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Forgiveness, Buybacks, and Exit Bonds: An Analysis of Alternate Debt Relief Strategies†

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1. INTRODUCTION

The 1980s have seen the issue of Third World debt rise to prominence as one of the foremost concerns for economic policy-makers. The foreign indebtedness of many developing countries has risen to such high levels that the casual observer is forced to wonder if the debt will ever be paid back. Many scholars are now arguing that the debt obligations of some of the most heavily indebted countries (HICs) are so large that they act as a severe disincentive to investment.[1] These disincentives, in turn, reduce growth rates in the HICs, thereby making future repayments even less likely.

Many explanations for the onslaught of the debt crisis have been offered. The late Seventies and early Eighties saw a rapid rise in interest rates as well as an equally rapid deterioration of the terms of trade of many HICs. Many sovereign debtors, which had been excellent investment opportunities for creditor banks, were suddenly insolvent. Low output shocks further exacerbated repayment possibilities. Faced with the possibility of non-payment, creditors entered into rescheduling negotiations with sovereign borrowers. These reschedulings have involved bargaining over the amount of repayment that will be made.

Unlike domestic borrowers, sovereign debtors do not face bankruptcy proceedings and the liquidation of their assets in the event of a default. What motivation, then, does a sovereign debtor have to repay its debt? Furthermore, why do banks lend to sovereign debtors in the first place?

Eaton and Gersovitz (1981) suggest that international borrowing is a repeated game in which default imposes a cost in terms of future access to capital markets.

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†Comments on this paper have not been received

[1]See, for example, Krugman (1988), Froot (1988), and Corden (1988).

Once a country defaults it will never be able to borrow from abroad again. Given the prospect of no future capital inflows, especially when future levels of consumption are uncertain, the debtor may suffer a considerable loss if it defaults. If this loss outweighs the gain it would receive by not repaying its debt, it will indeed choose not to default. Given this sort of behaviour by the borrower, the lender will be willing to supply loans up to the point where the losses associated with default are at least as great as the gains.

More recently, however, Bulow and Rogoff (1988a) have pointed out that under fairly general conditions and as long as the debtor country is able to hold assets abroad, such a pure reputation equilibrium will unravel. Debtors will not be able to borrow on reputational grounds alone. Their argument is appealling simple. A debtor country can sign an insurance contract abroad that will insure payment (to the debtor) at least as large as under the reputational contract. It would purchase such a contract using the proceeds it would otherwise have used as repayments to preserve its reputation as a good borrower.

It appears, then, that the pure reputation story is an insufficient explanation for the existence of sovereign borrowing and lending. Another approach that has been advanced in the literature argues that there exist penalties which creditors can inflict upon defaulting sovereign debtors. These penalties may include the imposition of a trade embargo, loss of trade credits, seizure of assets held abroad, etc. Under such an implicit contract, lending will take place to the point where the borrower becomes indifferent between repaying and defaulting (thereby bearing the costs of the penalties). Hence a credit ceiling exists for sovereign debtors.

This story seems to be consistent with the existence of lending to sovereign nations. The debt crisis can be interpreted as the realization of a series of unanticipated harmful shocks that pushed debtor countries to the point where they are better off defaulting and paying the penalties rather than actually repaying the debt. The reschedulings that take place are efforts to avoid the deadweight losses associated with default. (Creditors do not gain, for example, by imposing a trade embargo.)

The question of what brought about the debt crisis and why lending ever took place is still an open issue. Scholars seem to agree that there do exist some sorts of costs which lenders can impose or means by which creditors can extract resources.[2] Recent work has focused, instead, on issues regarding the debt overhang.

This paper addresses issues of debt relief in a model of an economy with an external debt overhang. Various forms of debt relief are discussed, as well as the conditions necessary for each form of relief to be optimal from the creditor's point of view. The remainder of this paper is organized as follows: in Section Two the concept of a debt overhang as well as some recent work in this literature is discussed.

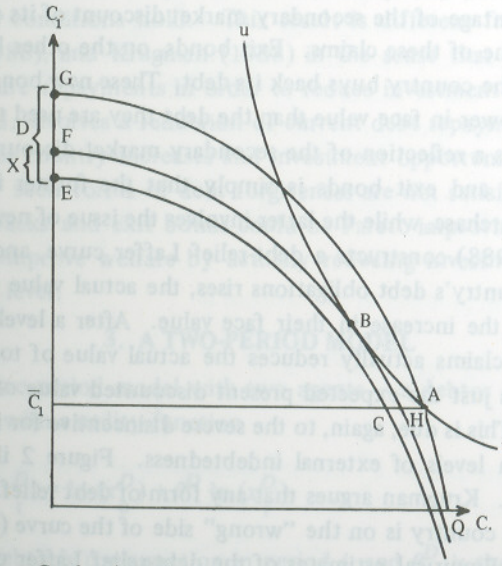
[2] See, for example, Claessens and Diwan (1988), Diwan (1988), and Bulow and Rogoff (1988).

Section Three describes the model, and conclusions are presented in Section Four.

2. DEBT OVERHANG

A debt overhang problem arises when the expected present discounted value of potential future resource transfers from a debtor country is less than its current debt stock. Much attention has been devoted to the policy implications of a debt overhang. The Baker Plan, which sought to solve the debt crisis, argued that there exist ample growth possibilities in the debtor countries, and that these opportunities were not being utilized due to the lack of available credit. Implicitly, the Baker Plan seems to have relied upon a story of a market failure to explain why markets do not see such opportunities and react to them by lending more.

Corden (1988) suggests that debt forgiveness may indeed serve to make creditors better off. He argues that the debt burden of some countries may be so high that it acts as a severe disincentive for investment. Forgiveness of some of the debt could spur investment so much that the total value of creditors' remaining claims may actually be more than what it was before the forgiveness. Figure 1 illustrates Corden's model.



Source: Corden (1988).

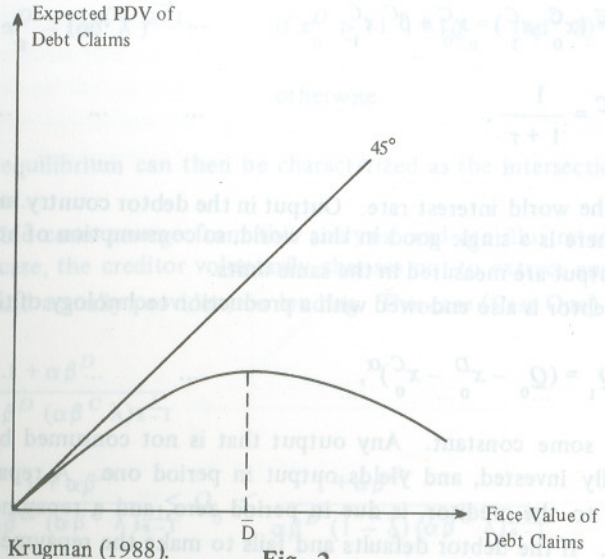
Fig. 1.

In this two-period model, the debtor country has total resources Q in period zero. It chooses to invest part of its resources for production, and consumes the rest. In period one the proceeds of the investment are realized according to the concave production function mapped out by the points QAG. Additionally, the country owes a foreign debt D, which must be repaid in period one. It is assumed that creditors have access to a "gunboat" technology – they can extract all resources in the debtor country above a minimum level $\bar{c}_1$. Thus, the debtor's consumption possibilities curve is the line which connects the points QACE. The country's intertemporal utility function can be represented by the curve uu, which is tangent to QACE at point A. The country invests very little (just enough to produce $\bar{c}_1$), and ends up not repaying any of its debt. If, on the other hand, creditors forgive X of the debt, the debtor consumption possibilities path becomes QAHBF, and it chooses to be at point B. Now the creditors are repaid (D – X), so they are better off. More investment takes place, and previously unused investment opportunities are availed. The debtor is as well off as before the forgiveness.

One important drawback of this model, however, is that if such a voluntary writing-down of debt claims is good for creditors, why do we not observe unilateral acts of debt forgiveness? Krugman (1988) and Froot (1988), in independent papers, discuss other forms of debt relief – buybacks and exit bonds. In a buyback, a debtor country takes advantage of the secondary market discount of its debt claims to buyback and retire some of these claims. Exit bonds, on the other hand, are an instrument with which the country buys back its debt. These new bonds are senior to the old debt and are lower in face value than the debt they are used to repurchase. This difference, again, is a reflection of the secondary market discount. The distinction between buybacks and exit bonds is simply that the former involves the use of reserves in the repurchase, while the latter involves the issue of new liabilities.

Krugman (1988) constructs a debt-relief Laffer curve, and shows that as the face value of a country's debt obligations rises, the actual value of these obligations rises by less than the increase in their face value. After a level $\bar{D}$, any increase in the face value of claims actually reduces the actual value of total claims. (Actual value, of course, is just the expected present discounted value of future repayments to the creditors.) This is due, again, to the severe disincentive for investment associated with very high levels of external indebtedness. Figure 2 illustrates this debt-relief Laffer curve. Krugman argues that any form of debt relief is Pareto-improving only if the debtor country is on the "wrong" side of the curve (debt obligations are greater than $\bar{D}$). Empirical estimates of the debt-relief Laffer curve indicate, however, that very few of the HICs are on the wrong side of the curve.[3]

It appears, then, that there still does not exist a good story to justify initiatives like the Baker Plan. If indeed there exist productive but unutilized investment opportunities in the HICs, why do markets not react by debt relief initiatives or new



Source: Krugman (1988).

Fig. 2.

lending? This paper seeks to address this issue. The central argument is that in a debt overhang unilateral debt forgiveness as well as liquidity relief is in the creditor's interest if certain conditions hold. This result is different from that of Corden (1988), Froot (1988), and Krugman (1988) in the sense that it does not involve forgiveness of future repayments in order to reduce investment disincentives. This debt relief, instead, involves a reduction of current debt repayments so that investment in the debtor country increases and investment opportunities are utilized. If the conditions for such forms of debt forgiveness are not satisfied then debt relief schemes like buybacks and exit bonds could be Pareto-improving. These schemes, however, seek to improve welfare by actually reducing investment and bringing it to a more efficient level.

3. A TWO-PERIOD MODEL

Consider a two-period model with two agents – a debtor and a creditor. The debtor is endowed with a utility function

$$u^D(x_0^D, x_1^D) = \ln(x_0^D) + \beta^D \ln(x_1^D), \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where x_i^D is the debtor's consumption in period i, and β^D is the debtor's intertemporal discount factor. The creditor seeks to maximize the present discounted value of its consumption. The creditor's utility, then, is simply

[3] Claessens (1988) is one of the first such works.

$$u^C(x_0^C, x_1^C) = x_0^C + \beta^C x_1^C, \quad \ldots \quad (2)$$

$$\beta^C = \frac{1}{1+\tau}, \quad \ldots \quad (3)$$

where τ is the world interest rate. Output in the debtor country in period zero, Q_0, is given. There is a single good in this world, so consumption of both agents as well as debtor output are measured in the same units.

The debtor is also endowed with a production technology of the form

$$Q_1 = (Q_0 - x_0^D - x_0^C)^\alpha, \quad \ldots \quad (4)$$

where α is some constant. Any output that is not consumed by either agent is automatically invested, and yields output in period one. A repayment D_0, from the debtor to the creditor, is due in period zero, and a repayment D_1 is due in period one. If the debtor defaults and fails to make the repayment D_i in period i, the creditor exercises a penalty and may seize up to λ of the debtor's output in that period. Thus, if D_i is greater than λQ_i, the debtor prefers default to repayment. We assume that a debt overhang exists, and so D_0 is greater than λQ_0. Additionally, we assume that D_1 is sufficiently large to ensure that default will be the preferred strategy of the debtor in period one. Thus, the debtor will consume $(1-\lambda)Q_1$ in period one, and λQ_1 will be extracted by the creditor.

The optimization problem of the debtor can now be written as

$$\max_{x_0^D} \ln(x_0^D) + \beta^D \ln[(1-\lambda)(Q_0 - x_0^D - x_0^C)^\alpha], \quad \ldots \quad (5)$$

and the optimization problem of the creditor is

$$\max_{x_0^C \le \lambda Q_0} x_0^C + \beta^C \lambda (Q_0 - x_0^D - x_0^C)^\alpha. \quad \ldots \quad (6)$$

Suppose both agents choose x_0^D and x_0^C simultaneously, taking the other's action as given. The reaction curve of the debtor can then be written as

$$x_0^D = \frac{Q_0 - x_0^C}{1 + \alpha\beta^D}. \quad \ldots \quad (7)$$

The reaction curve of the creditor is just

$$x_0^C = \begin{cases} Q_0 - x_0^D - (\alpha\beta^C\lambda)^{\frac{-1}{\alpha-1}} & \text{if } x_0^D \ge (1-\lambda)Q_0 - (\alpha\beta^C\lambda)^{\frac{-1}{\alpha-1}} \\ \lambda Q_0 & \text{otherwise.} \end{cases} \quad \ldots \quad (8)$$

A Cournot-Nash equilibrium can then be characterized as the intersection of these two reaction curves.

Three possible cases emerge from this analysis, and are illustrated in Figure 3. In the first case, the creditor voluntarily chooses not to extract any resources from the debtor, and actually provides new lending. This case (Case One) holds if

$$Q_0 < \frac{1+\alpha\beta^D}{\alpha\beta^D(\alpha\beta^C\lambda)^{\frac{1}{\alpha-1}}} \quad \ldots \quad (9)$$

If

$$\frac{1+\alpha\beta^D}{\alpha\beta^D(\alpha\beta^C\lambda)^{\frac{1}{\alpha-1}}} \le Q_0 < \frac{1+\alpha\beta^D}{\alpha\beta^D(1-\lambda)(\alpha\beta^C\lambda)^{\frac{1}{\alpha-1}}}, \quad \ldots \quad (10)$$

the creditor voluntarily extracts less than λQ_0, the full amount it is capable of extracting (Case Two). Finally, if

$$Q_0 < \frac{1+\alpha\beta^D}{\alpha\beta^D(1-\lambda)(\alpha\beta^C\lambda)^{\frac{1}{\alpha-1}}}, \quad \ldots \quad (11)$$

the creditor extracts the full amount that it can (Case Three).

Investment in this model is simply

$$I = Q_0 - x_0^D - x_0^C, \quad \ldots \quad (12)$$

which yields output

$$Q_1(I) = I^\alpha. \quad \ldots \quad (13)$$

In the first two cases

$$I = (\alpha\beta^C\lambda)^{\frac{-1}{\alpha-1}} \quad \ldots \quad (14)$$

The marginal product of investment, $Q_1'(I)$, is then

$$Q_1'(I) = \alpha I^{\alpha-1} = \frac{1+\tau}{\lambda}. \quad \ldots \quad (15)$$

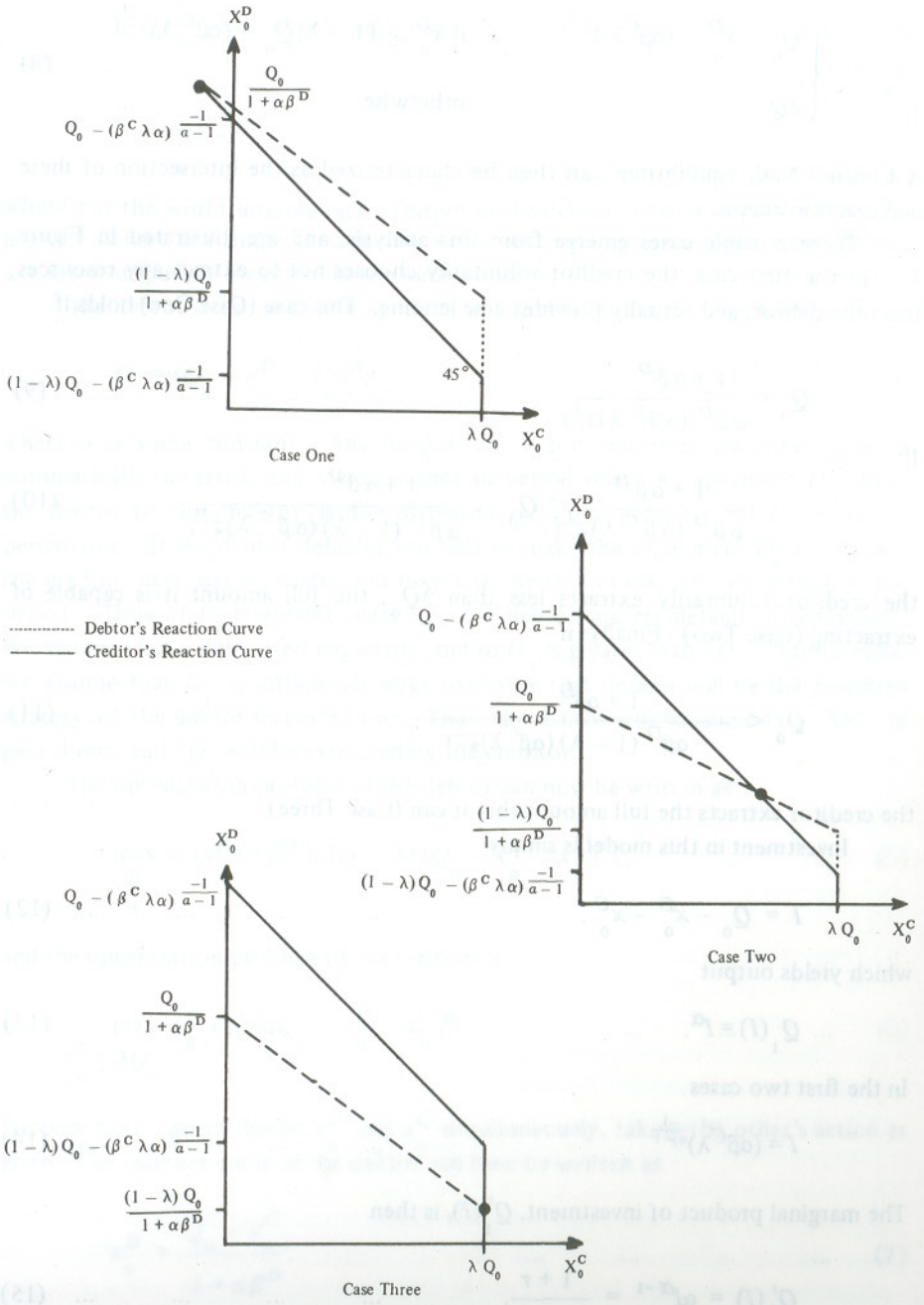


Fig. 3.

Without default risk, efficient lending requires the marginal product of capital to equal the world interest rate. In the presence of default risk and a debt overhang, efficient lending from the creditor's point of view equates the marginal product of capital with the world interest rate divided by λ, the lender's share of the borrower's output. This can also be seen by rewriting the creditor's utility function, Equation 2, as

$$u^C(x_0^C, x_1^C) = x_0^C + \beta^C \lambda Q_1(I). \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (16)$$

Differentiating this with respect to x_0^C, we get the first order condition

$$1 + \beta^C \lambda Q_1'(I) \frac{\partial I}{\partial x_0^C} = 1 - \beta^C \lambda Q_1'(I) = 0. \quad \ldots \quad \ldots \quad \ldots \quad (17)$$

This is exactly the same as Equation 15. Condition 17, then, is satisfied in the first two cases. In the third case, however, the marginal product of investment is less than $\frac{(1+\tau)}{\lambda}$ there is "too much" investment.

4. CONCLUSIONS

Our model rigorously demonstrates that if current debtor income is sufficiently low, the creditor will voluntarily provide debt and liquidity relief (Case One) or debt relief (Case Two), even though the debtor is in default. In either event, the level of investment in the debtor country will be efficient. If, however, current debtor income is sufficiently high, the creditor will extract as much as it can and the level of investment will be inefficient.

Any debt buyback or exit bond scheme which seeks to improve the welfare of both agents by capturing efficiency gains that may arise from a change in otherwise inefficient levels of investment can be successful only if Case Three holds. The intuition as to whether such schemes could be Pareto-improving is actually quite the opposite of what is implicit in initiatives like the Baker Plan. Instead of capitalizing on available investment opportunities, these buybacks or exit bonds would seek to bring investment in debtor countries to more efficient levels by actually *reducing* the amount of resources that is invested.

In Cases One and Two, unilateral debt forgiveness by the creditor is Pareto-improving. This forgiveness, however, improves welfare for a very different reason than that discussed by Corden (1988), Froot (1988), and Krugman (1988). Instead

of reducing future repayments in an effort to reduce investment disincentives and thereby increase investment, the debt relief in this model directly increases investment by reducing current repayments. If the conditions for such relief are not satisfied (Case Three), then other forms of debt relief may improve welfare by reducing investment. Unlike Froot (1988), this model shows that debt relief schemes like buybacks and exit bonds can be Pareto-improving when unilateral forgiveness is not.

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