Fiscal Policy, Relative Prices and Net Exports in a Currency Union

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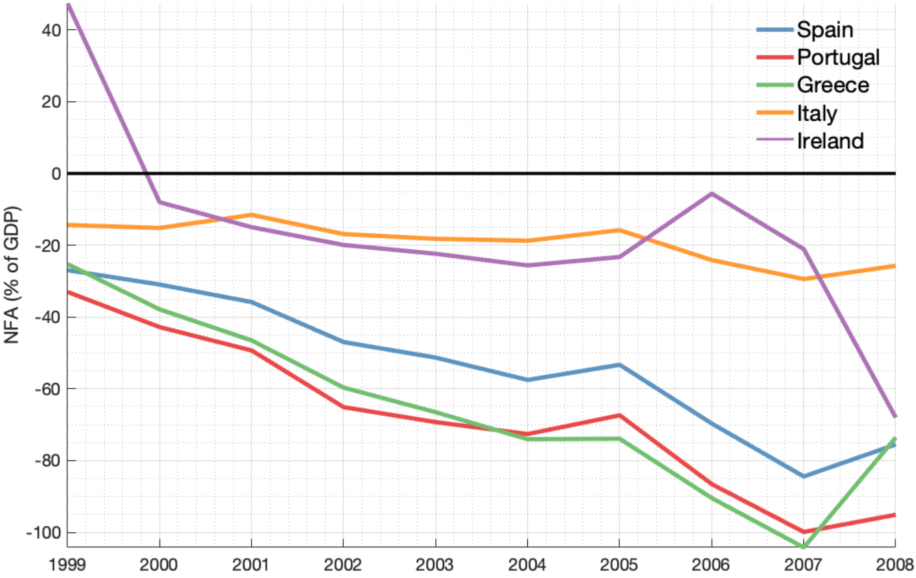
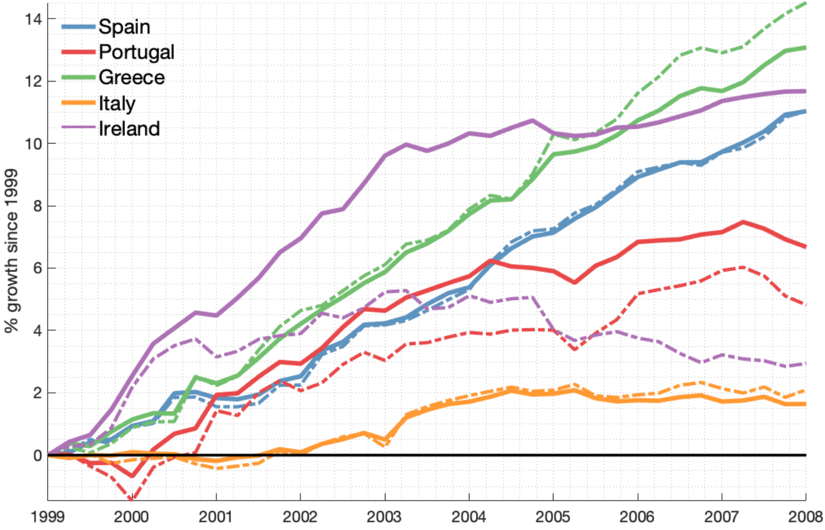
Net Foreign Asset Position 1999-2008



CPI Growth relative to EA Average: 1999-2008



Note: A value of 10 indicates that consumer prices in that country rose by 10% more than they did for the euro area. Continuous line refers to the overall CPI, the dashed line refers to the CPI of traded goods.

Motivation and Goals

The silver lining of fiscal austerity: eliminate internal *and* external imbalances

There is a need to implement an ambitious structural reform agenda to strengthen external competitiveness [and] accelerate reallocation of resources from the non-tradable to the tradable sector. [...] Inflation needs to be reduced significantly below the euro area average for Greece to regain swiftly price competitiveness. Domestic demand tightening [...] through fiscal adjustment [...] will be essential to bring inflation down in a meaningful way.

The Economic Adjustment Programme for Greece, 2010

Wage moderation will contribute to more dynamic exports and the reduction of the external deficit.

The Economic Adjustment Programme for Portugal, 2011

Study the effects of fiscal policy (government consumption and consumption tax rate) on net exports, the terms of trade and expenditure switching in a monetary union

Our Results

Empirical spending cut multiplier after 2 years

$$\underbrace{\tilde{P}}_{\downarrow\atop -\frac{1}{3}} = \underbrace{\alpha}_{\downarrow\atop \frac{1}{3}} \times \underbrace{\left(\tilde{P}_N - \tilde{P}_T\right)}_{\downarrow\atop (-1)} + \underbrace{\tilde{P}_T}_{\downarrow\atop 0}$$

Deflationary for non-traded goods $\rightarrow$ real exchange rate depreciation

Missing terms-of-trade deterioriation

Net exports multiplier: $\approx \frac{1}{2}$ (driven by imports, not exports)

Two key features to rationalize findings in DSGE model:

- Strong home bias in government spending
- Restricted labor mobility across sectors

Empirical Approach

Sample: semi-annual data (1999 - 2018) on government consumption and consumption tax rates; 12 core EA countries; Source: Eurostat

Identification: fiscal policy takes at least one period to respond (see Blanchard and Perotti, 2002) and use professional forecast to control for anticipation (see Auerbach and Gorodnichenko, 2012, Born et al., 2013, Miyamoto et al., 2018)

$$\Delta G_{i,t} = \alpha_i^g + \beta_f^g F_{t-1} \Delta G_{i,t} + \beta_{\mathbf{z}}^{\mathbf{g}} \psi(L) \mathbf{z_{i,t-1}} + \varepsilon_{i,t}^g,$$

$F_{t-1} \Delta \ln G_{i,t}$ is the $t-1$ OECD forecast for $G_{i,t}$

$\mathbf{z_{i,t-1}}$: real GDP, unemployment rate and spending growth

$\varepsilon_{i,t}^g$ are the extracted fiscal policy shocks

Similar approach for consumption tax rates; no forecasts available, so we collect announcement dates

Empirical Approach

$$\sum_{s=0}^{h}(\log x_{i,t+s} - \log x_{i,t-1}) = \alpha^x_{i,h} + \alpha^x_{t,h} + M^g_h \sum_{s=0}^{h} \frac{G_{i,t+s} - G_{i,t-1}}{Y_{i,t-1}}$$

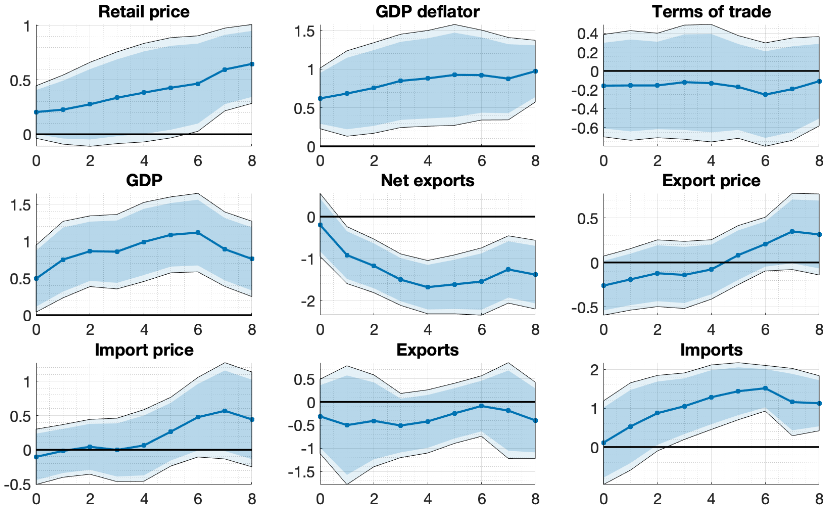
$$+ M^\tau_h \times \frac{C_{i,t-1}}{(1+\tau_{i,t-1})Y_{i,t-1}} \sum_{s=0}^{h}(\tau_{i,t+s} - \tau_{i,t-1}) + \beta_{\mathbf{z}}\psi(L)\mathbf{z}_{i,t-1} + \varepsilon^x_{i,t},$$

$\varepsilon^g_i, \varepsilon^\tau_i$ are instruments for $\frac{G_{i,t+j}-G_{i,t-1}}{Y_{i,t-1}}$ and $\tau_{i,t+j} - \tau_{i,t-1}$

Instruments are highly relevant up to 8 semesters (see Olea and Pflueger, 2013) Instruments

Multiplier M^g_h is the percent change in x between $t-1$ and $t+h$ for an increase of government spending by 1% of output over that period

Government Spending Multipliers



Spending Multiplier at the Product Level

Estimate how the response of prices and consumption depends on the good's import share

Use HICP data on 90 COICOP categories

Use consumption data on 38 categories

$$\sum_{s=0}^{h}\left(\log P^{j,ret}_{i,t+s} - \log P^{j,ret}_{i,t-1}\right) = \left(M^g_h + m^g_h \times im_j\right)\sum_{s=0}^{h}\frac{G_{i,t+s} - G_{i,t-1}}{Y_{i,t-1}}$$

$$+ \left(M^\tau_h + m^\tau_h \times im_j\right) \times \frac{C_{i,t-1}}{(1+\tau_{i,t-1})Y_{i,t-1}}\sum_{s=0}^{h}\left(\tau_{i,t+s} - \tau_{i,t-1}\right) + \mathbf{z}^j_{i,t-1} + \varepsilon^j_{i,t}$$

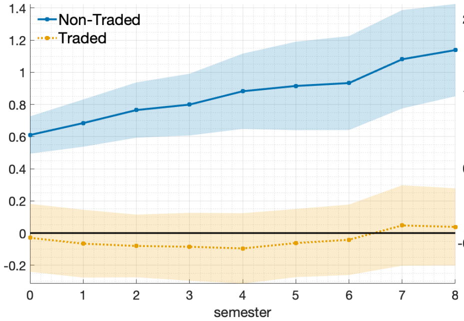
M^g_h is the multiplier for a good with 0 import share (non-traded good)

$M^g_h + m^g_h \times 0.3$ is the multiplier for a good with 30% import share (average traded good)

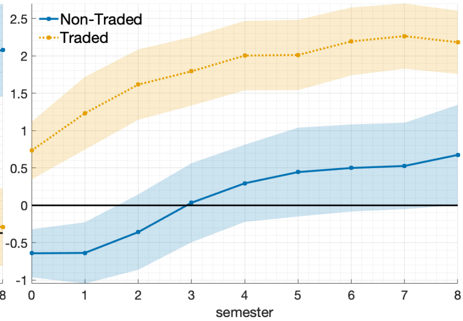
Import Shares of Consumption Goods (Extract)

Name	Weight	Import Share 50%	25%	75%
Motor cycles, bicycles and animal drawn vehicles	2‰	53.7%	32.7%	64.0%
Equipment for the reception, recording and reproduction of sound and picture	5‰	50.7%	48.8%	53.2%
Motor cars	33‰	49.8%	42.5%	55.5%
Major household appliances whether electric or not and small electric household appliances	9‰	49.6%	43.5%	57.6%
Passenger transport by air	6‰	37.6%	11.7%	67.1%
Furniture and furnishings	17‰	30.8%	25.5%	34.2%
Bread and cereals	30‰	26.1%	15.7%	40.4%
Tobacco	31‰	24.4%	19.5%	32.1%
Vegetables	16‰	18.1%	13.5%	28.7%
Recreational and sporting services	12‰	4.7%	3.5%	5.4%
Maintenance and repair of personal transport equipment	15‰	0.2%	0.0%	0.6%
Hairdressing salons and personal grooming establishments	10‰	0.0%	0.0%	2.5%

Spending Multiplier at the Product Level



(a) Retail Prices



(b) Real Consumption

Note: Panels display the estimated coefficient for a **non-traded** good ($\widehat{M}_h^g$) and the **average traded** good with an import share of 30% (calculated as the linear combination of the estimated coefficients $\widehat{M}_h^g + 0.3 \times \widehat{m}_h^g$). One-standard-deviation error bounds are displayed, based on Driscoll-Kraay standard errors clustered at the country and time level.

Spending Multiplier at the Industry Level

Estimate how the response of producer prices depends on the industry's export share

Use the Gross Value Added (GVA) deflator for 64 industries

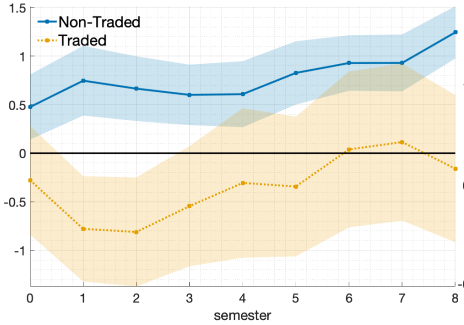
$$\sum_{s=0}^{h} \left(\log P^k_{i,t+s} - \log P^k_{i,t-1}\right) = \left(M^g_h + m^g_h \times ex_{i,k}\right) \sum_{s=0}^{h} \frac{G_{i,t+s} - G_{i,t-1}}{Y_{i,t-1}}$$

$$+ \left(M^\tau_h + m^\tau_h \times ex_{i,k}\right) \times \frac{C_{i,t-1}}{(1+\tau_{i,t-1})Y_{i,t-1}} \sum_{s=0}^{h} \left(\tau_{i,t+s} - \tau_{i,t-1}\right) + \mathbf{z}^k_{i,t-1} + \varepsilon^k_{i,t},$$

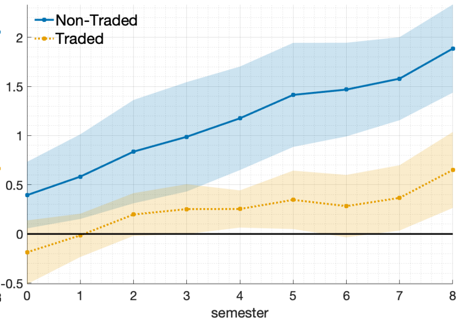
M^g_h is the multiplier for a good with 0 export share (non-traded good)

$M^g_h + m^g_h \times 0.5$ is the multiplier for a good with 50% export share (average traded good)

Spending Multiplier at the Industry Level



(a) Gross Value Added Deflator



(b) Nominal Wage per Employee

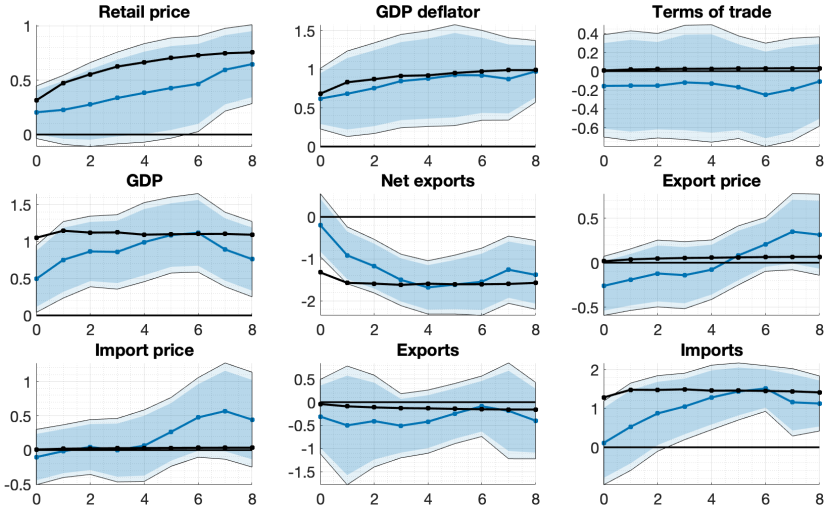
Note: Panels display the estimated coefficient for a **non-traded** good ($\widehat{M}_h^g$) and the **average traded** good with an export share of 50% (calculated as the linear combination of the estimated coefficients $\widehat{M}_h^g + 0.5 \times \widehat{m}_h^g$). One-standard-deviation error bounds are displayed, based on Driscoll-Kraay standard errors clustered at the country and time level.

Model

Small-open economy (SOE) in a monetary union as in Gali and Monacelli (2005) with 5 extensions

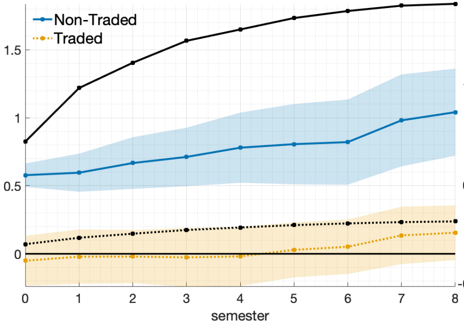
- Non-traded good + Traded good (CES aggregate)
- Traded good requires distribution services (Devereux, 1999)
- Strong home bias in government spending
- Restricted labor mobility across sectors (Horvath, 2000) RLM
- Non-CES demand (Kimball, 1995) $\Rightarrow$ variable markups and pricing to market PtM

Spending Multipliers: Data and Model

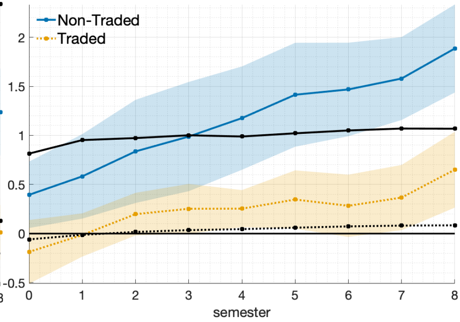


Note: The blue line is the response in the data. The black line is the government spending multiplier derived from the model.

Spending Multipliers: Retail Prices and Nominal Wages



(a) Retail Prices



(b) Nominal Wages

Note: The blue line is the response in the data. The black line is the government spending multiplier derived from the model.

Model Analysis

Table: ALTERNATIVE MODEL SPECIFICATIONS: SPENDING MULTIPLIERS

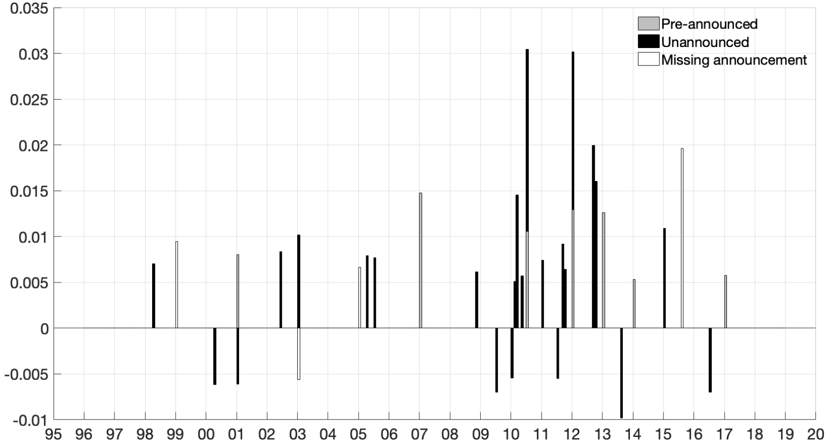
	Aggregate Multipliers				Relative Multipliers		
	P^{ret}	ToT	NX	GDP	$\frac{P_N^{ret}}{P_T^{ret}}$	$\frac{C_N}{C_T}$	$\frac{W_N}{W_T}$
Data	0.38	-0.13	-1.68	0.99	0.80	-1.71	0.92
	[0.00; 0.76]	[-0.65; 0.39]	[-2.21; -1.15]	[0.54; 1.44]	[0.38; 1.22]	[-2.56; -0.86]	[0.08; 1.76]
Model							
(1) Plain Vanilla	0.25	0.38	-2.72	0.75	0.11	-0.11	0.00
(2) (1) + Home bias in G	0.32	0.52	-2.63	0.80	0.14	-0.14	0.00
(3) (2) + Imperfect factor mobility	0.87	0.08	-1.65	1.09	0.83	-0.83	1.04
(4) (3) + Distribution services	0.66	0.08	-1.69	1.07	1.47	-1.47	0.98
(5) (4) + Pricing to market (Benchmark)	0.66	0.03	-1.59	1.09	1.46	-1.46	0.94
(6) (2) + Pricing to market	0.46	0.16	-2.07	0.97	0.20	-0.20	0.00

Notes: Table displays the estimated cumulative government spending multipliers at a horizon of 4 semesters in the data and the model. The second row shows the 90% confidence interval of the estimated response in the data. Columns 4 and 5 display the estimated coefficient $-0.3 \times m^g$ on the interaction term with the import share for both retail prices and consumption from regressions at the COICOP level. Similarly, columns 6 and 7 display the estimated coefficient $-0.5 \times m^g$ on the interaction term with the export share for both nominal wages and the GVA deflator from regressions at the NACE level.

Conclusions

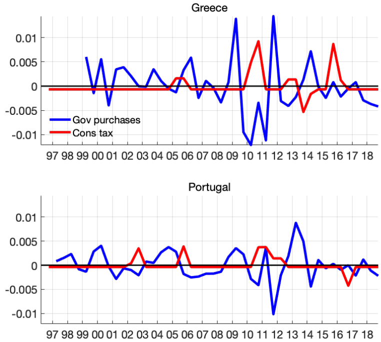
- Substantial output costs of correcting external imbalances through government spending:
  - Current account improvement of 1 euro would require a cut in government spending of 2.4 euros, leading to a drop in GDP by 2.4 (1.1) euros
  - Reducing external debt by 40% of GDP over 10 years would imply output losses of 10% (3%) per year
- Labor mobility a key factor $\rightarrow$ structural reforms

Consumption Tax Changes and Announcements



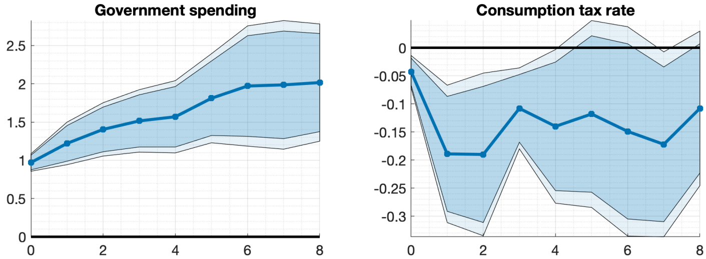
Note: Figure depicts consumption tax changes in our sample. Announcement cutoff: 6 months. Only tax changes amounting to 0.5 percentage points or more are displayed.

Extracted Shocks in Government Spending and Tax Rates

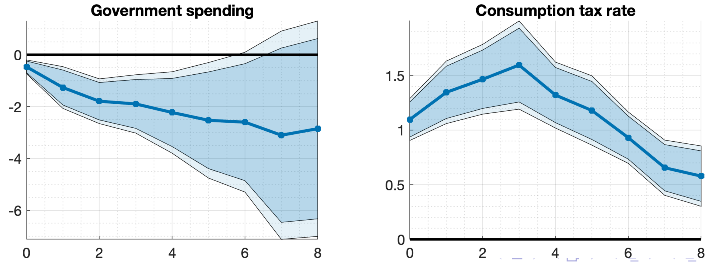


Note: Figures depict the estimated government spending residuals and consumption tax rate residuals for selected countries. Residuals are expressed in percent of GDP, i.e. for government spending, the figure displays $\hat{\varepsilon}^{g}_{i,t}\frac{G_i}{Y_i}$ and for the consumption tax rates, the figure displays $\frac{\hat{\varepsilon}^{\tau}_{i,t}}{1+\tau_i}\frac{C_i}{Y_i}$, where G_i, Y_i, C_i and τ_i are average values for the sample period.

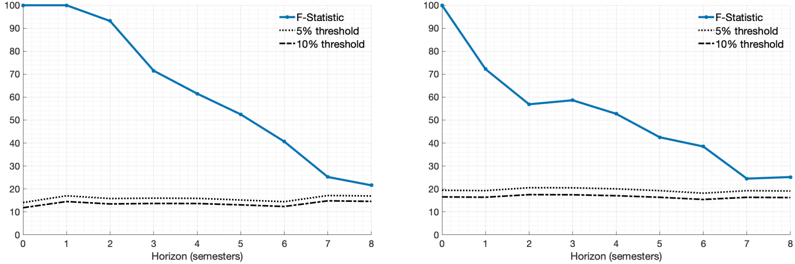
Response to Estimated Shocks



(a) Response to Government Spending



Test for Weak Instruments



(a) Government Spending

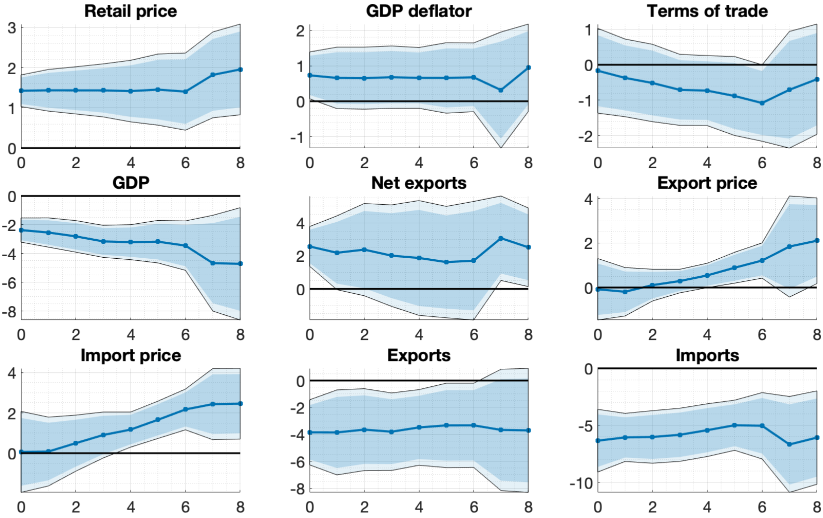
(b) Consumption Tax Rate

Figure: Test for Weak Instruments

Note: Figure displays the F-statistics to test the relevance of the instruments $shock^{g}_{i,t}$ (a) and $shock^{\tau}_{i,t}$ (b). The figure also plots the critical values at both the 5% and 10% level for testing the null hypothesis that the two-stage least squares bias exceeds 10% of the OLS bias. F-statistics are capped at 100. Errors are robust to heteroskedasticity and serial autocorrelation. Tests are implemented using the Stata command `weakivtest`.

Back

Consumption Tax Multipliers



Pricing to Market

Demand for (domestic) variety ι is

$$H_t(\iota) = \left[1 - \theta \log\left(Z_t \frac{P_{H,t}(\iota)}{P_{V,t}}\right)\right]^{\frac{\psi}{\theta}} V_t$$

The elasticity of demand for variety ι is

$$\varepsilon_t(\iota) = -\frac{\partial \log H_t(\iota)}{\partial \log P_{H,t}(\iota)} = \frac{\psi}{1 - \theta \log\left(Z_t \frac{P_{H,t}(\iota)}{P_{V,t}}\right)}.$$

$\theta \to 0$ is the CES case; $\psi > 1$ is the elasticity of substitution between varieties

$\theta > 0$, the demand elasticity increases in a variety's relative price $\frac{P_H(\iota)}{P_V}$

Elasticity of the markup to a relative price change is:

$$\Gamma(\iota) = \frac{\theta}{\psi - 1 + \theta \log\left(Z_t \frac{P_{H,t}(\iota)}{P_{V,t}}\right)}.$$

When competitors lower their price (i.e. a fall in $P_{V,t}$), the variety producer faces a higher elasticity of demand and responds by reducing their markup Back

Restricted Labor Mobility

Labor supply in sector j obeys

$$\kappa L_t^{\frac{1}{\eta}} \left(\frac{L_{j,t}}{L_t} \right)^{\xi} = \frac{W_{j,t}}{P_t^{ret}} U_{1,t}.$$

$\xi = 0$ converts back to the standard labor supply condition with wages being equalized across sectors

For small enough values of ξ, labor supplied across sectors remain substitutes

A special case arises whenever $\xi = \frac{1}{\eta}$, which implies that labor supply in sector j does not depend on labor supplied to other sectors:

$$\kappa L_{j,t}^{\xi} = \frac{W_{j,t}}{P_t^{ret}} U_{1,t}.$$

Labor supply changes in one sector have no direct effect on labor supplied in another sector (benchmark) Back