Federal Reserve Bank of Dallas
Globalization and Monetary Policy Institute
Working Paper No. 142
http://www.dallasfed.org/assets/documents/institute/wpapers/2013/0142.pdf

Sovereign Debt Crises: Could an International Court Minimize Them?*

Aitor Erce
Bank of Spain

April 2013

Abstract

This paper discusses the merits of the statutory approach to sovereign debt crises. It presents a model of sovereign debt roll-overs where, in the event of a liquidity crisis, a Sovereign Bankruptcy Court has powers to declare a standstill on debt payments. The model shows the ability of the Court to mitigate the coordination problem inherent to roll-overs in sovereign debt markets. Moreover, the scale of the coordination problem is reduced regardless of the quality of the information handled by the Court. The mere existence of the Court forces investors to focus on its course of action rather than on other investors beliefs. Nonetheless, such an entity might affect negatively countries' incentives to apply costly policies.

JEL codes: D82, F02, K41

* Aitor Erce, Research Economist, General Directorate of International Affairs, Bank of Spain, Alcala 48, 28014, Madrid, Spain. +34-91-338-5498. aerce@bde.es. I thank Giancarlo Corsetti, Javi Diaz-Cassou, Javier Vallés and Sanne Zwart for comments. These are my personal views and do not reflect those of the Bank of Spain. While in 1980 the stock of sovereign and publicly guaranteed debt stood at 11.5 billion dollars and the relation between bonds and loans was 1 to 10, in 2006 the stock of debt was up to 420 billion dollars and the ratio of bonds to loans was above 20 to 1. The views in this paper are those of the author and do not necessarily reflect the views of the Bank of Spain, the Eurosystem, the Federal Reserve Bank of Dallas or the Federal Reserve System.

Sovereign Debt Crises: Could an International Court Minimize Them?*

Aitor Erce†

April 24, 2013

Abstract

This paper discusses the merits of the statutory approach to sovereign debt crises. It presents a model of sovereign debt roll-overs where, in the event of a liquidity crisis, a Sovereign Bankruptcy Court has powers to declare a sandstill on debt payments. The model shows the ability of the Court to mitigate the coordination problem inherent to roll-overs in sovereign debt markets. Moreover, the scale of the coordination problem is reduced regardless of the quality of the information handled by the Court. The mere existence of the Court forces investors to focus on its course of action rather than on other investors' beliefs. Nonetheless, such an entity might affect negatively countries' incentives to apply costly policies.

Keywords: Sovereign debt, liquidity, International Court, standstill.

JEL classification: D82, F02, K41.

Introduction

Financial globalization has led to important changes in financial structures. In the realm of the sovereign entities, this process was reflected in a marked shift from bank financing to market financing through bond issuance, both domestically and abroad.[1] This has had clear advantages. Access to an increasing number of jurisdictions where to issue and an increased number of instruments broadened emerging markets' investor base. This, in turn, helped domestic financial deepening and reduced funding costs (Andritzky, 2012). The process, however, also brought risks. The trend toward market financing has made sovereigns more vulnerable to abrupt reversions in capital flows (sudden-stops).

*I thank Giancarlo Corsetti, Javi Diaz-Cassou, Javier Vallés, Sanne Zwart and two anonymous referees for comments. These are my personal views and do not reflect those of Banco de España.

†Bank of Spain

[1] While in 1980 the stock of sovereign and publicly guaranteed debt stood at 11,5 billion dollars and the relation between bonds and loans was 1 to 10, in 2006 the stock of debt was up to 420 billion dollars and the ratio of bonds to loans was above 20 to 1.

On top of this, for sovereigns unable to service their debts, the increased complexity of debt structures poses a threat to finding adequate ways to restructure them. Greece, which just conducted a debt buyback after the restructuring of its domestic law bonds in 2011 proved insufficient to reverse the underlying debt dynamics, is a case in point. Argentina is another recent example. Through its interpretation of the pari-passu clause, a recent ruling by a US Court, where a private creditor is suing Argentina over the 2001 default, threatens to force Argentina to repay dissenting creditors in full.[2]

Sovereign debt crises can be *fundamental*, if debt is so large that without debt relief the country can not stabilize it, or *liquidity-driven*, when a temporary mismatch between revenues and expenses limits the sovereign ability to repay. While this difference can be crucial, the need to coordinate with a group of heterogeneous creditors is common to both types of events. Indeed, coordination problems can drive an illiquid Government into insolvency. Other manifestations of the coordination problem include investors fearing a restructuring and pulling out of the country (the so-called "rush for the exits").[3] The recognition of this myriad of problems prompted an intense debate, still ongoing, on how to structure the International Financial Architecture to limit the incidence of future crises. Traditionally, the solution to sovereign distress has been a combination of official assistance and/or debt restructuring with the Paris and London Clubs. On this debate, there are two well established camps. On the one side, there are those that advocate for *market solutions* such as the inclusion of collective action clauses into bond contracts or the development of guiding principles, like the IIF's *Principles for Stable Capital Flows and Debt Restructuring*. On the other are the supporters of *statutory solutions,* including the creation of sovereign debt restructuring mechanisms (SDRM) or an International bankruptcy regime. While after the Mexican-Asian crises market solutions appeared to have gained broader support, recent events in Europe highlight the need to complement market mechanisms. Market solutions were appealing because they allowed for ad-hoc solutions, potentially better suiting country specific aspects. The downside is that, as argued in Sachs (1995), flexibility comes at the cost of increased uncertainty about the official sector's path of action.[4] What is needed is a credible mechanism to prevent speculators from turning a liquidity crisis in a sovereign debt market into a solvency crisis.

In this context, the objective of the paper is to provide a fresh look at the statutory approach to crisis resolution from a theoretical perspective. The paper studies the scope for creating a Sovereign Bankruptcy Court (SBC), which would monitor countries and be empowered to declare payment standstills when crises

[2] See Schumacher et al. (2012) for an excellent overview on litigation against sovereigns.

[3] Also, depending on the legal structure of the debt, unanimity requirements might allow a minority of holders ("hold-outs") to stop a debt restructuring. Even if this is not the case, hold-outs may push for full repayment and take advantage of other investros willingness to renegotiate ("free-riding"). Moreover, the so-called vulture funds, might strangle the country by suing it for repayment in different jurisdictions ("strangulation by litigation").

[4] The absence of a clear route map can protract debt restructuring indefinitely. Too often crises are solved only after a series of partial solutions. See Diaz-Cassou et al. (2008).

are due to temporary illiquidity.[5] I show that a Court designed in such way reduces the coordination problem faced by creditors. On the negative side, I show that the SBC, by supporting countries when in need, will likely reduce sovereigns' incentives to apply costly policies ex-ante. Similar to Ghosal and Thampanishvong (2012), conditioning access to the SBC on a verifiable variable offsets the negative effect on effort of unconditional recourse to the Court.

From a technical point of view, this paper draws on Corsetti et al. (2006), who uses a global game to analyze the effect of IMF lending on debt roll-overs.[6] As investors need to focus on the Court's behavior, the extent to which other investors' beliefs matter is reduced, facilitating coordination. The creation of a SBC and the use of payment standstills to protect countries from litigation are not new to the theoretical literature. Haldane et al. (2002) present a rollover global game where standstills are modelled as an exit tax. As Haldane et al. (2002) and Corsetti et al. (2005), I place the coordination problem at the core but, by explicitly modelling the Court, I can study it's strategic interaction with investors. Miller and Zhang (2000) argue that, without an orderly procedure, the IMF is forced to bail out distressed members, fostering investors' moral hazard. A payments' standstills would rescue the Fund from this 'time inconsistency' trap. Gai et al (2004) show that the effectiveness of standstills depend on the quality of official sector's surveillance. I show conditions under which a better informed Court reduces the coordination problem. Haldane et al. (2004a, 2004b) show that payment moratoria are useful during liquidity crises and that a international bankruptcy court could also improve on the outcome of solvency crises. Their results grant much less effectiveness to market approaches such CACs or the creation of creditor committees. Gai and Shin (2004) show that if the Court increases the recovery rate, it need not generate a rush for the exits. In Martin and Peñalver (2003) standstills tilt the sovereign's term structure through reduced liquidity and default risk. Eaton (2003) shows that an SBC could elicit debtor's moral hazard.[7] Jeanne and Bolton (2007) argue that the coordination problem has the ex-ante effect of fostering debt structures sub-optimally hard to restructure. This is the result of investors' competing to guarantee repayment in an event of stress. They show that a SBC would be an adequate tool to correct this inefficiency. Recently, Jeanne (2009) studies the interaction between the maturity structure and the international financial architecture. In a model where short term debt is used as a commitment device, Jeanne finds that well-intentioned policies might backfire if they facilitate countries' exit from a crisis He shows that an international court acting only under some ex-ante conditions would reduce the degree of market incompleteness and improve welfare. As in Ghosal and Miller (2003) and Jeanne (2009), I find that

[5] Voices to grant Greece a debt payments moratorium emerged as the need to provide debt relief shifted from privately held to officially held debt.

[6] Global games have been used to analyze other policy measures such as collective action clauses or official lending. See Haldane et al. (2004) on the first, and Rochet and Vives (2004) or Morris and Shin (2006) on the second.

[7] Willingness to repay is another important aspect of sovereign debt. Although not explicitly, the discussion regarding effort is clearly related.

ex-ante agreement on the circumstances in which the Court can declare a standstill (verifiable conditionality in Jeanne (2009)), limits the negative implications on debtors' willingness to implement costly adjustment policies.

The following section summarizes the evolution of the statutory approach. Section II outlines a simple model of self-fulfilling debt crises. In Section III the international arbitrator is introduced into the game, and some basic features of both models are compared. Section IV evaluates the implications for authorities' effort and discusses how the results change if the Court would be used to address insolvency. Section V concludes.

I. Statutory versus market approach

The succession of crises since the mid 90's (Mexico, Thailand) prompted an intense debate on how to improve our mechanisms for the prevention and resolution of debt crises. Various far-reaching proposals were discussed both in academic and official circles. Part of the debate focused on the extent to which crises had been primarily a result of failures in international financial markets or were due to mistaken policies. Those stressing the importance of market failures advocated for the creation of a meaningful official financial safety net articulated around a lender of last resort (Fisher, 1999). In turn, those stressing policy failures prioritized the need to avoid distorting the incentives of sovereigns and their private lenders, placing moral hazard at the centre of the discussion (Simpson, 2006). In parallel, the debate revolved around the intimately related perspective of the nature of the reforms required. Two approaches stood out: the contractual or market approach and the statutory approach.

The contractual or market-based approach argues in favour of solutions implying the minimum level of institutional intervention. It's proponents defend the creation of sets of principles, like the *Principles for Stable Capital Flows and Debt Restructuring*, to guide the behavior of the different actors, and the inclusion of clauses in bond contracts, such as collective action clauses (CACs) (see Eichengreen et al., 2003).[8] In contrast, those defending the statutory approach argue in favour of having an international institution in charge of intermediating the disputes between sovereign debtors and their creditors and enabling it to lead the steps whenever a country requires a payments standstill or a debt restructuring. As discussed below, the most relevant proposals to establish an international authority are based on the Chapter 11 of the US Bankruptcy Code. The best known example is the SDRM proposal (Krueger, 2002). Eventually, the debate resulted in a compromise geared towards market solutions, of which the Rey Report and the Prague Framework for crisis resolution are good examples.[9] According to the Prague framework, adopted in 2001, liquidity crises ought to be resolved by combining limited and predictable official assistance, catalysis of private capital flows, and private sector involvement (PSI). Simi-

[8] For a summary of the Principles and a discussion of its virtues see IMF (2004).
[9] See "The Resolution of Sovereign Liquidity Crises" by the G-10.

larly, the inclusion of CACs in sovereign bonds , as advocated by the G-10, has been a successful experience.[10] Still, other contractual innovations such as aggregation clauses may be needed.

According to Rogoff and Zettelmeyer (2003), discussions regarding the need to adequate the international financial architecture (IFA) to problems stemming from sovereign debtors date back to before World War II.[11] The first official discussion goes back to the Meeting of the Group of 77 developing countries at Arhusa in 1979. Remarkably, issues such as need of an arbiter, the coordination problem and the importance of new financing, were already mentioned.[12] The first reference to an international Chapter 11 for private creditors appeared in Oechsli (1981). Although Oechsli referred to coordination problems among investors, his proposal aimed at reducing the uncertainty surrounding the resolution path, what, in his view, was the main cause for delays in resolving debt problems. The work of Sachs (1984) on coordination and free riding and that of Krugman (1989) on debt overhang (distinction between solvency and liquidity) were instrumental for subsequent proposals. Rogoff and Zettelmeyer (2003) highlight four early proposals within the statutory approach Barnett et al. (1984), Cohen (1989), Raffer (1990) and Kaeser (1990). Kaeser (1990) is the first to argue that a bankruptcy procedure should be used to fight over-indebtedness but not temporary payments difficulties The Brady plan and the ensuing resumption in capital flows stopped the discussion temporarily.[13]

After the Mexican crisis in 1995 had to be resolved with an extraordinary loan by the US Authorities, the debate came back. Jeffrey Sachs (1995) gave a tremendous boost to it. He advocated for the development of elements that would allow the IFA to go towards the creation of a Sovereign Bankruptcy Court. In line with Oechsli (1981), Sachs argued that the lack of a well defined legal framework led to ad-hoc restructurings with uncertain results. Such institution should be able to: (i) avoid a freeze in the public sector during the restructuring (use standstills to avoid legal prosecution), (ii) promote creditors' coordination and (iii) incentivize responsible debt management practices. Chun (1996) presented a similar proposal, although he saw this option as a solution to the coordination problem (illiquidity).[14] Eichengreen and Portes (1995, 1997) proposed a system where a trustee would help coordinate the bondholders committees, while considering the position of dissenting creditors. In their view the mechanism should focus on liquidity crises and avoid grab races which could further damage the economy.Their porposal included elements of the market approach such as the inclusion of CACs. Bank of Canada and Bank of England

[10] Such provisions were included in debt exchanges by Argentina, the Dominican Republic and Uruguay (IMF, 2005). The Greek Government included them retroactively on its domestic debt instruments prior to last year's debt restructuring.

[11] Rogoff and Zettelmeyer (2003) present an excellent discussion of the various proposals on how to resolve sovereign debt problems going back to the late seventies.

[12] This proposal was, however, focused on official creditors.

[13] Within the existing statutory approach, the 80s saw the inception of the IMF's lending into arrears policy. Debevoise (1984) proposed to use Article VII (2) of the Fund's articles of agreement to protect (against legal prosecution) countries unilaterally declaring a standstill.

[14] Also the IMF's legal department (1995) studied if the Fund could fill such role.

presented a joint proposal for handling crises through a combination of official financing and private sector involvement (PSI). PSI would be either voluntary through debt exchanges and roll-overs, or involuntary, using payments standstills to provide time to find a solution.[15] To override the required legal changes in a large number of jurisdictions, they proposed a non-statutory approach similar to the IMF's *Lending into Arrears Policy* (*LiA*).[16] Finally, the IMF presented the Sovereign Debt Restructuring Mechanism (Krueger, 2002).[17] It advocated for a system where a super-majority of creditors to a country could impose a debt restructuring on all creditors, while avoiding legal action by holdouts. The system granted the country immunity through a payments standstill while the debt restructuring was negotiated.[18] Despite it's lack of success, at the time the market approach seemed to have gained the debate, The SDRM was by far the most seriously debated proposal.[19]

Given the depth of the crisis in the Eurozone, the framework for sovereign crises resolution is again under scrutiny. European authorities created two facilities to complement the support provided by the IMF, the European Stability Mechanism (ESM) and the European Financial Stability Fund (EFSF). While the latter is aimed at tackling liquidity problems and did not contemplate PSI, the ESM was set-up to deal also with situations in which debt relief by private creditors is required, much in line with the IMF's Lending into Arrears Policy.

The framework outlined here differs from Sachs (1995) and Anne Krueger's SDRM in that it is designed to cope with temporary payment problems. In this regard it coincides with the proposal by Chun (1996) and Haldane and Saporta (2003) in that it aims at reducing inefficient runs on sovereign debt markets. Another important difference of the approach here is that it only relies on standstills and remains silent as regards other forms of private sector involvement, such as direct debt restructurings, which characterize proposals like the ESM or the SDRM, aimed at addressing solvency problems.

II. A benchmark model

To set a benchmark, I use a model with standard features in the spirit of Chui et al. (2002). The model analyzes a small open-economy government's financing decisions. It stretches over three time periods defined below. A government with resources amounting to O, has access to an international liquid asset M and to a risky investment I. In order to carry on the investment, the government needs external financing whenever $O < I$. It can obtain it from a mass-one continuum

[15] According to them, a payments standstill would facilitate coordination by aligning creditors' and debtors' incentives.

[16] See Diaz-Cassou et al. (2008) and Erce (2013) for a critical review of this policy.

[17] Schwarcz (2000), Eichengreen (2000) or Krueger and Haldane (2001) for other proposals.

[18] In a first version the power to declare a standstill was given to the IMF. This was so controversial that in a second version it was to be taken jointly by the Fund and a super majority of creditors.

[19] Bolton and Skeel (2004) argue that if the SDRM would focus on guaranteeing the existence priority in repayment, it needed not affect negatively the cost and availability of funds.

of investors, willing to lend in a short term horizon at an interest rate i. The outside option for the investors is a safe asset with rate of return i^w which, for simplicity, is set to zero. The risky investment yields θ in period 2, or θ / $(1+k)$ in period 1. The parameter $k \in (0, \infty)$ reflects a cost associated with the early liquidation of the investment. I assume that θ is normally distributed with mean $\widehat{\theta}$ and variance $1 / \gamma$.[20]

In period 0, the government borrows an amount D_0. It then uses O and D_0 to invest in the risky investment and the liquid asset, $O + D_0 = M + I$. These parameters are taken as given. As borrowing is short term and the investment matures in period 2, , in period 1 the Government needs to roll over this debt. Ahead of the roll-over, investors receive a private noisy signal about θ and use it to decide wether to roll-over or not. When deciding to roll-over Investors do not know if the Government will repay or not. In period 2, the government repays outstanding debt and consumes whatever left.

Liquidity and solvency

Think first of a scenario where all investors roll over. Given the amount due, $(1+i)D_0 = D$, the country is solvent in period 2 if $\theta I + M \geq D$. This inequality defines the minimum rate at which the country is solvent under a full roll-over. Call it *fundamental insolvency rate,* $\theta_s = \frac{D-M}{I}$.

If, instead, a positive mass of investors,f ask for repayment, in period 1, the country needs an amount fD of liquidity. If $M < fD$, the country must liquidate a proportion l of the investment, $l = (1+k)\frac{(fD-M)_+}{\theta I}$. After that, in period 2, the country counts with resources $\theta(1-l)I$ to repay outstanding debt $(1-f)D$. Then, the minimum rate at which the country is still be solvent is,

$$\theta'(f) = \theta_s + k\frac{(fD-M)_+}{I} > \theta_s. \tag{1}$$

Payoffs and information

As in Rochet and Vives (2004) and Corsetti et al. (2006), private investors' payoff structure depends on making the right choice. If the final outcome is a default, creditors fleeing receive w more units of utility than those rolling over. Instead, if the project succeeds, those who rolled over get utility r units above those who withdrew.[21] This assumption makes the perceived utility independent of the extent of default, implying that the analysis abstracts from distributional issues between the creditors and the country.

Creditors get a signal $s_i = \theta + \varepsilon_i$, where ε_i is normally distributed with zero mean and precision α. Their updated beliefs are normally distributed, $\theta | s_i \sim N(\frac{s_i\alpha + \widehat{\theta}\gamma}{\alpha+\gamma}, \frac{1}{\alpha+\gamma})$. The mean of this distribution will be denoted by

[20] Rate of return and the fundamentals of the economy will be used as synonyms.

[21] If investors have a utility function which is just the sum of consumption at any date and waiting gives bigger consumption, waiting is the right option. Another way to rationalize these pay-offs is by assuming that investors' choices are driven by reputational concerns

$\rho_i = E[\theta|s_i]$. Φ and ϕ stand for the standardized cumulative distribution and the associated density function respectively.I assume that θ is unknown, but its distribution, as that of investors' private signals, is common knowledge.

Equilibrium: runs and solvency

As it is standard in this type of games, I look for equilibria in trigger strategies. Uniqueness is guaranteed when the relative precision of the private signal (with respect to the public one) is large enough. The unique equilibrium is defined by a rate of return θ', which produces a distribution of public and private signals such that there is a signal s' that makes the investor receiving it is indifferent between fleeing or staying. In such equilibrium, private investors withdraw their money in period 1 if their updated beliefs about θ fall below some critical value $\rho'(s')$. Two equations define the two unknowns.

The first comes from identifying the lowest level of returns that makes a run successful. Since noise is independent, the probability of a creditor holding beliefs below ρ' is equal to the proportion of investors with beliefs below ρ', $f = P[s_i < s'|\theta] = \Phi(\sqrt{\alpha}(s' - \theta))$. Condition (1) can be rewritten as,

$$s' = \theta' + \frac{1}{\sqrt{\alpha}}\Phi^{-1}((\theta' - \theta_s + \frac{kM}{I})\frac{I}{kD}). \tag{2}$$

The fact that, in equilibrium, the marginal investor must be indifferent between staying or fleeing, provides the second equation. Given the probability of a successful run, $P[\theta < \theta'/\rho_i] = \Phi(\sqrt{\alpha+\gamma}(\theta' - \frac{\alpha s_i + \gamma\widehat{\theta}}{\alpha+\gamma}))$, this indifference condition can be expressed as

$$r[1 - \Phi(\sqrt{\alpha+\gamma}(\theta' - \frac{\alpha s'}{\alpha+\gamma} - \frac{\gamma\widehat{\theta}}{\alpha+\gamma}))] - w\Phi(\sqrt{\alpha+\gamma}(\theta' - \frac{\alpha s'}{\alpha+\gamma} - \frac{\gamma\widehat{\theta}}{\alpha+\gamma})) = 0.$$

When $\theta > \theta'$, rolling-over gives r units of utility more than fleeing. If, instead, $\theta < \theta'$ the run is successful and fleeing gives w units of utility more. Rearranging the expression above,

$$\theta' = \frac{\alpha s'}{\alpha+\gamma} + \frac{1}{\sqrt{\alpha+\gamma}}\Phi^{-1}(\frac{r}{r+w}) + \frac{\gamma\widehat{\theta}}{\alpha+\gamma}. \tag{3}$$

Equations (2) and (3) deliver the equilibrium values θ' and s' that characterize the economy. The probability of default is $P(\theta < \theta')$ and the size of the run $P(s < s')$.

III. Enter the Sovereign Bankruptcy Court

Now, a Sovereign Bankruptcy Court (SBC) with powers to declare a payments standstill is introduced in the model economy. The goal is to analyze how this affects the coordination problem and the likelihood of sovereign debt crises.

A Sovereign Bankruptcy Court

In the model, the Court monitors issuing countries and, when these undergo financial stress, decide whether a temporary payments suspension (standstill) is to be applied. In line with the proposal by Eichengreen and Portes and Ghosal and Miller (2003), the Court aims to fight liquidity problems. This view differs from the one held by Krueger (2002) or Jeffrey Sachs, who envisions this institution as a tool to cope with insolvency problems. We address this difference by discussing an extension in which the SBC is also in charge of dealing with insolvency problems. I also discuss another model extension in which the Government has to choose a level of effort. The aim is to study the implications of the SBC for the Governments' incentives to apply costly policies.[22]

A model of sovereign debt crises in the presence of a SBC

The Court and investors move simultaneously in period 1. Analogous to investors', the SBC's rule of action is based on a private signal it receives in the interim period. The analysis, from a partial equilibrium perspective, leaves again D and I unchanged.

The SBC's goal is to avoid liquidity-induced defaults. The Court is not interested in protecting countries doomed to fail ($\theta < \theta_s$) or solvent ($\theta > \theta^*(f)$).[23] Using its signal, the SBC decides whether to call a payments standstill. Declaring a standstill has a fixed cost, $C > 0$, for the Court.

The Court's payoff also depends on taking the right decision If the standstill is properly called, the SBC perceives a utility R. But if the standstill is incorrectly called, it faces disutility qR. The SBC will be declare a standstill whenever the expected payoff from doing so is non-negative. As before, investors perceive utility r when, after rolling-over, the country does not default, and w if, after fleeing, the country defaults. Note that if the Court correctly called a standstill, those who rolled over receive a higher payoff.[24]

The SBC receives a signal $S = \theta + v$, where $v \sim N(0, \frac{1}{\beta})$. Using it, it's beliefs become $\theta|S \sim N(\frac{(\beta S+\gamma\widehat{\theta})}{\beta+\gamma}, \frac{1}{\beta+\gamma})$. Define $\rho_{SBC} = E[\theta|S]$ and denote the cumulative distribution and the density function of the Court, with Ω and ω respectively. The Court knows the distribution of θ and s_i.

[22] Note that ex-ante agreement to submit to an SBC implies a contractual obligation by both creditors and sovereigns. According to Horn (2004), sovereigns can only renounce immunity from jurisdiction and execution by contractual means.

[23] The assumption that the multilateral sector seeks to intervene only in fundamentally sound countries is standard in the literature (Morris and Shin, 2006). The SBC seeks to disrupt market functioning as little as possible.

[24] In Rochet and Vives (2004) the large player´s payoffs are monetary. In this case they could reflect the ineffective disruption on international capital flows or reputational concerns (such as a widening of the perceived accuracy of its information).

Liquidity and solvency with a SBC

If f investors flee, the minimum rate at which the country is still solvent in period 2 is $\theta^*(f) = \theta_s + k\frac{(fD-M)}{I}$. Whenever $\theta \in (-\infty, \theta^*(f))$, if the SBC does not act, the country defaults. Instead, if $\theta < \theta_s$ the country defaults regardless the action taken by the SBC. Only if $\theta \in [\theta_s, \theta^*(f)]$ the SBC can avoid a default.

Solvency, runs and standstills in equilibrium

This section characterizes the new equilibrium. As in the benchmark, the core of the model is the coordination problem among investors. In addition, now they must consider the action taken by the SBC. The payoff of rolling over depends positively on both the amount of investors rolling over and on the willingness of the Court to call a standstill. Similar to that on Corsetti et al. (2004) and Corsetti et al. (2006), the model presents an equilibrium in which investors employ trigger strategies.[25]

Four variables characterize the equilibrium. A threshold θ^* below which the country defaults if there is no standstill. A threshold s^* for investors' private signals and two thresholds, S^{sup} and $S^{\text{inf}} < S^{\text{sup}}$, determining the range of signals for which the SBC will act

Let's start by θ^*. If investors' threshold is s^*, the proportion withdrawing is $f = Prob(\rho_i \leq \rho^* \backslash \theta) = prob(s_i \leq s^* \backslash \theta) = \Phi(\sqrt{\alpha}(s^* - \theta))$. Plugging this into (2), the *fundamental insolvency* treshold is

$$\theta^* = \theta_s[1 + k\frac{[\Phi(\sqrt{\alpha}(s^* - \theta^*)) \cdot D - M]_+}{D - M}]. \tag{4}$$

When the Court does not intervene, there will be a default if $\theta \leq \theta^*(s^*)$.

Next, I recover S^{sup} and S^{inf}. In the margin the Court is indifferent between calling a standstill or not, and the expression holds with equality. Define $\rho_{SBC} = \frac{(\beta S + \gamma\widehat{\theta})}{\beta + \gamma}$. The Court assigns probability $\int_{\theta_s}^{\theta^*} \omega((\sqrt{\beta+\gamma}(\theta - \rho_{SBC}))d\theta$ to its intervention being successful. The SBC compares payoffs as follows

$$R\int_{\theta_s}^{\theta^*} \omega((\sqrt{\beta+\gamma}(\theta - \rho_{SBC}))d\theta - qR(1 - \int_{\theta_s}^{\theta^*} \omega((\sqrt{\beta+\gamma}(\theta - \rho_{SBC}))d\theta \geq C. \tag{5}$$

The SBC's optimal strategy is to call a standstill whenever the above inequality holds. As shown in Figure 1 and formalized in the next proposition, this rule of action leads the SBC to act when its signal falls within an interval.

Proposition 1 *Let* $C^* = (1-q)R$.

[25] Goldstein and Pauzner (2005) provides a uniqueness argument even in an environment of one-sided strategic complementarities. Vives (2006) proves that multiplicity of equilibria in supermodular games, such as global games, is not much of an issue for policy analysis since comparative statics are identical in all equilibria..

(1) *If $C < C^*$, the SBC's optimal strategy is to declare a standstill when its private signal falls within a range $[S^{\inf}_{SBC}, S^{\sup}_{SBC}]$, where $S^{\inf}_{SBC}$ and $S^{\sup}_{SBC}$ are the unique values of S for which* (5) *holds with equality, with $S^{\inf}_{SBC} < S^{\sup}_{SBC}$.*
(2) *If $C > C^*$, the Court never declares a standstill.*

The proof can be found in the Appendix.

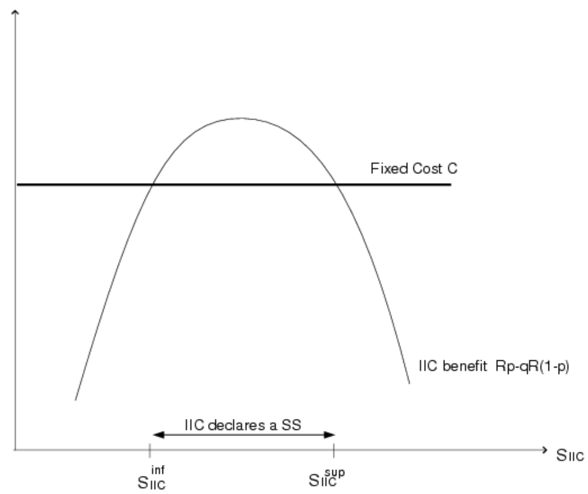

Figure 1. SBC standstill declaration

Intuitively, the SBC calls a standstills if its beliefs do not fall far apart from $[\theta_s, \theta^*(f)]$. As the SBC's signal worsens, the probability that it can avoids a default decreases, reducing the expected value of calling a standstill. Similarly, when the value of the signal increases, the probability of calling a standstill unnecessarily increases, reducing the Court's incentives to call one.

Finally, one can solve for the investors' threshold. They maximize their utility taking into account: (i) if $\theta < \theta_s$, the economy will default in period 2 no matter what the SBC does and, (ii), if $\theta \in [\theta_s, \theta^*(s^*)]$ the country defaults only if the SBC does not act. Therefore, they assign probability $\Phi(\sqrt{(\alpha+\gamma)}(\theta_s - \rho_i))$ to the country defaulting no matter what the SBC does. Using the utility outcomes defined above, the payoff from not rolling over is,

$$\begin{aligned} U^{NR} &= w[\int_{-\infty}^{\theta_s} \sqrt{\alpha+\gamma}\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))d\theta \\ &+ \int_{-\infty}^{S^{\inf}_{SBC}} \int_{\theta_s}^{\theta^*} \sqrt{\alpha+\gamma}\sqrt{\beta}\omega(\sqrt{\beta}(S_{SBC}-\theta))\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))dS_{SBC}d\theta \\ &+ \int_{s^{\sup}_{SBC}}^{\infty} \int_{\theta_s}^{\theta^*} \sqrt{\alpha+\gamma}\sqrt{\beta}\omega(\sqrt{\beta}(S_{SBC}-\theta))\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))dS_{SBC}d\theta]. \end{aligned}$$

ϕ and ω are, respectively, the density functions of Φ and Ω, and $\rho^* = \frac{\alpha s^* + \gamma\widehat{\theta}}{\alpha+\gamma}$.

The first element within the square brackets is the probability assigned by creditors to the country defaulting despite the SBC action. As long as θ falls below θ_s, the country always defaults, justifying investors' decision to run. The second and third elements correspond to situations where the SBC could avoid a default, $\theta_s < \theta < \theta^*$. In this scenario not rolling over is optimal conditional upon the SBC not acting. As the SBC acts only if $S \in [S_{SBC}^{\inf}, S_{SBC}^{\sup}]$ we get two terms. The first for the case with a signal below $S_{SBC}^{\inf}$, and the second corresponding to signals above $S_{SBC}^{\sup}$. Similarly, we can define the corresponding payoff from rolling over as,

$$
\begin{aligned}
U^R &= r[\int_{\theta^*}^{\infty} \sqrt{\alpha+\gamma}\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))d\theta \\
&\quad + \int_{S_{SBC}^{\inf}}^{S_{SBC}^{\sup}} \int_{\theta_s}^{\theta^*} \sqrt{\alpha+\gamma}\sqrt{\beta}\omega(\sqrt{\beta}(S_{SBC}-\theta))\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))dS_{SBC}d\theta].
\end{aligned}
$$

The first term collects the probability of a run failing regardless of the SBC. The second corresponds to the probability of the run being unsuccessful, conditional upon the Court acting. Note that the expressions above account for the fact that for every threshold for the creditors' beliefs there is a different maximum rate for default, θ^*. Every s^* determines a unique level of early withdrawals, which, in turn, implies a different maximum rate. Thereby, every s^*, by implying a different level of pressure on the domestic economy, leads to a different range of θ under which the SBC will be willing to act, i.e. $[\theta_s, \theta^*(s^*)]$.

As before, investors' threshold corresponds to the signal making whoever receives it indifferent between staying or running. The condition $U^R - U^{NR} = 0$ becomes

$$
\frac{r}{r+w} = \Phi(\sqrt{\alpha+\gamma}(\theta^*-\rho^*)) - \int_{\theta_s}^{\theta^*} \sqrt{\alpha+\gamma}\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))\Omega(S_{SBC}^{\sup}, S_{SBC}^{\inf})d\theta, \tag{6}
$$

where $\Omega(S_{SBC}^{\sup}, S_{SBC}^{\inf}) = \Omega(\sqrt{\beta}(S_{SBC}^{\sup}-\theta)) - \Omega(\sqrt{\beta}(S_{SBC}^{\inf}-\theta))$.

This equation determines the equilibrium threshold s^*. Although it is not possible to find a close form solution, in the Appendix I show that, in the case of highly informative private signals, there is a unique solution to this equation. This last equation, together with the one for $\theta^*(s^*)$, the one for θ_s, and the one determining $[S_{SBC}^{\inf}, S_{SBC}^{\sup}]$ completely characterize the equilibrium of the model.

Aggressiveness and Probability of crises: comparing outcomes

How does the introduction of the SBC affect creditors'? Does its presence reduce the probability of observing a crisis?

Proposition 2 *Allowing the SBC to declare payments' standstills reduces agents' incentives to withdraw their money in the interim period, $s^* < s'$.*

The intuition is straightforward. The mere existence of the SBC allows investors to be less concerned about what other investors think, mitigating the coordination problem

Proof. Without the Court, $\Phi(\sqrt{\alpha+\gamma}(\theta'(s')-\rho'))=\frac{r}{r+w}$, where $\rho'=\frac{\alpha s'+\gamma\widehat{\theta}}{\alpha+\gamma}$.

While with the Court,

$$\frac{r}{r+w}=\Phi(\sqrt{\alpha+\gamma}(\theta^*(s^*)-\rho^*))-\sqrt{\alpha+\gamma}\int_{\theta_s}^{\theta^*}\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))F(s^*)d\theta,$$

where $\rho^*=\frac{\alpha s^*+\gamma\widehat{\theta}}{\alpha+\gamma}$, $F(s^*)=\Omega(S_{SBC}^{\sup},S_{SBC}^{\inf})$, $F(s^*)\in(0,1)$. Define $p=\sqrt{\alpha+\gamma}$. As $\Phi(p(\theta^*(s^*)-\rho^*))-\int_{\theta_s}^{\theta^*}\phi(p(\theta-\rho^*))F(s^*)d\theta=\Phi(p(\theta'(s')-\rho'))$,

$$\Phi(p(\theta^*(s^*)-\rho^*))>\Phi(p(\theta'(s')-\rho'))\Leftrightarrow s^*-\theta^*(s^*)<s'-\theta'(s').$$

From the "mass condition" one can see that both $\theta'(s')$ and $\theta^*(s^*)$ are strictly increasing in $s-\theta(s)$, so that $\theta^*(s^*)<\theta'(s')$. Use the positive relation between $\theta(s)$ and s to get $s^*<s'$. ■

In the absence of a SBC, investors behave more aggressively, they run with higher signals, what increases the country's vulnerability. The probability of observing a crisis matches the probability of having a rate of return below the threshold, $Prob(\theta<\theta'(s'))>Prob(\theta<\theta^*(s^*))$. As a result, the probability of observing a crisis is larger in the absence of the SBC. An International Court with authority to call standstills can provide not only ex post benefits (as it can implement barriers to capital outflows), but is also beneficial ex ante. It reduces the coordination problem, making runs and crises less likely.

The role of the accuracy of the Court's information

The analysis so far shows that the presence of the Court is enough to reduce the coordination problem. Now, I analyze how the quality of the SBC's information affect the coordination problem. Below I show that if the court acts cautiously and fundamentals are on the liquidity crisis zone, the better informed the SBC the smaller the coordination problem. First, I introduce a definition used in proving the statement above.

Definition 3 *The Court is said to act cautiously whenever its range of action* $(S_{SBC}^{\inf},S_{SBC}^{\sup})$ *is contained in the interval* (θ_s,θ^*). *That is, the SBC does not act if its own signal falls out of the range of fundamentals for which it should do so.*

Next, I show that higher variable costs make the Court more cautious and present it's implications for the precision of the Court's information.

Proposition 4 *When* q *is sufficiently large, the Court acts cautiously.*

Proof. *Recall the equation determining the interval of action for the Court:*

$$\Lambda(\widetilde{S}) = \int_{\theta_s}^{\theta^*} \omega(\sqrt{\beta+\gamma}(\theta - \frac{\gamma\widehat{\theta}+\beta\widetilde{S}}{\gamma+\beta}))d\theta = \frac{qR+C}{R(1+q)} = F(q).$$

Note that $\lim_{S_{SBC}^{\sup}\to\infty} \Lambda(S_{SBC}^{\sup}) = \lim_{S_{SBC}^{\inf}\to-\infty} \Lambda(S_{SBC}^{\inf}) = 0$ *and* $\frac{\partial F(q)}{\partial q} > 0$. *As* q *increases,* $S_{SBC}^{\inf}$ *increases and* $S_{SBC}^{\sup}$ *decreases. Given that the three equations are continuous,* $\exists\ \widehat{q}$ *such that if* $q > \widehat{q}$, *then* $(S_{SBC}^{\inf}, S_{SBC}^{\sup}) \subset (\theta_s, \theta^*)$. ■

Proposition 5 *If* $q > \widehat{q}$ *and* $\theta \in (S_{SBC}^{\inf}, S_{SBC}^{\sup})$, *the bigger the precision of signal extracted by the Court the smaller* θ^*.

Proof. *We know that the bigger* $\int_{\theta_s}^{\theta^*} \sqrt{\alpha+\gamma}\phi(\sqrt{\alpha+\gamma}(\theta-\rho^*))\Omega(S_{SBC}^{\sup}, S_{SBC}^{\inf})d\theta$ *is, the smaller the coordination problem. Given that only* $\Omega(S_{SBC}^{\sup}, S_{SBC}^{\inf})$ *changes with* β,

$$\begin{aligned}\frac{\partial\Omega(S_{SBC}^{\sup}, S_{SBC}^{\inf})}{\partial\beta} &= [\omega(\sqrt{\beta}(S_{SBC}^{\sup}-\theta))(\frac{\partial\sqrt{\beta}}{\partial\beta}(S_{SBC}^{\sup}-\theta)+\sqrt{\beta}\frac{\partial S_{SBC}^{\sup}}{\partial\beta}) \\ &\quad -\omega(\sqrt{\beta}(S_{SBC}^{\inf}-\theta))(\frac{\partial\sqrt{\beta}}{\partial\beta}(S_{SBC}^{\inf}-\theta)+\sqrt{\beta}\frac{\partial S_{SBC}^{\inf}}{\partial\beta})]\end{aligned}$$

If the Court is cautious then $\frac{\partial S_{SBC}^{\sup}}{\partial\beta} > 0$ *and* $\frac{\partial S_{SBC}^{\inf}}{\partial\beta} < 0$. *If in addition,* $\theta \in (S_{SBC}^{\inf}, S_{SBC}^{\sup})$, *then* $\frac{\partial\Psi(\beta)}{\partial\beta}$ *is undoubtedly positive.* ■

When the fundamentals are such that a cautious SBC should call a standstill, the better informed it is the smaller the coordination problem. This implies that during liquidity crises, better information helps the most.

Figure 2 graphically represents the action interval of a cautious SBC.

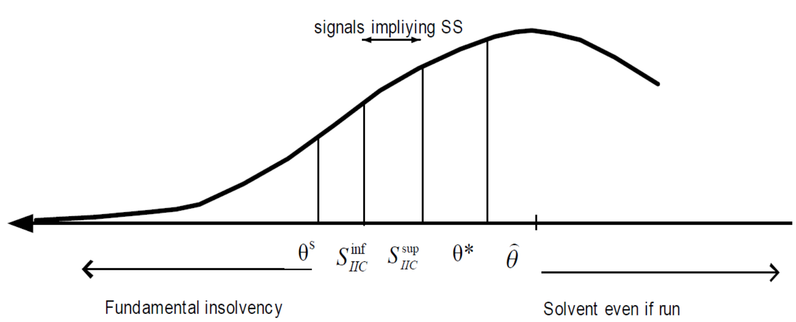

Figure 2: Range of action of a cautious SBC

Summary 6 *The presence of better informed SBC in illiquid economies:*

1) Reduces the region in which a coordination problem exists, $\frac{\partial(\theta^*-\theta_s)}{\partial\beta} < 0$.

2) As a result the probability of a debt crisis, $P(\theta < \theta^*)$ *is also reduced.*

SBC and incentives to apply costly policies

A common critique of support mechanisms is that they reduce debtors' incentives to apply adjustment policies.[26] In this section I assess the implications that the SBC has on Governments' incentives to implement costly effort. To introduce effort in the game I assume that before the roll-over game the government has to make a decision regarding the implementation of a set of costly policies. The Government can choose between exerting high and low effort.

If the Government applies low effort (does not implement adjustment policies), the expected return is θ_L. If, instead, the government implements high effort it gets an increased expected return, $\theta_H > \theta_L$. Effort has a *Cost* assumed to be fixed. Under this scheme, incentives to exert effort depend on the conditions under which access to the SBC is granted. For simplicity the analysis is, again, performed assuming that private signals are arbitrarily precise.

Analyze first the case without Court. Without effort , welfare is

$$\lim_{\alpha\to\infty} W^N(L) = \int_{\theta'}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_L) \cdot d\theta.$$

Instead, if effort is applied,

$$\lim_{\alpha\to\infty} W^N(H) = \int_{\theta'}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - Cost.$$

g and G stand, respectively, for the density and cumulative functions of the distribution of returns conditional on high effort.

The country's change in welfare from implementing effort is,

$$\triangle W^N = I \cdot \triangle\theta(1 - G(\theta'/\theta_L)) + \int_{\theta'}^{\theta'+\triangle\theta} [\theta I + M - D] g(\theta/\theta_H) \cdot d\theta - Cost.$$

The lower limit of integration is θ', as only for returns above that threshold will the country have some cash left. The benefits of effort come from both the increase in the expected return and it's effect on liquidation costs.

When the SBC is present, the country's welfare can be calculated as,

$$\triangle W^{SBC} = I \cdot \triangle\theta(1 - G(\theta_s/\theta_L)) + \int_{\theta_s}^{\theta_s+\triangle\theta} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - Cost.$$

For arbitrarily precise signals, two things occur. First, the SBC never defends a country if $\theta < \theta_s$. Second, creditors never withdraw if $\theta > \theta_s$. Thus, the lower limit of integration is θ_s. The first element in the right hand side collects the expected increase in output. The second, the drop in liquidation costs. Define $\triangle W^{SBC} - \triangle W^N = A + D$.

[26] In a recent paper, Ghosal and Thampanishvong (2012) show that CACs are likely to generate conflit between ex-ante and ex-post efficiency.

Given that $\theta' > \theta_s$, then

$$A = I \cdot \triangle\theta[G(\theta'/\theta_L) - G(\theta_s/\theta_L)] > 0,$$

The SBC increases the range of fundamentals for which countries enjoy the return to effort making it more attractive This effect is displayed in A. In addition, the SBC protects countries in such a way that only under relatively low returns a run is observed.

$$D = \int_{\theta_s}^{\theta_s+\triangle\theta} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - \int_{\theta'}^{\theta'+\triangle\theta} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta$$

Countries worry less about liquidation costs, as they are already hedged against runs by the presence of the Court, $D < 0$. To understand the effect of the SBC on effort I analyze the model numerically.[27] I focus on the effects of changes to the average return without effort (θ_L), the return to effort ($\triangle\theta$), and the variance of the public signal ($\frac{1}{\gamma}$). The values used on the parametrization are summarized in the Appendix.

For the SBC to incentivize effort both leverage and liquidation costs had to be very high.[28] Figures 3a to 3f, in the Appendix, summarize the results. Figures 3a and 3b show how effort changes with the initial average return. The reaction is shown both in scenarios with low/high variance where return to effort is kept low, and scenarios with low/high returns to effort while keeping the variance low. Only when the variance or the return to effort are low, at low initial returns, the SBC does not lead to lower effort. As the initial average return increases, the saving in liquidation costs grows faster without the Court, making effort more desirable in the absence of the SBC. Similar results are obtained when the return to effort is allowed to change (Figures 3c and 3d). Finally, when the precision of the public signal falls, the difference in incentives vanishes (Figures 3e and 3f). As uncertainty increases, any outcome becomes more feasible, reducing the relative gains from effort.

Summary 7 *Only when the initial return and the return to effort are low the SBC incentivizes effort. This incentive vanishes as fundamental (public) uncertainty increases.*

This result reflects the general view that policies aimed at helping countries in stress affect incentives to reform. It is worth noting, however, that when the situation is relatively bad (low return without effort), the SBC can help countries to apply costly policies. The next section argues that this tension can be limited by conditioning the recourse to the Court on the country's effort.

[27] This analysis is not a calibration exercise based on some underlying empirical observations.

[28] With liquidation costs below 70%, the SBC never achieved higher effort. As regards leverage, the parametrization above implies that $\frac{d}{I} = 0.95$.

Conditionality

Now, the SBC can only act in a country if such country has applied effort, which as before is public knowledge. The Court sets a perfectly observable condition.[29] As a result, investors play the roll-over sub-game knowing if the SBC is to intervene or not. If effort is high, the SBC will consider whether to act or not and investors will set their threshold at s^*. Conversely, if effort is low, the SBC will never act and investors choose to run if $s_i < s'$. In turn, this affects the effort choice. Now the level of utility of the government conditional on effort is $\triangle W^{SBC}_{cond}(L) = \int_{\theta'}^{\infty}[\theta I + M - D] \cdot g(\theta/\theta_L) \cdot d\theta$, if low, and, $\triangle W^{SBC}_{cond}(H) = \int_{\theta_s}^{\infty}[\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - Cost$, if high.

What if resort to the SBC is conditioned to policy effort? With an SBC, the utility from exerting effort is,

$$\triangle W^{SBC}_{cond} = \int_{\theta_s}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - \int_{\theta'}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_L) \cdot d\theta - Cost.$$

In the absence of the SBC the incentive to exert effort is as before, $\triangle W^N$. The implications of this type of approach are straightforward.

Proposition 8 *When compared with the incentive to exert effort in the absence of standstills, the policy of conditional standstills enhances the incentives of the debtor country to do so,* $\triangle W^{SBC}_{cond} > \triangle W^N$.

Proof. *What matters is the following difference*

$$\triangle W^{SBC}_{cond} - \triangle W^N = \int_{\theta_s}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta - \int_{\theta'}^{\infty} [\theta I + M - D] \cdot g(\theta/\theta_H) \cdot d\theta$$

which,as long as $\theta_s < \theta'$, *is strictly positive.* ■

While a policy of unconditional support is likely to reduce the incentive to exert effort, an implementation in which support depends on the country's behavior, represents an incentive to apply effort.

SBC and solvency crises

What would happen if the SBC would be to declare payment moratoria also as a way to fight solvency crises?

One thing is certain, analogous to the result in Corsetti et al. (2006), if the SBC would care also about solvency it would intervene more often, reducing again the need to second guess other creditors and mitigating, potentially, the coordination problem. However, whenever $\theta < \theta_s$, the Court will be freezing investors inside the country but will not avert a default. One the one hand this

[29] While the assumption might seem extreme, itis in line with IMF conditionality. The Fund generally uses quantitative targets which can be meassured without error. Moreover, again in line with this assumption, the precautionary lines that the IMF has developed in recent years include ex-ante quantitative benchmarks for clasiffication.

would still be positive because by preventing a run the Court is avoiding the inefficient losses associated with an early closure of the investment, increasing the size. However, on the other hand, investors would be forced to accept not only postponed payments but also in a reduced amount, as in this case some PSI would be required. The issue would be how to balance these two effects. Indeed, depending on the perceived pay-offs it could well be the case that investors prefer to flee.[30]

IV. Conclusions

This paper analyzes the potential for a *Sovereign Bankruptcy Court* to mitigate the coordination problem inherent to sovereign debt in the context of liquidity problems. After reviewing the most relevant proposals for the setting of up a Court, I present a model where the SBC can declare payments standstills whenever a country faces a liquidity crisis. The model focuses on the coordination problem faced by sovereign creditors required to roll-over their debts. It shows that as the Court forces investors to focus on its course of action rather than just second guessing other investors beliefs, the scale of the coordination problem is reduced and creditors become less aggressive. Interestingly, this result holds regardless of the precision of the information handled by the Court. In situations when a country is prone to suffer liquidity crises is when better information provides more good coordination.

References

[1] Andritzky, J. (2012). Government Bonds and Their Investors: What Are the Facts and Do They Matter? IMF Working Paper 12/158.

[2] Barnett, B., Galvis, S., and Gouraige, G. (1984). On Third World Debt. Harvard International Law Journal, Vol. 25.

[3] Bolton, P., and Skeel, D. (2004). Inside the black box: How should a sovereign bankruptcy framework be structured?. Emory Law Journal, Vol. 53.

[4] Bolton, P., and Jeanne, O. (2007). Structuring and restructuring sovereign debt: The Role of a Bankruptcy Regime. Journal of Political Economy, Vol. 115, no. 6.

[5] Cohen, B. (1989). A Global Chapter 11. Foreign Policy, Vol. 75.

[6] Corsetti, G., Dasgupta, A., Morris, S., and Shin, H. (2004). Does one Soros make a difference? A theory of currency crises with large and small traders. Review of economic Studies 71.

[30] Understanding these effects would require a dynamic setting, something beyond the scope of this paper.

[7] Corsetti, G., Guimaraes, B. and Roubini, N. (2006). International lending of last resort and moral hazard. A model of IMF's catalytic finance. Journal of Monetary Economics, Volume 53, Issue 3.

[8] Chui, M., Gai, P., and Haldane, A. (2002). Sovereign liquidity crises: Analytics and implications for public policy. Journal of Banking and Finance 26.

[9] Chun, J. (1996). Post-Modern' Sovereign Debt Crisis: Did Mexico Need an International Bankruptcy Forum?. Fordham Law Review, Vol. 64.

[10] Debevoise, W. (1984). Exchange Controls and External Indebtedness: A Modest Proposal for a Deferral Mechanism Employing the Bretton Woods Concepts. Houston Journal of International Law, Vol. 7.

[11] Diaz-Cassou J., Erce, A., and Vazquez, J. (2008). The Role of the IMF in Recent Sovereign Debt Restructurings: Implications for the LIA Policy. BdE Occasional Paper 0805.

[12] Erce, A. (2013). Sovereign Debt Restructurings and the IMF:Implications for Future Official Interventions. Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute, Working Paper No. 143.

[13] Eaton, J. (2003). Standstills and an International Bankruptcy Court. In Fixing Financial Crises in the 21st Century (ed. by A. Haldane), Routledge.

[14] Eichengreen, B. (2000). Can the Moral Hazard Caused by IMF Bailouts Be Reduced?. Geneva Reports on the World Economy, Special Report 1.

[15] Eichengreen, B., Kletzer, K. and Mody, A. (2003). Crisis resolution: Next steps. WP Santa Cruz Center for International Economics.

[16] Eichengreen, B., and Portes, R. (1995). Crisis? What crisis? Orderly workouts for sovereign debtors. Centre for Economic Policy Research.

[17] Eichengreen, B., and Portes, R. (1997). Managing financial crises in emergig markets. Prepared for Jackson Hole's Annual Economics Conference.

[18] Fisher, S. (1999). On the Need for an International Lender of Last Resort. Speech at the joint luncheon of the American Economic and Finance Associations.

[19] Gai, P., Hayes, S. and Shin, H. (2004). Crisis costs and debtor discipline: the efficacy of public policy in sovereign debt crises. Journal of International Economics, Volume 62, Issue 2.

[20] Gai, P. and Shin, H.S. (2004). Debt maturity structure with preemptive creditors. Economics Letters, 85(2).

[21] Ghosal, S. and Miller, M. (2003). Coordination failure, moral hazard and sovereign bankruptcy procedures. The Economic Journal, Vol. 113.

[22] Ghosal, S., and Thampanishvong, K. (2012). Does strengthening Collective Action Clauses (CACs) help?. Journal of International Economics, forthcoming.

[23] Goldstein, I., and Pauzner, A. (2005). Demand-deposit contracts and the probability of bank runs. The Journal of Finance, Vol. LX, No. 3.

[24] Group of Ten Report (The Rey Report) (1996). The Resolution of Sovereign Liquidity Crises. International Monetary Fund.

[25] Haldane, A. and Kruger, M. (2001). The resolution of international financial crises: private finance and public funds, Bank of England Financial Stability Review.

[26] Haldane, A., Hayes, S., Peñalver, A., Saporta, V. and Shin, H. (2002). Binding-in the private sector. Bank of England Working paper.

[27] Haldane, A., Irwin, G. and Saporta, V. (2004a). Bail-out or work-out? Theoretical considerations. The Economic Journal Vol. 114.

[28] Haldane, A., Peñalver, A., Saporta, V. and Shin, H. (2004b). The Analytics of Sovereign Debt Restructuring. Journal of International Economics, Volume 65, Issue 2.

[29] Horn, N. and Kroll, S. (2004). Arbitrating Foreign Investment Disputes. Aspen Publishers.

[30] International Monetary Fund (2004). Progress Report to the International Monetary and Financial Committee on Crisis Resolution.

[31] International Monetary Fund. Global financial stability report. Various issues.

[32] Jeanne, O. (2009). Debt Maturity and the International Financial Architecture. American Economic Review 99:5.

[33] Kaeser, D. (1990). Pour un système équitable de désendettement. Speech given at a Swissaid forum on solutions to the debt crisis.

[34] Krueger, A. (2002). New approaches to sovereign debt restructuring: An update to our thinking, Conference on "Sovereign Debt Workouts: Hopes and Hazards.

[35] Krugman, P. (1989). Market-Based Debt Reduction Schemes. In Analytical Issues in Debt (ed. by J. Frenkel et al.), International Monetary Fund.

[36] Martin, B. and Peñalver, A. (2002). The effect of payments standstills on yields and the maturity structure of international debt, Bank of England Working Paper.

[37] Miller, M. and Zhang, L. (2000). Sovereign Liquidity Crises: the Strategic Case for a Payments Standstill. The Economic Journal, Vol. 110.

[38] Morris, S. and Shin, H.S. (2006). Catalytic Finance: When does it work?. Journal of International Economics 70.

[39] Oechsli, C. G. (1981). Procedural Guidelines for Renegotiating LDC Debts: An Analogy to Chapter 11 of the U.S. Bankruptcy Reform Act," Virginia Journal of International Law, Vol. 21, No. 2.

[40] Raffer, K. (1990). Applying Chapter 9 Insolvency to International Debts: An Economically Efficient Solution with a Human Face. World Development, Vol. 18, No. 2

[41] Rochet, J.C. and Vives, X. (2004). Coordination failures and the lender of last resort: Was Bagehot right after all?. Journal of the European Economic Association 2(6).

[42] Rogoff, K., and Zettelmeyer, J. (2003). Bankruptcy Procedures for Sovereigns: A History of Ideas, 1976–2001. IMF Staff Papers Vol. 49, No. 3

[43] Sachs, J. (1984). Theoretical Issues in International Borrowing. Princeton Studies in International Finance 54.

[44] Sachs, J. (1995). Alternative approaches to financial crises in emerging countries. In Capital Flows and Financial Crises (ed. by M. Kahler). Council on Foreign Relations.

[45] Schumacher, J., Trebesch, C., and Enderlin, H. (2012). Sovereign Defaults in Court. The Rise of Creditor Litigation 1976 - 2010. Mimeo.

[46] Schwarcz, S. (2000). Sovereign Debt Restructuring: A Bankruptcy Reorganization Approach. Cornell Law Review, Vol. 85

[47] Simpson, L. (2006). The Role of the IMF in Debt Restructurings: Lending into Arrears, Moral Hazard and Sustainability Concerns", G-24 Discussion Papers, No. 40

[48] Vives, X. (2006). Complementarities and Games: New Developments. Journal of Economic Literature, 43, 2.

Appendix

I. Benchmark economy. Uniqueness

Uniqueness will be guaranteed if the relative precision of the private signal is large enough.

Equation (2) has a slope $\frac{\partial s'}{\partial \theta'} = 1 + \frac{1}{\sqrt{\alpha}} \frac{\partial \Phi^{-1}((\theta' + \frac{kM}{I} - \theta_s)\frac{I}{kD})}{\partial \theta'}$.

Rewriting equation (3) as $s' = \frac{\alpha+\gamma}{\alpha}(\theta' - \frac{\gamma\widehat{\theta}}{\alpha+\gamma} - \Phi^{-1}(\frac{r}{r+w})\frac{1}{\sqrt{\alpha+\gamma}})$, its slope is $\frac{\partial s'}{\partial \theta'} = \frac{\alpha+\gamma}{\alpha}$.

Uniqueness is satisfied if $\frac{\alpha+\gamma}{\alpha} < 1 + \frac{1}{\sqrt{\alpha}} \min(\frac{\partial \Phi^{-1}((\theta' + \frac{kM}{I} - \theta_s)\frac{I}{kD})}{\partial \theta'})$. In that case, the slope of equation (2) is always bigger than that of equation (3), implying that there is, at most, one crossing point.

Note that the minimum of $\frac{\partial \Phi^{-1}(.)}{\partial \theta'}$ is equal to the reciprocal of the maximum value of $\frac{\partial \Phi(.)}{\partial \theta'}$, which is $\frac{1}{\sqrt{2\omega}}$. Thus, we can rewrite the condition as $\alpha > \frac{\gamma^2}{2\omega}$. As long as,the condition above holds, the derived trigger equilibrium is unique.[31]

II. Proof of Proposition 1

Suppose that $C < (1-q)R$. Define $\rho_{SBC} = \frac{\gamma}{\beta+\gamma}\widehat{\theta} + \frac{\beta}{\beta+\gamma}S$. Recall

$$A(\rho_{SBC}) = R(1+q)\int_{\theta_s}^{\theta^*} \omega((\sqrt{\beta+\gamma}(\theta - \rho_{SBC}\ ))d\theta = qR + C$$

Note that $\lim_{\rho\to-\infty} A(\rho_{SBC}) = \lim_{\rho\to\infty} A(\rho_{SBC}) = 0$.

Solving $\max_{\rho} A(\rho_{SBC}) = \max_{\rho}(R+qR)[\Omega(\overline{x}) - \Omega(x_s)]$, where $\overline{x} = \sqrt{\beta+\gamma}(\theta^* - \rho_{SBC})$ and $x_s = \sqrt{\beta+\gamma}(\theta_s - \rho_{SBC})$.

The first order condition is, $\omega(\overline{x}) = \omega(x_s) \implies \omega(\sqrt{\beta+\gamma}(\theta^* - \rho_{SBC})) = \omega(\sqrt{\beta+\gamma}(\theta_s - \rho_{SBC}))$. There are two possibilities for this equation to hold.

First, $\theta^* = \theta_s$ and ρ_{SBC} not defined. This can not be the case because $f > 0$ implies that $\theta^* > \theta_s$. The second makes use of the symmetry of the normal distribution. It implies that $\rho_{SBC} - \theta_s = \theta^* - \rho_{SBC}$. It is easy to see that the maximum of the function above is obtained for $\rho_{SBC}^M = \frac{\theta^* + \theta_s}{2}$.

Now, using again the first order condition just derived,

$$\frac{\partial A(\rho_{SBC})}{\partial \rho_{SBC}} = \begin{cases} > 0 \text{ if } \rho_{SBC} < \rho_{SBC}^M \\ < 0 \text{ if } \rho_{SBC} > \rho_{SBC}^M \end{cases} .$$

Note that $A(\rho_{SBC})$ is continuous, starts at zero and ends up also at zero. Note also that it continuously increases until $\rho_{SBC} = \rho_{SBC}^M$, and decreases afterwards. Then as long as $R(1+q)\int_{\theta_s}^{\theta^*} \omega((\sqrt{\beta+\gamma}(\theta - \rho_{SBC}^M\ ))d\theta - qR > C$, the function $A(\rho_{SBC})$ intersects twice with the line $C + qR$.

[31] This is a sufficient condition. Additionally, iterated deletion of strictly dominated strategies can be used to show that this equilibrium is the unique equilibrium (see Morris and Shin, 2000).

Call those values $\rho_{SBC}^{\sup}$ and $\rho_{SBC}^{\inf}$. Use $\rho_{SBC} = \frac{\gamma}{\beta+\gamma}\widehat{\theta} + \frac{\beta}{\beta+\gamma}S$ to recover $S_{SBC}^{\sup}$ and $S_{SBC}^{\inf}$. Moreover, for all values of the signal between those two the equation above holds with strict inequality, and the Court will declare a standstill as stated in the proposition.

III. Existence of a unique equilibrium in trigger strategies with the Court

Here we show that if the conditions derived below hold the proposed equilibrium is unique.

Applying the following changes of variables $\overline{\lambda} = \sqrt{\alpha+\gamma}(\theta^* - \frac{\gamma}{\gamma+\alpha}\widehat{\theta} - \frac{\alpha}{\gamma+\alpha}s^*)$, and $\overline{\lambda}_s = \sqrt{\alpha+\gamma}(\theta_s - \frac{\gamma}{\gamma+\alpha}\widehat{\theta} - \frac{\alpha}{\gamma+\alpha}s^*)$, equation (6) can be rewritten as,

$$\frac{r}{r+w} = \int_{-\infty}^{\overline{w}} \phi(w)dw - \int_{\overline{w}_s}^{\overline{w}} \phi(w)(\Omega(\overline{\mu}) - \Omega(\overline{\mu}_s))dw,$$

where $\overline{\mu}$ and $\overline{\mu}_s$ are implicit functions of $\overline{\lambda}, \overline{\lambda}_s$ and other model parameters.

The right hand side of the above expression is increasing in both $\overline{\lambda}$ and $\overline{\lambda}_s$. To see it decompose further to get,

$$\begin{aligned} \frac{r}{r+w} &= \int_{-\infty}^{\overline{\lambda}_s} \phi(\lambda)d\lambda + \int_{\overline{\lambda}_s}^{\overline{\lambda}} \phi(\lambda)d\lambda - \int_{\overline{\lambda}_s}^{\overline{\lambda}} \phi(\lambda)(\Omega(\overline{\mu}) - \Omega(\overline{\mu}_s))d\lambda \\ &= \int_{-\infty}^{\overline{\lambda}_s} \phi(\lambda)d\lambda + \int_{\overline{\lambda}_s}^{\overline{\lambda}} \phi(\lambda)F(\overline{\mu}, \overline{\mu}_s)d\lambda \end{aligned}$$

As long as $F(\overline{\mu}, \overline{\mu}_s) \in (0,1)$, increases in $\overline{\lambda}$ and $\overline{\lambda}_s$ increase the value of the right hand side. Now, given $S_{SBC}^{\sup} > S_{SBC}^{\inf}$ the function F is always in that interval and the expression is always increasing in both arguments.

Next, I show that the partial derivatives of $\overline{\lambda}$ and $\overline{\lambda}_s$ with respect to s^* are negative. This implies that increases in s^* reduce the right hand side. As the expression is strictly decreasing in s^* there is a unique point where the equality holds. That is the unique solution for the problem.

Rewrite (4) using the definition of $\overline{\lambda}$ as,

$$\theta^* = (\theta_s - \frac{kM}{I}) + \frac{kD}{I}\Phi(-\overline{\lambda} - \frac{\gamma}{\sqrt{\alpha+\gamma}}\widehat{\theta} + (\sqrt{\alpha+\gamma} - \sqrt{\alpha})\theta^* + (\sqrt{\alpha} - \frac{\alpha}{\sqrt{\alpha+\gamma}})s^*). \tag{7}$$

Now, calculate the derivative of $\overline{\lambda}$ with respect to s^*,

$$\frac{\partial \overline{\lambda}}{\partial s^*} = \sqrt{\alpha+\gamma}\frac{\partial \theta^*}{\partial s^*} - \frac{\alpha}{\sqrt{\alpha+\gamma}}. \tag{8}$$

Plugging $\frac{\partial \theta^*}{\partial s^*} = \frac{\frac{kD}{I}\phi(.)[-\frac{\partial \overline{\lambda}}{\partial s^*} + (\sqrt{\alpha} - \frac{\alpha}{\sqrt{\alpha+\gamma}})]}{(1 - \frac{kD}{I}\phi(.)(\sqrt{\alpha+\gamma} - \sqrt{\alpha}))}$ back into (8) gives,

$$\frac{\partial \overline{\lambda}}{\partial s^*} = \frac{\frac{kD}{I}\phi(.)[\frac{(\alpha+\gamma)\sqrt{\alpha} - \alpha\sqrt{\alpha}}{\sqrt{\alpha+\gamma}}] - \frac{\alpha}{\sqrt{\alpha+\gamma}}}{1 + \frac{kD}{I}\phi(.)\sqrt{\alpha}}.$$

A sufficient condition for the equilibrium to be unique is that the derivative above is negative. As the denominator is positive, the following must hold,

$$\frac{\partial\overline{\lambda}}{\partial s^*} < 0 \Leftrightarrow \phi(.)[\frac{(\alpha+\gamma)\sqrt{\alpha}-\alpha\sqrt{\alpha}}{\sqrt{\alpha+\gamma}}] - \frac{\alpha}{\sqrt{\alpha+\gamma}} < 0, \tag{9}$$

so that $\frac{kD}{I}\phi(.)\gamma < \sqrt{\alpha}$. But ϕ has its maximum value at the mean, $\phi(mean) = \frac{1}{\sqrt{2\omega}}$. This leads to $\alpha > \gamma^2 \frac{k^2 D^2}{2\omega I^2}$. For private signals with precision above the one just derived $\frac{\partial\overline{\lambda}}{\partial s^*} < 0$. As $\frac{\partial\overline{\lambda}_s}{\partial s^*} = -\frac{\alpha}{\sqrt{\gamma+\alpha}} < 0$ independently of the precision, for signals with the precision just derived, both derivatives are negative and therefore there is a unique s^* solving (6). This unique s^* determines θ^*, and this last one uniquely determines S^{sup} and S^{inf}.

III. Evaluating the SBC effect on effort

E	0.1	k	0.8
M	0.5	θ_L	$(1.25, 1.50)$
I	1	$\triangle\theta$	$(0.1, 0.35)$
i	0.1	$\frac{1}{\gamma}$	$(0.2, 1.2)$

Parameter values

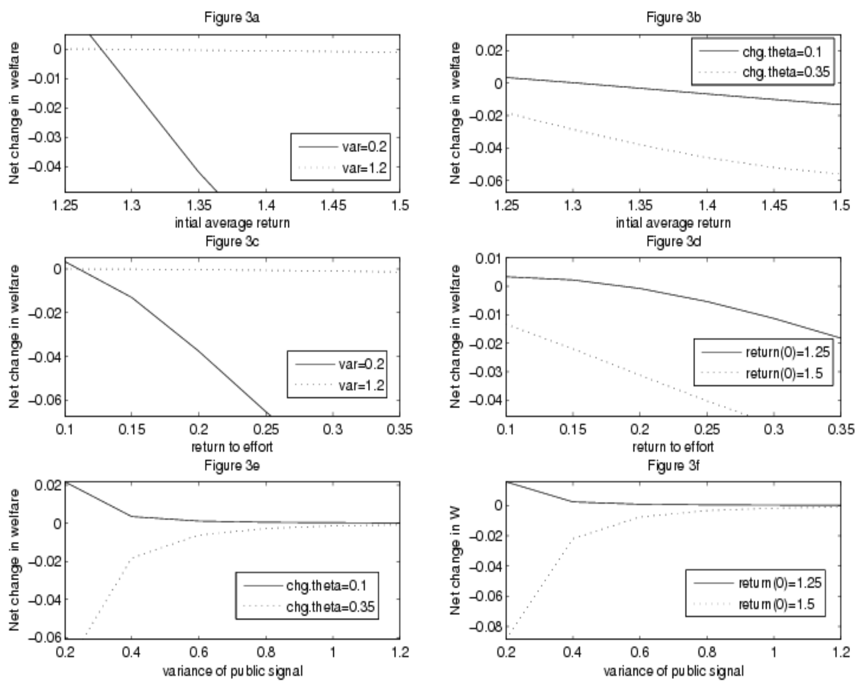

Figure 3: Incentives to apply effort under different parametrizations