

# Debt sustainability and fiscal space in a heterogeneous Monetary Union: normal times vs the ZLB

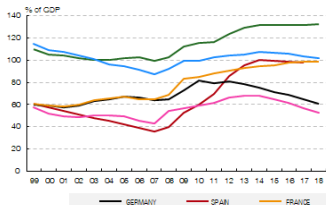
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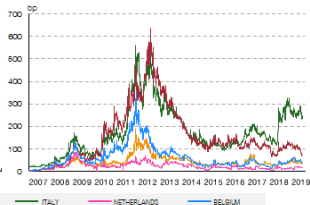
Frankfurt, 20-12-2019



## General gov debt



## 10-year bond spreads



High gov. debt/GDP in EMU members raise concerns about debt sustainability:

- Is debt sustainability different for a EMU member? Normal times vs ZLB
- Are there spillover effects on debt sustainability within EMU?
- Are effects of fiscal consolidation & coordination different within EMU?



- 1 Introduction
- 2 Preview of results
- 3 Model
- 4 Fiscal limit
- 5 Long-run fiscal consolidation
- 6 Short-run discretionary fiscal policy
- 7 Conclusions



- **Standard Monetary union DSGEs** assessing policy effects do not account for default risks: Gali & Monacelli (2008), Ferrero (2009).
- **Debt sustainability** literature use DSGEs with exogenous risk premia: Mendoza and Oviedo (2004), Corsetti et al. (2013).
- **Sovereign default** literature internalize default cost but assume exogenous output: Eaton & Gersovitz (1981), Arellano (2008), Dovis (2019).
- **Default in EMU** is more likely the result of accidents, than strategic.



- **Normal times:** Risk channel matters significantly when debt is  $>90\%$ .
  - ▶ Makes long run consolidation to 60% costly, with spillovers to EMU.
  - ▶ Reduces significantly multiplier of discretionary fiscal policy.
  - ▶ Endogenous risk premium explains 40% of that reduction.
  - ▶ Policy coordination favors joint consolidation
  
- **ZLB:** Risk channel becomes muted
  - ▶ Consolidation generates deflation expectations  $\Rightarrow \uparrow$  real int. rate
  - ▶ Policy coordination favors expansion in Core.



Two-country New Keynesian model (Benigno & Benigno (2005)), modified for:

- 1 Periphery's High debt is subject to default risk, Core with low debt.
- 2 Endogenous debt sustainability risk: distance to fiscal limit (Bi (2012))

Other characteristics:

- Total home bias in debt & gov spending.
- Distortionary taxes on income.
- Calibration: Periphery (Spain) & Core (Germany).

# Main Mechanism:

## 1) RISKY PERIPHERY'S GOVERNMENT DEBT

- Periphery's government debt ( $b_{t-1}$ ) is subject to default risk, with haircut  $\delta$  ( $= 0.3$  annually, Bi (2012)) and risky yield  $R_t$

$$\delta_t = \begin{cases} 0 & \text{if } b_{t-1} < \mathcal{B}(\mathcal{S}_t) \\ \delta & \text{if } b_{t-1} \geq \mathcal{B}(\mathcal{S}_t) \end{cases}$$

where  $\mathcal{B}(\mathcal{S}_t)$  is a random draw from fiscal limit distribution

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- Periphery household's Euler eq includes risky yield & expected haircut:

$$\lambda_t = \beta E_t \frac{R_t(1 - \delta_{t+1})\lambda_{t+1}}{\pi_{t+1}}$$



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- Core gov debt is NOT risky:  $\delta_t^* = 0$ ,  $R_t^* = R_t^{ECB}$

**Debt sustainability** defined as distance to stochastic Fiscal Limit ( $\mathcal{B}(\mathcal{S}_t)$ )

- **Fiscal limit** is max debt that can be supported without default.
- Iterate on the gov. budget constraint, assuming no default & tax rate =  $\tau^{\max} = 0.435$  (Spain's marginal rate)

$$\mathcal{B}(\mathcal{S}_t) = \beta_t^p \pi(\mathcal{S}_t) E_t \sum_{j=0}^{\infty} \beta^j \frac{\lambda(\mathcal{S}_{t+j})}{\lambda(\mathcal{S}_t)} \frac{\tau^{\max} y(\mathcal{S}_{t+j}) - g_{t+j}}{tot(\mathcal{S}_{t+j})^{1-\eta}}$$

where state of the economy  $\mathcal{S}_t = \{g_t, g_t^*, tot_{t-1}\}$

# Main Mechanism:

## 2) PERIPHERY'S DEBT SUSTAINABILITY RISK = FISCAL LIMIT

$$B(S_t) = \beta_t^p \pi(S_t) E_t \sum_{j=0}^{\infty} \beta^j \frac{\lambda(S_{t+j})}{\lambda(S_t)} \frac{\tau^{\max} y(S_{t+j}) - g_{t+j}}{tot(S_{t+j})^{1-\eta}}$$

- Endogenous: depends on state of economy ( $S_t = \{g_t, g_t^*, tot_{t-1}\}$ ).
- Captures private sector's perception: HH's discount factor.
- $\beta_t^p$  = stochastic political risk → brings risk premium closer to evidence (in 2018 Spain had debt/y=97% & spread $\approx$ 100bp).
- FL distribution simulated using Markov Chain Monte Carlo method.



- **Fiscal policy rule** in each country:

$$\tau_t = \tau + \gamma_b(b_{t-1} - 0.6)$$

- **Monetary policy**

$$R_t^{ECB} = \begin{cases} R^{ECB} + \alpha_\pi(\pi_{MU,t} - \pi_{MU}) & \text{if } s_t^R = 1 \\ 1 & \text{if } s_t^R = 2 \end{cases}$$

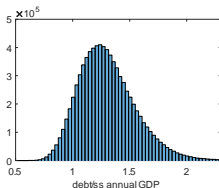
MP regime evolves exogenously according to  $\begin{pmatrix} p_1 & 1 - p_1 \\ 1 - p_2 & p_2 \end{pmatrix}$   
prob to stay in regime  $p_1=.99$ ,  $p_2=.65$ .

# Periphery's Fiscal Limit:

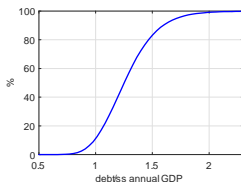
DISTRIBUTION COMPUTED USING B(St)



Histogram



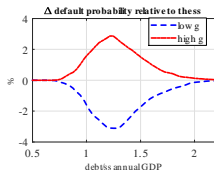
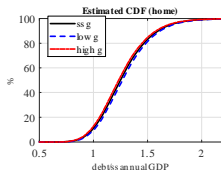
Cumulative density function (cdf)



- FL approx symmetric with mean=125%, sd=24
- Prob of default = 0 for  $B/Y < 80\%$  & =1 for  $B/Y > 200\%$
- Between 80-180%:  $\uparrow B/Y \rightarrow \uparrow$  default Prob

# Periphery's Fiscal Limit:

10% CHANGE IN PERIPHERY'S GOV. EXPENDITURE  $g$



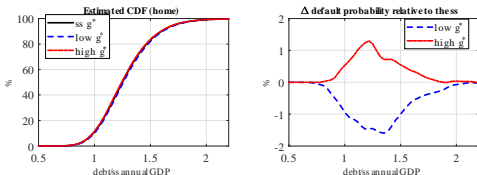
10%  $\uparrow g$ :

- $\uparrow$ deficit,  $Y$ ,  $\pi \rightarrow \downarrow$ FL (shift UP/LEFT)
- MP channel weak: small  $\uparrow Y^{EA}$ ,  $\pi^{EA} \rightarrow$  small  $\uparrow R^{ECB} \rightarrow \downarrow$ FL

$\Rightarrow$  Both  $\downarrow$ FL (shift UP/LEFT)  $\rightarrow \uparrow$  default prob (3% B/Y=125%)

# Periphery's Fiscal Limit:

10% CHANGE IN CORE'S GOV. EXPENDITURE  $g^*$



10%  $\uparrow g^* \rightarrow \uparrow \text{deficit}^*, Y^*, \pi^* \rightarrow$  spillover to Periphery due to:

- MP channel:  $\uparrow R^{ECB} \rightarrow \uparrow$  financing costs of debt  $\rightarrow \downarrow$  FL
- Trade channel:  $\uparrow M^* = X \rightarrow \uparrow$  FL (shift DOWN/RIGHT)

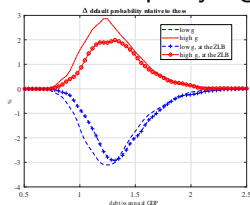
$\Rightarrow$  Net effect  $\downarrow$  FL (shift UP/LEFT)  $\rightarrow \uparrow$  default prob (1.5% B/Y=125%)  
Spillover is 50% of own effect (3% vs 1.5%).

# Periphery's FL under ZLB.

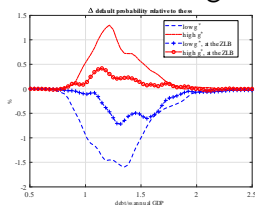
10% CHANGE IN  $g$  OR  $g^*$  UNDER ZLB



10%  $\Delta$  Periphery's  $g$



10%  $\Delta$  Core's  $g^*$



- NO MP channel under ZLB  $\Rightarrow$  SMALLER effect of  $\Delta g, g^*$  on FL

$\Rightarrow$  Smallest effect of  $\Delta g^*$  on FL.





- 1 Peripherys' long-run consolidation from  $B/Y=100$  to 60%
  - 2 Discretionary short-run fiscal policy (transitory  $\Delta g$ ,  $g^*$ )
- Under two regimes for Monetary Policy:
    - ▶ Normal times
    - ▶ Zero lower bound



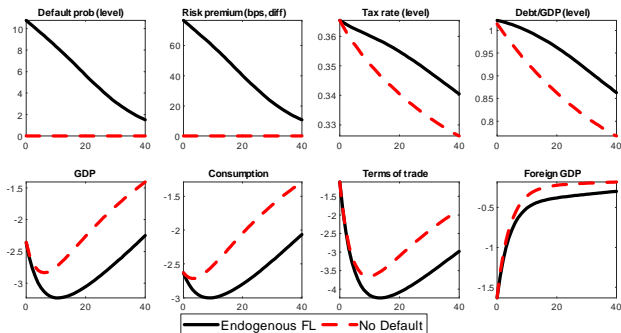
Policy scenario 1:

Periphery's long-run consolidation from  $B/Y=100$  to 60%

What we do: set Periphery's debt at 100% & let fiscal/monetary rules bring economy back to 60%

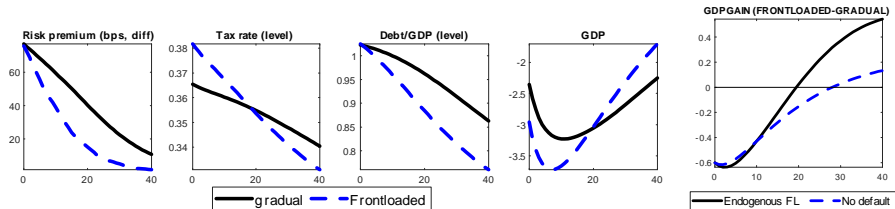
# Periphery's long-run Consolidation:

B/Y FROM 100 TO 60%



- High debt requires significant  $\uparrow$  tax,  $\downarrow$   $B/Y$  slowly, with high risk premium
- Long and costly process ( $\downarrow$ Y, C & L), spillover to Core ( $\downarrow$ Y\*).
- With NO default lower cost of financing.  $\rightarrow$  smaller Y loss

# Periphery's Consolidation: Frontloaded?



- Frontloaded  $\Downarrow$  risk premium & long-run cost.
- Initial greater  $\Downarrow$  Y due to flex wages: stronger  $\uparrow$  tax  $\rightarrow$   $\uparrow$  W  $\rightarrow$   $\uparrow$   $R^{ECB}$
- GDP loss from frontloading is lower when FL is Endogenous.



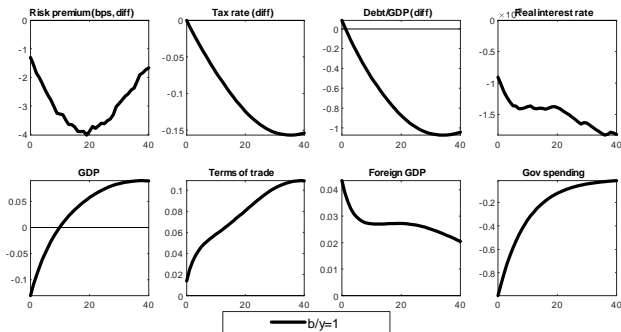
Policy scenario 2:

Discretionary short-run fiscal policy (transitory  $\Delta g$ ,  $g^*$ )

Monetary Policy in normal times regime

IRFs show marginal effects with respect to long-run consolidation.

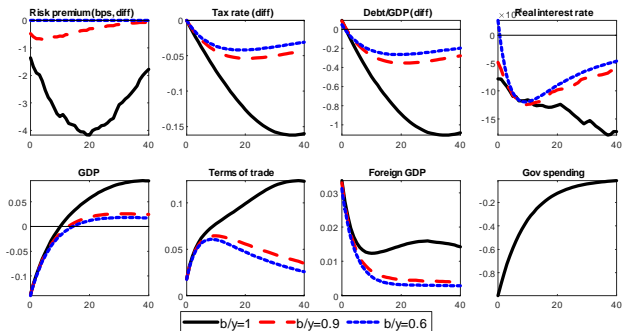
# Discretionary fiscal policy: 1% fall in $g$



- With high debt,  $\downarrow g \rightarrow \uparrow FL$ ,  $\downarrow$  risk premium  $\rightarrow \downarrow R/\pi \rightarrow \uparrow Y, C, tot$
- Initial fall in  $Y$ , but increases after 10q
- MP channel weak:  $\downarrow \pi^{EA} \rightarrow$  small  $\downarrow R^{ECB} \rightarrow \uparrow FL$

# Discretionary fiscal policy: 1% fall in $g$

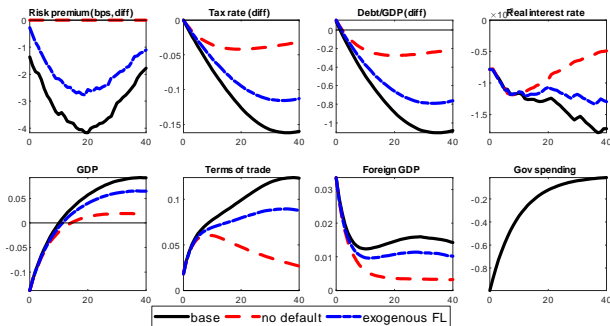
## THE NON-LINEAR EFFECT OF THE DEBT LEVEL



- Risk premium channel becomes relevant for debt  $> 90\%$
- Below 90% periphery is closer to low-debt Core

# Discretionary fiscal policy: 1% fall in $g$

## EFFECT OF ENDOGENEIZING THE FISCAL LIMIT

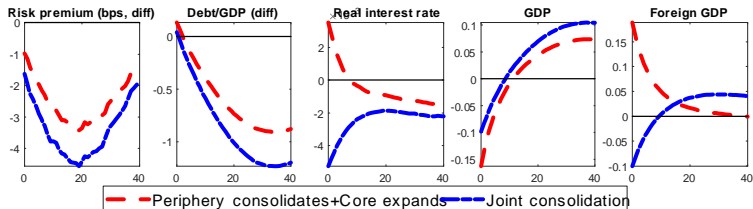


- When FL is Exogenous RP does not jump  $\downarrow$ , falls only as  $\downarrow$  debt
- When debt is not risky, RP is constant, small  $Y$  gain.



# Fiscal coordination in EMU:

## JOINT CONSOLIDATION IS BEST POLICY



- $\uparrow g^* \rightarrow$  strong MP channel:  $\uparrow R^{ECB} >$  Trade channel
- Thus, best coordination policy is joint consolidation.

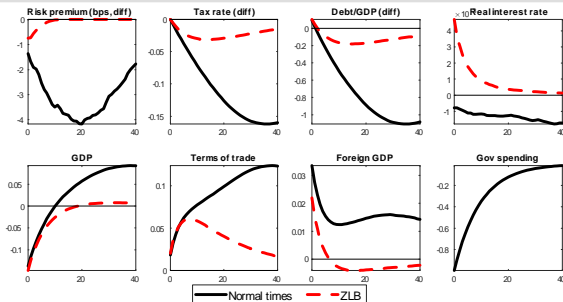


Policy scenario 2:

Discretionary short-run fiscal policy (transitory  $\Delta g$ ,  $g^*$ )

Monetary Policy in **Zero Lower Bound regime**

# ZLB, Discretionary FP: 1% fall in $g$



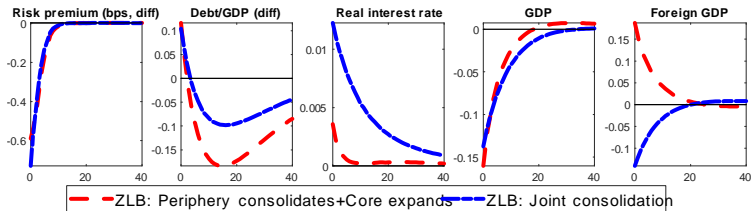
Under ZLB the RP channel is muted:

- $\downarrow g \rightarrow \uparrow FL \rightarrow \downarrow RP \rightarrow$  initially  $\downarrow Y, \text{ inf}$
- ZLB  $\rightarrow$  constant  $R, \downarrow \text{inf} \rightarrow \uparrow \frac{R}{P} \rightarrow \downarrow FL \rightarrow \uparrow RP$

$\Rightarrow$  net effect  $\rightarrow$  constant RP  $\rightarrow$  multiplier  $\approx$  No default case

# ZLB: Fiscal coordination

PERIPHERY'S CONSOLIDATION & CORE'S EXPANSION IS BEST POLICY



At ZLB  $\rightarrow$  NO MP channel  $\rightarrow$  RP constant  $\rightarrow$  best is  $\uparrow g^*$ ,  $\downarrow g$ .



Multiplier PV(DY)/PV(DG) models	Periphery			Spillover to Core			Euro area		
	0	1 yr	10 yr	0	1 yr	10 yr	0	1 yr	10 yr
No default	0.71	0.66	0.24	-0.18	-0.17	-0.25	0.14	0.13	-0.08
Exogenous FL	0.71	0.66	-0.24	-0.18	-0.18	-0.37	0.14	0.12	-0.32
<b>Endogenous FL</b>	<b>0.71</b>	<b>0.65</b>	<b>-0.50</b>	<b>-0.18</b>	<b>-0.18</b>	<b>-0.42</b>	<b>0.14</b>	<b>0.12</b>	<b>-0.45</b>
Endogenous FL, ZLB	0.82	0.77	0.56	-0.09	-0.08	-0.09	0.23	0.22	0.17

- Risk premium reduces multiplier by 76bp, 29bp due to endo FL
- Spillover to EMU reduces multiplier by 35bp, 13bp due to endo FL.
- ZLB kills RP channel → multiplier  $\approx$  No default case



- Effect of productive government spending
- Effect of structural reforms.



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# THANK YOU FOR YOUR ATTENTION





Periphery = Spain, Core = Germany

parameters	values	
$\beta$	0.99	the discount factor
$\theta$	11	elasticity of substitution
$\psi$	116.5	Rotemberg adjustment parameter
$\alpha_\pi$	2.5	Taylor rule parameter to inflation
$\gamma_b$	0.3	tax response parameter to changes in debt
$b/y$	0.6	steady state debt to output ratio (home)
$b^*/y^*$	0.6	steady state debt to output ratio (foreign)
$g/y$	0.183	steady state gov spending to output ratio (home)
$g^*/y^*$	0.187	steady state gov spending to output ratio (foreign)
$\tau$	0.3005	steady state income tax rate (home)
$\tau^*$	0.3425	steady state income tax rate (foreign)
$a, a^*$	1	steady state technology
$\rho^g, \rho^{g^*}$	0.9	AR(1) coefficient in government spending rules
$\sigma_g, \sigma_{g^*}$	0.01	standard deviation of government spending shock
$s$	0.36	share of home country
$\eta$	0.63	home country bias in home goods
$\eta^*$	0.37	foreign country bias in home goods
$\delta$	0.07	quarterly haircut on debt if default occurs