Dealing with Heterogeneous Creditors in Sovereign Bond Restructurings

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Introduction

Recent sovereign bond restructurings

- multiple bond series
- heterogeneous exchange offers
- heterogeneous choices by bondholders
- use of ‘enhanced’ CACs

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Collective Action Clauses (CACs)

- key pillar of debt restructuring framework with private creditors
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Enhanced CACs

- inserted in external bond issuances since 2014-15 (ICMA 2014)
- when restructuring multiple bond series, sovereign can choose among 3 voting rules

Enhanced CACs: Definition

Within a restructuring of multiple bonds, can choose among 3 voting rules

Source: Indenture of Ecuador's 10.75% 2022 Notes

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- **Series-by-series: within-bond ($\approx 75\%$)**

  *In the case of any **Modification** of the terms and conditions of the Notes [...], such Modification **may be made with the consent of** Ecuador and of holders of **at least 75%** in aggregate principal amount **of the Notes** then outstanding.*

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- **Two-limb: across-bonds ($\approx 66.6\%$) and within-bond ($\approx 50\%$)**

  *[...] any modification to the terms and conditions of **two or more series** may be made [...] with the consent of the Republic, and (x) the holders of **at least 66 2/3%** of the aggregate principal amount of the outstanding debt securities **of all series [...] (taken in aggregate)**; **and*** (y) the holders of **more than 50%** the aggregate principal amount [...] **of each affected series (taken individually)**.

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- **Single-limb: across-bonds ($\approx 75\%$) + *uniform applicability* constraint**

  [...] any modification to the terms and conditions of ***two or more series*** *may be made, [...] with the consent of the Republic, and the holders of at least 75% of the aggregate principal amount [...]* ***of all series [...] (taken in aggregate)****, provided that the* ***Uniformly Applicable condition*** *is satisfied.*

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Enhanced CACs in Practice

Adoption

- two-limb CACs inserted in bond contracts since Uruguay 2003
- single-limb introduction in 2014 viewed as key innovation
- wide belief that single-limb would be most effective procedure
  - *more robust 'aggregation' feature designed to limit the ability of holdouts to neutralize traditional CACs, which operate on a series-by-series basis* (IMF, 2014)
- Eurozone 2022 Model CACs include single-limb only

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Argentina & Ecuador 2020 debt restructurings

- enhanced CACs tested in practice for the first time
- both opted for two-limb aggregation
- both made differentiated exchange offers across bond series

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- A theoretical analysis of optimal debt restructuring with
  - multiple bonds
  - heterogeneous creditors
  - enhanced CACs

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  (e.g. expected litigation cost/outcome, discount rates, coupon/maturity preferences)

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- Consider **heterogeneity**
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- Characterise
  - optimal offers, for a given voting rule
  - optimal voting rule

  for the debtor government

Literature

- Theoretical: single bond restructurings
  - Haldane et al. (2005); Engelen and Lambsdorff (2009); Bi, Chamon and Zettelmeyer (2016); Pitchford and Wright (2012, 2017)

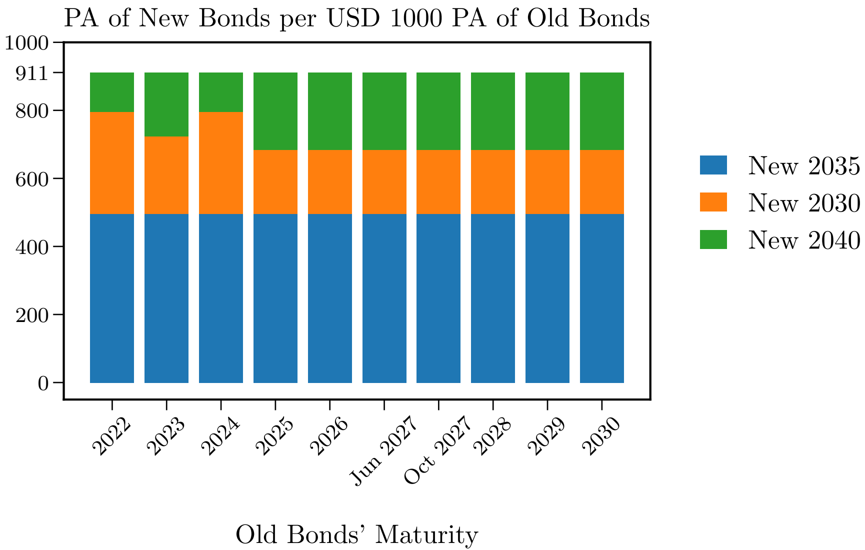
- Empirical: bond-level restructuring outcomes
  - Fang, Schumacher and Trebesch (2021); Asonuma, Niepelt and Ranciere (2023)

- Empirical: effects of CACs on bond prices
  - Becker et al. (2003); Eichengreen Mody (2004); Carletti et al. (2016, 2020); Chung and Papaioannou (2020)

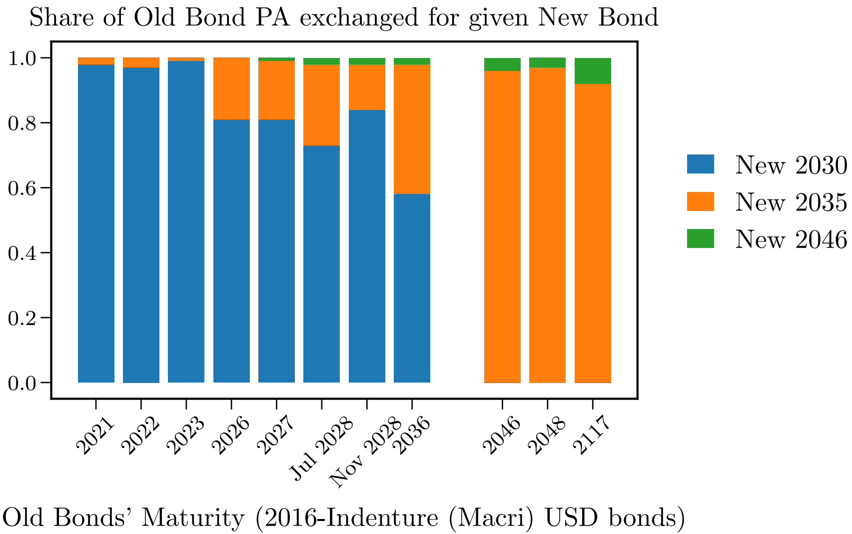
Outline

- Motivating evidence
- Static model, two bonds
  - setup
  - optimal offers given voting rule
  - optimal voting rule
  - comparative statics
- Environments
  - deterministic
  - stochastic

Ecuador 2020: Heterogeneous Offers



Argentina 2020: Heterogeneous Offers & Choices



Model Setup

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Exchange offer

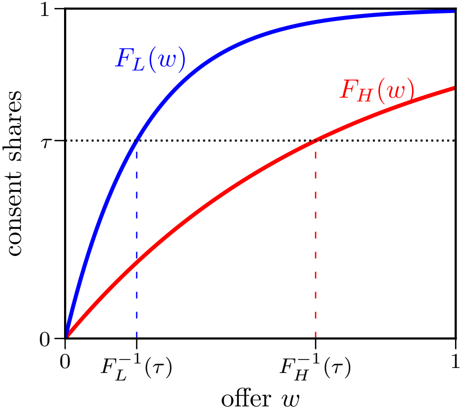
- government makes offer w_i to holders of bond i
- creditor accepts if $w_i \geq v$
- share of consent within bond i is given by $F_i(w_i)$

Creditor-Bond Heterogeneity

- Holders of bond H have higher reservation values

$$F_H(w) < F_L(w) \qquad \text{for any } w$$

$\Rightarrow$ bond H has better payment terms, holders have better litigation skills, ...



Government Problem

- Objective function = restructuring payout

$$\min_{w_H, w_L} \lambda\, w_H + (1-\lambda) w_L$$

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- Participation constraints depend on the voting rule
  - Two-limb

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‘Auxiliary’ Problem

- Problem with aggregate constraint only

$$\min_{w_H, w_L} \; \lambda\, w_H + (1-\lambda) w_L$$
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- Additional constraint in full problem depends on voting rule
  - Two-limb: $\tau = \tau_2^{\mathrm{a}}$ and $F_i(w_i) \geq \tau_2^{\mathrm{s}}$ for $i \in \{H, L\}$
  - Single-limb: $\tau = \tau_1$ and $w_H = w_L$

Single-limb Offer

- Optimal uniform offer w_u s.t.

$$\lambda F_H(w_u) + (1-\lambda) F_L(w_u) = \tau_1$$

- Total government cost

$$C_1 = w_u$$

- Remarks
  - $F_H(w_u) < \tau_1 < F_L(w_u)$
  - $w_u(\lambda, \tau_1)$ increasing in λ, τ_1

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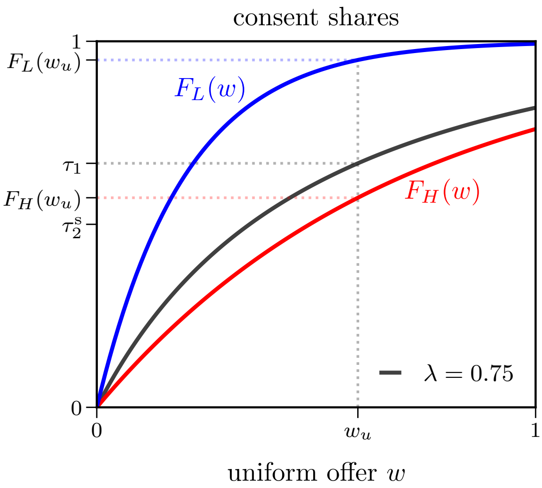

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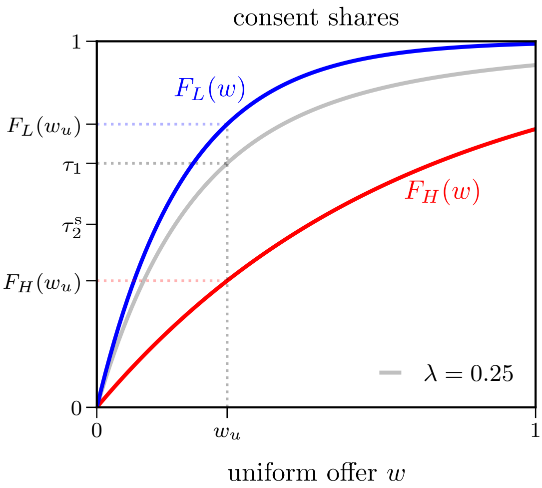

Two-limb Offer

- Auxiliary problem

$$\min_{w_H} \; C_2(w_H) := \lambda\, w_H + (1-\lambda) g(w_H) \qquad \text{where} \qquad g(w_H) := F_L^{-1}\left(\frac{\tau_2^{\mathrm{a}} - \lambda\, F_H(w_H)}{1-\lambda}\right)$$

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- Full solution (w_H, w_L)
  - $=$ $(\widehat{w}_H, \widehat{w}_L)$ if series-by-series constraint is satisfied
  - $\neq$ $(\widehat{w}_H, \widehat{w}_L)$ if *one* series-by-series constraint binds, e.g.

$$F_H(w_H) = \tau_2^{\mathrm{s}} \qquad \text{and} \qquad w_L = F_L^{-1}\left(\frac{\tau_2^{\mathrm{a}} - \lambda \tau_2^{\mathrm{s}}}{1-\lambda}\right)$$

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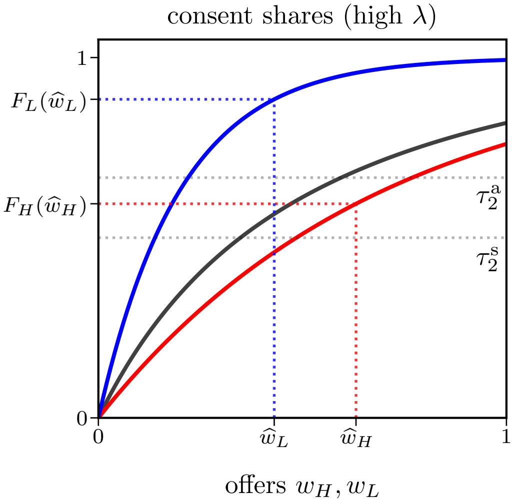

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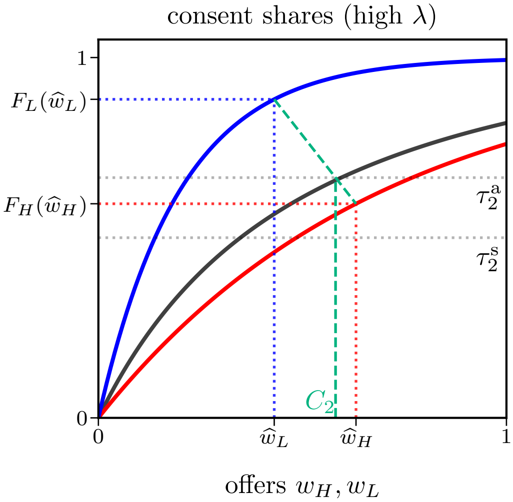

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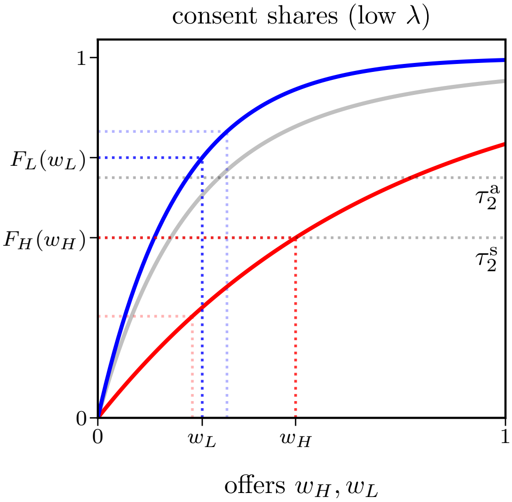

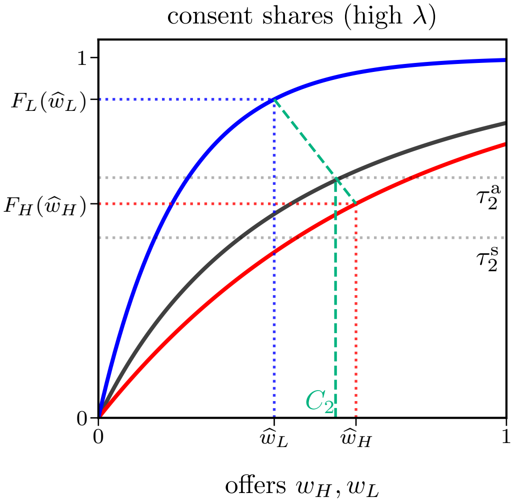

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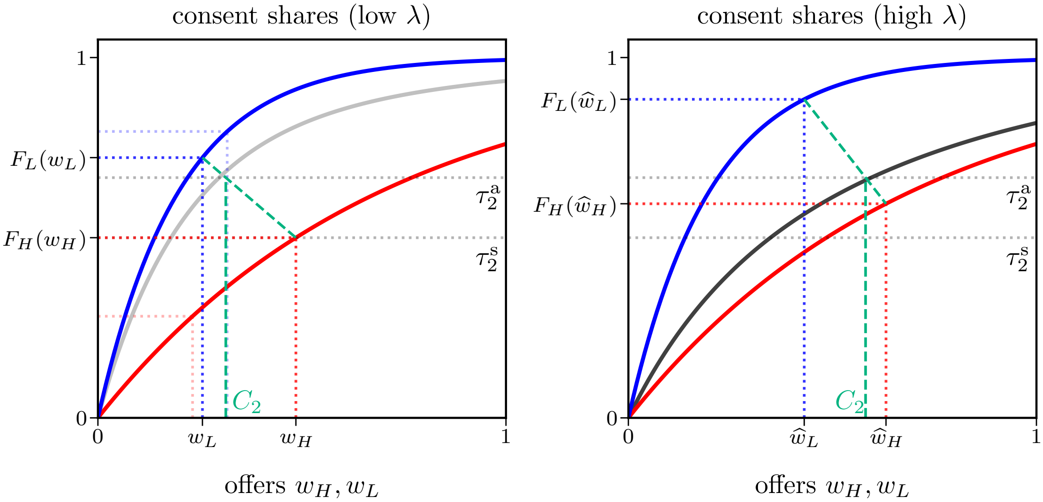

Optimal Voting Rule
Sufficient Conditions

Lemma

Two-limb dominates single-limb if

(i) *the optimal single-limb offer* w_u *satisfies all series-by-series constraints:* $F_i(w_u) \geq \tau_2^{\mathrm{s}}$

(ii) *the auxiliary problem solution* $\widehat{w}_i$ *satisfies all series-by-series constraints:* $F_i(\widehat{w}_i) \geq \tau_2^{\mathrm{s}}$

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Remarks

- Advantage of single-limb is lack of series-by-series constraints

  $\Rightarrow$ worthless if not binding

- Result generalises to $N-$bond case

Comparative Statics

Sufficient Conditions

Proposition 1

- Two-limb is optimal if
  - H-bond share (λ) high enough ▸ λs
  - heterogeneity across bonds not too high ▸ γs
  - $\lambda \approx 0$ when $\tau_1 > \tau_2^{\mathrm{a}}$

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▸ λs

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- Single-limb is optimal if $\tau_1 \approx \tau_2^{\mathrm{a}}$ and
  - around $\widetilde{\lambda}$ such that $\widehat{w}_H = \widehat{w}_L = w_u(\widetilde{\lambda}, \tau_1) < F_i^{-1}(\tau_2^{\mathrm{s}})$ for some i
  - $\lambda \approx 0$ when $\tau_1 = \tau_2^{\mathrm{a}}$

Parametric Example

Assuming: $F_i(w) = 1 - e^{w/\phi_i}$, $\phi_H = 0.7, \phi_L = 0.2$ and $\tau_1 = \tau_2^{\mathrm{a}} = 2/3, \tau_2^{\mathrm{s}} = 1/2$

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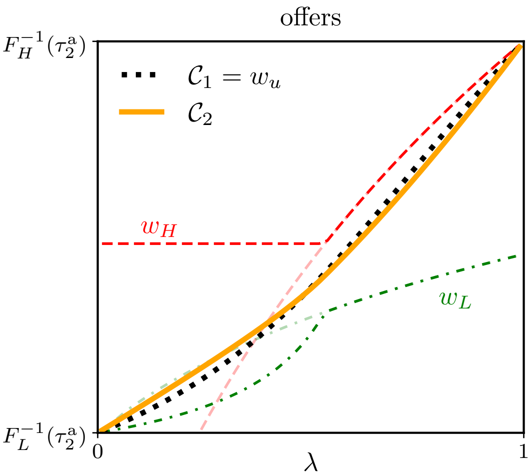

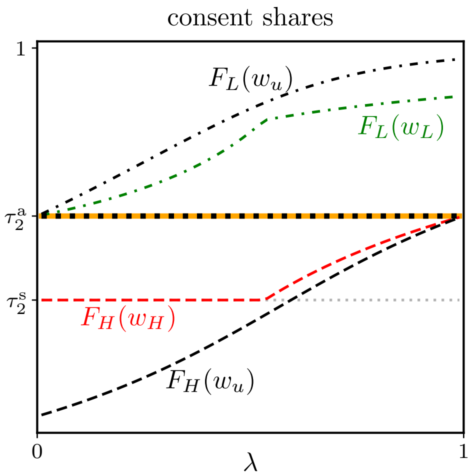

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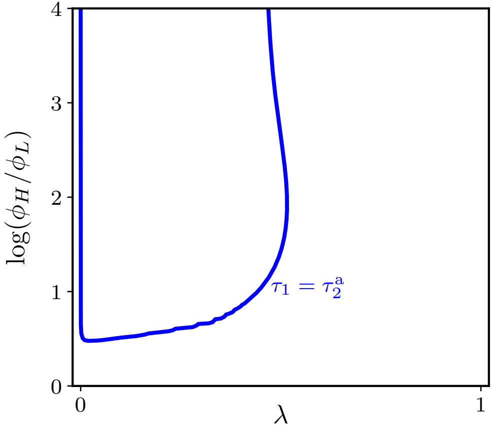

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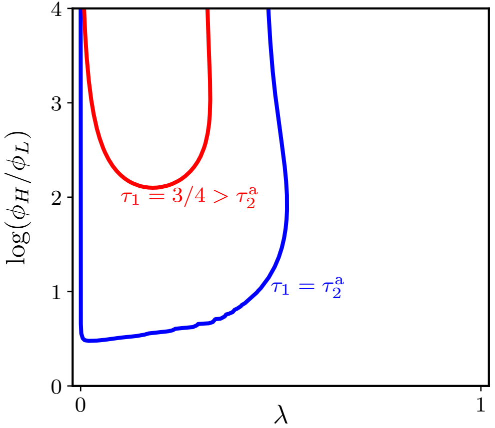

Stochastic Consent Shares

- Assume there is a bond-specific shock ϵ_i to the consent share

- CACs are triggered if
  - aggregate: $\sum_i \lambda_i [F_i(w_i) - \epsilon_i] \geq \tau$
  - series-by-series: $F_i(w_i) - \epsilon_i \geq \tau_2^{\text{s}}$

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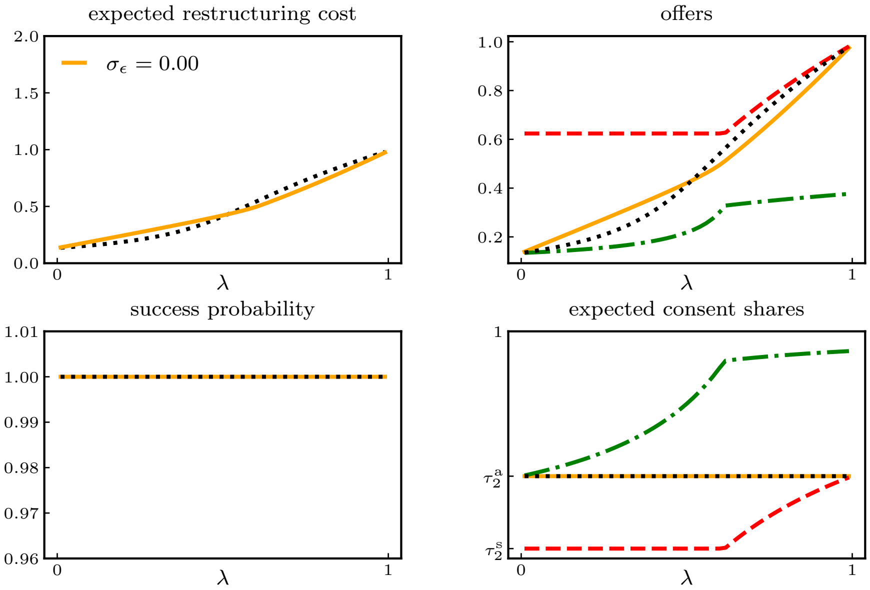
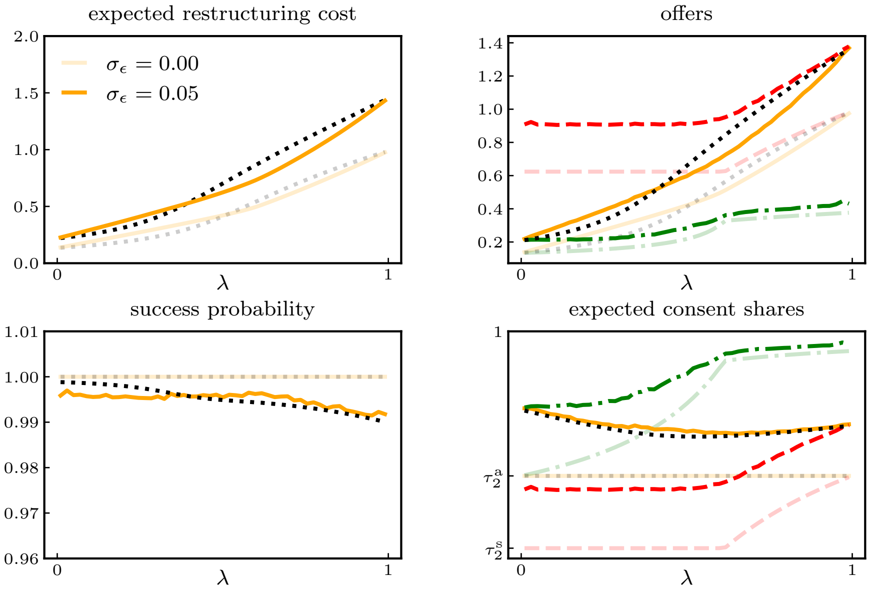
  - two-limb with redesignation

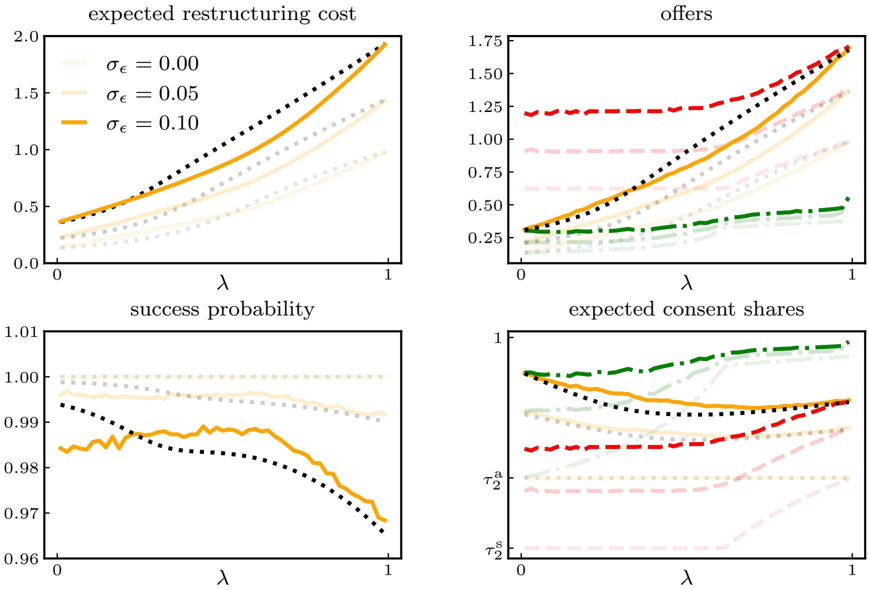
$$\underbrace{P_{\mathrm{a},H,L}\Big(\lambda_H w_H + \lambda_L w_L\Big)}_{\text{both bonds}} + \underbrace{P_{\mathrm{a},H}\Big(\lambda_H w_H + \lambda_L Z\Big)}_{\text{just } H} + \underbrace{P_{\mathrm{a},L}\Big(\lambda_H Z + \lambda_L w_L\Big)}_{\text{just } L} + \underbrace{(1 - P_{\mathrm{a}})Z}_{\text{failed exchange}}$$



expected restructuring cost
offers
success probability
expected consent shares
$\sigma_\epsilon = 0.00$
2.0
1.5
1.0
0.5
0.0
0.8
0.6
0.4
0.2
1.01
1.00
0.99
0.98
0.97
0.96
1
τ_2^{a}
τ_2^{s}
0
λ



expected restructuring cost
2.0
1.5
1.0
0.5
0.0
$\sigma_\epsilon = 0.00$
$\sigma_\epsilon = 0.05$
0
1
λ
offers
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
1
λ
success probability
1.01
1.00
0.99
0.98
0.97
0.96
0
1
λ
expected consent shares
1
τ_2^{a}
τ_2^{s}
0
1
λ


expected restructuring cost
offers
success probability
expected consent shares
$\sigma_\epsilon = 0.00$
$\sigma_\epsilon = 0.05$
$\sigma_\epsilon = 0.10$
λ
τ_2^{a}
τ_2^{s}

Takeaways and Agenda

Takeaways

- an economic theory of the optimal
  - restructuring of multiple, heterogeneous bonds
  - use of enhanced CACs
- results depend on degree of bond & creditor heterogeneity

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A lot more to be done with this framework:

- quantitative analysis of ARG and ECU restructurings through the lens of our model
- optimal bond pool designation

and taking a step back

- endogenous investor sorting into bonds ($\Rightarrow F_i$ within and across)
- endogenous government bond issuance/maturity structure

Uniform applicability

ICMA

- exchange on same terms for same (menu of) instrument(s)
- amendments to principal, accrued interest imply new bonds have same provisions

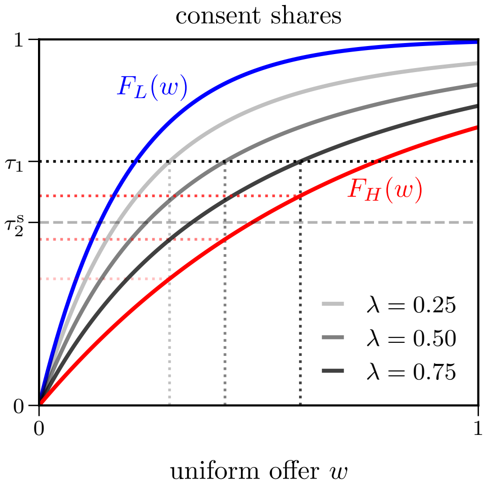
Euro Area

- exchange on same terms for same (menu of) instrument(s)
- reduce face value by same %
- extend maturity by same period or same %

Single-limb: comparative statics wrt λ

Assuming: $F_i(w) = 1 - e^{w/\phi_i}$, $\phi_H = 0.7, \phi_L = 0.2$ and $\tau_1 = \tau_2^{\text{a}}$

◂ back



Single-limb: comparative statics wrt ϕ_H/ϕ_L

Assuming: $F_i(w) = 1 - e^{w/\phi_i}$ and $\tau_1 = \tau_2^{\mathrm{a}}$

back