



Coordinated Fiscal Policies in the Euro Area: Revisiting the Size of Spillovers

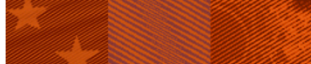
Mario Alloza Pablo Burriel Javier Pérez

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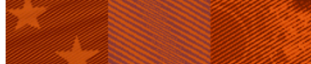
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Advertisement: Check Banco de España Annual Report chapter 4 on Fiscal Policy in EMU ([link here](#))



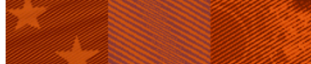
- **Mechanisms / related literature.**
- New database.
- Identification of fiscal shocks.
- Effects of own fiscal shocks.
- Fiscal spillovers across countries.



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- Are spillovers empirically relevant?



- Some references:
 - Early work: Beetsma, Giuliodori & Klaasen (2006)
 - More recently: Auerbach & Gorodnichenko (2013), Hebous & Zimmerman (2013), Goujard (2016).
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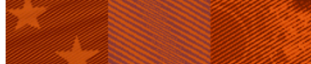
- **Contribution**: combine ingredients from the literature and try to overcome some of the above limitations:
 - ① Produce novel homogeneous dataset.
 - ② Attempt to identify structural shocks (exogeneity).
 - ③ Focus on government spending (& components) & tax shocks.
 - ④ Allow for non-linear effects.



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	ESA-2010	ESA-95
Germany	2002	1995
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Is this adequate for empirical studies?

Creating a Fiscal Database I



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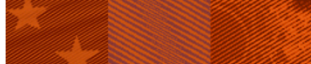
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- Quarterly frequency from 1980q1 - 2015q4.



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Creating a Fiscal Database II



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- Procedure:

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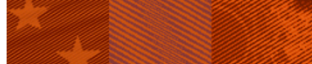


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- ③ Interpolate annual data (z_t) using intra-annual indicators (\mathbf{u}_t).

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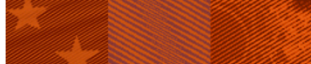


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- ③ **Estimate** the effect of spillover shocks using local projections.

Identifying country-specific shocks



- Consider $\mathbf{x}_t = [tr_t = \text{TOR-THN-SIN}, \mathbf{g}_t = \text{GCN+GIN}, y_t, p_t, R_t]'$.

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- Estimate a VAR (for each country and fiscal instrument):

$$\mathbf{x}_t = \mathbf{B}(L)\mathbf{x}_{t-1} + \mathbf{e}_t$$

Reduced-form and structural shocks: $\mathbf{A}_0\mathbf{e}_t = \mathbf{C}\boldsymbol{\varepsilon}_t$:

$$\begin{aligned} e_t^T &= \alpha_{t,y}e_t^Y + \alpha_{t,p}e_t^P + \alpha_{t,r}e_t^R + \beta_{t,g}\varepsilon_t^G + \varepsilon_t^T \\ e_t^G &= \alpha_{g,y}e_t^Y + \alpha_{g,p}e_t^P + \alpha_{g,r}e_t^R + \beta_{g,t}\varepsilon_t^T + \varepsilon_t^G \end{aligned}$$

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- Identifying assumptions (Blanchard Perotti, 2002):
 - **Key**: no discretionary response of fiscal policy to economic developments within a quarter.
 - Calibrate output elasticity of tax revenues $\alpha_{t,y}$ and other parameters using institutional data. ▶ elasticities
 - Contemporaneous restriction: $\beta_{g,t} = 0$.



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with $z_{i,t} \in \{g_{i,t}, tr_{i,t}\}$

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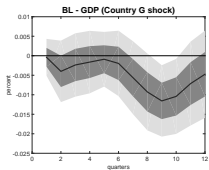
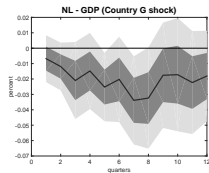
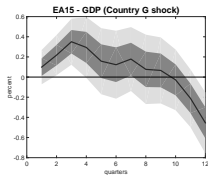
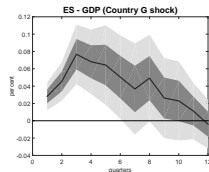
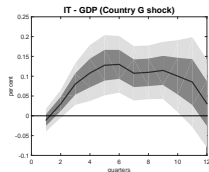
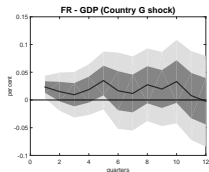
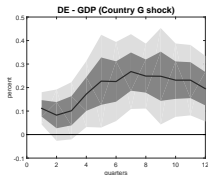
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- Cumulative multiplier** at time h :

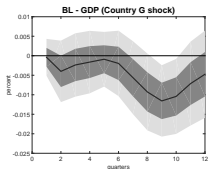
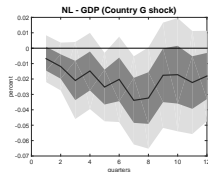
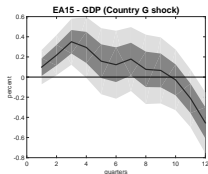
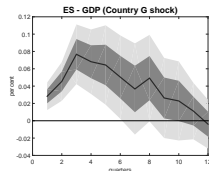
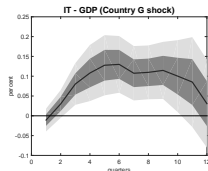
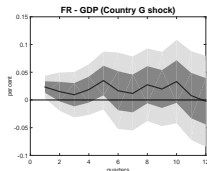
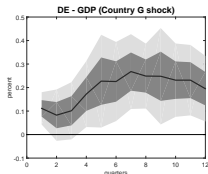
$$M_{i,h} = \frac{\sum_{r=0}^h \beta_{i,r}}{\sum_{r=0}^h \gamma_{i,r}}$$

- Newey-West standard errors to correct for induced correlation.

GDP response to own spending shock

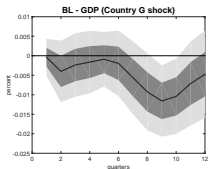
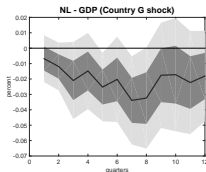
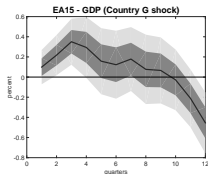
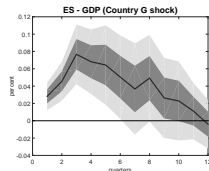
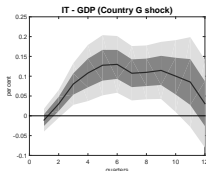
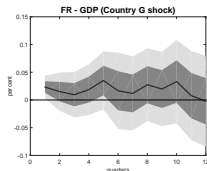
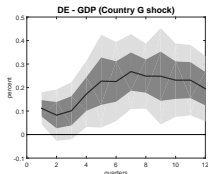


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- **Significant** effect on GDP in DE, IT, ES, (less) FR, EA
- **Sistematically negative** GDP effect in NL & BE (**dropped**)

Government spending multiplier



	DE	FR	IT	ES	NL	BE	EA
impact	0.97**	0.37**	-0.09	0.47**	-0.27	-0.02	0.33*
1 year	0.89**	0.43	0.60**	1.06**	-0.59*	-0.12	1.01**
2 years	1.39**	1.14	1.09**	1.36**	-1.09*	-0.20	1.09*
3 years	1.79**	1.69	1.24**	1.23**	-1.54*	-0.37*	0.64

▶ components

▶ non-linear

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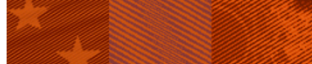
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- **Sistematically negative** multipliers in NL & BE

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Comparing to previous work



	Literature 1985-2010					This paper 1985-2010				
	DE	FR	IT	ES	EA	DE	FR	IT	ES	EA
impact	0.4	1.6	0.1	0.3	0.6	1.0	0.5	0.0	0.5	0.5
1 year	1.2	1.5	0.3	1.2	1.4	0.9	0.9	0.6	1.3	1.5
2 years	1.8	1.2	0.8	1.8	1.7	1.9	1.7	1.3	1.3	2.3

- Estimated Multipliers **in line with empirical literature**.
Source: EC's PFR (2012), for FR Cleaud et al (2013)

Net tax revenues multipliers



	DE	FR	IT	ES	NL	BE	EA
impact	-0.38	-0.03	-0.18**	-0.18*	-0.42**	-0.15**	-0.45**
1 year	-0.13	-0.05	-0.16*	-0.03	-0.53**	-0.31**	-0.61**
2 years	0.36	0.03	-0.14	0.13	-1.14*	-0.39**	-0.44
3 years	0.65	-0.03	-0.37	-0.05	-1.85	-0.55**	-0.48

- Negative in the short/medium run but high uncertainty beyond that.
- More sensible results for NL & BE? ▶ Output effects



- Mechanisms / related literature.
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- Effects of own fiscal shocks.
- **Fiscal spillovers across countries.**



How do fiscal shocks in one country affect economic activity in another country?



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Procedure:



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How do fiscal shocks in one country affect economic activity in another country?

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- 1 **Estimate spillovers** from country i to country j .
- 2 **Aggregate** these spillovers to obtain measures of how much a country **benefits** from others' fiscal actions (*destination*) and which countries **generate** more spillovers (*origin*).
- 3 **Compare** to alternative methods from the literature.



Estimate by **Local Projections** the spillover effect of fiscal shocks in country j to output in country i over horizon h :

$$\frac{y_{i,t+h} - y_{i,t-1}}{y_{i,t-1}} = \alpha_{i,h} + \beta_{i,j,h} \frac{\text{shock}_{j,t}}{y_{i,t-1}} + \delta_{i,h}(L)\mathbf{x}_{i,t-1} + \xi_{i,t+h}$$
$$\frac{z_{j,t+h} - z_{j,t-1}}{y_{i,t-1}} = \lambda_{i,h} + \gamma_{i,j,h} \frac{\text{shock}_{j,t}}{y_{i,t-1}} + \rho_{i,h}(L)\mathbf{x}_{j,t-1} + u_{i,t+h}$$

with $z_{i,t} \in \{g_{i,t}, tr_{i,t}\}$

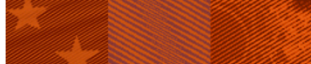


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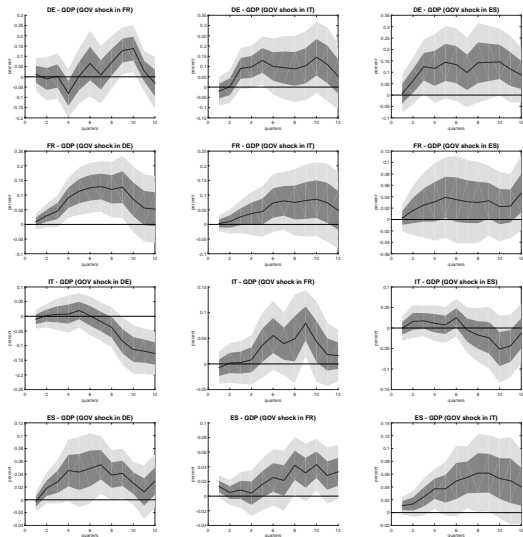
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- Normalize both eqs. by destination country $y_{i,t-1}$.
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- IR functions for $y_{i,t}$ and $g_{j,t}$ given by: $\beta_{i,j,h}$ and $\gamma_{i,j,h}$.

Country pairs Spillovers: GDP

Most country pair spillovers **significant at 68%**, IT only with FR:





- We aggregate spillovers by **destination**:

$$spillover_{i,h}^D = \frac{\sum_{j \neq i} \sum_{r=0}^h \beta_{i,j,r}}{\sum_{j \neq i} \sum_{r=0}^h \gamma_{i,j,r}} = \sum_{j \neq i} M_{i,j,h} \frac{\gamma_{i,j,r}}{\sum_{j \neq i} \gamma_{i,j,r}}$$

$w_j = \frac{Y_j}{\sum_{i \neq j} Y_i}$ & $M_{i,j,h}$ = spillover multiplier on country i from a shock originated in country j at horizon h .



- We aggregate spillovers by **destination**:

$$\text{spillover}_{i,h}^D = \frac{\sum_{j \neq i} \sum_{r=0}^h \beta_{i,j,r}}{\sum_{j \neq i} \sum_{r=0}^h \gamma_{i,j,r}} = \sum_{j \neq i} M_{i,j,h} \frac{\gamma_{i,j,r}}{\sum_{j \neq i} \gamma_{i,j,r}}$$

- and aggregate spillovers by **origin**:

$$\text{spillover}_{j,h}^O = \sum_{i \neq j} \frac{\sum_{r=0}^h \beta_{i,j,r}}{\sum_{r=0}^h \gamma_{j,r}} w_j = \sum_{i \neq j} M_{i,j,h} w_j$$

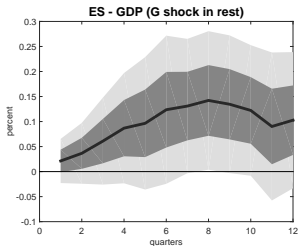
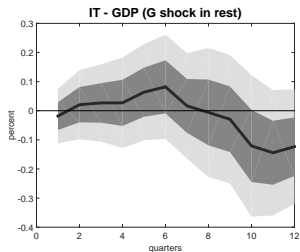
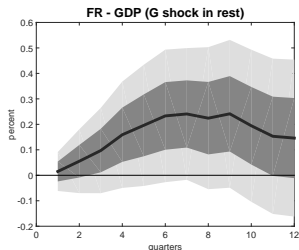
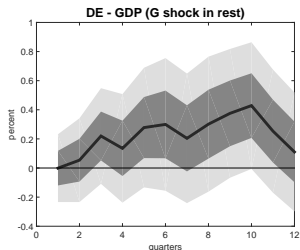
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GDP responses (by destination)

Who benefits most from spillovers

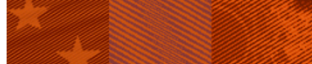


Significant agg. spillovers by destination at **68% confidence**

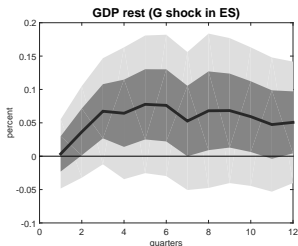
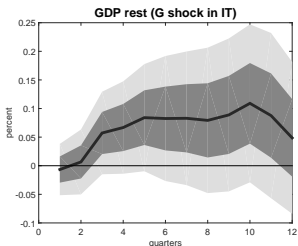
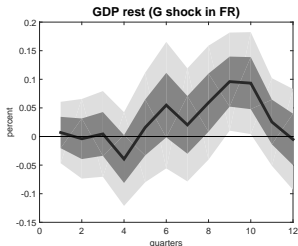
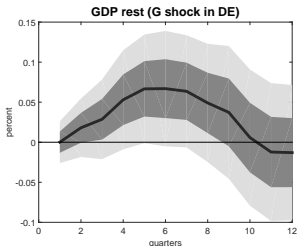


GDP responses (by origin)

Who generates more spillovers



Significant agg. spillovers by origin at **68% confidence**



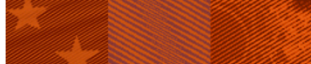
Government spending spillovers



	DE	FR	IT	ES
By destination:				
impact	0.00	0.05	-0.07	0.07
1 year	0.63	0.31*	0.07	0.24*
2 years	1.72	0.72*	0.16	0.61*
3 years	2.80*	1.03*	-0.13	1.00*
By origin:				
impact	0.00	0.11	-0.06	0.05
1 year	0.21*	-0.22	0.40	0.83*
2 years	0.47*	0.97	0.89*	1.57*
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Significant positive spillovers:

Government spending spillovers



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Government spending spillovers



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Government spending spillovers



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Being more provocative (less rigorous):

Government spending spillovers



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Being more provocative (less rigorous):

- DE benefits more from spillovers than FR/ES ($\approx *2$)
- ES & IT generate more spillovers ($\approx *3$)

Trade channel of spillovers

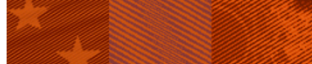
Effects on other countries' exports



	DE	FR	IT	ES
By destination:				
impact	0.12	0.01	-0.02	-0.01
1 year	0.90*	0.28*	0.04	0.09
2 years	2.31*	0.62*	0.12	0.31*
3 years	3.68*	0.80*	0.13	0.44*
By origin:				
impact	0.02	0.47*	0.06	-0.32
1 year	0.22*	0.62	0.61*	0.24
2 years	0.46*	3.16*	1.06*	0.99
3 years	0.70*	7.55	1.41*	1.51

- Important spillovers on Exports.
- Evidence of importance of a trade channel.

Spillovers: components of G



	Public consumption				Public Investment			
	DE	FR	IT	ES	DE	FR	IT	ES
by destination								
1 year	0.4	0.3	0.1	0.2*	1.8*	1.0*	0.2	0.4
2 years	0.8	0.7	0.2	0.6*	3.8*	2.3*	0.0	1.2
by origin								
1 year	0.2*	-0.9	0.7*	0.7	0.9*	1.0	0.9*	1.4
2 years	0.6*	-1.4	1.0	1.2	1.9*	2.6*	2.2*	1.9*

Spillovers: components of G



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- Investment's Spillover > & + significant than Consumption's

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- Investment's Spillover $>$ & + **significant** than Consumption's
- By destination due to Investment, except ES

Spillovers: components of G



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- By origin DE/IT due to I & C, while ES/FR due to I

Spillovers: components of G



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- Investment's Spillover $>$ & + **significant** than Consumption's
- By destination due to Investment, except ES
- By origin DE/IT due to I & C, while ES/FR due to I
- All generate sizable investment Spillovers (≈ 2 after 2 yrs)

Spillovers: components of G



	Public consumption				Public Investment			
	DE	FR	IT	ES	DE	FR	IT	ES
by destination								
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Being more provocative (less rigorous):

Spillovers: components of G



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Being more provocative (less rigorous):

- DE/FR benefit more from I spillovers than IT/ES ($\approx *2$)

Spillovers: components of G



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Being more provocative (less rigorous):

- DE/FR benefit more from I spillovers than IT/ES ($\approx *2$)
- Concentrate efforts on Gov. Investment (all ≈ 2)



- Alternative specification (Auerbach & Gorodnichenko 2002):
- Procedure:
 - 1 Aggregate identified shocks $\varepsilon_{i,t}^G$ into measure of spillover:

$$shock_{i,t} = \sum_{j \neq i} \omega_{ij} \varepsilon_{j,t}^G G_{j,t-1}$$

- 2 Construct cumulative multiplier as described earlier.
- Different policy experiment, allows comparison to literature.
 - Caveat: take a stance on ω_{ij} (but efficient if ω_{ij} true).

Government spending spillovers - alt.



	DE	FR	IT	ES
impact	-0.19	0.02	-0.11	0.04*
1 year	0.00	0.25*	-0.03	0.17**
2 years	0.73	0.50**	0.00	0.32**
3 years	1.16*	0.59**	-0.28	0.40**

- Very similar dynamics to spillovers *by destination* above (but higher precision).
- Aggregate cumulative multiplier in the third year: 0.6.
- Estimates sit on lower range of AG 2013 (~ 2.0).

▶ output effects

▶ non-linear



- Results suggest that **fiscal spillovers** in the EA are important.
- Relevant policy implications for the design of **coordinated fiscal policies**.
- However, results must be treated with caution due to the **uncertainty** surrounding the estimates.
- We need to understand better the **mechanisms** generating these results.



Thank you for your attention!

Government spending components



	DE	FR	IT	ES	EA
Gov. consumption					
impact	1.15**	0.08	-0.13	0.55**	0.77*
1 year	1.00*	-0.22	0.89**	0.79**	1.66**
2 years	1.74**	0.33	1.43**	-0.02	1.02
3 years	2.46**	1.42	1.51*	-1.51*	0.09
Gov. investment					
impact	1.25*	1.31**	0.04	0.27*	0.41*
1 year	2.91**	1.87**	0.66*	1.10**	1.91**
2 years	4.90**	2.59**	1.76**	2.29**	3.17**
3 years	5.19**	2.52*	2.32**	3.67*	2.76*

▶ return



- Estimate Impulse-Responses in i using **Local Projections**

$$\frac{z_{i,t+h} - z_{i,t-1}}{y_{i,t-1}} = 1\{s_t = A\} \left(\alpha_{i,h}^B + \beta_{i,h}^B \frac{\text{shock}_{i,t}}{y_{i,t-1}} + \delta_{i,h}^B(L) \mathbf{x}_{i,t-1} \right) + 1\{s_t = B\} \left(\alpha_{i,h}^R + \beta_{i,h}^R \frac{\text{shock}_{i,t}}{y_{i,t-1}} + \delta_{i,h}^R(L) \mathbf{x}_{i,t-1} \right) + \xi_{i,t+h}$$

with $z_{i,t} \in \{y_{i,t}, g_{i,t}, tr_{i,t}\}$

- Regimes $s_t \in \{A, B\}$ can represent boom or recessions, or periods of low and high fiscal stress.
 - 1 Recessions: periods of two consecutive quarters of negative growth of output.
 - 2 High fiscal stress: periods where the debt-to-GDP ratio increases for three consecutive quarters.

Government spending non-linearities

Booms vs Recessions



	DE	FR	IT	ES	EA
Booms					
impact	0.99**	0.51**	-0.24*	0.51*	0.11
1 year	0.69**	0.95*	0.31*	0.96**	0.43
2 years	1.27**	3.06*	1.01**	1.22*	0.40
3 years	1.85	4.90*	1.29*	1.29*	0.25
Recessions					
impact	0.12	0.37	-0.01	0.13*	-0.57
1 year	0.46	0.43	0.32	0.47*	-0.52
2 years	1.01	0.33	-0.12	0.00	-0.18
3 years	0.82	0.79	0.55	-7.13	-0.06

▶ return

Government spending non-linearities

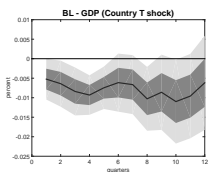
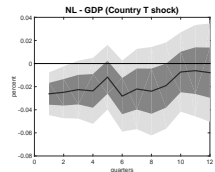
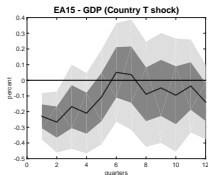
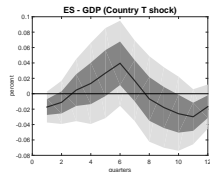
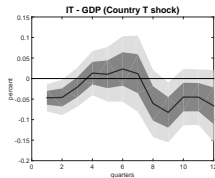
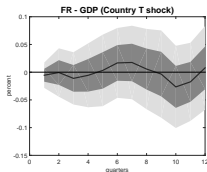
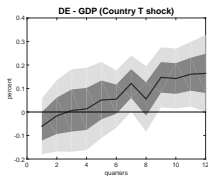
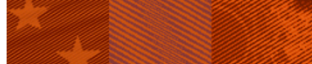
Low vs High Fiscal Stress



	DE	FR	IT	ES	EA
Low stress					
impact	0.95**	0.66**	-0.07	0.55*	0.32
1 year	0.98**	1.56*	0.66*	1.04**	1.10*
2 years	1.57**	4.71*	1.19**	1.04*	1.67*
3 years	1.92**	4.25*	1.40*	1.15*	2.56*
High stress					
impact	0.81*	-0.24	-1.14**	0.26*	-0.44
1 year	1.15	-1.46*	-1.16*	0.64*	0.23
2 years	1.73	-1.98	-0.59	0.88	1.12*
3 years	1.19	-1.30	0.30	-1.23	1.22*

▶ return

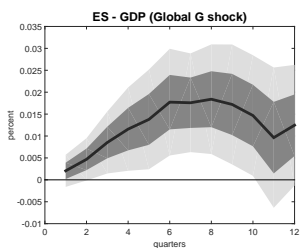
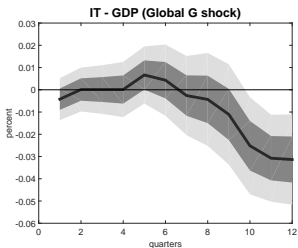
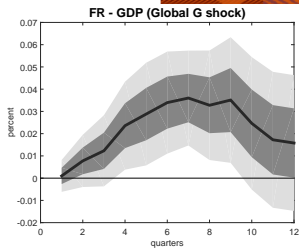
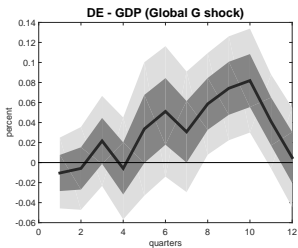
GDP response to own tax shock



- Negative in the short/medium run but high uncertainty beyond that.
- More sensible results for NL & BE?

▶ return

GDP responses -alternative



- Very similar dynamics to spillovers *by destination* above (but higher precision).

Non-linear spillovers (destination)

Booms vs Recessions



	DE	FR	IT	ES
Booms				
impact	0.33*	-0.12*	-0.15*	0.10*
1 year	0.29	-0.02	-0.04	0.19**
2 years	0.64	0.17*	0.05	0.34**
3 years	0.77	0.20	-0.13	0.44**
Recessions				
impact	-0.74*	-0.91**	-0.11	-0.25*
1 year	2.61*	-1.12**	-0.01	-0.15
2 years	3.25*	-0.83**	0.40	-0.03
3 years	3.24*	-0.90*	1.31	0.03

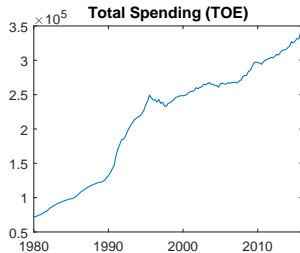
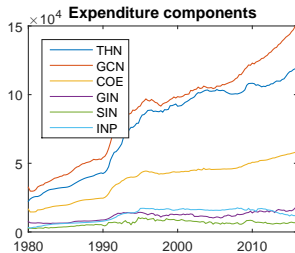
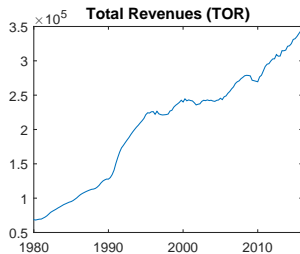
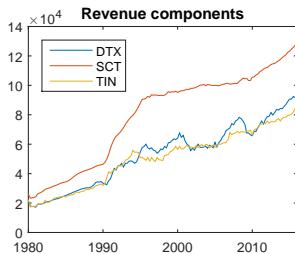
Non-linear spillovers (destination)

Low vs High Fiscal Stress

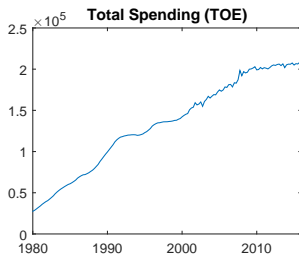
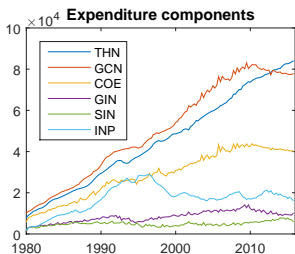
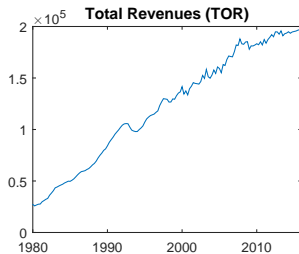
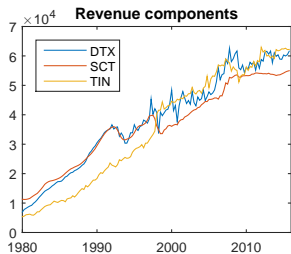


	DE	FR	IT	ES
Low stress				
impact	-0.09	-0.08	0.01	0.20**
1 year	0.19	0.13	0.23*	0.32**
2 years	0.96	0.30*	0.33*	0.53**
3 years	1.63*	0.25	0.06	0.76**
High stress				
impact	0.21	0.10	0.10	-0.22*
1 year	-0.14*	0.32*	2.66	-0.15
2 years	-0.96	0.50*	0.51	0.03
3 years	-1.67	0.90*	40.4	0.21

▶ return



[▶ return](#)



▶ return

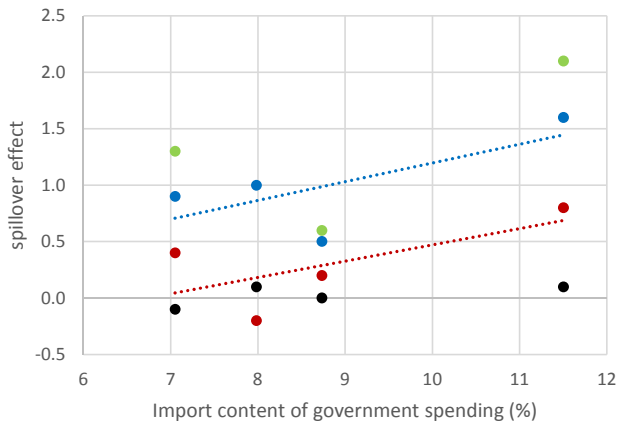


$$\alpha_{t,y} = \sum_i \eta_{T_i, B_i} \eta_{B_i, Y} \frac{T_i}{T}$$

	DE	FR	IT	ES	NL	BE	EA
$\alpha_{t,y}$	1.36	2.01	1.70	1.81	1.68	1.75	1.61
$\alpha_{t,p}$	1.04	0.96	1.08	0.85	0.95	0.96	0.96
$\alpha_{t,r}$	0	0	0	0	0	0	0
$\alpha_{g,y}$	0	0	0	0	0	0	0
$\alpha_{g,p}$	-0.5	0	-0.5	-0.5	-0.5	-0.5	-0.5
$\alpha_{g,r}$	0	0	0	0	0	0	0

▶ return

Spillovers and import-content of gov.

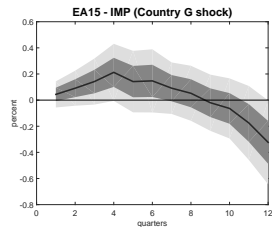
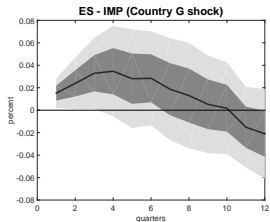
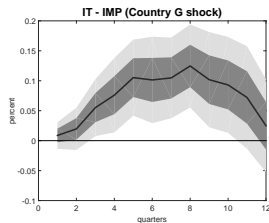
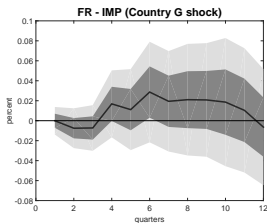
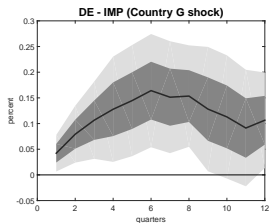
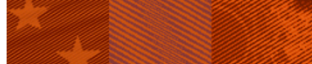


● impact ● 1 year ● 2 years ● 3 years

▶ return

Trade channel of spillovers

Imports response to own spending shock



Trade channel of spillovers

Effects on own imports (multipliers)



	DE	FR	IT	ES	EA
impact	0.37**	0.00	0.07	0.25**	0.15
1 year	0.68**	0.01	0.46*	0.52*	0.51*
2 years	0.94**	0.60	0.95**	0.63*	0.67*
3 years	1.07**	0.98	1.08**	0.43	0.25

[▶ return](#) Significant reaction of domestic imports after an (own) government spending shocks.