An efficient rescheduling of the debt must take into account the market value of the debt. I argue here that the appropriate approach is not to write down the debt to its value on the secondary market, but to scale the flows of payments on the debt. The key to an efficient rescheduling is to offer debt relief reflecting the market discount, where the relief is contingent upon the country's adjustment effort (rather than setting repayment terms "once and for all" as in the Brady plan). I propose, as an example, that stabilization or adjustment programs under the aegis of the International Monetary Fund or the World Bank could include provisions allowing debt servicing or repurchase for a set duration at the secondary market rate. This would both reflect and provide incentives to increase a country's ability to repay.

There is ample evidence to suggest that the debt of many debtor nations is too large: accumulated arrears, failed reschedulings, and creditor sale of claims on developing countries at a discount on secondary markets. Excessive debt generates inefficiencies, and I examine here two of the three seemingly distinct sources of that inefficiency. The first has to do with the dual prices created by discounts on the secondary market, and the second with the disincentives to investment, growth, and new lending created by excessive debt: the "debt-Laffer curve" problem. The third, the effect within the lending countries, is not addressed here (see Dornbusch 1988).

The first approach, initiated by Dooley (1987), states that any discrepancy between the market value and the nominal value of the debt is a source of inefficiency. To illustrate, consider that to all investors in the world except Brazil, purchasing a dollar of the nominal claims on Brazil costs, say, fifty cents. When Brazil repays its debt, however, a dollar buys one dollar of principal or interest falling due, not two. Basic economic theory shows that such price discrepancies are inefficient.

The second approach, initiated by Sachs (1988), states that there may be a debt overhang, or a "debt-Laffer curve" (Krugman, forthcoming). When the
debt is zero, lenders receive nothing. It is expected that repayments grow with debt in the intermediate ranges—but only to a point. Beyond some maximum, larger levels of debt pose such an expected repayment burden on returns to investment that investment and thus future growth will decline, and repayment on the claims already outstanding will fall. When the debt is infinite, creditors may receive nothing—hence Krugman's debt-Laffer curve (for an exposition of the forms of debt overhang, see Claessens and Diwan, this issue).

In rescheduling it is common practice to incorporate some portion of the overdue interest into the principal outstanding, or to provide new loans with which to pay debt service due. If the country is perceived to be beyond the peak of the debt-Laffer curve by the secondary market, the decline in the secondary market price in response to this increase in debt will be so sharp that the total value of the debt outstanding may actually decline. In this case, lenders could increase the market value of their claims by appropriate cuts in their face value.

To test the relevance of the Laffer curve approach, if the price of debt on the secondary market is used as its market price, one can calculate the elasticity of the price with respect to the "quantity" or total nominal value of the debt. The value of the debt is at a maximum when the absolute value of that elasticity is equal to one. If it is greater than one, lenders may increase the value of their claims by writing off the face value of the debt, that is, the Laffer curve problem does occur.

On the surface, the dual price and debt overhang issues appear to be substantively different. The dual price approach implies that any discount is a potential source of inefficiency; the concept of a debt overhang suggests only that debt service creates inefficiencies in those countries where the debt is so large that the price elasticity is greater than one. I will argue here that these are two faces of the same coin and that the relative price distortion denounced by Dooley is at the heart of the debt overhang problem.

As a result, I will recommend that the debt write-off which the overhang approach implicitly suggests—while sometimes a good thing—is never in itself the appropriate remedy to a debt overhang. Instead, the key is a clear commitment from lenders that the amount they will ask the country to repay in any period will take into account the country's economic situation, as reflected in the discount on the market value of the debt.

Consider the following (practical) version of such a discounting scheme. Assume that any country which signs a stabilization program with the International Monetary Fund (IMF) or the World Bank is rewarded by a deal in which the debtor may use the resources that it can mobilize to repurchase its debt at a discount, agreed upon ex ante with its creditors, for, say, a period of ten years. On the one hand, the country is encouraged to adjust as far as it can so as to benefit from this opportunity of repurchasing its debt at a good price. On the other hand, ten years later, the creditors can recontract the deal and raise
the price at which the country can repurchase its debt so that lenders do not necessarily have to lose (too much) in order to induce the country to adjust.

This scheme shows that it is possible to reverse the crowding out of investment by debt into a crowding in which fosters growth and the adjustment effort of the country. It also shows that it is crucial that the debtor trusts that the price (agreed upon ex ante) at which it can repurchase its debt will not be scaled up too soon (as early as the creditor will see that the country has adjusted). This is why the industrial countries (and especially the IMF or the World Bank) are needed to make sure that the deal is trustworthy.

The first part of this article reassesses the debt overhang problem and shows its equivalence with the dual price approach. The second part provides an empirical test of the existence of the debt-Laffer curve and considers its implications for a debt write-off. I conclude with a proposal for a rescheduling scheme as an alternative to write-offs that would give the debtor country payment relief equivalent to the secondary market discount while maximizing creditor returns.

I. The Lender's Optimal Rescheduling Strategy

The idea of the debt overhang in the literature is based on a country's inheritance in period 1 of a stock of debt that it must repay in period 2. In period 1 the country may decide to invest (at the expense of, say, domestic consumption) and get the return on this investment in period 2. But the country knows that lenders will try in period 2 to extract as many of the benefits from the investment as they can. Debt can be seen as a tax on the country's resources, possibly deterring profitable investment opportunities. If lenders insist on keeping the face value of the debt above the maximum $D^*$, in their books, the borrower would scale down its investment decisions in response to the repayment burden, and both the country and the lenders would lose. The simple remedy is to write off any debt that exceeds the threshold $D^*$.

Here I would criticize not the empirical relevance of the argument but its intellectual universality. The usual tax-Laffer curve argument is universal in that there is a maximum tax rate above which the returns to the government must decline. (The argument's empirical relevance is a totally different matter.) In the debt-Laffer curve argument, it is more difficult to understand intuitively how lenders could lose by having more nominal claims rather than fewer. If there were some threshold debt $D^*$ above which they lose, lenders could always reschedule any difference between the face value of the debt and the amount $D^*$—without explicitly writing it down. Whether this is what the rescheduling of the past seven years has achieved would have to be tested empirically.

These issues are addressed in a multiperiod framework which I summarize below (see Cohen 1988 for the full model, and Cohen and Sachs 1986 for the specification without uncertainty). The optimal rescheduling strategy for lend-
ers is based on the maximum present discounted value of the repayment that lenders could expect, which I call the benchmark value. By refraining from extracting the maximum repayment in each period in the short run, the lenders allow investment at an optimal rate and thus economic growth. This raises GDP over time and increases the stream of repayment over the long run. The present discounted value of the repayments in the latter case is larger than that in the more shortsighted maximum extraction approach.

To calculate the absolute maximum repayment which lenders can attain, I assume away any debtor bargaining power so all potential gains are captured by the lenders. The rescheduling so designed is efficient in the sense that it increases the welfare of the lenders without reducing that of the debtor.

The benchmark value is calculated as that which would result if the creditors controlled the decisions to consume, invest, and service the debt, while the debtor country retained the option to default if the lenders' policy reduced welfare too severely. If the borrower were to default, however, the lenders could impose a penalty which would permanently reduce the productivity of the country's capital. Default therefore provides a lower bound of welfare beyond which lenders could not push the country. As the economy is infinitely lived, the lenders could always reschedule debt and avoid provoking default.

The economy is structured as follows. Domestic output, $Q_t$, is simply equal to the installed capital stock, $K_t$:

$$Q_t = K_t$$

If the country were to default on its debt, I assume—following Eaton and Gersovitz (1981)—that creditors are able to impose a penalty on the country which reduces productivity by a factor, $\lambda$, such that output then becomes:

$$Q_t = (1 - \lambda) K_t$$

Growth is endogenous and depends on the productivity of capital and on the country's chosen investment rate. To increase the stock of installed capital by $I_t$ units, the country must spend:

$$J_t = I_t \left[ 1 + 0.5 \Phi \left( I_t / Q_t \right) \right]$$

(following Abel 1978 and Hayashi 1982). The stock of capital and hence output in period $t + 1$ is then the sum of the increase $I_t$ and the depreciated capital stock from period $t$, plus the effect of an exogenous stochastic shock, $\theta_{t+1}$, which increases or decreases the productivity of capital:

$$K_{t+1} = [K_t (1 - d) + I_t] (1 + \theta_{t+1})$$

where $d$ is the rate of depreciation of installed capital.

The country's representative consumer has an expected utility function of the type:

$$U_0 = E_0 \sum_{t=0}^{\infty} \beta_t (1/\gamma) C_t; \gamma < 1$$
where $C$ is consumption.

The world interest rate, $r$, is constant and the country's valuation of future relative to current consumption (its discount factor $\beta$) is assumed to be lower than the world's:

$$\beta < \frac{1}{1 + r}$$

As a consequence the country—if in financial autarky—would not undertake some investment which would be profitable at the lower world interest rate.

Under these assumptions, one can show that the efficient investment rate, $\bar{x}$, defined as that which maximizes the wealth of the country, is a constant:

$$\bar{x} = I_t / Q_t$$

for all $t$. The postdefault investment rate is also a constant, $x_d < \bar{x}$.

The "maximum repayment" benchmark that reflects the country's low discount factor is characterized by an investment rate $x^*$ that is less than the efficient rate, but greater than the default rate: $x_d < x^* < \bar{x}$. Given $x^*$ and thus $Q$ for all $t$, the level of debt service in each period, $P_t$, is set such that the share of output paid, $b^*$, is less than the postdefault decline in productivity, $\lambda$:

$$P_t = b^* Q_t, \text{ with } b < \lambda$$

The present discounted value of this stream of transfers provides an upper bound to the market value of the debt. Because some share of the retained output will be used for investment, $Q_t$ and thus $P_t$ grow each period. If one assumes that the economy grows only at the (equivalent of the) postdefault rate, the lenders would receive less period-by-period by requiring payment of $b^*$. But, by allowing investment and thus growth, while lenders get less in the early years, they receive more later, and in present value terms, they receive more overall.

In contrast, when repayments are not adjusted for the debtor's ability to repay, the lenders ask the country to pay the amount that it would forgo by defaulting. The country chooses the investment rate $x_d$ and pays $P_t = \lambda Q_t$ in each period—and thus reaches its lower welfare bound (this argument is detailed in Cohen and Michel 1988).

How do the creditors attain the hypothetical maximum repayment stream? They first calculate the ex post market value of the debt outstanding (call it $q^*D$). From this they then split the outstanding face value of the debt into the part on which they will require service, which is the equivalent of its market value, and a nonperforming part which they will hold in abeyance. The lenders then enter into a contractual agreement which is credible to the borrower, in which debt service for each period is set so that the transfers, $P_t$, are the equivalent of that which would come due on the market value:

$$q_t D_{t+1} = q_t D_t (1 + r) - P_t$$

This provides a repayment schedule that induces the country to invest, con-
sume, and repay at levels that produce the lender's optimal repayment stream. In this case the market value of the debt coincides with the maximum repayment benchmark in equilibrium, and an efficient rescheduling has been achieved.

It is important to emphasize that lenders should not reduce the debt service so that it is exactly commensurate with the debt's observed secondary market value. If they did, this would induce the country to do whatever it could to reduce the market value of the debt, rather than encouraging investment, growth, and repayment—the incentives would be wrong. Instead, the lenders should calculate the debt's theoretical benchmark value and check that their estimated price is consistent with the actual price in secondary markets. To attain the maximum returns, however, lenders should not explicitly write down the debt so that the face and the market value of the debt coincide. Instead, by keeping the nonperforming part of the debt on their books, they may benefit in the future from positive exogenous shocks that raise the country's ability to pay. In brief, they should cut debt service flows from the country, but not the stock of debt outstanding.

This result links the dual price and debt overhang approaches. Any discount, however small, is a potential source of inefficiency if not appropriately taken into account. By scaling the debt-service flows to the debt's ex post market value, lenders act as if only market prices apply so that the country's investment decisions (which are flows) will reflect the return on capital embodied in the secondary market discount. But by maintaining the full face value of the debt obligation, lenders may benefit from the country's growth when, in the future, it may be able to afford to service the full debt.

The theoretical approach above emphasizes that flows (not stocks) are the core of the matter. More specifically, what is really needed for an efficient rescheduling are clear rules of the game that the borrower believes the lenders will obey. Short of such rules, a self-fulfilling downward spiral may occur. If the borrower does not trust that future reschedulings will obey the principles just outlined, it may anticipate that the lenders will ask for too much in the future. This discourages investment (for the reasons outlined in the debt overhang approach), which then induces the lenders to raise the debt service above the theoretical benchmark to extract the resources freed by reduced investment. At the end of this downward spiral, lenders mimic exactly the postdefault path—they ask the country, period by period, to transfer the amount they would forgo by defaulting. No account is taken of the tradeoff between the debt's service and the country's growth, and both parties lose relative to a growth-inducing arrangement.

Under these circumstances, a write-off of the debt may benefit lenders, and a debt-Laffer curve problem may arise. By reducing the stock of outstanding debt, the lenders' claims that they will let the country invest appropriately may gain some credibility.
But no write-off can bring the equilibrium back to the (constrained) first-best solution. Consider, for example, a write-down of 30 percent of the Brazilian debt. If the lenders were to insist, after the write-off, that all interest falling due and perhaps all or part of the principal coming to maturity should be serviced, this would differ little from Brazil’s current difficulties. A write-off may help the country only if lenders make it clear that they will reschedule the newly written-down debt in ways that acknowledge the country’s investment and growth opportunities. These considerations are now (briefly) investigated empirically.

II. Empirical Estimates of the Debt–Laffer Curve Argument

I test here for empirical support for the debt–Laffer curve, and the debt write-off that it suggests may be needed for some countries. If the curve exists, we should find evidence that there are countries to the right of the “peak,” that is, which exhibit a negative relationship between the nominal value (the “quantity”) and the market value of their debt. If so, this indicates that the price of debt in the secondary market responds so positively to cuts in the debt’s face value that its elasticity is less than -1. This elasticity is the evidence needed, and it is estimated first.

Previous studies have estimated low values for the elasticity of the market price of the debt with respect to its gross nominal value. Purcell and Orlanski (1988), for instance, reported an elasticity of 0.34 which is about average for the studies I have reviewed. I have estimated an equation, representative of these earlier studies, as follows:

\[
\log q = 5.06 - 0.653 \log \frac{D}{X} - 2.231 \frac{A}{D}
\]

\[
- 1.016 \frac{R}{D} - 0.274 \text{ Dummy 1987.12}
\]

where \( q \) is price of the debt on the secondary market, \( D \) is the nominal value of total debt outstanding, \( X \) is the value of exports, \( A \) is debt service due and unpaid (arrears), and \( R \) is the proportion of debt rescheduled since 1982. I use the ratio of nominal debt to exports to reflect the debt relative to the country’s ability to repay. The variable for 1987 is included to reflect CitiCorp’s May 1987 decision to add $3.0 billion to its reserves against the event of a write-off of developing country debt. The \( R^2 \) is 0.560 for pooled equations for year-end 1986 and year-end 1987 data with 60 degrees of freedom (standard errors are in parentheses).

From this equation, one would tend to reject at the 95 percent level of confidence the hypothesis that the elasticity of the price of the debt is larger than 1 with respect to its face value (\( \log \frac{D}{X} \)). As would be expected, however, the price of debt is significantly negatively associated with both arrears and
rescheduling. In addition, the dummy variable separating the 1986 and 1987 data appears to be significant, indicating that CitiCorp’s decision to build up reserves did influence the market.

Despite the equation’s appeal and simplicity, it is extremely misleading for the following reasons. First, the elasticity measure is based on the entire sample rather than the subset of countries most likely to be in a debt overhang situation. Thus the generally positive relationship in cross-section data could obscure the negative relationship for some cases. Running the same regression for a subsample of sixteen countries with a debt-to-export ratio larger than three yielded a larger elasticity, estimated at 1.183 (with a standard error of 0.339). Second, and perhaps more important, the equation takes the arrears and rescheduling variables as exogenous, while these variables obviously depend on debt and perhaps also on the price.

To overcome these two difficulties (and a more technical one in which log \( q \) cannot be normally distributed when the price is smaller than 1), I have estimated a reduced-form equation in which the dependent variable has the logistic form

\[
\log \left( \frac{q}{1 - q} \right) = 2.152 - 1.509 \log \frac{D}{X} - 0.048 \text{ X growth} - 0.583 \text{ Dummy 1987.12}
\]

when \( X \text{ growth} \) is the rate of growth of exports. The \( R^2 \) is 0.389 for a pooled equation for end-1986 and end-1987 data with 60 degrees of freedom. According to this equation the elasticity of the secondary market price with respect to total nominal debt is \( 1.509 \) (1 - \( q \)) with a standard error, \( \sigma \), of 0.305 (1 - \( q \)).

The debt-Laffer curve hypothesizes that for countries to the right of the peak, the absolute value of the elasticity of the market price to total face value is greater than 1. This hypothesis would be supported if we are able to reject the null hypothesis, \( H_0: |\epsilon| < 1 \) for all countries in our sample. From the estimated coefficients of equation 11, we can find a critical value for \( |\epsilon| \) above which we could reject \( H_0 \), equal to 1 plus a confidence interval calculated as the product of the \( t \) statistic times the standard error, \( \sigma (1 - q) \). At a 95 percent level of confidence, this is an interval of 0.5097, giving a critical value of 1.5097 (1 - \( q \)).

Elasticities were estimated for several selected highly indebted countries. None of the observed elasticities fall above this value, so that we cannot reject the hypothesis that \( |\epsilon| < 1 \) (see Cohen 1988 for the estimated prices and elasticities). Thus we do not find support for the debt-Laffer curve.

Relatedly, the critical elasticity reflects a value of \( q \) which can also be used

\[
dq/q + dq/(1 - q) = -1.509 \quad \text{so that} \quad dq/q = -(1 - q)/1.509.
\]

1. Differentiating equation 11 yields: \( dq/q + dq/(1 - q) = -1.509 \) so that \( dq/q = -(1 - q)/1.509 \).
to indicate the point at which we can reject $|\epsilon| < 1$. For $\epsilon = 1.509 (1 - q) > 1 + to (1 - q)$, this is $q < -0.00065$, that is, a negative secondary market price. This means that none of the countries in the sample which generated the estimated coefficients of equation 11 will have a secondary market price on the basis of which one can reject the hypothesis of a positive relationship between the face and market value of the debt.

The elasticity and price estimates suggest that a write-off from the face value of the total debt for these countries could decrease its secondary market value, so that lenders would not gain from the write-offs currently being proposed.

III. Proposal: Discounting Debt Service and Repurchases

As emphasized earlier, the core of rescheduling’s inefficiency is the dual price situation. Lenders must acknowledge the discount on the secondary market and avoid imposing a relative price distortion on the borrower. The failure to acknowledge such dual price incentives may result in debt overhang problems.

One simple way to achieve—or almost achieve—an efficient rescheduling is to price the service and repurchase of the debt at market terms. In other words, if the (equilibrium) price of the debt is 50 percent, lenders should accept that a dollar of principal or interest paid by the debtor is counted as two dollars (see Portes 1987 for an earlier similar proposal). By so doing, they eliminate all relative price distortions and offer the borrower the same price as they would to any other investor. This scheme generates an incentive to adjust, giving the country a chance to stabilize and perhaps to bring down its debt-to-export ratio, compared with the current rescheduling scheme, which creates “debt fatigue”—the debt-to-export ratio keeps rising.

It is important, however, that lenders and borrowers reach an agreement on an equilibrium price rather than simply relying on the market’s estimate. This agreement could be part of a debt rescheduling package: borrowers would commit themselves (through the World Bank or the IMF) to an adjustment program, and lenders would commit themselves to a “market” evaluation of the flows of resources to be generated by the program.

The reason such a scheme is only an approximation of the first-best solution is that a sequence of good stochastic stocks may raise the price of the debt back to par ($q = 1$). Lenders may then regret having reduced the value of the resources transferred by the debtor. Indeed, this is the main reason they do not want to write down the stock of the debt. But the difference between the two approaches is crucial. In the discounting scheme, only the flows are adjusted to reflect economic circumstances so that a sequence of good shocks can be acknowledged by the lenders in time. But in a debt write-down, the contingent dimension of the rescheduling is lost.

Except for the (low-probability) event of this series of favorable shocks, the discounting scheme exactly mimics the optimum rescheduling strategy. It is important to see that the ex post market price underlying this scheme is the
average price of the debt and not the marginal price (which is often zero or near zero).

The debate can thus be interpreted as dealing with whether the buyback is made “once and for all” or varies with a country’s ability to repay. A “once and for all” buyback may not help the country very much if the marginal (market) value of the debt that is redeemed is zero. But the right thing to do would be to arrange a discounted buyback that hinges on the commitment that repurchased claims are scaled to reflect the ex post market value.

References


