

# External Debt Buyback: Scorned Too Much

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## I. Introduction

One of the most respected advanced texts, Krugman and Obstfeld's *International Economics* (1991), and the literature on which it leans (primarily Bulow and Rogoff, 1988) are remarkably one-sided when it comes to the question of external debt buyback by heavily-indebted countries. Krugman and Obstfeld, henceforth KO, conclude that "the cash buyback probably hurts the debtor" (1991, p. 669) and model no other possible outcome. Furthermore, they claim that "the result that a self-financed debt buyback hurts the debtor and benefits creditors is *generally* valid under assumptions that seem to describe the current plight of heavily indebted developing countries" (p. 667, emphasis added).

The unconditional advice to avoid debt buybacks may be only too welcome in such countries. Yet, as this note will show, its professional foundations are weak and, in fact, highly conditional. Hence economists who advise or lecture in heavily indebted countries are free to advocate a more balanced approach.

The next section (II) explains the forward-looking balance-sheet valuations also used in textbook analyses of debt buybacks. Section III replicates the essence of the KO demonstration of buybacks harming debtors. It then shows that their story and its moral lack generality. An alternative setup leads to the exact opposite conclusion: *creditors* are harmed by buybacks. The final section (IV) considers the range of possibilities on who gets hurt.

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## II. Balance-Sheet Valuation Conventions

This note accepts the criteria under which KO (1991, pp. 663 - 667) deduced that debtor governments will lose from buying back the external debt they have incurred or guaranteed. Their analysis compares the outlay cost ( $X$ ) of a preannounced buyback of given size with the benefit to the debtor measured by the market value ( $D$ ) of outstanding debt. If the price ( $P$ ) increases when the face value ( $F$ ) of outstanding debt is scheduled to be reduced by debt buyback, the cost is said to exceed the benefit and the debtor loses.<sup>1</sup> On the other hand, the creditor loses if  $P$  falls when  $F$  is cut, i.e., when the marginal price of debt,  $dD/dF$ , exceeds the average price,  $P = D/F$ , of debt bought back under the announced program.

Also as in KO (1991, pp. 663 - 665) and as in many textbooks on corporate finance, we will use illustrations involving only two discrete possibilities for some future date, rather than a continuous distribution of outcomes. Hence there will be a good outcome,  $g$ , with probability  $Pr(g)$  and a bad outcome,  $b < g$ , with probability  $Pr(b) = 1 - Pr(g)$ . Also for simplicity, the certain return, amounting to  $\min[b, g] = b$ , will be discounted at the rate 0 while the risky part of the return will be discounted at the rate of 50 percent. These real rates are also used in Brealey and Myers (1991, pp. 440 - 441) to discount riskless and risky parts of returns, but their exact size is immaterial to the point at issue which will be made with numerical specificity nonetheless. Thus the discount factor for riskless returns is 1 and not separately identified, while it is  $R$  for the risky part of the total return and equal to  $1/1.5$ , or two-thirds.

The demonstration is developed against the following background of prior history: When times were good, debt of 50 had been issued at par so that  $D$  equalled  $F$  and  $P$  was 1 originally. Conditions have since deteriorated from where  $b$  was no less than 50 and the value of total assets well over 50, which was the market value of debt alone. The less favorable current situation, which forms the starting point for the present analysis, is characterized by  $b = 20$ ,  $Pr(b) = 5/6$ , and  $g = 110$ ,  $Pr(g) = 1/6$ . Hence the current market value of all assets and liabilities is only  $V = Pr(b)b + Pr(g)[b + (g - b)R] = 20 + (110 - 20)R/6 = 30$  before debt buyback.

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<sup>1</sup> In contrast to *Krugman and Obstfeld* (1991) associating a rise in the market price of debt with net losses to debtors, *Krueger et al.* (1990, p.16) mention "the view that buy-back of the debt could effectively promote the resumption of growth if and only if the buy-back resulted in a situation where the value of the remaining debt outstanding returned to par." Although the validity of the KO criterion itself thus may be questioned, this note will not attempt to challenge it.

As is well known, the market value of debt,  $D$ , is equal to the face value,  $F$ , minus the value of the default option implied by limited liability, “inability to pay,” or contingent-claims features that are understood to attach even to sovereign debt contracts. The value of this put option,  $POP$ , is thus derived from the “right” to extinguish a debt repayment obligation of  $F = 50$  that accrues interest on the risky part,  $F - b$ , by surrendering whatever liquid or recoverable assets and good will the government still commands. International reserves are such liquid assets that form part of the external debt management process (see Dooley, 1987; Dooley, Lizondo, and Mathieson, 1989; Landell-Mills, 1989). They are treated as functionally equivalent to working capital that is included in the flow of gross returns.

Since a total return of no less than  $b = 20$  will be available in any event but no less than  $(F - b)/R + b$ , fully covering principal and interest, only with probability  $1/6$ , the present value of the put or default option is  $POP = [R(F - b)/R]Pr(b) = (50 - 20)(5/6) = 25$  to the debtor. Hence the market value of the debt is  $D = F - POP = 50 - 25 = 25$ . Dividing by  $R$  is the same as multiplying by  $(1 + r)$ , where  $r$  is the (not necessarily annual) real interest rate or factor applying to the risky part of returns.

Equity,  $E$ , is the residual claim,  $V - D = 5$ . Its value is equal also to the expected present value of the call on official assets after full settlement of debt claims with interest. Since anything will be left over only in the event of the good outcome,  $g > (F - b)/R + b$ , it follows that  $E = Pr(g)[g - (F - b)/R - b]R = 5$ .

The value of foreign official investments other than international reserve assets is determined as the difference between  $V = 30$  and the starting cash assets of 20, using market-value accounting as in Brealey and Myers (1991, pp. 440, 492). The result is the first balance sheet in Table 1. It gives the reference position prior to debt buyback for a country in external payments difficulties and with a 50% market discount,  $(F - D)/F$ , on its debt.<sup>2</sup>

### III. The KO Story with a Different Ending

A formal summary of the key relations and concepts is useful before obtaining the modifications of the balance sheet produced by debt buyback under condition implied in the KO demonstration and under alternative conditions. From equation (9) below on, values are dated depending on

<sup>2</sup> Discounts on the debts of highly indebted countries have ranged from 36 percent for Chile to 96 percent for Peru in a recent year. See Rogoff (1990, p. 4) and the references given there.

Table 1

**The Official International Position of a Country in  
External Payments Difficulties Before (0) and After (1) Debt Buyback**

<i>Assets</i>		<i>Liabilities</i>	
(1) The Distressed Situation Prior to Debt Buyback			
Cash Assets: Internat. Reserves	20	Foreign Debt	25
Other Foreign Official Investments	10	Equity Position	5
Total Assets	30	Tot. Liabilities	30

Memorandum: The face value of external debt is  $F(0) = 50$ ;  
its price is  $P(0) = 0.5$ , or 50 % of par.

(2) The Balance Sheet After Spending 10 on Buyback from  
a Hidden Grant, or on the KO Assumption that  $u = 0$

Cash Assets: Internat. Reserves	20	Foreign Debt	22.43
Other Foreign Official Investments	10	Equity Position	7.57
Total Assets	30	Tot. Liabilities	30

Memorandum: The face value of external debt is  $F(1) = 34.58$ ;  
its price is  $P(1) = 0.6486$ , or 64.86 % of par.

(3) The Balance Sheet after Spending 10 on Debt Buyback Assuming  $u = 1$

Cash Assets: Internat. Reserves	10	Foreign Debt	13.05
Other Foreign Official Investments	10	Equity Position	6.95
Total Assets	20	Tot. Liabilities	20

Memorandum: The face value of external debt is  $F(1) = 28.31$ ;  
its price is  $P(1) = 0.4610$ , or 46.10 % of par.

Note: (2) and (3) represent independent alternatives to (1).

whether they apply before (0) or after (1) an announced program of debt buyback. The equations follow.

- (1)  $R = 1/(1 + r)$ , a discount factor with  $r = 50\%$  for risky returns.
- (2)  $V = b + Pr(g)(g - b)R$ , present value of all assets;  $Pr(g) = 1/6$ .
- (3)  $V = D + E$ , also the value of debt ( $D$ ) and equity ( $E$ ) liabilities.

- (4)  $D = F - POP$ , the market value of debt,  $F$  the face value.  
 (5)  $POP = Pr(b)(F - b)$ , present value of default option;  $Pr(b) = 5/6$ .  
 (6)  $P = D/F$ , the average price of debt.  
 (7)  $dD/dF = P(d \ln P/d \ln F + 1)$ , the marginal price of debt.  
 (8)  $E = Pr(g)[g - (F - b)/R - b]R$ , the market value of equity.  
 (9)  $g(1) = g(0) - uX$ ,  $g(0) = 110$ ;  $0 \leq u \leq 1$ ;  $X = 10$ .  
 (10)  $b(1) = b(0) - uX$ ,  $b(0) = 20$ .  
 (11)  $X = -P(1)[F(1) - F(0)]$ , outlay for debt buyback;  $F(0) = 50$ .

Combining equations (4) and (5) yields:

- (12)  $D = b + Pr(g)(F - b) = b(i) + Pr(g)[F(i) - b(i)]$ ,  $i = 0$  or  $1$ .

This last equation shows that debtors have a claim on the certain return,  $b < F$ , and on  $(F - b)/R$ , which is that part of the risky return, itself to be discounted at  $R$ , that is owed from the good outcome,  $g = 110$ , expected with probability  $1/6$ .

The change in the face value of debt, contained in equation (11), that is produced by the buyback is brought out next. Dating  $D$ ,  $b$ , and  $F$  for post-buyback and substituting from equation (6) for  $P(1)$  in equation (11) and using equation (12) to substitute for  $D(1)$  and equation (10) to substitute for  $b(1)$  yields:

- (13)  $F(1) - F(0) = -X[F(1)]/\{b(0) - uX + Pr(g)[F(1) - b(0) + uX]\}$ .

What happens now to the value of the debt if an amount equal to  $X = 10$  units is used to repurchase debt? In the KO analysis doing so does nothing to diminish the minimum amount that will be available with certainty, so that  $b$  remains 20. This is equivalent to setting  $u$  equal to 0 in equation (13). Such an implied specification would be suitable for debt forgiveness or for analyzing the effects of using a foreign capital grant of 10 for debt buyback, but not for buybacks in which foreign assets must be drawn down to reduce external liabilities. International reserves can not be ignored as implicit collateral behind sovereign debt. Because (invested) reserves are part of future gross returns, reducing such reserves must normally lower both the good and the bad outcomes achievable in the future. If that reduction is fully operative,  $u$  equals 1. In that case cash assets and the value of return outcomes all fall by  $X = 10$  under all contingencies, relative to the situation that would prevail without buyback.

With the present values of  $F(0) = 50$ ,  $X = 10$ ,  $b(0) = 20$ , and  $Pr(g) = 1/6$ , equation (13) can be reduced to the quadratic:

$$(14) F(1)^2 + (110 - 50u)F(1) - 5,000 + 2,500u = 0.$$

Solving this equation with the KO assumption of  $u = 0$  yields the single positive root,  $F(1) = 34.582$ . Dating and substituting into equation (12) further yields  $D(1) = 22.43$  and hence  $P(1) = 0.6486$ . The price of debt thus rises from 0.5 to almost 0.65 immediately upon announcement of the debt buyback program. The face value of outstanding debt falls from 50 to 34.58 when that program is executed and 10 units are spent on debt buyback at the new price  $P(1)$ . Hence  $dlnP/dlnF$  in equation (5) equals  $-0.71$ .

This result means that for each dollar (mark or yen) spent on debt buyback the market value of outstanding debt falls by only 29 cents. This makes debt buyback inadvisable as KO had concluded from a similar demonstration. The loss involved is shown in the second balance sheet in Table 1 by the market value of equity rising from 5 only to 7.57 in spite of a hidden foreign grant of 10 to be used for debt buyback. In balance sheet (2), the market price of the 50 units of debt originally outstanding rises by 1486 basis points for a capital gain of 7.43 accruing to foreign bondholders. So the market value of outstanding debt falls not by 10 but only by 2.57, from 25 in balance sheet (1) to 22.43 in (2). Hence only 2.57 of the foreign grant of 10 adds to the official equity position or net worth of the debtor country, and 7.43 is the "loss" which KO would attribute to the external debt buyback per se. Of course, the grant required for the internal consistency of their demonstration might be tied, and thus not be available for any other use.<sup>3</sup> Then the debtor's only opportunity loss could lie in not getting it.

Letting  $u$  equal 1 rather than 0 yields the exact opposite result for debtors and creditors. Although the present analysis was developed specifically to question the position advanced by KO on its own terms, its basic conclusion, that debtors may be helped rather than hurt, parallels that of Dooley (1988). The alternative special case of  $u = 1$  implies that the reduction in reserves associated with debt buyback lowers the cash assets behind the remaining debt by the same amount, rather than not at all, as with  $u = 0$ . The results with  $u = 1$  are that  $F(1) = 28.31$ ,  $D = 13.05$ , and hence  $P(1) = 0.4610$ . With the market price falling (from 0.5) along with the face value (from 50) as a result of the buyback program,  $dlnP/dlnF$  is now positive in equation (5) and equal to 0.14. Hence the market value of the debt falls by *more* than the cost of the buyback, or by \$ 1.14 for every dollar spent reducing  $F$  by  $1/P(1)$ .

<sup>3</sup> The advisability of such capital grants is another matter not discussed here. For critical treatments see *Bulow and Rogoff* (1990) and *Eaton* (1990).

The third balance sheet in Table 1 reveals this net benefit by the value of the equity position rising from 5 in balance sheet (1) to 6.95 in (3) without the help of any implied foreign grants. With the marginal price of debt (the marginal value of debt reduction) above the average price at which debt is bought back, debt buyback would be advisable by the KO criterion under these conditions. It is clear, therefore, that the KO story is not general and can readily be given a different ending.

#### IV. Evaluation

Given that the answer on who gets hurt from debt buyback critically depends on accompanying conditions, the question that remains is which starting assumptions are most realistic. Finding that value of  $u$  for which debt buyback has no effect on the market price of debt may help organize this discussion by establishing an appropriate divide ( $u^*$ ). Substituting  $P(1) = P(0) = 0.5$  into equation (11) yields  $F(1) = 30$ . Substituting this value into equation (14) and solving for  $u$  shows that  $P$  will be unaffected by debt buyback if  $u^*$  equals 0.8. If  $u$  is smaller, such an operation would harm debtors, – if greater it would harm creditors by the criterion that is based on the sign of  $d \ln P / d \ln F$  and hence on whether the marginal exceeds the average price of debt.

No general answer can be given as to which range,  $0 \leq u < 0.8$  or  $0.8 \leq u \leq 1$ , is more likely to contain realistic values of  $u$ . Indeed, the answer may differ by country, over time, and by the closeness of the relation between the level of desired international reserves and the stock of external debt outstanding.

On the one hand, the level of actual and prospective reserves is always carefully considered in rescheduling operations, and countries are sometimes enjoined to maintain specified minimum levels of reserves or to rebuild reserves on a schedule. Also, the demand for international reserves might be a function mostly of factors other than external debt. In either case debt buyback would reduce reserves only temporarily. In addition, there is always the possibility, however remote, that reserves that are here today are gone tomorrow for reasons other than debt buyback. In that event the effect of debt buyback on reserves might also not be very lasting in the sense that if debt buyback had not cut into reserves, something else might have been allowed to do so soon after.<sup>4</sup> However, if the demand for international reserves is closely linked to external debt, and conversely, if the perceived

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<sup>4</sup> This argument is not helpful for systematic analysis to the extent behavioral change is implied.

security of debt is closely related to reserve holdings,  $u \geq 0.8$  would be more likely than  $u < 0.8$ . In that case, contrary to KO, it would be the *creditors* for emphasis who might have to beware of debt buybacks lowering reserves. Be this as it may, Krugman and Obstfeld's assumption amounting to  $u = 0$ , and their demonstration that buybacks are extremely harmful to debtors can not be accepted as valid *generally* or as a sufficient basis for policy advice.<sup>5</sup>

## References

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## Zusammenfassung

### Ist der Rückkauf von Auslandsschulden zu sehr in Mißkredit geraten?

Hochverschuldeten Entwicklungsländern, die in den 80er Jahren den Zugang zu privaten internationalen Finanzquellen verloren hatten, ist auf unterschiedliche Weise Schuldenerlaß gewährt worden, wobei auch ein Rückkauf ihrer Auslandsschulden mit einem beträchtlichen Abschlag in Erwägung gezogen und zum Teil auch praktiziert worden ist. Es trifft zwar zu, daß ein Schuldenerlaß oder Zuschüsse zum Rückkauf von Auslandsschulden diese Abschläge mindern, jedoch braucht ein Schuldenerückkauf diese Wirkung nicht unbedingt zu haben. Der Grund dafür ist der, daß, wenn Devisenreserven, die als Deckungsmasse für die Auslandsschulden eines

<sup>5</sup> Attention is again drawn to the important work by *Dooley* (1988).



Landes gelten, für den Schuldenrückkauf eingesetzt werden, der Wert dieser den internationalen Gläubigern des Landes verbleibenden Reserven höchstwahrscheinlich gemindert wird. Daraus ergibt sich, daß der bei den ihnen verbleibenden Forderungen vom Markt bewirkte Abschlag höher oder geringer ausfällt, je nachdem wie eng die Deckungsbeziehungen zwischen den liquiden amtlichen Devisenreserven und den weniger liquiden Auslandsschulden sind. Diese Feststellung weist die in dem weit verbreiteten Lehrbuch von Krugman und Obstfeld enthaltene und mit Nachdruck verfochtene Forderung zurück, daß ein eigenfinanzierter Schuldenrückkauf dem Schuldnerland abträglich und seinen Gläubigern *im allgemeinen* zuträglich ist. Dies wäre das Ergebnis eines Kurstreibens, d.h. eines Absenkens des Abschlags unterhalb der Parität, bei den noch offenen Schulden. Da unter den in diesem Beitrag definierten Bedingungen das Gegenteil geschehen kann, ist der kategorisch erteilte politische Rat an die Schuldnerländer, sich eines Schuldenrückkaufs zu enthalten, unbegründet.

## Summary

### External Debt Buyback: Scorned Too Much

Heavily-indebted developing countries that had lost access to voluntary international financing in the 1980s have been granted various forms of debt relief while also considering, and sometimes executing, repurchases of their foreign debt at deep discounts. While it is true that debt forgiveness or grants for repurchasing foreign debt will reduce that discount, debt buyback need have no such effect. The reason is that the application of international reserves, which serve as a country's implicit collateral against external debt, to debt buyback reduces the value of the assets, and of all possible outcomes, left for international creditors. Hence the market discount on their remaining claims may either rise or fall depending on the closeness of the collateral relationship between liquid official foreign assets and less liquid foreign debt. This finding, demonstrated with rigor, refutes the claim, made in Krugman and Obstfeld's widely-used textbook, that a self-financed debt buyback hurts the debtor country and benefits its creditors *generally*. It would do so by driving up the price, i. e., lowering the discount from par, of the debt that remains outstanding. Since the opposite may occur under conditions defined in the paper, categorical policy advice, for debtor countries to avoid buybacks, is unfounded.

## Résumé

### Le rachat de dettes extérieures a-t-il perdu de son crédit?

On a octroyé de différente manière des remises de dettes aux pays en voie de développement fortement endettés qui avaient perdu dans les années 80 l'accès aux sources financières privées internationales. On a également évoqué de racheter leurs dettes extérieures en les allégeant considérablement et cela a été aussi en partie réalisé. Il est certes correct qu'une remise de dettes ou des subventions pour le rachat de dettes étrangères diminuent leur décote, mais un rachat de dettes ne doit pas nécessairement avoir cet effet. La raison en est la suivante: lorsqu'on utilise, pour le rachat des créan-

ces, des réserves de devises qui servent de fonds de garantie pour les dettes étrangères d'un pays, la valeur de ces réserves restant aux créanciers internationaux du pays sera probablement réduite. Il en résulte que le montant de la décote produit par le marché est plus ou moins élevé en fonction des rapports de garantie entre les réserves de devises officielles liquides et les dettes extérieures moins liquides. Cette constatation rejette la thèse contenue dans le manuel très répandu de Krugman et Obstfeld et défendue avec fermeté, qu'un rachat de dettes autofinancé est préjudiciable au pays débiteur et en général profitable à ses créanciers. Ceci serait le résultat d'une baisse de la décote en-dessous de la parité pour les dettes encore non-réglées. Comme, sous les conditions définies dans cet article, le contraire peut se produire, le conseil politique donné catégoriquement aux pays débiteurs de ne pas procéder à un rachat de dettes, n'est pas justifié.