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SOVEREIGN DEBT, CREDITOR-COUNTRY GOVERNMENTS, AND MULTILATERAL INSTITUTIONS

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1 Introduction

It has been little more than a decade since the onset of the international debt "crisis", of less than full and timely repayment of debt obligations by borrowers in sovereign countries who had borrowed large sums of money from private banks in Western industrialized nations. About the same time ago, the pioneering study of Eaton and Gersovitz [1981] was the first to note and analyze the impact of some of the salient features of sovereign debt, which set it apart from domestic debt contracts for which repayment incentives are enforced by a judicial system with credible penalties (see, for example, Gale and Hellwig [1985]). Eaton and Gersovitz noted that such credible judicial mechanisms are hardly available at an international level, particularly when the borrowers are sovereign governments or their agents. They then studied the impact of threatened *termination of further lending* in the event of non-repayment of earlier loans, as a device for creating incentives for repayment by sovereign borrowers. In their model, the penalty arising from termination of lending is that of non-availability of finance to smooth intertemporal variations in consumption arising from endowment or productivity shocks in the sovereign debtor economies.[1] Eaton and Gersovitz [1981] showed that, given such "termination threats", some degree of borrowing and lending, which led to a second-best level of consumption-smoothing over time by borrowers, was indeed feasible.

In the past few years, there has been an explosion of literature on the sovereign debt problem, augmenting and sometimes modifying the analysis of Eaton and Gersovitz, and examining the role (if any) that creditor country governments and multilateral financial institutions (such as the World Bank or the International Monetary Fund) may play in alleviating the sovereign debt "crisis" of zero or partial repayments by borrowers.[2] Some authors, such as Corden [1989], Helpman [1989], and Froot and Krugman [1990], have essentially ignored the non-enforceable contractual aspect of sovereign debt, and focused in large part on the diminished incentives for internal investment (in industries producing exportable goods) for sovereign debtors caused by a large debt "overhang", of debt repayment commitments relative to uncertain future export earnings of sovereign debtors. Given the inefficiency arising from such diminished investment incentives, and the resulting reduced growth rate in debtor countries, some of these authors have argued that there could be a "Debt Laffer Curve", such that reducing the contractual repayment obligation could result in *higher* values of their debt contracts for lenders, via the improved incentives for investment and growth for sovereign debtors. Myers [1977] was the first to analyze these incentive effects in a domestic debt context.

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[1] The credibility of the termination threat is ensured by (a) zero profits among competing lenders, and (b) the seniority of earlier debt contracts in the eyes of courts in the creditor countries.

[2] The problem of non-repayment is widely agreed to have been caused by (i) rising real interest rates in the 1980s, (ii) declining terms of trade for many sovereign borrowers, and (iii) "capital flight" of investing abroad by private citizens in debtor countries.

Moreover, authors such as Corden, Helpman, and Froot-Krugman have argued, there exists a serious *coordination problem across multiple creditors* involved in negotiations over reductions of contractual debt repayment obligations. (Such reductions may be either in the joint interests of creditors as a whole, given a "Debt Laffer Curve", or be obtainable through aid provided by third parties.) The reason is that, since default probabilities are lower on inframarginal as compared to marginal repayment obligations, each creditor has an incentive to "free-ride" on reductions in contractual repayment obligations by other creditors, which improve the value of the "hold-out" creditor's share of the remaining repayment obligations in which creditors share *pari passu* . Indeed, even buying back debt at discounted market prices that reflect its default risks, is not an answer to this coordination problem unless it can be done with the debtor's own resources. The reason is that buying back debt rewards creditors at the rate of the slope of the chord from the origin, on the concave curve linking debt value to contractual obligation given default prospects, whereas fair compensation ought to be based on the slope of the tangent to this debt value curve at the relevant point, which is lower than the slope of the chord [3]. In this context, these authors, particularly Corden [1989], have proposed a *coordinating role for multilateral financial institutions* . Corden suggests the creation of senior debt, with priority over repayment obligations to private banks, by debtor country governments as obligations to a World Bank *cum* I.M.F. "Debt Facility", in return for money to retire some of the debt obligations to private bank creditors. If done right, the resulting dilution in the value of the private banks' inframarginal debt contracts can make up for any excess value paid in buying back their marginal debt at the discounted average market prices.

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[3] Froot and Krugman [1990] estimate that for Ecuador a fifty per cent reduction in the face value of its debt obligation, by roughly $5 billion, would reduce the market value of Ecuador's external debt by only $550 million. In contrast, the cost of such a debt buyback at the discounted (average) market price would cost $2.9 billion.

In a stream of recent papers, Bulow and Rogoff [1988, 1989, 1990] have taken a quite different position, particularly on the merits of governmental or multi-lateral intervention in the debt renegotiation process, as compared to the authors mentioned above. In Bulow and Rogoff [1989], they analyze a model in which, as in Eaton and Gersovitz [1981], contractual obligations *per se* have no impact on the degree to which sovereign debtors are willing to repay their debt. Instead, repayment incentives are enforced through the threat of harmful penalties in the event of (sufficient) default. In contrast to Eaton and Gersovitz, Bulow-Rogoff emphasize the penalties arising from *trade sanction threats* as the important device for enforcing (partially) the repayment obligations. The bargaining process over the magnitude of repayments, by sovereign debtors to Bank creditors (syndicates), is modeled in Bulow-Rogoff [1989] as a complete-information repeated alternating offers game, as in Rubinstein [1982]. As a result of this assumption, the "constant-recontracting" possibilities of their model (and title) are reduced to instantaneous agreement on the first offer as the unique subgame-perfect bargaining outcome.

In Bulow-Rogoff [1988, 1990], the authors expand on their view of the sovereign debt problem, to analyze the potential role of creditor country governments and multilateral financial institutions[4]. In Bulow-Rogoff [1988], the authors analyze an extended *trilateral bargaining model* of the Rubinstein [1982] type, in which the size of the "pie" subject to division via a rotating offer sequence requiring acceptance by the others, is that of (i) the export value of the sovereign debtor *plus* (ii) the consumer surplus derived by citizens of the creditor country from uninterrupted trade with the debtor country. Focusing on a by-now-standard stationary "focal" equilibrium, which is reached without any delay, Bulow-Rogoff [1988] show that there exist parameter values such that the payoff of the creditor-country government (and its non-Bank citizens) in the trilateral bargaining outcome, is lower than its payoff in the bilateral bargaining between private banks and sovereign debtors. Interpreting this conclusion as one rationalizing unwarranted subsidies by creditor-country governments to sovereign debtors, which banks anticipate in their anticipated payoffs and thus volume of initial lending, Bulow and Rogoff [1990] argue against "being taken to the cleaners" by such governmental intervention in bargaining [5]. On the relevance of multilateral institutions in the sovereign debt (re)negotiation process, Bulow and Rogoff [1990] are more sanguine and non-paradigmatic. They simply question the precommitment abilities of the World Bank and I.M.F. in enforcing the seniority of their claims relative to that of private banks in the "Debt Facility" proposed by Corden [1989] and others. They back up this aspersion of pusillanimity by noting that, in the last half of the 1980s, almost all *net* lending to troubled sovereign debtors has come from these multilateral financial institutions, rather than from private banks.

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[4] Rotemberg [1988] has questioned the validity of a perfect-information bargaining framework, in light of the seemingly long delays in arriving at negotiated debt reduction plans for sovereign debtors. He develops a model of beneficial debt buybacks, in which creditors have private information regarding the costs of sanctions and "harassment" which they can impose on debtors. However, he finds no role for any governmental policy intervention.

All this brings us to the *lacunae that we seek to address* in this paper. Certainly, Bulow and Rogoff [1988, 1989, 1990] have been somewhat innovative in incorporating repeated rather than single-shot take-it-or-leave it offers in their modelling of the sovereign debt repayment problem. They have also been correct to emphasize the differing policy implications of the (enforceable) contractual versus induced-by-threats views of the sovereign debt repayment process. Indeed, their modelling of (complete-information) bargaining, over repayments out of flow export earnings by the sovereign debtor at each point, is probably appropriate although it makes it difficult to rationalize the seemingly long delays in reaching such renegotiated repayment bargains across sovereign debtors and private banks, unless interventionists governmental processes have been slow as well as misguided, as is their view [6]. *However,* they have failed to provide an adequate justification for the subgame perfection, or credibility, of the use of threatened trade sanctions by creditor-country governments, which result in the loss of consumer surplus from uninterrupted trade for their citizens. In other words, how does the government of their trilateral bargaining scenario (Bulow-Rogoff [1988]) *not only* "sit out" as Bulow-Rogoff recommend, thus leading to their bilateral bargaining model (Bulow and Rogoff [1989]), *but also* commit to imposing trade sanctions should private banks and sovereign debtors reject each other's offers on repayment?

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[5] In the case of equal intertemporal discount rates among sovereign debtors, creditor Banks, and creditor-country governments, the Bulow-Rogoff conclusion implies that one-third of the "pie" mentioned above be less than the creditor country consumer surplus from uninterrupted trade with the *particular* sovereign debtor country. We leave it to the reader to imagine the degree of non-substitutability for these tradeable goods that is envisioned.

The critical question here is the importance of a *governmental role in the imposition of trade sanctions* by the creditors, in the face of inadequate repayment of debt obligations by a sovereign debtor to *private* banks. (We assume that international judicial mechanisms can *rule out* the use of such threats to extort payments by countries which have *not* borrowed, or beyond the repayment obligations in the original debt "contract".) Bulow and Rogoff are less than clear on this. On the one hand, they undermine the importance of the credit-termination threats employed in Eaton and Gersovitz [1981], by arguing that debtor countries could potentially buy insurance in a futures market (for future endowment shocks), at a lower cost than that of repaying past debt obligations. On the other hand, they do not tell us how the force of trade sanctions can arise largely from private bank actions such as denial of trade-facilitating services, when the sovereign debtor can simply turn to other banks to restore such facilities [7]?

We argue in this paper that, first, the empirical observation of ongoing delays in the debt write-down process vis-á-vis *future* obligations of sovereign debtors, does *not necessarily* support the Corden/Helpman/Froot-Krugman view that *contractual* repayment obligations, and the resulting disincentives for marginal investment and inter-lender coordination, are of central importance in the sovereign debt renegotiation problem [8]. (In a model such as that of Vincent [1989], if the debtor or some banks have superior information compared to others in the lending syndicate regarding the debtor's future export earnings prospects, then such bargaining delays would arise.) Adopting instead the Eaton-Gersovitz view as modified by Bulow and Rogoff, we argue that it is crucial to envision an economic and institutional set-up that makes governmental participation in the trade-sanction process credible (subgame-perfect). We show that a natural role for multilateral financial institutions arises in such a perspective, as *agents* of creditor-country governments through whom these governments credibly promise *conditional side-payments* to sovereign debtor countries, and ultimately to their private bank creditors, in the event of "adequate" partial repayments by the sovereign debtors. The magnitude of these repayments are, in turn, determined by the penalties for debtors arising from the trade sanctions threatened in the event of inadequate repayment, and these threats are made credible by the contingent side-payment enforced via a "bond" administered by the multilateral financial institution(s), with finances pre-committed by the creditor-country government(s).

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[6] If renegotiations are costly, and hence made over *future* debt repayment obligations given *uncertain* export earnings prospects for the sovereign debtor, about which it has superior information, then the bargaining model of Vincent [1989] would predict equilibrium delays in settlement.

[7] To elaborate, if informational advantages of extant lending banks give "bite" to their threats of withdrawing trade-related facilities in the event of default by sovereign debtors, such informational asymmetries should also cause problems with smooth functioning of markets in futures contracts for insuring shocks to the debtors' future incomes etc. See Thomas [1991] for support for this argument.

Our analysis has all the simplicity, and the shortcomings, of the view of strategic use of contracts with third parties pioneered in Schelling [1960], and recently analyzed in an axiomatic bargaining model by Green [1990]. We ascribe observability and irrevocability to the contingent contract between the creditor-country government and the multilateral institution, based on incompletely specified grounds of reputation [9]. The non-existence of an adequate non-cooperative modelling of renegotiations in such a context has precluded further theoretical explorations of this point on our part thus far. The simple model of debt renegotiation with a subgame-perfect trade sanction process is detailed in Section

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[8] Such a view must, of necessity, be based on "optimistic" expectations regarding a New World Order, with its concomitant sanctions and penalties, all of which appear somewhat remote despite the events of the past year centered on the Persian Gulf!

[9] As Green [1990] notes, "To prevent renegotiating one must either invoke a reputational argument or make communication between the principal and his partner impossible. Finally, an effective contract requires that the partner not be able to subsequently contract with the opponent". Green then goes on to model the polar opposite of these assumptions in an axiomatic bargaining framework.

2, which also concludes with suggestions for further research.

2 The Model and Results

2.1 Framework

As in Bulow and Rogoff [1988,1989], we assume that the sovereign debtor maximizes a utility function of the simple, discounted, linear form:

$$U = \sum_{t=1}^{\infty} \frac{(C_t^D + C_t^F)}{(1+d)^t} \tag{1}$$

where $\{C_t^D, C_t^F\}$ are its quantities of consumption of the domestic and foreign goods, respectively, and d is its intertemporal discount factor. The sovereign debtor produces a volume Y of the tradeable domestic good, which it can sell for a price $(P > 1)$ units of the foreign good. Given the simple linear preferences embodied in equation (1), the sovereign debtor thus always strictly prefers to be at a corner solution of *full trade*; presumably, this unrealistic assumption facilitated the use of the Rubinstein [1982] bargaining model in Bulow-Rogoff's analysis. For simplicity, we assume that the new level of P following the sovereign debt "crisis" – in which the previously contracted level of debt repayment is *not* forthcoming from the sovereign debtor – is certain to remain constant in future. We shall briefly raise the implications of relaxing this assumption below.

Past and potential lenders to the sovereign debtor include a set of competing banks (or syndicates thereof), all based in a single creditor country, for simplicity. These banks have profit functions that are (a) linear in units of repayment in the foreign (to the debtor) good, and (b) discounted intertemporally at a rate of interest $\pi < d$. It is the lower discount rate of banks, relative to that of the sovereign debtor, that creates the desirability of strictly positive borrowing by the debtor country. It is assumed that the proceeds from any new borrowing, in the past or at present, is immediately consumed by the debtor, which is consistent with the preferences specified in equation (1). However, the amount repaid per period, R, is determined in a bargaining process among the debtor country and its creditor(s), with the costs of disagreement arising from the threatened use of trade sanctions which disrupt the desired exports by the sovereign debtor. As a result, the maximum level of repayment R that is incentive-compatible for the debtor country is a function of its terms of trade, P. It is assumed, to provide a historical context, that the *past* terms of trade, $P_0 > P$, supported in the above sense a contracted repayment amount C per period that is no longer incentive-compatible for the debtor country. [10] However, the threatened use of trade sanctions in the event of lack of agreement between the debtor and its creditor(s), must also be made incentive-compatible, or credible, for the creditor-country *government* which, as we have argued in the Introduction, must be given an active and strategic role in the trade sanction process, in order to differentiate the Bulow-Rogoff [1988,1989] "story" from that of Eaton and Gersovitz [1981].

The government in the creditor country maximizes a welfare function that takes account of *both* consumers' surplus from unimpeded trade with the sovereign debtor country for its citizens, as well as the profits (losses) of the bank creditors located in the creditor country. The consumer surplus from unimpeded trade with the sovereign debtor country is assumed to have the simple form:

$$\text{Creditor-Country Consumer Surplus} \quad = Z(P)Y \tag{2}$$

where $Z(P)$ is decreasing in P, the terms of trade of the debtor country. This expression is a reduced form for the incremental consumer surplus obtained from the products of this particular debtor country, for which imperfect substitutes presumably exist in the form of importable goods from other countries. In addition to this consumer surplus, the creditor country government also gives weight to its banks' profits from lending, in deciding on whether or not to impose trade sanctions following upon a breakdown in negotiations between the banks and the sovereign debtor country. For simplicity, we shall assume that the creditor-country government cares only about the taxes paid by its banks, which are reduced by $T * \Pi(D)$ in the event of default by an amount D, relative to the *old* sovereign debt "contract" of repaying C per period, when T is the tax rate and $\Pi(D)$ is the banks' loss from default. We shall assume that:

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[10] The shift in the terms of trade, from P_0 to P, may be taken to be "unanticipated", or, if the timing of it were anticipated, then incorporated in the amount of funds originally lent by the banks to the sovereign debtor, i.e., the discounted sum of repayments C when P_0 held, followed by some $R < C$ afterwards.

$$\begin{aligned}\Pi(D) &= D \quad \text{without trade sanctions} \\ &= D + \alpha(D) \quad \text{with trade sanctions} \qquad (3)\end{aligned}$$

where, in line with Bulow-Rogoff [1989], $\alpha(D)$ is a positive-valued increasing function that represents any recoveries that the banks can make through seizures of the debtor country's assets in creditor-country locations etc. More general utilitarian formulations, as in Ray [1990], could also be used to specify governmental preferences.

The trade sanctions themselves, imposed by the creditor-country government, are assumed to take the form of a *tariff increase* that lowers the price received by the debtor country for its exportables by a fraction β, the fractional *ad valorem* tariff rate. It is assumed that imperfect competition, among the exportables of the debtor country and others exporting to the creditor country, causes the price of the debtor's exportables to rise to $P(\beta)$, strictly increasing in β, which leads to the quantity demanded by the creditor-country consumers to fall to $\gamma(\beta).Y$, where $\gamma(\beta) \in [0,1]$ is strictly decreasing in β, in the goods market equilibrium.

Besides the sovereign debtor, the creditor banks, the creditor-country government (with its non-strategic citizens), there is a *fourth player* in our model, the multilateral financial institution, such as the World Bank or the International Monetary Fund. We assume that this institution can act, credibly and irrevocably, as an agent to the creditor-country government in the following limited sense. The creditor-country government can put up a bond of value B in units of its produced good, with the understanding that the multilateral institution will provide πB to the sovereign debtor country as "debt relief", in every period that the creditor-country government does *not* declare trade sanctions against the sovereign debtor country. If, in any period, trade sanctions are declared against the debtor country, then no debt relief is provided, and πB accrues back to the (equity) account of the creditor country at the multilateral institution. It is assumed, in line with Schelling [1960] but in contrast to elements of Green [1990], that no communication between the multilateral institution agent and the sovereign debtor country – which might be used to generate side-payments that eliminate the institution's incentive to enforce the delegated contingent contract above – is feasible. As we shall see, the amount πB is chosen to create credibility for the use of the trade sanction threat by the creditor-country government, and in equilibrium it is creditor banks that obtain this amount, in addition to other repayments made by the sovereign debtor. Thus, the formal debt contract, of repayment C per period, is *never written down* to a level that equals the repayment by the sovereign debtor itself. [11] This feature of our model may be germane to explaining the empirically observed delays in the debt write-down process.

Given the set-up above, we can now analyze:

(i) the conditions under which trade sanction threats would be credible for the creditor-country government; and

(ii) the maximum repayment R that would be extracted from the debtor-country government, given the sanction threat.

2.2 Analysis

In the event of disagreement between the sovereign debtor and its bank creditors, leading to (credible) trade sanctions by the creditor-country government, the sovereign debtor can either (a) export what it can, or (b) consume its domestic production itself. It will do the former upto the point where:

$$(1-\beta)M(\beta) \geq 1$$

or if

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[11] We assume throughout that "extortionary" trade sanction threats, made in an attempt to extract payments more than the "contractual" amount C from the debtor country, are ruled out by some pre-existing agreement on trade and tariffs.

$$M(\beta) \geq \frac{1}{(1-\beta)} \tag{4}$$

where $M(\beta) \leq P(\beta)$ is the marginal revenue on the export level $\gamma(\beta)$. The debtor country thus derives a payoff of

$$\Pi(\beta) \equiv Max[1, \{(1-\beta)P(\beta)\gamma(\beta) + (1-\gamma(\beta))\}]Y \tag{5}$$

versus that of

$$PY \tag{6}$$

in the event of no trade sanctions.

Unlike in Bulow-Rogoff [1989], we do not bother with the possibility of allowing the debtor to *store* its exportable production, leading to discounted Rubinstein [1982] bargaining with the creditor banks. The reason is simple. Even in the most favorable case for trade-sanction threats, where $P(\beta) = P, \gamma(\beta) = Y$ because of perfect substitutes for the debtor's exportables, the maximum repayment that can be extracted from the debtor with the one-shot trade sanction threat is $[P-1]Y$, whereas Rubinstein [1982] bargaining would lead to a repayment $f(d,\pi)PY$, where $f(d, \pi \in (0,1)$ depends on the relative discount rates of the banks and the debtor. As $d \rightarrow \pi$, and the bargaining period is shortened, $f(d,\pi) \rightarrow 0.5$ which is likely to be much larger than $\frac{(P-1)}{P}$, and $f(d,\pi) > 0.5$ for $d > \pi$. It seems that the applicability of the Rubinstein [1982] bargaining model is of dubious relevance in the sovereign debt context, as the debtor would not *choose* to store.

In any event, the maximum repayment that the debtor would make, given the trade sanction threat embodied in the fractional ad-valorem tariff β, is given by comparing equations (5) and (6), to be:

$$R(\beta) = PY - \Pi(\beta) \tag{7}$$

in units of the creditor-country produced good. Notice that if β is optimally set by the creditor-country government to be sufficiently high to eliminate trade, because inequality (4) is violated at zero exports, then $R(\beta) = (P-1)Y$.

We now consider the incentives of the creditor-country government to impose trade sanctions, at some (subgame-perfect) optimally chosen tariff level β, in the event of disagreement among the sovereign debtor and the creditor banks regarding the amount to be repaid. Recognizing that, if trade-sanction threats are credible, then on the equilibrium path a repayment amount $R(\beta)$ will be extracted *without* trade sanctions, so that the creditor-country government will enjoy a payoff per period of:

$$E(\beta, B) = [Z(P)Y - T\{C - R(\beta) - \alpha(C - R(\beta))\} - (1-T)\pi B] \tag{8}$$

The three terms in equation (8) represent the consumer surplus from unimpeded trade, the tax loss from bank loan writeoffs, taking into account the side-payment πB to the sovereign country debtor *and ultimately to creditor banks*, via the multilateral institution, respectively.

On the other hand, if the debtor country defaults and pays zero, then the creditor-country government must compare its payoff *without* trade sanctions:

$$E_1(B) = Z(P)Y - T\{C - \alpha(C)\} - (1-T)\pi B \tag{9}$$

with its payoff *with* trade sanctions:

$$E_2(\beta) = \operatorname*{Max}_{\beta}[Z(P(\beta))\gamma(\beta)Y - T\{C - \alpha(C)\} + \beta P(\beta)\gamma(\beta)Y] \tag{10}$$

In writing equation (10) as we have, we are assuming that the condition in inequality

(4), for the profitability of some exports by the debtor country, is satisfied; if β is high enough to violate inequality (4), then $\gamma(\beta)$ should be replaced by zero in equation (10). The creditor-country government's problem can hence be expressed as:

$$\operatorname*{Max}_{\{B\geq 0,\beta^{*}\in(0,1]\}} E(\beta^{*}, B) \tag{11}$$

subject to:

$$E_1(B) \leq [\operatorname*{Max}_{\beta} E_2(\beta)] \tag{12a}$$

$$\beta^{*} \epsilon Arg \operatorname*{Max}_{\beta\in(0,1]} E_2(\beta) \tag{12b}$$

Note that we have assumed if the debtor defaults and "invites" trade sanctions, he will repay nothing, which is obvious[12]. The tariff level β^{*} represents the subgame-perfect trade sanction; the openness problem in (12b) can be remedied by specifying a minimum (adminstratively feasible) level of the punitive tariff rate, β.

It is fairly obvious that the answer to the maximization problem above will *not* always involve $B = 0$, which would have required no third-party contracting with multilateral institutions. The crucial issue is that of the reaction of the price of the debtor's exportable $P(\beta)$ to the ad-valorem tariff β, as well as the quantity reaction $\gamma(\beta)$, all arising from competition among countries exporting to the creditor-country. If the sovereign debtor is, for example, a monopolist exporter facing a demand curve $Q(P)$, he or she will choose $P(\beta)$ to maximize

$$\operatorname*{Max}_{P(\beta)} [(1-\beta)P(\beta)Q(P(\beta)) - Q(P(\beta))] \tag{13}$$

where the second-term in equation (13) represents the opportunity cost of not consuming the exportable good. The first-order condition to (13) is:

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[12] It is clear that inequality (12a) and the problem (12b) are unaffected in the event of non-zero repayments *below* $R(\beta^{*})$ by the debtor; hence repaying either 0 or $R(\beta^{*})$ is optimal for the debtor.

$$[(1-\beta)Q(P(\beta))+Q'(P(\beta))\{P(\beta)(1-\beta)-1\}]=0 \tag{14}$$

where primes denote derivatives, and we assume $Q'(P) < 0$. Generically, both $P(\beta)$ and hence $Q(P(\beta)) = \gamma(\beta)Y$, will react to changes in β. If the change is *sufficiently important*, that will imply that, given equations (9) and (10), the inequality (12a) can *not* be satisfied for $B = 0$, at any $\beta > 0$, and hence trade sanctions lose their credibility, leading to zero repayments by the sovereign debtor, which will *not* be optimal (in equation (11)) for the creditor-country government, in general.

To illustrate, consider an extreme case in which $\beta \in \{0,1\}$, so that disruption of trade is either absent or total, leading to $\gamma(0) = 1, \gamma(1) = 0$. Then we see that to make $E_1(\beta) = E_2(1)$, in order to make the trade sanction threat credible, we must set

$$(1-T)\pi B = Z(P)Y \tag{15}$$

Is that going to be optimal for the creditor-country government? If it set $B = 0$, then it would elicit no repayment from the sovereign debtor to its banks, and thus its overall payoff would be:

$$E_1(0) = [Z(P)Y - T\{C - \alpha(C)\}] \tag{16}$$

On the other hand, if it set πB as in equation (15), then it would elicit a repayment to its banks of

$$R(\beta = 1) = (P-1)Y \tag{17}$$

leading to the overall creditor-country government payoff of:

$$E\left(\beta = 1, B = \frac{Z(P)Y}{\pi(1-T)}\right)$$

$$= -T\{C - (P-1)Y - \alpha(C - (P-1)Y)\} \tag{18}$$

In comparing the payoffs in equations (16) and (18), assuming that $\alpha(C) \simeq 0$, we see that setting up a side-contract with the multilateral institution is optimal for this creditor-country government *if and only if*:

$$Z(P)Y \leq T(P-1)Y \tag{19}$$

which is, of course, a condition that can be met quite plausibly.

An interpretation of equation (19) bears emphasis. When P is high, and $Z(P)$ is close to zero, such a conditional side-payment scheme administered through a third-party multilateral institution agent is both beneficial and achieved at little cost (πB) to the creditor-country government. If P is close to 1, and $Z(P)$ is high, such third-party contracting is unlikely to help the creditor-country government; it would be optimal to let the (impoverished) debtor country default on its loans to creditor banks (for example, sub-Saharan Africa?). It is in the *middle regime*, which in the real world involves complications relating to fluctuations in P randomly over time, that difficult and flexible choices of optimal governmental policies are involved.

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