Renegotiation, Collective Action Clauses and Sovereign Debt Markets*

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Abstract

Collective action clauses (CACs) are provisions specifying that a supermajority of bondholders can change the terms of a bond. We study how CACs determine governments' fiscal incentives, sovereign bond prices and default probabilities in environments with and without contingent debt and IMF presence. We claim that CACs are likely to be an irrelevant dimension of debt contracts in current sovereign debt markets because of the variety of instruments utilized by sovereigns and the implicit IMF guarantee. Nonetheless, under a new international bankruptcy regime like that recently proposed by the IMF, CACs can increase significantly the cost of borrowing for sovereigns, contrary to what is suggested in previous empirical literature.

Keywords: Sovereign debt; Collective action clauses; Renegotiation; Moral hazard; International bankruptcy court.

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1 *Introduction*

Collective action clauses (CACs) are provisions in debt contracts specifying that the terms of the contract regarding principal, interest, and maturity can change if there is consent of a predetermined supermajority of bondholders. This paper studies how CACs determine governments' fiscal incentives, their cost of borrowing, and their default probabilities. Understanding these interactions is essential for the design of the so-called "Sovereign Debt Restructuring Mechanism" (SDRM) proposed by the IMF and currently under discussion.[1]

When governments raise funds in international capital markets to finance their fiscal deficits, it is difficult to observe or enforce the way in which these resources are spent. Whether those funds are employed in financing "unproductive" government expenditure –from corruption to overspending in political campaigns– or in financing "productive" expenditure –such as ports, roads, public health, cut of distortionary taxes or law enforcement– usually has an impact on the countries' future productivity and hence on their chances of being able to meet their obligations.

Furthermore, when governments find themselves with huge debt overhangs, they face the unavoidable trade-off of utilizing their poorer fiscal resources to either finance their greater expenditure needs or attend debt payments. In these cases, generating fiscal surpluses to meet debt obligations is not only a matter of feasibility but also one of incentives. This feature is key for CACs to matter.[2]

At that point, both bondholders and the country under consideration would potentially benefit from a debt renegotiation, either through a debt restructuring, partial forgiveness or both. The reason why is simple. Huge debt overhangs give governments few incentives to generate fiscal surpluses for repayment. Whether renegotiation will actually occur or,

[1] The discussion about policies regarding sovereign debt dates back at least to Adam Smith. See the evolution of these ideas in Rogoff and Zettelmeyer (2002).

[2] See Morris and Shin (2001) and Corsetti, Guimaraes and Roubini (2003) for an interesting catalytic finance approach alternative to our (ex-post) incentive imperfection. See Haldane, Penalver, Saporta and Shin (2003) for an asymmetric informational approach and Jeanne (2003) for a model where debt maturity works as a commitment device.

even if it did, whether the outcome of the renegotiation process will be the best possible ex-post outcome for bondholders is a matter of them acting cooperatively, for which they need to have aligned incentives. The best possible ex post outcome for bondholders is one where the value of the outstanding debt after renegotiation is maximized. This value depends on both the nominal amount of debt outstanding and the probability of repayment. Because governments' incentives to repay depend negatively on the size of their outstanding debt, bondholders face the trade-off of forgiving part of that debt and hence increasing the probability of repayment versus holding on to the old debt.

But bondholders' incentives to renegotiate might not be aligned if lenders are large in number, or if they have debt issued with different characteristics regarding CACs and legal jurisdictions.[3] The argument works as follows: if each bondholder posseses a very small fraction of the debt, he will have little incentive to forgive because he can only marginally affect the government's incentives to repay. Since the probability of getting paid is basically independent of an individual's actions, he would always find it incentive compatible to hold to the pre-existing debt rather than cooperate in the renegotiation process. In the same spirit, if the debt has been issued in different legal jurisdictions, the absence of an international bankruptcy court creates conflict among jurisdictions of creditors. In the end, this free riding problem introduces a very costly renegotiation process (even under CACs). CACs play an important role in that they reduce the cost of renegotiation by aligning bondholders' incentives in case of financial distress within a jurisdiction. For example, these clauses can specify a majority rule that binds (or induces) all bondholders to a friendly restructuring process, eliminating the free riding problem among creditors in a given country.[4,5] Furthermore, CACs together with Sovereign Debt Restructuring Mechanism (SDRM) would reduce the free riding problem even further by aligning creditors' incentives across jurisdictions.

We show that facilitating sovereign debt renegotiation, with CACs and a SDRM, is

[3]This is a characteristic of the 1990s that was not present in the 1980s, when syndications of banks held most of the international bonds.

[4]See Dixon and Wall (2000) and Sturzenegger (2002) for descriptions of commonly used CACs.

[5]Keltzer (2002) analyses an interesting dynamic model of constant renegotiation under different bond characteristics.

not always a good idea from the ex-ante perspective when debt payments are not state contingent.[6] At the moment of raising the resources to finance government expenditure, and when there is moral hazard in government's expenditures, a costly debt restructuring process can be used as a commitment device to not renegotiate in case of financial distress. While the absence of the CACs is ex-post inefficient for the parties, they can introduce powerful incentives for governments to behave fiscally. By reducing the government's payoff when financial distress occurs, debt issuance without CACs has the advantage of avoiding the government's fiscal misconduct.[7]

The sensitivity of the probability of crisis to government fiscal conduct determines whether such clauses, together with a SDRM, would benefit the issuing government. We show that committing to not renegotiate, by avoiding these type of clauses in the debt contracts, can be welfare enhancing when the chances of a crisis are sensitive to the government's fiscal conduct. If so, placing the debt under US law, generally without collective actions provisions, or in various jurisdictions induces good incentives for governments to avoid debt crisis altogether, since if default was to happen renegotiation would be very costly. On the other hand, we also show that debt contracts with CACs and a SDRM that facilitates the renegotiation dominate those without such clauses when the probability of financial crisis is mainly driven by exogenous reasons. In this case, collective action provisions, together with an international bankruptcy court, are recommendable because reducing the cost of renegotiation is not only optimal from the ex-post but also from the ex-ante perspective.

Matters are different when the world has the IMF without commitment to avoid intervention. We assume that this institution represents the interest of a group of countries affected by the performance of emerging economies via contagion, geopolitical or trade considerations. Then, governments' decisions to include or not include friendly restructuring clauses in bonds are influenced by IMF behavior, affecting the international allocation of capital and the countries' incentives to stay out of trouble. While in the absence of the IMF countries would be inclined to avoid CACs and to not have a SDRM as a commitment device

[6] When debt payments are state contingent including these clauses is never a good idea.

[7] This trade off is in the spirit of Bolton and Scharfstein (1996).

for moral hazard considerations, in its presence they would prefer it in order to force an IMF intervention and hence benefit from subsidized international borrowing.[8] In general, we show by propositions and examples that the IMF can have ambiguous implications regarding borrowing countries' welfare, bond prices, and default probabilities.

Our analysis sheds light on the discussion of the role of collective actions clauses together with a SDRM in affecting the trade off between ex-post restructuring cost and ex-ante moral hazard. Recent work by Eichengreen and Mody (2000) shows that yields on primary sovereign debt markets (initial auctions) are higher when bonds have CACs, especially for low rated borrowers.[9] Becker, Richards and Thaicharoen (2003) and Gugiatti and Richards (2003) argue that bond prices are not affected very much by the implicit (legal jurisdiction) or explicit inclusion of this type of clauses when looking at yields in secondary markets. Hence, they conjecture, either financial markets are not really aware of the role of those clauses, or the moral hazard problem that these clauses bring to international credit markets does not outweigh the ex-post inefficiencies (of no renegotiation) and switching to a SDRM would not increase borrowing costs.[10] We show that these empirical exercises suffer from some sort of Lucas critique. The reason is that bond yields are estimated under the current regime, characterized by no renegotiation due to a compositional effect and the presence of the IMF, but these yields would be different in a regime with a SDRM and CACs.

First, our analysis shows that the probability of a country falling into default is affected by the composition of total international borrowing, and not by the fact that it has issued few bonds with CACs. In this respect, three qualifications must be considered: i) the composition of debt with and without collective action provisions, ii) the number of legal jurisdictions where the debt was issued, and to a lesser extent, iii) the diversity of the debt

[8] Ghosal and Miller (2003) evaluate collective action clauses against a SDRM with an international bankruptcy court. They favor the latter given that this court is assumed to have verifiability, commitment and enforceability power (all of which are assumed away in our discussion). Eaton (2002) also assumes that an international bankruptcy court can distinguish why things went bad (verifiability).

[9] Eichengreen, Kletzer and Mody (2003) confirm these findings utilizing data on secondary debt markets.

[10] Similar arguments are presented in Haldane, Penalver, Saporta and Shin (2003) and Dixon and Wall (2000).

maturity structure (although we do not formally analyze this case). Quantitatively, these compositional effects are relevant. By 2002, 59% off all international borrowing occurred under US jurisdiction, 10% under German jurisdiction and 6% under Japanese law, all with no collective action provisions, while 24% resided in the UK, where the opposite is true.[11] The compositional effect is likely to be driving the result that borrowing costs are similar in both cases, given that most of the international debt is issued without collective action provisions (and no SDRM is in place). Once the country is in financial distress, holders of bonds with friendly restructuring provisions might not forgive because they posses a minority of the total outstanding debt and they can only marginally affect the probability of repayment. In particular, we argue that the compositional effect was present in the case of Argentina, and likely to have been present in other cases of default.

Second, the presence of the IMF also helps explain the negligible yield differential in bonds. Even if forgiveness was to occur under a specific composition of debt and in the absence of the IMF, which would generate a premium in bond yields, the premium is likely to disappear when lenders anticipate an IMF intervention. The country would then count on having enough resources to repay all bonds regardless of the debt composition in terms of the number of jurisdictions and collective action provisions, and hence yield differentials would vanish. Furthermore, the IMF intervention is more likely to occur when lenders do not forgive (either when there are no CACs or when there is no forgiveness by lenders because of the compositional effect).

Looking at these yield premiums in search of evidence of moral hazard in the presence of the IMF is not a good idea. To see this, consider the case in which all countries have all of their debt issue with one type of contractual arrangement in a unique jurisdiction, abstracting from our first consideration about the compositional effect. In this world, bonds with no collective action provisions would exhibit lower yields because bailouts will be more likely, and not because of better incentives. Contrary to common wisdom, bonds without CACs can induce serious moral hazard problems if the IMF cannot commit to avoid intervention. In

[11] See Geithner, Gianviti and Hausler (2002) for the composition of international borrowing. See Gianviti (2002) for differences in main national laws (English, US, German and Japanese laws).

such a world, crisis will be frequent for countries issuing debt without collective provisions, although prices would not reflect the risk since lenders will recoup their loans either from the country (in good times) or the IMF (in bad times).

Whether CACs can mitigate moral hazard depends on how much the international community cares about a particular country. We characterized three main cases: the IMF can have a low, an intermediate or a high level of interest in the destiny of the country. In the first case, the IMF would not intervene regardless of the actions of the government. Then there is no point of forcing countries to include CACs and the free contractual approach is actually constrained optimal. In fact, forcing the inclusion of friendly restructuring provisions can increase the probability of default for usual moral hazard considerations. In the intermediate case, the IMF has enough interest in the country to launch a bailout, although investors would forgive or renegotiate under collective actions and a SDRM. By forcing countries to include these provisions, the IMF would benefit to the detriment of the borrower's welfare, given that investors would price the default risk. An interesting theoretical possibility arises in this case: "CACs might induce better incentives," contrary to what is suggested in policy discussions. There exists a range in the parameter space where the IMF would launch a full bailout under no collective actions but would not intervene under CACs. Since debt forgiveness is never as big as a full bailout, countries would exert more effort under CACs. Finally, in the case where the IMF has a high level of interest in the country, the IMF will implement full bailouts. This follows from a result stating that when the country is financially distressed there is always some debt forgiveness, either from the IMF or from lenders, but never from all. Consequently, again we obtain that there will be no difference between yields across bonds, although crises (bailouts) will be frequent if the moral hazard problem is important.

2 The Model

We describe the model with the help of Figure 1. This is a two period world. The world begins with a country issuing an amount D of debt in period one. The resources raised are

allocated into two types of government expenditures: "productive" (G_1) and "unproductive" (G_2).[12] Unproductive government expenditure gives the country's government a total utility of kG_2, with $k > 0$. The interest rate is zero, without loss of generality. In the second period the first source of uncertainty is realized. It is known whether the country enters a situation where it needs a financial restructuring, or if it simply does well. When the country performs well it reaches an output level Y_h and pays an amount D_h. At that stage, the government's payoff becomes $Y_h - D_h + kG_2$, which occurs with probability $\theta(G_1)$. We assume that $\theta' \geq 0$, $\lim_{x \longrightarrow 0} \theta'(x) = \infty$, $\theta'(D) = 0$ and $\theta'' < 0$. Thus the role of the productive government expenditure is to increase the probability of the country avoiding the conflict with bond holders and producing a high level of output.

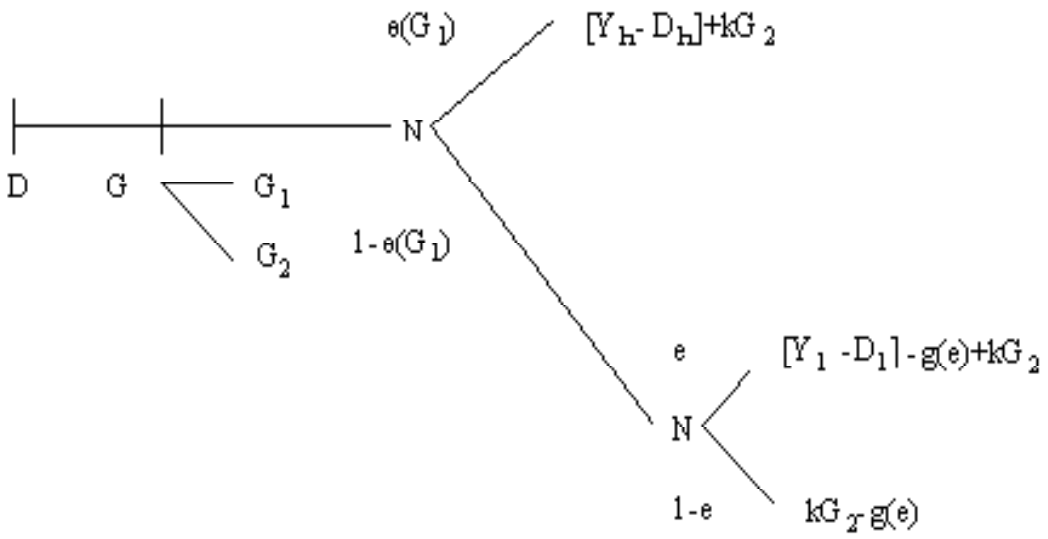

Figure 1:

With probability $1 - \theta(G_1)$ the country falls into a state of financial distress in which chances of meeting debt obligations are at risk. At this stage, the government decides how much fiscal effort e to exert. Higher fiscal effort increases the probability of reaching the second state of the world, where the country produces Y_l. We assume that $Y_h > Y_l > 0$. The fiscal effort is assumed to be increasingly costly to capture the idea that raising additional

[12] This resembles the investement-consumption decision in Atkeson (1991).

resources when the country is financially distressed is more expensive than in good times. In particular, we assume that the fiscal effort cost function is $g(e)$ with $g' > 0$, $g'' > 0$, and $\lim_{e \longrightarrow \infty} g'(e) = \infty$. Also, this cost is paid in advance before the realization of the uncertainty. Thus the government's payoff at the second stage is $Y_l - D_l - g(e) + kG_2$, assumed to occur with probability e. With probability $1 - e$ the country is unable to produce and hence repay any debt. Then, the government's payoff simply becomes $kG_2 - g(e)$.

The three states of the world are observable for the parties. For this reason, an aggregate debt contract is a triple $\{D, D_h, D_l\}$ because we only need to specify debt payments in those states where there is some output to be shared by the parties. We say this is the "aggregate" debt contract because in Section 4 we study the role of the composition of sovereign debt. Finally, our economy is supposed to face a mass of infinitesimal risk neutral competitive international lenders.

For simplicity we also assume:

Assumption 1: $g(e) = \frac{1}{1+\chi} e^{1+\chi} Y_l$, with $\chi > 0$.

Where Y_l is used for normalization purposes. More importantly, we also assume

Assumption 2: G_1, G_2, and e are unobservable to lenders.

For future reference, we use the following definition

Definition 1 *A debt contract dominates another one when it derives higher or equal government utility on the parameter set while it derives strictly greater utility for some non-empty parameter subset.*

Now we concentrate on solving allocations under different environments.

3 State contingent debt payments and no CACs

Because of Assumption 2, financial contracts cannot depend on G_1, G_2, or e. As we know, these variables affect the probability of debt repayment. This imperfection introduces a moral hazard problem when G_1 and G_2 are chosen in the first period and when the fiscal effort e is decided in the second period. Allocations in this economy come from solving the following government's problem:

Problem I

$$\max_{D_h,D_l,G_1,G_2,e} EU = \theta(G_1)[Y_h - D_h] + [1-\theta(G_1)]\left[e(Y_l - D_l) - \frac{e^{1+\chi}}{1+\chi}Y_l\right] + kG_2 \quad (1)$$

subject to

$$\begin{aligned} \theta(G_1) D_h + [1-\theta(G_1)] eD_l &\geq D & (2)\\ G_1 + G_2 &= D & (3)\\ (Y_l - D_l) &= e^{\chi} Y_l & (4)\\ \theta'(G_1)\left[Y_h - D_h - e(Y_l - D_l) + \frac{e^{1+\chi}}{1+\chi}Y_l\right] &= k & (5) \end{aligned}$$

Equation (2) is the lenders' participation constraint. Lenders' expected profits should be at least zero. Equation (3) is the government's resource constraint. Equation (4) is the incentive compatibility constraint for the government in period two, when conflict arises. This constraint holds with equality because D_l is less than or equal to Y_l. At that stage, the debt contract is irreversible and all variables except the level of fiscal effort are given. The optimal allocation for **Problem I** is subject to the constraint that the fiscal effort choice is driven by incentives because of Assumption 2. Equation (5) is the incentive compatibility constraint for the government in the first period, when it chooses to allocate its resources between productive and unproductive uses. Again, the incentive compatibility constraint is imposed because the government cannot commit in advance to a pre-specified government expenditure plan.

From Equation (4) we get that fiscal effort is

$$e = \left[\frac{(Y_l - D_l)}{Y_l}\right]^{1/\chi} \quad (6)$$

where effort $e \in [0,1]$. The chances of the government of being able to pay back at least part of the debt are driven by D_l itself. In the case of no debt, the fiscal effort exerted is $e = 1$ and the country never reaches the no-output state. A huge debt overhang goes against the fiscal incentives to meet debt payments as effort decreases with D_l. This point turns out to be very important in our story. In particular, if $Y_l = D_l$, then $e = 0$.

Replacing the effort level in our problem, letting $G_2 = D - G_1$, and elimiting a constant our problem simplifies to:

Problem I

$$\max_{D_h, D_l, G_1} EU = \theta(G_1)[Y_h - D_h] + [1 - \theta(G_1)] \frac{\chi (Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} - kG_1 \tag{7}$$

subject to

$$\theta(G_1) D_h + [1 - \theta(G_1)] \frac{(Y_l - D_l)^{1/\chi} D_l}{Y_l^{1/\chi}} \geq D \tag{8}$$

$$\theta'(G_1) \left[Y_h - D_h - \frac{\chi (Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} \right] = k \tag{9}$$

A closed form solution for this problem does not exist.

Problem I implicitly assumes that the contract cannot be revised or renegotiated in the second period. This is assumed to be the case when bonds do not include CACs.[13] When they do, bondholders can potentially reach a restructuring agreement that would benefit both sides, creditors and the debtor country.

4 Renegotiation

To see how this works, imagine that the government has reached a state of conflict with lenders in the second period. For generality, also assume that at this stage part of the debt is symmetrically distributed in n legal jurisdictions that implicitly or explicitly include collective action provisions in bonds, while the rest of this debt is issued with no special provisions. Jurisdictions can enforce the outcome of the renegotiation process to all bondholders in their own countries, but they are unable to do so in other jurisdictions. Furthermore, assume all jurisdictions renegotiate at the same time.

Do lenders have incentive to renegotiate in this case? The answer depends on the composition of the debt. Lenders might be better off by relieving part of the debt overhang to this

[13] De Brun and Della Mea (2003) show that the free rider problem in renegotiations without CACs is overestimated, as in the recent case of Uruguay 2003. Nonetheless, our results are relevant as long as CACs can make the renegotiation process easier to implement.

country and thus inducing the government to increase its probability of repayment when a large enough mass of bonds is renegotiated.

When renegotiation is allowed, the debt after renegotiation would be the one that maximizes the value of the debt for each jurisdiction given the actions of the rest of the jurisdictions. Lenders within jurisdiction i are assume to behave as one big lender who solves the following problem

$$\max_{D_{li}^C, e} V = eD_{li}^C \tag{10}$$

subject to

$$Y_l - D_{li}^C - D_{l-i}^C - D_l^{NC} = e^{\chi} Y_l \tag{11}$$

$$D_{li}^C \leq D_l^C/n \tag{12}$$

where D_{li}^C denotes the payment to jurisdiction i after the renegotiation, D_{l-i}^C are the payments to the rest of the jurisdictions with collective action provisions, D_l^{NC} are the payments to bondholders without friendly restructuring clauses, and D_l^C are the total payments promised to all jurisdictions with CACs on issuance. Superscript C and NC stand for collective and no collective action clauses. Equations (11) and (12) are the government's incentive compatibility constraint and participation constraint, respectively. Combining the first order condition for all jurisdictions gives the following solutions for debt per jurisdictions, total debt, and effort:

$$D_{li}^C = \frac{\chi}{1+n\chi}\left(Y_l - D_l^{NC}\right) \tag{13}$$

$$\sum_i D_{li}^C + D_l^{NC} = \frac{n\chi Y_l + D_l^{NC}}{1+n\chi} \tag{14}$$

$$e = \left[\frac{\left(Y_l - D_l^{NC}\right)}{(1+n\chi)Y_l}\right]^{1/\chi} \tag{15}$$

As long as an interior solution exists (Equation (12) is not binding), there will be renegotiation. Notice that the total amount of renegotiated debt by jurisdiction decreases with the number of jurisdictions and the amount of debt issued without collective action provisions. This implies that as the free riding problem worsens, each jurisdiction will tend to forgive

more. Nonetheless, Equation (14) shows that the total debt after renegotiation increases in n and D_l^{NC}. Also, Equation (15) demonstrates that total forgiveness and effort decrease with the number of jurisdictions and the amount of debt issued without collective clauses. Hence, the conditional probability of default given that the country is in financial distress increases with these two compositional effect.

But no renegotiation will take place if Equation (12) binds. Indeed, this is the case when $\sum_i D_{li}^C > D_l^C$, or

$$n \geq \frac{D_l^C}{\chi\left(Y_l - D_l^C - D_l^{NC}\right)} \tag{16}$$

This expression shows that compositional effects in sovereign debt are important as a commitment device to not renegotiate. Renegotiation is more unlikely to occur as the composition of debt without CACs increases (D_l^C falls) and as the number of jurisdictions increases. This compositional effect is consistent with empirical findings by Eichengreen and Mody (2000) where bond prices with collective action provisions are only slightly higher than those without such clauses, and further evidence by Becker, Richards and Thaicharoen (2001), and Gugiatti and Richards (2003) where bond prices are not really different whether they include or do not include collective action provisions. It is likely that because of the compositional effect we just described, bond prices would not differ given that there is no preferential treatment to any bondholder. Conjecturing from this result that the benefits of not having collective action provisions to avoid moral hazard problems are not that great (as proposed in the empirical discussion) is simply wrong under this environment. Furthermore, this evidence cannot be used to support the idea of a massive inclusion of these clauses in bond contracts together with an international bankruptcy court.

The main problem is that conjectures are drawn from observed bond prices under the current regime, where the free riding problem across bondholders is important enough that, even under CACs, no forgiveness would take place. Collective action provisions would not be used in the renegotiation process, as was the case in the Pakistan default and likely to be the case of Argentina 2001, yet unresolved. But matters might eventually be different if countries are forced to gradually swap their debt to include restructuring provisions, and if an international bankruptcy court (SDRM) is born. Then the moral hazard problem might

become important, and sovereigns might face higher borrowing rates. In other words, the conjectures drawn from current bond prices suffer from some sort of the Lucas critique, in the sense that bond prices will be different if a SDRM together with CACs are put in place.

In order to analyze the implications of a SDRM, we focus on two main cases: one where all bonds include CACs and there is no issue about jurisdictions (due to the presence of a SDRM) and one where none does. In the first case, we assume bondholders cooperate in the renegotiation process and act as one big lender. In the second case, the opposite is true and free riding makes renegotiation impossible.

For future reference, we define the allocations as outcomes of the renegotiation process when all bonds have CACs ($D_l^{NC} = 0$) and the number of jurisdictions does not affect the renegotiation outcome ($n = 1$), as

$$D_l^* = \frac{\chi}{1+\chi} Y_l \tag{17}$$

$$e^* = \frac{1}{(1+\chi)^{1/\chi}} \tag{18}$$

as long as $D_l^* < D_l$.

Overall, our analysis suggests that optimal allocations under CACs must be different than those coming from solving **Problem I** due to the renegotiation. For this reason we now turn to study those allocations.

5 State contingent debt payments, CACs and a SDRM

Lenders must take into account the fact that, if the country reaches the state of conflict, renegotiation will occur as long as $D_l^* < D_l$. Moreover, those incentives to forgive an important fraction of the debt are determined by χ, a parameter that determines the sensitivity of the government to exert fiscal effort in troubled times. Equation (17) shows that D_l^* decreases with this parameter and it goes to zero when $\chi \longrightarrow 0$, illustrating that incentives to renegotiate can be powerful.

In the presence of CACs, renegotiation is a possible outcome of the contract. Thus, our problem now becomes:

Problem II

$$\max_{D_h,D_l,G_1} EU = \theta(G_1)[Y_h - D_h] + [1-\theta(G_1)]\frac{\chi(Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi)Y_l^{1/\chi}} - kG_1 \tag{19}$$

subject to

$$\theta(G_1) D_h + [1-\theta(G_1)]\frac{(Y_l - D_l)^{1/\chi} D_l}{Y_l^{1/\chi}} \geq D \tag{20}$$

$$\theta'(G_1)\left[Y_h - D_h - \frac{\chi(Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi)Y_l^{1/\chi}}\right] = k \tag{21}$$

$$D_l \leq D_l^* \tag{22}$$

where D_l^* is given by the renegotiation problem presented above (Equation (17)).

Proposition 2 *With state contingent debt payments, debt contracts without CACs dominate those with CACs.*

Proof. Problem II differs from **Problem I** in that it allows for debt renegotiation. Both problems maximize the same objective function, while the feasible set of Problem II is strictly included in the feasible set of **Problem I** due to Equation (22). ■

Again, with collective action provisions it is not credible to set $D_l > D_l^*$ since it is known that in case of financial distress the debt will be renegotiated. Hence the lack of commitment to not renegotiate adds a constraint to our optimization problem with state contingent debt.

6 Uncontingent debt payments and no CACs

In this case, creditors' rights are assumed to be the same in all states, although default is possible. Furthermore, governments pay what is owed as long as they have enough resources. Otherwise they pay what they have. Then, equilibrium allocations solve the following problem:

Problem III

$$\max_{D_h,D_l,G_1} EU = \theta(G_1)[Y_h - D_h] + [1-\theta(G_1)]\frac{\chi(Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi)Y_l^{1/\chi}} - kG_1 \tag{23}$$

subject to

$$\theta(G_1) D_h + [1 - \theta(G_1)] \frac{(Y_l - D_l)^{1/\chi} D_l}{Y_l^{1/\chi}} \geq D \quad (24)$$

$$\theta'(G_1) \left[Y_h - D_h - \frac{\chi (Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} \right] = k \quad (25)$$

$$\min\{D_h, Y_l\} = D_l \quad (26)$$

where Equation (26) imposes the constraint that debt is not state contingent. This gives the following result:

Proposition 3 *Without CACs, debt contracts with state contingent payments dominate contracts without state contingent payments.*

Proof. The argument here is similar to the proof of Proposition 2. Optimal allocations in **Problem I** derive at least the utility derived by allocations in **Problem III**. ■

Finally, we study our last environment without the IMF.

7 Uncontingent debt payments, CACs and a SDRM

Again, payments are uncontingent in this case, subject to the feasibility constraint. Optimality in this case requires solving the following problem:

Problem IV

$$\max_{D_h, D_l, G_1} EU = \theta(G_1) [Y_h - D_h] + [1 - \theta(G_1)] \frac{\chi (Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} - kG_1 \quad (27)$$

subject to

$$\theta(G_1) D_h + [1 - \theta(G_1)] \frac{(Y_l - D_l)^{1/\chi} D_l}{Y_l^{1/\chi}} \geq D \quad (28)$$

$$\theta'(G_1) \left[Y_h - D_h - \frac{\chi (Y_l - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} \right] = k \quad (29)$$

$$\min\{D_h, D_l^*\} = D_l \quad (30)$$

Because CACs impose an additional constraint due to the fact that $D_l^* < Y_l$ from Equation (17), two statements result:

Proposition 4 *With CACs, state contingent debt contracts dominate uncontingent ones.*

Proof. The feasible set of **Problem IV** is included in the feasible set of **Problem II**. If $D_l = D_l^*$ in **Problem II**, then state contingent debt contracts derive the same utility as uncontingent ones. ■

Proposition 5 *With uncontingent debt payments, there exist economies where debt contracts with no CACs dominate those with such clauses and vice versa.*

Proof. Because the intuition behind the proofs is important for our discussion, we develop the proof to this proposition here.

We prove our proposition by example. For this, we make some simplifying assumptions. The first is

$$\theta(G_1) = \begin{cases} \bar{\theta} & G_1 > \overline{G_1} \\ \underline{\theta} & otherwise \end{cases} \tag{31}$$

When the productive government expenditure is large enough, the country reaches a higher probability of success ($\bar{\theta} > \underline{\theta}$). Notice that the distance $\left|\bar{\theta} - \underline{\theta}\right|$ suggests a higher sensitivity of final outcomes to the government expenditure G_1 and it makes incentive issues more relevant in our discussion.

Another assumption is that $Y_l < D$. Hence, as we noted from the international investors' participation constraint (Equation (28)), $D_h > Y_l$.

Now assume that the debt contract does not include CACs. Because there is no renegotiation in this case, the equilibrium level of fiscal effort exerted by the country in case of financial distress is simply $e^* = 0$, given that $D_h > Y_l$. Countries will have no incentive to exert fiscal effort because everything produced would go to meet debt payments. As a result, the country would not exert any level of effort to repay. From Equation (28), we see that D_h satisfies $\bar{\theta} D_h = D$.

Our incentive constraint to support a high level of productive government expenditure, under our assumption about $\theta(G_1)$, is then

$$\left(\bar{\theta} - \underline{\theta}\right)(Y_h - D_h) \geq k\overline{G_1} \tag{32}$$

which we assume holds.

Hence, the expected payoff for a country issuing debt without CACs is

$$EU = \bar{\theta} Y_h - D - k\overline{G_1} \tag{33}$$

Under CACs, countries and debt holders will renegotiate if the country reaches the state of financial distress. Then, debt payments are given by D_l^*. That problem with collective actions clauses is otherwise equal to the previous one. But it is useful to inspect the incentive compatibility constraint for this case.

Because renegotiation is possible, the state of the world where the country faces financial distress is not that bad, and hence distorts the country's incentives to allocate the funds in productive expenditure. The incentive compatibility constraint for a high level of G_1 is

$$\left(\bar{\theta} - \underline{\theta}\right) \left[Y_h - D_h - \frac{\chi Y_l}{(1+\chi)^{\frac{1+2\chi}{\chi}}} \right] > k\overline{G_1} \tag{34}$$

but we assume that $\frac{\chi Y_l}{(1+\chi)^{\frac{1+2\chi}{\chi}}}$ is big enough to overturn Condition (32). Consequently, the incentive compatibility constraint for $\bar{\theta}$ does not hold and $\theta = \underline{\theta}$. Furthermore, $G_1 = 0$. Since $D_l = D_l^*$ the investors' participation constraint becomes

$$\underline{\theta} D_h + (1 - \underline{\theta}) \frac{\left(Y_l - D_l^*\right)^{1/\chi} D_l^*}{Y_l^{1/\chi}} \geq D \tag{35}$$

Using Expression (17) and plugging this constraint into the objective function, we obtain the country's expected payoff under collective actions clauses

$$EU^C = \underline{\theta} Y_h - D - (1 - \underline{\theta}) \frac{\chi(2+\chi)}{(1+\chi)^{\frac{1+2\chi}{\chi}}} Y_l \tag{36}$$

Now see that contracts without CACs dominate those with them whenever $EU > EU^C$, or equivalently

$$(1 - \underline{\theta}) \frac{\chi(2+\chi)}{(1+\chi)^{\frac{1+2\chi}{\chi}}} Y_l < \left(\bar{\theta} - \underline{\theta}\right) Y_h - k\overline{G_1} \tag{37}$$

Intuitively, the result depends on the sensitivity of the probability θ to productive government expenditure. If this probability is unaffected by G_1, then the optimal contract should include CACs and renegotiation takes place. Note that when $\left|\bar{\theta} - \underline{\theta}\right| \longrightarrow 0$ our condition will not hold, making debt contracts with CACs optimal. Why? Reducing the cost of the contract ex-post (making renegotiation easy to implement) is optimal ex-ante.

Matters are different when this sensitivity is strong. Making the state of distress very bad (although ex-post inefficient) will provide greater incentives for countries to stay out of trouble and induce fiscal behavior. This is the case when, other things equal, $\left|\bar{\theta} - \underline{\theta}\right|$ is big enough.[14] ■

Figure 2 summarizes our results regarding the welfare implications of the different contractual arrangements (where $>$ implies dominance according to Definition 1).

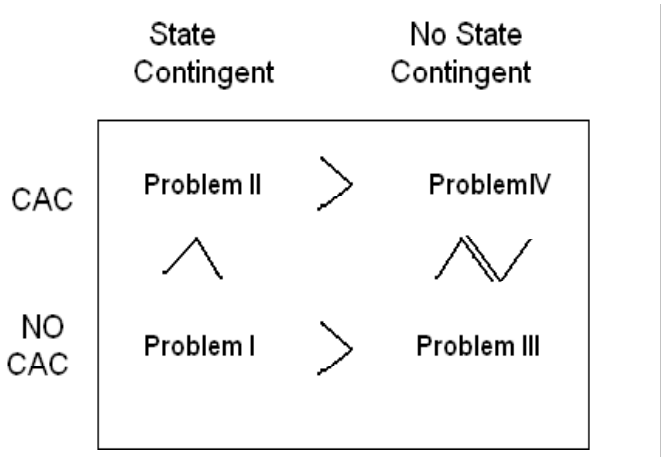

Figure 2: Welfare under different debt contracts

Two main messages follow from this figure. First, CACs and the SDRM can only improve welfare in a world without state contingent contracts. This implies that maybe more attention should be focused on how to implement state contingent contracts rather than on the SDRM. Indeed, GDP growth indexed bonds have been proposed before. Second, our result implies that in an environment without the IMF, countries should be allowed to choose the type of debt contract that best fits their needs. In this sense, a SDRM together with collective action provisions is welfare detrimental for those economies where incentive issues regarding fiscal conduct are central (G_1 tends to be low relative to G_2).

Furthermore, note that in a world with state contingent bonds, CACs would not be utilized since they would reduce welfare.

We can also learn from the example provided in the previous proof what is the impact of collective actions on the price of the debt. In the absence of collective actions, or even with

[14] We work under the assumption that $\underline{\theta} > 0$. Otherwise loans D could not be supported in equilibrium.

collective actions and enough free riding among lenders (as shown in Section 4), we know that $\overline{\theta} D_h^{NC} = D$ because no fiscal effort is exerted by a country that falls into financial distress. With CACs, the debt promise (D_h) is computed from Equation (35). Rearranging this expression, together with the government's incentive compatibility constraint and assuming that Condition (34) does not hold, we obtain

$$\underline{\theta} D_h^C + (1 - \underline{\theta})\, e^* D_l^* = D \tag{38}$$

where D_h^C is the uncontingent debt promise. For the same amount of loans D, CACs will reduce the cost of the debt whenever $D_h^C < D_h^{NC}$ and vice versa. We now focus on this condition. Debt without CACs is cheaper when

$$D_h^C = \frac{D - (1 - \underline{\theta})\, e^* D_l^*}{\underline{\theta}} > \frac{D}{\overline{\theta}} = D_h^{NC} \tag{39}$$

Equivalently

$$\overline{\theta}\,(1 - \underline{\theta})\, e^* D_l^* < D(\overline{\theta} - \underline{\theta}) \tag{40}$$

Note that because $e^* D_l^* < D_h^C$ and from Equation (38) we obtain that $e^* D_l^* < D$ and hence $\overline{\theta}\,(1 - \underline{\theta})\, e^* D_l^* < D$. Consequently, a higher sensitivity of the probability of good times (a higher $\left|\bar{\theta} - \underline{\theta}\right|$) makes debt without CACs cheaper in the sense of lower payments D_h^C. In our example, the economies for which condition (40) holds are characterized by

$$\overline{\theta}\,(1 - \underline{\theta})\, \frac{\chi Y_l}{(1 + \chi)^{\frac{1+\chi}{\chi}}} < D(\overline{\theta} - \underline{\theta}). \tag{41}$$

On the contrary, when the sensitivity of the probability of a good outcome with respect to the government's action is low ($\left|\bar{\theta} - \underline{\theta}\right| \longrightarrow 0$), condition (40) is overturned and debt contracts with CACs are cheaper. Renegotiation reduces the cost of the contract ex-post without altering incentives ex-ante. Interestingly, the price of the debt being lower for contracts without CACs does not imply that the country will choose to utilize them because of Condition (37). As an example, if the opportunity cost of unproductive government expenditure is too big (k), then the government might prefer to not include CACs, even though they would be effective in imposing fiscal discipline.

Our next step is to study the role played by the IMF in affecting the government's expenditure decisions. Understanding the IMF's role in international financial markets turns out to be essential for our discussion, because it distorts the international allocation of capital by changing equilibrium prices.

8 The role of the IMF

In the former sections we analyze an environment in the absence of the International Monetary Fund (IMF). In these sections we extend the analysis to study the role of the IMF in international financial markets because, as it turns out, it is a key player in the Sovereign Debt Restructuring analysis.[15] While previous studies such as Miller and Zhang (2000) have discussed the role of the IMF in the Sovereign Debt Restructuring analysis, ours departs from that literature in that we choose to model the IMF as a strategic player making decisions to maximize its own payoffs, rather than having the IMF committed to a pre-determined strategy.

We let the IMF be an institution responsible for representing a club of countries in taking actions, such as bailing out countries, in reaction to international financial crisis. In essence, we assume that when a country defaults on its debt, it generates externalities to other countries in the world, in one way or another. Financial contagion is one example of these externalities, but there are other reasons why member countries might have interests in the destiny of a particular country. Geopolitical reasons, or economic reasons such as having a trading partner's economy under-performing might call for IMF intervention. We model these reasons as a cost J that the international community incurs when an emerging country reaches the state of default (the no-output-state in our story). The IMF has the power to grant subsidized loans to countries in financial distress. In our model, the size of the subsidy or bailout is S, and the purpose is to reduce the debt overhang and introduce incentives for countries to avoid a state of default and financial contagion. We describe the sequence of

[15] In previous studies, the IMF has been modeled as an auditor, an enforcer, or a fund. See Powell (2002). In this paper, the IMF plays the role of a fund because it can provide money in case of financial distress.

the model with the help of Figure 3.

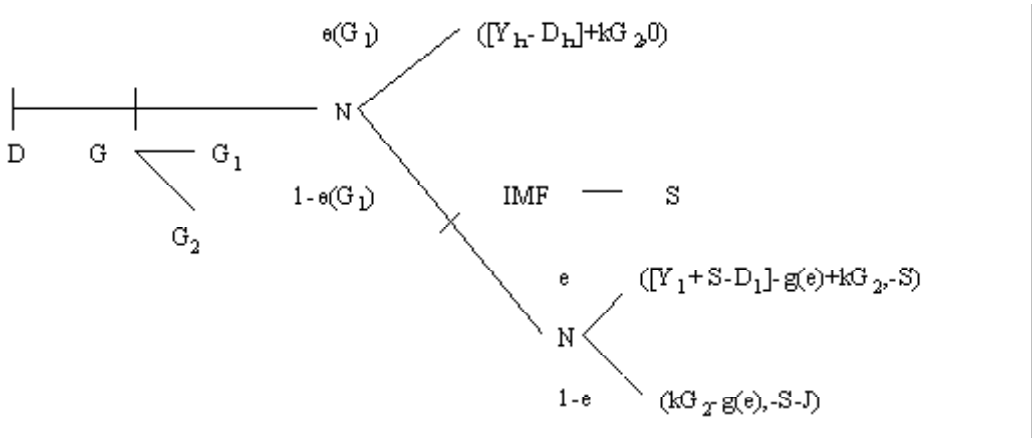

Figure 3

When the first uncertainty is resolved with a bad shock, the IMF has the possibility of bailing out part or all of the outstanding debt. A bailout will affect the country's payoffs and hence its incentives to exert fiscal effort. In our simple story, we model the bailout as a gift from the IMF to the country and international investors. While IMF loans are subsidized, these loans are rarely defaulted on. Nonetheless, this assumption captures two important ideas: 1) IMF interventions are subsidies to the recipient country, and 2) IMF re-financing removes the problem from the current government, which we assume only cares about the near future. For both reasons, we model the IMF bailouts as gifts without loss of generality.[16]

For practical purposes, we study the role of the IMF in the environment where international debt obligations are not state contingent.[17] That is, the financial contracts pre-specify an amount that is promised to be delivered in all states of the world. Despite the fact that promises are uncontingent, debt payments might be subject to renegotiation or default.

We first study the case where debt contracts do not include CACs in order to then move to the alternative with CACs.

[16] An alternative way of modeling this is by lettting the IMF recover part of the bailout in the future regardless of the state of the world the country falls in. This alternative of reducing the cost of the bailout for the IMF is equivalent to an increase in J, working in favor of more frequent IMF's interventions.

[17] We also rule out the possibility that the IMF could reward countries that reach the high output state.

8.1 Uncontingent debt payments and no CACs

The game is solved using backward induction. Once the first shock is realized as bad, the IMF decides the size of the bailout, knowing that there will be no renegotiation between bondholders and the government because there is enough free riding among creditors. At this point, the IMF is aware of the incentive effects it generates with its bailout, as well as the fact that its actions change the probability of default and financial contagion (no output state). For that reason, the IMF solves the following problem:

$$\max_{S^*, e^*_{IMF}} U^{IMF} = -S^* - (1 - e^*_{IMF})\, J \tag{42}$$

subject to

$$\begin{aligned} Y_l + S^* - D_l &= e^{*\chi}_{IMF} Y_l && (43)\\ D_l &= \min\{D_h, Y_l + S^*\} && (44)\\ 0 &\leq S^* \leq D_h && (45) \end{aligned}$$

where Equation (43) is the government's incentive compatibility. Condition (44) states that the debt is uncontingent. Note that the total amount of resources available in the second state is now $Y_l + S^*$. Condition (45) implies that bailouts never exceed D_h, or equivalently that $e \leq 1$. The solution for the IMF's problem is

$$\begin{aligned} S^{int} &= -Y_l + D_l + \left[\left(\frac{J}{\chi}\right)^{\chi} 1/Y_l\right]^{1/(\chi-1)} && (46)\\ e^{int} &= \left(\frac{J}{\chi Y_l}\right)^{1/(\chi-1)} && (47) \end{aligned}$$

as long as an interior solution to the problem exists. This is the case when $\chi > 1$ and $0 \leq S^{int} \leq D_h$. When $S^{int} < 0$, the optimal solution for the IMF bailout is $S^* = 0$, which implies a fiscal effort exertion of $e^* = \left(\frac{Y_l - D_l}{Y_l}\right)^{1/\chi}$. Thus, when the debt overhang is not big enough or the externality of default on the international community is not big enough, we find that the IMF best response is to stay out. Equivalently, when $S^{int} > D_h$ the IMF will implement a full bailout and drive the effort to $e^* = 1$.

In the case of $\chi < 1$, there is always a corner solution with full or no bailout depending on the IMF's payoffs.[18] There is full bailout when the following inequality holds and vice versa

$$U^{IMF}(S = D_l) = -D > -\left[1 - \left(\frac{Y_l - \min\{Y_l, D_h\}}{Y_l}\right)^{1/\chi}\right] J = U^{IMF}(S = 0)$$

Note that when there is full bailout, $D_l = D_h$, and because $e = 1$, $D_h = D$. This result shows that, when a full bailout is anticipated, no risk premium will be added to bonds (without CACs). When there is no bailout, the fiscal effort exerted is less than one and hence $D_h > D$. In this way, the full bailout condition becomes

$$\left[1 - \left(\frac{Y_l - D_h}{Y_l}\right)^{1/\chi}\right] J > D \qquad \text{for } Y_l \geq D_h, \text{ or} \tag{48}$$

$$J > D \qquad \text{otherwise.} \tag{49}$$

A full bailout arises if its cost (D) is smaller than the expected benefits ($(1-e).J$), or in other words, if the IMF cares enough about the destiny of the country (J is big enough).

In short, independently of the parameter χ being greater or less than one, we get that the IMF's best responses (possible bailout solutions) are

$$S^* \in \left\{0, -Y_l + D_l + \left[\left(\frac{J}{\chi}\right)^{\chi} 1/Y_l\right]^{1/(\chi-1)}, D_h\right\} \tag{50}$$

depending on the case described by the above conditions.

Having solved for the IMF response, we can continue solving the country's government problem.

Problem V

$$\max_{D_h, D_l, G_1} EU = \theta(G_1)[Y_h - D_h] + [1 - \theta(G_1)] \frac{\chi (Y_l + S^* - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} - kG_1 \tag{51}$$

subject to

$$\theta(G_1) D_h + [1 - \theta(G_1)] \left[S^* + \frac{(Y_l + S^* - D_l)^{1/\chi} (D_l - S^*)}{Y_l^{1/\chi}}\right] \geq D \tag{52}$$

[18] The second order condition shows that the interior solution is a minimum.

$$\theta'(G_1)\left[Y_h - D_h - \frac{\chi\left(Y_l + S^* - D_l\right)^{\frac{1+\chi}{\chi}}}{(1+\chi)Y_l^{1/\chi}}\right] = k \tag{53}$$

$$D_l = \min\{D_h, Y_l + S^*\} \tag{54}$$

and given that the bailout is optimally chosen by the IMF

$$S^* \in \left\{0, -Y_l + D_l + \left[\left(\frac{J}{\chi}\right)^{\chi} 1/Y_l\right]^{1/(\chi-1)}, D_h\right\}, \tag{55}$$

Thus, in case of financial distress, lenders receive at least S^* no matter what the outcome at this stage. When the bailout is not full, lenders will get an additional $D_h - S^*$ when the government manages to pull the country out of default and meet debt payments. This event happens with conditional probability $e = \left(\frac{Y_l + S^* - D_l}{Y_l}\right)^{1/\chi}$. Several observations follow from this problem.

First, note that the incentive compatibility constraint for G_1 implies that, for the same debt contract (D, D_h, D_h), the productive government expenditure falls with the size of the bailout. In that sense, episodes of financial distress are more frequent if the IMF intervenes. Also notice that **Problem V** nests **Problem III** when there is no intervention ($S^* = 0$). This occurs when the size of the externalities on the international community J is small enough ($\chi < 1$ and Condition (48) does not hold or $\chi > 1$ and $e^{int} < \left(\frac{Y_l - D_l}{Y_l}\right)^{1/\chi}$).

We obtain that whenever the IMF intervenes ($S^* > 0$), then $D_l = D_h$, even if bailouts are partial. We see this with the help of Figure 4, where we plot both functions $D_l = D_h$ and $D_l = Y_l + S^*$ on the vertical axis and the size of the IMF intervention on the horizontal axis, assuming $D_h > Y_l$. The function $D_l = \min\{D_h, Y_l + S^*\}$ passes through points A, B and C. For any level of intervention corresponding to the segment $\overline{AB}$, the IMF is bailing out lenders without affecting the probability of default (as it is shown in Equation (43)). Hence, if intervention does occur in equilibrium, it will happen in the remaining section of the min function where $D_l = D_h$.[19] Moreover, bailouts never exceed the promised D_h since at $S^* = D_h$ the fiscal effort is at its maximum ($e = 1$). On the other hand, note that if

[19] Interventions in the segment $\overline{ABC}$ imply partial bailout since ($S^* < D_l$), although partial interventions in the segment $\overline{BC}$ support $D_l = D_h$. Note that at point C (45 degree line), there is full bailout.

$D_h < Y_l$ then segment $\overline{AB}$ disappears and $D_l = D_h$. We conclude that if the IMF intervenes ($S^* > 0$) equilibrium will happen in segment $\overline{BC}$ ($D_h - Y_l \leq S^* \leq D_h$).

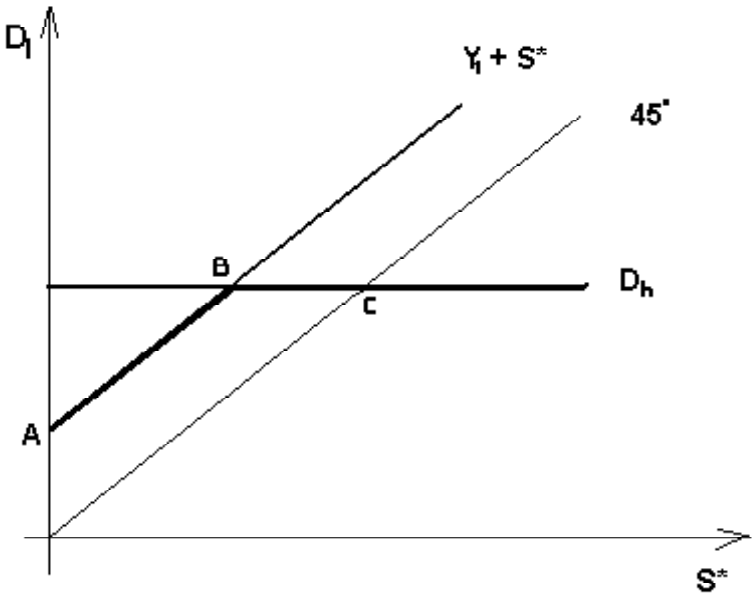

Figure 4

Under partial bailouts, $D_l = D_h$ and the size of the IMF's bailout and the government's fiscal effort are given by Expressions (46) and (47). Replacing these expressions in the lenders' participation constraint gives

$$D_h = D + (1 - \theta)(1 - e^{int})[D_h - S^*] \tag{56}$$

The risk premium under partial bailout is determined by the unconditional probability of default and the amount lost by lenders in that state ($D_h - S^*$). When a full bailout is anticipated ($S^* = D_h$), then $D_h = D$ implies that no risk premium will be added to bond prices. Furthermore, full bailout implies that $e = 1$, abolishing the default state altogether.

From this intuition we get the following statement:

Proposition 6 *Under uncontingent debt contracts and without CACs, the government's welfare under full bailout is greater than under partial and no bailout.*

Proof. See Appendix. ■

The heart of the proof of this proposition relies on the fact that the incentive compatibility constraint for G_1 is not binding when there is a full bailout ($S^* = D_l = D_h = D$). The intuition is that moral hazard is a problem for the government because lenders charge them a higher premium. But premiums disappear under a full bailout because of the implicit IMF guarantee. While full or no bailout are the only possible outcomes when $\chi < 1$, when $\chi > 1$ partial bailout must be considered. Then

Proposition 7 *The government's welfare under partial bailout might be greater or smaller than under no bailout.*

Proof. See Appendix. ■

The intuition of this proposition is similar to that of Proposition 5. The sensitivity of productive government expenditure to bailouts can be so strong that countries would prefer that the IMF did not exist.

Now we turn to the analysis of the case where bonds include CACs and there is a SDRM in place. Because CACs facilitate renegotiation, the debt forgiveness can come from the IMF's bailout and/or a renegotiation with lenders. Here, we model the IMF and the lenders in a game where they choose the amount of debt the IMF bails out and that lenders forgive. In particular, we analyze a sequential (Stackelberg) game where the IMF is the leader in the debt restructuring process.[20] We consider the sequential (versus the simultaneous) game more realistic, given that the IMF is wired to deal with countries in financial distress and hence has a first mover advantage.

8.2 Stackelberg equilibrium with uncontingent debt payments, CACs and a SDRM

Again, we solve the problem by backward induction and start analyzing the behavior of the lender for a given size of the IMF's bailout, under CACs and a SDRM.

[20] In an Appendix, available upon request, we analyze a simultaneous Cournot game. Multiplicity of equilibria in pure and mixed strategies might arise in this case.

The lenders' forgiveness comes from their utility maximization problem. Lenders get the IMF bailout S^{St} when the country reaches the zero output state, which happens with probability $\left(1-e^{St}\right)$, and D_l^{St} when the country reaches the intermediate output level state, occurring with probability e^{St}. Superscript St stands for Stackelberg. Note that while the debt is uncontingent, actual payments are subject to renegotiation, and hence D_l^{St} is an endogenous variable of the lenders' utility maximization problem:

$$\max_{D_l^{St},e^{St}} V^{St} = e^{St} D_l^{St} + \left(1-e^{St}\right) S^{St} \tag{57}$$

subject to

$$Y_l + S^{St} - D_l^{St} = \left(e^{St}\right)^{\chi} Y_l \tag{58}$$

$$0 \leq D_l^{St} \leq D_h^{St} \tag{59}$$

The solution to our problem is given by:

$$D_l^{St} = \frac{\chi}{1+\chi} Y_l + S^{St} \tag{60}$$

$$e^{St} = \frac{1}{(1+\chi)^{1/\chi}} \tag{61}$$

where lenders renegotiate under a SDRM (no free riding). Note that the level of effort is independent of S^{St}, the IMF bailout. It is, in fact, the same level of effort that the lender would exert under no bailout (see Equation (18)). Also note that D_l^{St} increases one-to-one with S^{St}. Indeed, the lenders' debt forgiveness plus the IMF's bailout is constant in that range, and hence the remaining debt is the same as under no IMF intervention ($D_l^{St} - S^{St} = D_l^* = \frac{\chi}{1+\chi} Y_l$). Strictly speaking, the lenders' best response to an IMF bailout of size S^{St} is

$$D_l^{St} = \begin{cases} \frac{\chi}{1+\chi} Y_l + S^{St} & \text{when } \frac{\chi}{1+\chi} Y_l + S^{St} \leq D_h^{St} \\ D_h^{St} & \text{otherwise} \end{cases} \tag{62}$$

But the IMF will never implement a bailout in the following range

$$S^{St} \leq D_h^{St} - \frac{\chi}{1+\chi} Y_l$$

When lenders forgive some of their capital, the IMF best response is to avoid wasting resources in a bailout. In this case, a bailout does not change the fiscal effort exerted

by the government, and hence the likelihood of avoiding the international financial contagion. Thus the IMF would only intervene when the bailout can induce a probability $e^{St} = \left(\frac{Y_l + S^{St} - D_l^{St}}{Y_l}\right)^{1/\chi} > 1/(1+\chi)^{1/\chi}$, which implies that the bailout S^{St} is bigger than the lenders' forgiveness $D_l^{St} - D_l^*$ without IMF intervention. Given the lenders' best response (Equation (62)), the IMF bailout has to be strictly greater than $D_h^{St} - \frac{\chi}{1+\chi} Y_l$. This result proves the following proposition[21]

Proposition 8 *Under uncontingent debt contracts with CACs and a SDRM, there is always some debt forgiveness either from the IMF or from lenders, but never from all of them in the sequential game.*

The minimum amount of forgiveness is given by that coming from the lender $D_h^{St} - \frac{\chi}{1+\chi} Y_l$ (same as under **Problem II**). The IMF is only intervening when the size of its bailout is higher than the lenders' forgiveness. There are cases where, even if the IMF's targeted fiscal effort is higher than e^{St} in Equation (61), it would prefer not to launch a bailout. For low levels of interventions there is not responsiveness of fiscal effort to a greater size of the bailout, neutralized by a smaller private debt forgiveness. Consequently, the IMF internalizes the lenders' response by not granting a bailout unless the IMF optimally opts to induce a higher fiscal effort than that of Expression (61) –due to a big enough J.

When does the IMF intervene? The condition is given by

$$\begin{aligned} -S^{St} - \left[1 - \left(\frac{Y_l + S^{St} - D_h^{St}}{Y_l}\right)^{1/\chi}\right] J &> -\left[1 - \frac{1}{(1+\chi)^{1/\chi}}\right] J, \text{ or} \\ -S^{St} + J\left[\left(\frac{Y_l + S^{St} - D_h^{St}}{Y_l}\right)^{1/\chi} - \frac{1}{(1+\chi)^{1/\chi}}\right] &> 0. \end{aligned} \tag{63}$$

Let $H(S^{St})$ be the left hand side of the IMF intervention condition. The size of the bailout $S^{St} \in \left[\max\left\{D_h^{St} - \frac{\chi}{1+\chi} Y_l, 0\right\}, D_h^{St}\right]$. The reader can verify that $H\left(D_h^{St} - \frac{\chi}{1+\chi} Y_l\right) \leq 0$ and that

$$H(D_h) = -D_h^{St} + J\left[1 - \frac{1}{(1+\chi)^{1/\chi}}\right] \lesseqgtr 0.$$

[21] See that, in this case, the overall level of forgiveness to the government is greater, since $D_l^{St} - S^{St} < D_l^*$.

If $H\left(D_h^{St}\right) > 0$ (J is big enough) there is always some bailout, partial or full. Again in the case of $\chi < 1$, partial bailout is ruled out. Hence $H\left(D_h^{St}\right) > 0$ implies full bailout. Furthermore,

Proposition 9 *Under uncontingent debt contracts with CACs and a SDRM, the government's welfare under full bailout is greater than under no or partial bailout in the sequential game. Moreover the government's welfare under partial bailout might be greater or smaller than under no bailout.*

Proof. The proof follows from those to Propositions 6 and 7. ■

When $\chi > 1$, partial bailout might arise. See that now $H\left(S^{St}\right) = -S^{St} + J(e^{St} - e^*)$, which is greater than zero for a big enough externality J since $e^{St} > e^* = 1/\left(1+\chi\right)^{1/\chi}$.

In summary, forgiveness comes either entirely from the IMF or from the lenders but never from both –as Proposition 8 states. Then, if bailouts (partial or full) are equilibrium IMF responses in the sequential game, allocations will necessarily coincide with those of **Problem V (**uncontingent debt payments, no collective action provisions and IMF). Also, if the IMF response is no bailout, allocations would coincide with those of **Problem IV** (uncontingent debt payments, collective actions clauses and a SDRM without IMF).

Before concluding, we show that the IMF intervention is more likely to occur under debt contracts without CACs.

Proposition 10 *The parameter set for which there is IMF intervention is larger without CACs.*

This proposition follows from the following argument. We know from Proposition 8 that when there are CACs there is never forgiveness from both the IMF and the lenders. This implies that when there are CACs and the equilibrium is such that the IMF intervenes anyway, the IMF would be indifferent between having a SDRM in place or not. However, when there is no IMF intervention ($S = 0$), the IMF's payoff is higher under CACs and a SDRM, since there is some forgiveness by the lenders and hence the fiscal effort exerted by the government (e) is higher. Therefore, whenever there is intervention under CACs and a

SDRM, there is also intervention under no CACs, while the converse is false. This argument resembles some of the reasons behind the IMF position in favor of a SDRM.

9 Discussion

In this section we present the main results of our analysis that help to clarify some issues of the discussion on the Sovereign Debt Restructuring Mechanism (SDRM).

First, the presence of the IMF has ambiguous effects on the government's welfare. While an IMF bailout is a subsidy, it also might make countries worse off for removing the commitment device to spend the amount borrowed in productive government expenditure, which would cause them to avoid the distressful state all together.

Second, conflict between the IMF and the issuing government about collective action provisions does not always arise. Both might prefer debt contracts without collective actions for moral hazard considerations. On the other hand, both will prefer collective actions in environments where J is small enough and the moral hazard issues are non-existent. That is also the case when the IMF wishes to implement a full bailout regardless of the inclusion of CACs in debt contracts (J is big enough).

Of course, conflict sometimes is evident. When both the IMF and lenders' targeted fiscal effort levels are about the same, governments will definitely choose not to include CACs. In this case, the IMF prefers that lenders forgive, but the country prefers an IMF bailout to receive the subsidy. Because the IMF lacks commitment to avoid intervening, a SDRM can induce lenders to internalize the default probability. This argument makes debt without CACs an attractive proposition for governments, and a SDRM a desirable institution for the IMF.

Third, it is worth noticing the theoretical possibility that collective actions can, in fact, be utilized as a commitment device, opposite to common wisdom. This might happen in environments where the targeted fiscal effort of the IMF is higher than that of lenders. In this case, if the government decides to include collective actions in debt contracts and the IMF chooses not to implement a bailout, the equilibrium outcome would be one where

lenders renegotiate and the fiscal effort exerted by the government is that targeted by the lenders. On the contrary, if the government opted for no friendly orderly restructuring provisions, the IMF's best response would be to implement a bailout. When moral hazard problems are severe in that parameter range, the IMF intervention might end up reducing the government's expected utility. While it is counter intuitive to think that collective actions might turn out to be a good idea precisely for moral hazard considerations, the logic behind this idea is quite the same. Having no collective actions implies an IMF bailout and a higher fiscal effort, making the distress state not that bad. On the contrary, collective actions would allow lenders to renegotiate and the IMF to stay out, making it *ex-post* worse but introducing better incentives to stay out of trouble *ex-ante*.[22] In this environment, forcing debt contracts to include friendly orderly restructuring provisions would be a good idea from both the IMF's and the government's standpoint.

Finally, our paper has a series of empirical implications. Eichengreen and Mody (2000) conduct an empirical investigation to answer the question whether CACs raise borrowing costs. Looking at primary debt markets (issuance), they find that during the 1990s, East Asian issuers paid lower spreads under UK law –which forces all debt contracts to include CACs– while Latin American and Eastern European spreads were lower under US law – which does not force friendly orderly restructuring provisions. These findings are confirmed by Eichengreen, Kletzer and Mody (2003) who work with data on secondary debt markets. From their findings, they conjecture that for "less credit-worthy borrowers the advantage of provisions facilitating an orderly restructuring are offset by the moral hazard and additional default risk associated with the presence of renegotiation-friendly loan provisions."

Becker, Richards and Thaicharoen (2001) and Gugiatti and Richards (2003) argue that bond prices are not affected much by the implicit or explicit inclusion of these type of clauses when we look at yields in secondary markets. From these results they conjecture that either financial markets are not really aware of the role of those clauses, which seems to be supported by their conversations with practitioners, or the moral hazard problem that these clauses

[22] Eichengreen and Ruhl (2000) also point out that collective action clauses make it incentive compatible for the IMF not to intervene.

bring to international credit markets does not outweigh the ex-post inefficiencies (of no renegotiation). Lead by this argument, they suggest that switching to a SDRM together with a massive use of CACs would not increase borrowing costs.[23]

We rationalize this discussion with the help of the lenders' participation constraint, from which we derive the sovereign yields.

$$Yield = \frac{D_h}{D} - 1 = \frac{1-\theta}{\theta}\left(1 - \frac{eD_l + (1-e)S}{D}\right)$$

In the absence of IMF bailouts ($S = 0$), the value of the debt at the renegotiation stage (eD_l) increases with CACs. If moral hazard is mild, then θ will change only marginally, leading to a lower yield for debt issued with CACs. But if moral hazard is important, then $\frac{1-\theta}{\theta}$ will be higher under CACs. As long as the moral hazard dominates, CACs are not a good idea. While we showed how this intuition works in Proposition 5, we also show that the conjectures of the literature are incorrect, both when the IMF is present, and when there are compositional effects in sovereign debt markets.

Assume that the IMF has a big enough stake in the destiny of the country (J is big). Anticipating the bailout, countries would issue debt without CACs or with enough free riding among creditors (compositional effect). The IMF would then launch a bailout if crisis occurs given that it constitutes its best response. But a full bailout ($S = D_h$) implies $e = 1$, $D_l = D_h$ and zero yield. The risk premium vanishes because lenders always collect, either from the government or from the IMF. In this world with the IMF, looking at risk premia in sovereign debt markets in search of evidence of moral hazard, like the empirical literature does, is misleading. When a full bailout occurs along the equilibrium path, no yield premia would be observed although the probability of crisis (the moral hazard) is at its maximum.

We also claim that the empirical exercises mentioned before might suffer from the Lucas critique due to a compositional effect in debt issuance. A large fraction of sovereign debt is placed in jurisdictions not using friendly restructuring provisions, while the rest is divided among many jurisdictions. The fact that incentives are aligned within a jurisdiction does

[23] Again, other contributions support this idea. See arguments presented in Haldane, Penalver and Saporta (2003) and Dixon and Wall (2000).

not imply that lenders would forgive in excess of what lenders in other jurisdictions would. When the compositional effects are present, CACs become an irrelevant dimension in debt contracts since under financial distress no debt would be condoned. It is for this reason that yields in bonds with and without CACs are the same. We claim that this argument invalidates the exercise of looking at yields in bonds with CACs in search for evidence of moral hazard and, furthermore, predicting the consequences of a SDRM on the cost of borrowing for sovereigns. The observed bond yields are equilibrium prices under the current regime, characterized by no renegotiation regardless of the presence of CACs (not considered in the empirical literature). Nonetheless, once a SDRM is put in place and debt contracts are bound to include CACs, borrowing costs can increase drastically because of incentives.

Our approach suggests that before doing the previous empirical exercises we should investigate whether the inclusion of CACs necessarily implies renegotiation. If CACs do not imply an easier renegotiation process in the first place, then they could play no role on incentives. In this regard we suggest comparing yields in bonds issued by the same country with and without CACs in a period of financial distress, in other words, in periods before renegotiation occurs and once the country is under financial crisis (when risk premia go up). Our model has clear predictions about these yields' behavior. In the transition to a financially distressed state, yields on bonds with CACs should increase by more than those without such clauses if renegotiation is indeed an equilibrium outcome of the game. The reason is that the first class of bondholders will condone a fraction of the debt while the rest would not (or would condone less).

The data we examined suggest that CACs were an irrelevant dimension of debt contracts for the case of Argentina 2001. First, note that the compositional effect in the Argentinean sovereign debt is heavily present. In the actual negotiation, about 46% of total debt is likely to be excluded for one reason or the other. For example, loans from multilateral agencies, which are non-renegotiable, account for 19% of the total debt.[24]

[24]Source: Ministry of Finance, Argentina.

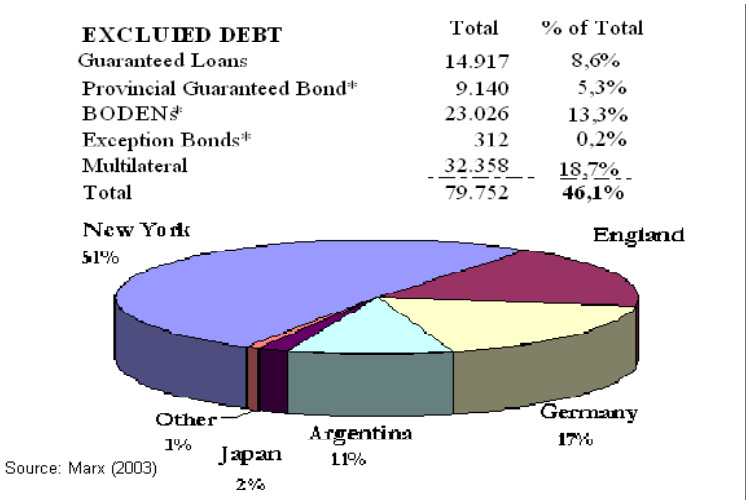

Figure 5: Debt composition. Argentina 2002.

The remaining 54% of the debt is distributed among 8 jurisdictions of which New York, Germany and Japan, accounting for 70% of the renegotiable debt, have no CACs. This compositional effect is likely to lead UK lenders to avoid forgiving beyond what other jurisdictions would condone, although CACs are included in their bonds.

Figure 6 shows the evolution of yields for two very similar Argentinean bonds issued under UK law, with CACs, and German law, without them, during the period of financial distress.[25] Argentina fell into financial distress in the second semester of 2001, once fundamentals were weak and the US announced its position against IMF intervention, leading to an upward spiral in bond yields.[26]

Note that these yields behave alike. Moreover, other bond yield comparisons for the case of Argentina lead to the same result. Assuming that there are no big arbitrage opportunities in bond markets, we conclude that CACs did not play an important role in the case of Argentina. We argue that this is the case precisely because of the compositional effects we lay down in our model. CACs are not a relevant dimension of the contract since they are

[25] Both bonds are named "Letras Externas de la Republica Argentina", and are denominated in Euros. Both pay principal upon maturity (the one issued in Germany, in January 26 of 2007 while the one issued in UK, in February 22 of 2007). Interests are paid annually (the German bond pays 10.25% and the UK one 10%). Source: JPMorgan.

[26] See the Wall Street Journal article titled: "O'Neil Suggests U.S Won't Back More IMF Loans to Argentina," October 31st 2001.

not utilized along the equilibrium path.

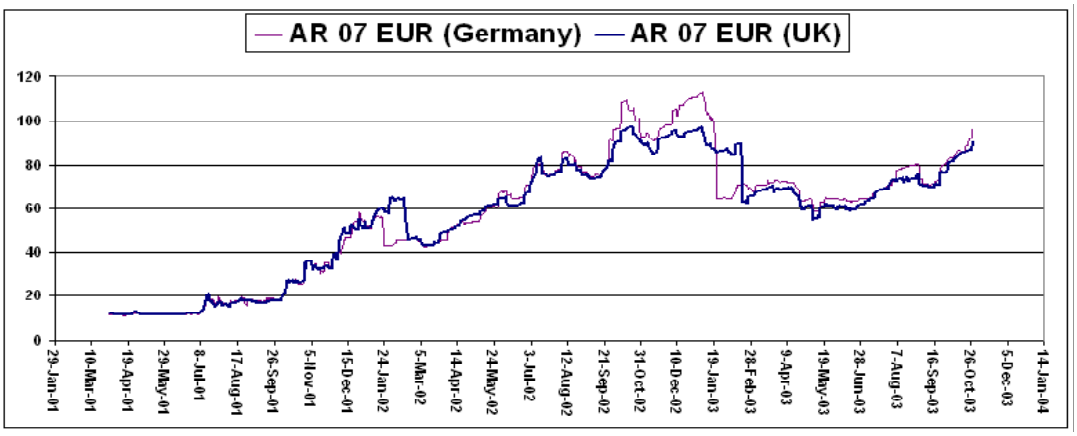

Figure 6: Argentine yields comparison in 2001 crisis.

To conclude, we show that compositional effects were also present in other experiences of default. We present data on debt composition for Russia, Ukraine, Ecuador, Pakistan and Argentina. The number of bonds issued by these sovereigns as well as the number of jurisdictions involved is not as big as for the case of Argentina. Yet, we claim that the compositional effects are likely to have been present in those cases as well due to the high fraction of official debt, usually non-renegotiable. Note that in the case of Pakistan, for example, 88% of the sovereign debt was non-renegotiable.

Comparison of crisis features

Issue	Russia	Ukraine	Ecuador	Pakistan	Argentina
# Old Bonds Involved	3	5	5	3	152
Amount Restructured (US$ MM)	31,600	2,600	6,600	610	82,000
# of Legislations Involved	1	3	2	1	8
Official Debt/Total Debt	45%	75%	50%	88%	23%

Source Marx (2003)

Table 1

While evidence suggest that CACs are unlikely to be a relevant characteristic in debt contracts for these experiences, future research should be done to assert whether this is also the case for most emerging countries and, furthermore, whether the presence of the IMF can also help explain the observed lack of spread in bonds with and without CACs.

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Appendix

Proof of Proposition 6.

We start by defining **Problem V(-IC)** as **Problem V** without the incentive compatibility constraint for G_1:

$$\max_{D_h, G_1} EU = \theta(G_1)[Y_h - D_h] + [1 - \theta(G_1)] \frac{\chi (Y_l + S^* - D_l)^{\frac{1+\chi}{\chi}}}{(1+\chi) Y_l^{1/\chi}} - kG_1 \tag{64}$$

subject to

$$\theta(G_1) D_h + [1 - \theta(G_1)] \left(S^* + \frac{(Y_l + S^* - D_l)^{1/\chi} (D_l - S^*)}{Y_l^{1/\chi}} \right) \geq D \tag{65}$$

where

$$\begin{aligned} D_l &= \min\{Y_l + S^*, D_h\} \\ S^* &\in \left\{ 0, -Y_l + D_h + \left(\left(\frac{J}{\chi} \right)^{\chi} 1/Y_l \right)^{1/(\chi-1)}, D_h \right\} \end{aligned}$$

Note the following facts:

1. The utility of the government under **Problem V(-IC)** is increasing in S^*, since the objective function is increasing in S^* and the lender's participation constraint relaxes with S^*.

2. The utility of the government for a given value of S^* under **Problem V(-IC)** is greater than or equal to the one under **Problem V,** since **Problem V** has an additional constraint (the incentive compatibility for G_1).

3. When $S^* = D_h$ the solution of **Problem V(-IC)** satisfies the incentive compatibility constraint. Hence the value of the utility of the government under **Problem V(-IC)** equals the one under **Problem V.**

The proof follows from these three facts. ■

Proof of Proposition 7.

We prove our proposition by example, as we did for **Proposition 5**. Again we assume

$$\theta(G_1) = \begin{cases} \bar{\theta} & G_1 > \overline{G_1} \\ \underline{\theta} & otherwise \end{cases} \tag{66}$$

where $(\bar{\theta} > \underline{\theta})$.[27] Another assumption is that $Y_l < D$.

The incentive constraint to support a high level of productive government expenditure under our assumption about $\theta(G_1)$ is then

$$\left(\bar{\theta} - \underline{\theta}\right)(Y_h - D_h) \geq k\overline{G_1}. \tag{67}$$

The expected payoff for a country issuing debt without collective action clauses and under no bailout is

$$EU = \bar{\theta}Y_h - D - k\overline{G_1}. \tag{68}$$

Under partial bailout, if the country reaches the state of financial distress the IMF will provide funds in the amount of $S^* = -Y_l + D_h + \left(\left(\frac{J}{\chi}\right)^{\chi} 1/Y_l\right)^{1/(\chi-1)}$. It is useful to inspect the incentive compatibility constraint for this case. Because under partial bailout the state of the world where the country faces financial distress is not that bad, the government's incentives to allocate the funds in productive expenditure deteriorate. The incentive compatibility constraint for a high level of G_1 is

$$\left(\bar{\theta} - \underline{\theta}\right)\left(Y_h - D_h - \frac{\chi\left(\frac{J}{\chi}\right)^{\frac{1+\chi}{\chi-1}} Y_l^{\frac{2}{1-\chi}}}{(1+\chi)}\right) > k\overline{G_1} \tag{69}$$

but we assume that $\frac{\left(\frac{J}{\chi}\right)^{\frac{1+\chi}{\chi-1}} Y_l^{\frac{2}{1-\chi}}}{(1+\chi)}$ is big enough to overturn Condition (67). Consequently, the incentive compatibility constraint for $\bar{\theta}$ does not hold and $\theta = \underline{\theta}$. Furthermore, $G_1 = 0$. Since $D_l = D_h$ the investors' participation constraint becomes

$$\underline{\theta}D_h + (1 - \underline{\theta})\left(S^* + \frac{(Y_l + S^* - D_h)^{1/\chi}(D_h - S^*)}{Y_l^{1/\chi}}\right) \geq D \tag{70}$$

[27] We work under the assumption that $\underline{\theta} > 0$. Otherwise loans for the amount of D could not be supported in equilibrium.

or similarly

$$D_h + (1-\underline{\theta})\left[1-\left(\frac{J}{\chi Y_l}\right)^{1/(\chi-1)}\right]\left[-Y_l+\left(\left(\frac{J}{\chi}\right)^{\chi}1/Y_l\right)^{1/(\chi-1)}\right] \geq D \tag{71}$$

Plugging this constraint into the objective function, we obtain the country's expected utility when the IMF is present

$$EU^{IMF} = \underline{\theta}Y_h - \underline{\theta}D_h - (1-\underline{\theta})\frac{\chi\left(Y_l + S^* - D_h\right)^{\frac{1+\chi}{\chi}}}{(1+\chi)Y_l^{1/\chi}} \tag{72}$$

or similarly

$$\begin{aligned} EU^{IMF} &= \underline{\theta}Y_h - \underline{\theta}D - \\ &\quad \underline{\theta}(1-\underline{\theta})\left[1-\left(\frac{J}{\chi Y_l}\right)^{1/(\chi-1)}\right]\left[-Y_l+\left(\left(\frac{J}{\chi}\right)^{\chi}1/Y_l\right)^{1/(\chi-1)}\right] \\ &\quad -(1-\underline{\theta})\frac{\chi\left(\frac{J}{\chi}\right)^{\frac{1+\chi}{\chi-1}}Y_l^{\frac{2}{1-\chi}}}{(1+\chi)}. \end{aligned} \tag{73}$$

Now we are able to observe that contracts without CACs dominate those with them whenever $EU > EU^{IMF}$. Equivalently

$$\begin{aligned} &(1-\underline{\theta})\begin{pmatrix} D - \frac{\chi\left(\frac{J}{\chi}\right)^{\frac{1+\chi}{\chi-1}}Y_l^{\frac{2}{1-\chi}}}{(1+\chi)} \\ -\theta\left[1-\left(\frac{J}{\chi Y_l}\right)^{1/(\chi-1)}\right]\left[-Y_l+\left(\left(\frac{J}{\chi}\right)^{\chi}1/Y_l\right)^{1/(\chi-1)}\right] \end{pmatrix} \\ < \quad &\left(\bar{\theta}-\underline{\theta}\right)Y_h - k\overline{G_1}. \end{aligned} \tag{74}$$

As in **Proposition 5,** the result depends on the sensitivity of the probability θ to productive government expenditure. If this probability is unaffected by G_1 then the government is better with partial bailout. Note that when $\left|\bar{\theta}-\underline{\theta}\right| \longrightarrow 0$ it is more unlikely that our condition will hold. Why? Reducing the cost of the contract ex-post is optimal ex-ante.

Matters are different when this sensitivity is strong. Making the state of distress very bad (although ex-post inefficient) will provide greater incentives for countries to stay out of trouble and to maintain fiscal conduct. This is the case when, other things equal, $\left|\bar{\theta}-\underline{\theta}\right|$ is bigger. ■