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TAX CREDITS FOR DEBT REDUCTION

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ABSTRACT

The incentives for domestic investment in debtor countries are influenced by the terms of their external obligations and by the system of taxation utilized to provide government revenue for debt payments. It is well known that existing debt contracts could be altered to improve the incentives for investment but this has proven difficult to accomplish, perhaps because individual creditors have incentives not to agree to such changes. In this paper we show that a simple tax credit scheme that can be implemented unilaterally by the debtor government can overcome at least some of the inefficiencies caused by existing debt contracts.

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I. Introduction

It is clear that debt forgiveness voluntarily and freely provided by external creditors benefits a debtor country. Forgiveness increases resources available to the debtor for current consumption and investment. It is often argued, moreover, that forgiveness can also benefit creditors, because they might share in the increased output made possible by increased investment. 1/ Two things are obviously necessary for both parties to gain. First, the incentives for residents of the debtor country must be such that investment actually increases as compared to what would occur without forgiveness. Second, institutional arrangements that determine the distribution of output between the residents of the debtor country and its creditors must provide assurance that the additional output will be shared.

The debtor country's tax system is an important determinant in the distribution of the benefits of forgiveness. We argue that an administratively simple tax structure can be used to transform existing financial contracts--that are poor mechanisms for the distribution of property rights in the presence of a debt overhang--into a distribution system that provides better incentives.

The tax reform developed in this paper is a simple one. The debtor country would offer to exchange, for a reduction in the contractual value of its debt, a tax credit that could be used to "pay" future taxes on equity earnings in the debtor country. In this way, the debtor country

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1/ See Sachs (1988), Krugman (1988), Helpman (1989), Froot (1989), and Dooley (1989).

allows individual creditors to share the benefits of increased future output. We show that the debtor and creditor gain from this tax credit.

This tax reform can be viewed as an alternative to explicit changes in existing debt contracts. A possible advantage of altering the tax structure, rather than existing contracts, is that the debtor can do so without the universal approval of individual creditors. In most cases, important features of sovereign debt contracts can be waived or amended only if a substantial majority of creditors approve of such changes. Since it will often be advantageous for a few creditors to withhold approval, in order to win concessions from the debtor or other creditors, a more direct route to a change in the property rights of creditors might prove useful.

The plan of the paper is as follows: In the next section, we present a simple model in which the tax system is designed to collect revenue sufficient to make contractual debt payments to nonresident creditors, subject to the condition that the tax rate cannot exceed a feasible level. In this framework some level of forgiveness may be in the interest of both debtor and creditors. However, the remaining debt will continue to reduce investment incentives. In Section III we introduce a tax credit that can be used by nonresident creditors that forgive additional debt to pay taxes on future income from domestic equity holding. Our tax credit is shown to induce additional debt forgiveness and investment and to benefit the debtor and the creditors. Section IV provides concluding remarks.

II. The Model

The basic model is from Helpman (1989). The government of the debtor country has inherited an external debt, D, which carries a contractual interest factor R. The debtor government generates payments by taxing domestic output. The future is collapsed into a single "next" period in which output, Y, depends on investment undertaken today, I, and a random productivity shock, $\tilde{\theta}$, which changes the value of domestic output in terms of external debt. Next period output is

$$Y(\theta;I) = \theta E(I), \tag{1}$$

where θ represents the realization of $\tilde{\theta}$ and $E(\cdot)$ is an increasing concave function. We use E to measure the number of real equities issued in the debtor country. 1/

The tax system used to generate government revenues for debt-service payments is one in which the tax rate, τ, is set to exactly generate RD unless income in the next period is so low that this would require a tax rate above a feasible level, t. In this case the tax rate is set at t and debt-service payments are equal to the resulting tax revenue which falls short of RD. The highest value of θ for which the tax rate is set at t is denoted by θ_C. Clearly,

$$\theta_C(D,I) = RD/tE(I). \tag{2}$$

1/ A "unit" of E can be thought of as a physical unit, such as one tree of a given age and size. The value of a unit of E will depend on expectations about the future after tax earnings that ownership of a unit of E will provide an investor.

For values of output above those associated with $\theta_c(\cdot)$ debt is fully serviced and the tax rate is lower the higher the output level, while for lower output levels the tax rates equals t independently of output, and debt-service payments are lower the lower the output level. The applicable tax rate is

$$\tau(\theta;D,I) = \begin{cases} t & \text{for } \theta \le \theta_c(D,I), \\ RD/\theta E(I) & \text{for } \theta \ge \theta_c(D,I). \end{cases} \qquad (3)$$

The resulting structure of the tax rate and debt-service payments are illustrated by the full curves in Figures 1 and 2, respectively (OAB in Figure 2). Creditors facing this system know that if residents of the debtor country decide to invest more today, output next period will be higher for every value of the productivity shock θ. In turn, the tax rate can begin to fall at lower values of θ. In Figure 1 the "high investment" tax rate schedule is the broken line to the right of θ_c^H and remains the full line for lower values of θ. Since the range of productivity shocks with partial payment shrinks from $(0,\theta_c)$ to $(0,\theta_c^H)$, the expected value of tax revenues, and therefore debt service payments, will be higher as investment increases.

In order for creditors, as a group, to forgive part of the debt they would have to believe that it will raise expected repayments. This can be illustrated in Figure 2 as follows: Debt forgiveness of F means that RD shifts down to R(D-F). But if this level of forgiveness also raises investment, then the repayment schedule becomes OA_FB_F instead of OAB, and the tax rate schedule in Figure 1 shifts down to the broken line curve. Now, if the distribution of θ is, say, uniform on $[\underline{\theta},\overline{\theta}]$, then this level

Figure 1

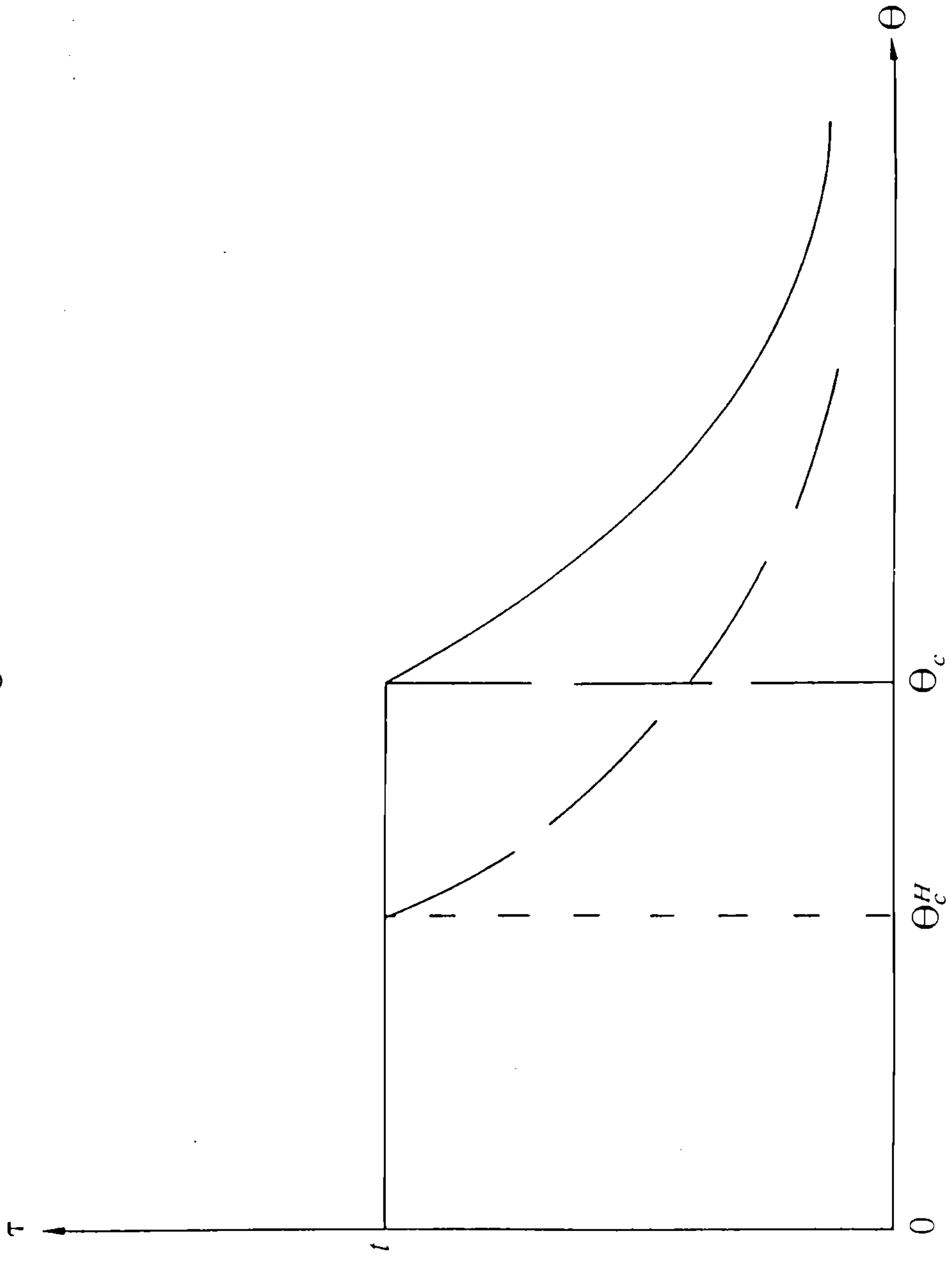
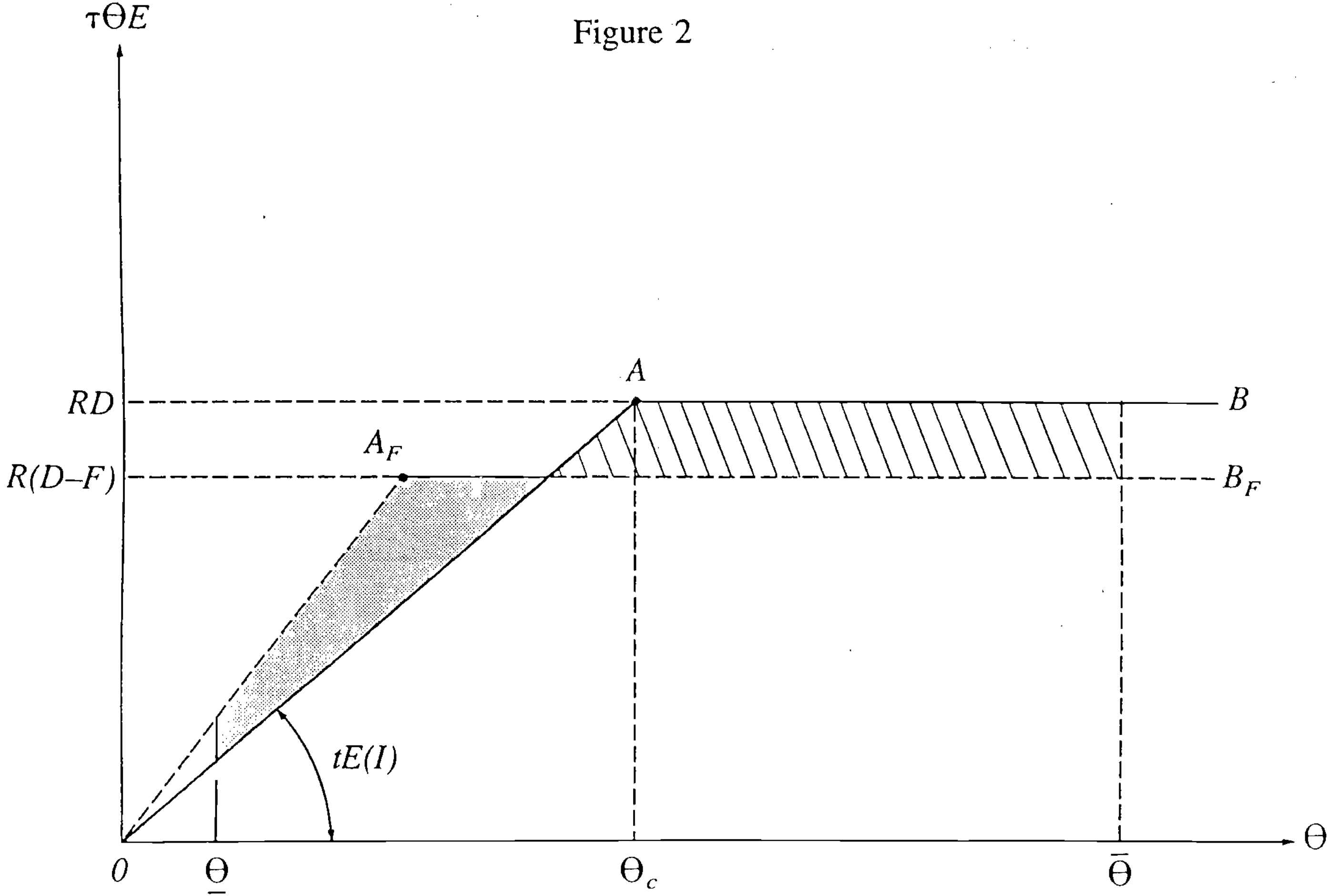


Figure 2



of forgiveness is desirable for the creditors if and only if the shaded area in Figure 2 is larger than the lined area. 1/

More generally, given a functional relationship between investment and debt, I(D) (that we will soon derive), and assuming that creditors value debt according to the expected value of repayments, the value of debt is given by

$$V(D) = \mathcal{E}\tau[\theta;D,I(D)]\theta E[I(D)]/R^{*}, \tag{4}$$

where $\mathcal{E}$ is the expectations operator over θ and R^{*} equals one plus the riskless interest rate on world financial markets. Equation (4) states that the market value of debt, V(D), is equal to the discounted expected value of the product of the tax rate, τ, which depends on the value of productivity shock, θ, the value of debt, D, and the level of investment, I(D); and the tax base, θE, which also depends upon investment. The price of a unit of debt on the secondary market is

$$p(D) = V(D)/D. \tag{5}$$

If investment declines as debt rises (as will be the case in what follows) the secondary market price is lower the larger the outstanding debt. The debt's total value V(D) = p(D)D, however, increases for small values of D. If it increases for all debt levels, there will be no voluntary forgiveness. If, on the other hand, its value begins to decline after some debt level, as depicted in Figure 3, it becomes in the joint interest of

1/ For other distributions of θ, the areas would have to be weighted by their probability of occurring.

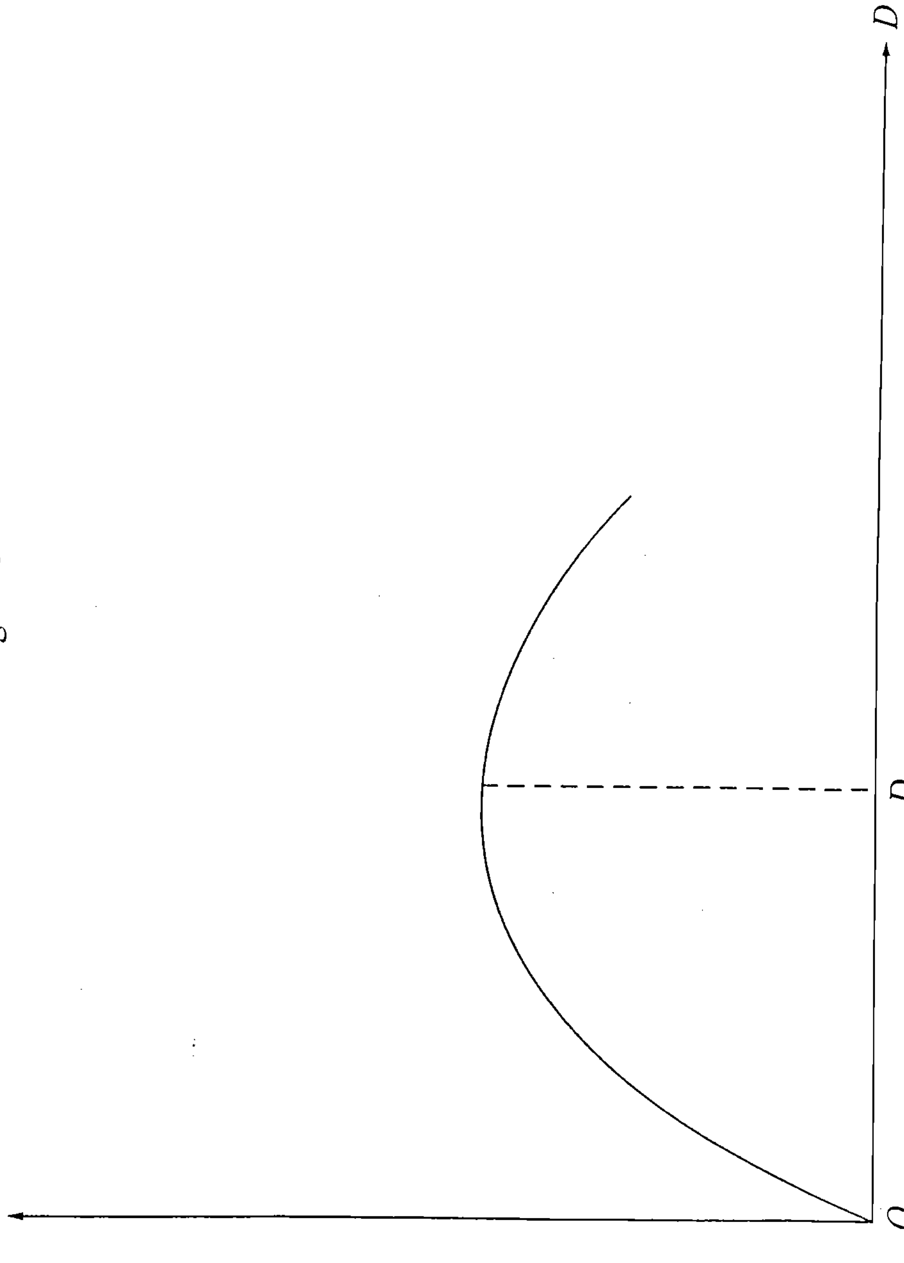


Figure 3

creditors to reduce debt to D_0 whenever its initial value is larger. The value of debt is largest at D_0.

The same point is illustrated in Figure 4 by means of a demand curve and a marginal revenue curve (the curve in Figure 3 is like a total revenue curve). The marginal revenue curve is defined in the usual way by

$$MR(D) = p(D) + Dp'(D).$$

A value maximizing single creditor, or a consortium of creditors, with an initial debt larger than D_0 would voluntarily reduce it to the point at which marginal revenue equals zero. Namely, to D_0.

Even when debt is reduced to D_0, however, further forgiveness would benefit the debtor who could compensate the creditors so as to make everyone better off, because the remaining debt discourages investment to an undesirable degree. This stems from the fact that positive tax rates τ reduce the private marginal return on investment below the social value.

Since the response of investment to changes in taxation are crucial to the analysis, we close this section with a description of the relationship between debt, taxes, and investment. Investment is determined by companies' attempts to maximize their net value on the stock market. Hence, if q is the price of a unit of E on the stock market they choose investment so as to maximize $qE(I)-I$. This produces a supply price $q_s(I)$ that increases with investment, as shown in Figure 5, because the marginal product of investment is declining. For this analysis we also assume that the debtor country is fully integrated with international capital markets and that its equities are a negligibly small part of the total market. This means that the price investors will pay for a unit of E equals the

Figure 4

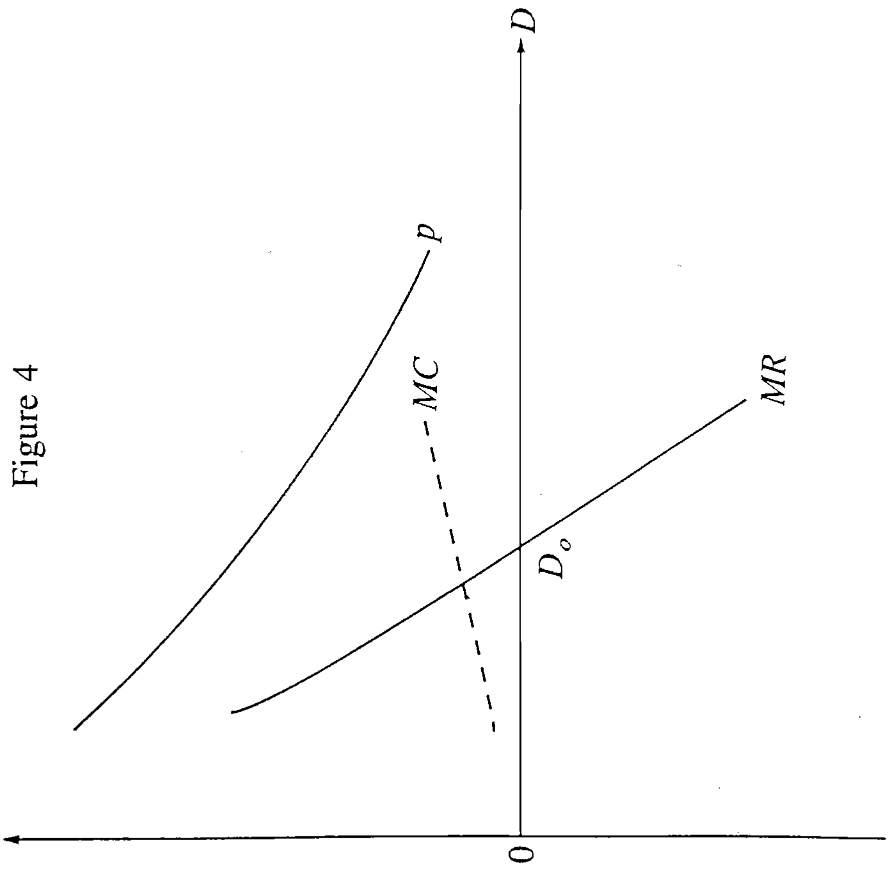
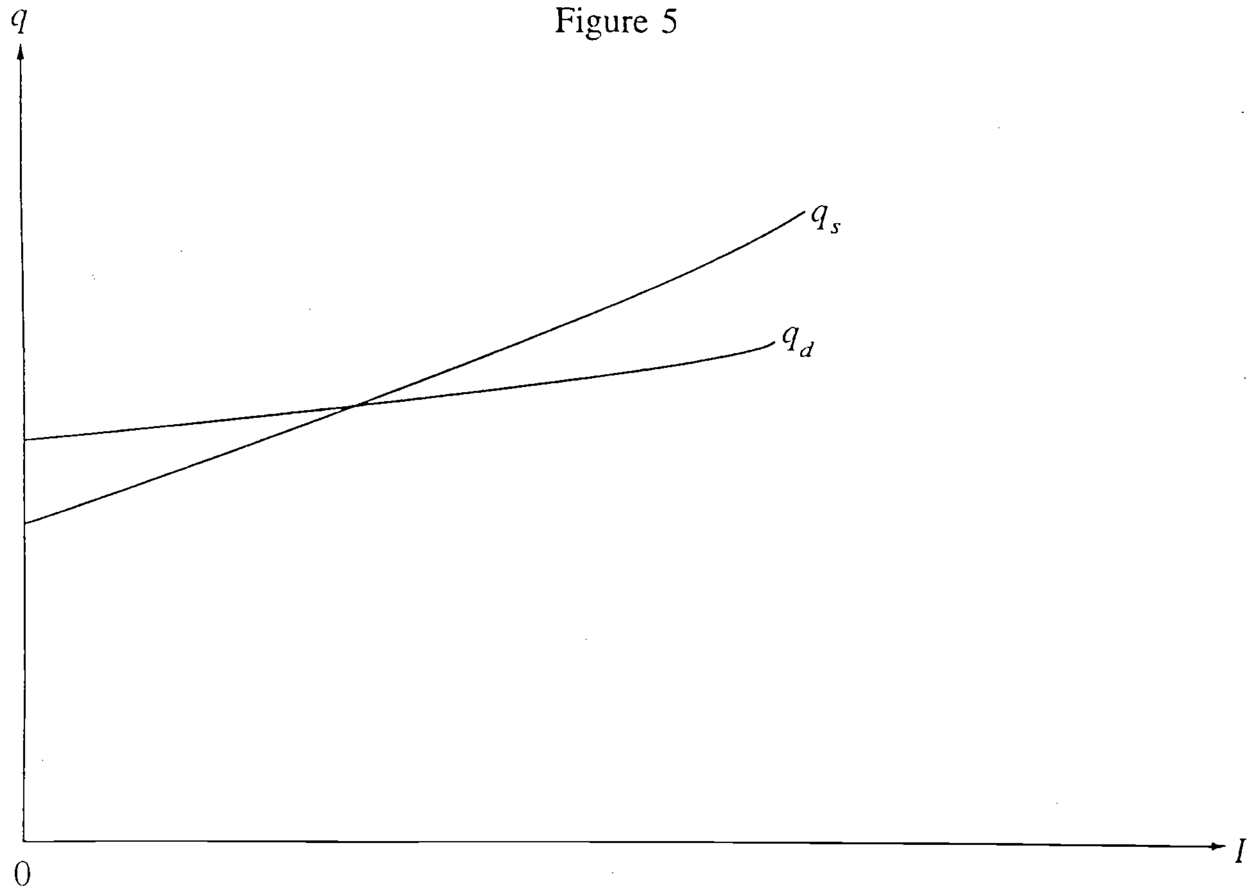


Figure 5



present discounted value of the expected, after tax return on equity. Namely, the demand price is

$$q_d(D,I) = \mathcal{E}[1-\tau(\theta;D,I)]\theta/R^*. \tag{6}$$

This demand curve is also depicted in Figure 5. It is upward sloping because increased investment will reduce the average tax rate paid by each unit of capital. It shifts downward when debt increases because tax rates increase with higher debt levels.

Helpman (1989) has shown that the curves in Figure 5 may intersect more than once. In this paper we restrict attention to cases in which equilibrium is unique and assume that the supply curve has a steeper slope so that the equilibrium is stable. In this case an increase in debt shifts the demand curve down and brings about lower investment. Namely, the function I(D) is declining and debt forgiveness increases investment.

III. The Tax Credit Program

In this section we assume that the creditors cooperate. 1/ We introduce a tax credit to debt forgiven beyond the above defined equilibrium forgiveness level, D_o. Obviously, the level of forgiveness that is attained without the tax credit depends upon a great many variables and is not easily quantified. We assume for analytical convenience that it has already been established; i.e., the tax credit

1/ In Helpman (1989) it is shown that noncooperative behavior among creditors will lead to qualitatively similar results for the model developed in Section I. To keep the analysis simple, cooperative behavior is assumed throughout this section.

is introduced when the face value of debt is D_o. The objective is to improve on this outcome by modifying the tax system.

The debtor government offers creditors that forgive a unit of contractual debt the right to a discount on taxes paid on income generated by α units of domestic equity. As in the previous section, the general tax on next period's income is τ, but a creditor who forgives debt pays a tax rate of $(1-\lambda)\tau$ on his income from α units of equity. As in the previous section, the value of τ will depend on the outcome for output in the next time period while λ and α are parameters set by the debtor government in advance.

The tax structure is now slightly more complicated. In high output states the tax rate τ is adjusted so that

$$R(D_o-F) = \tau\theta E(I) - \delta\tau F,$$

where δ is the product of λ and α. The "new" term on the right-hand side is the tax rebate given on F dollars worth of forgiveness. If the tax rate τ implied by this formula rises above the maximum acceptable rate t, full interest payments are not made, and τ is set at t. As in the previous section, we define θ_c as the critical productivity shock at which τ reaches t, which is now given by

$$\theta_c(D_o,I,F,\delta) = R(D_o-F)/t[E(I)-\delta F]. \qquad (7)$$

The resulting tax rate is

$$\tau(\theta;D_o,I,F,\delta) = \begin{cases} t & \text{for } \theta \le \theta_c(D_o,I,F,\delta), \\ R(D_o-F)/\theta[E(I)-\delta F] & \text{for } \theta \ge \theta_c(D_o,I,F,\delta). \end{cases} \qquad (8)$$

The tax system discussed in the previous section is a special case in which $\delta=0$ (no tax credits). Indeed, when $\delta=0$ and $D=D_o$ cooperating creditors, who are interested in the market value of their claims, abstain from debt forgiveness (F=0). This is the point of departure of our analysis. We now see what happens when a small tax credit is introduced. For realizations of the productivity shock below the critical level the tax rate remains at its maximum level t. For higher productivity shocks the tax rate remains constant to a first-order approximation (the partial derivative $\tau_\delta(\theta;D_o,I,0,\delta)$ equals zero). Hence, the introduction of the tax credit has no effects unless it changes forgiveness. If forgiveness increases, the tax rate τ declines in high productivity states as long as the tax credit δ is small ($\tau_F(\theta;D_o,I,F,0) < 0$ for $\theta > \theta_c$). Large tax credits lead to higher tax rates as a result of debt forgiveness because the savings on debt service payments fall short of the tax credit on forgiven debt.

With this scheme in place, the value of a real equity (i.e., a unit of E) on the international financial markets is

$$q_d(D_o,I,F,\delta) = \mathcal{E}[1-\tau(\theta;D_o,I,F,\delta)]\theta/R^*. \tag{9}$$

Since in high productivity states the tax rate is smaller the larger the investment level, the demand price increases in investment and the determination of investment is as depicted in Figure 5. The only difference is that now the demand schedule depends also on F and the tax credit δ. We have seen above that when F=0 (which is the initial level of forgiveness) the first-order effect of the tax credit on the tax rate τ is nil. Therefore, its first-order effect on the demand schedule in Figure 5 is nil, which implies that its direct first-order effect on investment is also nil. On the other hand, for small values of the tax credit, forgiveness reduces tax rates, shifts upwards the demand schedule, and thereby raises equilibrium investment (recall that the supply schedule does not depend on the tax system). Hence, investment takes on the functional form $I(D_0;F,\delta)$, with $I_F(D;F,0) > 0$ and $I_\delta(D;0,\delta) = 0$.

It is useful to observe at this point that our tax credit can be implemented in a variety of combinations, because only the product $\delta=\lambda\alpha$ matters; i.e., its decomposition into the proportion of taxes rebated λ and the number of real equities on which a rebate is given α is of no consequence. An extreme form of the system is one in which a forgiven unit of the face value of debt entitles the creditor to tax free income on δ real equity holdings. The reader may find most convenient the latter interpretation.

In considering forgiveness creditors calculate its effect on the market value of the remaining debt and on the value of the tax credit. They are interested in their sum. Each one of these components of their wealth depends on the response of investment that we summarized by the function $I(D_0;F,\delta)$. Thus, when the face value of debt is reduced to D $(F = D_0 - D \geq 0)$ the expected present value of the tax credit on a unit of forgiven debt is given by

$$T(D_0;D,\delta) = \delta\mathcal{E}\tau[\theta;D_0,I(D_0;D_0-D,\delta)]\theta/R^* \text{ for } D \leq D_0. \qquad (10)$$

Naturally, this value equals zero when the tax credit equals zero and, what is most important for what follows, it increases in the tax credit for small values of δ (i.e., $T_\delta(D_o;D,0) > 0$). The combined value of the tax credit to the group of creditors equals $T(D_o;D,\delta)(D_o-D)$.

The remaining debt is valued on the secondary market by the present value of expected debt service payments (as in (4)), given by

$$V(D_o;D,\delta) = \mathcal{E}\tau[\theta;D_o,I(D_o;D,\delta),D_o-D,\delta]\theta E[I(D_o;D_o-D,\delta)]/R^* \text{ for } D\leq D_o, \quad (11)$$

and the secondary market price of a unit of face value of debt is

$$p(D_o;D,\delta) = V(D_o;D,\delta)/D \text{ for } D \leq D_o. \quad (12)$$

For creditors as a group the problem is to set $D \leq D_o$ so as to maximize

$$W(D_o;D,\delta) = p(D_o;D,\delta)D + T(D_o;D,\delta)(D_o-D). \quad (13)$$

The first term on the right-hand side represents the value of the remaining debt while the second term represents the value of the tax credit.

The solution to this problem can be represented as follows: As in Figure 4, an additional unit of face value of debt brings in

$$MR(D_o;D,\delta) = p(D_o;D,\delta) + Dp_D(D_o;D,\delta)$$

units of wealth on the secondary market. With the tax credit in place, however, this has a marginal cost that equals the expected present value of the forgone tax credit; i.e.,

$$MC(D_o;D,\delta) = T(D_o;D,\delta) - (D_o-D)T_D(D_o;D,\delta).$$

Hence, cooperating creditors choose to forgive debt up to the point at which the contribution of a marginal unit of debt to its secondary market value just equals the value of forgone tax credits. This rule maximizes their wealth.

When $\delta=0$ forgone tax credits are nil and the MC curve coincides with the horizontal axis in Figure 4. In this case cooperating creditors equate MR to zero and the solution is at $D=D_0$, as depicted in the figure. The introduction of our tax credit program has no first-order effect on the level of the demand curve at $D=D_0$. This stems from the fact (explained above) that at this point it has no first-order effect on tax rates and therefore no direct effect on investment (i.e., $I_\delta(D_0;0,\delta)=0$). In addition, we show in the Appendix that it has no effect on the slope of the demand curve at D_0. Consequently, the new marginal revenue curve also intersects the horizontal axis at D_0.

On the other hand, as we explained above, the tax credit program has a <u>positive</u> first-order effect on the tax credit received per unit of debt forgiveness (i.e., $T_\delta(D_0;D,0) > 0$). Therefore, it has a positive first-order effect on MC at $D=D_0$. This implies that to a first-order approximation the program shifts the equilibrium in Figure 1 to the intersection point of the broken MC curve and the new MR curve. Since the latter (not drawn) crosses the horizontal axis at D_0, their intersection has to be at a lower debt level, which shows that the tax credit introduces a <u>positive</u> first-order effect on debt forgiveness.

The first-order effect on the incentive for debt forgiveness brings, in turn, a first-order reduction in tax rates τ in high productivity states. Lower tax rates raise the demand for investment schedule in Figure 5 and bring about a first-order increase in investment and real equity prices.

The intuition behind this argument is that the investment tax credit has a large effect on the incentives to forgive the first additional dollars worth of debt beyond D_0. But the loss in tax revenue from only one dollar's worth of forgiveness, when spread over the average tax rate for the whole economy, is so small that it can be ignored. Thus, the investment tax credit partially overcomes the distortion in international capital markets caused by existing external debt contracts. The remaining question is whether both creditors and debtors gain, or at least not lose, in terms of welfare, that is, are these changes Pareto improving?

First, take the creditors. They cannot lose, because as δ rises they can choose to abstain from further debt reduction. In fact, using the envelope theorem it is easy to show that the first-order effect of δ on the welfare measure in (13) is nil while the second-order effect is positive. This implies that creditors strictly gain from tax credit programs in which δ is not too small. Now take the debtor. The introduction of the program has a negative first-order effect on tax rates τ and a positive first-order effect on investment and equity prices. The increase in equity prices brings about a capital gain to debtor residents, provided they did not go short on their own equity holdings (which is reasonable to suppose). The increase in q and the corresponding increase in investment I raise $qE(I)-I$, which brings about a positive wealth effect in the debtor country. Finally, the decline in tax rates raises income from equity holdings, which is also beneficial. (A formal analysis of these points is straightforward using the indirect utility function derived in Helpman (1988).) Hence, the debtor country gains from the program whenever δ is sufficiently small.

IV. Concluding Comments

We have shown that a simple tax credit for debt reduction induces debt forgiveness from which both the debtor and the creditors gain. The gains result from better investment incentives. The tax reform amounts to a conversion of debt into another asset; i.e., claims to future tax receipts. It does not require that the debtor government monitor the creditors so that any particular creditor actually invests in the debtor country. In fact, a creditor could sell the tax credit to a third party more interested in equity investment in the debtor country.

The proposal also does not require the debtor government to finance an asset exchange in the initial time period when the lack of funds is most acute, which is a well-known problem with buy backs and debt-equity swaps. Furthermore, unlike buy backs and debt equity swaps it guarantees gains to both parties. By implementing the tax credit program the debtor government increases the efficiency of the debt contract to the benefit of the debtor and the creditors.

APPENDIX

The new MR curve in Figure 4 obtains zero at D_o if and only if $V_{D\delta}(D_o;D_o,0)=0$, which we prove below.

Naturally, at D_o we have $V_D(D_o;D_o,0)=0$, or using (11);

$$\mathcal{E}\theta(-\tau_I I_F-\tau_F)E - \mathcal{E}\theta\tau E'I_F = 0 \tag{14}$$

at this point (when $D=D_o$ and $\delta=0$). In addition, calculating from (11) $V_{D\delta}$ and using the fact that $I_\delta = \tau_\delta = 0$ when $D=D_o$ and $\delta=0$, we obtain:

$$RV_{D\delta} = - \mathcal{E}\theta(\tau_{F\delta}+\tau_I I_{F\delta})E - \mathcal{E}\theta\tau E'I_{F\delta}, \tag{15}$$

when $D=D_o$ and $\delta=0$. Applying (14) this yields:

$$\left(\frac{I_F R}{E}\right) V_{D\delta} = \mathcal{E}\theta(\tau_F I_{F\delta}-\tau_{F\delta}I_F). \tag{16}$$

However, using (8) and the implicit form of the investment function $I(\cdot)$; i.e., $\mathcal{E}\theta[1-\tau(\theta;D_o,I,F,\delta)]/R^* = 1/E'(I)$,

we calculate:

$$I_F = - \mathcal{E}\theta\tau_F/\Delta,$$
$$I_{F\delta} = - \mathcal{E}\theta\tau_{F\delta}/\Delta,$$

for $D=D_o$ and $\delta=0$, where

$$\Delta = \mathcal{E}[\theta\tau_I - E''/(E')^2]/R^*.$$

Together with (16) they imply

$$V_{D\delta} = 0.$$

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