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

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- Results: Positive and large fiscal spillovers.

Outline

- Mechanisms / related literature.
- New database.
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  - Different mechanisms: trade, interest rates.
  - Recent empirical work: large spillovers. ▸ more
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- Other sources? partial availability of some components (GCN) from OECD.
- Is this adequate for empirical studies?

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- Quarterly frequency from 1980q1 - 2015q4.

Creating a Fiscal Database II

- Similar approach to Paredes et al. 2014: Use intra-annual fiscal data & preserve coherence with official annual data.
- Procedure:
  1. Use official quarterly figures (Eurostat *ESA2010* & *ESA1995*) when available and annual (Eurostat) figures before that.
  2. Set up an **unobserved components** model (separating between trend, seasonal and irregular components):

$$\begin{pmatrix} z_t \\ \boldsymbol{u}_t \end{pmatrix} = \boldsymbol{T}_t + \boldsymbol{S}_t + \boldsymbol{e}_t$$

  3. Interpolate annual figures (z_t) using intra-annual information (indicators $\boldsymbol{u}_t$).

▸ examples

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

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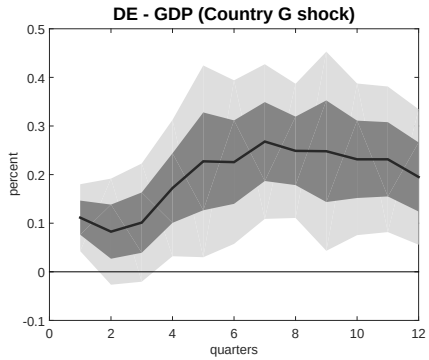
  with $z_{i,t} \in \{g_{i,t}, tr_{i,t}\}$

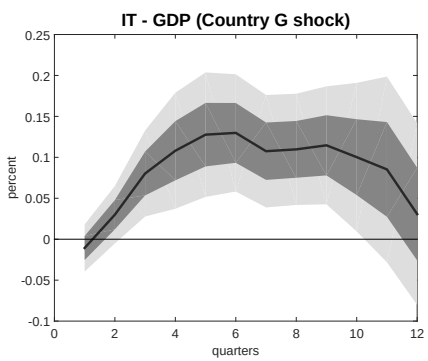
- IR functions for $y_{i,t}$ and $z_{i,t}$ given by: $\beta_{i,h}$ and $\gamma_{i,h}$.
- **Cumulative multiplier** at time h:

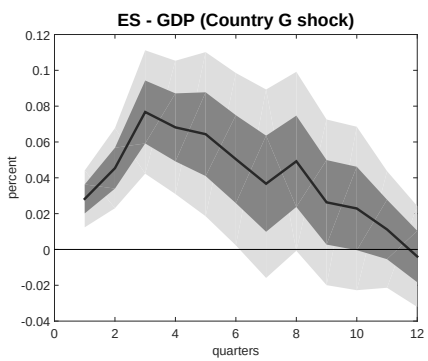
$$M_{i,h} = \frac{\sum_{r=0}^{h}\beta_{i,r}}{\sum_{r=0}^{h}\gamma_{i,r}}$$

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

GDP response to own spending shock







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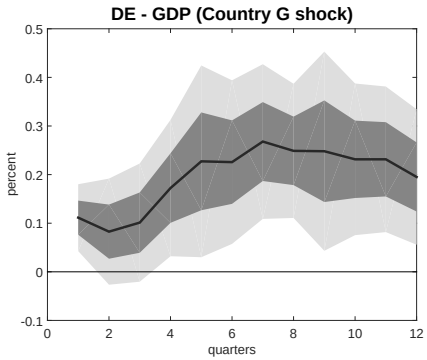

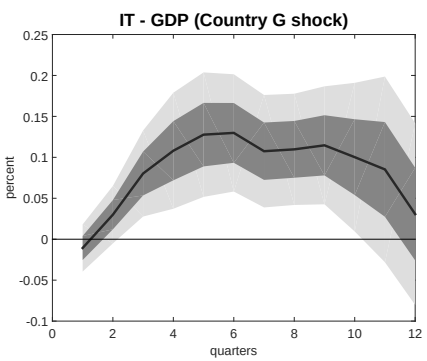

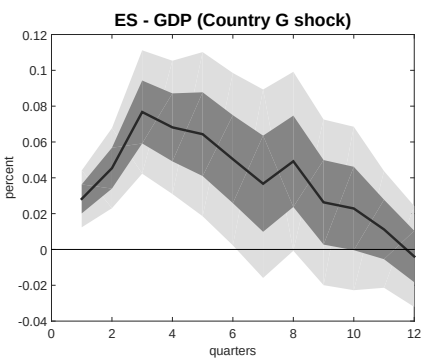

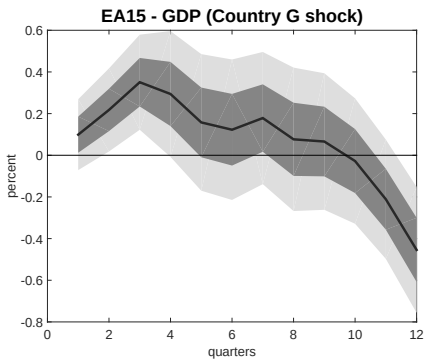

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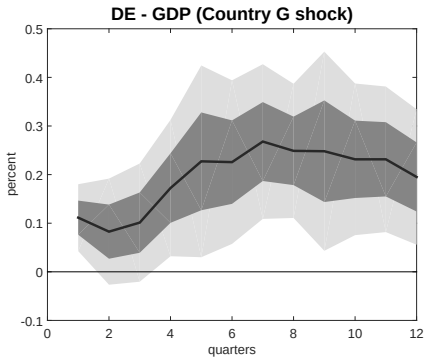

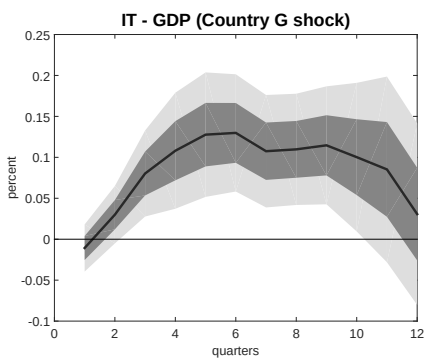

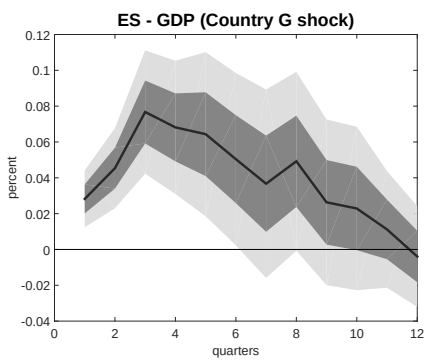

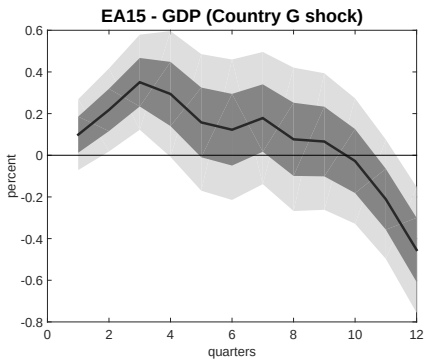

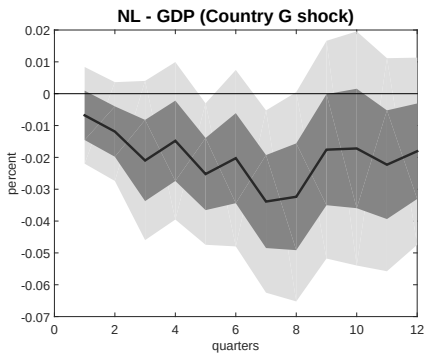

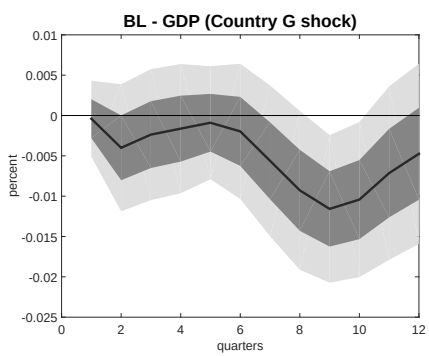

Government spending multiplier

	DE	FR	IT	ES	EA
impact	0.97**	0.37**	-0.09	0.47**	0.33*
1 year	0.89**	0.43	0.60**	1.06**	1.01**
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- Puzzling effects of NL and BE.

▸ components ▸ non-linear ▸ literature ▸ tax effects

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  3. **Compare** to alternative methods from the literature.

Estimation of country-pair spillovers

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

$$\frac{y_{i,t+h} - y_{i,t-1}}{y_{i,t-1}} = \alpha_{i,h} + \beta_{i,j,h}\frac{shock_{j,t}}{y_{i,t-1}} + \boldsymbol{\delta}_{i,h}(L)\boldsymbol{x}_{i,t-1} + \xi_{i,t+h}$$

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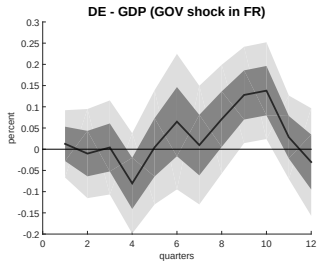
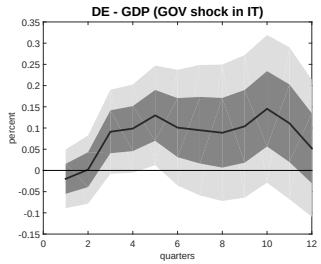
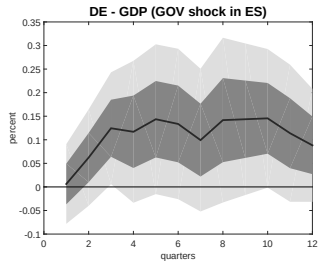
- Normalize both equations by destination country by $y_{i,t-1}$.
- Controls for destination country $x_{i,t}$ and origin country $x_{j,t}$.
- IR functions for $y_{i,t}$ and $g_{j,t}$ given by: $\beta_{i,j,h}$ and $\gamma_{i,j,h}$.

Country pairs Spillovers: GDP







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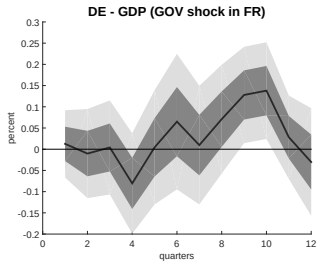

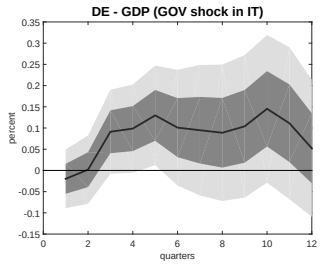

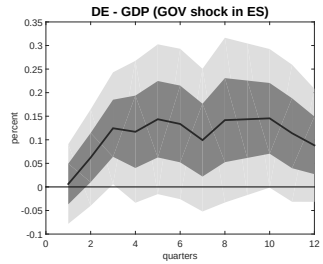

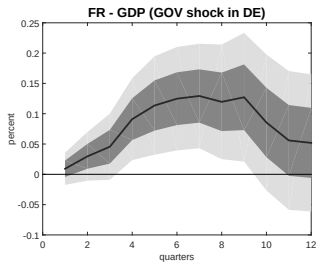

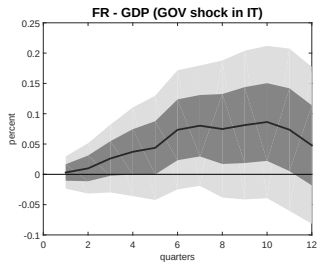

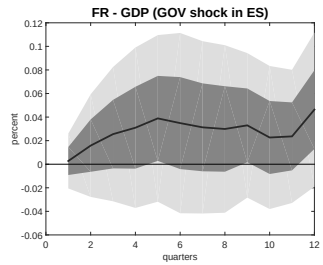

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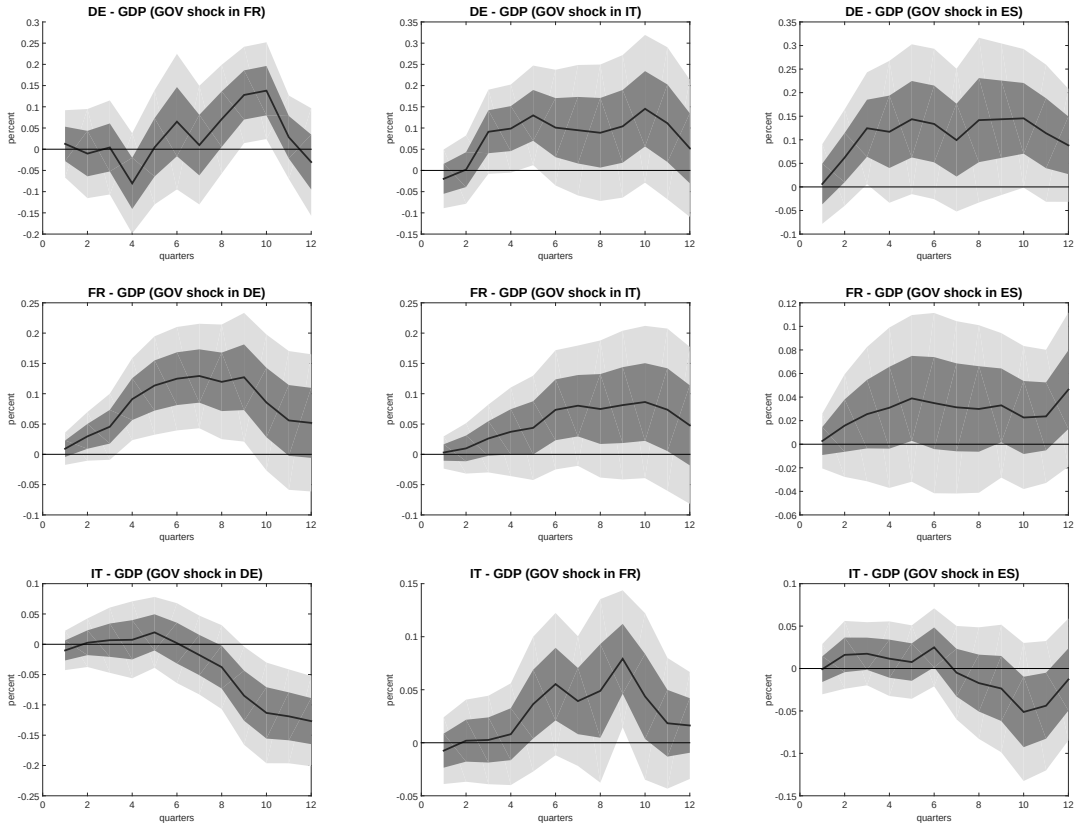

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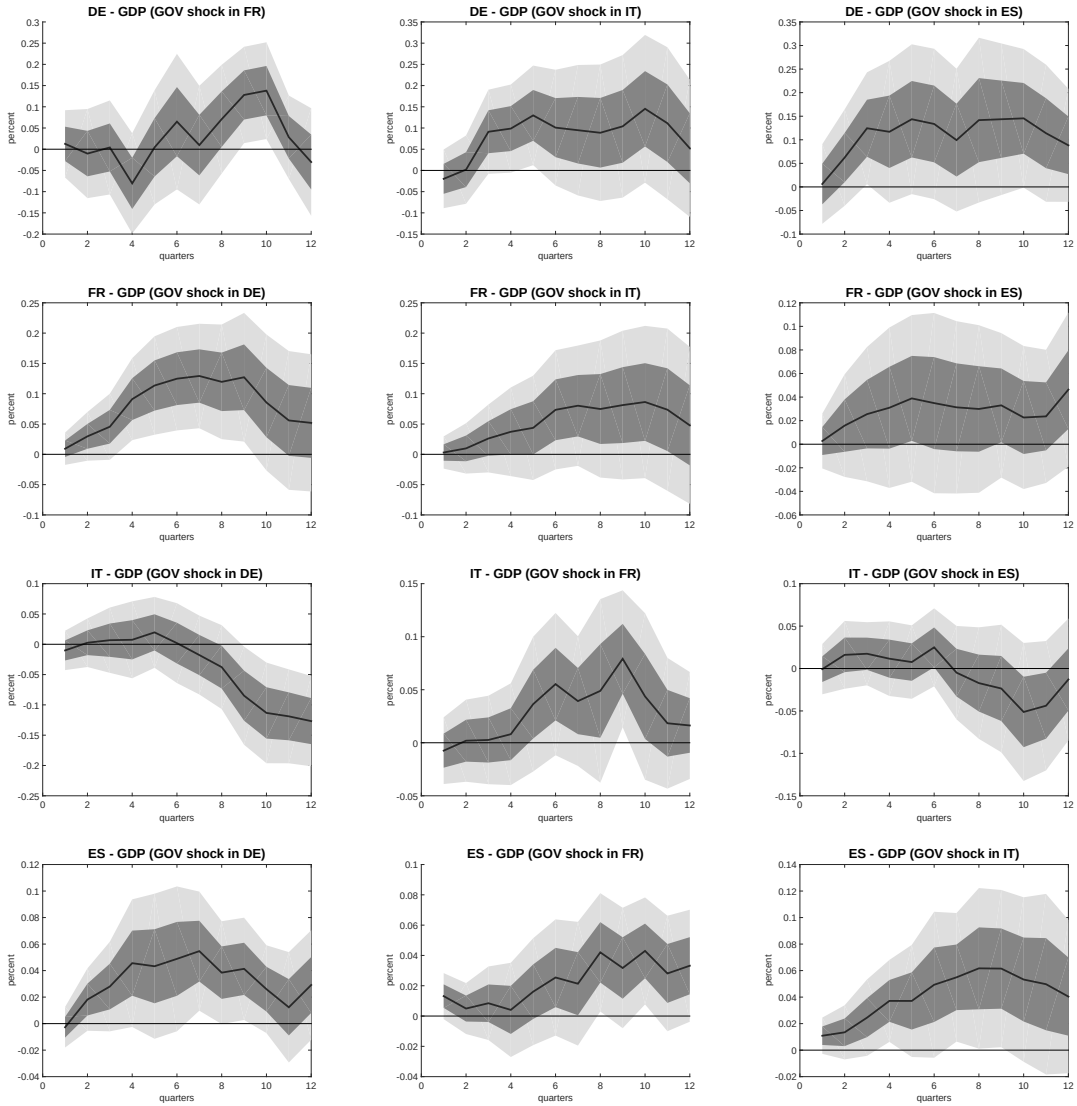

Spillovers by destination and origin

- We aggregate spillovers by **destination**:

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

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- And aggregate spillovers by **origin**:

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

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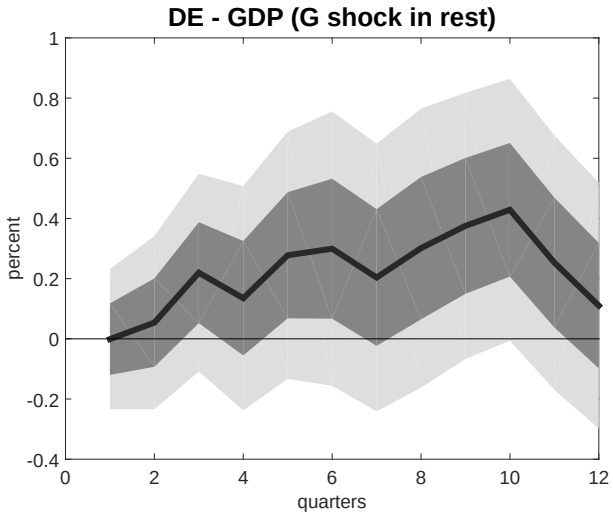
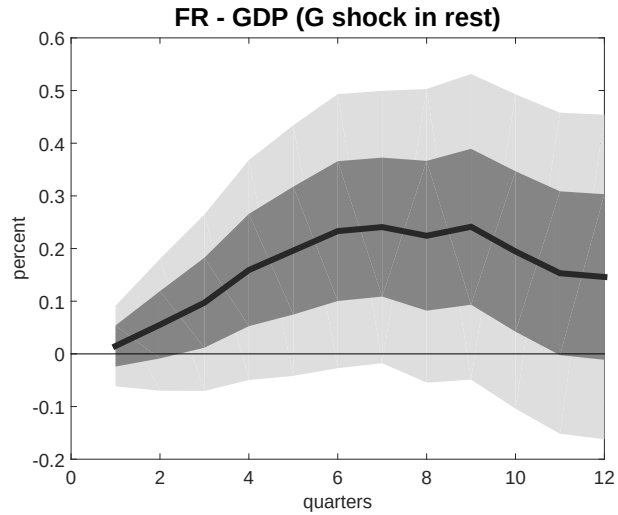
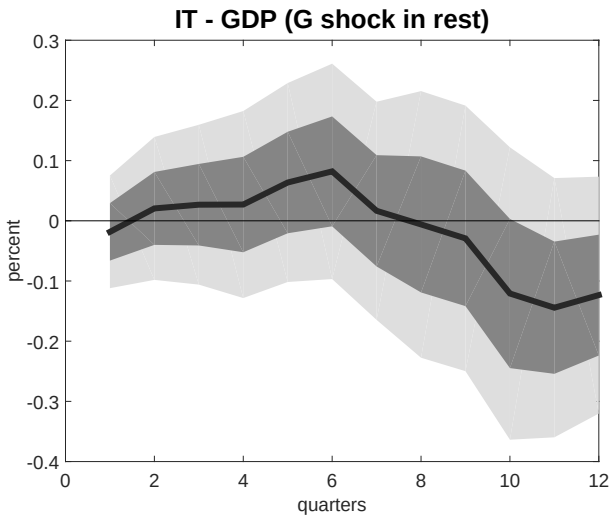
$w_i = \frac{Y_i}{\sum_{i \neq j} Y_i}$ & $M_{i,j,h}$ = spillover multiplier on country i from a shock originated in country j at horizon h.

GDP responses (destination)







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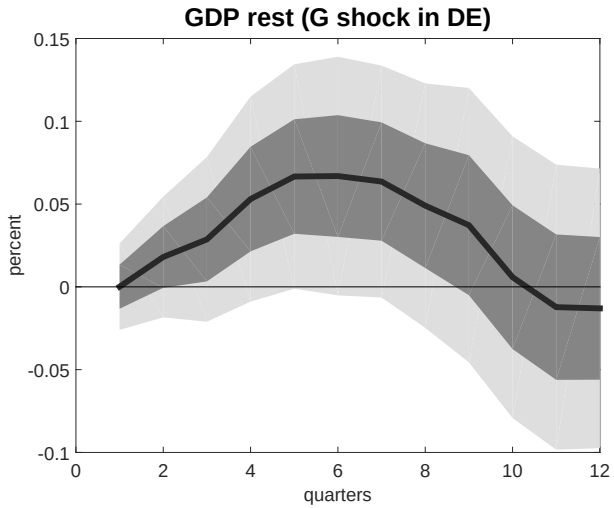

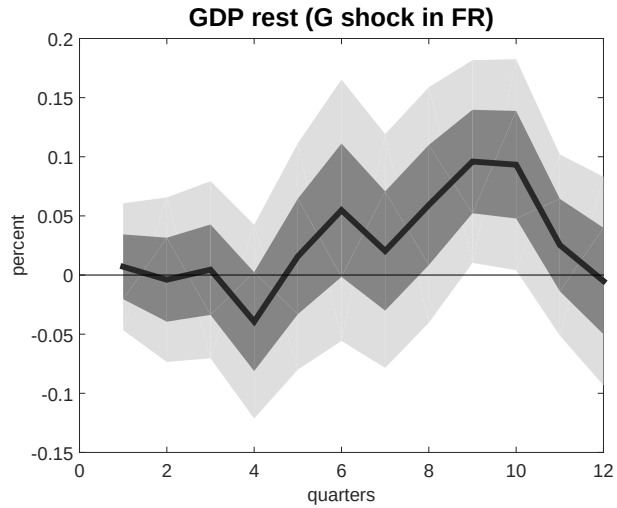

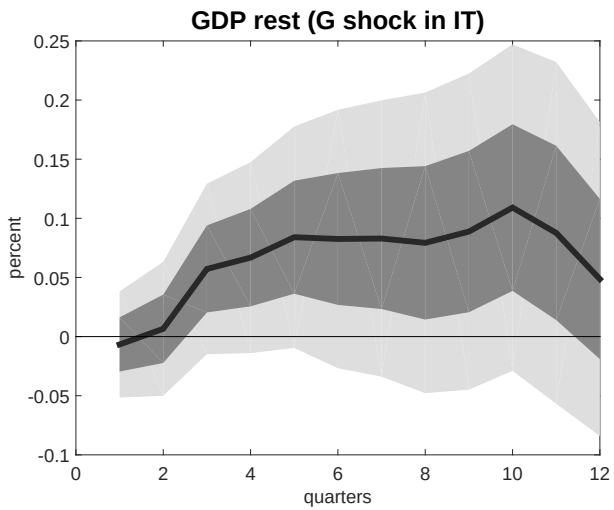

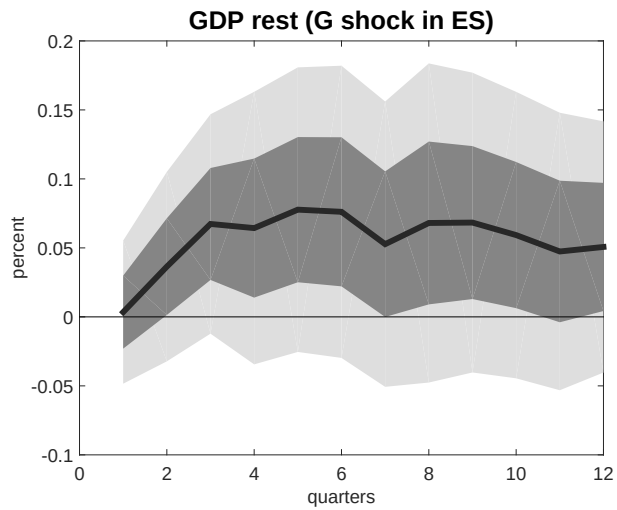

Government spending spillovers

	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*
3 years	0.58**	3.62	1.31*	2.11*

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impact	0.00	0.05	-0.07	0.07
1 year	0.63	0.31*	0.07	0.24*
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2 years	0.47*	0.97	0.89*	1.57*
3 years	0.58**	3.62	1.31*	2.11*

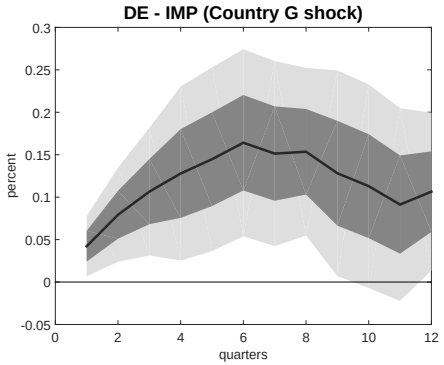
Positive and **significant** spillovers:

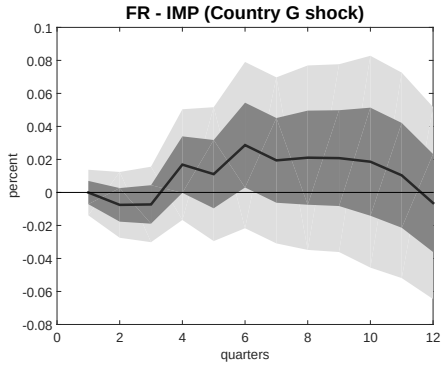
- by destination FR, ES & (less) DE (upper bound).
- by origin DE, FR & ES.

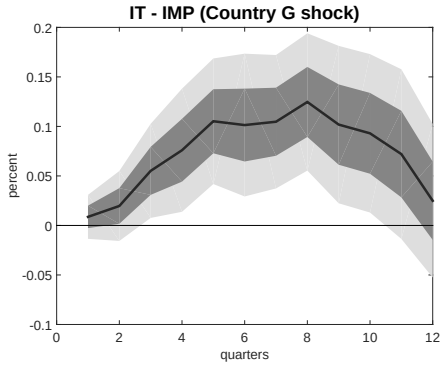
Exploring a potential mechanism

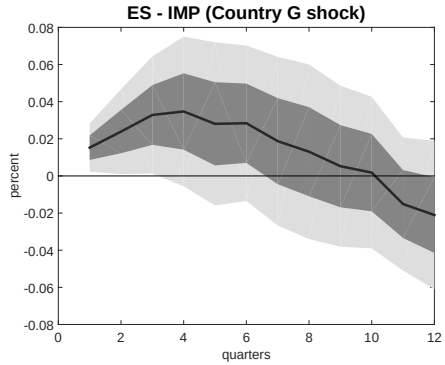
- How do the effects of fiscal policy spill over to other countries?
- Potential explanation: **trade channel**.
  - $\uparrow G_i \Rightarrow \uparrow M_i \Rightarrow \uparrow X_{j,i}$.
- Two effects:
  - Direct: import-content of government spending.
  - Indirect: $\uparrow Y_i \Rightarrow \uparrow M_{i,j}$.

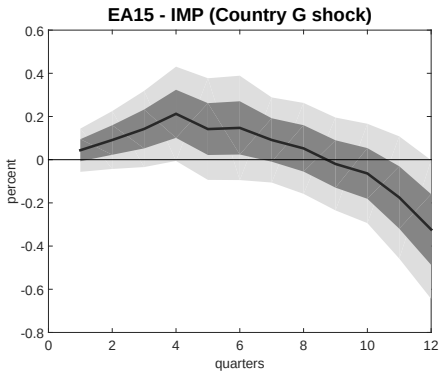
Trade channel I: domestic imports











Trade channel I: effect on imports

	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

- Significant reaction of domestic imports after a government spending shock.

Trade channel II: effect on 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

- Evidence of the presence of a trade channel. ▸ import-content

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

	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

- Importance of spillovers due to public investment
  - tend to be more significant than consumption spillovers.
  - larger in size (≈ 2 after 2 yrs).

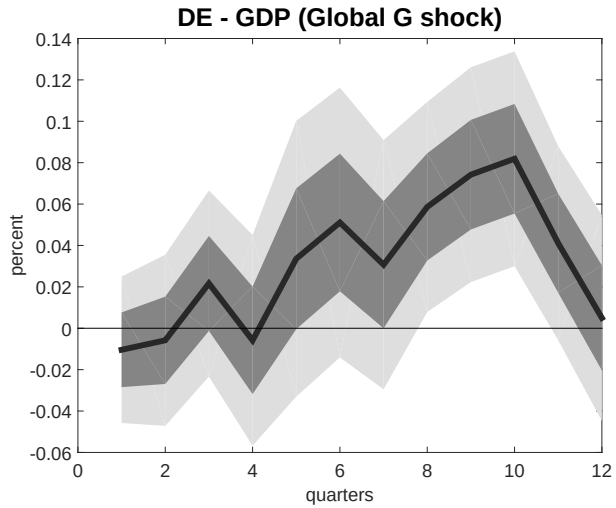
Estimating fiscal spillovers: alternative

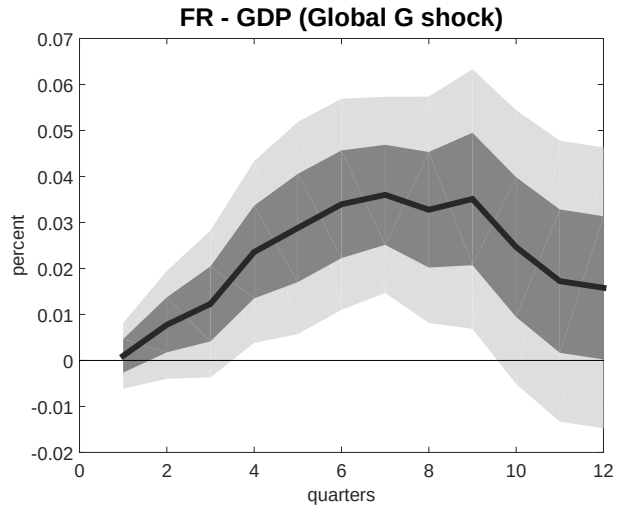
- Alternative specification (Auerbach & Gorodnichenko 2002).
- Procedure:
  1. Aggregate identified shocks $\varepsilon^G_{i,t}$ into measure of spillover:

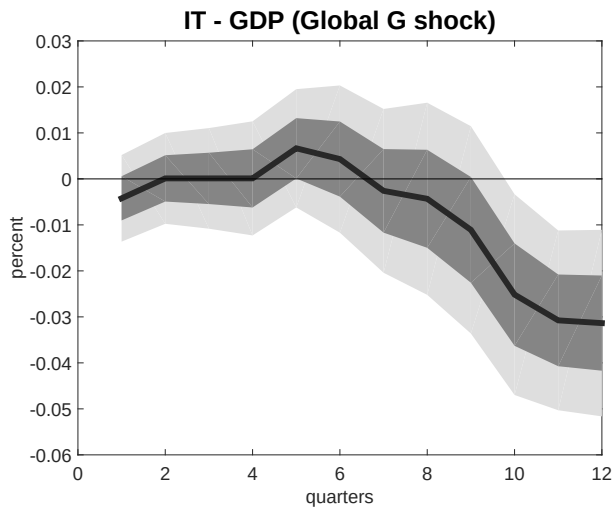
$$shock_{i,t} = \sum_{j \neq i} \omega_{ij} \varepsilon^G_{j,t} G_{j,t-1}$$

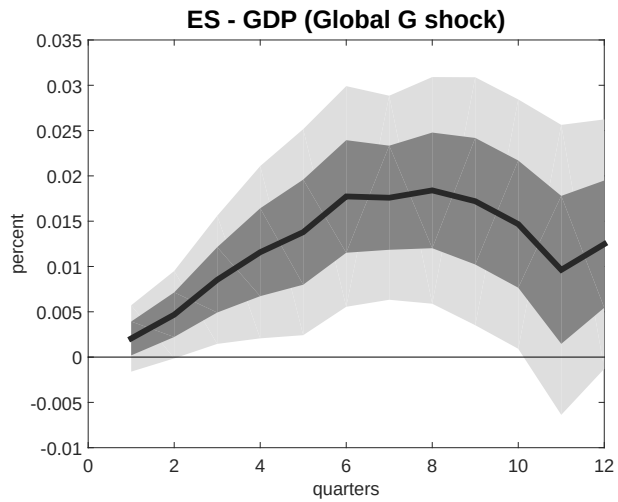
  2. Construct cumulative multiplier as described earlier.
- Different policy experiment, allows comparison to literature.
- Caveat: take a stance on ω_{ij} (but efficient if ω_{ij} true).

GDP responses -alternative









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 ($\sim$ 2.0).

▸ non-linear

Conclusion

- 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.

Conclusion

Thank you for your attention!

Mechanisms

- Two potential mechanisms in a currency area:
  - Trade: $\uparrow G_i \Rightarrow \uparrow Y_i \Rightarrow \uparrow X_{j,i} \Rightarrow \uparrow Y_j$
  - Interest rates: $\uparrow G_i \Rightarrow \uparrow \pi_i \Rightarrow \uparrow \pi \Rightarrow \uparrow R \Rightarrow \downarrow Y_j$

Mechanisms

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  - Interest rates: $\uparrow G_i \Rightarrow \uparrow \pi_i \Rightarrow \uparrow \pi \Rightarrow \uparrow R \Rightarrow \downarrow Y_j$
- In a basic model: small spillovers (monetary policy response).
- Much higher with binding ZLB: Blanchard Erceg Linde (2016).
  - $\uparrow G_i \Rightarrow \uparrow \pi_i \Rightarrow \uparrow \pi \Rightarrow R \approx 0 \not\Rightarrow \downarrow Y_j$
  - Large government spending spillovers.

Mechanisms

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  - $\uparrow G_i \Rightarrow \uparrow \pi_i \Rightarrow \uparrow \pi \Rightarrow R \approx 0 \not\Rightarrow \downarrow Y_j$
  - Large government spending spillovers.
- Are spillovers empirically relevant?

Literature

- Some references:
  - Early work: Beetsma, Giuliodori & Klaasen (2006)
  - More recently: Auerbach & Gorodnichenko (2013), Hebous & Zimmerman (2013), Goujard (2016).
    - $\Rightarrow$ Very large spillovers (higher than domestic shocks).

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    - $\Rightarrow$ Very large spillovers (higher than domestic shocks).
- No "gold-standard" in the literature: problems with identification (reduced form shocks, exogeneity...), data.
- Common **problem**: lack of suitable quarterly data.
- **Contribution**: combine ingredients from the literature and try to overcome some of the above limitations:

return

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

Government spending non-linearities

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

$$\frac{z_{i,t+h} - z_{i,t-1}}{y_{i,t-1}} = 1\{s_t = A\}\left(\alpha^B_{i,h} + \beta^B_{i,h}\frac{shock_{i,t}}{y_{i,t-1}} + \boldsymbol{\delta}^B_{i,h}(L)\boldsymbol{x}_{i,t-1}\right) + 1\{s_t = B\}\left(\alpha^R_{i,h} + \beta^R_{i,h}\frac{shock_{i,t}}{y_{i,t-1}} + \boldsymbol{\delta}^R_{i,h}(L)\boldsymbol{x}_{i,t-1}\right) + \xi_{i,t+h}$$

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

	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

	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

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

Source: EC's PFR (2012), for FR Cleaud et al (2013).

- Estimated multipliers **similar** in magnitude to previous work.

▸ return

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

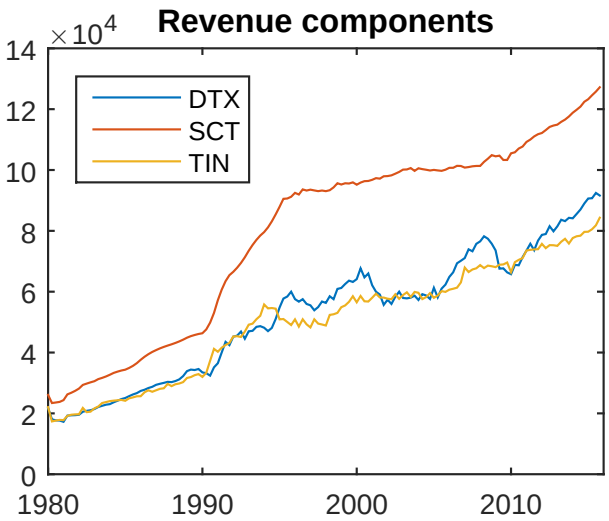
- Negative in the short/medium run but high uncertainty beyond that.
- Controversy over identification: Caldara Kamps (2017).
- More sensible results for NL & BE? ▸ Output effects ▸ return

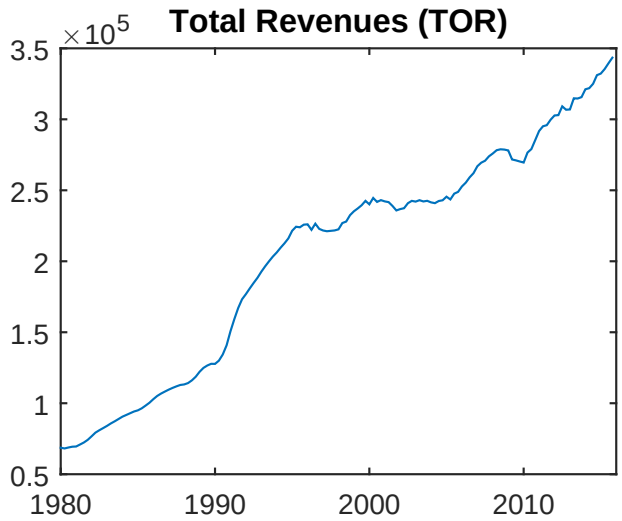
Non-linear spillovers (destination)

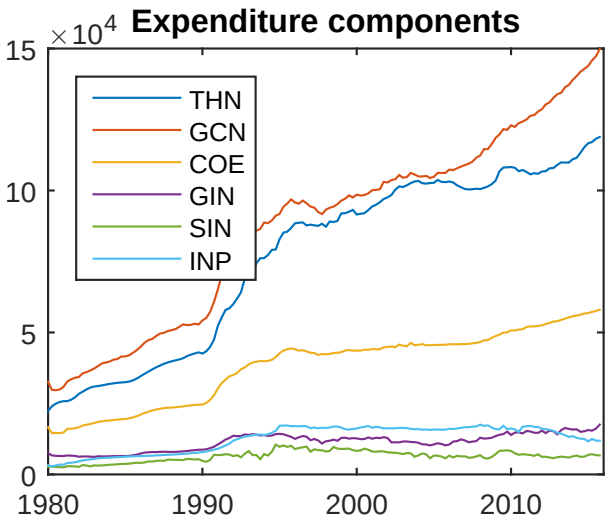
	DE	FR	IT	ES
Booms				
impact	0.33*	-0.12*	-0.15*	0.10*
1 year	0.29	-0.02	-0.04	0.19**
2 years	0.64	0.17*	0.05	0.34**
3 years	0.77	0.20	-0.13	0.44**
Recessions				
impact	-0.74*	-0.91**	-0.11	-0.25*
1 year	2.61*	-1.12**	-0.01	-0.15
2 years	3.25*	-0.83**	0.40	-0.03
3 years	3.24*	-0.90*	1.31	0.03

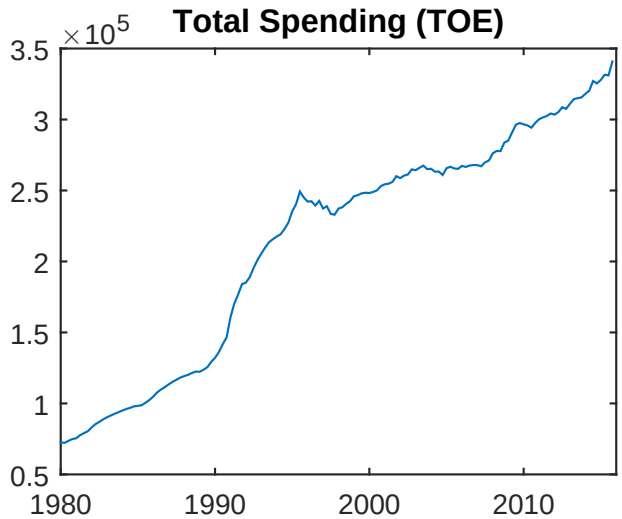
return

Germany



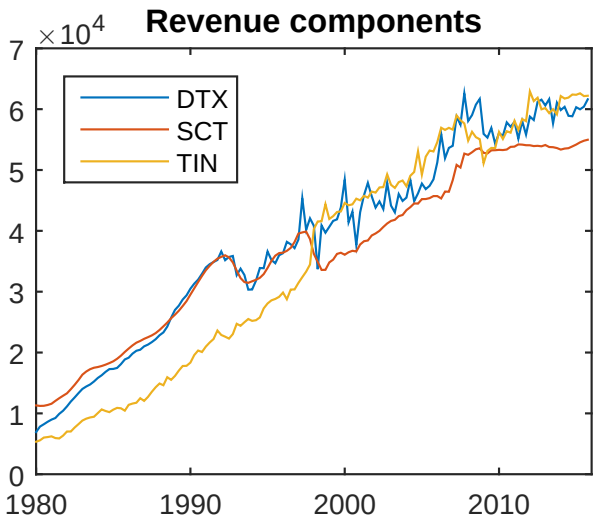


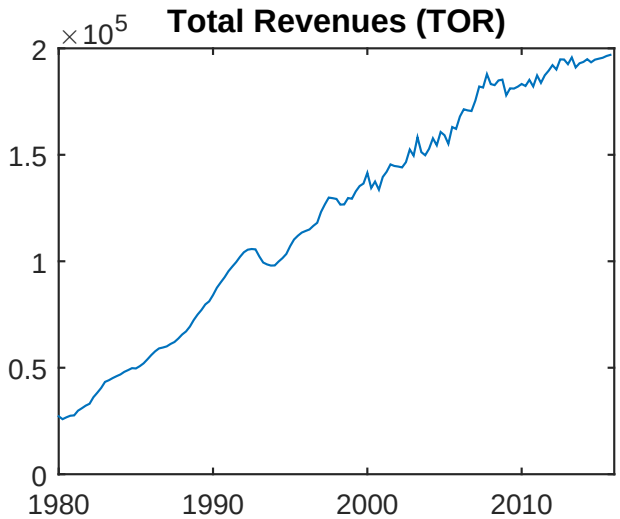


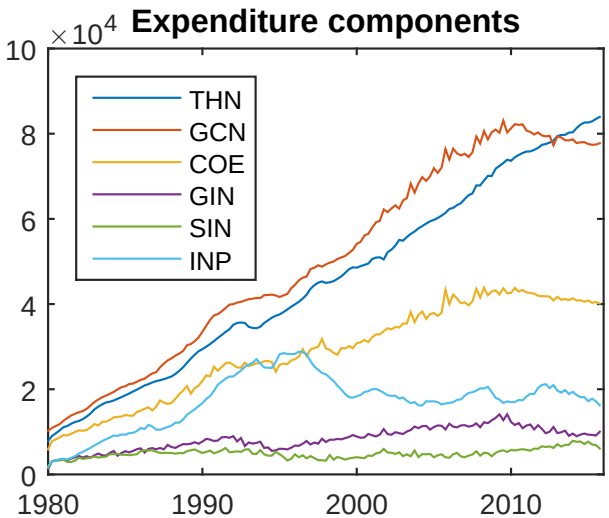


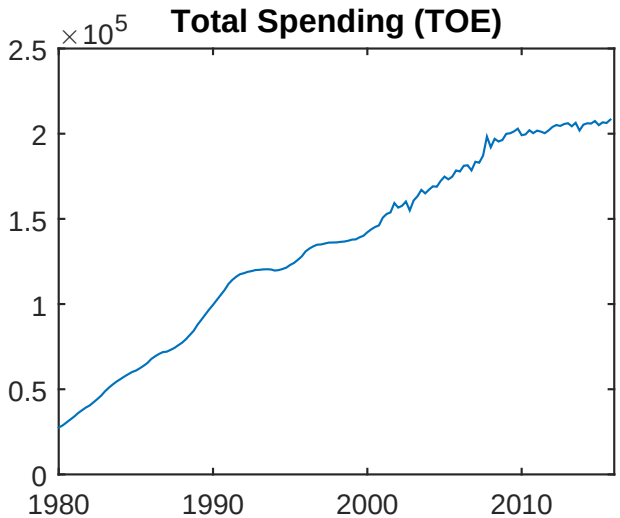
return

Italy









return

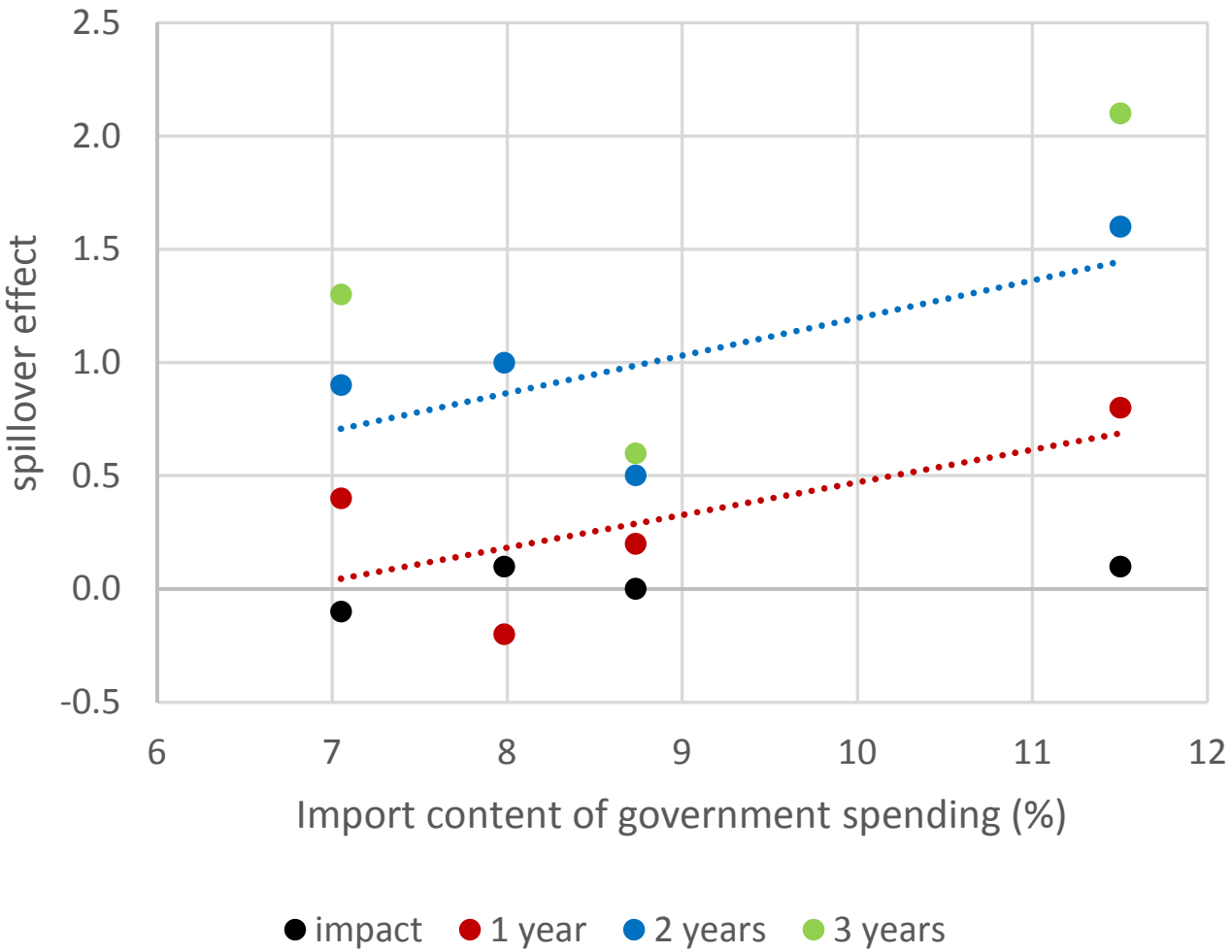
Elasticities

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

	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

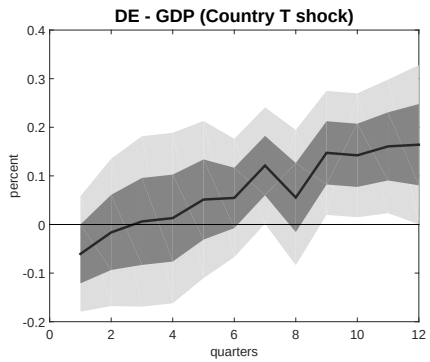
return

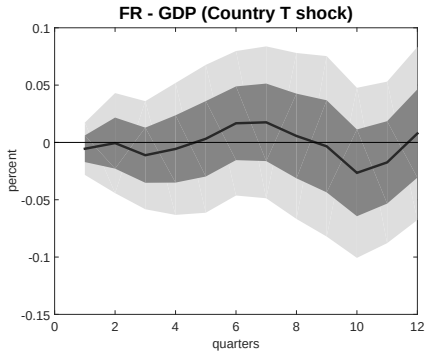
Spillovers and import-content of gov.

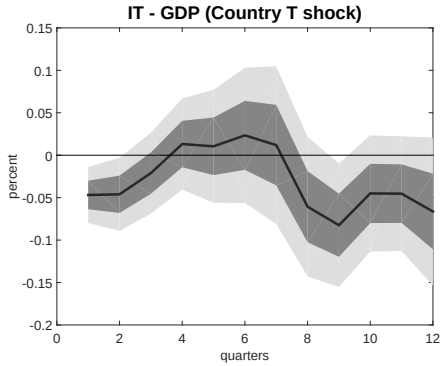


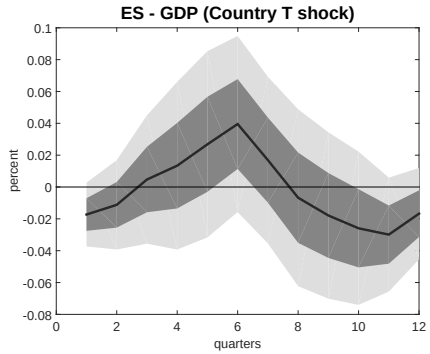
return

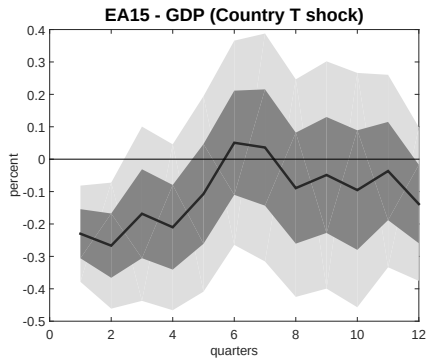
GDP response to own tax shock

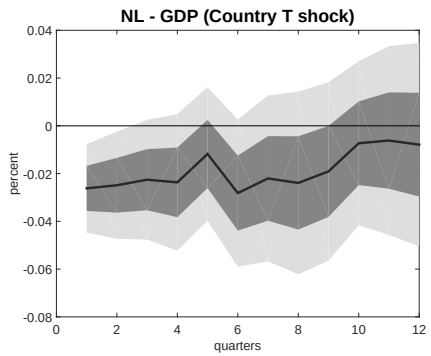


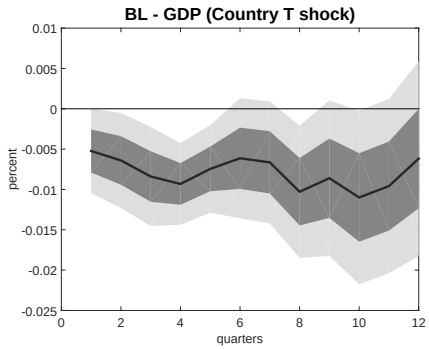












return