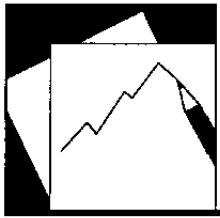


# Working Paper

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INTERNATIONAL MONETARY FUND



# IMF Working Paper

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## Sovereign Bond Restructuring: Collective Action Clauses and Official Crisis Intervention

*Kenneth M. Kletzer*

**IMF Working Paper**

Research Department

**Sovereign Bond Restructuring: Collective Action Clauses and Official Crisis Intervention**

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Authorized for distribution by Eduardo Borensztein

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**Abstract**

<p>The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.</p>
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This paper compares the restructuring of sovereign bonds with and without collective action clauses. One conclusion is that collective action clauses can allow efficient debt renegotiation in a formal model of sovereign debt renegotiation while unanimity rules offer incentives for opportunistic behavior by bondholders that leads to inefficient outcomes. With collective action clauses, the mutual gains from renegotiation can be internalized by bondholders so that the holders of each bond issue have incentives to participate in a collective debt restructuring. The analysis abstracts from transactions costs, and the last conclusion might well be sensitive to renegotiation and coordination costs.

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## I. INTRODUCTION

The emerging market financial crises of the last decade have prompted widespread concern about the adequacy of the present international financial architecture to maintain a stable international economy. Recently, attention has focused on the framework for the renegotiation and restructuring of developing country debt. Prolonged and costly sovereign debt renegotiations are widely taken as evidence of inefficiencies in international financial markets that should be addressed by institutional innovation. The possibility that these result from the inability of various creditors to cooperate effectively in debt restructurings has been a concern for many years in many debt crises. Market participants, academics, and policymakers have offered a variety of explanations and proposed solutions for collective action failures between lenders in the resolution of sovereign debt problems.

The most recent debates reinvigorate the argument that international bankruptcy procedures are needed to coordinate the actions of creditors with diverse interests and information to restructure debts and achieve the timely resolution of debt crises. Recent proposals by Haldane and Kruger (2001) and by Krueger (2002) suggest that the IMF play a prominent role in the reorganization of sovereign debt obligations. The restructuring of sovereign debt under such proceedings would require the aggregation of debt claims in parallel with corporate reorganization under Chapter 11 of the United States Bankruptcy Code. Schwarcz (2000) and Miller and Stiglitz (1999) offer other recent proposals to apply bankruptcy reorganization procedures to sovereign debt. The United States Treasury (Taylor (2002)) has counterargued that the creation of a role for the IMF in convening debt reorganization tribunals is unnecessary.

Another approach to reform are proposals that collective action clauses be required or encouraged for sovereign bond lending. The case for collective action clauses is argued by Eichengreen and Portes (1995) and by Eichengreen (1999). Essentially, these proposals argue that bonds issued under U.K. governing law, which include collective representation, sharing and majority action clauses, are more readily restructured to the mutual advantage of creditors and debtors than are bonds issued in the United States under the State of New York's laws governing corporate bonds. Collective action clauses allow bondholder trustees (for example, a bondholder assembly) to modify the repayment terms of bonds subject the approval of a qualified majority of bondholders (typically, those holding a supermajority of the outstanding debt). By contrast, the unanimous consent of all bondholders is required to revise the terms of repayment (amounts and timing) of a corporate bond issued in the United States. This allows an opportunity for "vulture funds" to seek a privately favorable outcome by holding a bond restructuring hostage. The U.S. Treasury response weighs in favor of the adoption of collective action clauses.

Several authors have discussed the implications of collective action clauses and the ability of small bond funds to gain by engaging in strategic behavior under unanimous consent rules.<sup>2</sup> Bonds issued under New York governing law can include covenants that are modifiable by a

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<sup>2</sup> A very useful overview of collective action clauses is given in Bank of England (2000), pages 142-51.

qualified majority of bondholders and have financial value to bondholders but do not directly concern the terms of repayment. Using such covenants, a majority can accept an exchange of new bonds for the old bonds after rewriting provisions that do directly affect the amount and timing of repayments. Such exit consents can reduce the secondary-market value of the bonds held by bondholders that do not participate in the exchange and were used, for example, in the restructuring of Ecuadorian Brady bonds. Buchheit and Gulati (2000) explain how exit consents can be used for restructuring sovereign bonds issued under US governing law. Roubini (2000), for example, argues that collective action clauses are unnecessary because bond exchanges in recent cases (Ecuador, Ukraine, and Pakistan) allowed restructuring by a supermajority of bondholders. These cases, however, may lead issuers, bondholders, and underwriters to close off this opportunity by incorporating unanimous consent requirements into all bond covenants in new bond issues.

This paper analyzes the incentives of multiple creditors to collectively renegotiate a country's debt in a formal model of sovereign debt renegotiation. The welfare case for collective action clauses is also developed using the model. The formal game theoretic model of Kletzer and Wright (2000) provides a framework for the analysis and arguments. In this model, a sovereign debtor seeks to smooth consumption over time against stochastic national income. The institutional structure of the model is transparent. Unlike much of the debt literature, there are no implicit assumptions regarding the enforcement of contracts that are not derived as part of the equilibrium. In Kletzer and Wright (2000), sovereign immunity protects borrowers from confiscation of resources inside national borders and lenders are always free to choose whether to participate in any transaction. There are no exogenous, external means of enforcement, but lending and repayment are sustainable in an equilibrium which imposes no constraints on renegotiations of any kind. In the present paper, a seniority provision is introduced both for expositional convenience and to introduce collective action problems. However, one implication of Kletzer and Wright (2000) is that the seniority privilege supports the same equilibrium as do the endogenous means of enforcement derived there.

Respect for the sovereign immunity of the borrower and the ability of any lender to choose whether to provide resources to the borrower at any time restrict credit transactions in the model economy. Given these self-enforcement constraints, there are efficient equilibria for payments between the debtor and its creditors that can be interpreted in terms of simple bond contracts subject to ex post renegotiation. The simple model provides the mutual gains from debt renegotiation that motivate the analysis. In the model, renegotiation is welfare improving and increases the level of lending to the sovereign borrower.<sup>3</sup> The constrained efficient equilibria of the model economy provide the benchmark for the welfare comparisons and arguments made in this paper.

In the absence of transactions costs, collective action clauses support efficient renegotiation in the model of sovereign debt. However, unanimity clauses give rise to a type of rent-seeking behavior in bond restructurings that leads to inefficient equilibria of the model. Unanimity clauses

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<sup>3</sup> This property is shared by other models of sovereign debt with renegotiation. For example, the model of repeated bargaining over trade sanctions with by Bulow and Rogoff (1989a). See also, models by Atkeson (1991), Cole, and Kehoe (1998) and Fernandez and Rosenthal (1990).

do not generally support efficient outcomes in this environment, because there are incentives for holdouts in renegotiations. The last bondholder can always gain at the expense of the others, and competition to be last can lead to protracted negotiations between bondholders and the debtor. Lending and repayment are consequently inefficient compared with the outcomes attainable under collective action clauses. The model is also used to demonstrate conditions under which multiple lenders internalize the mutual gains from collectively renegotiating sovereign debt. This result implies that as long as each lender holds a sufficiently large share of the total debt, then each lender has an incentive to come to the bargaining table. A simple example suggests that a sufficiently large share for this purpose may be a small percentage of the total debt.

The approach taken is Coasian in spirit. Achieving efficient outcomes under collective action clauses depends on the costs of forming a qualified majority and renegotiating the debt. In the absence of transactions costs, unanimous consent clauses are a source of inefficiency in renegotiation that can be eliminated by collective action clauses. Introducing renegotiation costs will reduce the welfare attainable under either collective action or unanimous consent. Reversing the welfare ranking of the two contract forms, however, would require the formation of a qualified majority to be more costly than achieving unanimous consent, which seems to be a peculiar presumption.

An additional conclusion is that the establishment of bankruptcy tribunals in which all of a sovereign's debts are aggregated and restructured together might be redundant if collective action clauses were adopted for all sovereign bond issues. The mutual gains from renegotiation for the holders of different bonds issued by a given debtor can provide incentives to bondholders to convene councils of bondholder representatives (representing the qualified majority) in the absence of external coordination or intervention. This suggests that the establishment of a sovereign debt restructuring mechanism (SDRM) under the auspices of an international institution may be more than is needed to create an environment for renegotiations that are efficient within the constraints of sovereign immunity to take place. This conclusion is also sensitive to the Coasian assumption of costless renegotiation. If renegotiation between the holders of different bonds is costly, then the formation of private bondholder councils and collective restructuring of sovereign bonds will be inefficient. This could be a greater problem when bonds are issued in different legal jurisdictions, and the creation of a SDRM that aggregates debts might improve welfare compared with the universal adoption of collective action clauses.

Two papers, Eichengreen and Mody (2000) and Becker, Richards, and Thaicharoen (2001), seek to determine whether collective action clauses affect interest spreads on sovereign bonds. The first paper finds significant empirical evidence that these clauses do affect interest differentials using primary market spreads, while the second shows contradictory findings using secondary market yields. The arguments in this paper that collective action clauses can yield welfare benefits that can be unattainable under unanimous consent clauses do not include a prediction regarding bond spreads. One reason is that more is lent under collective action clauses. Bond spreads should incorporate the risk premium for renegotiation, which happens more readily under collective action clauses. Alternatively, under unanimity clauses bond spreads should incorporate a risk premium for delays in settlement and repayment when renegotiation does occur.

Other policy proposals have been made for reforming the international financial architecture in the wake of the emerging markets crises of the last decade. These include universal debt rollover options (Buitert and Sibert (1999)), standstills (for example, as proposed by Haldane and Kruger (2001)) and official guarantees, contingent credits, lending into arrears, and so forth. These proposals address problems of financial crises that might benefit from an infusion of liquidity or a suspension of demands for repayment as contracted. The current paper addresses debt problems that will not go away with delay. The debt renegotiations considered here arise because the contractual obligations of the borrower exceed the amount that the government is willing to pay in present value. Some may wish to label these solvency problems, but the level of repayments is determined by debtors' willingness to pay as defined succinctly by Wallich (1943) and given analytical meaning by Eaton and Gersovitz (1981). Papers that analyze standstills, debt-rollover options, and other interventions to avoid financial and currency crises in emerging market economies include Chui, Gai, and Haldane (2000); Gai, Hayes, and Shin (2001); and Miller and Zhang (2000), in addition to Buitert and Sibert (1999).

The repeated game model of sovereign debt of Kletzer and Wright (2000) is first summarized. The equilibria of this model are used as the benchmark for discussing how the introduction of exogenously enforced seniority rights of creditors vis-à-vis each other affects debt renegotiation. Under such seniority privileges, the renegotiation of debt between two lenders and among bondholders under unanimous consent and qualified majority consent is compared. The formalism is limited so that the arguments focus on explaining how strategies for a debtor and creditors can be constructed (or not) that implement an efficient equilibrium. The paper explains how unanimity leads to a game of a simple war of attrition between lenders and directs readers to the well-known literature on these games for the characteristics of equilibrium. The possible extension of the model to allow for imperfect information and the robustness of the qualitative results to such extensions is discussed before the conclusion.

## II. A MODEL OF SOVEREIGN DEBT RENEGOTIATION

A model of sovereign debt in which foreign borrowing serves to smooth the consumption of the debtor country is used to illustrate the effects of institutional innovation. This model is based on Kletzer and Wright (2000) which is also used in Eaton and Kletzer (2000) and Wright (2002).<sup>4</sup> The borrower is risk averse and realizes a stochastic income each period. The borrower faces a pool of risk-neutral potential lenders. At any time, the borrower can choose to leave the international credit market and consume her endowment for every period thereafter. The debtor's endowment cannot be seized by foreign creditors, so that any repayments are made voluntarily by the borrower. The borrower only makes payments to foreign creditors if it is in her best self-interest looking forward in the future equilibrium relationship with the lenders. This assumption is consistent with the observation that debtors hold very few off-shore assets (as a proportion of debt) that might be

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<sup>4</sup> Eaton and Kletzer (2000) study the dynamics of debt and renegotiation when the discount rates of a lender and borrower differ. M. Wright (2000) extends the demonstration of self-enforcement of debt relationships in Kletzer and Wright (2000) to allow for debtor savings.

seized by foreign creditors and may avoid seizure by repatriating such assets in anticipation of debt repudiation.

The borrower seeks to maximize expected utility given by

$$U_t = u(c_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} u(c_s), \quad (1)$$

with respect to the consumption plan,  $\{c_t, c_{t+1}, \dots\}$ , in each period  $t$ . The discount factor,  $\beta$ , lies between zero and one,  $c_t$  is restricted to be non-negative and  $u(c)$  is strictly concave and increasing. The condition that  $\lim_{c \rightarrow 0} u'(c) = \infty$  is imposed for simplicity. The borrower's income consists of a stochastic endowment of a single non-storable good. The borrower can always assure that her utility is at least as great as the autarky expected utility realized by consuming her income each period into the future,

$$U_t^A(y_t) = u(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} u(y_s). \quad (2)$$

In any equilibrium, the sovereign immunity constraint,

$$u(c_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} u(c_s) \geq u(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} u(y_s), \quad (3)$$

must hold for all  $t$ .

The borrower's income in any period can be one of  $N$  finite number of values given by  $y^1 < y^2 < \dots < y^N$ , where  $y^1 > 0$  and  $y^N < \infty$ . It is also assumed that this income is independently and identically distributed across time, although all the arguments made in this paper carry over to the case in which  $y_t$  follows a Markov chain. The borrower's current income realization,  $y_t$ , is known when any decisions are made at time  $t$ .

Any lender seeks to maximize the expected present value of the net transfers he receives from the borrower,

$$\Pi_t = \tau_t + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} \tau_s, \quad (4)$$

where  $\tau_t$  is the net payment received from the borrower in period  $t$ . With a single lender,  $\tau_t = y_t - c_t$ . The lender only makes new payments to the borrower if the expected present value of the future returns are positive. For example, a lender will only buy a new bond issued by the debtor if the net expected present value of the bond is non-negative. This implies that the lender's participation constraint,

$$\Pi_t \geq 0,$$

holds at all times in equilibrium. That is, a lender only makes a net payment to the borrower if doing so is in his best interest looking forward in the entire future relationship with the borrower. For simplicity, the discount factor for the lender is assumed to be the same as for the borrower. This assumption is relaxed in the model of sovereign debt dynamics of Eaton and Kletzer (2000)

but does not affect the implications drawn here.

There are gains from intertemporal trade between the borrower and any lender in this model. In the first-best allocation, the borrower's consumption would be fully smoothed over all dates and possible income realizations (states of nature). In this case, lenders would fully insure the borrower against income fluctuations. However, for a positive discount rate the first-best solution may violate either the sovereign immunity constraint for the borrower or the participation constraint for a lender in some states of nature.

Self-enforcing equilibria of this economy are perfect equilibria of the implied repeated game in which the borrower or any lender can make a non-negative transfer of resources that is less than or equal to its current endowment. For the case of a single lender, these are found by first converting the borrower's utility into her surplus over autarky as

$$\begin{aligned} V_t &= [u(c_t) - u(y_t)] + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} [u(c_s) - u(y_s)] \\ &= [u(c_t) - u(y_t)] + \beta E_t (V_{t+1}) \end{aligned} \quad (5)$$

so that the sovereign immunity constraint is simplified to

$$V_t \geq 0$$

for each possible income realization at time  $t$ . The perfect equilibria are the sequences of transfers that lead to consumption sequences that satisfy the constraints,  $V_t \geq 0$  and  $\Pi_t \geq 0$ , for all dates  $t$  in all possible states of nature. These are characterized in Kletzer and Wright (2000).

In an equilibrium, the net payments made by the lender or by the borrower at date  $t$  are contingent upon the history of income realizations up to and including date  $t$ ,

$$\omega_t \equiv (y_1, \dots, y_t),$$

and on the past history of actions by each agent. Kletzer and Wright show that all possible equilibrium consumption paths can be found by first finding the efficient perfect equilibria. These can be found by solving the dynamic programming problem:

$$V_t(\Pi_t, \omega_t) = \max \{ [u(c_t) - u(y_t)] + \beta E_t V_{t+1}(\Pi_{t+1}, \omega_{t+1}) \} \quad (6)$$

subject to

$$y_t - c_t + \beta E_t \Pi_{t+1} \geq \Pi_t, \quad (7)$$

$$V_{t+1} \geq 0, \quad \text{for each } y^1, \dots, y^N, \quad (8)$$

and

$$\Pi_{t+1} \geq 0, \quad \text{for each } y^1, \dots, y^N, \quad (9)$$

where the maximization is taken with respect to the sequence of consumptions,  $\{c_s\}$ , and of lender surpluses,  $\{\Pi_s\}$ , for  $s \geq t$ .

Consumption in the solution satisfies the Euler condition,

$$u'(c_t) = u'(c_{t+1}) (1 + \varphi_{t+1}(\omega_{t+1})) - \psi_{t+1}(\omega_{t+1}), \quad (10)$$

where  $\varphi_{t+1}(\omega_{t+1}) \geq 0$  and  $\psi_{t+1}(\omega_{t+1}) \geq 0$  are the state-contingent Lagrange multipliers on the constraints,  $V_{t+1} \geq 0$  and  $\Pi_{t+1} \geq 0$ , respectively. If any of these constraints are binding, consumption cannot be fully smoothed across all states of nature between period  $t$  and  $t + 1$ .

When the borrower's constraint is binding for a particular income realization,  $y^n$ , for date  $t + 1$ , the borrower's consumption will be higher in that state for date  $t + 1$  than it is in period  $t$ . This is because the borrower is not willing to pay more in date  $t + 1$  in state  $y^n$  when the alternative of permanent autarky is available to her. If the lender's constraint binds in some state,  $y^n$ , for period  $t + 1$ , then the borrower's consumption will be lower in that state for  $t + 1$  than it is period  $t$ . In this case, the lender would prefer to abandon this relationship to paying more.

The solution for the efficient perfect equilibria has several important properties. First, only if the common discount rate is sufficiently small will full consumption smoothing be possible. However, for reasonable parameters for the coefficient of variation for debtor income and the discount rate, credit transactions are feasible and achieve partial smoothing of the borrower's consumption. In this case, consumption in period  $t$  depends upon the current income,  $y_t$ , and on lagged consumption,  $c_{t-1}$  (see Kletzer and Wright (2000) for details). For any efficient perfect equilibrium consumption path, the borrower's consumption in state,  $y^n$ , on any date will satisfy

$$\underline{c}^n \leq c \leq \bar{c}^n,$$

where  $\underline{c}^n \leq y^n \leq \bar{c}^n$ . The bounds  $\underline{c}^n$  and  $\bar{c}^n$  are both increasing with  $y^n$ . Furthermore,  $\underline{c}^1 = y^1$  and  $\bar{c}^N = y^N$ . The interpretation of  $\underline{c}^n$  is that if  $c_t = \underline{c}^n$  in equilibrium, then the borrower realizes the same utility as she would if she chose permanent autarky. Similarly, if  $c_t = \bar{c}^n$ , then the lender's surplus,  $\Pi_t$ , is zero.

A two-state example illustrates the equilibrium and can be used as a basis for subsequent arguments. Let borrower income take on two possible states,  $y^1 < y^2$ , in any period with constant probabilities,  $p$  and  $1 - p$ , respectively. The autarky utility for the borrower is

$$U_t^A = u(y_t) + \frac{\beta}{1 - \beta} E u(y), \quad (11)$$

which is increasing in current income,  $y_t$ . Consider the steady state of an efficient equilibrium with partial smoothing. In this case,

$$u'(\bar{c}^1) > u'(\underline{c}^2), \quad (12)$$

$$V(y^2, \underline{c}^2) = u(\underline{c}^2) - u(y^2) + \frac{\beta}{1 - \beta} E(u(c) - u(y)) = 0, \quad (13)$$

$$\Pi(y^2, \underline{c}^2) = y^2 - \underline{c}^2 + \frac{\beta}{1 - \beta} E(y - c) > 0 \quad (14)$$

and

$$V(y^1, \bar{c}^1) = u(\bar{c}^1) - u(y^1) + \frac{\beta}{1 - \beta} E(u(c) - u(y)) > 0, \quad (15)$$

$$\Pi(y^1, \bar{c}^1) = y^1 - \bar{c}^1 + \frac{\beta}{1 - \beta} E(y - c) = 0. \quad (16)$$

The borrower's sovereign immunity constraint is binding in the high state, while the participation constraint for the lender is binding in the low state. That is, the borrower realizes zero surplus in the high state of nature, while the lender's surplus is exhausted in the low state. In the high endowment state of nature, the borrower is repaying debt while in the low state, the lender is making a new consumption smoothing loan.

The Euler condition implies that any efficient perfect equilibrium converges to this steady state. For example, if the long-term relationship between the borrower and lender begins with an initial loan made under free lender entry, then the initial surplus for any lender should be equal to zero. In an efficient perfect equilibrium, the borrower's consumption in the first period if her income is  $y^1$  equals  $\bar{c}^1$ , and the borrower receives a payment (called a loan) from the lender. If borrower first-period income is  $y^2$ , then the borrower's first-period consumption equals  $y^2$ , and the borrower neither receives nor makes a payment. The first time that borrower income equals its lowest value,  $y^1$ , a loan is made and the equilibrium for debtor consumption and payments between the debtor and creditors is in the steady state.<sup>5</sup>

The efficient self-enforcing equilibrium can be implemented using simple one-period contracts with free entry. Each contract specifies a loan made by a lender in state  $y_t$ ,  $\ell_t$ , and a state-contingent repayment schedule for period  $t + 1$ , denoted  $R_{t+1}$ . The net transfer to the borrower in period  $t$  equals  $\ell_t - R_t$ , which depends on current income and past income only through lagged consumption (which is previous period income plus the previous period net transfer) in equilibrium. In the steady state of the two-state example,  $\ell_t$  is only a function of  $y_t$  and  $R_{t+1}$  depends on  $y_t$  and  $y_{t+1}$ . The contract satisfies

$$-\ell_t + \beta E R_{t+1} = 0. \quad (17)$$

The borrower's consumption is given by

$$c_t = \ell_t - R_t + y_t. \quad (18)$$

Substitution into the expression for the lender's value,

$$\Pi(y_t, c_{t-1}) = y_t - c_t + \beta E_t \Pi(y_{t+1}, c_t), \quad (19)$$

leads to

$$\Pi(y_t, c_{t-1}) = y_t - c_t + \beta E_t \Pi_{t+1} = R_t + E_t \sum_{s=t}^{\infty} (-\ell_s + \beta E R_{s+1}) = R_t. \quad (20)$$

The state-contingent repayment is simply the total lenders' surplus for an efficient self-enforcing equilibrium. Therefore, the repayment for a sequence of contracts that implements the constrained optimum is positive in the two-state example for  $y_t = y^2$  and zero for  $y_t = y^1$ . In the steady state,

$$R(y^2) = \frac{\bar{c}^1 - y^1}{\beta(1-p)} \quad \text{and} \quad R(y^1) = 0.$$

<sup>5</sup> This statement is true for any number of states and for random income that is Markovian but not identically and independently distributed.

Taking the discount rate,  $\frac{1}{\beta} - 1$ , to be the risk-free opportunity rate of interest for the lender, the interest rate spread on this loan is equal to

$$\rho = \frac{1}{\beta(1-p)} - \frac{1}{\beta} = \left( \frac{p}{1-p} \right) \frac{1}{\beta}. \quad (21)$$

This sketch of the analysis of efficient self-enforcing equilibrium payments between the borrow and any number of lenders illustrates the gains from renegotiation of simple loan contracts. State-contingent repayments can be interpreted as outcomes of the *ex post* renegotiation of a simple loan contract that specifies principal,  $\ell_t$ , and maximal repayment,  $\bar{R}_{t+1}$ .<sup>6</sup> If the renegotiation of simple loan contracts were not possible, then any equilibrium lending arrangement would be restricted to those that provide the lender with surplus,  $\Pi(y_t, c_{t-1})$ , that is not contingent on  $y_t$ . This is not possible for any efficient perfect equilibrium, so that a restriction on renegotiation can only allow inefficient perfect equilibria to be realized. There are mutual gains from allowing *ex post* renegotiation of standard debt contracts in this economy.

In the consumption-smoothing model, the gains from renegotiation are the gains from state-contingent contracts with a risk-averse agent who has risky income. In the repeated trade sanctions model of Bulow and Rogoff (1989a), there are also gains from renegotiation with stochastic income. The equilibrium payment made in the Nash bargaining solution varies with the gains from trade. If a debt contract is restricted so that the same payment is made in every state of nature, then this payment will be the minimum of the borrower's payments in the bargaining equilibria for each state. Allowing state-contingent repayments increases the surplus for the lender in all but the lowest state. The initial loan is the amount the lender pays for the right to impose trade sanctions, so that higher expected surplus leads to a higher loan. For an impatient but risk-neutral sovereign, this raises welfare.

### III. SENIORITY RIGHTS AND RENEGOTIATION

The set of all perfect equilibria for the basic consumption-smoothing model of sovereign debt contains any equilibrium that satisfies the sovereign immunity constraint for the borrower and participation constraints for lenders. An equilibrium that is efficient within this set can only be improved upon if the participants can be bound externally to make payments to one another that they would prefer not to make (that is, they cannot abandon the relationship for autarky at any time). Any such restriction requires either some loss of borrower sovereignty over her own borders

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<sup>6</sup> It is important to note that the repayment in any state is non-negative as a consequence of the lenders' participation constraints. No lender can be obligated to accept a net repayment that yields negative surplus looking forward. Under the simple loan contracts, lender surplus equals  $R_t$  so that renegotiated repayments are restricted to be non-negative. This restriction, and the participation constraint that leads to it, contrasts sharply with the assumptions made by Bulow and Rogoff (1989b). For an elaboration, see Kletzer and Wright (2000).

or the forcing of payments by creditors. Neither is considered here.<sup>7</sup> An efficient self-enforcing equilibrium provides payoffs for each agent that are on the frontier of the surplus possibility set of all self-enforcing equilibria in each possible sequence of income realizations. The properties of the efficient equilibria can be used to assess whether a constrained efficient equilibrium can be achieved under a particular institutional arrangement. The equilibria that are feasible when restrictions are placed on recontracting will be in this set, but they may no longer be on the its efficient frontier.

The remainder of this paper considers restrictions on the renegotiation of debt contracts created by bond covenants binding between creditors and enforced by creditor country governments. Specifically, I consider how the enforcement of seniority rights across creditors and the use of collective action clauses can affect the outcomes of renegotiation. Although there are many ways to model bargaining between the borrower and lenders during renegotiation, any renegotiation equilibrium will be in the set of all self-enforcing equilibria. The strategy used here is to identify some characteristics of possible perfect equilibria under alternative institutions that govern debt renegotiation. Rather than study specific bargaining models, the approach is to show whether bond covenants can allow a constrained efficient equilibrium outcome. This approach is Coasian in spirit.

In the bare-bones institutional structure of the consumption-smoothing model of sovereign debt, any mutually beneficial renegotiation is possible given any history of the relationship between the borrower and lenders. Nothing impedes mutually beneficial renegotiation. The main point of Kletzer and Wright (2000) is to demonstrate that an efficient perfect equilibrium path can be supported by an equilibrium for the repeated game that is renegotiation proof when there are many possible lenders. This requires the construction of punishments for deviations from the equilibrium path of payments that are also constrained efficient. The interpretation of the punishment of the borrower for deviation from the equilibrium payments path is that the borrower faces a short-lived moratorium on new capital inflows. This moratorium ends as soon as the borrower makes a payment yielding all of the current surplus looking forward in new equilibrium relationship to the lenders. Kletzer and Wright (2000) proves that a threat of permanent autarky is unnecessary, as well as incredible, and that credible punishment threats are immune to interference by new lenders. The proof of the second result relies on common knowledge in the repeated game. However, the information requirements for the proof are that every lender observes the obligations of the borrower to every other lender, the borrower's income and the actions of every other lender. The important requirement is that the repayment terms of loan contracts and any renegotiations of them can be learned by other (actual or potential) lenders.

An informationally thrifty way to implement equilibrium is through the exogenous enforcement of seniority privileges between creditors. With fully state-contingent contracts subject to the

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<sup>7</sup> M. Wright (2000) considers exogenously enforced lender commitment in this framework. He shows that lender consortia can be sustained (in coalition-proof equilibria) that allow an efficient perfect equilibrium to exist.

self-enforcement constraints, simple seniority rights support an efficient perfect equilibrium.<sup>8</sup> Seniority privileges, however, may be problematic when accompanied by restrictions on renegotiation of conventional bond contracts.

A simple stylized case with one-period loan contracts and a seniority privilege is used. The seniority privilege ensures that if the borrower reneges on a loan payment, the lender can interfere with future payments to subsequent lenders. In the two-state example, suppose that the borrower reneges on repayment to her current creditor in state  $y^2$  at time  $t$  and a new lender makes a new loan. The existing lender can attach his claims to any payments made to the new lender in period  $t + 1$ . This reduces (or eliminates) any returns to the entrant, so that the new lender cannot offer a loan that implements an efficient equilibrium. Part or all of the surplus that could be realized in the continuation of the consumption-smoothing relationship has already been taken by the existing creditor who does not need to pay anything more to receive a positive share of the surplus. A new lender can only realize a gain equal to the additional surplus in the relationship beyond that already owed to existing creditor. In the steady state of an efficient equilibrium for the two-state example, the borrower realizes zero surplus in state  $y^2$  at time  $t$  by making the equilibrium repayment. If she reneges, the current lender continues to claim the repayment,  $R(y^2)$  against any repayments that might be made. The borrower will never repay more than  $R(y^2)$  (doing so would leave her worse off than in autarky). New lenders cannot realize any return from a loan given the seniority of existing debt, so that they should lend nothing. By refusing to repay, the borrower can consume all of her income,  $y^2$ , at time  $t$ , but will at best realize zero surplus in either state in period  $t + 1$ . Therefore, the borrower has no incentive to renege in this state.

Suppose that the lender refuses to renegotiate in state  $y^1$  (in the steady state of the example, the borrower's state-contingent payment is zero when income is  $y^1$ ). The borrower's surplus can only be negative if she pays the lender in state  $y^1$ , so she should let the debt obligation carry forward to the next period. The borrower only makes payments in the future, however, if looking forward in equilibrium at the time, her surplus is non-negative. If the lender simply rolls over a constant, or interest accumulating, repayment obligation, then the borrower receives nothing in the low income state until the debt is paid off. The borrower can credibly hold the lender's surplus to zero so that the lender cannot gain by refusing to renegotiate and provide a new loan in the low income state. In a renegotiation-proof perfect equilibrium, the lender will only be paid, at most, the constrained efficient equilibrium amount. In the example, this equals zero in the low income state and equals his opportunity cost inclusive of a risk premium in the high income state.

Deviation from the net transfers for the constrained efficient equilibrium are not immune to renegotiation of the strategies of the borrower and lender when the seniority privilege locks in the relationship between the borrower and a lender. The mutual gains from the constrained efficient equilibrium for this economy assure that, however complicated the sequence of loans and rollovers, the net payments made in equilibrium will match the constrained efficient state-contingent ones. Once the seniority privilege creates a bilateral relationship, achieving an efficient perfect equilibrium path depends only on the capacity of the two participants to take

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<sup>8</sup> Free entry by lenders in the initial contract yields all the gains from trade to the borrower but is not necessary for efficiency.

advantage of the mutual gains from intertemporal trade. These gains can be realized at the outset, so if a single actor can provide sufficient resources for smoothing the borrower's consumption up to the sovereign immunity and participation constraints, the seniority privilege helps attain an efficient self-enforcing equilibrium.

The seniority privilege can solve a problem of lender entry in the event that the borrower defaults, but it can also create a problem of lender exit in this model of sovereign debt. This is the problem that lenders may not act as a single agent, but rather as dispersed bondholders who can choose to exit from a long-term relationship even though they continue to hold senior claims. The same type of problem arises with multiple bond issues held by non-overlapping or imperfectly overlapping sets of creditors.

The coordination problem can be illustrated in an example with two lenders and the single borrower. As a consequence of the history of the endowment and simple accumulation of debt on conventional terms, let the sum of the face value of the two lenders' loans,  $R_A$  and  $R_B$  (for lenders  $A$  and  $B$ , respectively), exceed the maximum amount that the borrower will repay in any perfect equilibrium; this is  $R(y^2)$ . Recall that this is equal to the maximum lender surplus in any perfect equilibrium in the high income state. For single-period loan contracts with free entry,  $R(y^2)$  is the total repayment made in equilibrium under renegotiation. Along with paying  $R(y^2)$ , the borrower receives a new loan earning zero expected profits for lenders in the high income state. The borrower only pays this much if she expects to receive the efficient net transfer (equal to  $\bar{c}^1 - y^1$ ) when the low income state occurs in period  $t + 1$ . If the lenders refuse to relinquish their total claim,  $R_A$  plus  $R_B$ , which exceeds  $R(y^2)$  in present value, then borrower must pay less than  $R(y^2)$  to avoid realizing negative surplus. Anticipated refusals to renegotiate lead to inefficient self-enforcing equilibria.

First consider the borrower's response to a refusal to renegotiate by both lenders. The borrower can refuse to pay either lender or pay one and not the other. By satisfying the debt claim of one lender, say lender  $A$ , the borrower still needs to settle the remaining (and now senior) claim of lender  $B$  which has a face value greater than  $R(y^2)$  less the amount paid,  $R_A$ . If  $R_A$  is less than  $y^2 - \underline{c}^2$ , the borrower can consume more in the high income state today in exchange for consuming less than  $\bar{c}^1$  in the low income state in the future. Since  $\bar{c}^1$  is no greater than  $\underline{c}^2$ , paying off one claim in full but not the other must reduce the risk-averse borrower's utility in a subsequent self-enforcing equilibrium. This reduction in consumption smoothing implies that even if renegotiation between the borrower and lender  $B$  beginning in period  $t + 1$  is efficient, the borrower utility can only be reduced by paying  $R_A$  in period  $t$  in state  $y^2$  and dealing with the remaining debt,  $R_B$ , later. Because the efficient equilibrium gave the borrower zero surplus in the high income state, any such inefficient equilibrium must give her negative surplus at time  $t$ . The best that the borrower and lender  $B$  can do if the borrower pays  $R_A$  to lender  $A$  in the high income state is to immediately settle lender  $B$ 's debt for  $R(y^2) - R_A$  at time  $t$ . Therefore, whenever the borrower prefers autarky to paying the face value of her debts, she has an incentive to renegotiate all of her debt rather than selectively repay individual loans leaving the rest to renegotiate later.<sup>9</sup>

<sup>9</sup> With various bond maturities, cross default or acceleration clauses allow creditors to gain comparable seniority in the event the debtor defaults.

Next, consider a case in which one of the lenders (let this be lender B) refuses to renegotiate while the other lender renegotiates with the borrower. It was noted above that if both lenders insist on receiving the present value of the respective face value of their loans, the equilibrium will not be constrained efficient. Therefore, when the high income state occurs, there will be efficient perfect equilibria that can give each lender a higher return while holding the borrower's surplus to zero. In this case, lender A may be able to increase his payoff by renegotiating unilaterally. If he does so, his maximal surplus will equal the difference between the total efficient surplus in the relationship ( $R(y^2)$  in the example) and the amount that lender B can assure himself in the continuation of the game.<sup>10</sup> The continuation surplus for lender B is bounded above by the face value of his loan  $R_B$ . For example, if  $R(y^2)$  minus  $R_B$  exceeds the equilibrium payoff to lender A when both lenders are intransigent, then lender A can gain by unilaterally forgiving the difference between the  $R_A + R_B$  and  $R(y^2)$ .

The possibility of unilateral debt renegotiations can be motivated using a simple extensive form game of renegotiation between each lender and the borrower. In this game, either lender can unilaterally offer to accept a lower repayment, while the other refuses to renegotiate. A lower repayment can be observed as a combination of net repayments and new bonds. What matters is the equilibrium present value of the creditor's offer. The borrower accepts or rejects offers, but because this game is imbedded in the repeated game, the borrower never accepts less surplus than she realizes in equilibrium for the repeated game. Let the efficient equilibrium total lender surplus at time  $t$  be  $\Pi_t = \Pi(y_t, c_{t-1})$  and the total face value of the debt accumulated be  $R_t$ . The borrower holds the lenders' total surplus to  $\Pi_t$ . In these negotiations, the discount factor is given by  $e^{-\delta\Delta t}$  (let  $\delta = -\log \beta$ ) where  $\Delta t$  is the time interval between rounds of creditor offers. Either lender can choose to not participate in any round. One equilibrium is that the lenders proportionately share in efficient debt renegotiation which gives lender A and lender B the payoffs,  $(1 - x_t)\Pi_t$  and  $x_t\Pi_t$ , respectively, where  $x = R_B/R$ . If lender A renegotiates unilaterally, his equilibrium payoff is  $\Pi_t - xR_t$  and lender B's payoff is  $R_B$ . Suppose these payoffs satisfy,

$$\Pi_t - x_t R_t > e^{-\delta\Delta t} (1 - x_t) \Pi_t, \quad (22)$$

and

$$e^{-\delta\Delta t} x_t \Pi_t > \Pi_t - (1 - x_t) R_t. \quad (23)$$

The first of these inequalities implies that lender A will better making an offer to reduce his debt to  $\Pi_t - x_t R_t = \Pi_t - R_{Bt}$  if lender B does not participate over waiting one round for coordinated renegotiation. The second inequality says that lender B will not unilaterally renegotiate. Inequality (22) also implies (with a little algebraic manipulation) that the total loss for the lenders from delaying agreement,  $\Pi_t (1 - e^{-\delta\Delta t})$ , is less than the gain to lender B from holding out,  $R_{Bt} - e^{-\delta\Delta t} x_t \Pi_t$ . For  $R_t > \Pi_t$ , lender A can gain by renegotiating when lender B holds out if the debt held by lender B is a sufficiently small share of the total debt. Lender B will be better off

<sup>10</sup> This is an upper bound. The maximum payment that the debtor will make to lender A will leave her with just zero surplus given her the present value of her surplus in the continuation game played with lender B.

holding out. For this to be the case, the share of lender B's loans in the total debt needs to satisfy

$$\frac{1 - e^{-\delta\Delta t}}{R_t/\Pi_t - e^{-\delta\Delta t}} \geq x_t = \frac{R_{Bt}}{R_t}.$$

For example, if the discount factor,  $e^{-\delta\Delta t}$ , is 0.99 and the debt overhang ratio,  $R_t/\Pi_t$ , is 1.2, then lender B must hold less than five percent of the total debt.

The possibility of a successful holdout in efficient debt renegotiations arises when one of the two lenders holds a sufficiently small share of the total debt. In this case, the small lender will be able to take unilateral advantage of the seniority privilege. If neither lender is small, then either lender can only gain when they renegotiate jointly. Because there are mutual gains from renegotiation, an efficient self-enforcing equilibrium can be achieved in the consumption-smoothing model of sovereign debt as a bargaining equilibrium for the three party repeated game as long as neither lender is small enough to take unilateral advantage of the seniority privilege. The threat to insist on a higher payment is only credible for a small lender; essentially the seniority privilege makes the large lender hostage to the small one.

These arguments imply that, in the full information case, seniority privileges can enable rather than inhibit mutually beneficial debt renegotiation. Efficiency among the set of self-enforcing equilibria is achieved because the seniority privilege allows a single lender to form a permanent relationship with the borrower. Although a sufficiently small lender may have an advantage over a large lender when the face value of debt rises above the expected net present value of repayments because of relending, rollovers and reschedulings, this advantage should be priced into the terms of small and large loans. Holding out does not seem to create problems with two lenders, but it can, as discussed in the next section, when there are many potential small lenders with seniority rights as arises under bond lending with unanimous consent clauses.

The particular model of sovereign debt renegotiation used here assumes perfect information. In the steady state of an efficient perfect equilibrium for the two-state example, the borrower receives a loan and all of the surplus in the relationship in the low income state. In an efficient renegotiation in the low income state, therefore, the lenders simply forgive the entire debt so that new loans can be made. In this case, unilateral renegotiation and holding out can only yield zero payoffs in equilibrium. This case, though, may trouble some readers. If the assumption that the borrower's income is the borrower's private information is made in the model of Kletzer and Wright (2000), it can be shown that the borrower never receives a net transfer in debt renegotiations in an efficient self-enforcing equilibrium. Under this assumption, new lending does not take place in the same period as debt renegotiation.

## IV. BOND RESTRUCTURING

### A. Renegotiation Under Unanimous Consent

It is argued that with the single small lender, an efficient self-enforcing equilibrium that is renegotiation-proof can still be achieved under seniority rights. The seniority rights of the small lender, however, create an opportunity for conditional rent-shifting, by which I mean the redistribution of surplus from the large lender to the small lender after particular events. An important qualitative difference arises when there are many potential “small” lenders all seeking these rents.

Revision of the repayment terms of sovereign bonds issued under State of New York governing law typically require the unanimous consent of all bondholders. However, other terms of bonds issued under New York law often can be revised with the consent of a qualified (non-unanimous) majority of the bondholders. Exit consents can be (and have been) used in bond exchanges by a majority of bondholders that reduce the value of the remaining bonds held by a minority of bondholders who do not agree to the exchange. For this discussion, I assume that the only terms of contracts relate to repayments and revision of these requires unanimous bondholder consent. In the model economy, this requirement can give rise to a renegotiation game between bondholders that displays socially costly delay to agreement in equilibrium.

The general model with  $N$  states of nature can be used. Suppose there are many potential lenders, all with limited resources so that each bond issue is held by a number of creditors. The bonds are issued in small units, in the sense that one bond readily satisfies the “very small” requirement for holding out in renegotiation from above. Suppose that at date  $t$ , a low income state occurs and that the total non-contingent repayment exceeds the total equilibrium surplus of lenders,  $\Pi(y_t, c_{t-1})$ . As a benchmark, let this be the surplus for an efficient self-enforcing equilibrium. The argument will apply when the total lender surplus is generated by an equilibrium that is inefficient among the set of all perfect equilibria.

If lenders do not agree to renegotiate the debt overhang (defined as the excess of the debt claim over the equilibrium lenders’ surplus), then the borrower will not be able to borrow the amount ( $\ell_t$ ) that implements continuation of the equilibrium providing surplus  $\Pi(y_t, c_{t-1})$  to the lenders. This is because the seniority allows current bondholders at time  $t$  to claim part or all of any future repayments. In this situation, the arguments for the two lender case imply that some, sufficiently large, majority of bondholders will be better off renegotiating unilaterally and letting the minority receive the face value of their bondholdings. Delaying renegotiation would be costly for a fixed majority. The implementation of such renegotiations might be attempted using a bond swap in which the majority exchange the old bonds for new bonds that pay a proportionate share of  $\Pi(y_t, c_{t-1})$  minus the equilibrium value of any bonds kept by bondholders not accepting the swap. It might also be implemented through a bond restructuring in which the minority are paid off to assure unanimity.

The problem is that any bondholder can be the last to agree. An individual bondholder can hold out for the rent of being last. For example, with a secondary market for bonds, an investor can purchase a minority share of bonds and seek the maximal rent attainable in an equilibrium renegotiation between a single majority bondholder (equivalently, a representative of the majority of bondholders) and the borrower. Without a single majority bondholder, any creditor could be a holdout or sell shares to such a “vulture fund” for a price equal to the expected return to holding out. If everyone else agrees to the restructuring, then the last bondholder should not agree, seeking instead to maximize his rent subject to a constraint that other bondholders are at least as well off accepting the negotiated settlement.

With any bondholder eligible to be the holdout, this gives rise to a “war of attrition” between bondholders.<sup>11</sup> Consider  $J$  lenders, numbered  $j = 1, \dots, J$ , each holding a small enough share of the bonds to be a successful holdout if all the others cooperate in the bond restructuring. If all lenders 1 through  $J$  except lender  $j'$  agree to the renegotiation for the total surplus  $\Pi(y_t, c_{t-1}) - R_t^{j'}$ , where  $R_t^{j'}$  is the gross interest owed to lender  $j'$  under the original contract, the best action for lender  $j'$  is to holdout and take his rent. Lender  $j'$  realizes a higher payoff than does every other lender. This is one equilibrium for this simple version of the war of attrition with complete information, but there are many others, particularly mixed strategy equilibria. Lenders  $j'$  and  $j''$  can both choose strategies in which they agree to the restructuring with positive probability and holdout for one more period with the complementary probability. These probabilities are determined by the condition that the expected gain from waiting is zero for each of the two bondholders. Equilibria of this type generate stochastic delays to agreement which must reduce the total social surplus in the consumption-smoothing model.<sup>12</sup>

The unanimity rule together with the seniority rights that make it effective create the opportunity for a minority of bondholders to gain by holding out in a renegotiation of repayment obligations in a low income state. The exogenous enforcement of these covenants interferes with the renegotiations of perfect equilibria for the repeated relationship between all bondholders and the borrower which allow constrained efficient equilibria to be sustained. A reason that the war of attrition naturally arises in bond restructurings under the unanimity rule is that no particular lender is identified as the “small lender” of the previous section *ex ante*. When a particular lender can seek conditional rents, the expected value of the rent can be priced into the loans and renegotiation-proof constrained efficient equilibria are possible. In the bond restructuring case, the winner of the war of attrition between potential holdouts gets the rent, but these property rights are not assigned *a priori*. The possibility of inefficient equilibria in the rent-seeking game implies that initial lending and social surplus under the unanimity rule can be lower than in the efficient self-enforcing equilibria used as a benchmark.

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<sup>11</sup> Simple models of the war of attrition are explained in Fudenberg and Tirole (1991) in Sections 4.5.2, 6.5 and 6.7.1.

<sup>12</sup> Strategic delay to agreement can also arise in the presence of asymmetric information, as explained by Kletzer (1989) and Wells (1993).

## B. Renegotiation With Collective Action Clauses

Bonds issued in the United Kingdom include provisions that allow the formation of a bondholder assembly to propose modifications to the original terms of the bonds subject to the consent of a qualified majority of the bondholders. These collective action clauses include collective representation, majority consent to revisions of any clauses and equal sharing provisions so that all bondholders share equally in ultimate repayments. Such collective action clauses can eliminate the possibility of the rent-seeking wars of attrition in restructurings that are possible under the unanimous consent rule in the complete information model of sovereign debt. The argument is that competition between bondholders to be the pivotal voter can be used to eliminate the rent.

Suppose that the covenants to a particular bond issue specify that a qualified majority hold three-quarters of the outstanding bonds. When the debt burden exceeds the total surplus in an efficient equilibrium by less than one-quarter of the debt, only a small vulture fund holding fewer than one-quarter of the bonds could hold out for full repayment. Such a lender cannot realize a higher surplus from holding out than from agreeing to a proportionate share of restructured bonds worth the total surplus attainable in a self-enforcing equilibrium, simply because his voting shares are not necessary to conclude a renegotiation. The rent can only be gained by being the last to join the qualified majority. If there are many small bondholders, then competition among bondholders to be the decisive member of the qualified majority should dissipate any such potential rents.

Now, consider another potential vulture fund strategy. Investors purchase one-quarter of the bonds plus one and seeks to negotiate a favorable outcome with the other bondholders. If the other bondholders act collectively, then there are two equally senior creditors. If the solution to the condition for a “sufficiently small” creditor, given by  $x$  in the equation,

$$\Pi_t - xR_t = e^{-\delta\Delta t} (1 - x) \Pi_t, \quad (24)$$

is less than one quarter, then the new fund can gain for its members by renegotiating together with the majority. There is no gain from forming a minority coalition. Another outcome is that the remaining bondholders do not act collectively. In this case the best that the prospective vulture fund can do is build a qualified majority itself.

Under the collective action clause, the bondholders have an incentive to restructure the debt as soon as it exceeds the surplus that lenders can assure themselves in the highest income state in an efficient self-enforcing equilibrium. A conclusion is that renegotiation to the efficient frontier is mutually beneficial under collective action clauses as long as the size of a potentially profitable holdout coalition is less than the complement of a qualified majority. Whether such renegotiations occur will depend upon whether there are costs of renegotiation, bargaining and coordination between bondholders that inhibit the formation of a qualified majority.

### C. Bondholder Committees Versus Aggregation

Proposals for a sovereign debt restructuring mechanism (SDRM) respond to the holdout problem and potential coordination problems between creditors. It is implicit in such proposals that all bond claims against a sovereign debtor need to be aggregated to allow renegotiation. Unless an international bankruptcy tribunal interferes with the sovereign immunity of debtor countries or the ability of creditors to make net resource transfers voluntarily, it might not increase efficiency over collective action clauses under complete information. Suppose that there are many bond issues in default and all have collective action clauses. If a bondholders' committee consisting of representatives of the qualified majorities of each bond issue can be formed, or exists as a standing body (Eichengreen and Portes (1995)), aggregation under a formal tribunal may be unnecessary. If none of the bond issues comprises so small a fraction of the total debt that its holders can unilaterally hold out, then mutually beneficial renegotiation to an efficient self-enforcing equilibrium should be possible.

Frequently, government debt is held in a large number of outstanding bond issues, so that this condition is not met. The analysis, however, shows that there are welfare gains from including a majority action clause in a single bond issue *ex ante*. The logic applies equally well to the adoption of a clause that allows the restructuring of bonds by a qualified majority of the holders of a sufficiently large majority of the outstanding debt. This clause would specify, for example, that a three-quarters majority of the holders of all bonds is needed to restructure the lot, rather than a three-quarters majority of the holders of each issue. Such a super-collective action clause would eliminate the coordination problem among the representatives of the qualified majorities of each bond issued under U.K. governing law (by eliminating the representatives).

## V. EXTENSIONS

The model of sovereign debt renegotiation used in this paper assumes that debtor income is observed by the lenders. This leads to efficient self-enforcing equilibria that are implementable using state-contingent contracts. An alternative approach is to assume that lenders never observe borrower income but that the distribution of borrower income is common knowledge. Thomas and Worrall (1990) analyze a model of consumption smoothing with one-sided self-enforcement (binding on the risk-neutral lender) and show that perfect equilibria exist when self-enforcement constraints bind on both sides of the market (they do not derive properties of self-enforcing equilibria).

The assumption that the borrower's income is private information can be added to the model of Kletzer and Wright (2000) with a continuum of income states between  $y^1$  and  $y^N$ . In this case, the efficient perfect equilibria can be implemented using standard bond contracts with non-contingent repayments when the sovereign immunity and participation constraints do not bind for the borrower and lenders, respectively. The change in the borrower's debt level falls as previous period income rises. The debt level rises in low income states. As the debt level rises, the borrower's sovereign immunity constraint will eventually bind with positive probability in the next

period. There will be an upper bound for the expected present value of the debt (an endogenous credit limit). This is reached whenever the sovereign immunity constraint binds. When the upper bound on debt is reached, the borrower's sovereign immunity constraint binds for incomes below a threshold level,  $\hat{y} > y^1$ . In these states, the debt will be renegotiated in equilibrium. Under this type of asymmetric information, the borrower pays a portion of the accumulated debt and realizes positive future expected surplus just to compensate for the opportunity cost of a positive repayment. In contrast with the perfect information model, the borrower does not receive a net transfer (equivalently, a new loan) in renegotiation. The lenders capture all of the surplus from the continuation of the relationship in low debtor income states. This implies that all of the arguments regarding renegotiation under the stylized interpretation of the two governing laws are robust to this type of informational asymmetry.

## VI. CONCLUSION

A benchmark model of sovereign debt renegotiation is used to discuss the effects of exogenously enforced rights of creditors vis-à-vis other creditors on debt renegotiation. These seniority rights represent the ability of bondholders to assert their contractual rights against infringement by other bondholders, either holders of the same issues or subsequent lenders. The inclusion of seniority privileges also introduces a role for provisions with noncontingent debt contracts that enable or inhibit debt renegotiation. The model allows a comparison of the potential effects of U.S. and U.K. governing law for sovereign bond issues on debt restructuring with these simple explicit restrictions on loan contracts for welfare. The model does not incorporate any additional or implicit institutional assumptions that influence resource allocation. The welfare comparisons, however, are idealized benchmark ones. They do not incorporate any costs of renegotiation or barriers to coordination among creditors.

The comparisons do reveal that absent any costs of renegotiation, unanimity rules representing the application of U.S. governing law inhibit efficient renegotiation in the model economy, while collective action clauses do not. Collective action clauses can eliminate the possibility of socially costly delays in renegotiation that arise from the rent-seeking behavior of individual bondholders under unanimity clauses. Inefficient renegotiation reduces capital flows and debtor welfare. The approach taken makes a welfare argument for collective action clauses over unanimity clauses.

In the absence of any barriers to negotiation between the representatives of holders of different bond issues, the mutual gains to creditors from debt renegotiation imply that collective action clauses are all that are needed to achieve a constrained efficient equilibrium. This suggests that a prospective international bankruptcy tribunal under which all of a borrower's debts are restructured together may be overkill. Collective action clauses and the incentives for bondholders to send representatives to a bondholders council should suffice. However, this conclusion is only made up to the costs of collective action across bond issues and across creditor jurisdictions. It does not address any difficulties for coordination of creditor rights across creditor country borders. It is hard to envision that bargaining costs would favor unanimity clauses over qualified majority clauses, but such costs could render collective action clauses insufficient for achieving efficient

debt restructuring, which, in turn, would support a more efficient allocation of resources (for example, in the model economy used here). A resolution of this problem might be found in the adoption of majority action clauses that require a qualified majority of the holders of all bonds to agree to a restructuring rather than a qualified majority of each bond issue.

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