Tax revolts and sovereign defaults

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Introduction

Tax reforms are followed by large protests (e. g. France 2023, Argentina 2016) and even ousts of governments (e. g. Brazil 2016)

Sovereign default literature has explored the effects of political risk since Cuadra & Sapriza (2008), but not yet:

- This paper: How does the risk of civil conflict constrain government decisions in a quantitative model of sovereign risk?

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Protests differ from elections in ways that matter for sovereign risk:

1. High-frequency response associated with decline in reelection rates
2. Protests are costly for all parties $\rightarrow$ strategic considerations in staging and preventing them
3. Alter reelection prospects $\rightarrow$ shape lenders' expectations regarding future government preferences

This paper: Quantitative sovereign debt model

Standard Eaton and Gersovitz (1981) ; Arellano (2008) model with:

1. Heterogeneous workers and nonlinear taxation (Heathcote et al. 2017).
    - Government is controlled by parties with different preferences for redistribution.
2. Civil conflict dynamics (Acemoglu and Robinson 2001).
    - In response to fiscal choices workers strategically stage revolts. Revolts lower productivity but also lower reelection odds.

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We calibrate the model to Argentina between 2015-2020.

Results

- As in the data, political and fiscal crises coincide
- Protests increase default risk by increasing the odds of a Right-to-Left transition. (Argentina's 2020 default)
- Protests lower default risk by penalizing incumbents who opt to default. (dominates in our calibration)

Related literature

- Sovereign default and political risk (Representative Agent)

Hatchondo, et al. (2009); Hatchondo and Martinez (2010); Chatterjee and Eyigungor (2019); Cotoc, et al. (2021);

$\rightarrow$ Default rates by party are driven by redistribution motives
$\rightarrow$ Parties have the same discount rates, default costs, and the same reelection odds absent revolts

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- Sovereign default, political risk, and inequality

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→ Efficiency-equity trade-off impacts repayment capacity
→ Strategic changes in political turnover
→ Long-term maturity of the debt

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- Macro impacts of regime change

Acemoglu and Robinson (2001); Acemoglu, et al. (2011);Scheur, et al. (2016); Dovis, et al. (2016); Barbera, et al. (2020);

→Focus on quantitative impact on sovereign spreads

Empirical evidence

Empirical Motivation : Data sources

Measure of political risk

The International Country Risk Guide (ICRG index) is a measure of political risk for investment purposes

Monthly measures of political risk for 141 countries. Includes: Government Stability, Internal Conflict, External Conflict, Socioeconomic Conditions

Literature has found a significant effect on sovereign spreads (Hatchondo and Martinez 2010, Cruces and Trebesch 2013, Fourakis 2023)

Protests: narrative approach

Dow Jones Factiva algorithm to scrap newspaper's articles mentioning protests that can be linked to economic reforms or conditions, following David et al. 2022.

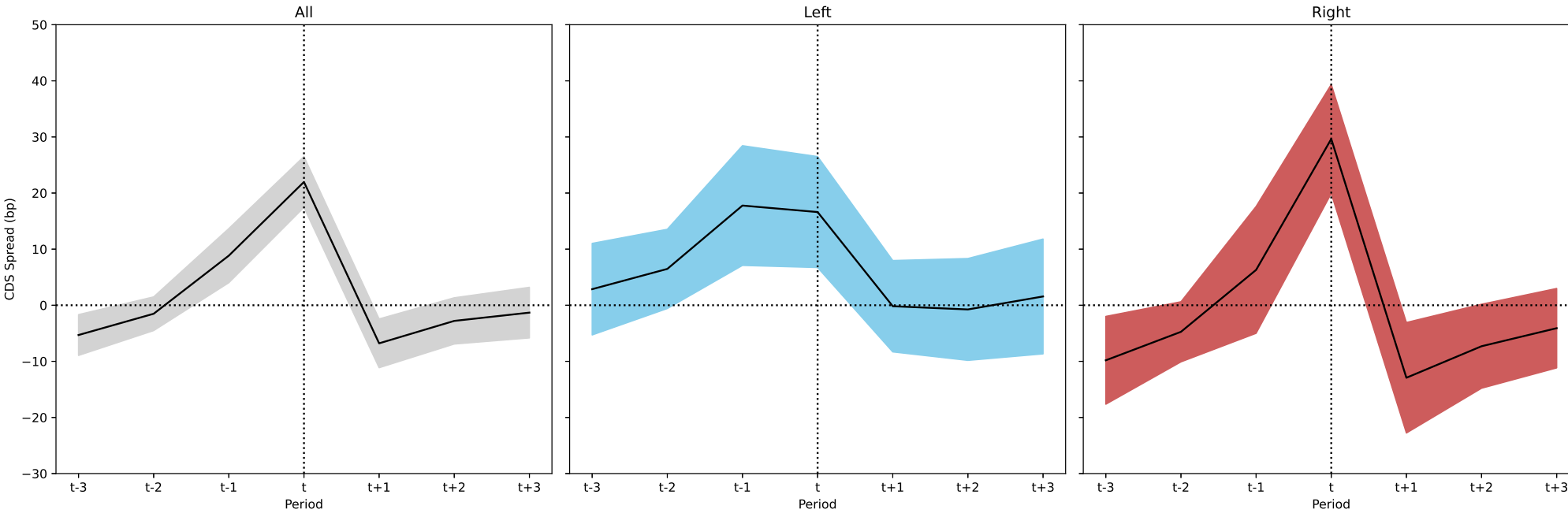
Keywords searched: Protest, revolt, general strike.

Cross-country evidence: Political Risk effect on spreads

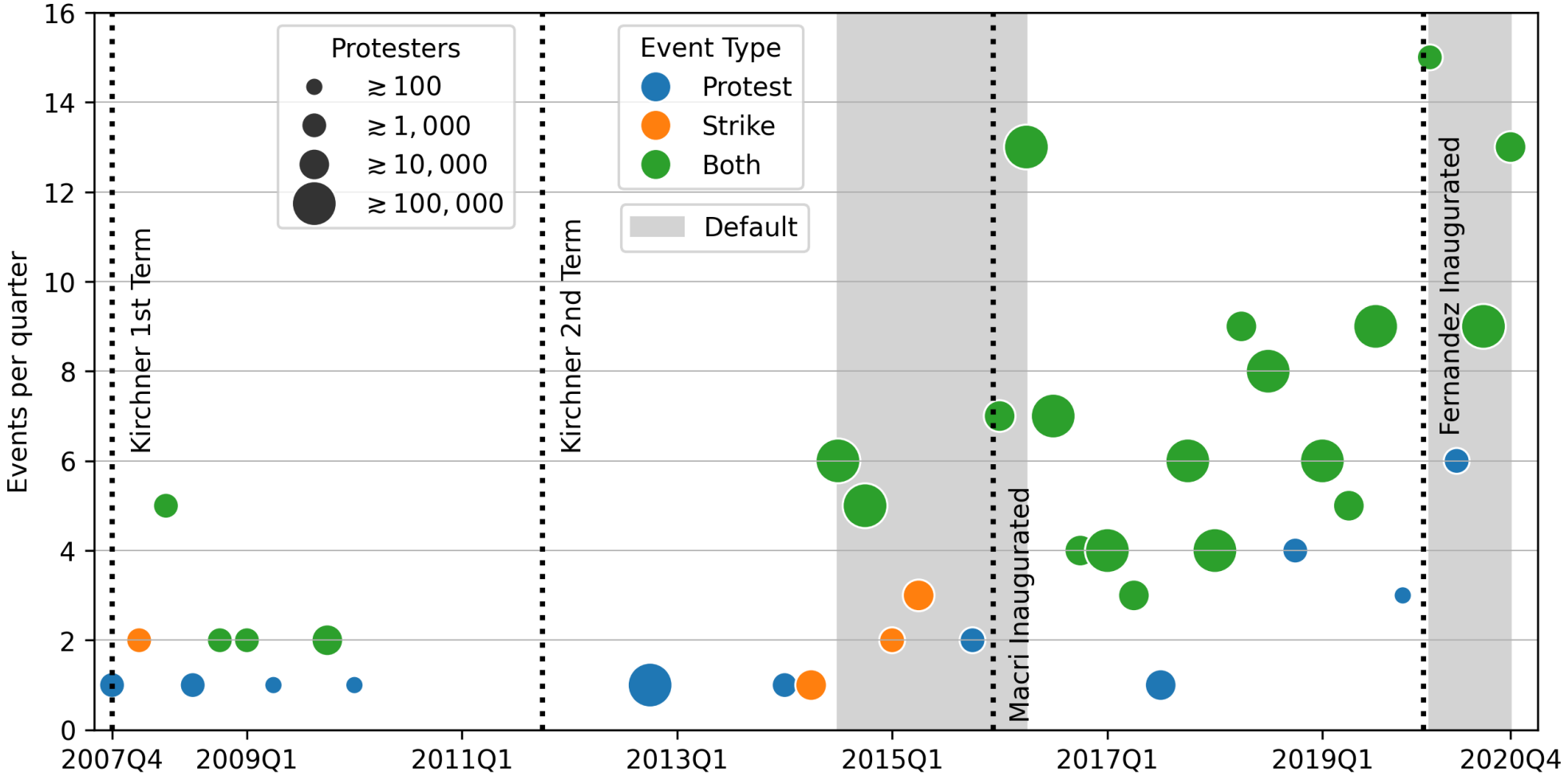
	(1) CDS Spread	(2) CDS Spread	(3) CDS Spread	(4) CDS Spread	(5) CDS Spread
Political Risk	9.333***	8.635***	12.60***	10.82***	15.91***
	(0.224)	(0.266)	(2.838)	(2.735)	(4.155)
External Debt-to-GDP		0.530***		0.625*	0.493
		(0.0450)		(0.264)	(0.308)
CA-to-GDP		-1.913***		1.227	1.770*
		(0.291)		(0.699)	(0.844)
Reserves-to-GDP					1.899*
					(0.731)
Real GDP growth					-1.848*
					(0.774)
Primary Balance-to-GDP					0.00796*
					(0.00394)
Quarterly FE	No	No	Yes	Yes	Yes
Country FE	No	No	Yes	Yes	Yes
Obs	4585	4067	4582	4064	2400

***Note*: Standard errors clustered at the country levels in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$**

Event analysis: Spreads during a political crisis

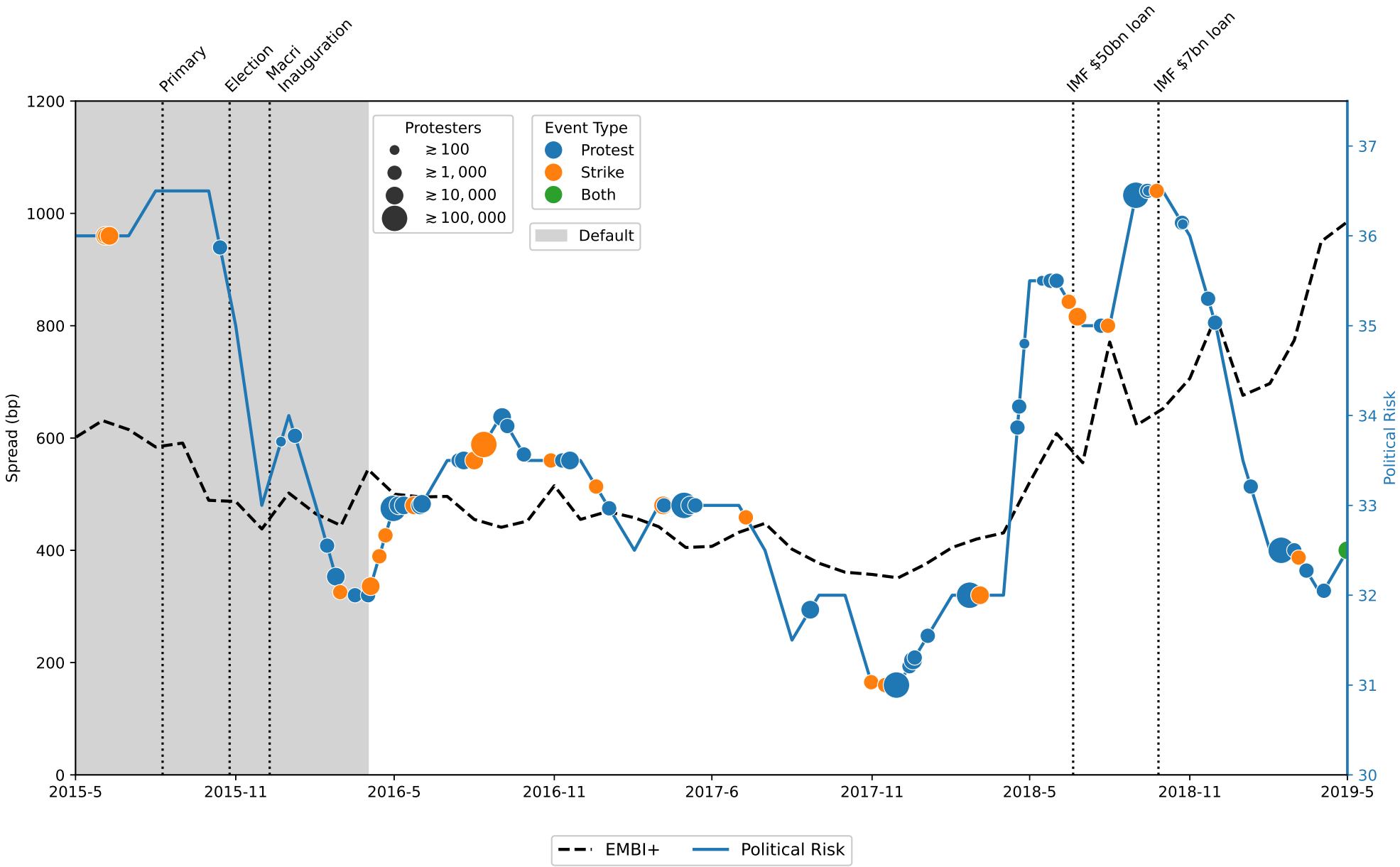


Protests and Defaults in Argentina 2007-2020



Political leanings

Argentina: Spreads, protests, and political risk during Macri



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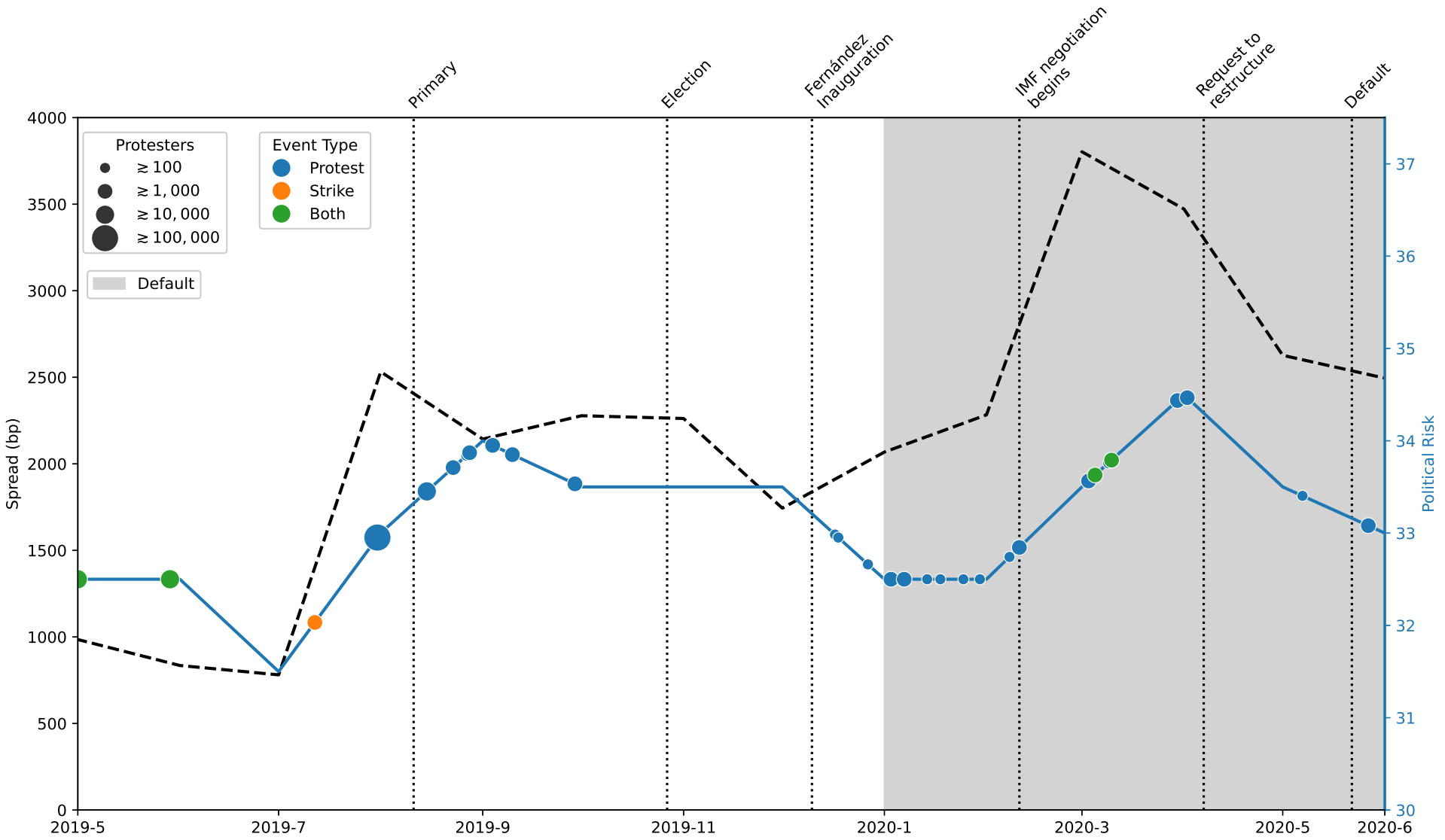

Model

Model: Small open economy

Government:

- Can be controlled by two parties $i, j \in \{L, R\}$
- Parties differ in taste for redistribution
- Incumbent decides to default ($\mathscr{D}_1$) or not ($\mathscr{D}_0$) on the debt
- Proposes a fiscal package$\equiv$ Tax progressivity and debt issuance

Flowchart

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Households:

- A measure one for each of the two levels of skill $\theta^L < \theta^R$
- Provide labor $(N^i)_{i\in\{L,R\}}$ solving a static problem Labor Supply
- After observing the fiscal package they strategically decide between Revolt ($\mathfrak{R}_1$) or Stability ($\mathfrak{R}_0$)

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Firm:

- Produces the final consumption good
- Hires skilled and unskilled labor

Risk neutral foreign lenders:

- Price the Gov's debt issuance
- in case of revolt ($Q(., \mathfrak{R}_1)$) and stability ($Q(., \mathfrak{R}_0)$)

Flowchart

Production, pre-tax wages and shocks

Production combines both types of labor

$$Y = \alpha(A, \mathscr{D}, \mathfrak{K}) \left[(\theta^L N^L)^\eta + (\theta^R N^R)^\eta \right]^{\frac{1}{\eta}}$$

Pre-tax wages given by profit maximization and free entry

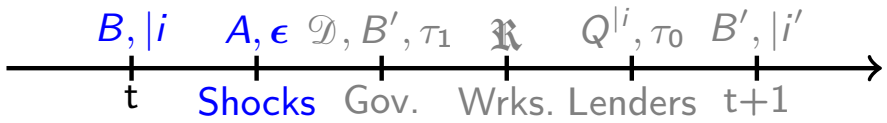
$$w^L = \alpha(A, \mathscr{D}, \mathfrak{K})^\eta \theta^L \left(\frac{\theta^L N^L}{Y} \right)^{\eta - 1}$$

$$w^R = \alpha(A, \mathscr{D}, \mathfrak{K})^\eta \theta^R \left(\frac{\theta^R N^R}{Y} \right)^{\eta - 1}$$

Exogenous aggregate shock: Total productivity (A)

Government's problem

Government state space is $(\underbrace{A, B}_{S_G}, |i, \boldsymbol{\epsilon})$



$|i$ denotes the type of the incumbent, $\boldsymbol{\epsilon}$ is a taste shock

Government chooses default $\mathscr{D}$, taxes $\boldsymbol{\tau}$ and public debt B' to solve :

$$W^{i|i}(S_G, \boldsymbol{\epsilon}) = \max_{\mathscr{D} \in \{\mathscr{D}_{\mathbf{0}}=0, \mathscr{D}_{\mathbf{1}}=1\}} \underbrace{\mathscr{D}}_{\text{Default}} \underbrace{W^{i|i}_{\mathscr{D}_{\mathbf{1}}}(S_G, \boldsymbol{\epsilon})}_{\text{Default choose } \tau_{\mathbf{1}}} + [1 - \mathscr{D}] \underbrace{W^{i|i}_{\mathscr{D}_{\mathbf{0}}}(S_G, \boldsymbol{\epsilon})}_{\text{Repayment choose (B',}\tau_{\mathbf{1}}\text{)}}$$

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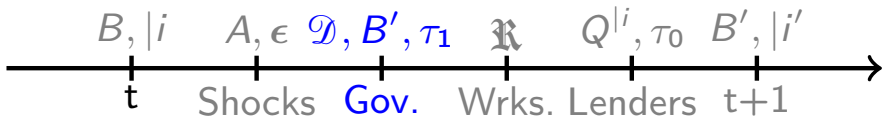

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Given (τ_1, B') the tax level $\tau_0(A, \tau_1, B', \mathfrak{K})$ adjusts to satisfy the budget constraint

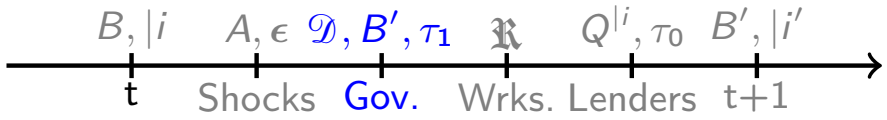
$$0 = (1 - \mathscr{D}) \times \Big[\underbrace{Q^{|i}(A, B', \mathfrak{K})[B' - (1 - \delta)B] - (\delta + z)B}_{\text{Debt Balance}} \Big] + \underbrace{\sum_{i=L,R} [w^i N^i - \tau_0 \left(w^i N^i \right)^{1-\tau_1}]}_{\text{Tax Receipt} \equiv \mathscr{T}}$$

Government takes the labor supply, wages, and lenders' best responses as given

Issuance cost

Government's problem in repayment ($\mathscr{D}_0$)

The state is $S^H = (S^G, \mathscr{D}_0, B', \tau_1)$



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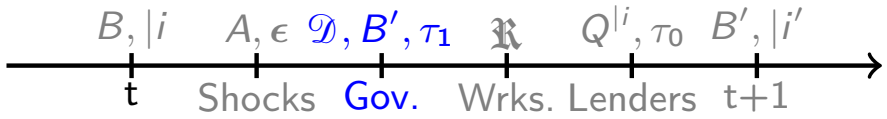

The repayment problem is:

$$W^{i|i}_{\mathscr{D}_\mathbf{0}}(S_G, \boldsymbol{\epsilon}) = \max_{B', \tau_\mathbf{1}} \Big[\qquad + \boldsymbol{\epsilon}_{B', \tau_\mathbf{1}} \Big]$$

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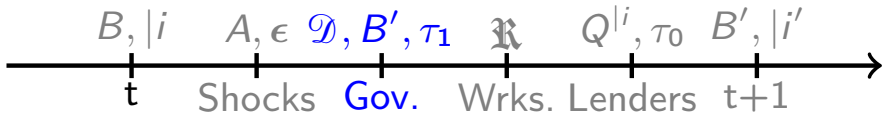

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$\mathbb{P}^{|i}(\mathfrak{R}|S^H)$ is the probability of Revolt

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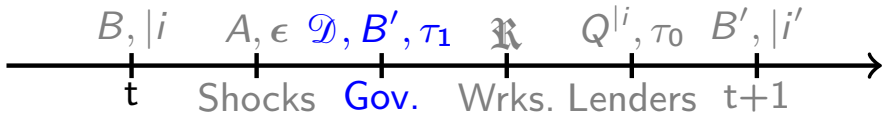

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$\mathbb{P}^{|i}(\mathfrak{R}|S^H)$ is the probability of Revolt

$\omega^{j|i}$ captures the ideology of the incumbent $|i$ (i.e. $\omega^{R|R} > \omega^{L|R}$)

$u^j(S^H, \mathfrak{R})$ is the current period utility of households of type j

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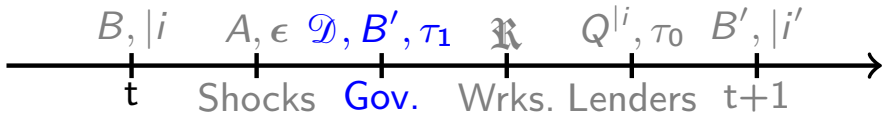

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$\mathbb{E}^{i|i}[W'|\mathfrak{R}, S^H]$ is the continuation value of incumbent party $|i$

Stability after repayment ($\mathfrak{R} = \mathfrak{R}_0 = 0$)

No revolt occurs (Stability), TFP is not penalized ($A = \alpha(A, \mathscr{D}_0, \mathfrak{R}_0)$)

$$Y = A \left[(\theta^L \underbrace{N^L}_{\equiv \mathcal{N}^L(\tau_1)})^\eta + (\theta^R \underbrace{N^R}_{\equiv \mathcal{N}^R(\tau_1)})^\eta \right]^{\frac{1}{\eta}}$$

$$w^i = A^\eta \theta^i \left(\frac{\theta^i \mathcal{N}^i(\tau_1)}{Y} \right)^{\eta - 1}$$

$$u(S^H, \mathfrak{R}_0) = u\left(\tau_0(S^H, \mathfrak{R}_0) \left[w^i \mathcal{N}^i(\tau_1) \right]^{1-\tau_1} \right) \text{ for } i = L, R$$

Gov. budget constraint

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Gov. budget constraint

Under stability, the incumbent is more likely to remain in office

Value out of office

$$\pi(\mathfrak{R}_0) > \pi(\mathfrak{R}_1)$$

$$\mathbb{E}^{i|i}[W'|\mathfrak{R}_0, S^H] = \mathbb{E}_{A'|A}[\pi(\mathfrak{R}_0) W^{i|i}(A', B', \epsilon') + (1 - \pi(\mathfrak{R}_0)) \overbrace{W^{i|j}(A', B', \epsilon')}^{\text{Value out of office}}\}$$

Revolt after repayment

In Revolt fiscal policy is still B', τ_1, but TFP is $\alpha(A, \mathscr{D}_0, \mathfrak{R}_1) < A$

$$Y = \alpha(A, \mathscr{D}_0, \mathfrak{R}_1) \left[(\theta^L N^L)^\eta + (\theta^R N^R)^\eta \right]^{\frac{1}{\eta}}$$

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In revolt higher chance of political turnover

Value out of office

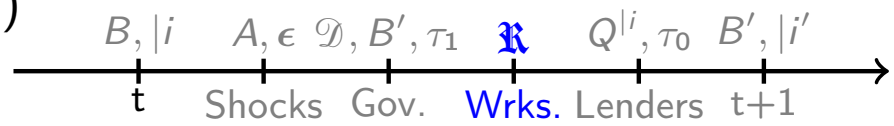
Default

$$\pi(\mathfrak{R}_1) < \pi(\mathfrak{R}_0)$$

$$\mathbb{E}^{i|i}[W'|\mathfrak{R}_1, S^H] = \mathbb{E}_{A'|A}[\pi(\mathfrak{R}_1) W^{i|i}(A', B', \epsilon') + (1 - \pi(\mathfrak{R}_1)) \overbrace{W^{i|j}(A', B', \epsilon')}^{\text{Value out of office}}]$$

Revolt decision ($\mathfrak{R}$)

Households face agg. state $(\underbrace{S_G, D, B', \tau_1}_{S^H}, \chi)$

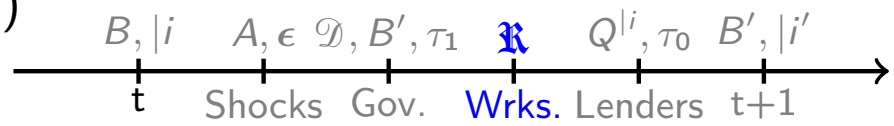


HHs of type $j \in \{L, R\}$ make revolt decision against a Gov. of type $i \neq j$:

$$V^{j|i}(S^H, \chi) = \max_{\mathfrak{R} \in \{0,1\}} \mathfrak{R} \times [V_1^{j|i}(S^H) + \chi] + \left[1 - \mathfrak{R}\right] \times V_0^{j|i}(S^H)$$

Revolt decision ($\mathfrak{R}$)

Households face agg. state $(\underbrace{S_G, D, B', \tau_1}_{S^H}, \chi)$



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where

$$V_0^{j|i}(S^H) = u(S^H, \mathfrak{R}_0) + \beta \mathbb{E}[\pi(\mathfrak{R}_0) V^{j|i}(S_{|i}^{H'}, \chi') + (1 - \pi(\mathfrak{R}_0)) \overbrace{V^{j|j}(S_{|j}^{H'}, \chi')}^{\text{Value in office}}]$$

Revolt cost ↓ Revolt gain ↓

$$V_1^{j|i}(S^H) = u(S^H, \mathfrak{R}_1) + \beta \mathbb{E}[\pi(\mathfrak{R}_1) V^{j|i}(S_{|i}^{H'}, \chi') + (1 - \pi(\mathfrak{R}_1)) V^{j|j}(S_{|j}^{H'}, \chi')]$$

Taking the laws of motion of all future aggregates as given for $x \in \{L, R\}$

$$S_{|x}^{H\prime} = \Big(\underbrace{\boldsymbol{D}^{|x}(S_G', \boldsymbol{\epsilon}'), \mathscr{B}^{\prime|x}(S_G', \boldsymbol{\epsilon}'), \boldsymbol{\tau}_1^{|x}(S_G', \boldsymbol{\epsilon}')}_{\text{Next period policies}}, \chi' \Big)$$

Definition of equilibrium

Decision rules and prices such that:

(i) Government default and fiscal package decision

(ii) Households favored by the opposition party decide to revolt or not

(iii) Foreign lenders offer the corresponding debt schedule

Price of debt

(iv) Production takes place and markets clear

Quantitative analysis

Bringing the model to the data

Calibrate model to match moments for Argentina

Tax progressivity: we follow Heathcote et al. 2017 to compute this from macro data

- Use employment to population, and population shares by education level to divide population between skilled and unskilled
- Compute pre-tax labor income using hourly wages and hours by education level
- Use disposable labor income as a proxy for post tax labor income
- Data source: CEDLA and World Bank

Politics:

- Political affiliation of party in power (Right vs Left) Political Leanings
- Tenure in office of each political party
- Data source: Database of Political Institutions 2020 (Scartascini et. al. 2020)

Calibrated parameters

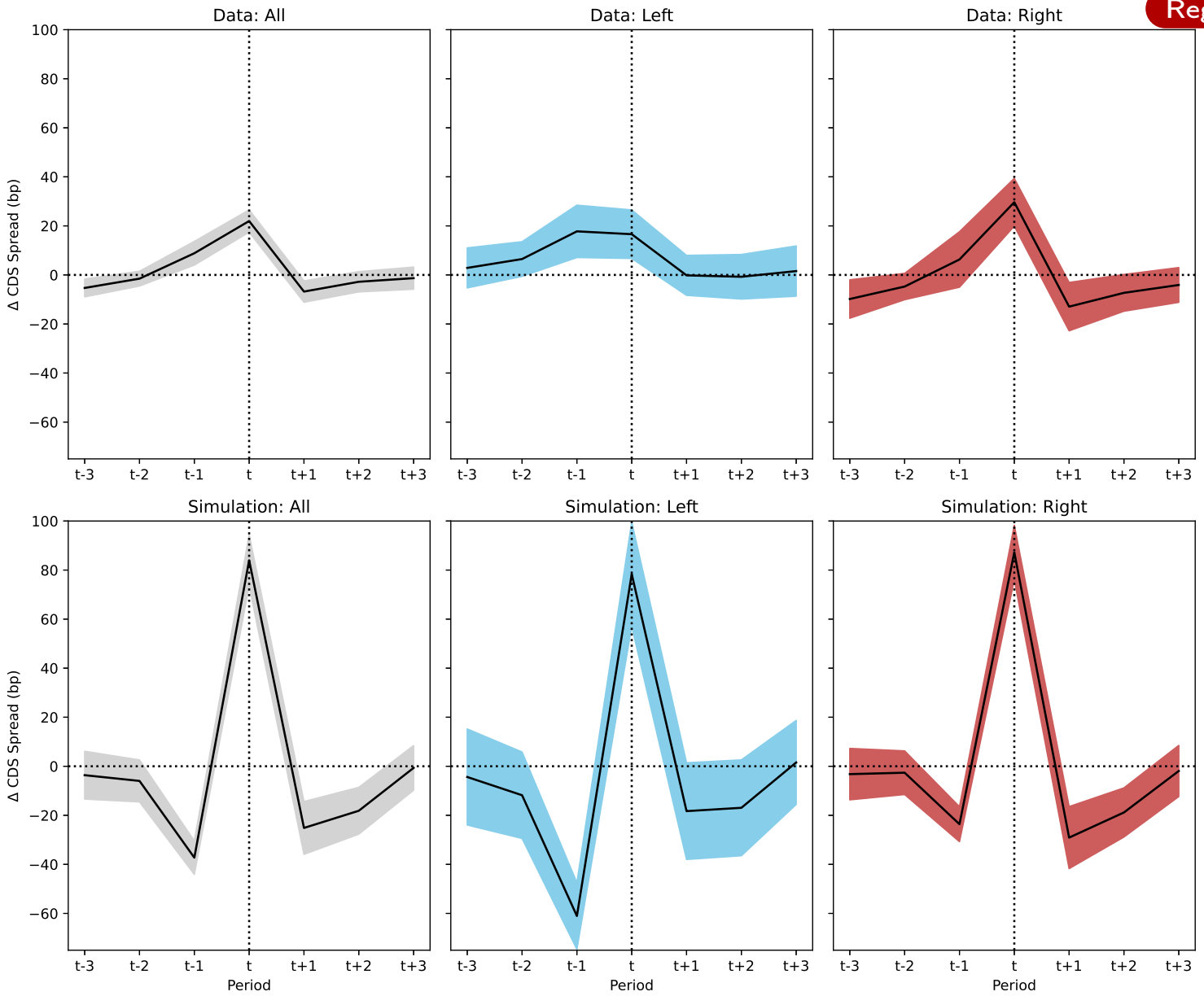
Parameter	Value	Moment	Target	Model
Discount factor	$\beta = .91$	Av. External Debt	88.8	85.6
Gov's taste shock ϵ	$\sigma^{\epsilon} = 7.5e-3$	Std. External Debt	23.1	20.0
Issuance Cost	$\iota_{\mathbf{1}} = .31$	Debt before default $\Delta B'_{D-\mathbf{1}}$	4.7	4.4
$\iota_{\mathbf{1}} \exp(\iota_{\mathbf{2}}\lvert B' - B\rvert) - \iota_{\mathbf{1}})$	$\iota_{\mathbf{2}} = 1.9$	Default frequency	4.1	4.4
Default Cost	$\phi^D_{\mathbf{0}} = -.19$	Av. Spread	8.4	7.3
$\alpha(A,1,0) = A - \max(\phi^D_{\mathbf{0}} A + \phi^D_{\mathbf{1}} A^{\mathbf{2}}, 0)$	$\phi^D_{\mathbf{1}} = .24$	Std. Spread	4.9	2.1
Welfare weight R for party R	$\omega^{R\lvert R} = .75$	Share R post-tax	62.5	63.2
Welfare weight R for party L	$\omega^{R\lvert L} = .20$	Share R pre-tax	65.6	65.7
HH taste shock	$\sigma^{\chi} = 9.0e-3$	Av. tax progressivity	21.1	16.1
Revolt Cost	$\phi^R_{\mathbf{0}} = -.21$	Revolts frequency	22.6	28.8
$\alpha(A,0,1) = A - \max(\phi^R_{\mathbf{0}} A + \phi^R_{\mathbf{1}} A^{\mathbf{2}}, 0)$	$\phi^R_{\mathbf{1}} = .26$	Share of R in power	46.4	49.5

Issuance cost

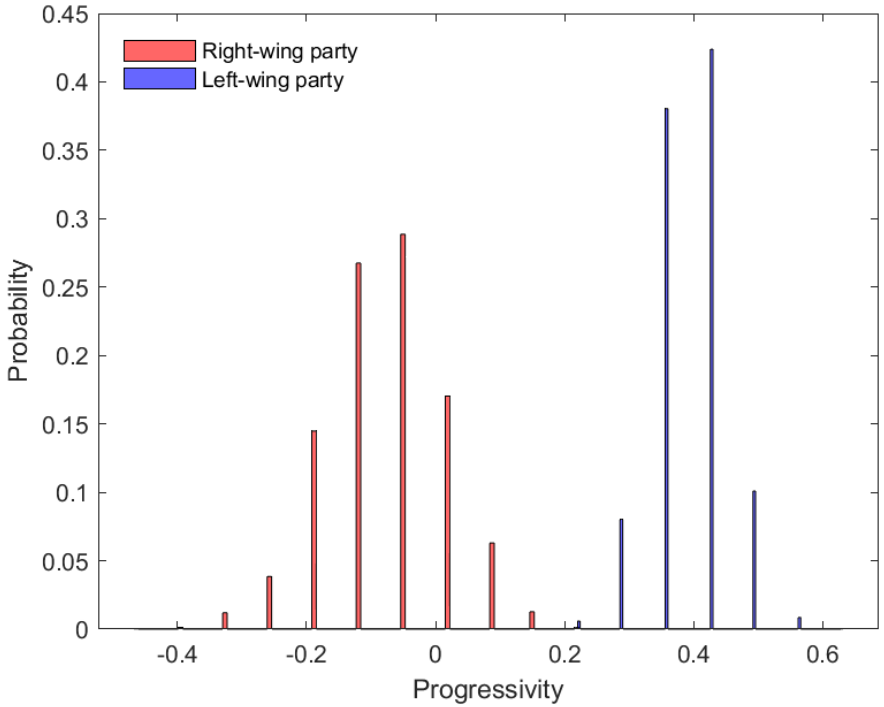
Parameters estimated outside of the model

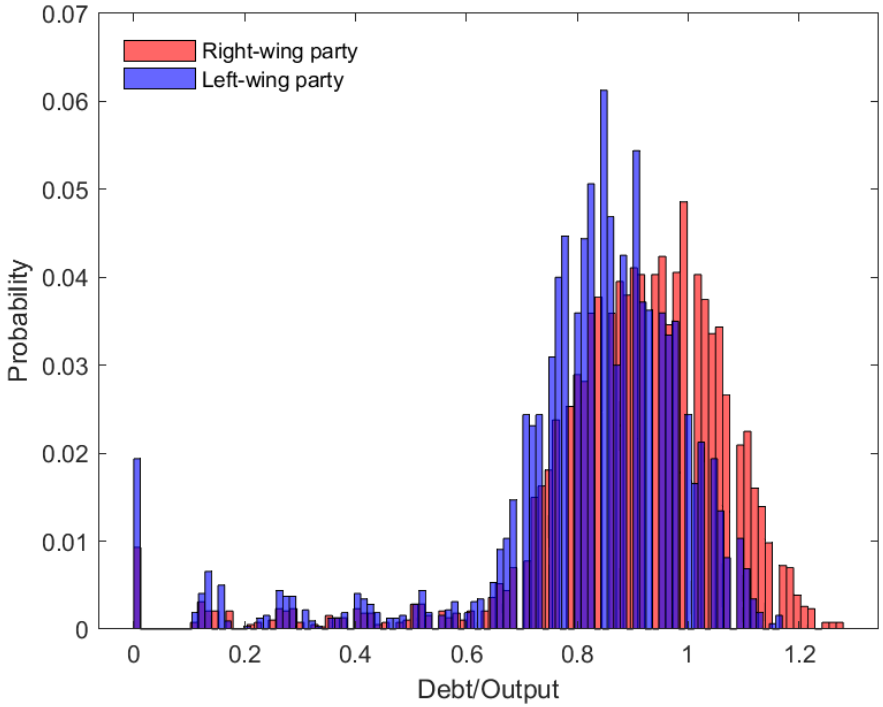
Validation: Event Analysis

Regression Results



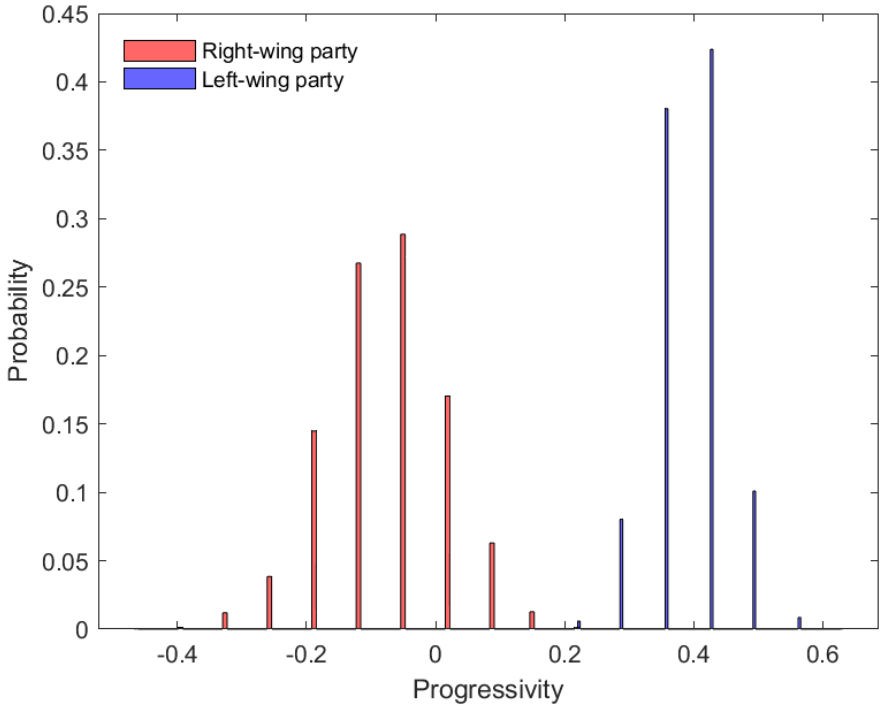
The ergodic distribution

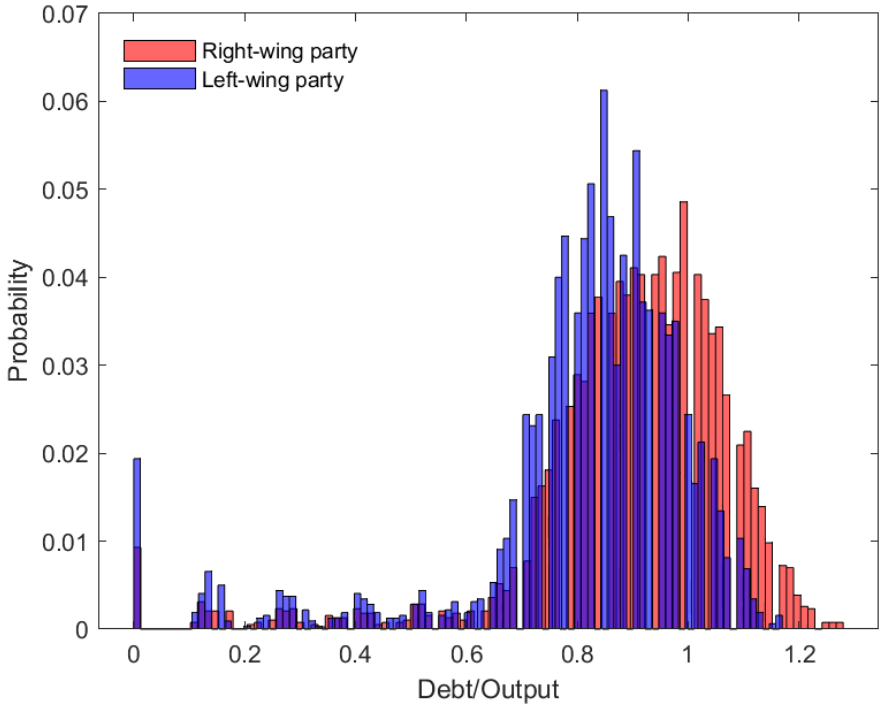




Output and progressivity | Debt to output | Default Sets | Spreads by party

The ergodic distribution





	$\mathscr{D}_0$	$\mathscr{D}_1$	Share of $\mathfrak{R}_1$ if $\mathscr{D}_0$	Share of $\mathfrak{R}_1$ if $\mathscr{D}_1$
Total	72.1	27.9	21.5	47.2
Incumbent : R	38.8	10.3	12.4	20.3
Incumbent : L	33.3	17.6	9.0	26.9

Output and progressivity | Debt to output | Default Sets | Spreads by party

Taking stock

1. Left-wing parties default more frequently

Taking stock

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    - This would not be the case without political turnovers

Model specification	Debt	Spread	Default Frequency
Baseline	86.0	7.4	4.3
Permanent L	76.1	7.9	4.4
Permanent R	77.8	7.6	4.4

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2. Revolts are more common in defaults

    - Revolts allow the economy to sustain more debt at lower spreads

Model specification	Debt	Spread	Freq. default	Revolts	R in power
Baseline	86.0	7.4	4.3	28.6	49.1
Exogenous turnover	72.3	8.7	4.9	-	50.0

The Left's political defaults in a 2 period model

A problem with only uncertainty about the default cost $z \sim \mathbb{U}[0,1]$:

$$\max_B y + \frac{1-\delta(B)}{1+r}B + \beta \mathbb{E}_z[\max\{zy, y-B\}]$$

The probability of default is $\delta(B^\star) = \frac{1-\beta(1+r)}{2-\beta(1+r)}$ and $B^\star = \delta(B^\star)y$

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Now consider the same problem but with two parties {L,R} and

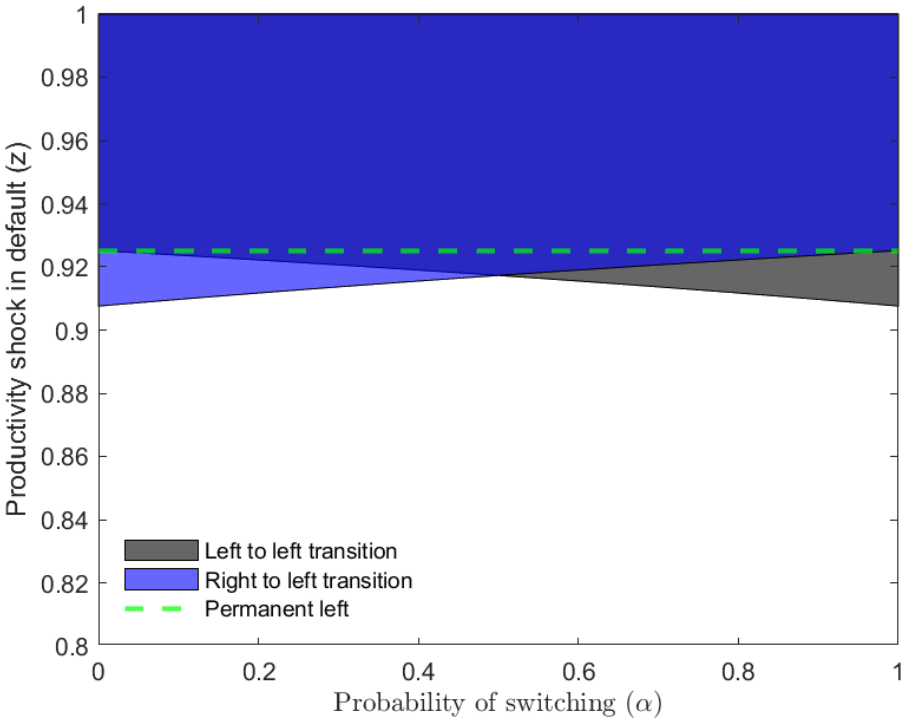
$$y^R > y^L$$

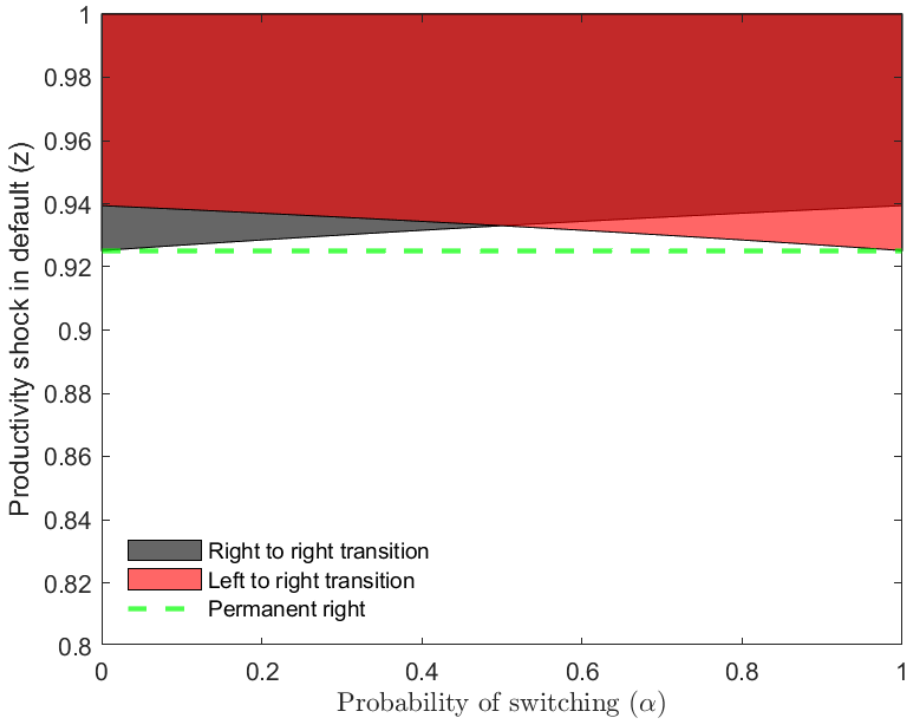
With permanent political types the default frequencies are the same for both parties

Turnovers and political defaults

Let $1 > \alpha > 0$ be the probability of a political turnover

The default sets by party are:

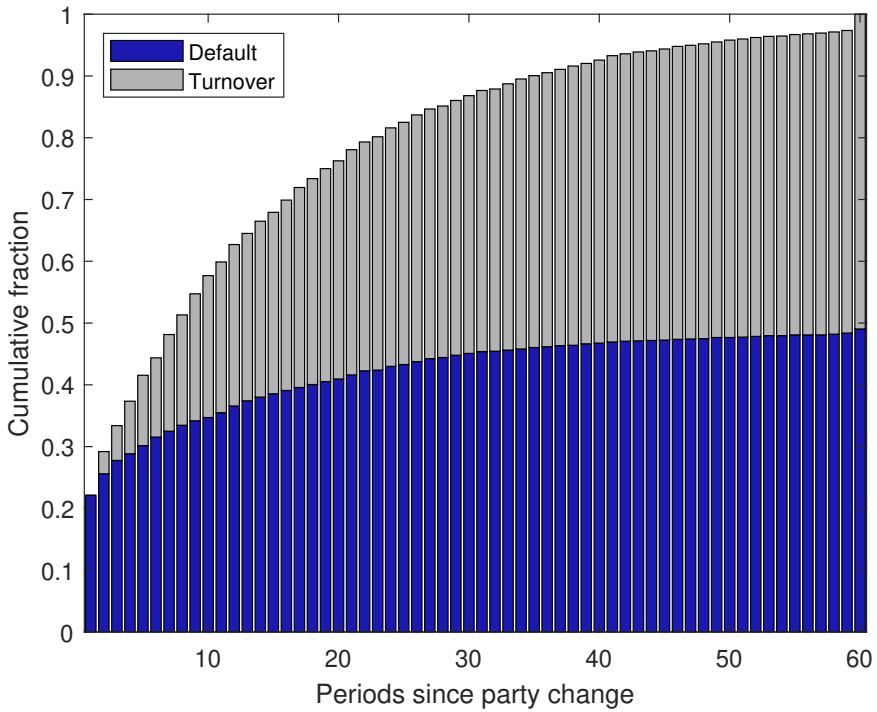


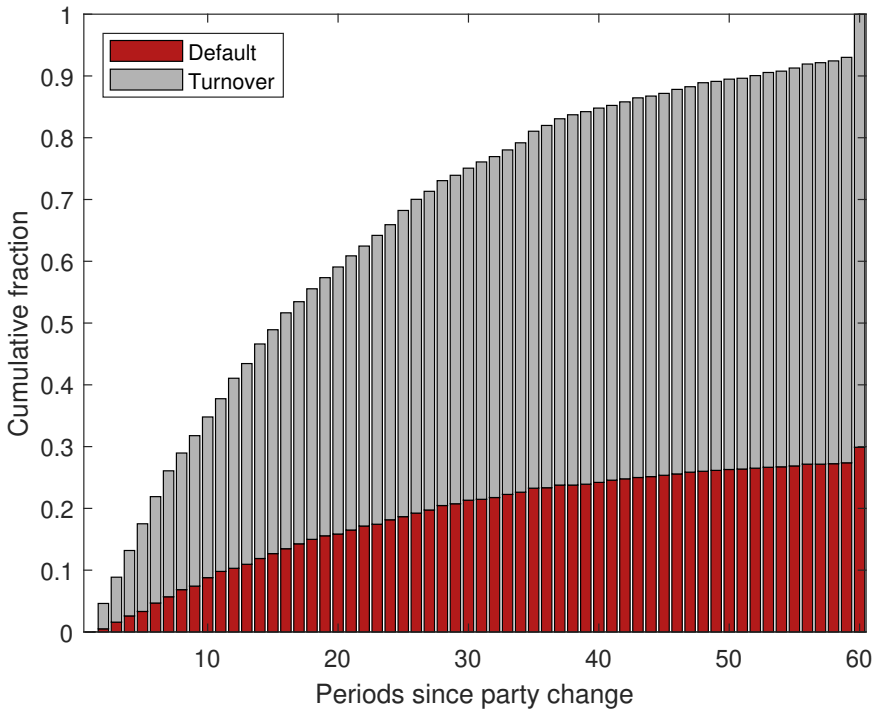


Right-to-Left-to-Default transitions

Right-wing government sustain more gross debt in good standing

- 20% of Right-To-Left transition (when in good standing) start in default
- Less than 1% of Left-To-Right transition start in default
- Revolts against a R government can trigger a default (9% at ergodic)

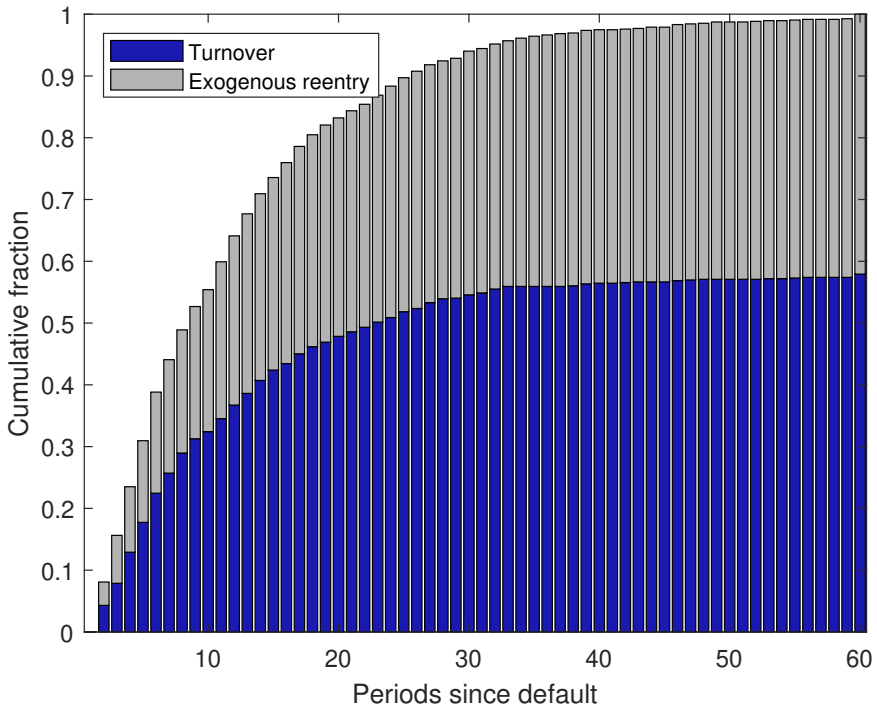


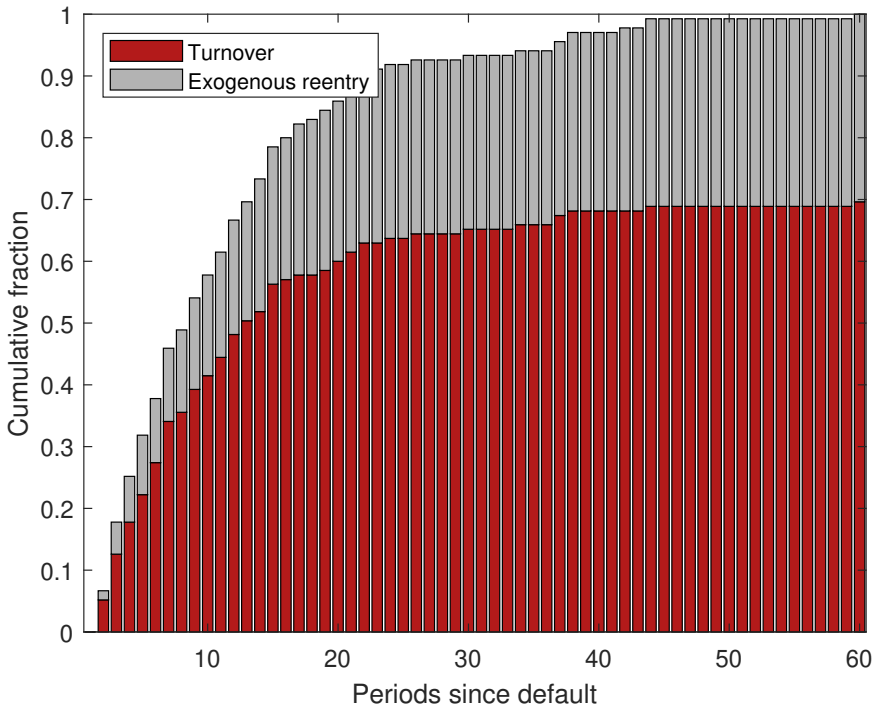


Revolt as an endogenous default cost

At the ergodic, nearly half the time in bad standing is spent in Revolt

- 13 periods after default half of right-wing gov. are overturned before reenter
- 23 periods after default half of left-wing gov. are overturned before reenter
- In a model without revolts at most 45% of gov. are overturned before reenter





Effect of Revolts and turnover

In the current baseline, the TFP in revolt during default is:

$$\alpha(A,1,1) = \alpha(A,1,0) - \max\{\phi_0^R \alpha(A,1,0) +_1^R \alpha(A,1,0)^2, 0\}$$

Thus defaulting lowers the cost of Revolt

- Revolts operate as an endogenous default cost

Spreads in different versions of the model

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Thus defaulting lowers the cost of Revolt

- Revolts operate as an endogenous default cost

Model specification	Debt	Spread	Defaults	Revolts	R in power
Baseline	86.0	7.4	4.3	28.6	49.1
$\mathfrak{R}$ only in repayment	48.3	13.2	6.0	13.5	47.8
$\mathfrak{R}$ only in default	114.3	6.5	3.9	12.4	53.1
$\mathfrak{R}$ cost independent of $\mathscr{D}$	74.1	5.8	3.6	16.0	49.3
Constant $\mathfrak{R}$ cost	75.2	5.7	3.6	15.0	49.5
Exogenous turnover	72.3	8.7	4.9	-	50.0

To do: Revolt costs in the utility, revolt costs as labor,...

Spreads in different versions of the model

Conclusion

Quantitative model of how social conflict impacts sovereign risk, political turnover, and redistribution, calibrated to Argentina

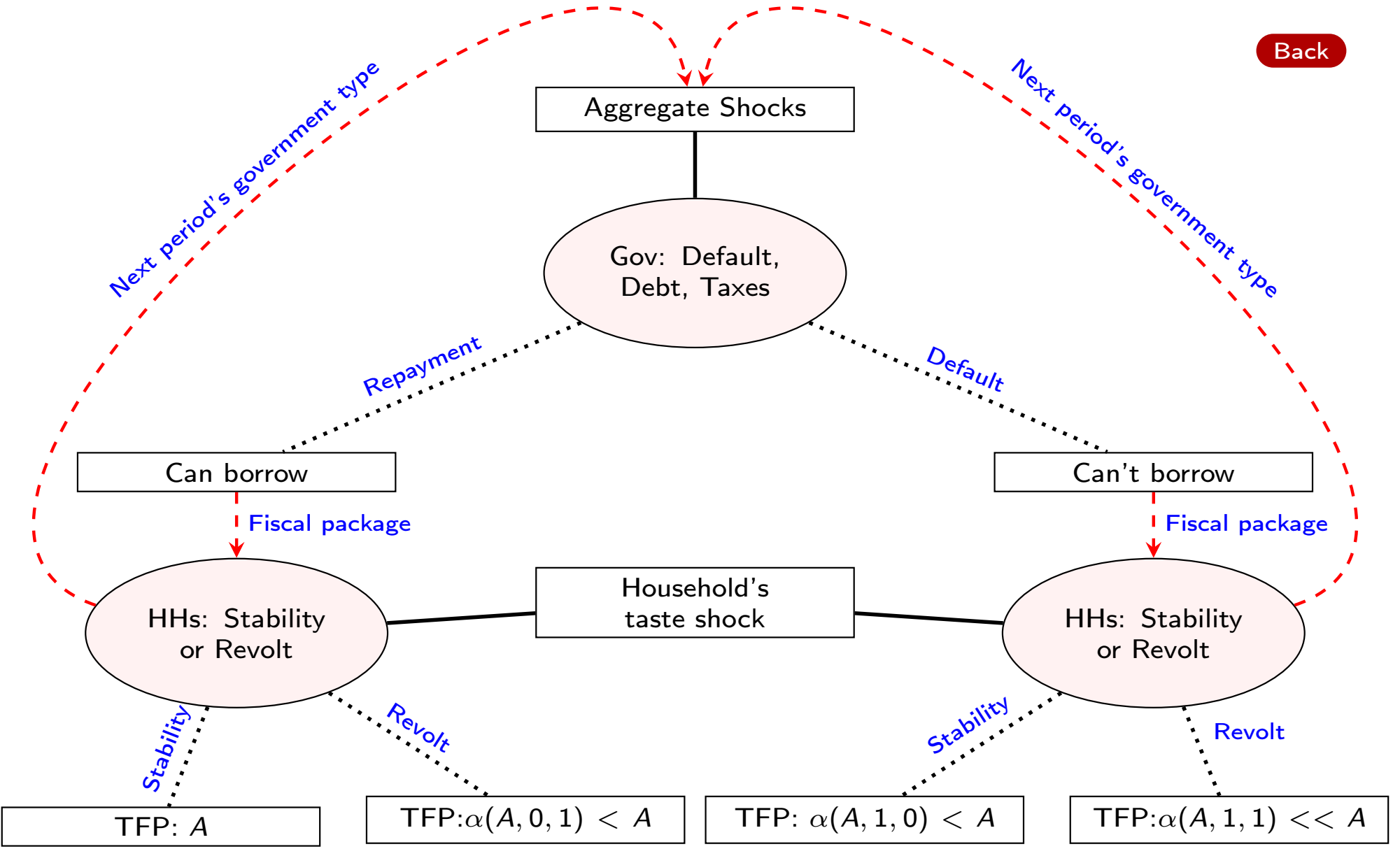
- Model replicates positive association between political and fiscal crises observed in the data
- Left-wing parties exhibit higher default rates, and Right-wing parties opt to sustain high debt.
- Revolts are more common during defaults

Effect of Revolts

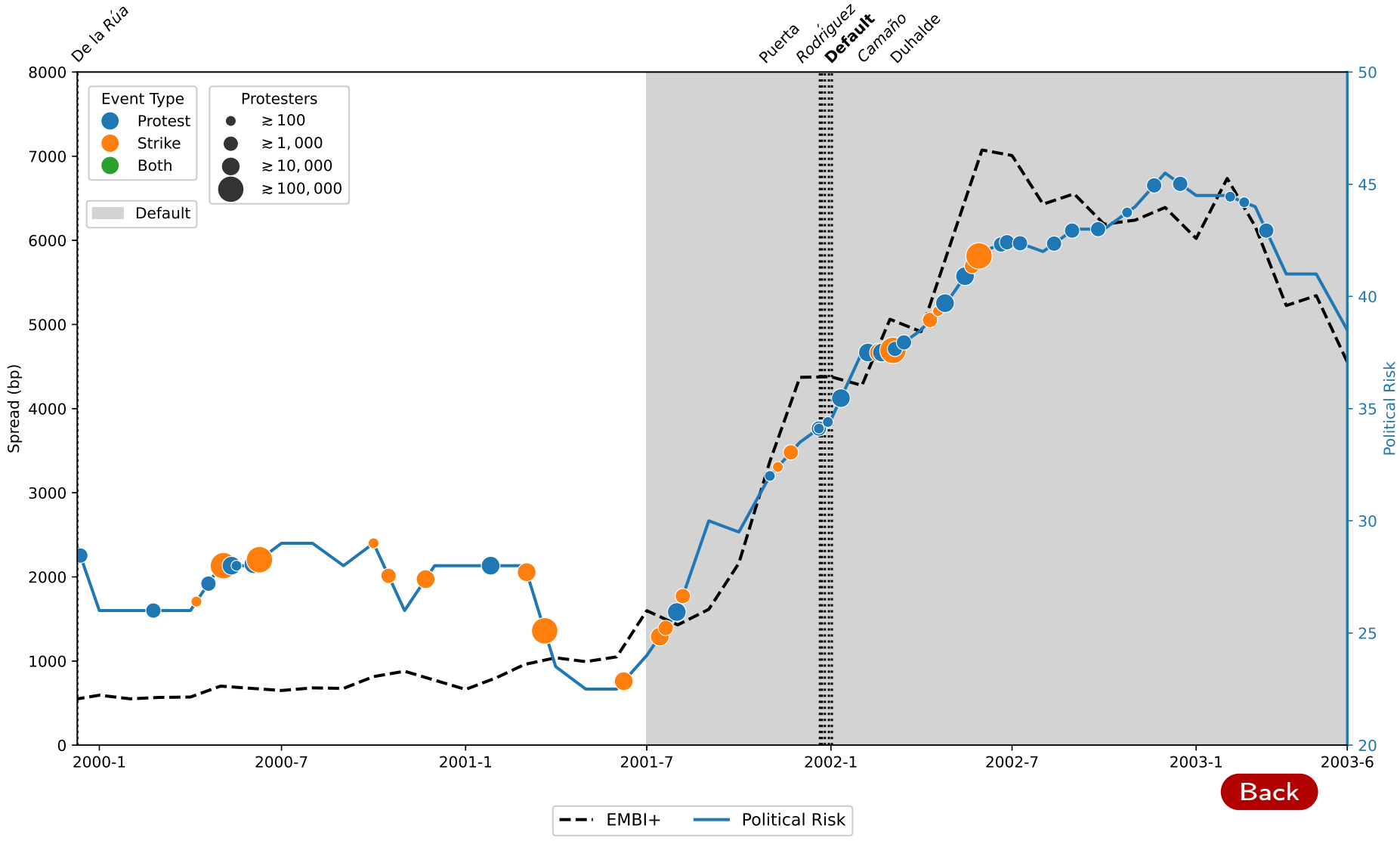
1. Protests exacerbate default risk by increasing the odds of Right-to-Left-to-default transitions
2. Protests lower default risk by punishing incumbents during defaults
3. The latter channel dominates. Without revolts, spreads would have been 130 basis points higher

Appendix

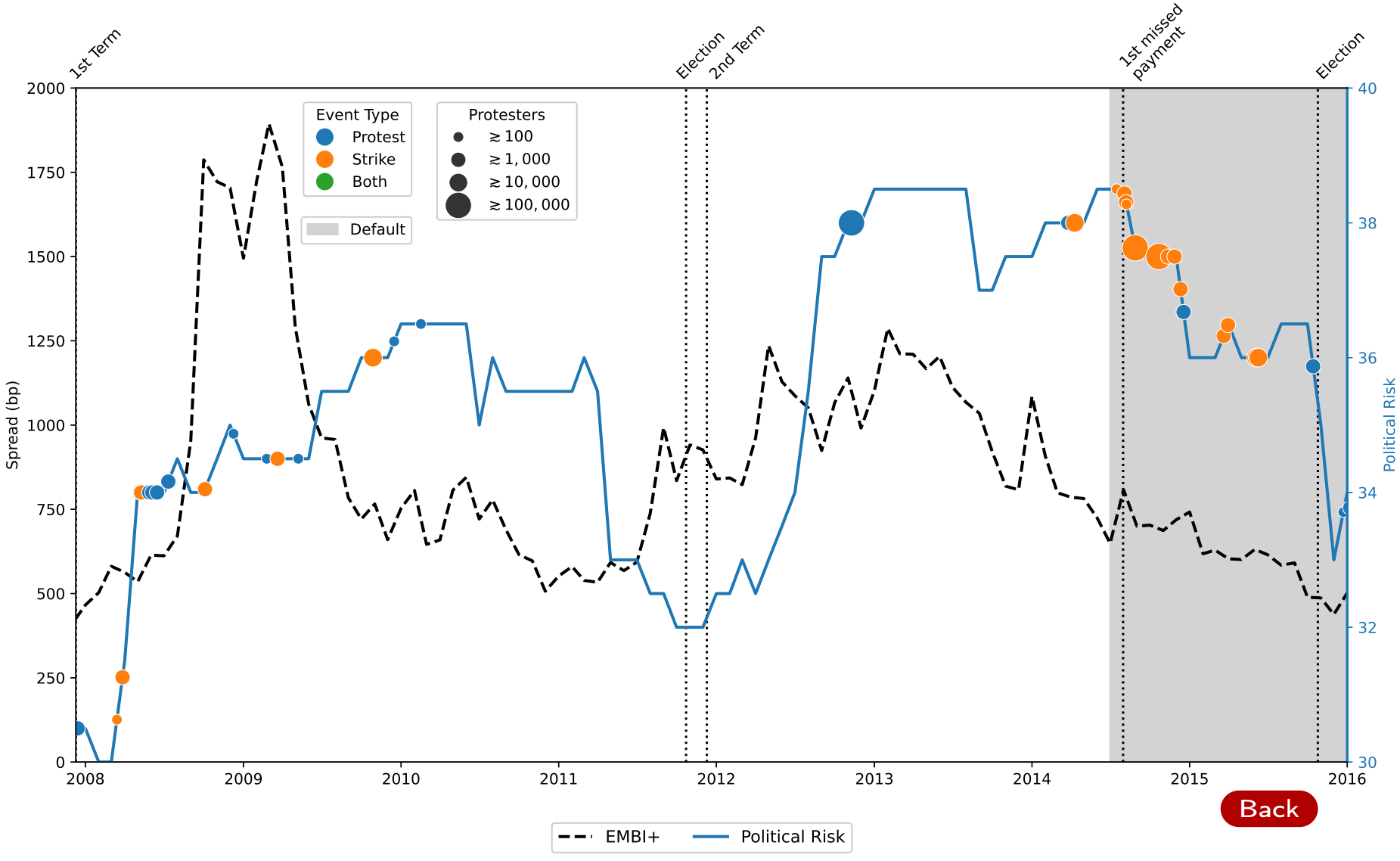
Sketch of the model



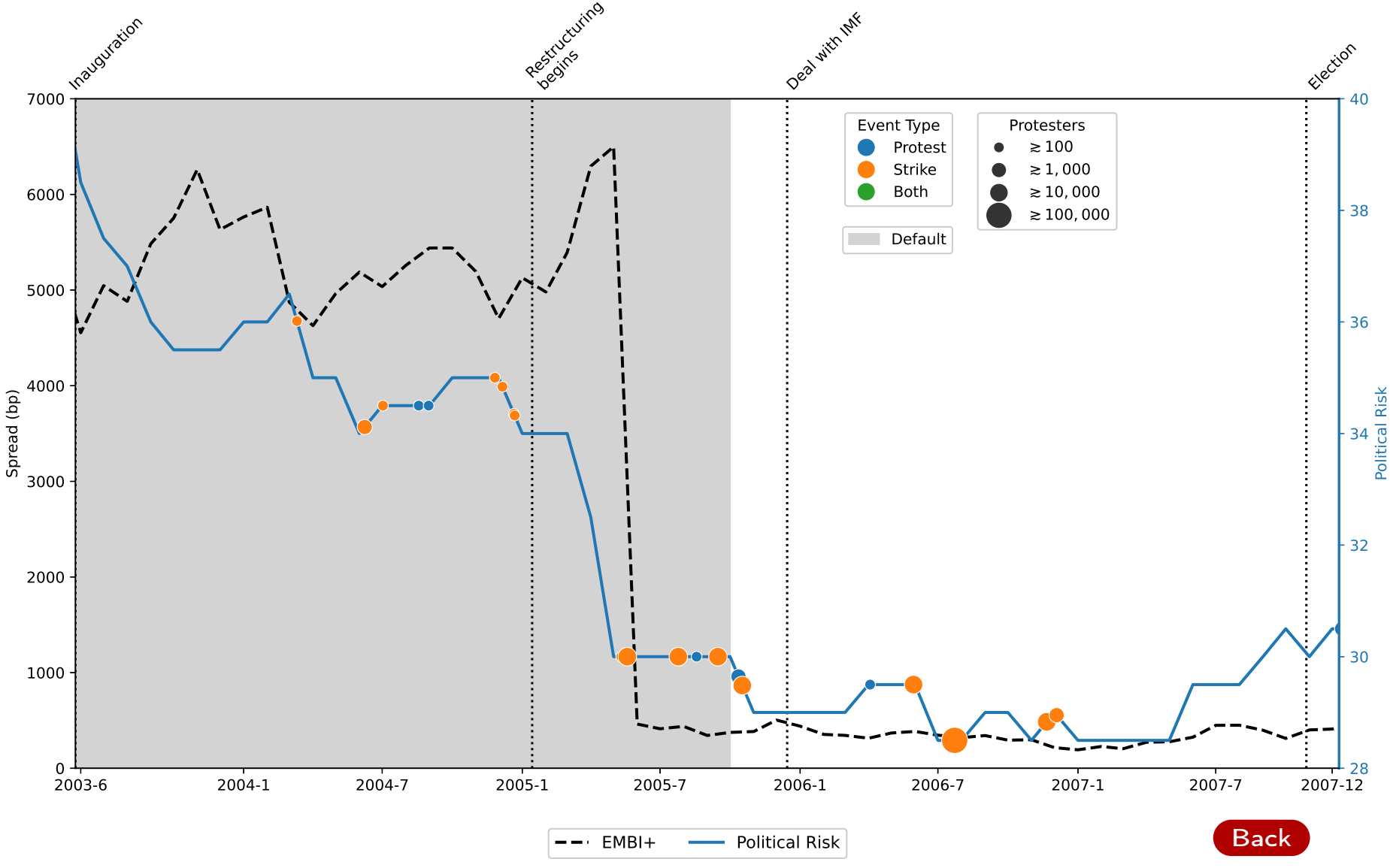
Argentina: Spreads, protests, and political risk during the 2001 default



Argentina: Spreads, protests, and political risk during the Cristina Fernandez de Kirchner administration



Argentina: Spreads, protests, and political risk during the Nestor Kirchner administration



Back

Labor supply static problem for $i \in \{L, R\}$

Given Tax level τ_0 and a level of tax progressivity τ_1 agents of type i solve

$$\max_{C^i, N^i} \log C^i - \exp(\frac{\phi_i}{\psi})\psi \cdot (N^i)^{\frac{1}{\psi}}$$

Subject to the budget constraint

$$C^i = \tau_0 \left(w^i N^i\right)^{1-\tau_1}$$

Given this preference assumptions labor supply is equal to

$$N^i = \frac{(1-\tau_1)^{\psi}}{\exp(\phi_i)}$$

Back to model intro Back to Stability Back to Ergodic

Government budget constraints

In repayment and stability the government's budget constraint is

$$0 = \mathscr{T}(S^H, \mathfrak{K}_0) + Q^{|i}(A, B', \mathfrak{K}_0)[B' - (1-\delta)B] - (\delta + z)B$$

In repayment and revolt the government's budget constraint is

$$0 = \mathscr{T}(S^H, \mathfrak{K}_1) + Q^{|i}(A, B', \mathfrak{K}_1)[B' - (1-\delta)B] - (\delta + z)B$$

In default and stability the government's budget constraint is

$$0 = \sum_{i=L,R} w^i(S^H, \mathfrak{K}_0) N^i(S^H, \mathfrak{K}_0) - \tau_0(S^H, \mathfrak{K}_0) \left[w^i(S^H, \mathfrak{K}_0) N^i(S^H, \mathfrak{K}_0) \right]^{1-\tau_1}$$

In default and revolt the government's budget constraint is

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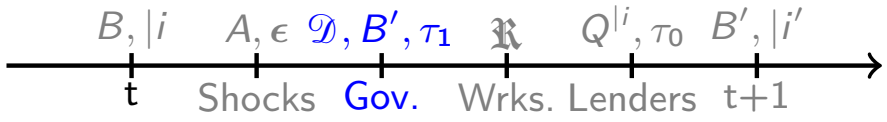
Back

Government's problem in default

In default, the government solves:



$$W^{i|i}_{\mathscr{D}_1}(S_G, \epsilon) = \max_{\tau_1}\left[\omega^{R|i} U^{R|i}_{\mathscr{D}_1} + \omega^{L|i} U^{L|i}_{\mathscr{D}_1}\right] + \beta \mathbb{E}^{i|i}_{\mathscr{D}_1}\left[W'\right] + \epsilon^{D}_{\tau_1}$$

Where for each $k \in \{L, R\}$

$$U^{k|i}_{\mathscr{D}_1}(S^G, \tau_1) = \mathbb{P}^{|i}(\mathfrak{R}_0|S^H) u^k(S^H, \mathfrak{R}_0) + \overbrace{\mathbb{P}^{|i}(\mathfrak{R}_1|S^H)}^{\text{Probability of Revolt}} u^k(S^H, \mathfrak{R}_1)$$

$$\mathbb{E}^{i|i}_{\mathscr{D}_1}\left[W'\right] = \underbrace{\mathbb{P}^{|i}(\mathfrak{R}_1|S^H) \times \mathbb{E}^{i|i}_{\mathfrak{R}_1}\left[W'\right]}_{\text{Continuation under Revolt}} + \underbrace{\mathbb{P}^{|i}(\mathfrak{R}_0|S^H)] \times \mathbb{E}^{i|i}_{\mathfrak{R}_0}\left[W'\right]}_{\text{Continuation under Stability}}$$

Incumbent's type pins the welfare weights it gives to each type: $\omega^{i|i} \geq \omega^{j|i}$

Stability after default

Under Stability, production is still affected by default costs $\alpha(A, \mathscr{D}_1, \mathfrak{R}_0) < A$

$$Y(\underbrace{A, \mathscr{D}_1, \tau_1,}_{S^H} \mathfrak{R}_0) = \alpha(A, \mathscr{D}_1, \mathfrak{R}_0) \left[(\theta^L \underbrace{N^L}_{\equiv \mathcal{N}^L(\tau_1)})^\eta + (\theta^R \underbrace{N^R}_{\equiv \mathcal{N}^R(\tau_1)})^\eta \right]^{\frac{1}{\eta}}$$

$$0 = \sum_{i=L,R} w^i(S^H, \mathfrak{R}_0) N^i(S^H, \mathfrak{R}_0) - \tau_0(S^H, \mathfrak{R}_0) \left[w^i(S^H, \mathfrak{R}_0) N^i(S^H, \mathfrak{R}_0) \right]^{1-\tau_1}$$

$$u(S^H, \mathfrak{R}_0) = u\left(\tau_0(S^H, \mathfrak{R}_0) \left[w^i(S^H, \mathfrak{R}_0) N^i(S^H, \mathfrak{R}_0) \right]^{1-\tau_1} \right) \text{ for } i = L, R$$

Government is allowed to leave default with probability γ

$$\mathbb{E}^{i|i}_{\mathfrak{R}_0}\left[W'\right] = \mathbb{E}_{A'|A}[\overbrace{\gamma}^{\text{Reentry}} \times \{\pi(\mathfrak{R}_0) W^{i|i}(A', 0, \epsilon') + (1 - \pi(\mathfrak{R}_0)) \overbrace{W^{i|j}(A', 0, \epsilon')}^{\text{Value out of office}}\}$$

$$+(1-\gamma) \times \{\pi(\mathfrak{R}_0) W^{i|i}_{\mathscr{D}_1}(A', \epsilon') + (1 - \pi(\mathfrak{R}_0)) W^{i|j}_{\mathscr{D}_1}(A', \epsilon')]$$

Revolt after default

In Revolt and Default TFP is doubly reduced $\alpha(A, \mathscr{D}_1, \mathfrak{K}_1) << A$

$$Y(\underbrace{A, \mathscr{D}_1, \tau_1,}_{S^H} \mathfrak{K}_1) = \alpha(A, \mathscr{D}_1, \mathfrak{K}_1) \left[(\theta^L \underbrace{N^L}_{\equiv \mathcal{N}^L(\tau_1)})^\eta + (\theta^R \underbrace{N^R}_{\equiv \mathcal{N}^R(\tau_1)})^\eta \right]^{\frac{1}{\eta}}$$

$$0 = \sum_{i=L,R} w^i(S^H, \mathfrak{K}_1) N^i(S^H, \mathfrak{K}_1) - \tau_0(S^H, \mathfrak{K}_1) \left[w^i(S^H, \mathfrak{K}_1) N^i(S^H, \mathfrak{K}_1) \right]^{1-\tau_1}$$

$$u(S^H, \mathfrak{K}_1) = u\left(\tau_0(S^H, \mathfrak{K}_1) \left[w^i(S^H, \mathfrak{K}_1) N^i(S^H, \mathfrak{K}_1) \right]^{1-\tau_1} \right) \text{ for } i = L, R$$

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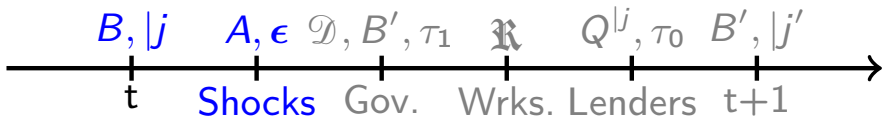
$$+(1-\gamma) \times \{\pi(\mathfrak{K}_1) W^{i|i}_{\mathscr{D}_1}(A', \epsilon') + (1 - \pi(\mathfrak{K}_1)) W^{i|j}_{\mathscr{D}_1}(A', \epsilon')]$$

Back

Value of the party out of office



The party out of power, $i \neq j$, faces the same state $(\underbrace{s, B}_{S_G}, \lfloor j, \epsilon)$

And has rational expectations about the fiscal choices made by the party in power

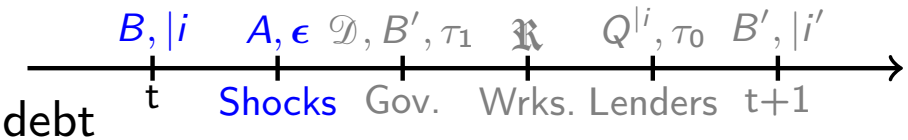
$$W^{i\lfloor j}(S_G, \epsilon) = \mathscr{D}^{\lfloor j}(S_G, \epsilon) W^{i\lfloor j}_{\mathscr{D}_1}(S_G, \epsilon) + [1 - \mathscr{D}^{\lfloor j}(S_G, \epsilon)] W^{i\lfloor j}_{\mathscr{D}_0}(S_G, \epsilon)$$

The values in default and repayment will depend on the default, borrowing, and tax choices of the incumbent

$$\mathscr{D}^{\lfloor j}_{\mathscr{D}_0}(S_G, \epsilon); \mathscr{B}'^{\lfloor j}(S_G, \epsilon); \tau_1^{\lfloor j}(S_G, \epsilon)$$

Back to Stability Back to Revolt

Government's problem with issuance cost



Before default Gov can issue high levels of debt

Chaterjee et al. 2012 refer to this as "extreme dilution"

The period budget constraint becomes:

$$0 = (1-\mathscr{D}) \times \Big[\underbrace{Q^{|i}(A, B', \mathfrak{K})[B' - (1-\delta)B] - (\delta + z)B}_{\text{Debt Balance}} \Big] + \underbrace{\sum_{i=L,R} [w^i N^i - \tau_0 \left(w^i N^i\right)^{1-\tau_1}]}_{\text{Tax Receipt}}$$

$$+ \underbrace{\iota_1 \exp(\iota_2 |B' - B|) - \iota_1}_{\text{Issuance cost}}$$

We borrow this functional from from Dvorkin et al. 2021

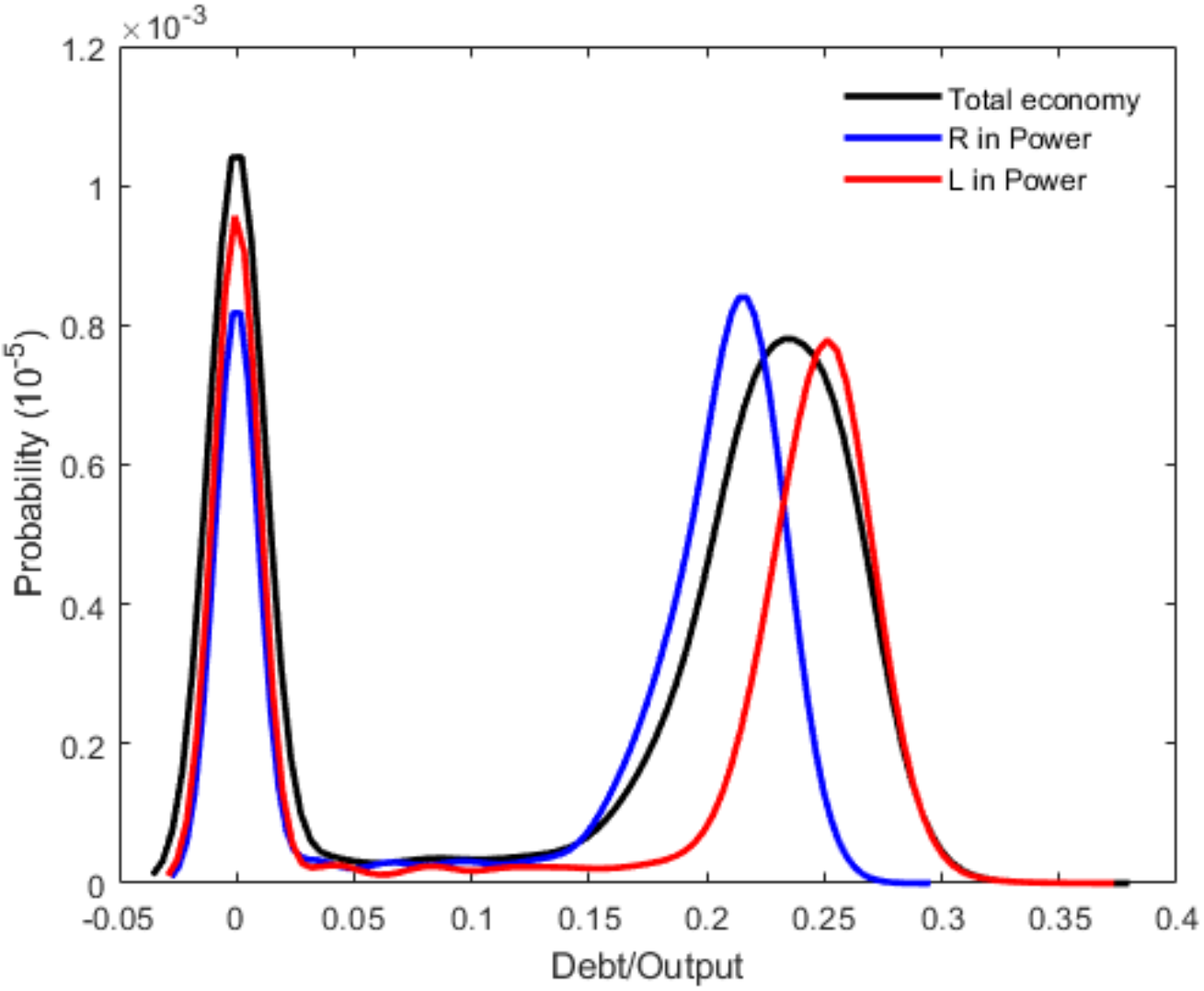
Back to government problem Back to calibration

Parameters estimated outside of the model

Parameter	Value	Source/Transition
Risk free rate	$r = .01$	Standard value
Inverse Frisch elasticity	$1/\psi = 3$	Standard value
Elasticity of substitution	$\eta = 2/3$	Gallegos 2006
Productivity of workers	$\theta_R = .7, \theta_L = 1 - \theta_R$	Hourly wage premia
Disutility of labor	$\exp(\phi_R) = 1.07$	Hours highly educated
Disutility of labor	$\exp(\phi_L) = .93$	Hours lowly educated
Productivity shock	$\rho^A = .95$	Chatterjee et. al 2012
$\log(A_t) = \rho^A \log(A_{t-1}) + \epsilon_t^A$	$\sigma^A = .03$	Argentina's GDP
Debt Maturiy	$\delta = .05$	Avg. maturity of debt
Debt Coupon	$z = 0.03$	Debt Service
Reentry Probability	$\gamma = 1/26$	Average exclusion
Tenure in office under stability	$\pi(\mathfrak{R}_0) = 1 - 1/32$	Morelli et al. 2023
Tenure in office under revolt	$\pi(\mathfrak{R}_1) = 1 - 1/16$	Pol. turnover since 2015
Correlation Gov's taste shocs	$\rho^\epsilon = .37$	Dvorkin et al. 2021

Back

Debt densities (B') by party in power



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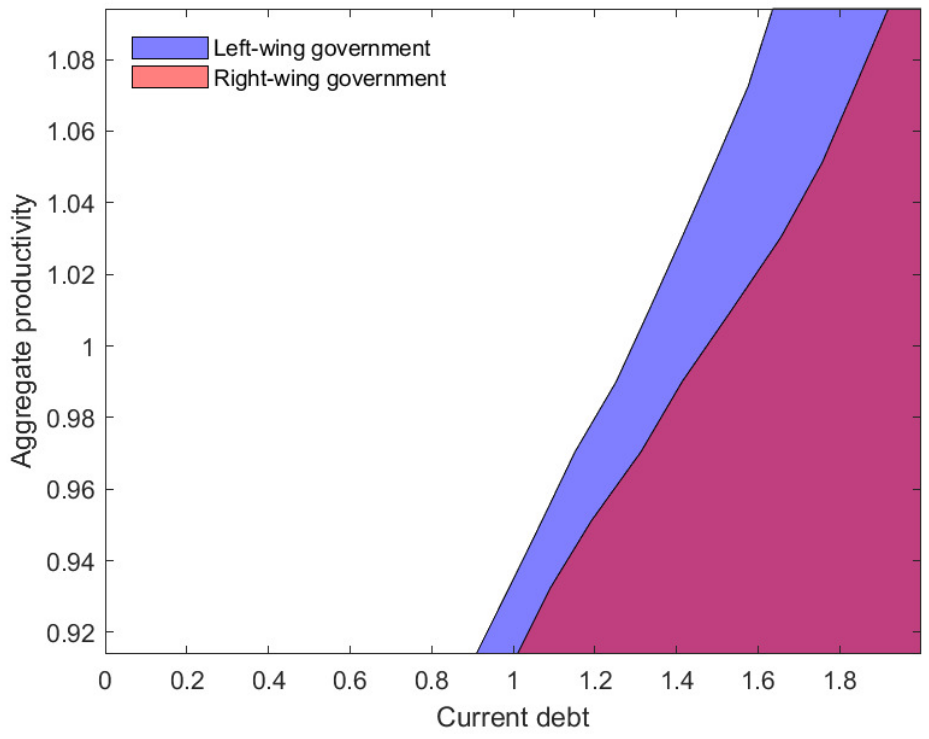
Default Sets



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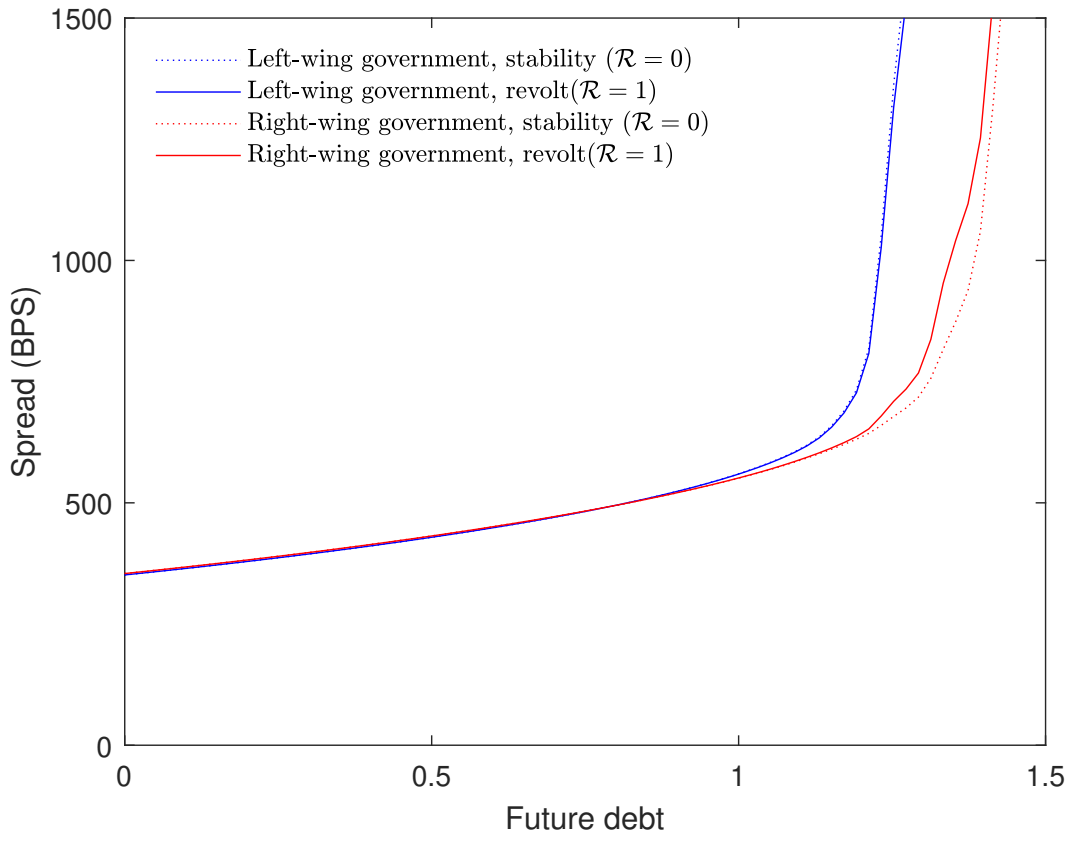
Spreads by party : effect of revolts



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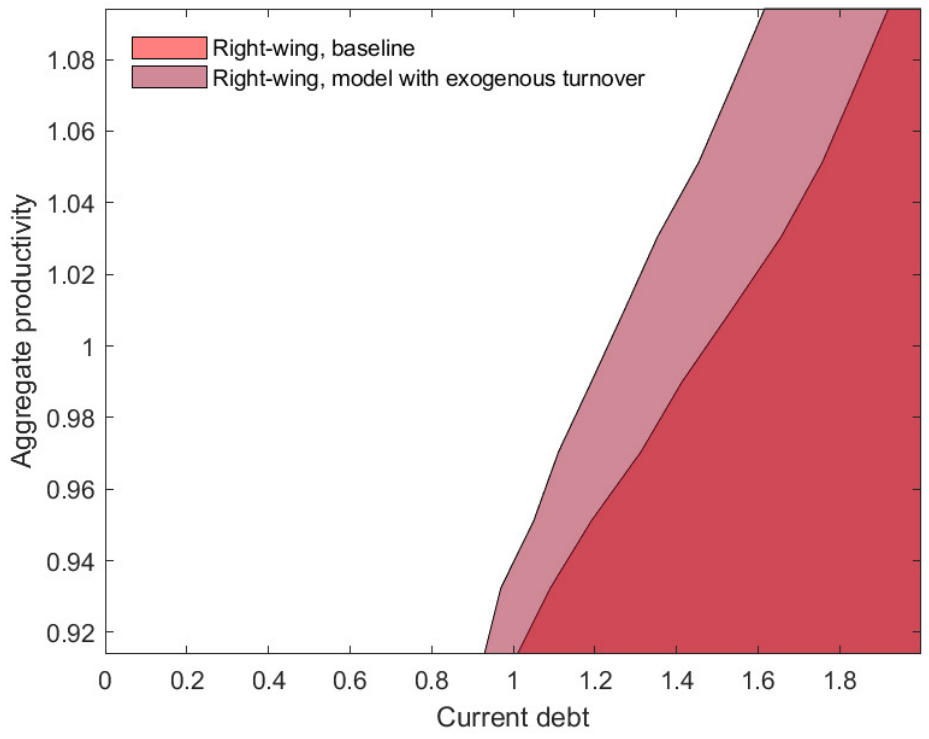
Default Sets in baseline and model with no Revolts



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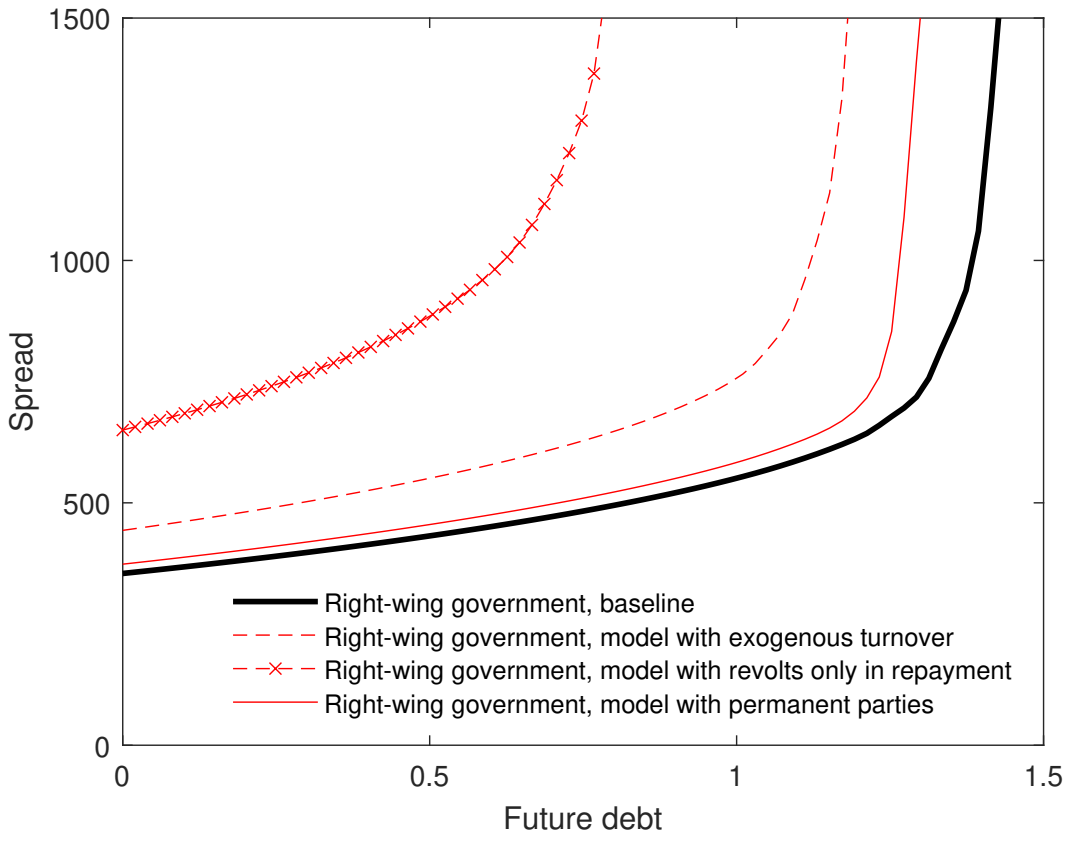
Spread Right wing government in all models



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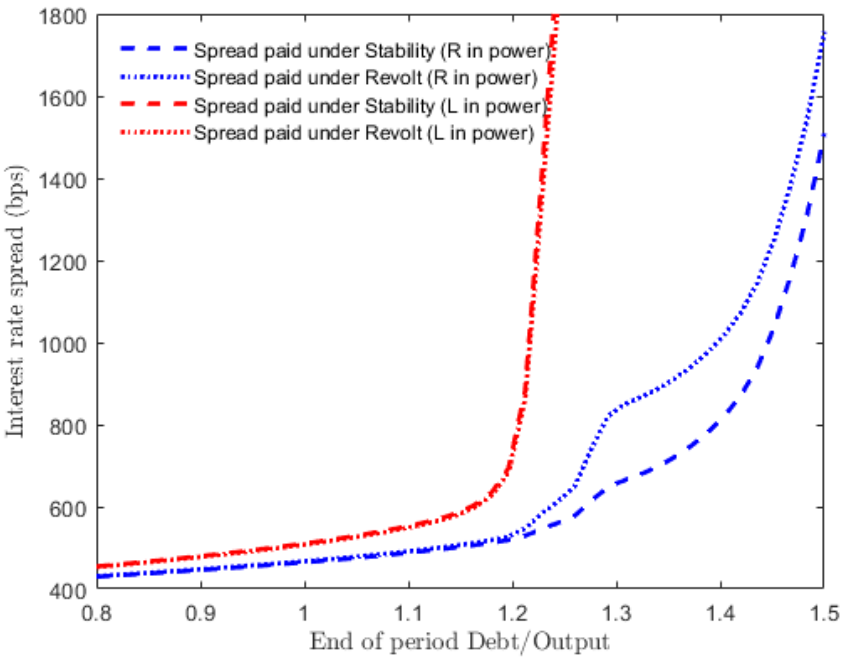
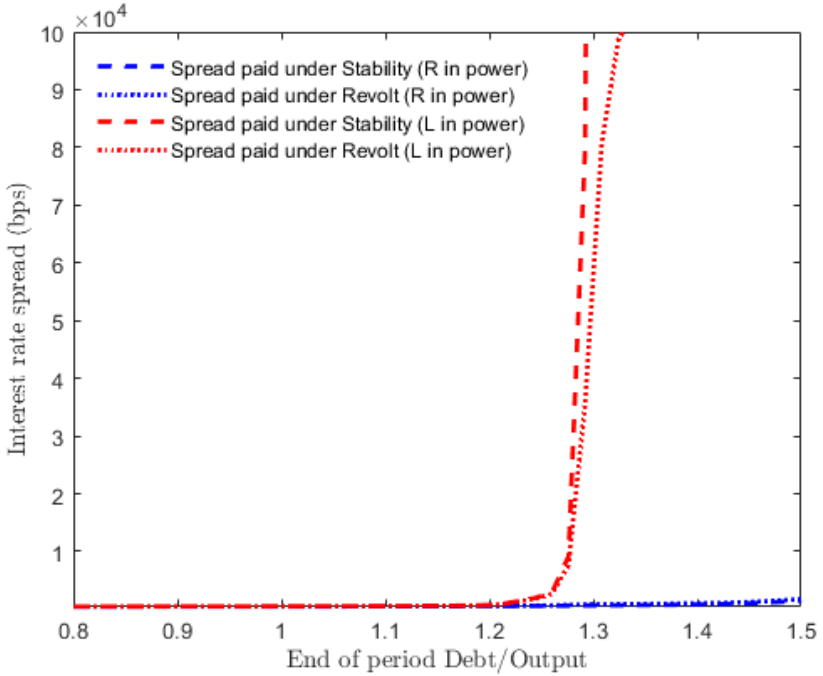
Interest rate spreads by party and revolt status





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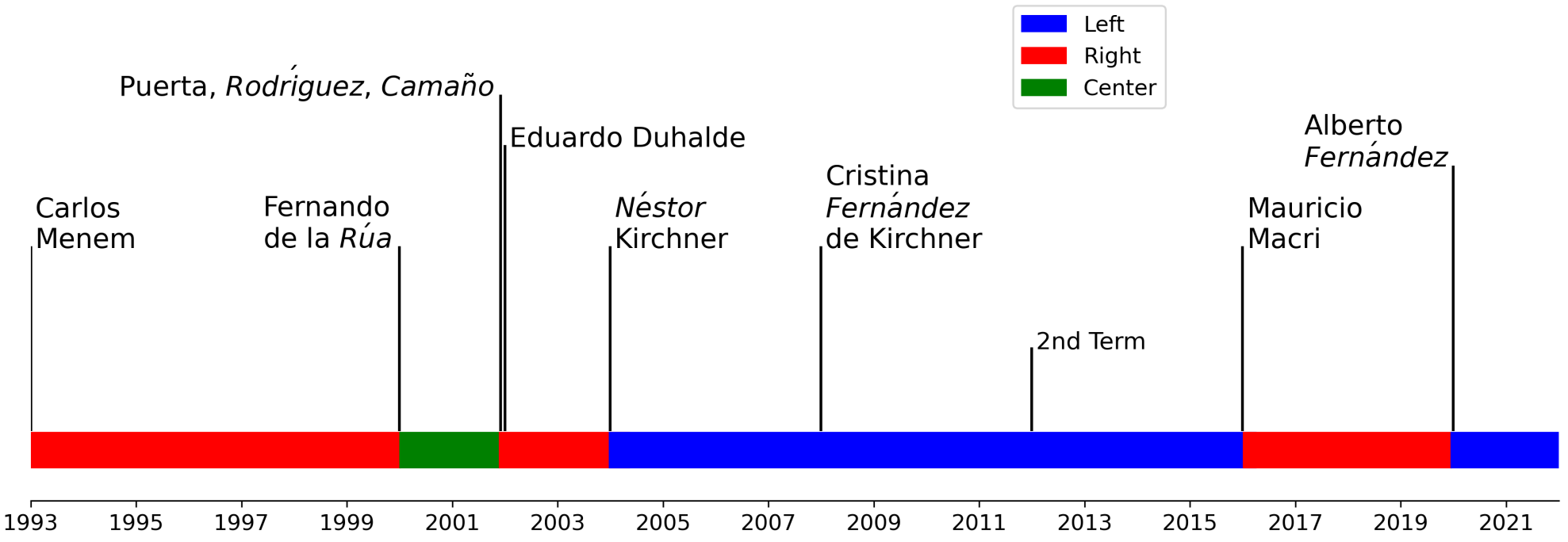
Political leanings of Argentina's executive



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Risk Neutral Foreign lenders pricing in equilibrium

In repayment, debt's prices depends on the expected party in office next period

$$Q^{|i}(A, B', \mathfrak{R}_{\mathbf{0}}) = \frac{\mathbb{E}_{A'|A}}{1+r}\Bigg\{1 - \pi(\mathfrak{R}_{\mathbf{0}})\mathscr{D}^{|i\prime}(A', B')\Big[\delta + z + (1-\delta)\sum_{r=\mathbf{1},\mathbf{0}} \mathbb{P}^{|i}(\mathfrak{R}_r|S^{H\prime}_{|i})Q^{|i}(A', \mathscr{B}^{|i\prime}, \mathfrak{R}_r)$$

$$-(1 - \pi(\mathfrak{R}_{\mathbf{0}}))\mathscr{D}^{|j}(A', B')\Big[\delta + z + (1-\delta)\sum_{r=\mathbf{1},\mathbf{0}} \mathbb{P}^{|j}(\mathfrak{R}_r|S^{H\prime}_{|j})Q^{|j}(A', \mathscr{B}^{|j\prime}, \mathfrak{R}_r)\Bigg\}$$

The same is true in Revolt

$$Q^{|i}(A, B', \mathfrak{R}_{\mathbf{1}}) = \frac{\mathbb{E}_{A'|A}}{1+r}\Bigg\{1 - \pi(\mathfrak{R}_{\mathbf{1}})\mathscr{D}^{|i\prime}(A', B')\Big[\delta + z + (1-\delta)\sum_{r=\mathbf{1},\mathbf{0}} \mathbb{P}^{|i}(\mathfrak{R}_r|S^{H\prime}_{|i})Q^{|i}(A', \mathscr{B}^{|i\prime}, \mathfrak{R}_r)$$

$$-(1 - \pi(\mathfrak{R}_{\mathbf{1}}))\mathscr{D}^{|j}(A', B')\Big[\delta + z + (1-\delta)\sum_{r=\mathbf{1},\mathbf{0}} \mathbb{P}^{|j}(\mathfrak{R}_r|S^{H\prime}_{|j})Q^{|j}(A', \mathscr{B}^{|j\prime}, \mathfrak{R}_r)\Bigg\}$$

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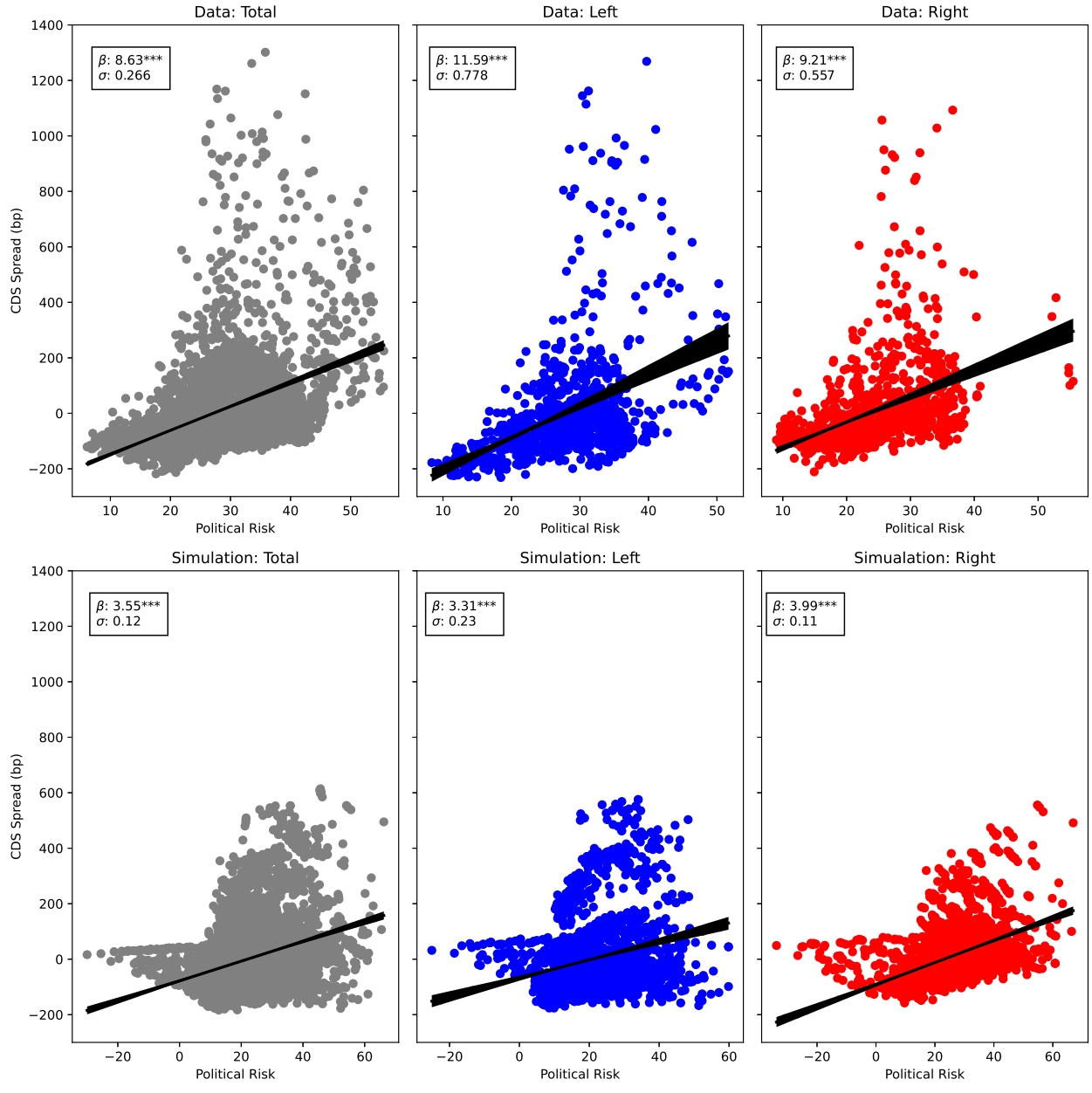
Validation: Untargeted effect of revolts on spreads



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