Creditor Heterogeneity and the Optimal Use of Enhanced Collective Action Clauses

VERY PRELIMINARY DRAFT

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Abstract

Enhanced CACs were first tested in Argentina and Ecuador in the context of their 2020 restructurings. In both instances, the debtor government decided to use two-limb rather than single-limb aggregation—taking many observers and commentators by surprise. This paper considers a simple model of sovereign debt restructuring with heterogeneous creditors to shed light on the optimal choice of aggregation procedure by a sovereign willing to implement a bond exchange at minimum cost.

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Introduction

Since their systematic introduction in New York-law governed sovereign bonds in 2003, collective action clauses (CACs) have been viewed as a key pillar of the international debt architecture. Indeed, by enabling the implementation of a restructuring without the unanimous consent of creditors, such clauses constitute an essential element of the contractual toolkit towards the orderly resolution of sovereign debt distress.[1]

Over the years, CACs have appeared in various forms in sovereign bond contracts. In their latest incarnation, so-called 'enhanced' CACs (ICMA, 2014) provide that in the context of a restructuring involving multiple bond series, the sovereign can choose among three voting procedures (or 'modification methods') to determine which series are swept into the bond exchange:

- the first procedure operates *series-by-series*, allowing a supermajority of participating creditors (usually 75%) to bind a dissenting minority within a bond issue;
- the *'two-limb'* mechanism relies both on the voting outcomes within bond series and on the aggregate outcome across series. The voting thresholds in this hybrid procedure are typically set at 50% and 66 2/3%, respectively.[2]
- the *'single-limb'* aggregation procedure exclusively relies on the aggregate voting outcome—with a supermajority threshold of 75% and the additional constraint (known as 'uniform applicability' condition) that all bond series receive the same exchange terms.

In view of the highly effective use of simple aggregation in the context of the Greek private restructuring of 2012 (see Zettelmeyer et al. (2013)), the presumption when 'enhanced' CACs were introduced was that the latter procedure would be the method of choice to conduct bond exchanges. Yet in the summer of 2020, in the first two instances when these contractual provisions were tested in practice, the Argentine and Ecuadorian governments opted in favour of two-limb aggregation—at odds with the belief commonly held in policy circles that single-limb aggregation would be the most potent tool to facilitate restructurings.[3]

Motivated by these recent developments, this paper constitutes a first attempt at providing an economic analysis of enhanced CACs in sovereign debt workouts. To do so, we consider a setup with multiple bond series and heterogeneous creditors, allowing for heterogeneity both within bonds (capturing differences in discount rates, regulatory constraints, information, or

[1] For background information on institutional and legal details, see Buchheit and Gulati (2002), Weidemaier and Gulati (2013), and Gelpern et al. (2016), as well as Buchheit et al. (2019), IMF (2014) and IMF (2020).

[2] When two-limb aggregation was first introduced (e.g., Uruguay 2003, Argentina 2005), the voting thresholds were set at 66 2/3% and 85%, respectively.

[3] For a detailed account of the eventful and controversial Argentine restructurings, see among others Buchheit and Gulati (2020), Clark and Lyratzakis (2020), de la Cruz and Lagos (2021), and Setser (2020).

litigation costs) and across bonds (which may differ, e.g., in terms of maturity or coupon rate, as well as in their bondholder base).[4] Our primary objective is to characterize the optimal choice of aggregation procedure by a debtor government in a restructuring.

Specifically, our stylised analytical framework features two bonds held by two different continua of investors. Within each group, investors have heterogeneous outside options, that is, they value the payoff from holding out of the restructuring differently. In a parametric example, we show that the two-limb aggregation procedure is indeed the optimal choice for the government, when the relative notional size of the 'expensive' bond—i.e., the bond whose holders have higher reservation values—is large enough. Conversely, the single-limb procedure is best when the size of the expensive bond is small, and the individual series threshold of the two-limb procedure becomes a constraint that is too costly to satisfy.

Our modelling environment, or extensions thereof, would be well-suited to investigate a number of related research questions such as the strategic interactions among creditors under aggregated voting, sub-aggregation and redesignation strategies, the endogenous sorting between bond characteristics and creditor types, the role of large (non-atomistic) investors and bond portfolio cross-holdings. Our analysis may also be extended to allow for messier multiple-bond environments with interlocking debt stocks featuring different CACs specifications, as was the case in Argentina 2020 with the two subsets of Kirchner and Macri bonds.

Related literature. The paper contributes to the theoretical economic literature on CACs in sovereign debt restructuring. Existing work—such as Haldane et al. (2005), Engelen and Lambsdorff (2009), Bi et al. (2016)—has looked at settings with a single bond instrument to study how strategic creditor interactions and restructuring outcomes are affected by a supermajority rule as opposed to unanimity.[5] By design, these papers are silent on cross-bond heterogeneity and aggregation. Instead, we adopt a setting with multiple bonds to address questions that are specifically related to enhanced CACs.[6]

Fang et al. (2021) provide rare systematic empirical evidence on the impact of CACs on restructuring outcomes. Namely, they study the combined impact of CACs and restructuring haircut on participation rates. Their restructuring sample includes bonds without CACs as well as bonds with 'old-style' series-by-series CACs, together with Greek local-law bonds with

[4]The latter dimension of heterogeneity becomes irrelevant in circumstances where cross-default clauses are activated and all bonds series are accelerated upon a payment default occurring prior to the restructuring.

[5]Also in a one-bond setting, Ghosal and Thampanishvong (2013) analyses the impact of a strengthening of CACs (i.e. lowering supermajority threshold) on intermediary vs ex ante efficiency, and resulting tradeoff, in a setup featuring debtor moral hazard and coordination friction due to incomplete information.

[6]Early analyses of CACs in a one-bond setup may still be relevant in practice: first, in case a country has multiple bonds outstanding, all of which having old-style series-by-series CACs; second, in the case of new issuer countries that have only one bond outstanding. Ecuador restructured one single bond in 2012, so did Mozambique in 2019.

("retrofitted") single-limb aggregation. The theoretical predictions derived from our analysis therefore do not directly speak to their evidence but could be tested in the future on an extended sample.

Our work is also connected to a series of empirical papers investigating empirically how the inclusion of various versions of CACs affects sovereign bond prices and yields, including early contributions by Becker et al. (2003) and Eichengreen and Mody (2004), and more recent ones by Carletti et al. (2016), Carletti et al. (2020) and Chung and Papaioannou (2020). Theoretical predictions on the fair pricing of CACs must build on, among other things, a fine understanding of how CACs are used and actually play out in restructuring times. Our work may thus inform such empirical investigations.

1 General Framework

In this section, we spell out a general framework that can be used to consider a restructuring of several bonds. In Section 2 we then consider a two-bond example where the analysis is particularly transparent.

Environment. We consider the restructuring of several bonds. There are N bond series indexed by $i \in \{1, ..., N\}$. The respective size of each bond series as a fraction of the whole debt stock to be restructured is given by λ_i, where $\sum_{i=1}^{N} \lambda_i = 1$.

Voting rules. We will consider the three different voting rules outlined in our introduction, each corresponding to a different CACs regime. We denote the first 'series-by-series' regime with the subscript 0. In this case, the entirety of bond series i is restructured if the share of consent within each series is at least larger than the series-by-series threshold t_0^s, which is typically equal to 3/4. The second regime is the so-called "two-limb" regime, where CACs are triggered if both a series-by-series and an aggregate cutoff are met. We denote this regime with subscript 2, and we denote the series-by-series and the aggregate thresholds with t_2^s and t_s^a respectively. These thresholds are typically equal to $t_s^2 = 1/2$ and $t_s^a = 2/3$. The third regime is the so-called "single-limb" regime, where CACs are triggered if an aggregate cutoff is met, and the offer made to all bond series must satisfy the uniform applicability condition. We denote this regime with subscript 1 and the aggregate threshold with t_1^a. This threshold is typically equal to $t_1^a = 3/4$.

In all regimes, the government chooses what offer to make to each bond series, and which bond series to include in the aggregate vote count when there are aggregate thresholds. We denote with $\mathcal{I} \subseteq \mathcal{B}$ the subset of bond series that are included in an exchange offer.

Bondholders. We assume each bond series i is held by a total mass λ_i of bondholders, and that each series is held by different investors. Each bondholder assigns idiosyncratic value v to the outcome of holding out of the bond exchange. We assume reservation values are exogenous, and abstract from explicit strategic considerations.[7] Reservation values v are distributed according to cumulative distribution function F_i for each bond series i. We assume that $F_i(0) = 0$ and $F_i(1) = 1$, but make no further assumption on the support or distribution of the reservation values.

Government. The government chooses which bond series to include in a restructuring, and makes offer ω_i to bond series i for all $i \in \mathcal{I}$. Bondholders follow cutoff strategies, so they accept the offer if it is at least as high as their value of holding out, that is, if $\omega_i \geq v$. It follows that the share of holders of bond series i that give their consent to offer ω_i is given by all bondholders with a reservation value below the offer, $F_i(\omega_i)$.

The government wishes to minimise the total cost of the restructuring, which is given by

$$\mathcal{C} = \sum_{j \in \mathcal{A}} \lambda_j \omega_j + \mathcal{L}\left(\sum_{j \in \mathcal{B} \setminus \mathcal{A}} \lambda_j \right), \tag{1}$$

where $\mathcal{A} \subseteq \mathcal{I} \subseteq B$ denotes the set of bond series where the offer is accepted and CACs are triggered, $\mathcal{B} \setminus \mathcal{A}$ denotes the set of bond series that are excluded from the exchange or that reject the offer, and $\mathcal{L}$ denotes a loss function which depends on the mass of bond series that are not restructured.

We now have all the elements to write down the constraints for each regime. In the series-by-series regime, the restructuring offer must satisfy

$$F_i(\omega) \geq t_0^s \quad \forall i \in \mathcal{I}. \tag{2}$$

In the two-limb regime, the restructuring offer must satisfy

$$F_i(\omega) \geq t_2^s \quad \forall i \in \mathcal{I} \tag{3}$$

$$\sum_{i \in \mathcal{I}} \lambda_i F_i(\omega_i) \geq t_2^a. \tag{4}$$

In the single-limb regime, the restructuring offer must satisfy

$$\sum_{i \in \mathcal{I}} \lambda_i F_i(\omega) \geq t_1^a. \tag{5}$$

We have outlined the mathematical framework behind the sovereign debt restructuring of multiple bond series with enhanced CACs. It is however difficult to make progress without

[7] For empirical evidence on sovereign debt litigation, see Schumacher et al. (2021). No systematic evidence on holdout payoffs, apart from well-publicized cases such as in the Argentine settlement—see Cruces and Samples (2016).

making specific assumptions on the shape of the reservation value distributions F_i and on the relative notional bond sizes λ_i. We thus turn to a more stylised setting where we provide a two-bond example that allows to derive more explicit conclusions.

2 Two-Bond Example

We now consider two bonds, $i \in \{1, 2\}$, with weights $\lambda_1 = \lambda$ and $\lambda_2 = 1 - \lambda$. For now, we restrict our attention to the case where the government wishes to restructure both bond series, and we only focus on the comparison between the single-limb and two-limb aggregation procedures. Without loss of generality, we assume that F_1 stochastically dominates F_2 in the first-order sense, that is $F_1(x) < F_2(x)$ for all $x \in [0, 1]$. In words, bond 1 will be the 'expensive' bond, i.e. the bond whose creditors have the higher reservation value distribution.

2.1 Single-Limb Aggregation

In the single-limb case, the government wishes to minimise its total spend subject to the aggregate constraint (5) and the uniform applicability condition that requires the offer to be the same across bond series. It follows that the optimal offer of the government ω^* solves

$$\lambda F_1(\omega^*) + (1 - \lambda) F_2(\omega^*) = t_1^a. \tag{6}$$

Given the stochastic ordering of F_1 and F_2, we can show that ω^* is increasing in λ and that

$$\omega^* \in \left[F_2^{-1}(t_1^a), F_1^{-1}(t_1^a)\right] \tag{7}$$

where the lower bound obtains when $\lambda = 0$ and the upper bound obtains when $\lambda = 1$.

2.2 Two-Limb Aggregation

In the two-limb case, the government wishes to minimise its total spend

$$\min_{\omega_1, \omega_2} \lambda \omega_1 + (1 - \lambda) \omega_2.$$

subject to

$$\lambda F_1(\omega_1) + (1 - \lambda) F_2(\omega_2) \geq t_2^a \tag{8}$$

$$F_i(\omega_i) \geq t_2^s \qquad i = 1, 2. \tag{9}$$

To characterise the equilibrium, let us first express ω_1 as a function of ω_2 using the aggregate constraint (8):

$$\omega_1 = F_1^{-1}\left(\frac{t_2^a - (1 - \lambda) F_2(\omega_2)}{\lambda}\right). \tag{10}$$

Note that if

$$t_2^s \leq F_2(\omega_2) \leq \frac{t_2^a - \lambda t_2^s}{1-\lambda} \tag{11}$$

then the series-by-series constraints in (9) are also satisfied. The first and second inequalities relate to ω_2 and ω_1 respectively.

We can thus consider the equivalent, transformed problem

$$\min_{\omega_2} \lambda F_1^{-1}\left(\frac{t_2^a - (1-\lambda)F_2(\omega_2)}{\lambda}\right) + (1-\lambda)F_2(\omega_2) \tag{12}$$

subject to constraint (11). In the unconstrained case where constraint (11) is not binding, the first order condition is given by

$$\lambda \frac{1}{f_1\left(F^{-1}\left(\frac{t_2^a-(1-\lambda)F_2(\omega_2)}{\lambda}\right)\right)}\left[-\frac{1-\lambda}{\lambda}f_2(\omega_2)\right] + (1-\lambda) = 0$$

which after some simplifications yields

$$f_1(\omega_1) = f_2(\omega_2) \tag{13}$$

where recall that ω_1 is a function of ω_2 as per equation (10). Condition (13) is also sufficient for an optimum if the following holds

$$\frac{d\log f(\omega_2))}{d\omega_2} > -\frac{d\log f(\omega_1))}{d\omega_1}\frac{1-\lambda}{\lambda}.$$

Single-limb vs. two-limb aggregation. We now have enough elements and a simple enough setting to ask our first question: when is it the case that the two-limb strategy is the most cost-effective for the government?

There are two possibilities. If constraint (11) is satisfied by the unconstrained solution of (13), then it is particularly easy to compare the two regimes. When the single-limb procedure has a weakly higher aggregate threshold, as is the case in practice, then it is straightforward to show that the two-limb regime is optimal, since it allows for a larger degree of freedom (different offers). When instead the two-limb unconstrained solution is not feasible, then we cannot say which regime dominates: two-limb aggregation allows differentiated offers but has more constraints. We can shed further light on this instance by making explicit parametric assumptions, which we do in the following subsection.

2.3 Parametric Example

We now consider the case where holdout values are exponentially distributed, that is,

$$F_i(v) = 1 - e^{-\frac{v}{\phi_i}}.$$

Assuming an exponential distribution is convenient because the single parameter ϕ_i provides a sufficient statistic of the stochastic dominance ordering. Without loss of generality, we will assume that $\phi_1 > \phi_2$, that is, bond 1 has holders with higher holdout values that will therefore require larger restructuring offers than those of bond 2.

Single-limb aggregation. Following the reasoning of Section 2.1, the optimal single-limb offer is ω^*

$$1 - t_1^a = \lambda e^{-\omega^*/\phi_1} + (1-\lambda)e^{-\omega^*/\phi_2}. \tag{14}$$

Two-limb aggregation. As in equation (10), we express ω_1 as a function of ω_2 using the aggregate constraint:

$$\omega_1 = -\phi_1 \log\left(\frac{t_2^a - 1 - \lambda + \lambda e^{-\omega_2/\phi_2})}{\lambda}\right). \tag{15}$$

With this, we can write down the unconstrained two-limb problem as per equation (12). The unconstrained solution for ω_2 is

$$\omega_2^{unc} = \phi_2 \log\left(\frac{\lambda\frac{\phi_1}{\phi_2} + 1 - \lambda}{1 - t_2^a}\right). \tag{16}$$

As stated previously in the general two-bond case, this is feasible if the series-by-series constraint is satisfied, that is if

$$t_2^s \leq 1 - e^{-\frac{\omega_2^{unc}}{\phi_2}} \leq \frac{t_2^a - \lambda t_2^s}{1-\lambda}. \tag{17}$$

These two inequalities require

$$\lambda\left(\frac{\phi_1}{\phi_2} - 1\right) \geq \frac{t_2^s - t_2^a}{1 - t_2^s} \tag{18}$$

$$\lambda\left(\frac{\phi_1}{\phi_2} - 1\right) \geq \frac{\phi_1}{\phi_2}\frac{1 - t_2^a}{1 - t_2^s} - 1. \tag{19}$$

The first inequality is always satisfied, since $t_2^s < t_2^a$. The second inequality holds for λ larger than a cutoff value which is a function of the aggregate thresholds t_1^a, t_2^a and of the distribution parameters ϕ_1, ϕ_2.

Optimal voting procedure given λ. We can now compute the total cost of the restructuring for the government as a function of the relative size of the two bonds. In the single-limb case total government spend is given by

$$\mathcal{C}_1 = \omega^* \tag{20}$$

where ω^* is given by equation (14), while for the two-limb case we have

$$\mathcal{C}_2 = \lambda\omega_1 + (1-\lambda)\omega_2. \tag{21}$$

To find out when the single-limb strategy is the cheapest voting option for the government, we proceed as follows. First, recall that if $t_2^a \le t_1^a$ as is the case in practice, the two-limb strategy weakly dominates the single-limb strategy whenever the unconstrained offer is feasible. Things becomes more interesting when the unconstrained two-limb offer is not feasible, which immediately implies that t_2^s binds for the high-v distribution, i.e. $F_1(\omega_1^{unc}) < t_2^s$. In this case the two-limb bond offers will be such that

$$F_1(\omega_1) = t_2^s$$
$$F_2(\omega_2) = \frac{t_2^a - \lambda t_2^s}{1-\lambda}$$

and the total spend for the government is given by

$$\begin{aligned} \mathcal{C}_2 &= \lambda F_1^{-1}(t_2^s) + (1-\lambda) F_2^{-1}\left(\frac{t_2^a - \lambda t_2^s}{1-\lambda}\right) \\ &= \lambda \phi_1 \log\left(\frac{1}{1-t_2^s}\right) + (1-\lambda)\phi_2 \log\left(\frac{1-\lambda}{1-t_2^a - \lambda(1-t_2^s)}\right). \end{aligned} \tag{22}$$

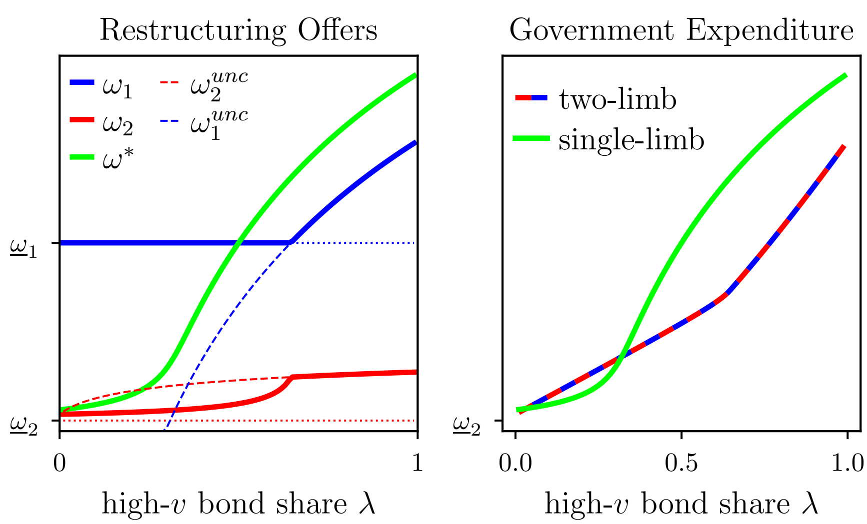

Figure 1: Illustration of optimal restructuring offers (left panel) and total government spend (right panel).

We perform a numerical example[8] to explore the results of the model, which are illustrated in Figure 1. The left panel shows the optimal offers in the case of single-limb aggregation (green solid line) and of two-limb aggregation (blue and red solid lines). The horizontal dotted lines represent the series-by-series CACs thresholds, and the dashed curves represent the unconstrained offers under two-limb aggregation. As is clear from the graph, the unconstrained two-limb offers are possible when λ is large enough, while for low λ the series-by-series constraint binds for ω_1, which implies the government can reduce ω_2 below its unconstrained

[8]We use the following parameters: $\phi_1 = 0.4, \phi_2 = 0.02, t_1^a = 3/4, t_2^a = 2/3, t_2^s = 1/2$.

level. The right panel illustrates the implied total government spend. The green curve represents the single-limb case, while the red-blue curve shows the two-limb case. Note that the single-limb option implies a larger spend at the extrema $\lambda = \{0, 1\}$ because we are assuming that $t_1^a > t_2^a > t_2^s$. As is clear from the graph, the single-limb strategy (green curve) is optimal when λ is low enough, i.e. in the region where the two-limb offers are constrained.

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