Aggregate Demand and Sovereign Debt Crises

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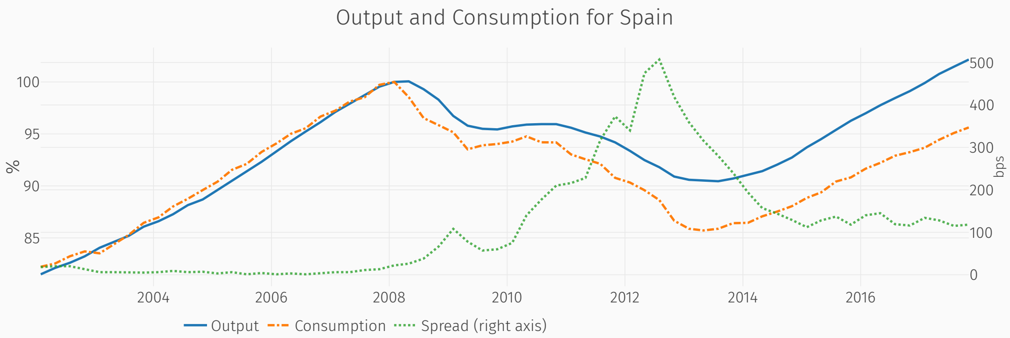
Motivation

- Sovereign debt crises associated with **deep** recessions ▸ More



- Conventional view: low output $\implies$ high spreads

▸ Detrended data ▸ Trade balance ▸ Low demand?

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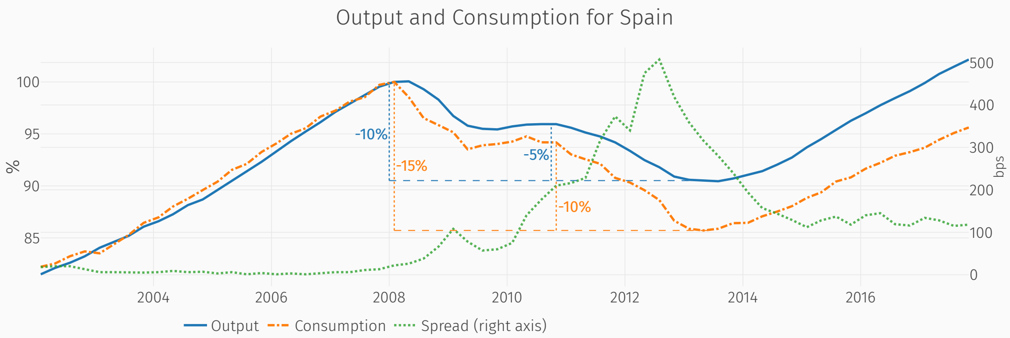

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- Spain: large output and consumption drops
  - $|\Delta C| > |\Delta Y| \implies$ Saving rate $\uparrow$ in the crisis
- IVs on Eurozone country-level data show
  1. High spreads cause output to fall
  2. High spreads cause consumption to fall **more** than output
- Sovereign debt literature assumes hand-to-mouth households or Law of One Price
  - Saving rate in the crisis?
  - Consequences?
  - Substantial fraction of government debt held by residents ▸ Spanish data

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This Paper

- I propose a model of debt crises
  - Prominent role for household consumption/savings decision
    - Heterogeneous domestic savers can choose to be exposed to sovereign debt
  - Savings pattern in the crisis
  - Feedback loop between spreads and output
    - $\uparrow$ Spreads $\implies$ $\downarrow$ Demand $\implies$ $\downarrow$ Output
- Model
  - Expectations of outcomes **in case** of default
    - Aggregate income losses $\longleftarrow$ TFP costs of default
    - Redistributive effects $\longleftarrow$ Domestic debt holdings
  - Economy looks riskier when the default probability increases
    - Default risk interacts with precautionary behavior

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Main findings

- Feedback effect explains significant portion of the crisis
  - Calibration numbers soon
- Highlight role of inequality, identity of debt holders
- New light on Aguiar-Gopinath facts More
  - Amplification of negative shocks, demand-driven recessions
  - In downturns volatility of $C >$ volatility of Y

Literature

- **Sovereign risk affecting the supply side through finance**

  Bocola (2016), Arellano, Bai, and Mihalache (2018), Balke (2017)

- **Domestic debt and default incentives**

  Gennaioli, Martin, and Rossi (2014), Mengus (2014), Mallucci (2015), Pérez (2016), D'Erasmo and Mendoza (2016), Ferriere (2016)

- **Sovereign risk and fiscal austerity**

  Cuadra, Sánchez, and Sapriza (2010), Romei (2015), Bianchi, Ottonello, and Presno (2016), Anzoategui (2017), Philippon and Roldán (2018)

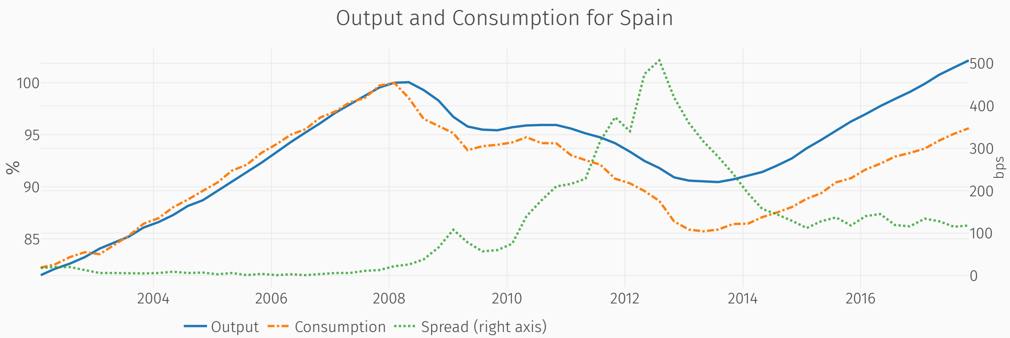
- **Shocks affecting aggregate demand through redistribution**

  Auclert (2017), Eggertsson and Krugman (2012), Korinek and Simsek (2016), ...

Roadmap

- Evidence
- Description of Model
- Model Results
- The Crisis

Evidence



Spain in the 2000s

Detrended data
Trade balance
Low demand?

Main Specification

- Regress outcome variable Q_{jt} on country j's spread

$$Q_{jt} = \beta Spread_{jt} + \gamma X_{jt} + \delta_t + \mu_j + \epsilon_{jt}$$

where $Q_{jt} = \log Y_{jt}, \log C_{jt}$

- Bartik-like IV strategy (Martin and Philippon, 2017)

$$Spread_{jt} = \underbrace{\bar{\sigma}_t \left[\phi_0 + \phi_1 \frac{B_{j,t-12}}{Y_{j,t-12}}\right]}_{Z_{jt}} + \eta_{jt}$$

- Data for 11 European countries between 1996Q1 – 2017Q4

  Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain

	Dependent variable:			
	$\log Y_{jt}$		$\log C_{jt}$	
	(1)	(2)	(3)	(4)
Spread_{jt}	-0.011^{***}		-0.011^{***}	
	(0.003)		(0.002)	
Spread_{jt} (IV)		-0.048^{**}		-0.088^{***}
		(0.019)		(0.022)
Model	OLS	IV	OLS	IV
Country + Time FE	✓	✓	✓	✓
Observations	968	968	968	968
Adjusted R^2	0.995	0.994	0.997	0.993

Standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

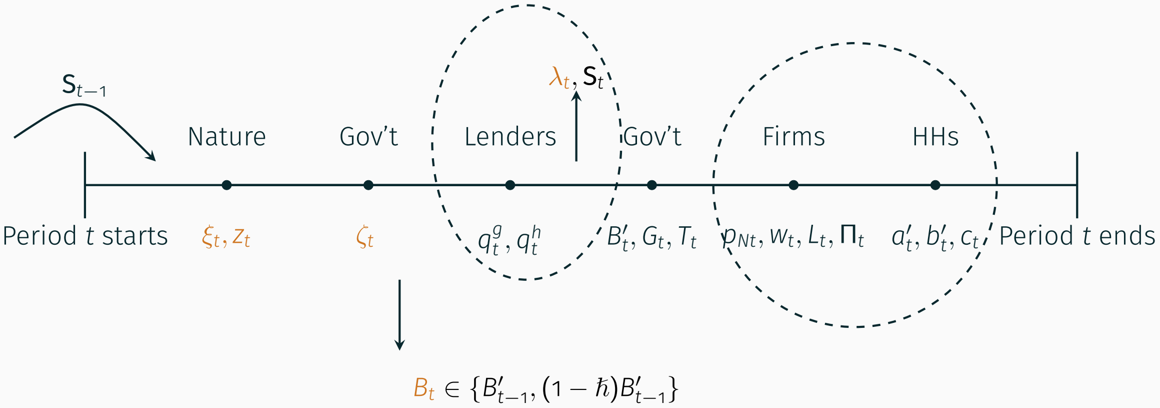
▸ The Cycle is the Trend
▸ Controls

Description of Model

General Description

- Small open economy with
  - Uninsurable idiosyncratic income risk + Incomplete markets
  - Default risk
  - Nominal rigidities
- Actors:
  - A government
    - Issues long-term debt, purchases goods, decides repayment
  - Households
    - Consume, work, save in the gov't **bond** + risk-free **debt**
    - Differ in 'cash' holdings, idiosyncratic income shock
  - Firms
    - Produce the goods with labor, subject to **wage rigidities**
  - Foreigners
    - Lend to the government and to the private sector
    - Price all assets

Timeline



Decisions within a period

Dashed ellipses encircle simultaneous decisions

At each t, the government

- Chooses **repayment** $h_t \in \{1, 1-\hbar\}$
- Follows fiscal rules for new **issuances** $B'(\mathbf{S}_t)$ and spending $G(\mathbf{S}_t)$
  - Can depend on full state: $(B_t, \lambda_t, \xi_t, \zeta_t, z_t)$ Fiscal rules
- Must satisfy its budget constraint

$$\underbrace{q_t^g}_{\text{debt price}} \underbrace{(B_t' - (1-\rho)B_t)}_{\text{new debt issued}} + \underbrace{T_t}_{\text{lump-sum}} + \underbrace{\tau w_t L_t}_{\text{payroll tax}} = \underbrace{G_t}_{\text{spending}} + \underbrace{\kappa B_t}_{\text{coupon}}$$

$\rightarrow$ T_t summarizes a default / austerity tradeoff

Given a government policy $h(\mathsf{S}, \xi', z'), B'(\mathsf{S}), T(\mathsf{S}, q^g)$, in a comp eq'm

- Risk-neutral foreigners ▸ General Formulation
  - Price all assets

$$q^h(\mathsf{S}) = \frac{1}{1+r^\star}$$

$$q^g(\mathsf{S}) = \frac{1}{1+r^\star}\mathbb{E}\left[\underbrace{\mathbb{1}_{(\zeta'=1)}(1-\xi')\kappa}_{\text{coupon}} + \underbrace{(1-\rho)}_{\text{depreciation}}\underbrace{\left(1-\hbar\mathbb{1}_{(\zeta=1\cap\zeta'\neq 1)}\right)}_{\text{potential haircut}}\underbrace{q^g(\mathsf{S}')}_{\text{resale price}}\,\middle|\,\mathsf{S}\right]$$

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- Firms
  - Traded and nontraded goods, CES aggregator, wage rigidities

$$Y_{Nt} = L_{Nt}^{\alpha_N}\left(1-\Delta\mathbb{1}_{(\zeta\neq1)}\right) \qquad Y_{Tt} = z_t L_{Tt}^{\alpha_T}\left(1-\Delta\mathbb{1}_{(\zeta\neq1)}\right) \qquad W_t \geq \bar{W}$$

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- Households
  - Access to both assets with borrowing limits, inelastic labor supply
- Approximation: $\lambda_t = \log \mathcal{N}(\mu_t, \Sigma_t)$. So $\mathsf{S} = (B, \mu, \sigma, \xi, \zeta, z)$

- Given govt's policies, aggregates, and evolution of the state

$$v(\omega,\epsilon,\mathsf{S})^{\frac{\psi-1}{\psi}} = \max_{c,a',b'} (1-\beta)c^{\frac{\psi-1}{\psi}} + \beta\mathbb{E}\left[\left(v(\underbrace{a'+R_{\mathsf{S},\mathsf{S}'}b'}_{=\omega'},\epsilon',\mathsf{S}')\right)^{1-\gamma}\middle|\,\omega,\epsilon,\mathsf{S}\right]^{\frac{\psi-1}{\psi(1-\gamma)}}$$

$$\begin{aligned}
\text{subject to } p_C(\mathsf{S})c + q^h(\mathsf{S})a' + q^g(\mathsf{S})b' &= \omega + \ell(\mathsf{S})\epsilon - T(\mathsf{S}) \\
\ell(\mathsf{S}) &= w(\mathsf{S})L(\mathsf{S})(1-\tau) + \Pi(\mathsf{S}) \\
R_{\mathsf{S},\mathsf{S}'} &= \mathbb{1}_{(\zeta'=1)}\kappa + (1-\rho)\left(1-\hbar\mathbb{1}_{(\zeta=1)(\zeta'\neq 1)}\right)q^g(\mathsf{S}') \\
a' &\geq \bar{a}; \qquad b' \geq 0 \\
\mathsf{S}' &= \Psi(\mathsf{S},\xi',z',h') \\
&\text{Exog LoMs for } (\epsilon,\xi,z)\text{; prob of } h' \text{ given } (\mathsf{S},\xi',z')
\end{aligned}$$

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- Skipping steps: in crisis times
  - $\pi\uparrow \implies \mathbb{E}[w'L'] = \pi\mathbb{E}[w'L'|\zeta'\neq 1] + (1-\pi)\mathbb{E}[w'L'|\zeta'=1]\downarrow$ ← Aggregate effect
  - $q^g\downarrow \implies \omega\downarrow$ for all ← Distributional effect
  - $\mathrm{cov}(R_{\mathrm{S},\mathrm{S}'}, sdf' \mid \mathrm{S})\downarrow$ ← 'Savings technology' effect

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Households

- Given govt's policies, aggregates, and evolution of the state

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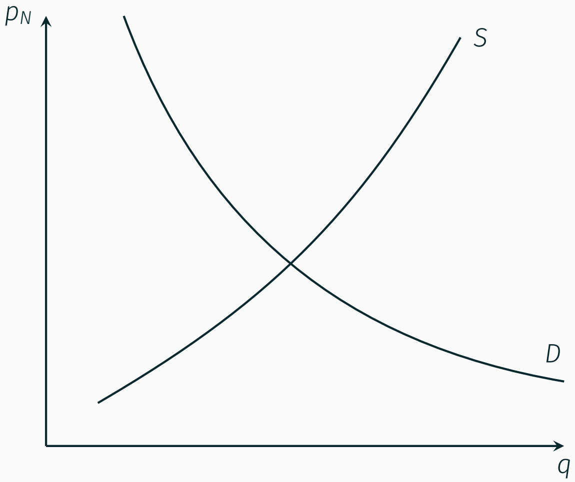
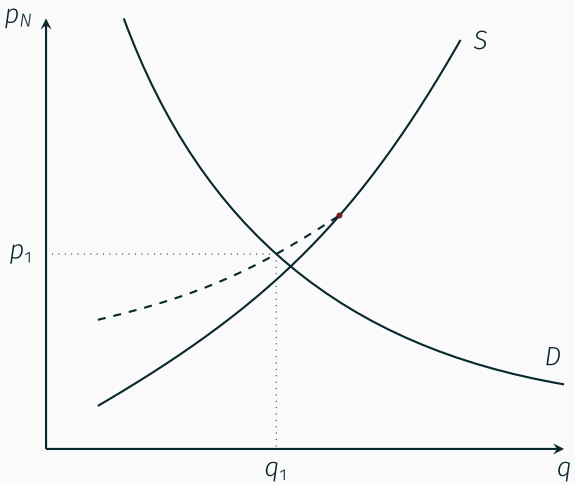
Aggregate Demand



$$Y_N^d = C\varpi\left(\frac{p_N}{p_C}\right)^{-\eta} + \frac{\vartheta_N}{p_N}G$$

$$Y_N^s = L_N^{\alpha_N}\left(1 - \mathbb{1}_{(\zeta\neq 1)}\Delta\right)$$

$$L_N^d = \left(\alpha_N \frac{p_N}{w}\right)^{\frac{1}{1-\alpha_N}}$$



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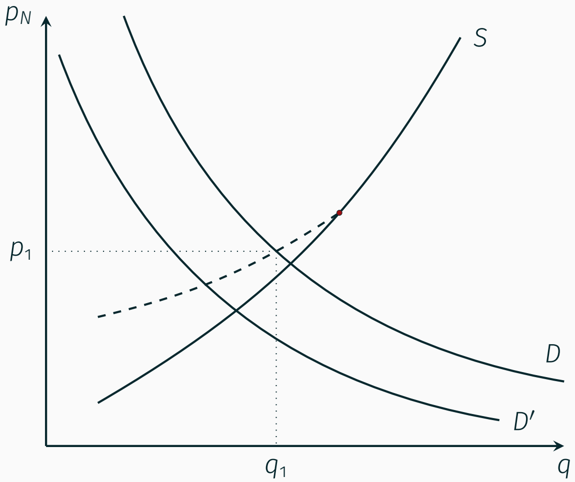

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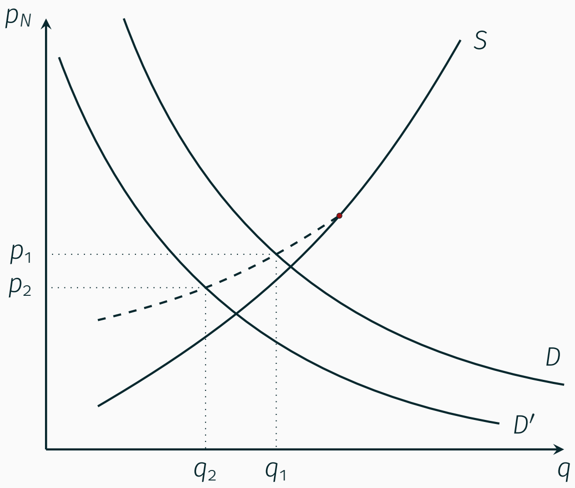
- $C \downarrow \implies p_N \downarrow \implies w \downarrow$



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- $C\downarrow \implies p_N\downarrow \implies w\downarrow$
- Wage rigidity creates price stickiness

- B'_t and G_t are given functions of $\mathbf{S}_t$
- Default / Repayment is an optimal **choice**
  - Utilitarian objective

$$\mathcal{W}(\mathbf{S}) = \int v(\mathbf{s}, \mathbf{S}) d\lambda_{\mathbf{S}}(\mathbf{s})$$

  - In period t, observe $\mathbf{S}_{t-1}$ and (ξ_t, z_t)
  - Gov't understands $\mathbf{S}_t = \Psi(\mathbf{S}_{t-1}, \xi_t, z_t, \zeta_t)$ Distribution
  - Default iff

$$\underbrace{\mathcal{W}\left(\Psi(\mathbf{S}_{t-1}, \xi_t, z_t, \zeta_t \neq 1)\right)}_{\text{v under def}} - \underbrace{\mathcal{W}\left(\Psi(\mathbf{S}_{t-1}, \xi_t, z_t, \zeta_t = 1)\right)}_{\text{v under rep}} \geq \sigma_g \xi_t^{\text{def}}$$

where $\xi_t^{\text{def}} \overset{iid}{\sim} \mathcal{N}(0, 1)$

Equilibrium Concept

Definition

Given fiscal rules $B'(\mathsf{S}), G(\mathsf{S})$, an *equilibrium* consists of ▸ Algorithm

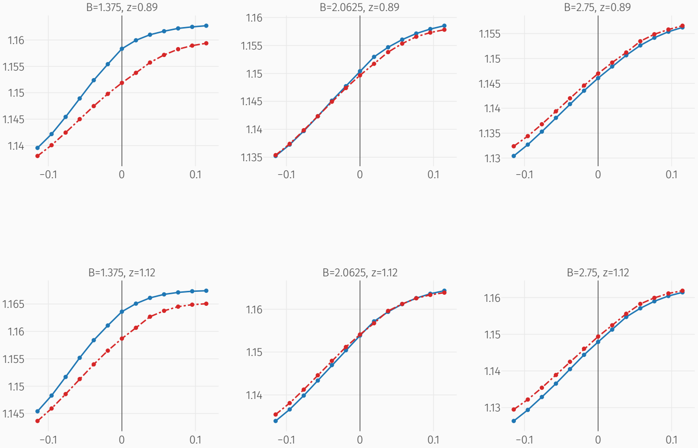
- A government policy $h'(\mathsf{S}, \xi', z')$
- Policy functions $\{\phi_a, \phi_b, \phi_c\}(\mathsf{s}, \mathsf{S})$
- Prices $p_C(\mathsf{S}), p_N(\mathsf{S}), w(\mathsf{S}), q^g(\mathsf{S})$. Quantities $L_N(\mathsf{S}), L_T(\mathsf{S}), \Pi(\mathsf{S}), T(\mathsf{S})$
- Laws of motion $\mu'(\mathsf{S}, \xi', z'; h), \sigma'(\mathsf{S}, \xi', z'; h)$

such that

- The policy functions solve the household's problem
- The laws of motion are consistent with the policy functions
- Firms maximize profits, $w(\mathsf{S}) \geq \bar{w}$, markets clear ▸ Market Clearing
- The government's default policy maximizes $\mathcal{W}(\Psi(\mathsf{S}, \xi', z', \cdot))$

Model Results

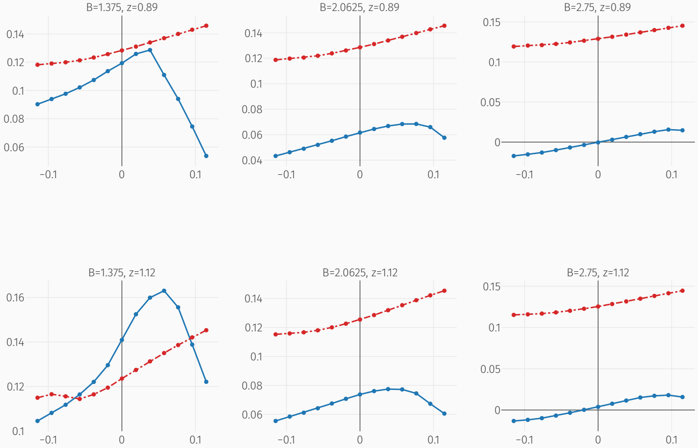
Preliminary results



Anticipated objective function

Blue: repayment, red: default

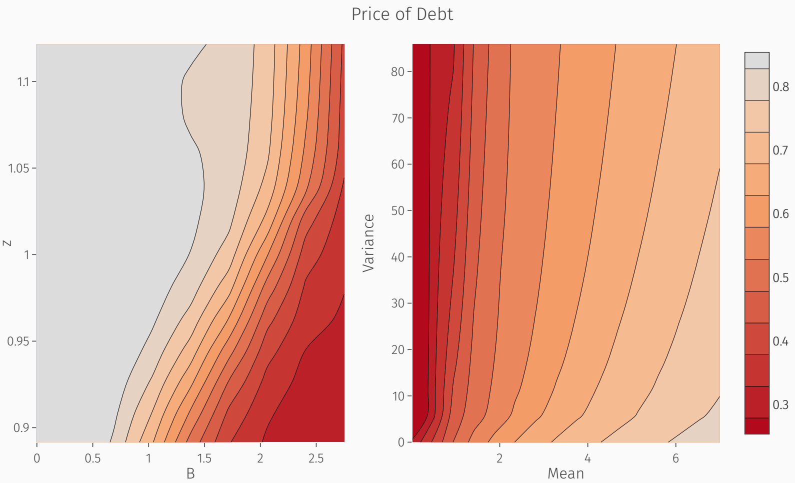
Preliminary results



Transfers

Blue: repayment, red: default

Preliminary results



Model: Benchmark

Preliminary results

Model: Benchmark

The Crisis

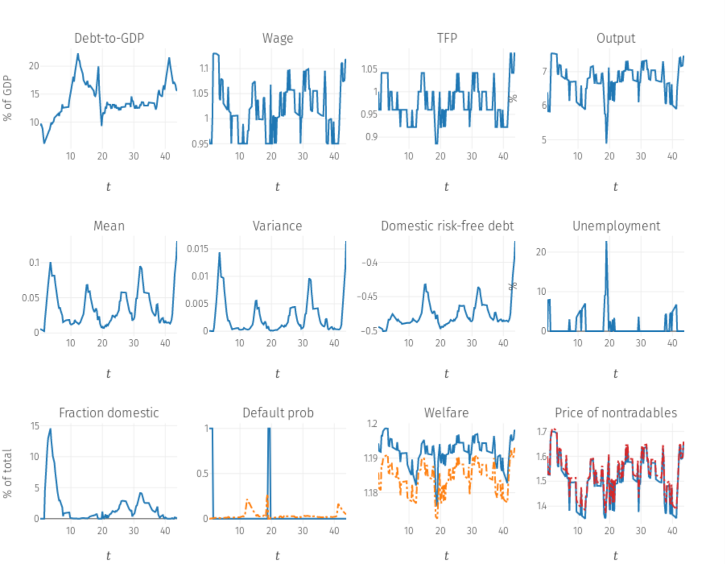
Calibration

Parameter	Value	Description	Source
$r^\star$	4% ann.	Risk-free rate	Anzoategui (2017)
$\hbar$	50%	Haircut in case of default	Philippon and Roldán (2018)
Δ	10%	TFP loss in case of default	Philippon and Roldán (2018)
ϖ	0.74	Share of nontraded in prod	Anzoategui (2017)
ϑ_N	80%	Share of nontraded in G	Anzoategui (2017)
$\rho_\epsilon, \sigma_\epsilon$	(0.978, 0.022)	Idiosyncratic income	D'Erasmo and Mendoza (2016)
	Internally calibrated		**Target (Spain)**
ρ_z, σ_z	(0.9, 0.025)	TFP process	(0.966, 0.013) AR(1) output
$1/\beta - 1$	5.2% ann.	Discount rate of HHs	Mean Debt-to-GDP 64%
$\bar{\xi}$	0.11	Mean tax on coupons	Mean domestic holdings 50%
γ	6.25	Risk aversion	(0.962, 0.017) AR(1) consumption
τ	12%	Progressivity of tax schedule	

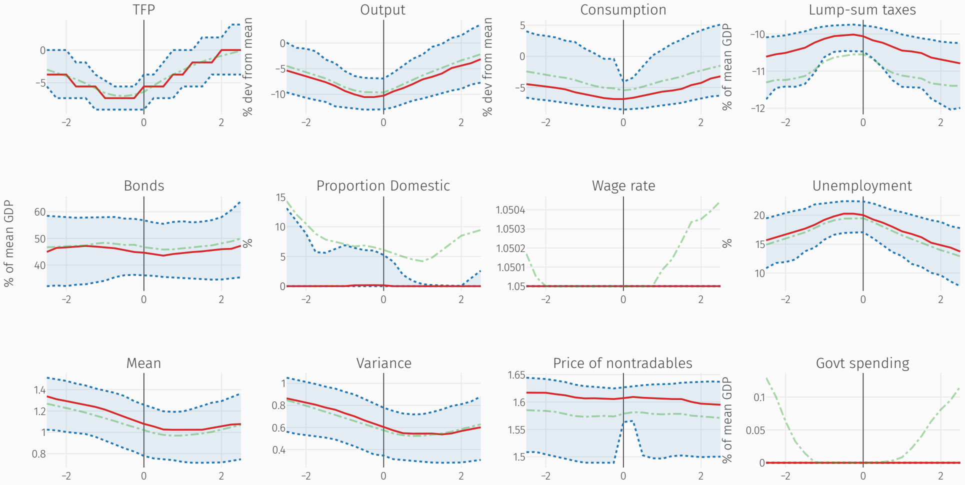
Simulate model economy for 2000 years

- Record all episodes of
  - *i*. High spreads for 6 quarters
  - *ii*. Default
- Take 2-year windows around each
  - Left with 131 defaults ($\sim$ 6% annual freq)
- Compute distribution of endogenous variables around them

Simulated Paths

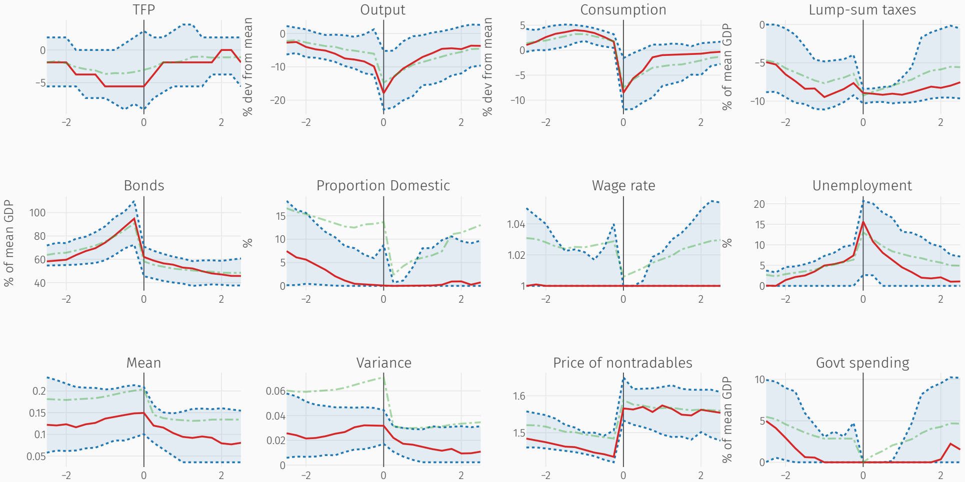


Simulated Data – High Spreads



Red: Median, Shaded blue: [0.25, 0.75] percentiles, Dashed green: Mean

Simulated Data – Default Episodes



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Still Missing

- **Calibrate** to match moments of Spanish economy
  - Standard: output, employment, spreads, net exports
  - New: distribution of exposures from Morelli and Roldán (2018) ▸ MR
- Compare episodes of high spreads in simulated data against
  - Same economy with no nominal rigidities
  - Same economy with **no risk**
    - Myopic domestic agents and foreigners who **perceive** no default risk
    - Myopic domestic agents only
  - No TFP costs of default $\leftarrow$ shuts down aggregate income losses
  - No capital losses + $\hbar = 0$ $\leftarrow$ shuts down redistributive wealth effects

  $\rightarrow$ Notions of **potential** output
- Difference is amplification through extra precautionary behavior
  - Different benchmarks emphasize different channels

Concluding Remarks

- Interested in interaction of
  - Default risk
  - Precautionary behavior

  + implications for amplification of shocks

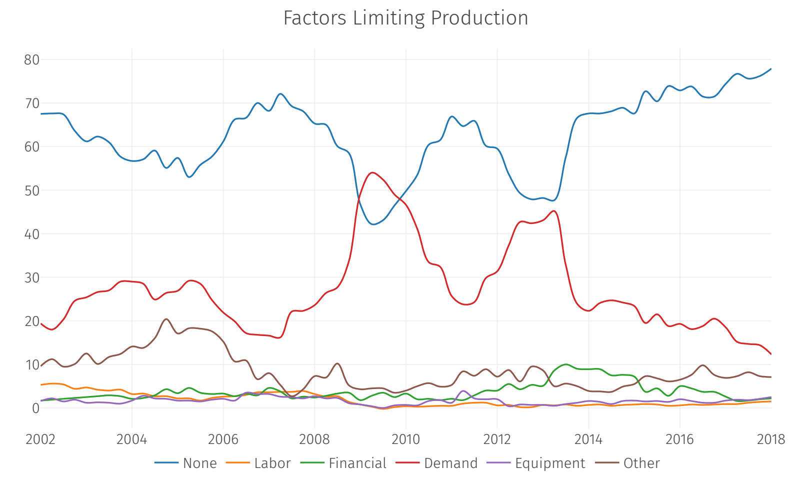
- Potentially helps explain severity of Eurozone debt crisis
  - Exploit Spanish data for calibration of exposures

- Key:
  - Aggregate + redistributive wealth effects if default
  - Agents take precautions against those
  - Timing flips usual MPC / transfer argument

- All comments welcome!

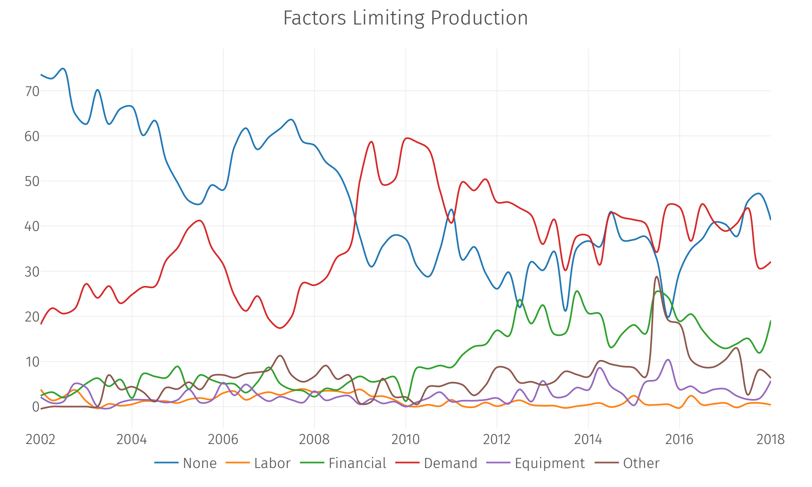
Italy

Back



Italian firms' self-reported limits to production

Source: Eurostat

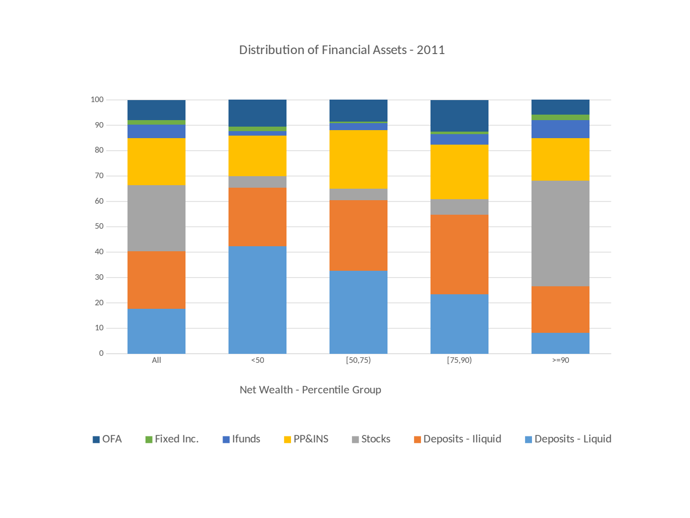


Greek firms' self-reported limits to production

Source: Eurostat

Household survey

- Companion paper: dom exp to Spanish sovereign risk ◂ Back



Measuring Exposures to Sovereign Debt - Banks

Measure exposure based on Philippon and Salord (2017)

- study European banks resolutions in Cyprus
- average total recapitalization need was around 17.4% of assets
- private investors provided 33% of need via loss in equity (91%), junior debt (53%) and senior debt (14%)
- remaining 2/3 came from government intervention

→ assumed not possible in Spain!
→ remaining need comes from senior debt and depositors

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Measuring Exposures to Sovereign Debt - Deposits

Work with different scenarios of loss on deposits:

Scenario	SD Loss	Dep. Loss
Extreme	25%	14%
Mild	50%	10%
Conservative	75%	5%

Table 1: Expected losses on deposits

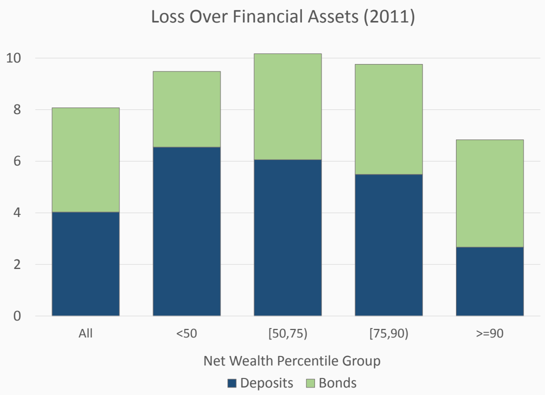
- Assume a 50% haircut on public debt that triggers a bank crisis
- Loss for depositors of 10%
- Overall, public debt and bank crisis would induce a fall of between 8% and 10% of financial assets

◂ Back

Data - Exposures

Back

- Companion paper: dom exp to Spanish sovereign risk More
- Pension funds, mutual funds, insurance – perfect passthrough
- Deposits – more complicated
  - Philippon and Salord (2017): bank resolutions in Cyprus Details



Fiscal Rules

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	G_t/Y_t		$\left(B_t' - (1-\rho)B_t\right)/Y_t$	
	(1)	(2)	(3)	(4)
Unemployment_t	0.031	0.073^{***}	0.334^{**}	0.346^{***}
	(0.039)	(0.015)	(0.158)	(0.059)
Unemployment_t^2	0.002		0.0001	
	(0.001)		(0.006)	
B_t/Y_t	0.010^{*}	-0.017^{***}	-0.010	0.009
	(0.005)	(0.002)	(0.020)	(0.007)
$(B_t/Y_t)^2$	-0.0002^{***}		0.0001	
	(0.00004)		(0.0001)	
Net Exports_t	0.009	0.007	0.046	0.019
	(0.019)	(0.012)	(0.075)	(0.046)
Net Exports_t^2	-0.0001		-0.001	
	(0.001)		(0.003)	
Mean FE	20.675	21.085	1.079	0.571
Country + Time FE	✓	✓	✓	✓
Observations	968	968	957	957
Adj. R^2	0.904	0.901	0.697	0.698

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Fiscal Rules (cont'd)

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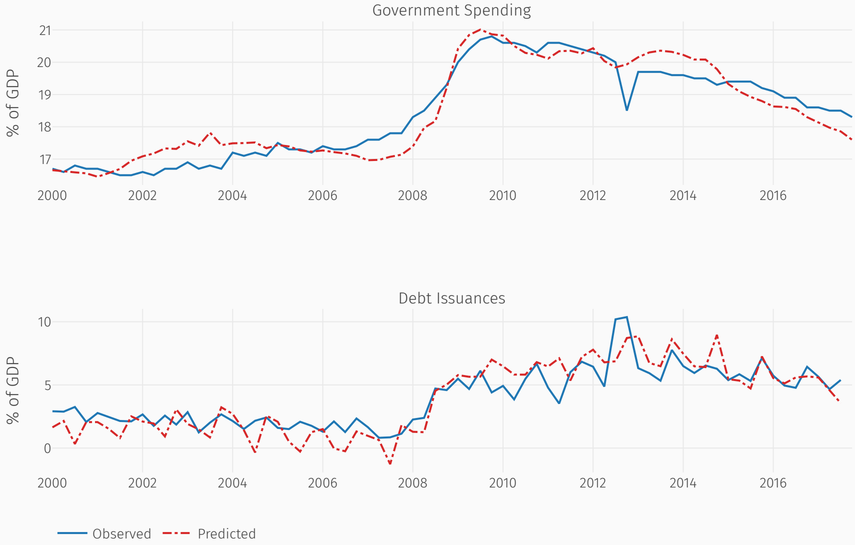

Evolution of the Distribution

The law of motion for λ

- Policy functions ϕ_a, ϕ_b at $\mathbf{S}_t$ determine assets at $t+1$
- After seeing z_{t+1}, the government decides **repayment**
- At $\mathbf{S}_{t+1}$, relationship between $q^g(\mathbf{S}_{t+1})$, $R_b(\mathbf{S}_{t+1})$, μ_{t+1}, σ_{t+1}

$$R_b(\mathbf{S}_{t+1}) = \mathbb{1}_{(\zeta_{t+1}=1)}\kappa + (1-\rho)q^g(\mathbf{S}_{t+1})$$

$$\int \omega d\lambda_{t+1} = \int \phi_a(\mathbf{S}_t) + R_b(\mathbf{S}_{t+1})\phi_b(\mathbf{S}_t)d\lambda_t$$

$$\int \omega^2 d\lambda_{t+1} = \int \left(\phi_a(\mathbf{S}_t) + R_b(\mathbf{S}_{t+1})\phi_b(\mathbf{S}_t)\right)^2 d\lambda_t$$

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Output growth and defaults

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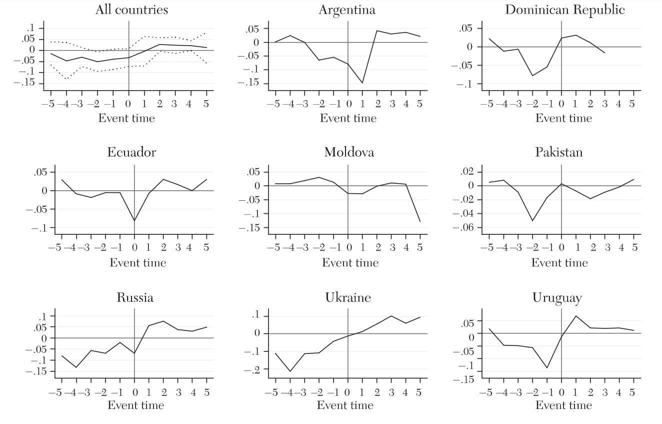

Defaults and output growth

Source: Panizza, Sturzenegger, and Zettelmeyer (2009)

Share of Domestic Debt

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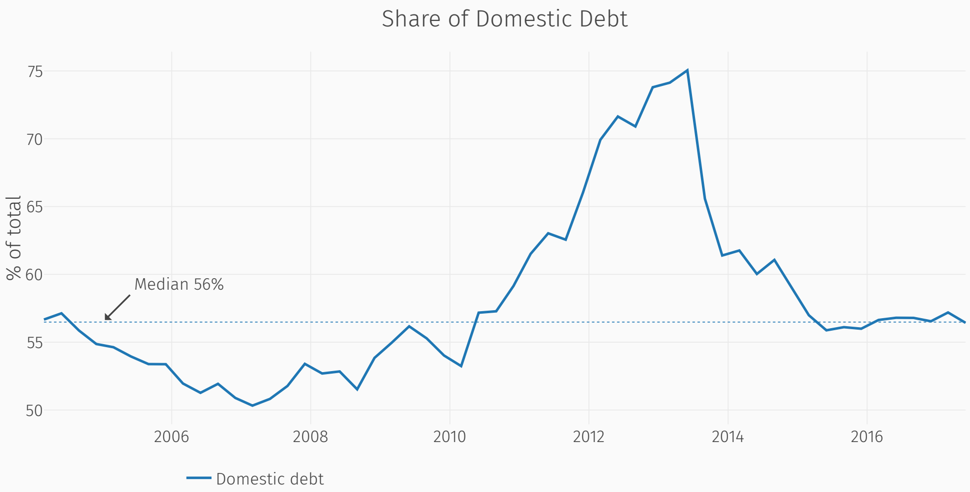
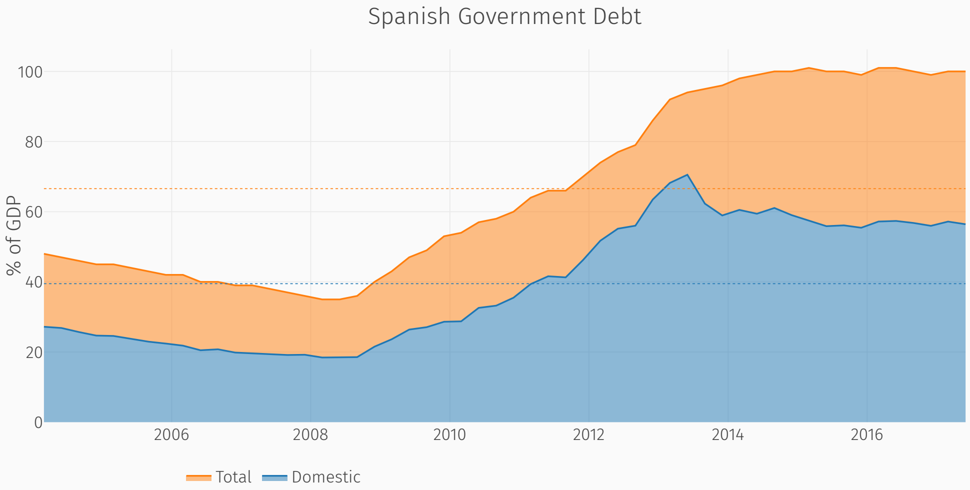


Source: Morelli and Roldán (2018) on Banco de España

Share of Domestic Debt



Source: Morelli and Roldán (2018) on Banco de España
Dotted lines are sample averages

General SDF of Foreigners

- If risk-averse foreigners

$$q_t^h = \frac{1}{1+r^\star}\mathbb{E}_t\left[\left(\frac{C_{t+1}^f}{C_t^f}\right)^{-\gamma_f}\right]$$

$$q_t^g = \frac{1}{1+r^\star}\mathbb{E}_t\left[\left(\frac{C_{t+1}^f}{C_t^f}\right)^{-\gamma_f} R_{t,t+1}^b\right]$$

where $R_{t,t+1}^b = \mathbb{1}_{(\zeta_{t+1}=1)}\tilde{\kappa} + (1-\rho)(1-\hbar\mathbb{1}_{(\zeta_t=1\cap\zeta_{t+1}\neq1)})q_{t+1}^g$

- Reduces to risk-neutral if

$$\text{cov}\left(\left(\frac{C_{t+1}^f}{C_t^f}\right)^{-\gamma_f}, R_{t,t+1}^b\right) = 0$$

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Solution Method

- Guess a policy for the government
    - Guess a law of motion for the distribution
        - Compute $q^g(\mathsf{S}), q^h$ from lenders' sdf.
        - Compute w, L_N, L_T, Π, T as functions of (S, p_N)
        - Guess a relative price of nontraded goods p_N
            - Solve the household's problem at $(\mathsf{s}, \mathsf{S}, p_N)$
            - Check market clearing for nontraded goods.
        - Iterate until $p_N(\mathsf{S})$ converges
    - Iterate until the law of motion converges
- Iterate on the government's policy

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Feedback

Back

	Unemployment$_{jt}$			Saving rate$_{jt}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Spread$_{jt}$	1.381***			0.461***		
	(0.064)			(0.097)		
Spread$_{jt}$ (IV)		2.372***	1.951**		1.634	2.048
		(0.826)	(0.896)		(1.186)	(1.515)
Spread Non-fin$_{jt}$		−0.172	−0.450		0.654	0.832
		(0.297)	(0.306)		(0.628)	(0.626)
Spread Fin$_{jt}$		−0.364	0.076		−0.265	−0.595
		(0.530)	(0.601)		(0.666)	(0.901)
B_{jt}/Y_{jt}			0.040***			−0.035
			(0.012)			(0.035)
Model	OLS	IV	IV	OLS	IV	IV
Country FE	Y	Y	Y	Y	Y	Y
Quad Time Trend	Y	Y	Y	Y	Y	Y
Observations	968	304	304	569	179	179
Adj. R^2	0.731	0.715	0.713	0.450	0.420	0.398

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Gilchrist-Mojon (2017) indices of corporate spreads for FRA, DEU, ITA, ESP. 2000Q1 – 2017Q4

Market Clearing

Back

- Three markets need to clear

$$Y_{Nt} = C_{Nt} + \frac{\vartheta_N}{p_{Nt}} G_t$$

$$Y_{Tt} = C_{Tt} + (1 - \vartheta_N) G_t - \mathtt{NFI}_t$$

$$(L_{Nt} + L_{Tt} - 1)(w_t - \gamma w_{t-1}) = 0$$

where net foreign inflows are

$$\mathtt{NFI}_t = \int \left(\omega - q_t^h \phi_a - q_t^g \phi_b \right) d\lambda_t - \kappa B_{t-1} + q_t^g (B_t - (1 - \rho) B_{t-1})$$

	Dependent variable Q_{jt}:							
	$\log Y_{jt}$				$\log C_{jt}$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spread_{jt}	-0.011^{***}				-0.011^{***}			
	(0.003)				(0.002)			
Spread_{jt} (IV)		-0.048^{**}	-0.031	-0.031		-0.088^{***}	-0.035^{**}	-0.035^{**}
		(0.019)	(0.023)	(0.024)		(0.022)	(0.017)	(0.016)
R^h_{jt}			0.054^{***}	0.049^{***}			0.004	-0.009
			(0.010)	(0.011)			(0.007)	(0.007)
R^s_{jt}				0.013				0.036
				(0.046)				(0.031)
Model	OLS	IV	IV	IV	OLS	IV	IV	IV
Country + Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	968	968	540	540	968	968	540	540
Adj. R^2	0.995	0.994	0.997	0.997	0.997	0.993	0.999	0.999

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
ECB borrowing rates for AUT, BEL, DEU, ESP, FRA, IRL, ITA, NLD, PRT. 2003Q1 – 2017Q4

Feedback

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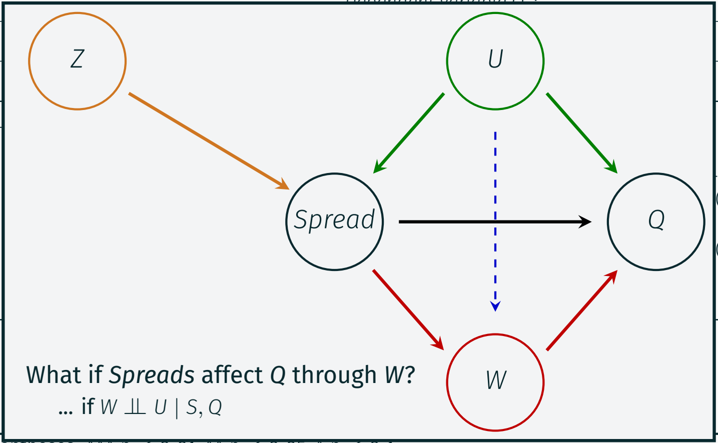


	(7)	(8)
Spread_{jt}		
Spread_{jt} (IV)	-0.035^{**}	-0.035^{**}
	(0.017)	(0.016)
R^h_{jt}	0.004	-0.009
	(0.007)	(0.007)
R^s_{jt}		0.036
		(0.031)
Model	IV	IV
Country + Time FE	✓	✓
Observations	540	540
Adj. R^2	0.999	0.999

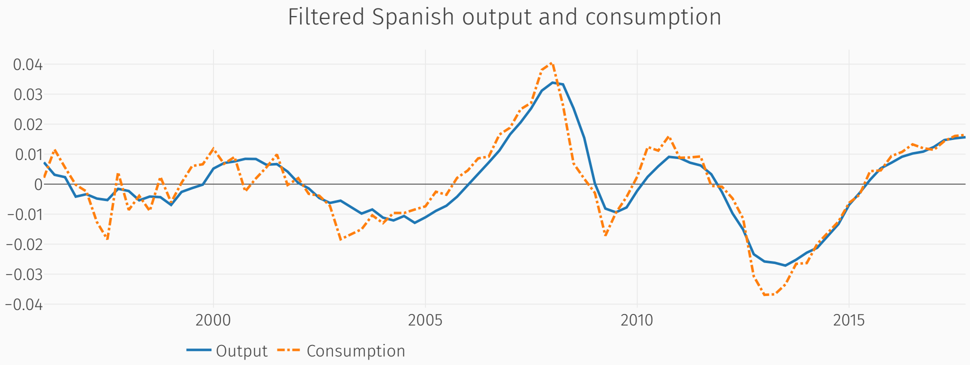
Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
ECB borrowing rates for AUT, BEL, DEU, ESP, FRA, IRL, ITA, NLD, PRT. 2003Q1 – 2017Q4

The Cycle is the Trend

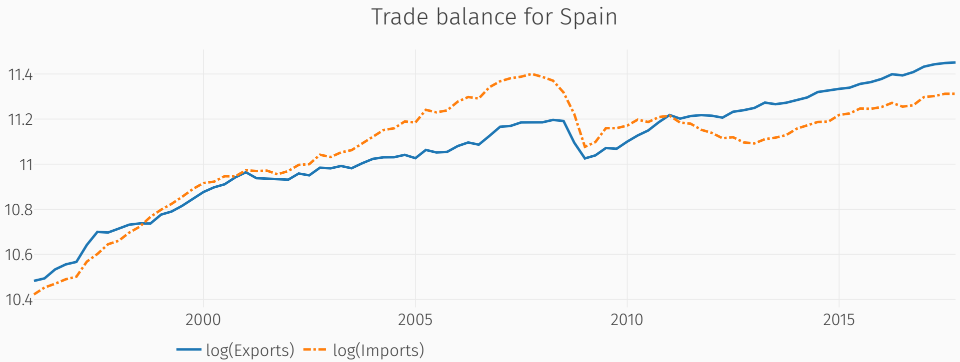
Back to Motivation Back to Evidence

	$\sigma(C)$	$\sigma(Y)$	$\sigma(C)/\sigma(Y)$	$\sigma(C)/\sigma(Y)$ (AG)
Austria	0.716	0.782	0.916	0.870
Belgium	0.556	0.795	0.700	0.810
Denmark	1.047	1.178	0.889	1.190
Finland	1.278	1.957	0.653	0.940
France	0.780	0.773	1.009	—
Germany	0.692	0.867	0.799	—
Ireland	3.140	3.680	0.853	—
Italy	1.165	0.978	1.191	—
Netherlands	1.726	1.244	1.388	1.070
Portugal	1.827	1.576	1.160	1.020
Spain	1.901	1.396	1.362	1.110

HP filtered data with $\lambda = 1600$. Std deviations in %.



Spain in the 2000s



Spain in the 2000s

Low demand?

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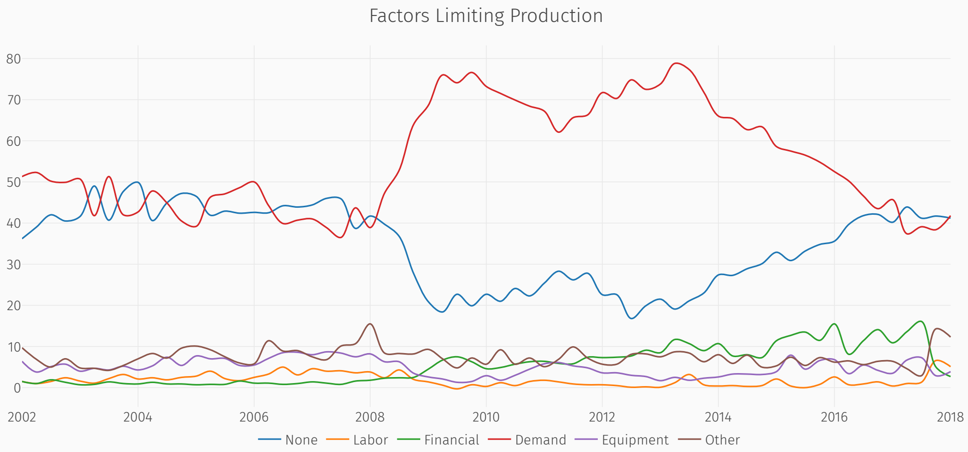

Spanish firms' self-reported limits to production

Source: Eurostat

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