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Distributional Aspects of Debt Adjustment

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Because external debt repayments have distributional implications in the debtor country, domestic politics affect the formulation of the debt strategy. And domestic opposition to heavy debt repayment can be a blessing for debt negotiators — who are likely to get better deals with creditors as a result.

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This paper — a product of the Debt and International Finance Division, International Economics Department — is part of a larger effort in PRE to understand the determinants of debt repayments by highly indebted developing countries. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Sheilah King-Watson, room S8-025, extension 33730 (31 pages).

Diwan and Verdier explore how the formulation of debt repayment policies can be affected by the nature of the decisionmakers and the strength of various interest groups.

Most models of debtor countries assume that all individuals in the economy are alike or that gainers compensate losers; most analysis ignores political considerations. But recent electoral campaigns in Latin America suggest that debt policy may have important distributive implications.

Diwan and Verdier argue that small penalties can be enough to deter default if they hurt the interests of groups that are closely associated with policymakers — especially when the costs of debt service can be shifted to groups with less influence on decisionmaking.

They focus on how debt policy affects domestic conflict between labor and capital, between import substitution and export promotion sectors, and between traded and nontraded goods sectors. Debt service requires austerity, which is distributed unequally; capital is better able than labor to move abroad and thus evade taxes — and with the expectation of higher taxes, capital is more likely to flee, reducing capital stocks. Meanwhile, to generate foreign resources, traded goods must expand, which requires a real devaluation; this generates a conflict with nontraded goods.

Diwan and Verdier argue that:

- Governments backed by constituencies from nontraded goods sectors are more likely to default.

- Without capital mobility, capitalists in import substitution will tend to oppose the repayment sought by capitalists in export promotion. Workers' interests will depend on imports' share in their consumption basket.

- With capital mobility, labor will oppose the extent of debt repayment sought by capitalists in both import substitution and export promotion sectors.

- Self-fulfilling external default with heavy capital flight is more likely when the default penalty is inelastic and when a left-wing government is in power.

- Assuming perfect bargaining, governments with constituencies that oppose heavy debt repayment can get better deals with creditors than governments supported by groups that favor more debt adjustment. Opposition at home can be a blessing for debt negotiators, as could be seen by the last Venezuelan rescheduling agreement (which followed street riots over price increases) and the recent Mexican debt relief agreement (which followed a very close election).

Distributional Aspects of Debt Adjustment

by
Ishac Diwan
and
Thierry Verdier

Table of Contents

Introduction

How do domest' politics affect debt external repayments by highly indebted coun·ies? The recent literature on sovereign debt does not provide much light on this question. Instead, it has produced important conceptual insights about the incentives of an apolitical country to service its foreign loans. With sovereign immunity, the government of a country that has lost access to voluntary credits can bargain with its creditors for a debt settlement. The bargaining outcome will depend on characteristics of the creditors, the debtor, and possibly of third parties. From the debtor's point of view, debt policy trades off the disutility of debt service against the cost of default--the consequence of direct or indirect penalties such as reduced access to the international capital and goods markets[2].

Usual models of debtor countries assume implicitly that all individuals in the economy are alike or that the gainers compensate the losers, thus flushing out of the analysis all political considerations. In contrast, the recent electoral campaigns in Latin America suggest that debt policy may have important distributive implications. The goal of this paper is to explore how the formulation of debt repayment policies can be affected by the nature of the decision-makers and by the strength of the various interest groups.

The paper first focuses on the differential effects of both the costs of default and of repayments on various domestic interest groups, in the absence of redistribution between gainers and losers. The analysis is helpful in solving an issue that has often puzzled economists: how can the seemingly relatively small costs of default support international lending and deter the highly indebted countries from defaulting? We argue that much insight can be gained by identifying the groups that gain from a default and those that lose. Small

[2]See for eg Bulow and Rogoff (1989) for such an analysis from a debtor "country" perspective.

penalties can be sufficient to deter default when they hurt the interests of groups that are closely associated with policy-makers, especially when the costs of debt service can be shifted to groups that have less impact on the decision-making process.

We highlight three factors that contribute to conflicts of interests in the formulation of the national debt policy. First, we explore the effect of conflicts of interest that are due to two features of public choice that are specific to debt adjustment policies: (i) Because the traded goods sectors needs to expand in order to generate the foreign resources needed for the external transfer, a real devaluation is required. This generates conflicts of interest between the traded and non traded goods sectors, an issue that we analyze in section I in the context of a model of a small dependent economy; (ii) Default and the economic consequences in terms of trade orientation and market access affect the export and the import substitution sectors differently, creating additional conflicts. This is studied in section II in the context of a traditional trade model. The extent of capital mobility turns out to be a decisive factor in the analysis.

Second, we focus (in section III) on the distributional effects of austerity. When the foreign debt is government owned (as in most LDCs), the internal transfer from the private and to the public sector that is required for debt service imposes austerity in ways that affect different interest groups differently. We focus on the conflict of interest between capital and labor that stem from the differential abilities of these factors of production to move abroad and thus, to evade taxes. Besides constraining government action, potential capital mobility can generate powerful forces in the economy through its effects on expectations. In particular, the expectation of higher taxes on capital can become self-fulfilling, thus reducing capital stocks considerably. However, good equilibria can also exist. While this possibility of multiple

equilibria has been studied elsewhere (Helpman [1988], Eaton [1987], Calvo [1988]), we argue here that the instability of expectational equilibria is affected by the identity of the decision-makers. In particular, we display an example in which the multiplicity of equilibria can disappear when the policy-makers are perceived to be sufficiently pro-capital.

Third, the nature of the debtor's government can affect its ability to bargain with its creditors. In particular, we develop (in section IV) the argument that governments that support interest groups that have larger incentives to default can ultimately obtain better deals with creditors than governments supported by groups that favor more debt adjustment.

I. Exchange Rate Policy and Debt Adjustment

To repay foreign creditors, it is not sufficient for a government to raise funds domestically; those funds must also be converted into foreign currency. This increases the demand for foreign exchange in the domestic economy and thus its price. This relative price change hurts the non traded goods sector and benefits the traded goods sectors. As a result, the extent of debt adjustment will depend upon the way in which the government trades off the welfare of two sectors. Moreover, as pointed out by Rodrik (1988), structural parameters such as the effect of devaluations on the government budget also matter.

To illustrate, consider a small dependent economy with two sectors (in the spirit of Dornbush [1973]) producing respectively a traded (T) and a non traded good (N). For simplicity, we take labor to be the only factor of production (the T sector is endowed with L_T and the N sector with L_N units of labor), and we assume that labor is sector specific (we allow labor mobility in the next section). Production functions are linear, and are given by $q_i = a_i L_i$, $i=(N,L)$. The price of N good is denoted by p and that of the T good by ep_T, where e is the exchange rate (p_T is determined in the international market and

is thus taken as given in the analysis). We take the T good as the numeraire and set $ep_T=1$. Both the traded good price p_T as well as each sector's wage rate are determined competitively. Wages are represented by w_i, with i=(L,N).

To neutralize effects due to differential spending patterns, we further assume that agents have homothetic preferences represented by:

(1) $\quad U^i(p,Y_i) = Y_i/E(p), \quad$ with: $E'>0$, $E''<0$,

where $Y_i = w_iL_i(1-t)$, i=(T,N), represents income, and t is an income tax, the sole instrument that provides public finance for debt service. Differentiating (1), and using the notation $\hat{x}=dx/x$, we have: $\hat{U}^i = \hat{Y}_i - \alpha\hat{p}$ where $\alpha = E'p/E$ represents the share of non traded goods in the consumption basket.

Consider that a fixed external debt obligation D is due, and that this obligation can be either completely or partially repaid. In case of partial repayment, the production functions are assumed to shrink, becoming $Q_i = q_i\xi(B)$ where $\xi(0)<1$, $\xi(D)=1$, $\xi'(B)\geq 0$ and $\xi''(B)\geq 0$, i=(T,N). This is a quite general representation of the consequences of partial default, and it can be defended in various ways. For example, penalties can be imposed in the wake of partial defaults; these penalties can be automatic as when bilateral creditors must, for internal reasons, reduce transfers and aid when their national commercial banks are not being serviced.[3] Assuming that the penalty is elastic in the amount repaid B is not necessary for our discussion, but adds realism. We take the view that limited default can be an optimal strategy for indebted countries because debtors may want to default on some types of loans but not others.[4] The assumption that the penalty affects both sectors equally is relaxed in the

[3]Alternatively and with perfect bargaining, the penalty is not imposed ex-post but rather it determines the debt settlement given by the bargaining proces. We discuss the first interpretation here and the second in section IV.
[4]Thus, $\xi(B)$ may be discontinuous, exhibiting various threshold levels.

discussion.

Equilibrium given B and t

With perfect competition in the labor market, equilibrium wages are given by $w_T = a_T\xi(B)$ and $w_N = pa_N\xi(B)$. Sectoral and aggregate incomes are then:

$$Y_T = (1-t)\xi(B)q_T \ , \quad Y_N = p\ (1-t)\ \xi(B)\ q_N \quad \text{and} \quad Y = Y_T + Y_N.$$

Using Roy's identities, we can obtain total demand N for the non-traded good:

$$N = N_T + N_N = -[U'^T_p/U'^T_Y] - [U'^N_p/U'^N_Y]$$
$$= (1-t)\ \xi(B)\ \alpha(p)\ [(q_T/p) + q_N]$$

Equating total demand for non-traded goods, N, to the total supply q^N, it is possible to solve for the real exchange rate p:

$$(2) \qquad p = [\alpha(p)\ (q_T/q_N)\ (1-t)]\ /\ [1 - \alpha(p)(1-t)].$$

In general, the real exchange rate is a decreasing function of the tax rate t.[5] To increase the government tradable revenue, a devaluation is needed.[6]

Optimal Taxes and Debt Repayment

We can now compute a debt-service possibility curve which will generally be a concave function in the (B,t) space. To see the effects at work, consider the government budget constraint:

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[5]Differentiating (2) with respect to t: $\partial p/\partial t = -p/(1-t)[1-\alpha(1-t)-\mu]$ where $\mu=\alpha' p/\alpha$ is the elasticity of α with respect to p. The expression is negative when μ is negative, that is, when substitution effects dominate the income effect (so that the share of N in consumption decreases with the real exchange rate p).

[6]When the penalty affects both sectors differentially, the real exchange rate is given by: $\hat{p} = p\xi_T(B)/\xi_N(B)$, where p is given in (2), and $\xi_i(B)$ is the share of output in sector i that is available for consumption when B is paid out.

$$(3) \qquad B = tY = t\,[Q_T + pQ_N] = t\,\xi(B)\,[q_T + pq_N],$$

Equation (3) implicitly defines B(t), the debt-service possibility curve. Differentiating, we have:

$$(4) \qquad dB/dt = [\ Y\ (1 + t\ s_N\ \epsilon_{pt})\ ]\ /\ [\ 1 - \epsilon_{\xi B}\ ]$$

where $s_N = \xi(B)pq_N/Y$ represents the share of the non-traded sector in total income, $\epsilon_{pt} = (\partial p/\partial t)(t/p)$ represents the (negative) elasticity of the real exchange rate with respect to the tax rate, and $\epsilon_{\xi B} = B\xi'/\xi$ represents the elasticity of the penalty with respect to the amount repaid.

Three effects are at work: a marginal increase in the tax rate directly increases tax receipts B by Y. There is however an additional effect that goes the other way: as t rises, the real exchange rate deteriorates.[7] As a result, the tax revenue in the non-tradable sector is negatively affected. If the elasticity ϵ_{pt} weighted by the share of the N sector in the economy is smaller than -1, tax revenue decreases in the non-tradable sector. We pursue below the more realistic case where $|s_N\ \epsilon_{pt}| \leq 1$. Thus, the larger the non-traded sector is and the larger the effect of taxes on the real exchange rate, the larger the needed tax rate (and real devaluation) for the government to be able to collect an additional dollar in traded revenue. Finally, the net effect of these two forces is multiplied because net output $\xi(B)Y$ increases with B, which itself

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[7] In this simple set-up, p is not affected by B. However, when the default penalty hits the two sectors differentially, we have: $d\hat{p}/\hat{p} = [(\xi'_T/\xi_T) - (\xi'_N/\xi_N)]\,dp/p$. Thus, in the more general case, the real exchange rate $\hat{p}$ is affected by the amount of debt serviced. As B rises, $\xi_N(B)$ rises, increasing the demand by the T sector for the N good and thus, increasing p. However, $\xi_T(B)$ also rise but by less than the rise in the N output, pushing p down. The net effect depends on the relative elasticities of ξ_T and ξ_N.

increases with t, thus reinforcing the effect of a tax change on tax receipts.

We can also rewrite the welfare level of the two groups of wage earners in terms of the tax rate t and the amount of debt repaid B. Clearly, U^T and U^N (as well as national income Y) increase in B: given a tax rate t, a higher debt repayment increases the welfare of both groups as well as disposable income because the penalties are then lower.

However, the effect of an increase in taxes--given B--is perceived differently by the two groups. Given B, the N sector is opposed to a tax increase as its welfare level decreases in t. Two reasons contribute to this: a tax increase lowers disposable income, and it induces a devaluation which further hurts N. On the other hand, an increase in taxes has an ambiguous effect on T's welfare. While T's disposable income drops by the direct effect, it is increased by the induced devaluation. Under some appropriate conditions, it is possible to show that the indifference curves of both groups are convex in the space (B,t), but that the slope of the indifference curve of the T group is smaller than that of the N group at any point (see appendix 1).

We have represented in figure 1 the function B(t) in the (B,T) space as a concave function[8] and the two groups indifference curves.

Discussion

Figure 1 illustrates the choice of different types of governments. If it acts in the sole interest of the non-traded sector, the government will pick point A where the welfare of the N sector is maximized. At A, the tax rate is low and consequently, debt repayment will be low. However, a government acting in the sole interest of the traded sector will choose a higher tax rate at point B, and debt repayment will be larger. Finally, a government that is maximizing national income will pick an intermediate policy at point C (see appendix 1).

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[8]It can be shown that under appropriate conditions, B(t) is concave. This will hold when ξ is concave enough, ϵ_{pt} is large enough, and t is small enough.

Put differently, there is a national consensus to repay an amount B_N of foreign debt and to devalue accordingly, and a national consensus not to repay more than B_T. However, for any repayment in between those quantities, there is a conflict of interest between the two sectors. If income redistribution was possible, then maximizing national income would be Pareto improving. However, in the absence of domestic redistribution, a government that is maximizing national income will be opposed by both sectors, with the traded goods sector seeking a more pronounced devaluation and a larger debt payment, and the non-traded sector seeking the opposite. An important policy implication is that in the absence of redistribution, a seemingly neutral objective of income maximization may be quite difficult to implement in the face of the political opposition it would generate.

II. Trade Related Conflicts and Social Coalitions

In this section, we explore the conflicts of interests that can arise between the factors of production employed in the export and in the import substitution sectors. The differential impact of debt repayment policy is due to a presumption of a differential impact of the default penalty on those sectors.

We embed our analysis in the well-known two-good/two-sector trade model where labor is mobile, but capital immobile between the two sectors (Jones [1975], Mussa [1974]).[9] Let K_i denote the capital stock in sector i, i=(X,M), where X stands for export and M for import, and L denote (fixed) labor supply. Using Jones' (1975) model, we summarize the production side of the economy with the following equations describing the unit cost and factor balance conditions:

$$(5a) \qquad 1 = a_{KX}\, r_X + a_{LX}\, w$$

$$(5b) \qquad p = a_{KM}\, r_M + a_{LM}\, w$$

[9]For the moment, we consider that capital is immobile internationally, but we relax this assumption in the sequel.

(5c) $a_{Ki}\, Q_i = K_i \quad i\epsilon(X,M)$

(5d) $a_{LM}\, Q_M + a_{LX}\, Q_X = L$

where Q_X and Q_M are the outputs of the export and import sectors, p is the relative price of the import good to the export good faced by the country (the export good is taken as the numeraire); a_{ij} is the i^{th} unit-input coefficient in the production of the j^{th} good ($i\epsilon(K,L)$, $j\epsilon(X,M)$); w is the wage rate; and r_i is the rental rate of capital in sector i, $i\epsilon(X,M)$. Equation (5a) and (5b) ensure zero-profits in the two sectors, and equations (5c) and (5d) ensure equilibrium between the demand for and supply of capital and labor.

Debt Repayment and Penalties

As above, suppose that the country has an amount D of external debt outstanding. We assume that when it partially defaults and repays an amount B<D, its terms of trade deteriorate. This is meant to capture the loss of trade credit and of market access incurred by a defaulting country. In particular, the price of the importable good is assumed to be given by:

(6) $p = p(B)$ with $p'(B)<0$; $p''(B)>0$; $p(0)=p_0$; and $p(D)=p^*<p_0$.

where p* is the international relative price of the importable good in terms of the export good. The country then faces a trade-off between debt repayments and terms of trade. The more it repays, the better are its terms of trade (in general, this trade-off may be discontinuous as discussed above).

It will be useful in the sequel to know how factor prices respond to a change in p. Differentiating the system in (5), and using the notation $\hat{x}=dx/x$, we get after some manipulations:[10]

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[10]A useful intermediate result is:
$0 = \theta_{KX}\, \hat{r}_X + \theta_{LX}\, \hat{w}$
$\hat{p} = \theta_{KM}\, \hat{r}_M + \theta_{LM}\, \hat{w}$

(7a) $\hat{w} = \mu\hat{p}$

(7b) $\hat{r}_M = [1-\mu\theta_{LM}]\ \hat{p}/\theta_{KM}$

(7c) $\hat{r}_X = -\mu\theta_{LX}\ \hat{p}/\ \theta_{KX}$,

where

$\mu = \lambda_M\epsilon_M\ /\ \lambda_M\epsilon_M + \lambda_X\epsilon_X$ is the elasticity of demand of the wage rate with respect to p.

$\epsilon_j = \sigma_j/\theta_{Kj}$ is the elasticity of demand for labor in industry j, $j\epsilon(X,M)$.

θ_{ij} is the distributive share of input i in sector j, with: $\theta_{KX} = a_{KX}r_X$, $\theta_{LX} = a_{LX}w$, $\theta_{KM} = a_{KM}r_M/p$, $\theta_{LM} = a_{LM}w/p$.

$\lambda_j = L_j/L$ is the share of labor in industry j, $j\epsilon(X,M)$.

$\sigma_j = [\hat{a}_{Lj} - \hat{a}_{Kj}]\ /\ [\hat{w}-\hat{r}_j]$, $j\epsilon(X,M)$, is the elasticity of substitution between capital and labor in industry j.

The system in (7) of course implies the usual result: $\hat{r}_X < 0 < \hat{w} < \hat{p} < \hat{r}_M$,[11] that is, that an increase in the relative price of the importable good increases the return on capital in the import sector but decreases it in the export sector. The wage rate increases in terms of the exportable good, but it decreases in terms of the importable good.

Social Conflict over Debt Adjustment

For simplicity, let us start the analysis with the case where the government uses a uniform tax t on all the factors of production in order to collect the resources that it needs for debt service.[12] Moreover, assume that preferences are given by equation (1) where Y^i represents the (after tax) income of the three interest groups in our economy: the capitalists in the export

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$0 = -\sigma_M\ \lambda_M\ [\hat{w} - \hat{r}_M] - \sigma_X\ \lambda_X\ [\hat{w} - \hat{r}_X]$

[11] because $\mu<1$.

[12] We later relax this assumption.

sector (X), those in the import substitution sector (M), and the workers (L). We have: $Y^X = (1-t)r_X K_X$, $Y^M = (1-t)r_M K_M$, and $Y^L = (1-t)wL$.

It is easy to show that--holding debt repayment B constant--an increase in the tax rate hurts the three groups (i.e $\partial U^i/\partial t<0$, $i\epsilon(X,M,L)$). The effect of an increase in debt repayment--holding taxes constant--is more complex. It is possible to show that: $\partial U^X/\partial B>0$, $\partial U^M/\partial B<0$, and $\partial U^L/\partial B>0$ iif $\alpha>\mu$. The interpretation is as follows: as the repayment B increases, p goes down (the terms of trade improve), and as a result, the rental rate r_X increases. Thus, capitalists in the export sector unambiguously gain. The capitalists in the import substitution sector are hurt because the return on their factor of production, r_M, is reduced by more than p. For labor, the effect of a drop in p is ambiguous, because the wage rate decreases by an amount proportionally smaller than the drop in p (since $\mu<1$). The net effect will be positive (the real consumption wage w/E will increase) only when α, the share of imports in consumption is higher than μ, the elasticity of the wage with respect to p.

It is now possible to show that in the space (B,t), the slopes of the indifference locus of the capitalists are well defined while that of the workers is ambiguous. For the X-capitalists, the indifference locus slopes up, while it slopes down for the IS-capitalists. For the workers, the indifference curve will slope up if the share of import in consumption is large enough. Moreover, when positive, this slope is larger than that of the X-capitalists' indifference curve at all points (see appendix 2).

We can also represent graphically the debt service possibility curve. The government budget constraint is given by $B = tY(p)$, where $Y(p)$ is national income given by:

$$(8) \qquad Y(p) = wL + r_X K_X + r_M K_M = Q_X + pQ_M$$

It is possible to show that B(t) is generally concave (see appendix 2). The basic intuition is that an increase in t increases debt service by less than Y, because of the adverse price effect which tends to reduce the tax base.

Equipped with the debt service possibility curve and the indifference curves of the different constituencies, we can analyze the possible social coalitions that can emerge. These will be crucially depend on the share of import in labor's consumption basket. The case where labor lose from a rise in p ($\alpha<\mu$) is simple: workers as well as the IS-capitalists are against any amount of debt repayments as their preferred policy is t=0 and B=0. However, the X-capitalists favor some adjustment (t*,B*). Thus, there is a zone of social conflict between t=0 and t*, with a possible coalition between labor and the IS-capitalists against the X-capitalists.

However, when the share imports is large enough in the workers consumption basket ($\alpha>\mu$), the debt adjustment trade-offs facing each interest group is somewhat different and it is depicted in figure 2. In this case, labor also prefers some adjustment t^*_w. But labor's preferred adjustment falls short of the X-capitalists' preferred adjustment t^*_x. And again, the IS-capitalists are against any adjustment. As a result, the constellations of potential social conflicts are now quite different: in the zone $(0,t^*_w)$, labor's interests converge with those of the X-capitalists. Both would be willing to join in the effort against the IS-capitalists in favor of stronger adjustment. In the zone (t^*_w, t^*_x), it is the interests of labor and the IS-capitalists that converge as they would both gain from a lower adjustment effort than the X-capitalists. Finally, there is a social consensus not to adjust beyond t^*_x.

Differential Taxes

The above results can be altered when the different interest groups are taxed differently, although the underlying logic is similar. Suppose that only one group is taxed. If labor alone is taxed, two types of social coalitions can

emerge, depending on the tax rate under consideration and on the share of imported goods in the consumption basket. In all cases, the X-capitalists favor full repayment. When the tax rate is too high and the share of import low, the interests of labor and of the IS-capitalists converge. However, for smaller tax rates, and when import shares are large, both labor and the X-capitalists will favor an increased tax, against the will of the IS-capitalists.

When the tax fall solely on the IS-capitalists, they will be opposed to any adjustment while those of the X-sectors will favor full adjustment again. Social coalitions thus depend on the position of labor. With a high import share in consumption, labor will join forces with the X-capitalists for full repayment, whereas with a low import share, they would gain by supporting the demands of the IS-capitalists for full default.

Finally, when the tax falls on the X-capitalists, this group will in general favor some partial repayment. The interests of labor will again depend on the share of imports in consumption (with this share large enough, workers support full repayment), while the IS-capitalists will maintain their opposition to any repayment. Thus, a coalition between all capitalists against labor to oppose large repayments might result.

Capital Flight Considerations

The analysis is deeply affected when we allow for international capital mobility. Since it is the capital of the IS sector that has incentives to fly away during the adjustment process, consider the case where the IS capital is mobile. Given an international return on capital of R, the after-tax return in the IS sector cannot be decreased below R.[13] Rather, when taxes are too high, quantities will adjust. This adds a restriction to the equilibrium conditions:

[13]However, when $(1-t)r_M > R$, there are no capital inflows because of credit rationing.

(9) $\quad (1-t)r_M \geq R \quad \text{and} \quad 0 \leq k_M \leq K_M$

where k_M refers to the IS capital that remains domestically. When (9) is binding, k_M is determined according to:

(10) $\quad (1-t)\ r_M = R.$

Of course, this affects the comparative statics around the equilibria. Instead of the system in (7), we now have:

(11a) $\quad \hat{w} = (\hat{p}/\theta_{LM}) - (\theta_{KM}/\theta_{LM})(dt/1-t)$

(11b) $\quad \hat{r}_X = (\theta_{LX}/\theta_{KX})\ [-(\hat{p}/\theta_{LM}) + (\theta_{KM}/\theta_{LM})(dt/1-t)]$

(11c) $\quad \lambda_M\hat{K}_M = (\lambda_X\epsilon_X+\theta_{KM}\lambda_M\epsilon_M)(\hat{p}/\theta_{LM}) - (\lambda_X\epsilon_X+\lambda_M\epsilon_M)(\theta_{KM}/\theta_{LM})(dt/1-t)$

Equation (11c) indicates that a drop in p (resulting from an increase in debt service B) induces capital flight in the import sector ($dK_M/dB<0$). Similarly, an increase in taxes t also induces capital flight ($dK_M/dt<0$). Capital flight in turn affects the profitability of capital in the export sector and the wage rate in equilibrium. But in contrast to the case without capital mobility, the wage rate w decreases in terms of the exportable good when p rises (equation 11a). This is due to two effects: for a given K_M, there is a reduction in the demand for labor in the IS sector; and since K_M is reduced by capital flight, there is a further depressing effect on the demand for labor. [14] The important consequence is that with perfect capital mobility, labor is always opposed to adjustment when capital flight occurs, irrespective of the share of export in the consumption basket.

In contrast, capital in the export sector is favorably affected by

[14]Mathematically, this is because $\hat{w}/\hat{p}>1$ since $\theta_{LM}<1$.

capital mobility as r_x is now increasing in the tax rate t (equation 11b). This is due to the fact that an increase in t generates capital flight which depresses wages (in terms of exportables). As a result, profitability rises.[15] Finally, capitalists in the IS sector are now marginally indifferent to debt policy since their revenue remains unaffected by both Δp and by Δt.

III. Government Objectives, Multiple Equilibria and capital Flight

The analysis above of the relationship between distributional conflicts and the willingness of governments to adjust to a debt overhang--while giving rise to several intuitive propositions--can be criticized on two major grounds:

(i) First, the analysis above cannot be easily reconciled with an ex-ante optimal tax system. For example, why would capitalists wait for a debt crisis to raise taxes on labor? Allowing for an ex-ante optimal (in some sense) tax system would alter the analysis. To expand on the above example, if the exploitation of labor was ex-ante as high as it can get, the burden of the debt crisis would have to be fully born by the capitalists themselves. Moreover, social goals are generally affected by national wealth, and it is not possible in general to separate the size of the economic pie from its distribution.

(ii) Second, the models analyzed above are not dynamic. Capital flight was assumed to take place **after** a government commits to tax capital. More generally however, it is likely that differences in the domestic private sector expectations of future government actions can constrain different types of governments differently. Equilibria driven by expectations has been recently studied in the context of public debt crises by Helpman (1988), Eaton (1987), and Calvo (1988). The premise of those analyses is that governments are expected to tax capital in order to fully service public debts.[16] However, when the

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[15]In extreme cases, it may even be possible now that the after tax return $(1-t)r_x$ increases in t.

[16]In the capital flight models of Helpman and Eaton, the flight of one capitalist raises the tax obligation of other capitalists, increasing their incentives to invest abroad. As a result, "equilibrium may involve all

default penalty is elastic enough, this need not always be the case, even in an optimizing framework. In fact, the shape of the government's reaction function is then crucially dependent on the weights attached to the welfare of various types of taxpayers.

Below, we present an example that can shed light on some of the possible complications these considerations add to the analysis. In this example, only capitalists are taxed, so that capitalists would a-priori want to default more than labor. However, due to time consistency problems and to implicit links between social preferences and wealth, an equilibrium in which a pro-capitalist government default less than a pro-labor government emerges.

An example with rational expectations and multiple equilibria

Consider a singe-sector economy with N individuals. We index individuals by the share of domestic capital they own. Each individual is endowed with one unit of labor (whose wage is given by w), and k_i percent of aggregate capital K, $i \epsilon N$. The higher k_i, the richer individual i is. Total domestic capital K is either already invested in real assets ($\hat{K}$), or free ($K-\hat{K}$), and free capital can be invested either abroad (F), or domestically ($I = K-\hat{K}-F$). Domestic investment yields a fix rate of return r.[17] But there is a tax t on domestic returns, leaving a net return of (1-t)r. Foreign investment yields R and cannot be taxed. The net (after tax) **domestic** income of individual i is therefore given by:

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capitalists investing domestically and the public foreign loans repaid, or all investing abroad with government insolvency and default on foreign loans the possible consequence" (Eaton 1987). In the public debt model of Calvo (1988), another channel of instability arises due to the effect of default expectation on the cost of refinancing the public debt. Expectations of future expropriations lead to a higher cost of capital and precipitate a forced default. However, other equilibria can exist with expectations of full repayment, low borrowing costs and as a result, no default.

[17] Production is competitive and uses capital and labor. For simplicity, we take a linear production function: $x = (K - F)\, r + w\, L$. In a competitive equilibrium, r and w are also the wages of capital and labor.

(12) $y_i = (1-t)\, k_i\, (K-F)\, r + w.$

Suppose that the country has an amount D of external debt outstanding. We assume that when it partially defaults and repays an amount B<D, the costs of (partial) default are proportional to the amount defaulted on. In particular, assume that the value of domestic output is reduced by a penalty that is proportional to the amount of repudiated debt. As a result, individual consumption is given by: $m_i = y_i/\xi(B)$ where $\xi(B)$ represents a default penalty. We take $\xi(0) = \gamma > 1$, $\xi(D) = 1$, $\xi'(B) \leq 0$ and $\xi''(B) \geq 0$.

Utility functions are given by $U_i(m_i)$, with $U' > 0$ and $U'' < 0$. The government is assumed to optimize over a welfare function W(.) that weights individual utility functions in a certain fashion. In particular, we take:

(13) $W(\alpha) = \Sigma\, \gamma_i\, U_i.$

where $\gamma_i = [\alpha k_i + (1-\alpha)n]$ are the social weights used by an α-government (where $0 \leq \alpha \leq 1$, $k_i = (\hat{K}_i + I_i)/(\hat{K}+I)$, $n = 1/N$, and $i \epsilon N$).[18] A government that is more pro-capital uses a higher weight for capital, α. The total tax collection, T, is used entirely for debt service:

(14) $T = t(I+\hat{K})r = B.$

The amount of taxation is determined optimally by the government who trades off its costs--in terms of disutility--against the cost of non-repayment. As we show

[18]Note that weights are assigned after capital flight took place. Politicians represent domestic interests. So some capitalists may have now became more of a worker in terms of domestic weights.

below, the optimal tax and repayment policy crucially depends on the type of government, α.

The sequence of moves is as follows. First, a government type is announced. Capital is then allocated between domestic and foreign investments given tax expectations.[19] A tax t on capital is then instituted, and production takes place. Finally, the government collects taxes to service debt (we impose T = B); the extent of the debt service B determines the penalty $\xi(B)$, and consumption take place. To solve this game, we start with the last period.

Ex-Post Tax Determination

The government seeks to find t* that maximizes W given domestic investment. The first order condition of this problem can be determined by differentiating W with respect to t. Rearranging terms and setting to zero, we have:

$$(15) \qquad W_t = - \Sigma \{ \gamma^i U'[\xi' m^i + k^i] \} = 0 ,$$

which says that the optimal tax trades off the weighted sum of marginal costs and benefits of all individuals. The benefit of an additional dollar of debt repayment is a marginal improvement in consumption, leading to a marginal gain of $-\xi' m^i$ for individual i. The marginal cost is the additional tax burden of k^i for individual i. This problem generally possesses an interior solution $t^*(\alpha)$.

Given α, $0 < \alpha < 1$, there is an medium agent for whom $t^*(\alpha)$ is optimal, i.e, for whom $-\xi' m^i = k^i$. Poorer agents will find t* too low relative to their own preferred level, (and they will receive a net social subsidy $[-\xi' m^i - k^i] < 0$) as they value the benefit of debt repayment more than their share of the cost of repayment. Conversely, richer agents would prefer less taxes and less debt

[19]For simplicity, we assume that capital becomes trapped once invested in real assets.

repayments (because they pay a net social tax $[-\xi'm^i - k^i] > 0$).[20] Thus, it should not be surprising to find that t* generally decreases in α, the weight attached to capital (appendix 3).

More interesting is the issue of the determinants of the government's reaction to a change in domestic investment. Because $W_{tt}<0$ by the second order condition (see appendix 3), we have sign $[\partial t^*/\partial I]$ = sign$[W_{tI}]$, with:

$$(16) \qquad W_{tI} = \underset{(+)}{\Sigma\{-\gamma^i U'\xi'(\partial m^i/\partial I)\}} - \underset{(-)}{\Sigma\{\gamma^i U'\xi''m^i tr\}} + \underset{(+/-)}{\Sigma\{\gamma^i U''(\partial m^i/\partial I)(-\xi'm^i-k^i)\}}$$

where $\partial m^i/\partial I = [(1-t)k^i/t - \xi'm^i](rt/\xi) > 0$ for all $i\epsilon N$.

As domestic investment increases, three effects determine the way in which the government alters the tax t* (ex-post). First, a wealth effect--represented by the first term in equation (16)--creates incentives to increase t* and debt repayment. Higher domestic investment implies higher future domestic consumption. As a result the desirability of a reduction in the consumption penalty rises, and with t the desirability of a larger debt repayment. This effect is larger for capital rich individuals, and thus, the aggregate effect is larger when α is large.

However, the wealth effect is somewhat reduced by the fact that there is decreasing return to debt repayments. This second effect is represented by the second term in (16). A rise in investment increases total tax collection, holding t* fixed. This reduces the consumption penalty. But since the marginal benefit of consumption is falling, large debt repayment become less attractive at the margin, calling for a drop in the tax rate. This effect is weak when the

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[20]Formally, this holds when: $d/dt[-\xi'm^i-k^i]=[(\xi'k^i/\xi)-m^i(\xi''-(\xi'^2/\xi))<0$; a sufficiant condition is that $\xi(.)$ is sufficiently convex.

default penalty is not very responsive to changes in debt repayments.

Finally, as domestic investment increases, the optimal extent of income redictributions changes. This is captured by the third term in (16). The increase in domestic wealth changes the way in which all agents value at the margin their net social contribution. As all individuals get richer, the capital rich individuals attach a smaller cost to being taxed, and this makes society "fairer" (i.e, more redistributive). But at the same time, the capital poor individuals attach now a smaller benefit to the net subsidy they receive, which favors less redistribution. The net effect on social welfare depends heavily on the social weights, and thus on α. The larger α, the larger the first effect, which call for an increase in the tax rate (conversely, when α is large and I is reduced, the socially optimal tax rate will tend to drop).

In sum, the function $t^*(I,.)$ can be either increasing or decreasing. The usual case for a decreasing reaction function will hold when α, the social weight placed on capital, is low, and when the marginal cost of non-repayment of the debt is large.[21] However, when α is large and when the marginal cost of default is insensitive to the size of the repayment, a government may well want to reduce taxes on capital when the capital base shrinks.

Investment, Expected Taxes and Equilibria

In this simple set-up, investment depends on the expected future tax rate t^e. All the free financial capital is invested domestically when $(1-t^e)\, r \geq R$, i.e when $t^e \leq 1- R/r$. Otherwise, all the financial capital flees abroad, and only $\bar{K}$ remains trapped domestically. This defines $I^*(t^e)$, a non continuous decreasing function.

In a rational expectations equilibrium, two conditions must be

[21]A typical case is when the cost of default are infinite. In this case, the government's problem has no interior solution, and the government has no choice but to attempt to repay the whole debt. So its sets $t^* = D/I$, implying that ex-post, $\partial t^*/\partial I = -D/I^2 < 0$.

satisfied: $t^e=t^*(I)$ and $I^*(t^e)=I$. In figure 3, we have plotted the two cases that correspond to an increasing and a decreasing government reaction function $t^*(I)$. With low enough α and/or high ξ'', $t^*(I)$ is a decreasing function. As a result, two equilibria can arise. The first one, represented by point A, corresponds to a case of relatively low (expected) taxes, no capital flight, and high debt repayment. The second at point B corresponds to a case of high (expected) taxes, complete flight of financial capital, and low debt repayment. In both cases, expectations are self fulfilling. Thus, the adjustment policies of pro-middle class governments will depend heavily on the expectations of the holders of financial capital.

However, with a high enough α, and/or a low enough ξ'', $t^*(I)$ is an increasing function. As a result, the equilibrium--at C--is unique. In equilibrium, the tax rate is lower than at A (because α is larger), there is no capital flight, and debt repayment is larger than in the bad equilibrium of a less pro-capital government.

IV. Politics and Bargaining

We have argued above that governments that value highly the costs of default (i.e, those with export promotion constituencies) and that do not value highly the cost of repayment (those with constituencies from the traded goods sectors) service their foreign debt more promptly in order to reduce their default penalties. This arguments extend easily to a world where a bargain is ultimately reached with the creditors and the default penalties are not imposed. In such a perfect bargaining framework, it should be of no surprise to find that the identity of the government that sits on the negotiating table matters, with pro-non-traded and pro-import substitution governments securing better deals than governments with more at stake with trade.

To illustrate the effect of perfect bargaining on debt repayment policies, consider the dependent economy model of section I. Suppose that when

the negotiations between the two parties fail to produce an agreement, the debtor country makes an optimal partial repayment that trades off sanctions against repayment, but that if an agreement is reached, sanctions are not applied and the creditors forgive (or refinance) the unpaid debt.

Now imagine that a government representing the interests of the non-traded sector (G_N) is negotiating. If negotiations are broken, the best that can be achieved is a utility level of U^N (B_N^*, t_N^*) (A in figure 1). However, the country would be willing to repay (and thus tax) more in exchange for a lifting of the sanctions. In particular, let (β^N, τ^N) represent a tax rate and associated repayment that leave G_N indifferent between an efficient deal (with no sanctions imposed) and no deal. Thus, τ_N is defined by: $U^N(B_N^*, t_N^*)=(1-\tau_N)q_N/E(p)=U^N(\tau_N)$. The set of deals that are acceptable to banks and to G_N are given by:

$$(17) \qquad X^N = \{ \ (\beta,\tau) \ | \ t_N^* \leq \tau \leq \tau_N \text{ and } \beta = \tau y(\tau) \ \}$$

where y is national income without sanctions (given by $y = q_T + pq_N$). A similar analysis defines the set of possible deals between G_T and its creditors:

$$(18) \qquad X^T = \{ \ (\beta,\tau) \ | \ t_T^* \leq \tau \leq \tau_T \text{ and } \beta = \tau y(\tau) \ \}$$

In figure 4, the bargains that G_T and G_N can secure are compared. The no-sanction debt possibility curve $\beta(\tau)$ is above the curve with sanctions B(t). The bargaining zones X^T and X^N are represented by the segments D^TC^T and D^NC^N. The government G_i would want to be as close as possible to D^i, and creditors will want to be as close as possible to C^i, i=(T,N).[22]

As expected, the bargaining zone of G_N includes deals that are more favorable to the debtor country than all the possible deals that G_T could

[22]It is easy to show that $\beta_N < \beta_T$.

possibly secure. But more interesting is that there might exist a zone of possible deals D^TC^N which represents a Pareto improvement for all the groups (T, N and the banks) over all possible allocations with unilateral action by the debtor. Such deals can arise when a government negotiates with the banks under the constraint that its opposition must be as well off as in the status-quo. In this sense, opposition at home can be a blessing for debt negotiators.[23]

V. Conclusions

We have argued that domestic politics are an important determinant of external debt policy. In particular, our analysis indicates that:

(i) Governments backed by constituencies from the non-traded good sectors of the economy will tend to default more;

(ii) Without capital mobility, capitalists in the import-substitution sectors will tend to oppose the repayment sought by the capitalists of the export sectors; workers interests will depend on the share of import in their consumption basket;

(iii) With capital mobility, labor will oppose the extent of debt repayment sought by capitalists in both the export and the import substitution sectors;

(iv) Self-fulfilling external default with large capital flight is more likely to occur when the default penalty is inelastic and when a left wing government is in power;

(v) with perfect bargaining, governments with constituencies that oppose large debt repayments get a better debt settlement.

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[23]Good examples of this phenomenon are the last Venezuelan rescheduling agreement (that followed street riots over price increases) and the recent Mexican debt relief agreement (that followed an very close election victory by the leading party). In both cases, the perception by the banks that there was a strong domestic opposition to a meager deal seemed to have played to the advantage of the debtor.

Appendix 1

Indifference maps. Differentiating (2), we obtain:

(A1) $dp/p = -dt/(1-t)[1-\alpha(1-t)-\mu]$, with $\mu=\alpha' p/\alpha$

To find the slopes of the indifference curves, differentiate (1) for each of the two groups:

$dU^T/U^T = \xi' dB/\xi \; - \; dt/(1-t) \; - \; \alpha dp/p$.

Setting to zero and using (A1), we get:

$$(A2) \qquad \left.\frac{dB}{dt}\right|_{U^T} = \frac{\xi(B)\,[\,1 - \alpha/[1 - \alpha(1-t) - \mu]}{\xi'(B)\,(1-t)} \geq 0 \quad \text{when } \alpha<(1-\mu)/2,$$

Similarly:

$$(A3) \qquad \left.\frac{dB}{dt}\right|_{U^N} = \frac{\xi(B)\,[1 + (1-\alpha)/(1-\alpha(1-t)-\mu)]}{\xi'(B)\,(1-t)} \geq 0.$$

Define $R = Y/E(p)$, the real disposable income. We can compute:

$$(A4) \qquad \left.\frac{dB}{dt}\right|_{R} = \frac{(1-\alpha-\mu)}{(1-t)[1-\alpha(1-t)-\mu]} \geq 0 \quad \text{since } \mu<0.$$

It is easy to check that:

(A5) $dB/dt|U^N > dB/dt|R > dB/dt|U^T$.

It can also be shown that the iso-utility curves are convex when $\xi(B)$ is sufficiently concave.

Appendix 2

From equation (1), we can derive the indifference locus for the three groups:

(A1) $\left.\partial B/\partial t\right|_{U_X} = B/\epsilon(1-t)[\mu(\theta_{LX}/\theta_{KX})+E'p/E]>0$

(A2) $\left.\partial B/\partial t\right|_{U_M} = B/\epsilon(1-t)[((1-\mu\theta_{LX})/\theta_{KX}) - E'p/E]<0$, since $[(1-\mu\theta_{LX})/\theta_{KX}]>1$ and $E'p/E<1$

(A3) $\left.\partial B/\partial t\right| = B/\epsilon(1-t)[E'p/E-\mu]>0 \; >0$ iif $E'p/E>\mu$.

$|U_L$

where $\epsilon=-(\partial p/\partial B)(B/p)$ is the opposite of the elasticity of the penalty with respect to the amount of debt repaid.

From the above equations, it is easy to verify that when $\partial B/\partial t$ evaluated at U_L is positive, then $\partial B/\partial t(U_L)>\partial B/\partial t(U_X)$. Conversely, when $\partial B/\partial t(U_L)<0$, then $\partial B/\partial t(U_L)<\partial B/\partial t(U_X)$.

Finally, using (18), we can derive:

(A4) $dB/dt = Y(p(B))/[1-tQ_M p'(B)] < Y(p(B)) = B/t.$

which implies that B(t) is concave for small enough t.

Appendix 3

To see that, differentiate (4) to get: $\partial t^*/\partial \alpha = - W_{t\alpha}/W_{tt}$. Because the denominator is negative, the expression has the same sign as the numerator. ($W_{tt} = rI \Sigma \{\gamma^i U'(-\xi'' m^i)\} + (rI/\xi) \Sigma \{\gamma^i U''[\xi' m^i + k^i]^2\} < 0$). The numerator is given by: $W_{t\alpha} = \Sigma \{(k^i - n) U' [-\xi' m^i - k^i]\}$. For poor individuals, the term in parenthesis is negative, the term in brackets is positive, and thus, the product is negative (and vice-versa for rich individuals). Thus, $W_{t\alpha}$ is negative when the middle class is small enough.

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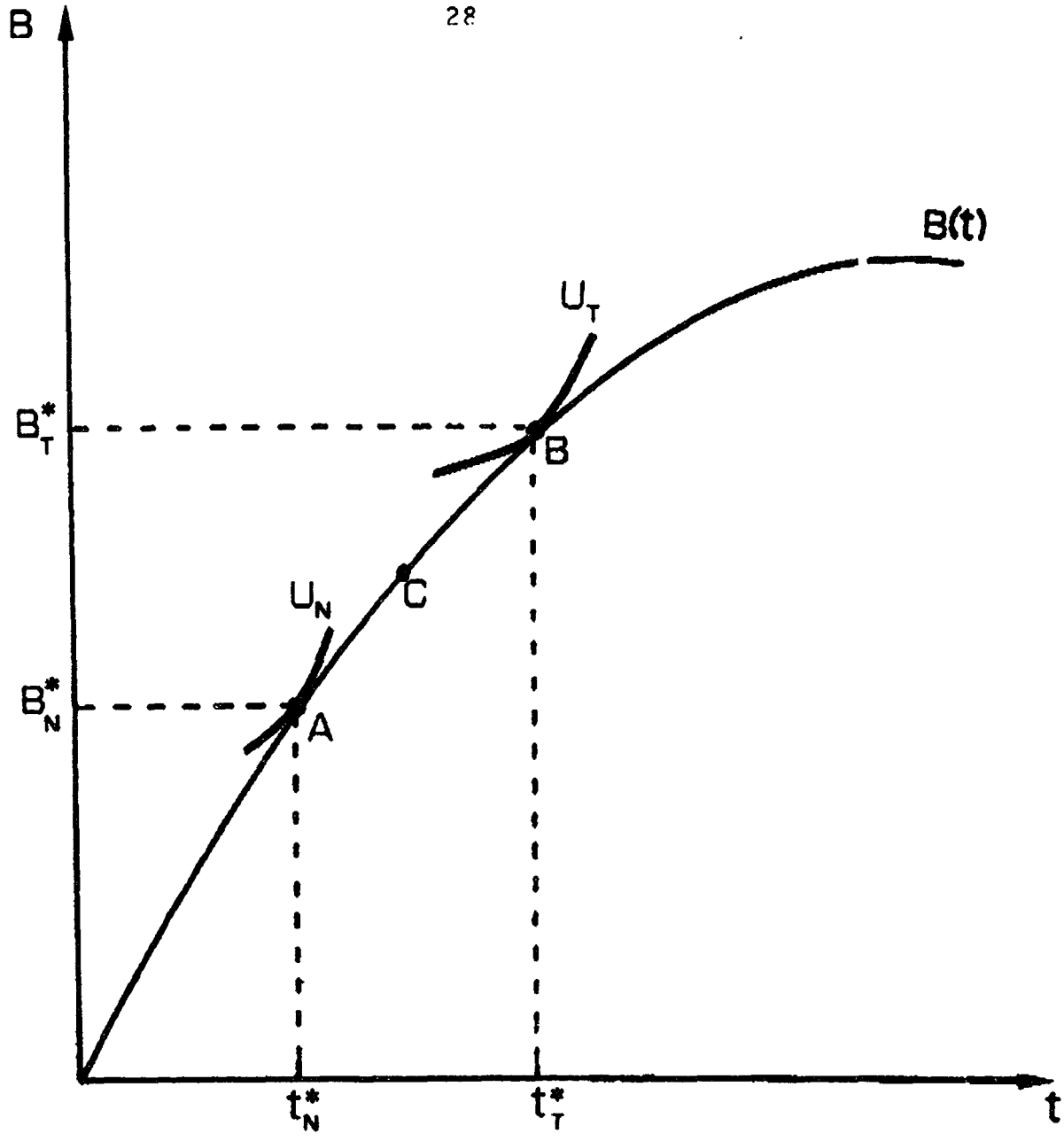


FIGURE 1

FIGURE II

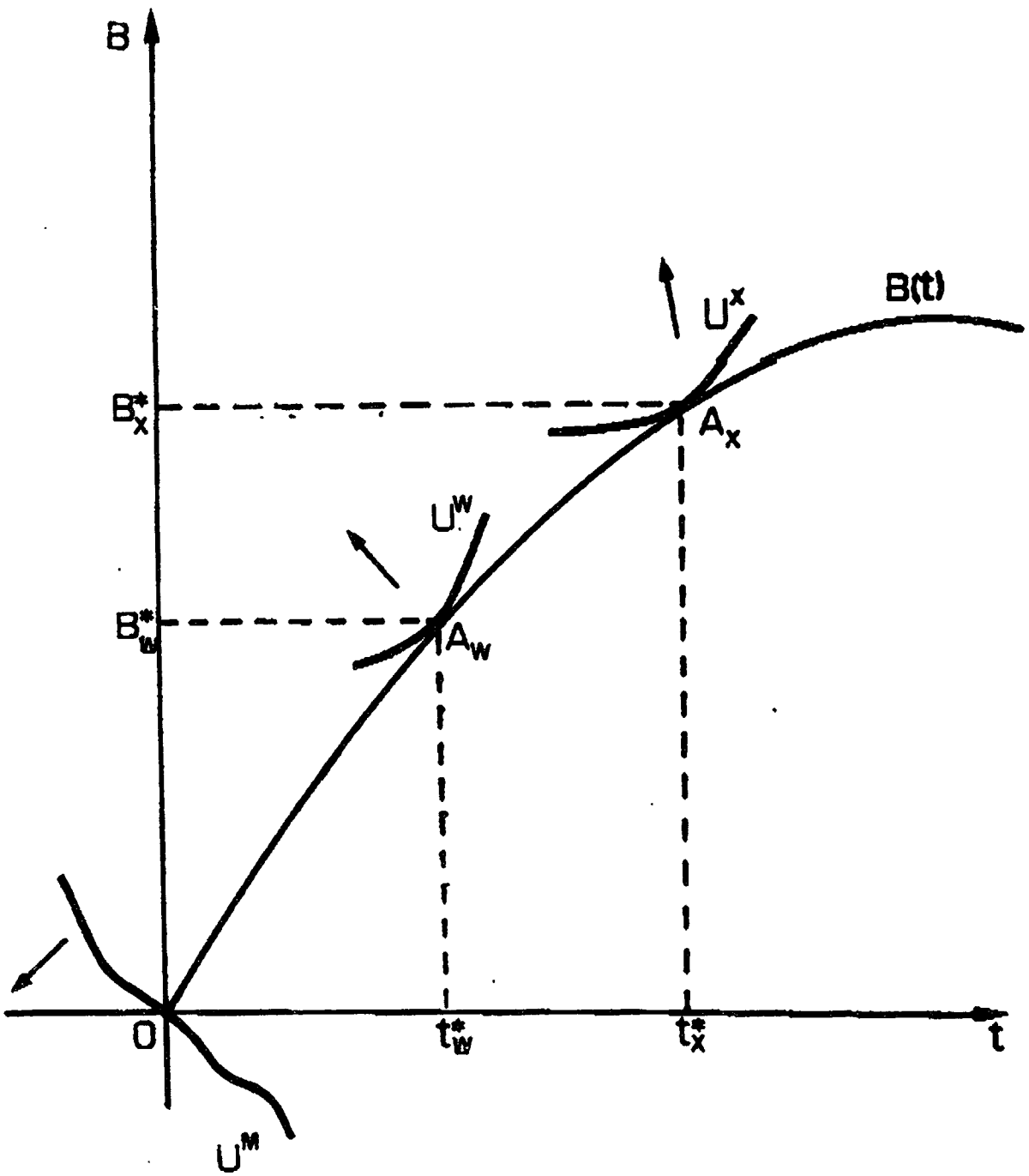


Figure III

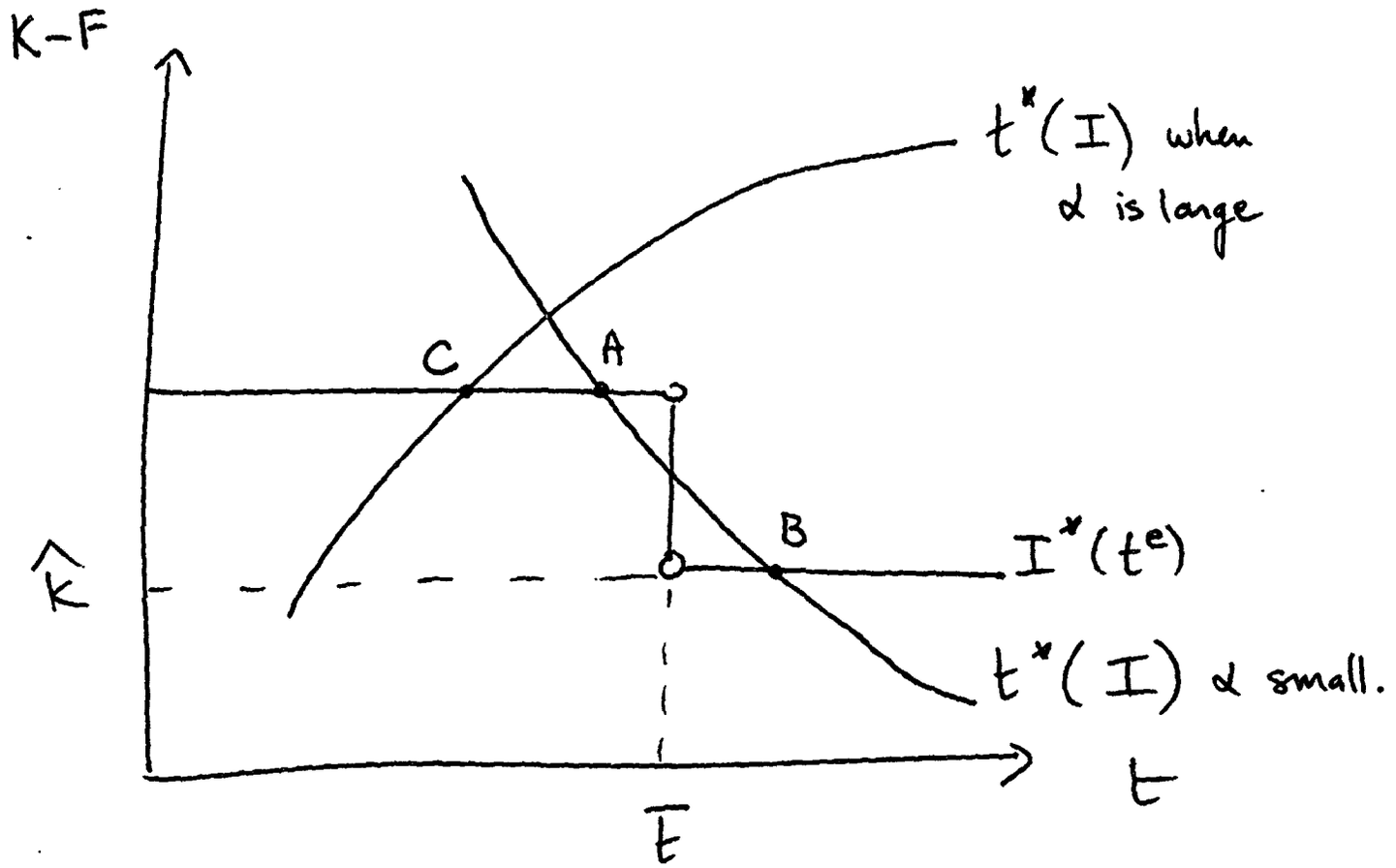
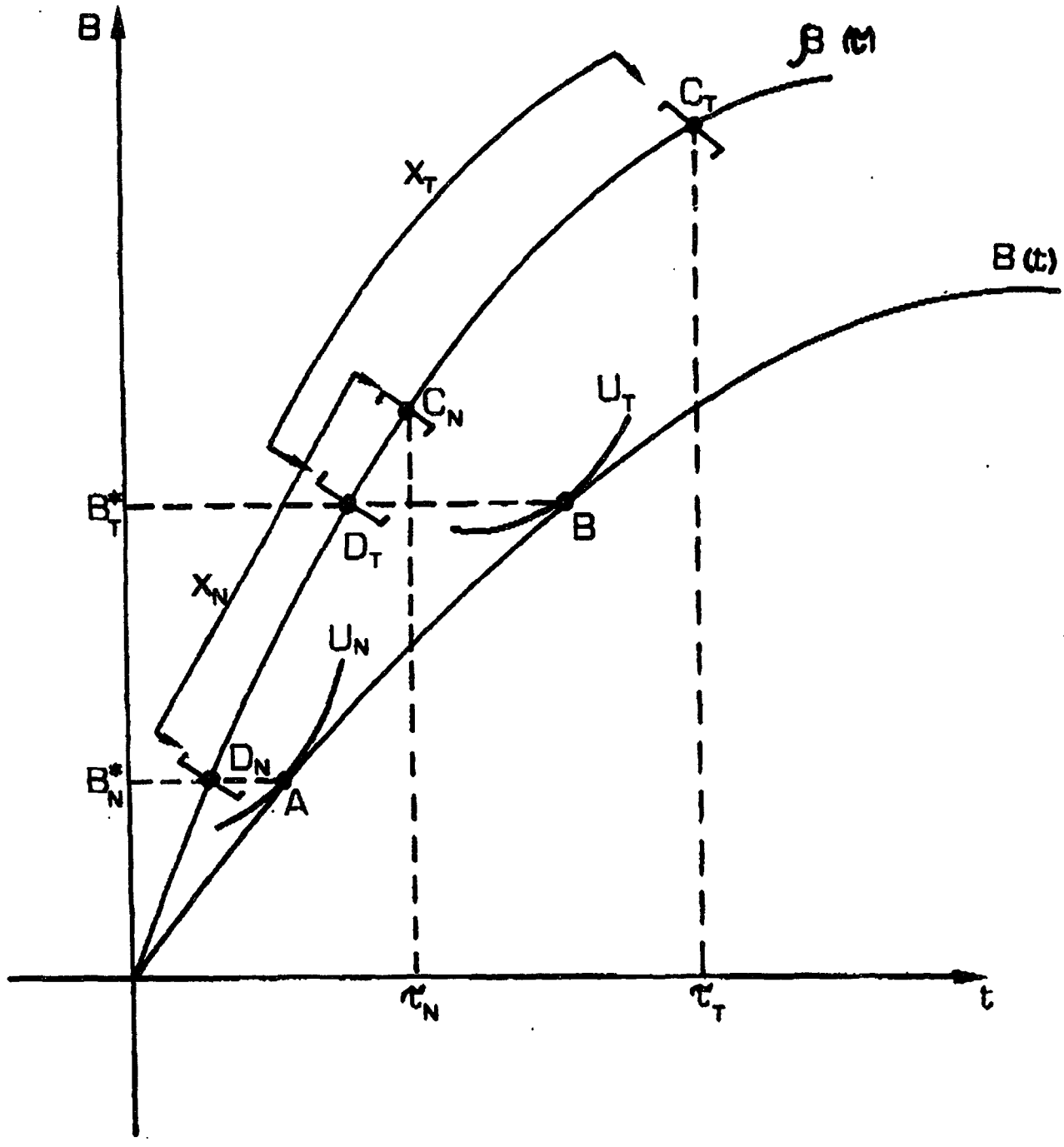


FIGURE IV.



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