delta) + B\delta] - p'[\omega(1 - \delta) + \delta] + \delta$, which is negative when δ is small, and equal to zero when δ reaches $\delta^{\max} < p'$. Note that, as τ gets smaller, there is more room for δ to increase before G_B becomes zero. Thus, $B(\delta)$ is convex in δ , with a vertical asymptote at p' . In Figure 4, δ^{\max} can be read as the point at which $B(\delta^{\max})$ is equal to $D(1 - \omega)$.

FIGURE 4
SECOND-PERIOD OUTCOMES WITH OVERHANG BUT NO ADJUSTMENT



Finally, note that the larger $\tau - \omega$ is, that is, the more asymmetric the sharing of the new loans, the lower is δ^{\max} . Thus, the more unfair the distribution of new loans, the smaller must be the price at which debt is retired.

If debt is repurchased on the secondary market, the price that must be paid is p' , the equilibrium price after the debt reduction (Bulow and Rogoff, 1988; Dooley, 1989). No individual creditor would voluntarily sell debt at a lower price. Therefore, deals that require proportional burden sharing cannot rely on market buybacks to achieve the desired debt reduction. Concerted debt reductions must be worked out to overcome this coordination failure. Ideally, each creditor bank would sell a specific share of its claims at a price below the expected ex post price p' . This may prove difficult in practice, however, because free riding remains the dominant strategy for each bank. Any amount of coordination, however, would still represent an improvement over the market approach.

A more important problem with the concerted approach is caused by heterogeneity among the commercial banks. If creditors differ with respect to their valuations of a country's debt, a concerted buyback that does not discriminate among banks and yet does not hurt any bank must occur at the reservation price of the bank with the highest valuation; for a discussion of heterogeneous valuation, see Diwan and Kletzer (1992). Attempts to discriminate between creditors require unobservable information and create moral hazard. The market mechanism is more efficient on this score, in that it allows creditors to self select, with only those with low valuations selling out at a particular offer price. Some of the desirable characteristics of the market-based approach, however, can be included in a concentrated package by offering the banks a menu of choices.

6 THE MENU APPROACH AND BURDEN SHARING AMONG CREDITOR BANKS

Recent agreements have focused on a menu of options from which individual creditors will select after the agreement has been approved. Such a menu is a contract, which may be partly implicit, defining a future opportunity set for the lenders. The menu approach requires that lenders commit to choose ex post from a restricted set of options. By combining concerted and voluntary characteristics, the menu approach to debt reduction retains the advantages, but not the inconveniences, of pure market and concerted mechanisms. In the first round, options and their relative prices are negotiated; in the second round, each creditor freely chooses his preferred option. Overall, the differentiation allowed by the menu produces larger actual relief, given the willingness of the banks as a group to offer debt relief (see Diwan and Spiegel, 1991, for a formal treatment).

For a menu of options to allow individual creditors to choose different options voluntarily, the values of all options must be comparable. Interestingly, this works out mechanically when the menu includes exit and relending options, because each unchosen option becomes more valuable as banks flock to a different one. In equilibrium, all options will have comparable values. The menu approach thus allows us to regard the IFIs as similar to any other creditor, except that they choose to provide new money rather than debt reduction. We shall show that any menu the IFIs and banks voluntarily adopt will necessarily satisfy the PDR. To illustrate this claim, we develop below an equilibrium analysis of the simplest case, in which all commercial banks are similar.

Suppose that the debtor and creditors (including the IFIs) have agreed on a simple menu of options represented by the pair (δ, n) . For each dollar of claim they hold, creditors can choose either to exit at a price δ or to reschedule the loan and lend n additional dollars. To show that both options will have the same value in equilibrium, let D_1 stand for the debt stock after the implementation of the agreement and N for the total amount of new money. We have

$$D_1 = R (D - B + N) , \tag{15}$$

$$p' = \alpha Y(1 + \theta)/D_1 , \tag{16}$$

$$n = N/(D - B) . \tag{17}$$

Lenders choose between the two options in a manner that maximizes the values of their assets subject to the terms of the menu (δ, n) . After the deal is implemented, debt prices are expected to be higher, at $p' > p = \alpha Y/RD$. A creditor that chooses to relend n dollars will have its old claim revalued. Its new claim n , however, will be valued only at p' , implying a capital loss of $(1 - p')$. Thus, the opportunity cost of withholding a unit of debt back from repurchase at price δ is $p'(1 + n) - n$. This implies that, when p' exceeds $(\delta + n)/(1 + n)$, the new-money option is preferable to the exit option. Less debt will then be sold and more new money offered, resulting in less debt reduction than expected. This leads to an increase in D_1 , using equation (15), and thus to a decrease in p' using equation (16). As creditors are price takers when they optimize ex post and because the expected present value of debt, p' , is strictly concave, portfolio-value maximization by the creditors has a unique solution. In equilibrium, we must then have

$$p' = (\delta + n)/(1 + n) . \quad (18)$$

The system of equations (15) to (18) can be solved for B , N , D_1 , and p' as a function of the menu (δ, n) . Any such menu (δ, n) will then produce an equilibrium (B, N) in which all the creditors obtain a payoff exactly equal to δ , whether they exit or relend. Therefore, all menus (δ, n) involve a proportional distribution of the net gains. In particular, a menu offered to all creditors, IFIs as well as commercial banks, will achieve a proportional sharing of the burden across both classes of creditors, and the requirements of PDR will necessarily be satisfied (once again, we leave aside the question of whether this involves fair burden sharing or not).

For a menu to be able to support the conditional adjustment program, however, (δ, n) should be chosen to make sure that enough new money is raised to finance adjustment, L_c° , and buybacks, $B\delta$. Which menus raise exactly $L_c^\circ = (N - \delta B)$? To answer this question, we feed equations (15) and (16) into (18) and obtain

$$\begin{aligned} \alpha Y(1 + \theta)/R(D - B + N) &= (\delta + n)/(1 + n) \\ &= \{\delta + [N/(D - B)]\}/\{1 + [N/(D - B)]\} \end{aligned} \quad (19)$$

using (17), which implies that $\alpha Y(1 + \theta) = R(\delta D + L_c^\circ)$ when $N - \delta B$ is set equal to L_c° . Solving for δ , we get $\delta = [\alpha Y(1 + \theta) - RL_c^\circ]/RD \equiv f$, using (11). Hence, when δ is set equal to the “fair” exit price f , any n will produce a menu that raises exactly L_c° on a net basis. We should not be surprised to find that $\delta = f$ is necessary to achieve a deal that

raises L_c° of net financing. Both options must have the same value, and proportional burden sharing with sufficient financing provides a payoff equal to f per dollar of initial debt. It is perhaps more surprising that, when $\delta = f$, the only effect of varying n is to increase the equilibrium volume of both buybacks and new money, with no net effect on the total liquidity, L , that is raised.¹⁸

¹⁸ To see this more clearly, let us look at how the equilibrium (B, N) and the net financing raised, $N - \delta B$, vary as the new money call, n , is increased. We do not impose the requirement that $N - \delta D$ be equal to L_c° . Differentiating (19) with respect to n and rearranging, we get

$$\partial N/\partial n = [\alpha Y(1 + \theta) - N]/(\delta + n) > 0$$

for small enough n . The effect of n is ambiguous. On the one hand, an increase in n raises the amount of new money for any given set of choices by banks. On the other hand, an increase in n makes exit more desirable and thus reduces the base for the new-money call. The total effect is positive as long as n does not exceed some maximum level (the debtor would not want to be on the declining part of the new money curve). When IFIs are keen on delivering their share of the burden of new loans rather than in the form of debt reduction, n should be set large enough to produce an equilibrium with a new-money contribution that is large enough to accommodate their exposure. A larger IFI exposure should lead to a larger n under proportional burden sharing. Similarly, to see the effect of n on the amount of debt reduction achieved in equilibrium, differentiate (17) with respect to n to get

$$\partial B/\partial n = -[(\partial N/\partial n)n - N]/n^2 > 0 .$$

As the new money call, n , is increased, the exit option becomes more desirable than the relending option. In equilibrium, however, both options must be equally desirable. As a result, more debt reduction will be achieved in order to raise further the ex post debt price p' and increase the attractiveness of the relending option. Increasing n thus leads to larger buybacks and more new money in equilibrium. What is the net effect on $(N - \delta B)$? Using the above, we find that $\partial(N - \delta B)/\partial n = (D/n)(f - \delta) \geq 0$ as $f \geq \delta$, and therefore the amount of net funds received is invariant to n when $\delta = f$, that is, under proportional burden sharing. Thus, the only effect of a change in n is indeed to accommodate different sets of preferences of the creditor group.

7 SUMMARY AND CONCLUDING REMARKS

This essay has covered a lot of ground. We have tried to present a framework in which the roles of the debt overhang, adjustment lending with conditionality, and arrangements of the Brady type involving new money and DDSR can be understood and evaluated.

We began with the observation that the chief inefficiency engendered by the existence of a debt is the inability of the debtor country, hampered by illiquidity, to finance desirable investments, including adjustment programs. This illiquidity effect on investment must be distinguished from the disincentive effect on which much writing has focused. The debt overhang *is* responsible for an investment shortfall, but we have argued that the shortfall is not the result of an artificial reduction in investment incentives but of a lack of liquidity.

Nevertheless, calls for new money and renewed lending will not solve the problem. The overhang makes it impossible for countries to attract voluntary loans from new groups of creditors. In the absence of seniority, new loans enter the same pool as old loans and instantly metamorphose into claims as poor as the old loans. Of course, these new loans may have led the country to undertake the investments it was previously unable to make and may have eliminated the overhang altogether. But, as long as the old claims stand undiminished, the new lenders will have to share with the old lenders the fruits of any improvement in creditworthiness. This depresses the return to the potential new lenders and keeps them from doing business with the debtor.

We then turned to the adjustment decision of the debtor government. We showed that a credit-constrained government will undertake an adjustment program that has immediate costs but eventual benefits only if a sufficient amount of external lending is available. Furthermore, although many governments would be happy to receive new money in exchange for undertaking adjustment, many would rather use the new money for consumption rather than investment and will do so in the absence of conditionality. Hence, conditionality buys a commitment to adjust, preventing the best from being the enemy of the good. Because an adjustment program benefits old creditors as well by increasing the debtor's ability to make debt-service payments, commercial banks may be prepared to finance the program on their own. We showed, however, that the amount of new lending required to "pur-

chase” adjustment in the absence of conditionality (that is, without the involvement of IFIs) can be much larger than the amount required when conditionality is present. The amount of new money banks will be willing to offer is constrained by their share of the resulting increase in productivity, and that share is quite low in practice. Adjustment lending with conditionality therefore greatly expands the set of efficiency-increasing bargains between creditors and debtors.

We next turned to the implications of IFI participation for the design of a financing package. The efficiency gains arising from the three-way bargain between the debtor, banks, and IFIs can be split in many ways. Any desired division can be achieved by an appropriate selection of (1) the amount of new money received by the debtor in return for adherence to an adjustment program, (2) the shares of the new loan provided by the two creditor groups, and (3) the sharing between the two creditor groups of the future repayment made by the country. The higher the loan, the better off is the country. The banks are better off and the IFIs worse off when the banks provide a smaller share of the loan and get a larger share of the future repayment. Of course, the constraint that the debtor, the banks, and the IFIs be at least as well off with a deal as without one limits the set of bargains.

When the IFIs have no prior exposure to the debtor country but are expected to provide new money to support an adjustment program, the banks must provide enough debt relief to return the country to creditworthiness and allow the IFIs to earn a “normal” return on their investment. When the IFIs have prior exposure, however, adjustment lending also improves the IFIs’ ability to collect on their old debts, and this reduces the amount of relief that banks need to offer. We focused the analysis on a proportional-distribution rule (PDR) under which the returns to the various creditors are shared in proportion to their initial exposure. Under such a rule, adjustment lending by IFIs requires debt or debt-service reduction by commercial banks. This is true whenever the IFIs’ share of new money exceeds their share of the outstanding debt stock, as was the case throughout the 1980s. The point of DDSR in our framework is not to create appropriate incentives for the debtor, as in much of the overhang literature, but to ensure that IFIs and banks are treated equitably. Debt reduction creates the “headroom” required for the more efficient IFIs to come in without subsidizing other creditors.

We also showed, however, that PDR precludes a complete elimination of the overhang and full return to creditworthiness (unless the IFIs have no prior exposure at all). If PDR were to do that, bringing

the post-deal price to unity, the IFIs (which do not provide DDSR) would remain whole, while the banks would take a loss on their DDSR. For the same reason, banks cannot be asked, under PDR, to provide all the debt reduction needed to return the debtor to full creditworthiness.

We then generalized our framework to include Brady-type deals in which IFIs lend the debtor the resources needed to retire some of the debt, and commercial creditors are presented with a menu of options. We showed that, under PDR, the exit price at which debt is retired must be below the post-deal price. Furthermore, the higher the IFIs' share of the new money, the lower must be this exit price. These requirements rule out market buybacks, for the only equilibrium price at which debt can be repurchased in the market is the equilibrium price after debt reduction. This finding provides a justification for the concerted approach characteristic of arrangements of the Brady type.

Some of the advantages of the market-based approach are recovered by offering a menu of options to commercial creditors. Such a menu allows the heterogeneity of banks' valuations to be reflected in their choices. For all options on a menu to be chosen voluntarily, their values must be identical in equilibrium, and this condition satisfies PDR automatically. We showed that this condition is met naturally when the menu contains exit and new-money options, because each of these options becomes more valuable as the other option is picked by an increasing number of banks. The menu approach also allows us to treat IFIs just as any other creditor group that happens to choose relending over exit.

We close by noting that our analysis of debt reduction extends to all forms of new finance that provide efficiency gains. One notable example is direct foreign investment. Just as with adjustment lending, it is necessary to convince prospective foreign investors that their profit remittances will not be crowded out by debt-service payments to existing creditors. Debt reduction represents a credible commitment on the part of banks that they will effectively allow seniority to subsequent creditors.

APPENDIX

This appendix provides more details on the derivation of the zones in Figures 1 and 2.

Without Conditionality

Substituting for C_1 and C_2 in the maximand (1), we can express the government's decision rule as follows:

$$\begin{aligned} \text{Adjust if: } & U(Y + L - K) + \beta \max [Y(1 + \theta) - R(D - B + L)] , \\ & (1 - \phi)Y(1 + \theta) \geq U(Y + L) + \beta \max [Y - R(D - B + L) , \\ & (1 - \phi)Y] . \end{aligned} \tag{A1}$$

As this makes clear, the net benefits of adjustment depend on whether the debt overhang is eliminated in period two or not. If it is eliminated, consumption in period two becomes

$$Y(1 + \theta) - R(D - B + L) \text{ or } Y - R(D - B + L) .$$

If the overhang continues, consumption in period two is independent of both L and B and equals $(1 - \phi)Y(1 + \theta)$ or $(1 - \phi)Y$. The cost-benefit calculus therefore has different properties depending on the status of the overhang.

Consider the demarcation between overhang and no-overhang zones. It is defined by those combinations of B and L that leave the government indifferent between repaying the debt in full and paying the penalty (ϕ times output). Hence, it is described by the equations

$$R(D - B + L) = \phi Y(1 + \theta) , \text{ when adjusting, and}$$

$$R(D - B + L) = \phi Y , \text{ when not adjusting.}$$

These are two 45-degree lines, with the first relevant in zones II and III, and the second relevant in zones I and IV. They capture the following simple intuitions. First, when the government is just short of default, an additional dollar of new lending has to be offset by an additional dollar of debt reduction to keep the government from crossing over. Second, when the government chooses to adjust (and output rises to $Y(1 + \theta)$), the no-overhang region becomes larger and the overhang region smaller.

Turn now to the loci that separate the adjustment zones from the no-adjustment zones. The relevant locus is easy to describe when an overhang prevails. Here we have the equality

$$U(Y + L - K) + \beta(1 - \phi)Y(1 + \theta) = U(Y + L) + \beta(1 - \phi)Y, \text{ or}$$

$$U(Y + L) - U(Y + L - K) = \beta(1 - \phi)\theta Y. \quad (\text{A2})$$

This defines implicitly a level of L , L° , which makes the equality hold. When the country remains in overhang, the government will choose to adjust for all L greater or equal to L° . In equation (2) of the text, L° is written as a function of the various parameters in (A2). Note that L° does not depend on B , for the face value of the inherited debt stock is of no consequence when overhang prevails. Therefore, the demarcation between zones III and IV (the adjustment and no-adjustment zones, both in overhang) is perfectly vertical in Figure 1.

The corresponding locus in the absence of overhang is more tricky to describe. Suppose that the government would be in overhang if it did not adjust, the relevant case for much of the discussion in the text. Here, the relevant equality is

$$U(Y + L - K) + \beta[Y(1 + \theta) - R(D - B + L)] = U(Y + L)$$

$$+ \beta(1 - \phi)Y, \text{ or}$$

$$U(Y + L) - U(Y + L - K) + \beta R(D - B + L) = (\phi + \theta)\beta Y. \quad (\text{A3})$$

This defines a schedule along which the government remains indifferent between adjusting and not adjusting. The relation between L and B along this schedule is given by

$$dB/dL = 1 - (\beta R)^{-1}[U'(Y + L - K) - U'(Y + L)], \quad (\text{A4})$$

which is of ambiguous sign because the expression in the square brackets is positive as long as $U'' < 0$.

The explanation for the ambiguity is as follows. A dollar increase in B increases the net benefit from adjusting by βR dollars (because this is the discounted present value of the increase in second-period consumption when adjusting). Should L be increased or decreased to offset the added incentive to adjust? An increase in L will *reduce* the benefit of adjusting insofar as it reduces the discounted value of second-period consumption; because overhang prevails when not adjusting, L does not affect second-period consumption when the government does not adjust. But an increase in L will also reduce the net cost of adjusting insofar as it contributes to the smoothing of consumption. If the first effect dominates the second, that is, $\beta R >$

$[U'(Y + L - K) - U'(Y + L)]$, L should be increased. Otherwise, L should be reduced. As long as $U''' > 0$, there are only three possibilities: (1) dL/dB is initially negative in the relevant range and then turns positive; (2) dL/dB is negative throughout; (3) dL/dB is positive throughout. Figure 1 is drawn assuming the first possibility, whereas the no-conditionality locus in Figure 2 is drawn assuming the second.

One final case must be considered to complete the description of Figure 1. Suppose that the government will not be in overhang if it does not adjust. In this case, the locus that describes indifference to adjustment is given by the equality

$$U(Y + L) - U(Y + L - K) = \beta\theta Y . \quad (\text{A5})$$

This defines implicitly a level of L , L° , which makes the equality hold. It is independent of B (as is L°), and it is easy to check that $L^\circ < L^*$. This explains the vertical line separating zones III and I in Figure 1.

With Conditionality

The government's decision rule now becomes

$$\begin{aligned} \text{Adjust if: } & U(Y + L - K) + \beta \max [Y(1 + \theta) - R(D - B + L) , \\ & (1 - \phi)Y(1 + \theta)] \geq U(Y) + \beta \max [Y - R(D - B), (1 - \phi)Y] . \end{aligned} \quad (\text{A6})$$

We can now proceed to locate the four zones of possible outcomes as before. Because conditionality affects only the incentive to adjust, not the demarcation between overhang and no-overhang zones, we focus exclusively on the former.

In the presence of an overhang, the locus that separates the adjustment zone from the no-adjustment zone is given by

$$U(Y) - U(Y + L - K) = \beta(1 - \phi)\theta Y . \quad (\text{A7})$$

This defines implicitly a level of L , L_c° , which makes the equality hold.

Suppose, next, that the government will be in overhang if it does not adjust but otherwise will not. The relevant equality is

$$U(Y + L - K) + \beta[Y(1 + \theta) - R(D - B + L)] = U(Y) + \beta(1 - \phi)Y ,$$

or

$$U(Y) - U(Y + L - K) + \beta R(D - B + L) = (\phi + \theta)\beta Y . \quad (\text{A8})$$

The relation between L and B along this schedule is given by

$$dB/dL = 1 - (\beta R)^{-1}U'(Y + L - K) < 0 , \quad (\text{A9})$$

with the negative sign unambiguous as long as the government remains liquidity constrained (that is, $U' > \beta R$). In this case, unlike the no-conditionality case, an increase in L always increases adjustment incentives. The schedules for conditionality and no conditionality are related as follows: (1) the two meet when $L = 0$, and (2) the schedule for conditionality always lies below the schedule for no conditionality.

Finally, suppose that the government will not be in overhang if it does not adjust. The locus that describes indifference to adjustment is given by

$$U(Y) - U(Y + L - K) = \beta\theta Y , \tag{A10}$$

which defines implicitly a level of L , L_c^{**} , which makes the equality hold. Once again, this is lower than the corresponding level under no conditionality, (that is, $L_c^{**} < L^{**}$). Figure 2 shows the new configuration and the way it relates to its analogue in the absence of conditionality.

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