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Global Financial Crises:
Institutions and Incentives

by

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Abstract

Increasing emphasis has been placed on the need for an effective lender of last resort for sovereign states to help cope with global financial crises. Where private creditors use short-term debt to check sovereign debtor's moral hazard, for example, there is clearly a role for an international lender of last resort to prevent self-fulfilling crises. This framework is used to assess the proposal of the Meltzer Commission -- for unconditional financial support, but only to states that pre-qualify. We find that, in the absence of conditional lending for those that do not qualify, there could be increased instability.

The recent Korean bail-in and the Brady Plan both show that procedures for sovereign debt restructuring -- including roll overs and write downs -- are essential complements to an international lender of last resort. After discussing analogies with private sector arrangements, the paper briefly compares the operations of the existing Paris Club with proposed Chapter 11 style procedures.

I. INTRODUCTION

Emerging market crises of the 1990s have led to wide-ranging scrutiny of the international monetary system and how it works. Stanley Fischer (1999, p.95) emphasized that the International Monetary Fund has increasingly come to play the role of crisis manager and international lender of last resort (LOLR) by lending to countries facing external payments crises. Lawrence Summers, Treasury Secretary of the United States, the largest shareholder of the IMF, stressed that the IMF should focus its finance on emergency operations—that it "must be a last, not a first, resort—and its facilities should reflect that role" (Summers 1999[2]). A timely analysis of this speech, and of five recent reports on the role of the IMF in a reformed global financial architecture, is to be found in Williamson (2000). The latest proposal to redefine the IMF's role is that of the "Meltzer Commission" in the United States. The central recommendation is that the IMF should function as a LOLR only for countries that meet criteria related to the stability of their domestic financial systems. More precisely, it is to act as "quasi LOLR to emerging economies" (where the 'quasi' signifies that the IMF cannot "print money"). In this role, lending would be of short maturity, be at a penalty rate and "except in unusual circumstances, where the crisis poses a threat to the global economy, loans would only be made to countries that have met pre-conditions that establish financial soundness." In these circumstances, the Commission's Report concludes, "there would be no need for detailed conditionality". In other words, pre-qualification would replace ex-post conditionality as a check on moral hazard.

The pre-qualification requirement would significantly limit the IMF's role as international LOLR. Its inclusion was intended to deal with the fact that liquidity crises occur very quickly with little time for detailed negotiations, and to avoid what the majority of the Commission perceived to be excessive intrusion into the sovereignty of the borrowing countries. The "Dissenting Statement" to the Report, however, argues that this proposal could be counterproductive even for the Commission's own stated goals (of limiting the incidence of crises, reducing their severity and duration, as well as their spill-over effects).

In the first part of this paper, an analytical framework is developed in which these issues can be examined. In Section II, beginning with private banks, we note that steps to avoid the liquidity crises may have disincentive effects which threaten bank solvency: and that short-term sovereign debt poses problems analogous to commercial bank deposits. To take account of incentive effects, Section III develops a formal model of a Debt Laffer Curve where the market value of debt "steps down" when the debt level reaches a critical value. Shortening the term of the debt can be used as an incentive device to secure adjustment effort and shift the Laffer Curve back up: but it is plagued by the risk of creditor panic. Section IV uses this framework to study crisis management in economies with and without pre-qualification for access to LOLR. If, as seems likely, the debt of countries failing to pre-

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[2]He also suggested that the IMF should focus on assessing "whether countries are likely to run into trouble" and do more to "collect and share financial information" than provide actual funding.

qualify exceeds the critical value, they will be loaded with short-term debt without access to a LOLR. To avoid the dilemma of either denying all credit to non-qualifiers, or supplying it without strings, we explore how liquidity support subject to conditionality could reduce their financial vulnerability.

Procedures for sovereign debt restructuring, including roll-overs and write-downs, are essential complements to an international lender of last resort, Williamson (2000). Section V discusses how suspensions of convertibility can help resolve financial panic, and how renegotiation can reduce debt overhang -- for private sector banks and corporates as well as for sovereigns. In Section VI the Bartolini-Dixit model of sovereign debt valuation is used to look at the modus operandi of the Paris Club and of an "International Convention for the Restructuring of Sovereign Debt" recently proposed by Schwarcz (2000). This is followed by Conclusions.

II. SOVEREIGN LIQUIDITY CRISES AND MORAL HAZARD

In the literature on banking crises, a crucial distinction is drawn between liquidity and solvency crises. The former occurs when a bank cannot honor its immediate contractual obligations to its creditors, even though its net present value is positive. That is, it does not have the funds to meet the withdrawal of deposits at a given point in time, although over time it would be able to do so. A solvency crisis is more serious: the bank's liabilities exceed its assets in present value—and the bank is effectively bankrupt. In principle, given the likelihood of contagion or spill-over effects, it is appropriate to bail out a bank facing liquidity problems; but banks that are insolvent should be closed down or put under new management. Guaranteed bail-outs can, however, lead to risky investment by banks which gamble for the upside leaving the regulators to bear the downside risk, i.e. attempts to deal with illiquidity may lead to insolvency, a problem of moral hazard.

How do sovereign governments, which borrow in the international capital market, compare with domestic banks? Though sovereign governments cannot go into liquidation, they can be insolvent and do default on their debt. Therefore, similar calculations of future cash flows relative to interest obligations can be made as for a private borrower.[3] Just as for domestic banks, sovereigns may face liquidity crises—the equivalent of bank runs—when creditors rush to exit. Some of the recent crises (Mexico in February 1995, and Korea in December 1997, for example) seem to have been clearly related to problems of illiquidity, not insolvency—as evidenced by the countries' success in avoiding default and in repaying early the official financing that was made available (Sachs, Tornell and Velasco, 1996; Radelet and Sachs, 1998).

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[3]For a discussion of some of the conceptual issues relating to sovereign insolvency, see Guidotti and Kumar (1991).

In so far as the actions of the borrowing country are not perfectly observable, moral hazard can also disrupt international lending. But in the case of sovereigns who borrow, the moral hazard lies not so much in the incentive to gamble *per se* as in the failure to put in the necessary "adjustment effort" after debt has been contracted.

Examples of sovereign liquidity crises and of sovereign default due to inadequate adjustment are given in Table 1. The debt crisis of the 1980s involved problems of insolvency for a number of Latin American countries, which had borrowed recycled "petrodollars" at low rates of interest when growth was strong but could not service them when interest rates rose and growth plummeted, leading to capital flight (see bottom right cell). Under the Baker Plan the situation was mis-diagnosed as one of illiquidity and countries were expected to "grow out of debt": but later, under the Brady plan, there were debt write-downs and financial support with conditionality (see top left). In the bottom left cell are the cases of Mexico and Korea, where solvency was not in question but there was nevertheless creditor panic. (Chang and Velasco (1999) use the Diamond /Dybvig (1983) framework to analyze such crises.) Trying to avert the panic by unconditional bail-outs may give rise to adjustment inertia and insolvency as indicated in the top right cell, as some have argued was the case in Russia during at least some of the 1990s, when program overshoots were ignored.

Table 1: Sovereign Lending

	High adjustment effort (solvency)	Adjustment inertia (insolvency)
Checking liquidity crises	*Latin America (Brady Plan)* (Bail-outs <u>with</u> conditionality)	*Russia in the 1990's* (Bail-outs/Bail-ins <u>without</u> effective conditionality)
Liquidity crises	*Mexico 1994/5 Korea 1997/8*	*Latin America in the early 1980's*

In contrast with domestic lending, there are no international bodies that undertake strict supervision and regulation of sovereign borrowers. There are, however, rating agencies for monitoring and the market discipline exerted by the existence of short-term debt: specifically the credible threat of short-term debtors to exit when repayment prospects look poor. But the existence of short-term foreign borrowing exposes countries to random self-fulfilling crises ("sunspots") not associated with fundamentals (Masson 1999).

To avoid random creditor panics, why not limit or prohibit short-term international borrowing by emerging market sovereigns and private enterprises? Jeanne (1999) and Rodrik and Velasco (1999) consider this question. Jeanne stresses the temptation governments face

to postpone fiscal adjustment and the role that short term debt may play in keeping them up to the mark. From this perspective, the problem is how to avoid sovereign debt crises without weakening the incentives for reform.

In analyzing how the international monetary system functions, one must clearly take into account both liquidity withdrawals driven by fundamental economic reasons and those arising from self-fulfilling creditor runs. Because borrowers cannot commit to actions that would ensure repayment, it is also necessary to take account of moral hazard. A model of this sort follows in the next section.

III. A MODEL OF INTERNATIONAL LENDING WITH LIQUIDITY CRISES AND MORAL HAZARD

a. Incentive Effects of Pulling out Short-term Debt

As in Krugman (1989), we assume that debt is contracted before effort is applied (though we treat the decision on effort as all-or-nothing). Thus, at the beginning of the period financing is made available to a sovereign borrower, who then chooses whether or not to apply *adjustment effort* (through enacting appropriate economic policies). With effort, it is more likely that the "good" state will occur; but this is partly random, determined by nature. After the state is drawn, the borrower then repays all outstanding debt in the event of the good state or some amount less than the contractual amount of the loan, depending on the return in the bad state. The inability of the creditor to contract on effort means that with high levels of debt, the borrower has little incentive to put in effort, and more debt can generate less value, as in Krugman's Debt Relief Laffer Curve.

Short-term debt gives the creditor liquidity advantages as well as extra leverage over the debtor, while for the borrower long-term debt avoids the risk of harmful liquidity runs. We assume that there are two maturities of debt, short and long, where the former can be withdrawn *after* the state is revealed, but *before* the payoffs are actually received (see Figure 1) with economic losses caused by early liquidation as in Diamond and Dybvig (1983). As in Jeanne (1999) and Rodrik and Velasco (1999), short-term debt can be used to exert some punishment on the debtor when the bad state occurs.[4] But, as Marchesi and Thomas (1999) note, if in the bad state nothing is retained by the borrower, there needs to be some non-pecuniary penalty ("collateral damage") associated with short-term debt to provide an

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[4]This feature can best be justified in a two-period model in which early liquidation by the creditors reduces the return on the investment. We appeal to such a mechanism, even though our model is not explicitly multiperiod.

incentive for the borrower to undertake effort.[5] In addition, short-term debt has the attraction of providing liquidity services. But the right of prompt liquidation leads to the possibility of self-fulfilling liquidity crises. Thus, the existence of short-term debt is associated both with benefits (enhanced effort by the borrower and greater liquidity) and costs (unnecessary crises). Details of the model follow.
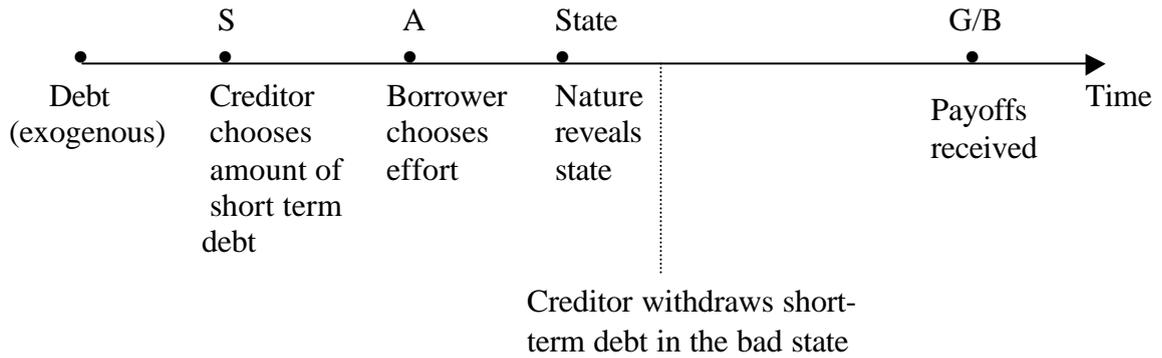

Figure 1. Ordering of events

Let D be the amount of debt (both short and longer term), G be the payoff to the debtor when the good state occurs (D of which needs to be repaid to the creditor), B is the payoff in the bad state (typically with $B<D$), S is the amount of short-term debt, P is the probability of a good state occurring, and a is the effort expended by the borrower. It is assumed that the probability of a good state is q with no effort, but increases with effort so:

$$P = q + ba \tag{1}$$

where it is assumed that $G > 1/b$ (so effort will be applied at zero level of debt) and that the cost to the borrower of expending the effort is just equal to α. In the bad state, (with $B<D$), all the payoff B is paid to the creditor. But if short-term debt is withdrawn, the borrower suffers a penalty ("collateral damage") in amount g per unit of short term debt. Thus, the expected utility EU of the borrower is given as follows:

$$EU = (q+ba)(G-D) - (1-q-ba)\, Sg - a \tag{2}$$

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[5]Although the creditor, as the residual beneficiary of pay-offs in the bad state, suffers losses from withdrawing short debt, there are benefits coming from the incentives on the debtor.

The expected payoff *ET* to the lender, assuming B> *Sd,* is

$$ET = (q+ba)D+ (1-q-ba) (B - Sd)   \quad\quad (3)$$

as the creditor not only gets less than complete repayment of debt in the bad state, but, as the residual beneficiary, also suffers costs associated with the early liquidation of short term debt, S*d* . Creditors are assumed to hold at least *l D* short term debt for liquidity purposes. The amount of short term debt may be increased above this level to increase the likelihood that the borrower puts in the requisite adjustment effort. When will it have the desired incentive effects and how much debt is needed to ensure the good state?
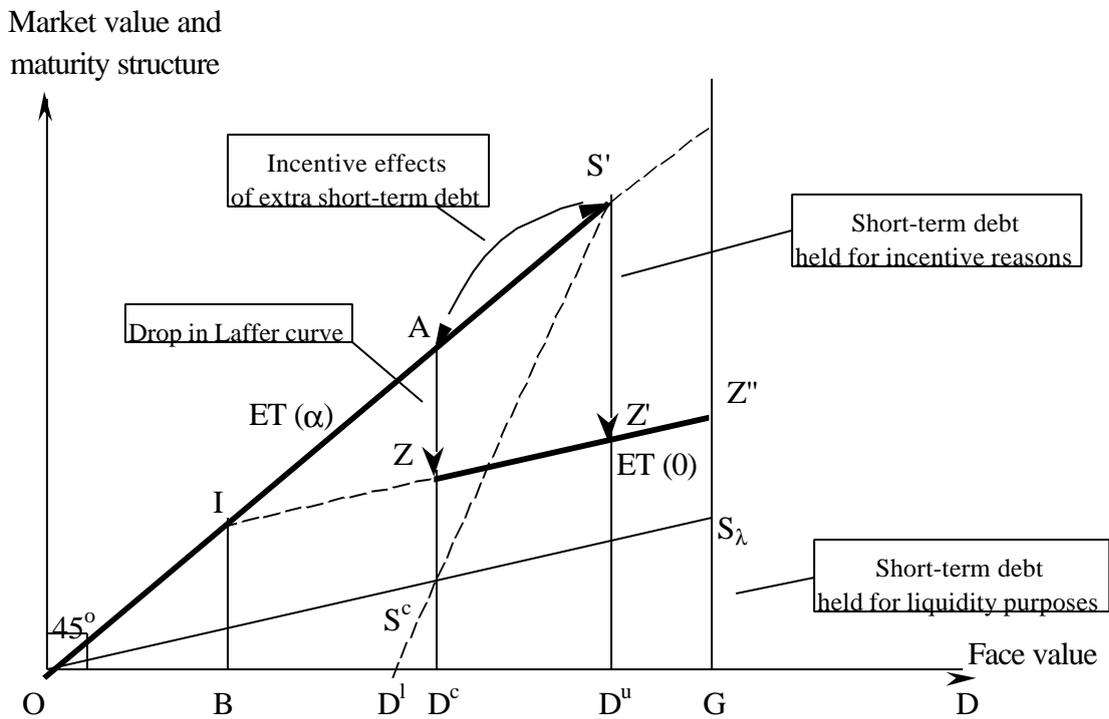
Figure 2. The composition and value of debt.

We illustrate the analysis with the aid of Figure 2 which shows the market value *ET* for levels of D from zero to G, in the special case where with effort the good state is certain (so application of effort ensures full value of debt and ET lies along the 45 degree line). Short-term debt held for purely liquidity purposes is shown by the line OS_λ in the Figure: short-term debt debt required for incentive purposes is shown by the dash line passing through S_C and S'. This may be derived as follows.

The debtor willonly put in the adjustment effort if

$$ba(G - D + Sg)\,³\,a   \quad\quad (4)$$

that is,

$$S \geq (1/\pmb{b} - G + D)/\pmb{g}. \tag{5}$$

For low levels of total debt, the debtor will have sufficient incentive to put in adjustment effort without any short term debt, in particular for

$$D \leq G - 1/\pmb{b} = D^l. \tag{6}$$

So <u>without any short term debt,</u> the *ET* curve would jump down at D^l and the payoff to the creditor would lie on the line segment IZ". Note that , with short-term debt being held by creditors for liquidity purposes, the incentive constraint is satisfied up to $D^c,$ that is for

$$D \leq (G - 1/\pmb{b})/(1 - \pmb{gl}) = D^c. \tag{7}$$

This implies a Laffer Curve corresponding to the stepped schedule OAZZ". Increasing short term debt above $\pmb{l}D$ extends the range over which effort is applied, however. It is evident from equation (5) that the level of short-term debt required to provide this incentive rises faster than the level of debt itself (since $\pmb{g}<\pmb{1}$) and the point where all debt needs to be short term, i.e. $S=D,$ provides the upper bound for the efficacy of this incentive device. This bound, labelled D^u in the Figure, is where

$$D^u = (G - 1/\pmb{b})/(1 - \pmb{g}). \tag{8}$$

Thus the region D^c, D^u is the range over which extra short-term debt will have its intended effect in increasing effort. The schedule labeled $S^c S'$ in the Figure shows the required short term debt , and its effect is to raise ET from ZZ' to AS', giving the stepped Laffer curve OS'Z'Z". If we define $S_1 = \pmb{l}D$ as the short-term debt held to satisfy liquidity needs and S_i as the short-term debt needed to provide the debtor incentives to supply effort, then $S = max(S_1, S_i)$. In what follows, a country whose short-term debt lies below D^u is said to satisfy the High Effort Constraint.

To ensure that, for the creditor, the extra short-term debt is worthwhile, the induced effort by the borrower must make up for extra costs that the creditor may suffer in the bad state, when short term debt is liquidated. That is, the condition

$$(\pmb{q} + \pmb{ba}) D + (1 - \pmb{q} - \pmb{ba}) (B - S_i \pmb{d}) \geq \pmb{q} D + (1 - \pmb{q})(B - S_1) \tag{9}$$

must be satisfied over the range (D^c, D^u).

In the special case shown in the figure, where the extra effort ensures that the good state occurs , so $(\pmb{q} + \pmb{ba})=\pmb{1},$ inequality (9) is obviously satisfied for all levels of debt in the range D^c, D^u as no liquidations take place, and debt values increase from ZZ' to AS'. In

general, however, applying effort cannot guarantee the good state. In this case, parameter values must satisfy

$$1-(d/g)(1-q-ba)/ba > B/(G-1/b) \qquad (10)$$

The RHS is at most equal to one, while the second term on the LHS is positive (it is zero in the certainty case).

b. The Risk of Random Runs

In the special case discussed above, short-term debt neatly solves the moral hazard problem posed by the inability to contract on effort. But in the more realistic case where $q+ab<1$, bad luck (e.g. adverse weather) may still produce the bad state despite effort, so the state is a noisy signal for effort and the state-dependent withdrawal of debt implies a positive probability of the debtor being punished inappropriately. In addition, there could be withdrawals of short term debt triggered by "sunspots" producing a run quite independently of whether the borrowing country was putting in effort or was in the good or bad state. The sunspots are introduced by hypothesizing that, in addition to the "fundamentals-driven" runs in the bad state, there are runs which occur in the *good state due to creditor panics*. We take the probability of such panics as exogenous, occurring with probability σ, in which case the investment is liquidated at a cost $S(g+d)$ to the borrower. Short term debt is a two-edged sword: it allows for punishment in the bad state, but it inflicts needless damage in the good state.

Rewriting equation (2), the expected utility of the borrower is

$$EU = (q+ba)(G-s(g+d)S-D)-(1-q-ba)Sg-a. \qquad (11)$$

As the borrower now suffers the effects of sunspot runs in the good state (see the term $-s(g+d)S$ in equation (11)), this reduces the expected rewards for adjustment effort, and undermines the use of short term debt as an incentive device. How is welfare affected? Assuming again for convenience that effort induced is sufficient to eliminate the bad state, social welfare must fall by $s(g+d)S$. If these sunspots costs exceed $ba(G-B)-a$, the net gains identified earlier, the mechanism is no longer socially efficient. But it may nevertheless be used, because the extra costs are borne by the borrower, not the lender who chooses the maturity. A situation can arise where the borrower is loaded with short term debt which the lenders expect to be repaid in full while the borrowers are in line to suffer costs which exceed the social benefits.

Both the history and theory of banking suggest that situations like this, when the market's cure for moral hazard threatens to kill the patient, can be improved upon by public intervention.

c. Insuring lenders

Why not simply eliminate all runs? As with banks, one problem is that doing so would give rise to moral hazard, as can be illustrated in the model of equations (1)-(10) above, in which there are no sunspots. Suppose that the borrower is given the possibility (perhaps from some international agency) of purchasing insurance at cost ρ that will pay off when the state is bad: instead of the borrower repaying only part of his loan, and defaulting on the rest, the international agency pays the whole amount, so the creditor will receive the full contractual value of its loan in both states. Then the returns to the borrower and the lender, instead of (2) and (3), respectively, will be

$$EU = (q+ba)(G-D) + (1-q-ba)(B-Sg) - a - r \qquad (12)$$

$$ET = D - (1-q-ba)Sd \qquad (13)$$

In these circumstances, the lender will have no extra incentive to extend short-term debt, and will set $S=lD$ (i.e., only to satisfy liquidity needs). As a result, the borrower's payoffs will be

$$EU = (q+ba)(G-D) + (1-q-ba)(B-lD) - a - r \qquad (14)$$

The effect on effort can be obtained by comparing the utility without and with (fixed) effort $\alpha>0$: call these EU_0 and EU_α. Now

$$EU_0 > EU_a \text{ if and only if } D > (G-B)/(1-g) \qquad (15)$$

That condition will be satisfied if the difference in the good and bad states is small, and the penalty to the debtor of liquidation of short-term debt is also small. Hence providing insurance (even actuarially fair insurance, as long as the premium is fixed in advance and does not depend on effort), reduces the incentive to put in effort that short term debt offered[6].

IV. PREQUALIFICATION AND CRISIS MANAGEMENT

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[6]The same applies to the proposal of Buiter and Sibert (1998) that all international lending contracts include a *Universal Debt Roll Over Provision*. While such a provision would eliminate the unnecessary, sunspot induced runs, it would also prevent liquidity withdrawals that involve monitoring borrowers, punishing them for having adopted policies that led to the bad state.

This model can be used to study crisis management for two different emerging market economies, one that has pre-qualified in terms of the Meltzer Commission's proposal and another that has not.[7] Assume specifically that for the prequalifier debt is less than the critical value D^c which triggers the issue of extra short-term debt , but this is not true for the country that has failed to qualify. What happens when crisis strikes?

Note first that both economies will have some exposure in the form of short maturity debt, but the proportion will be higher for the non-qualifier, for incentive reasons. This is shown in Figure 3, where the total amount of debt is taken to be the same for both countries, D^c_q is the critical value for the prequalifier, D^c_n is the critical value for the non-qualifier, and, D^* (the common level of debt) lies between the two. For the prequalifier, short term debt is chosen by the creditor for liquidity purposes only, so $S = lD^*$, shown as L in the figure. In the other case, short term debt is much closer to D^*, as shown at point H, as needed to induce high effort.

Composition of Debt
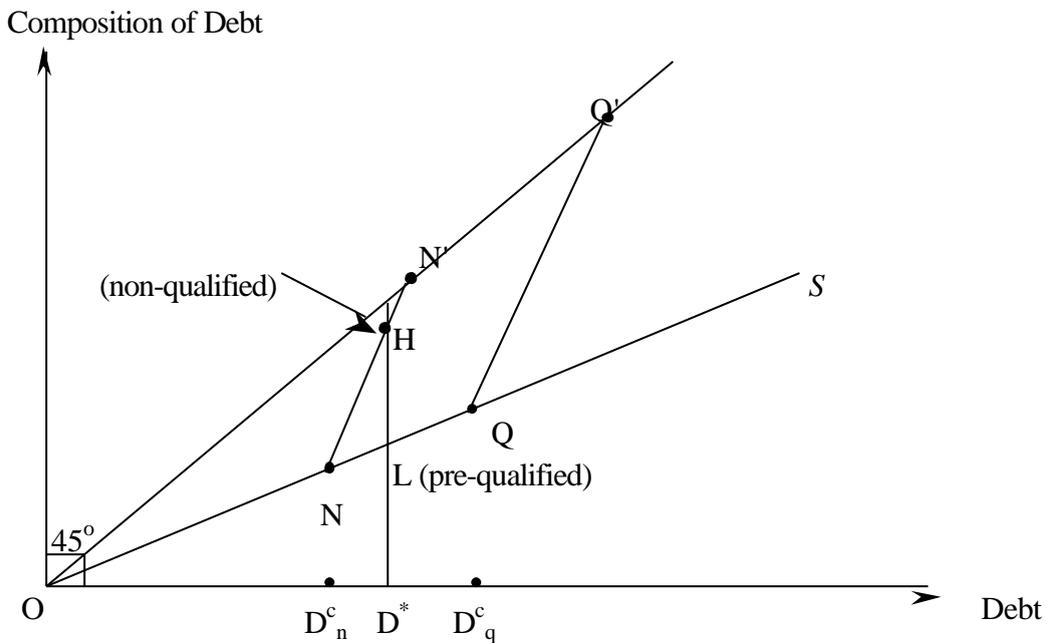
Figure 3. Composition of debt in two cases.

Even if high effort ensures the occurrence of the good state, both countries are still exposed to sudden withdrawals of short debt due to "sunspots". For the prequalifier, however, these should pose no problem as access to a deep pockets LOLR is available; and in any case the proportion of short-term debt is small, which is all to the good. (Indeed, if the

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[7]Note that most of the East Asian countries recently hit with crisis would not have satisfied the pre-qualification criteria of the Meltzer commission.

"prequalification" is common knowledge, as is most likely, the probability of "sunspot" withdrawals might well decline.)

What are the options in the other case? As the country has failed to qualify, it does not merit the protection of the LOLR. But with debt in excess of its critical value, the creditor needs the credible threat of pulling out substantial amounts of short term credit to induce high effort. The country is therefore heavily exposed to sunspot runs. Note that as creditor runs for incentive purposes occur only in the bad state, the LOLR could, in principle, lend when sunspot panics occur in the good state without undermining incentives. Such state contingent lending does not seem to be what the Meltzer Commission Report has in mind, since it would involve a detailed examination of the country's policies at the time of crisis. So we conclude that the basic option is *laissez faire:* let the country bear the consequences of random runs in the good state and certain pullouts in the bad. Maybe next time it will borrow less and/or increase its capacity to pay.

In exceptional circumstances, where the crisis poses a threat to the global economy, the "prequalification" framework proposed by the Meltzer Commission would allow the LOLR to lend. This could avert a sunspot crisis, but it could also undermine incentives as countries that believe themselves too big (or, like Russia, too nuclear) to fail will reduce their efforts to service debt.

Thus, from the perspective of the Report, it appears that the LOLR must either stand aside and leave the emerging country to its fate, or it must stand ready to give unconditional support if the crisis poses a systemic threat. This is unsatisfactory. Is there no other possibility? We consider, specifically, the possibility that the LOLR uses conditionality as a substitute for the monitoring embodied in the short-term debt extended to the "non-prequalified" economy.

If LOLR were to provide liquidity to meet all creditor runs, the elimination of sunspot runs would be a clear welfare gain. But how can lending programs be designed to preserve the incentive effects of "fundamentals-based" runs on short term debt? What if the authorities can check moral hazard with measures to elicit effort— and if the monitoring of countries via programs allows for conditioning directly on effort[8], and not just on the state?

Assume specifically that a lack of adjustment effort attracts a program penalty *p* representing the pressure on member countries to adhere to the program[9]. If the LOLR eliminates all runs, and helps to elicit adjustment effort, private lenders will benefit. Perhaps,

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[8]Discussed earlier with respect to the Brady Plan in Gruenwald and Miller(1997)

[9]This is analogous to the term measuring the disutility of Fund programs appearing in Marchesi and Thomas's (1999) screening model.

as a consequence, they can be bailed in to help the debtor.[10] So the debtor can be provided with a tangible write-down in the bad state, *k<B (* the "carrot")*,* as well as suffering pressure to elicit effort via LOLR conditionality (the "stick"). Let there be two possible levels of effort, zero or *a,* but with *a* below *(1-q)/b*, so the borrower's effort is insufficient to guarantee that the good state occurs. As LOLR lending is not subject to liquidity withdrawals, all debt can be regarded as effectively long-term. Then the calculus for the borrower will become:

$$EU_a = (q+ba)(G-D) + (1 - q - ba) k - a \qquad (16)$$

if adjustment effort *a* is applied; and

$$EU_0 = q(G-D) - p \qquad (17)$$

if adjustment effort is not applied. Note we assume that, thanks to extra monitoring, "pressure" is applied only when effort is missing: unlike the creditor sanctions, it is effort-dependent not state-dependent.

The debtor would only put in the adjustment effort if $EU_a > EU_0$, i.e.

$$ba(G – D)³ a - p - (1 - q - ba) k. \qquad (18)$$

Setting $EU_a = EU_0$ defines a critical value of debt, D^k up to which adjustment effort will be made.

$$D^k = (G-1/b) + ((1 - q - ba) k + p)/ba \qquad (19)$$

so

$$D^k = D^l + ((1 - q - ba) k + p)/ba$$

where D^l is the level at which the Laffer curve stepped down in the absence of short term debt (see Figure 2). Thus the effect of carrot and stick is to move the Laffer curve upwards in the same way as short-term debt in Figure 2.

In looking for a way out of the impasse posed by the Report, we have come up with an account that looks very much what the IMF normally does, which is to apply conditions to its lending to encourage governments to undertake necessary policy changes. Of course, the debtor country concerned may itself be committed to undertaking the effort and have the administrative and technical capabilities for doing

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[10]In the example where the private sector did the monitoring using short term debt, the private sector was already bailed-in, provided the return *B* in the bad state was substantially below *D*.

so: this is sometimes referred to as "program ownership" (see, for instance, Killick 1995; Brau (1981) describes the consultation process between the Fund and the member countries which underlies the program design and implementation). The notion of "program ownership" is that the country regards the adjustment effort (in macro policies, or in improving its bankruptcy law, or corporate governance, for example) to be in its own self interest, over and above what it achieves for its short run ability to pay the creditor or satisfy the Fund program.

In principle, the Fund does not have a mandate to impose a program or conditionality. However it is also the case that without such a program or conditionality, implementation of the desired policies may be difficult or delayed , perhaps due to political constraints and blockage by special interest groups. (See for example Miller and Zhang (1996) which shows how the IMF can raise welfare by allowing precommitment, which allows policy makers to overcome the ime inconsistency problem).

It is not surprising to note that many Fund programs in recent years have been formulated and designed by the countries concerned, albeit with important input and monitoring by the Fund staff. Though difficult to quantify in practical cases, program ownership is no doubt crucially important in achieving many economic reforms, since evidence shows that external "pressure" alone is unlikely to lead to the durable adoption of good policies (see, for instance, Leandro et al (1999)). Obviously to the extent that borrowers are trying to implement precisely the policies that creditors desire, monitoring by the latter (or the Fund) becomes less important.

We conclude that, to remedy the gaps in the way the Meltzer Report suggests handling "non-prequalifying" economies, one would have to institute an IMF type of conditionality, to monitor and provide incentives to the debtors. If access to a LOLR by non-prequalifiers is not available at a global level, there would doubtless be pressure for regional alternatives, like the Asian BIS proposed in 1998 (see, for example, Goodhart(1999)).

There are of course additional complications. For instance, it is more realistic to assume that the IMF can monitor some actions (e.g. those of governments) but not others (those of private firms or semi-autonomous government agencies). But capital flows to East Asian countries went mainly to the private sector. Clearly private lending institutions must do their own monitoring, and guaranteeing their lending against risk of loss may well lead to inadequate monitoring and reduced effort (investor's moral hazard). This problem can be ameliorated, though not eliminated, by enhanced disclosure requirements on the part of borrowers and improving financial sector supervision and accounting standards. There is increased emphasis by international financial institutions to establish codes of desirable practices in these areas, and to encourage countries to adopt and effectively implement them.

More fundamentally, the continued development of international bond and equity finance to private borrowers rather than to governments may reduce the relative importance of macroeconomic conditionality (i.e., over government budgets and monetary policies) and to require making creditors liable for some loss in the bad state—"bailing them in". Establishing prudential regulations and bankruptcy procedures is a longer-term process than correcting a temporary budget deficit. Moreover, attempts to address prudential issues at the height of a crisis (e.g. by closing banks) may make matters worse. This suggests an even bigger role for the IMF (and other IFIs) in ensuring structural reform efforts. [These considerations also suggest that there is some role for "conditionality" before a crisis occurs, but we do not believe that lending can be separated from conditions imposed on the borrower to undertake appropriate policies].

V. BAIL-OUTS, ROLL-OVERS AND WRITE-DOWNS

a. Complementarity between LOLR and Debt Restructuring

In a historical account of central bank operations at times of crises, Giannini(1999) shows that efforts to coordinate private creditors have been at least as important as the injection of central bank funds. As JP Morgan forcefully demonstrated in the earlier part of the twentieth century, such coordination can be achieved by the private sector on its own: but there is an obvious role for the central bank to act as a crisis manager. A recent example is provided by the LTCM "rescue" in late 1998. No public funds were involved: the Federal Reserve Bank of New York helped to arrange a private sector takeover and recapitalisation of the troubled hedge-fund—and the Fed cut interest rates to ease the liquidity crisis. At the international level, Fischer (1999) places a similar emphasis on the role of the IMF as a crisis manager. Concerted action taken by central banks to force a debt rollover of short-term bank credit for Korea at the end of 1997 is a case in point: by assuring big creditors that others were not pulling out, the temporary suspension of convertibility halted the run and restored confidence. This contrasts with the exclusive focus of the Meltzer Commission Report on the prompt supply of official funding to (pre-qualified) debtors as the mechanism for handling financial crises, a view which ignores the significant role that the coordination of private sector creditors can play.

Rollovers and standstills have a part to play in checking liquidity crises. In some cases, however, the problem is not one of temporary illiquidity but of insolvency: the flow of resources available to finance the debt is not sufficient even on a present value basis. Debt restructuring may then be inevitable. As the consensus that the debt of HIPCs to IFIs be partially written off suggests, the need for restructuring and writing down sovereign debt is widely recognized. But, as Williamson (2000, pp. 16) notes, " any creditor that suspects restructuring to be a possibility has an incentive to liquidate its claims while it remains possible". Hence the case for standstills – to prevent creditor flight, and to buy time for negotiations.

While there is no international regime for recognizing the insolvency of Governments (i.e., no legal provision for the discharge of unpayable sovereign debts) there are well established fora, the Paris and London Clubs, where public and private (bank) creditors, respectively, meet to restructure sovereign debt. However there is no such forum for private non-bank creditors holding sovereign debt, such as Brady bonds and Eurodollar issues. In contrast, private creditors holding *non-*sovereign debt do have access to the provisions of corporate bankruptcy law. What do those provisions suggest for sovereign restructuring arrangements? The next section examines this issue.

b. Analogous Mechanisms in the Private Sector

Table 3. Bail-outs, Roll-overs and Write-downs.

Policy	Banks	Corporates	Sovereign States
Bail-outs (supplying Liquidity)	Lender of Last Resort	Debtor in possession financing (DIP) under Chapter 11	International LOLR (with CCL and SRF): "lending into arrears" by the IMF
Roll-overs (suspending convertibility)	"Bank Holiday"	Automatic Stay under Chapter 11	"Payments standstill"
Write-downs (financial restructuring)	"Launching a lifeboat"	Debt Restructuring with majority voting under Chapter 11: or with contracts.	Paris/London Clubs: Debt Restructuring Convention;Creditor Committees

Table 3 indicates the banking and corporate parallels for all three mechanisms for handling financial crises. Besides the analogy with banks discussed earlier, there is in the first line a parallel between IMF sovereign lending into arrears and corporate Debtor-in-Possession financing under Chapter 11. As Sachs (1999, pp.182) has noted, for sovereign governments that are 'insolvent' but need working capital, "you do not necessarily need a lender of last resort, you need a legal regime, in order to get working capital."

What about "suspensions of convertibility"—like that imposed on short term loans to Korea in December 1997? What are the parallels here? They are also a feature of Chapter 11, as companies filing for protection against creditors are given an automatic stay of 180 days on debt payments. For banks, temporary halts to the convertibility of bank deposits into cash were not uncommon during the Great Depression, before the FDIC was set up, as banks closed their doors to avoid runs. For uninsured banks, such "holidays" can be a useful check on "sunspot" runs, as both Diamond and Dybvig (1983) and Rogoff (2000) acknowledge. But coordinated action may well prove necessary if the panic is pervasive.

Reference has been made to the operations of the Paris and London clubs in restructuring sovereign debt. For non-financial corporations, the analogy is financial

restructuring under bankruptcy, in particular the write downs and debt-for-equity swaps covered by Chapter 11, where the managers are able to put plans to the creditors, subject to the automatic stay. These procedures are too cumbersome for failing banks and hedge funds, which is why the Central Bank usually takes the initiative in restructuring negotiations (referred to in the UK as "launching a lifeboat").[11]

Rather than using Chapter 11 as the model for procedures to handle sovereign debt, Eichengreen and Portes(1995) have proposed creating Creditor Clubs like those that existed in the 1930s—together with contracts to allow for majority voting. The Reports of G10 and G22 both supported the revision of debt contracts: and, following UK, in April 2000, Canada announced that it is to adopt collective action clauses in its future foreign currency bond and note issues.

What Table 3 high-lights is how corporates, banks and sovereigns all need procedures to modify the structure of financial liabilities in order to keep functioning efficiently. Evidently high leverage can pose problems when earnings are low, particularly if debt maturity is short. Debt claims may be easier to keep track of and verify, but equity offers greater flexibility. From a long term historical perspective, it was "joint stock" firms which helped finance the Industrial Revolution. Currently, in the internet revolution, similar recourse to equity financing has been only too evident: in this case, even labor compensation has taken equity form! Given the volatility in the emerging market income streams, one wonders why there is so much debt in issue.

Why is more use not made of equity finance? The answer may involve high transactions costs and other institutional factors—such as weak corporate governance and lack of transparency.[12] For sovereigns, moreover, there are conceptual and practical difficulties in issuing income contingent claims. But more fundamentally, the answer is surely that debt acts as an incentive device to solve agency problems in the firm. Just as shortening the maturity of debt can help secure high effort, so leverage itself can be used to limit excessive risk-taking by owner managers. (Dewatripont and Tirole (1998)).

VI. RESTRUCTURING SCHEMES FOR SOVEREIGN DEBT

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[11]Banks are corporates, but given the highly leveraged positions they have relative to their equity, the mismatch in maturity between their assets and liabilities, and potential moral hazard considerations, they are in a special category.

[12]Rogoff (1999,p36) argues that "The main problem with the present system is that contains strong biases towards debt finance, especially towards intermediation by banks and does not adequately support equity finance and direct investment."

A variety of specific proposals have been made for ways to restructure sovereign debt. Raffer (1990) advocated procedures analogous to Chapter 9 of the U.S. bankruptcy court; Sachs (1995) proposed a framework similar to Chapter 11; Miller and Zhang (2000) proposed the creation of a negotiating forum analogous to the London and Paris Clubs. In all cases, the basic idea is to provide temporary protection from creditors (and debtor in possession finance if necessary) while restructuring takes place. How might bankruptcy style procedures operate at the international level, and how would they affect the value of sovereign debt?

Schwarcz (2000) has recently drawn up an explicit legal framework for sovereign debt restructuring. This entails the multilateral adoption of an "international convention for restructuring" (which we label ICR) based on bankruptcy reorganization law principles. The key features are the following: (i) the sovereign debtor can petition for debt relief at any time to the "Supervisory Authority"; (ii) there is no stand-still provision, but the Supervisory Authority "can lend into arrears with its claims taking priority over claims of other creditors"; (iii) all creditors would be bound to a plan of reorganization, agreed to by super-majority voting by classes of claims; and (iv) upon such agreements, debts not provided for in the plan would be discharged. Though modeled on Chapter 11 of the US corporate bankruptcy code, the convention would be largely self-executing, it is claimed, and not require supervision by any international bankruptcy court. To the extent that disputes must be adjudicated under the convention, "that task could be performed by establishing a low cost arbitration procedure".

Some idea of how such an ICR might operate can obtain using the debt valuation model published in the IMF Staff Papers by Bartolini and Dixit (1991). They calculate the market value of sovereign debt on the assumption that there are automatic rollovers in bad states where debt service cannot be paid in full. After sketching the model, we add the possibility of debt writedowns; first under a Paris Club restructuring, and then under an ICR.

If D is the face value of debt and r is the coupon rate (and also the rate of interest), and X is the capacity to pay, then the roll-over provision implies that $dD/dt = rD - X$, when $X < rD$. Otherwise D is constant, i.e. it is non-decreasing. X is assumed to follow a geometric Brownian motion process with trend m assumed to be less than the rate of interest. When X falls to rD or below, the debtor is by definition unable to fully service the debt. For a private debtor, this default might well trigger acceleration clauses and bankruptcy proceedings. But a sovereign protected by immunity can roll over the debt. As long as $X > (r – m) D$, the sovereign is solvent. (We assume that the debtor cannot borrow from other sources against the promise of future growth in the capacity to pay.) But when $X < (r – m)D$ the debtor is essentially insolvent and is playing a "Ponzi game"; and using rollovers as a way of reducing rather than simply postponing payment.

The implications of such "Ponzi games" for bond values are shown in Figure 4, where $x = X/D$ on the horizontal axis measures the current capacity to pay relative to debt outstanding, and the schedule OB shows the market value relative to the face value, i.e. $v = $

V/D. When the capacity to pay is much greater than debt service, bonds stand close to par, i.e. OB approaches one to the right of the figure. But bond values are depressed by rollovers, so OB goes to zero as x falls to zero.

Following the debt crisis of the 1980s, it was agreed that the debt stocks of severely indebted low income counties could be reduced in special circumstances and the forum for restructuring inter-governmental long-term debt is the Paris Club. To study the workings of the Paris Club using the BD model, take a debtor country which has been rolling up debt for some time.[13] When it first becomes insolvent, i.e. $x = r - m$, it arranges a program with the IMF and successfully negotiates a write-down, w, with its creditors. The effect of this agreement is to increase the variable x, defined as the ratio of X over D. (Specifically if 100w is the agreed percentage write down, x will jump to *(r-m)/(1 – w)*; thus x will double for a 50% writedown.) If this agreement was unanticipated, debt values would rise as shown by the shift from U_1 to U_2, and creditors would take a hit as the rise in market value fails to compensate for the write down. (Observe that U_1 and U_2 do not lie on a ray from the origin, the condition necessary for value gains to offset face-value losses.) With fully anticipated write-downs, however, the rise in the market value of the remaining debt will exactly offset the agreed write-down of face value. Debt values in this case will jump as shown by the shift from A_1 to A_2.

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[13]This analysis draws on Miller and Zhang(2000).
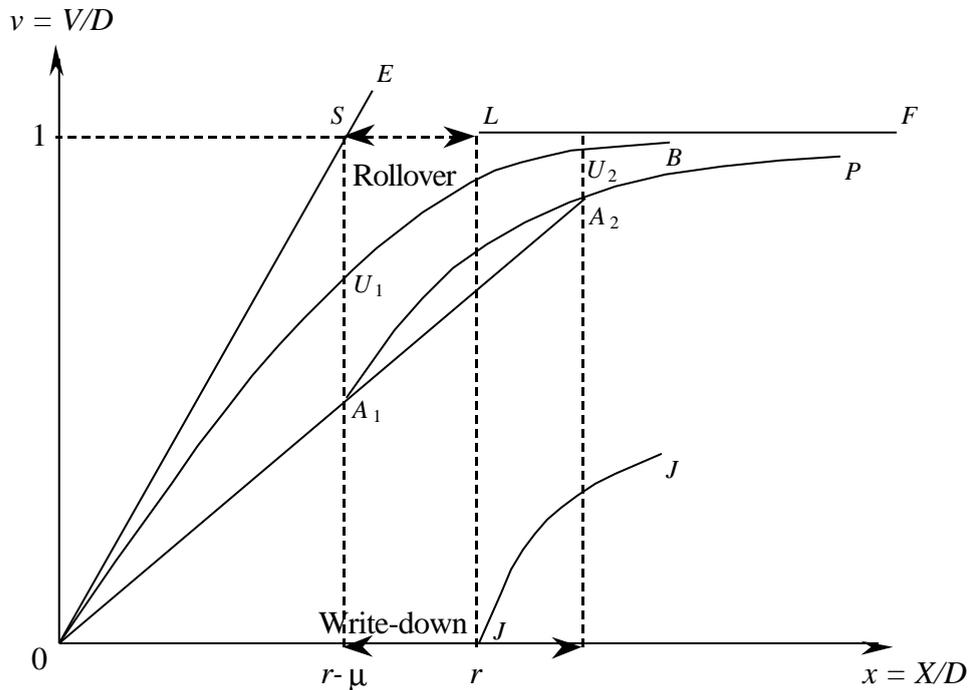
Figure 4: Sovereign Debt Restructuring

What if debt was restructured in a more decentralised fashion, with creditors and lenders recontracting under the auspices of a convention like that proposed by Schwarcz? Particular circumstances would of course play a role, but some insight may be obtained from the analysis of "constant recontracting" by Bulow and Rogoff (1989). Assume that there are sufficiently attractive gains from trade, and sufficiently powerful trade sanctions available to the creditor, for agreement to be reached. Then constant recontracting "involves splitting the total (maximal) size of the cake" (Muthoo, 1999, p108). If debt service capacity is taken to represent the maximal gains from trade for the debtor, this would mean splitting X. Though we consider a one-off settlement, rather than constant recontracting[14], we nevertheless make use of this result.

Let there be a one-off debt reduction which gives each side half the cake as soon as the Ponzi game begins, i.e. when x falls to r-m If this was fully anticipated it will be priced into the debt ex ante. So when $x = r$-m, and the face value of debt equals the present discounted value of the capacity to pay, debt will stand at a 50% discount, i.e. $v = 0.5$. With arbitrage ensuring that there is no loss of value to the creditor at the time of restructuring, the implications of such a Convention for bond values are shown by the curve A_1A_2P. The ray OA_1A_2 gives the splitting rule; renegotiation takes place whenever $x = r - m$,

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[14]It is implausible that legal proceedings would involve constant recontracting as long as the debtor is insolvent (as in Bulow/Rogoff): this would be very costly.

and each time debt values jump as shown by the move from A_1 to A_2 as debt is written down in line with the rule[15]. Renegotiation clears the debt overhang, but the possibility of future write-downs keeps debt values on $A_l A_2$ P below OB.

In the case of the Paris Club, the debt being restructured is bilateral government-to-government lending. But with sovereign debt held by private commercial creditors, there are other factors in play. If, for example, the sovereign has waived immunity as a precondition for raising finance in international capital markets (Bulow and Rogoff op. cit. p. 174), there is a clear danger of a 'grab race'. As soon as default begins, i.e. before insolvency threatens, any individual bond-holder has an incentive not to rollover but to withdraw, Williamson (2000). In such a case bond values may fall much further, as shown by the curve JJ in the figure and discussed further in Miller and Zhang (2000).

The need to protect illiquid debtors from creditor flight suggests some modification of Schwarcz's proposal. In particular, there may be a need for an automatic stay and for enforced rollovers. This is an important issue in the context of private sector involvement in crisis prevention and resolution.

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[15]For convenience we have assumed that resulting write-down matches the percentage shown for the Paris Club. This is diagrammatically convenient, but not necessary: it is not clear that Paris Club uses a splitting rule.

VII. Conclusions

In the recent proposals to reform the architecture of the international monetary system a key role has been accorded to the private sector. Since private capital flows are simply too large to be matched or countered by international financial institutions, most of the proposals seek ways for the IMF to complement the private sector. The private sector has an important role in monitoring the policies of emerging market countries and private sector borrowers, and one of the mechanisms for doing so is through the provision of short-term debt. By refusing to roll-over debts the private sector can inflict punishment when the outcome is not regarded as satisfactory. While this can be a salutary indication to the country, by causing runs it can also be extremely damaging to the country as well as cause broader spill-over effects.

The latest proposal for reform, that by the Meltzer Commission, takes a very narrow view of the role of the IMF. It emphasizes the role of transparency and prudential regulation: and together with free entry for foreign banks and a measure of fiscal probity, these would serve as the criteria for a country to prequalify for emergency help from the IMF. But there would be no role for IMF lending subject to ex post conditionality. This proposal raises three types of concern. The first and most important is that the prequalification criteria could exclude a large number of emerging market countries, which may be beset with liquidity crises but would not be able to draw on the IMF's resources, a severe limitation of its LOLR function. Though the Commission notes that there could be exceptions if the stability of the global financial system were at stake because a large country in need of liquidity assistance had not pre-qualified, this is likely in practice significantly to increase uncertainty and confusion.

Second, crisis in a country which has not pre-qualified and is not deemed to be systematically important ex ante, could lead to serious risks of incidence of contagion or spill-over effects threatening the stability of the international monetary system as a whole. Third, lending to those countries that fail to qualify but are deemed to be systemically important without any policy conditionality is likely to generate substantial moral hazard. The analysis in this paper suggests that emerging market countries that failed to qualify would be seriously exposed to financial crisis. It thus confirms the view of the dissenting minority of the Commission who asserted that the provisions proposed by the majority would promote financial instability, rather than reducing it.

Our analysis of the situation facing emerging market countries that might not qualify for assistance under the Meltzer conditions suggests that the likelihood of crises could be reduced through incentive mechanisms including: (i) the application of "peer pressure" on the borrowing country to elicit adjustment effort (as manifested in the conditionality attached to Fund programs, for example), as an alternative to the "collateral damage" inflicted by sudden credit withdrawals; and (ii) arranging bail-ins of the private sector, both to help compensate the debtor for adjustment effort and to encourage monitoring by lenders. In addition, enhancing the "ownership" by the countries concerned of programs required as part of lending conditionality (e.g. programs which promise to enhance economic efficiency via

increased transparency, better bankruptcy law and corporate governance) may have beneficial incentive effects. These are mechanisms to which the IMF is already committed. There are, of course, limits to the extent that relevant effort can by monitored by outside agencies such as the IMF; monitoring by private lenders will continue to be essential.

Notwithstanding the Meltzer Report, extra liquidity is by no means the only solution to creditor panic: crisis management often involves keeping existing creditors in play, if necessary by a temporary suspension of convertibility. Bank holidays keep depositors bailed in for example, and automatic stays give companies a breathing space to restructure debt. Just like stock markets, credit markets seem to need some circuit breakers.

Hints of insolvency can lead to creditor panic but in adverse states of nature, debts need to be restructured This is the rationale for Chapter 11 bankruptcy procedures (with automatic stay and debtor-in-possession finance) at the national level. Our paper explores analogous procedures for sovereign debt, under the Paris Club as now, and under an international convention for restructuring sovereign debt proposed by Schwarcz. Is this too ambitious? As Rogoff (1999, p40) remarks:

"Over the longer term the benefits of global capital market integration will prove a powerful incentive for enhancing global and regional institutions. Then ideas like a global bankruptcy court or an integrated system of financial regulation may not seem so far fetched."

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