Fiscal Policy and the "Great Recession" in the Euro Area

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Motivation

- The "Great Recession" of 2008-09 triggered a large-scale fiscal policy response:
  - fiscal stimulus packages:
    - United States: American Recovery and Reinvestment Act (ARRA)
    - European Union: European Economic Recovery Plan (EERP)
  - financial support measures
  - automatic stabilisers

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  - financial support measures
  - automatic stabilisers
- Lively debate in both academic and policy circles about the effectiveness of fiscal stimulus measures.
- **Question:** What did discretionary fiscal policy do to euro area GDP in the Great Recession, *quantitatively*?

Related literature

- The theoretical and empirical literature analysing the effectiveness of fiscal stimulus has focused on the size and the sensitivity of *fiscal multipliers*:
  - Corsetti et al. (2009), Erceg and Lindé (2010), Uhlig (2010), Christiano et al. (2011), Drautzburg and Uhlig (2011), Eggertsson (2011), Woodford (2011), Coenen et al. (2012)

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- A growing literature has emerged analysing the economic effects of *fiscal stimulus packages*:
  - ARRA: Cogan et al. (2010), Drautzburg and Uhlig (2011), Coenen et al. (2012)
  - EERP: EC (2009), ECB (2010), Cwik and Wieland (2011)

What we do

- Depart from estimated version of the ECB's New Area-Wide Model (NAWM; Christoffel, Coenen and Warne, 2008):
  - stylised fiscal sector with constant taxes, exogenous government consumption, balanced budget, Ricardian equivalence applies
  - simplification of calibrated version of the NAWM with richer fiscal sector (Coenen, McAdam and Straub, 2008)

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  - simplification of calibrated version of the NAWM with richer fiscal sector (Coenen, McAdam and Straub, 2008)
- Extend baseline NAWM to allow for an enhanced role of fiscal policy:
  - *theoretical extensions:* rule-of-thumb households, valuable government consumption, public capital, complementarities, fiscal rules, ...
  - *empirical extension:* measurement of, in total, 8 fiscal time series

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- Quantify the contribution of discretionary fiscal policy to euro area real GDP growth using the estimated model:
  - *ex-ante* evaluation of the effects of the EERP (assuming that it was implemented in line with its initial enactment)
  - *ex-post* evaluation on the basis of a growth accounting exercise decomposing the dynamics of real GDP growth into the contributions of fiscal and non-fiscal shocks

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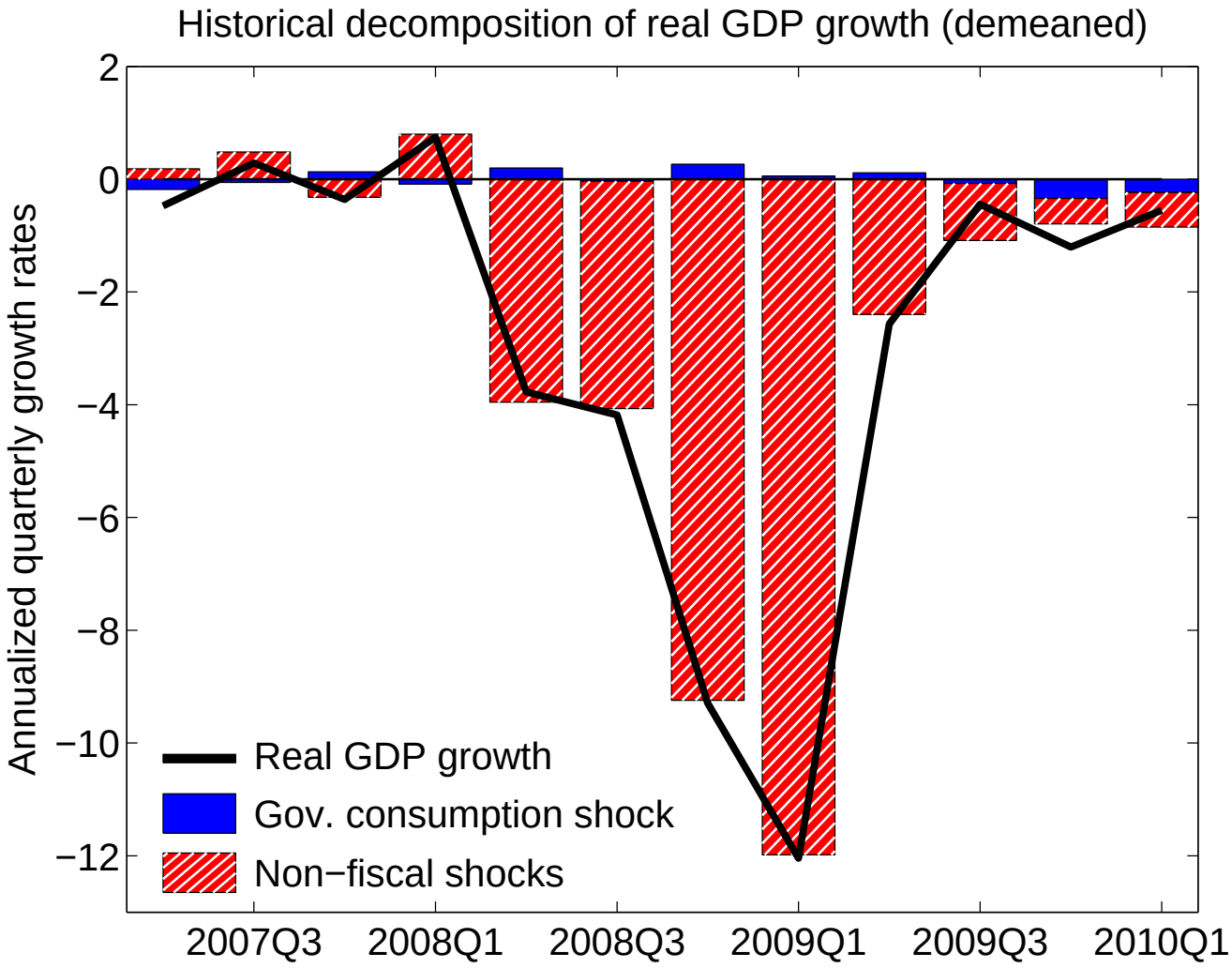
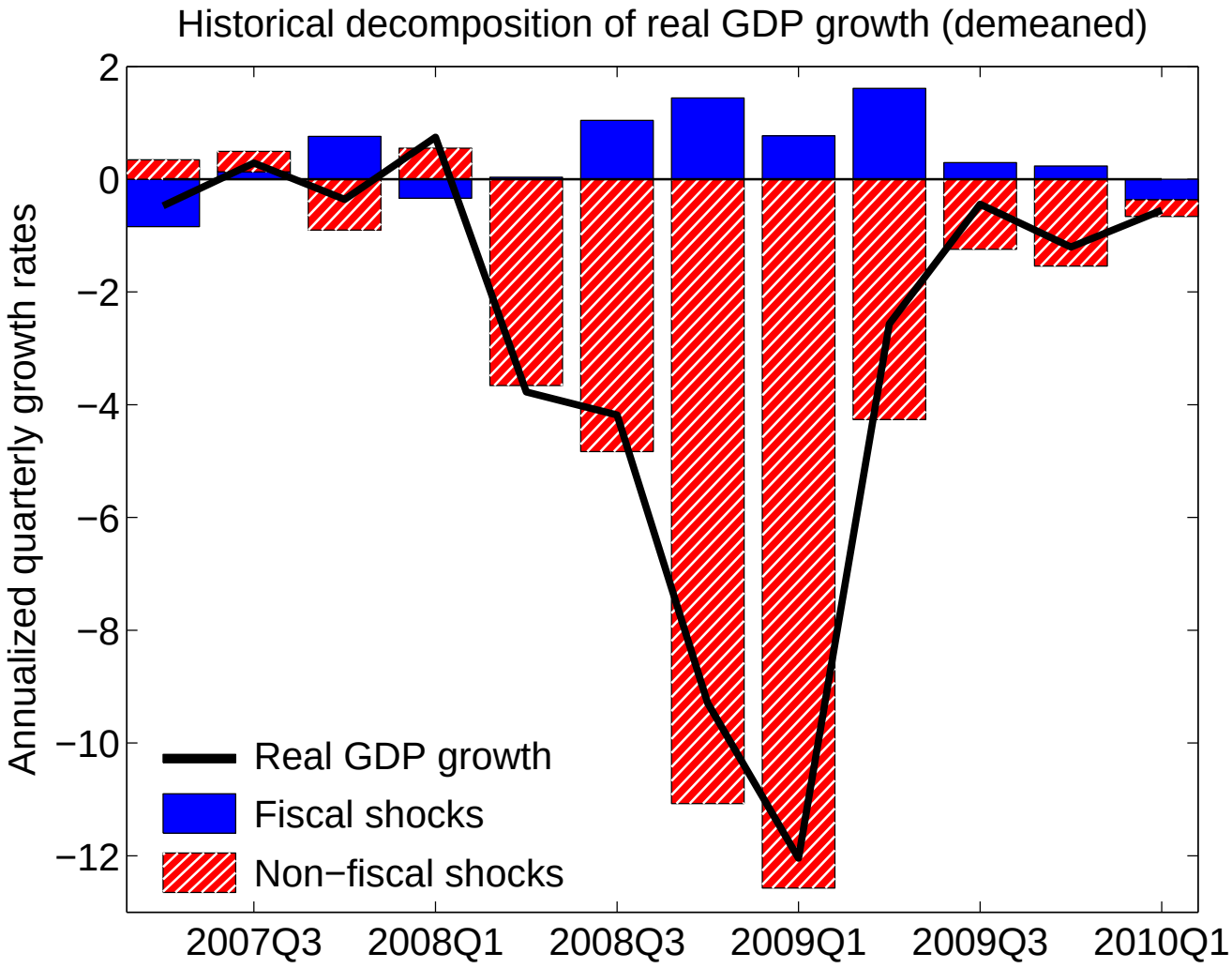
- Aim to reconcile the ex-ante and ex-post perspectives.

Preview: Baseline NAWM



Preview: NAWM + extended fiscal sector



Outline

The New Area-Wide Model (NAWM)

- The NAWM is an open-economy extension of the Smets and Wouters (2003, 2007) model, designed for forecasting and policy analysis:
  - four types of agents:
    - optimising households and (intermediate and final-good) firms
    - monetary authority and fiscal authority (Ricardian equivalence)
  - real and nominal rigidities: habit formation, adjustment costs, sticky prices and wages, ...
  - financial frictions: domestic and external risk premia
  - Rest-of-the-World block (SVAR)
- Estimated on 18 euro area time series, with government consumption being only fiscal observable

Rule-of-thumb households

- Share ω of non-Ricardian households:
  - rule-of-thumb consumption:

$$(1+\tau_t^C)\,P_{C,t}\,C_{j,t} \quad = \quad (1-\tau_t^N-\tau_t^{W_h})\,W_{j,t}\,N_{j,t}+TR_{j,t}$$

  - wage and labour supply identical across Ricardian and non-Ricardian households
- Aggregate consumption of Ricardian and non-Ricardian households:

$$C_t \quad = \quad (1-\omega)\,C_{i,t}+\omega\,C_{j,t}$$

- Galí, López-Salido and Vallés (2007), Coenen and Straub (2005), and Coenen, McAdam and Straub (2008)

Valued government consumption

- Households' utility function:

$$\mathsf{E}_t\left[\sum_{k=0}^{\infty}\beta^k\left(\ln\left(\tilde{C}_{h,t+k}-\kappa\,\tilde{C}_{t+k-1}\right)-\frac{1}{1+\zeta}\left(N_{h,t+k}\right)^{1+\zeta}\right)\right]$$

- Composite consumption good (CES aggregate):

$$\tilde{C}_{h,t} = \left(\alpha_G^{\frac{1}{\upsilon_G}}\,C_{h,t}^{\frac{\upsilon_G-1}{\upsilon_G}}+(1-\alpha_G)^{\frac{1}{\upsilon_G}}\,G_t^{\frac{\upsilon_G-1}{\upsilon_G}}\right)^{\frac{\upsilon_G}{\upsilon_G-1}}$$

- Private consumption response after government consumption shock depends on degree of complementarity.
- Leeper, Walker, and Yang (2009a).

Productive public capital

- Public capital stock for intermediate-good production:

$$Y_{f,t} = \varepsilon_t \left(\tilde{K}_{f,t}\right)^{\alpha} (z_t N_{f,t})^{1-\alpha} - z_t \psi$$

- Composite capital stock (CES aggregate):

$$\tilde{K}_{f,t} = \left(\alpha_K^{\frac{1}{\upsilon_K}} (K_{f,t})^{\frac{\upsilon_K - 1}{\upsilon_K}} + (1-\alpha_K)^{\frac{1}{\upsilon_K}} (K_{G,t})^{\frac{\upsilon_K - 1}{\upsilon_K}}\right)^{\frac{\upsilon_K}{\upsilon_K - 1}}$$

- Government maintains public capital stock and government investment is subject to time-to-build constraint.

- Leeper, Walker and Yang (2009a).

Fiscal feedback rules

- Feedback rules for fiscal instruments:
  - government consumption, investment and transfers
  - distortionary taxes on labour income, employers' and employees' social security contributions (SSC) and lump-sum taxes
- Example (in log-linearised form):

$$\hat{g}_t = \theta_G \hat{g}_{t-1} + \theta_{G,B} \hat{b}_t + \theta_{G,Y} \hat{y}_t + (1 - \psi_G) \hat{\eta}_t^G + \psi_G \hat{\eta}_{t-1}^G$$

  with a role for debt stabilisation ($\theta_{G,B}$), automatic stabilisation ($\theta_{G,Y}$) and possibly pre-announced discretionary policy (ψ_G, η_t^G)

- Leeper, Walker and Yang (2009b).

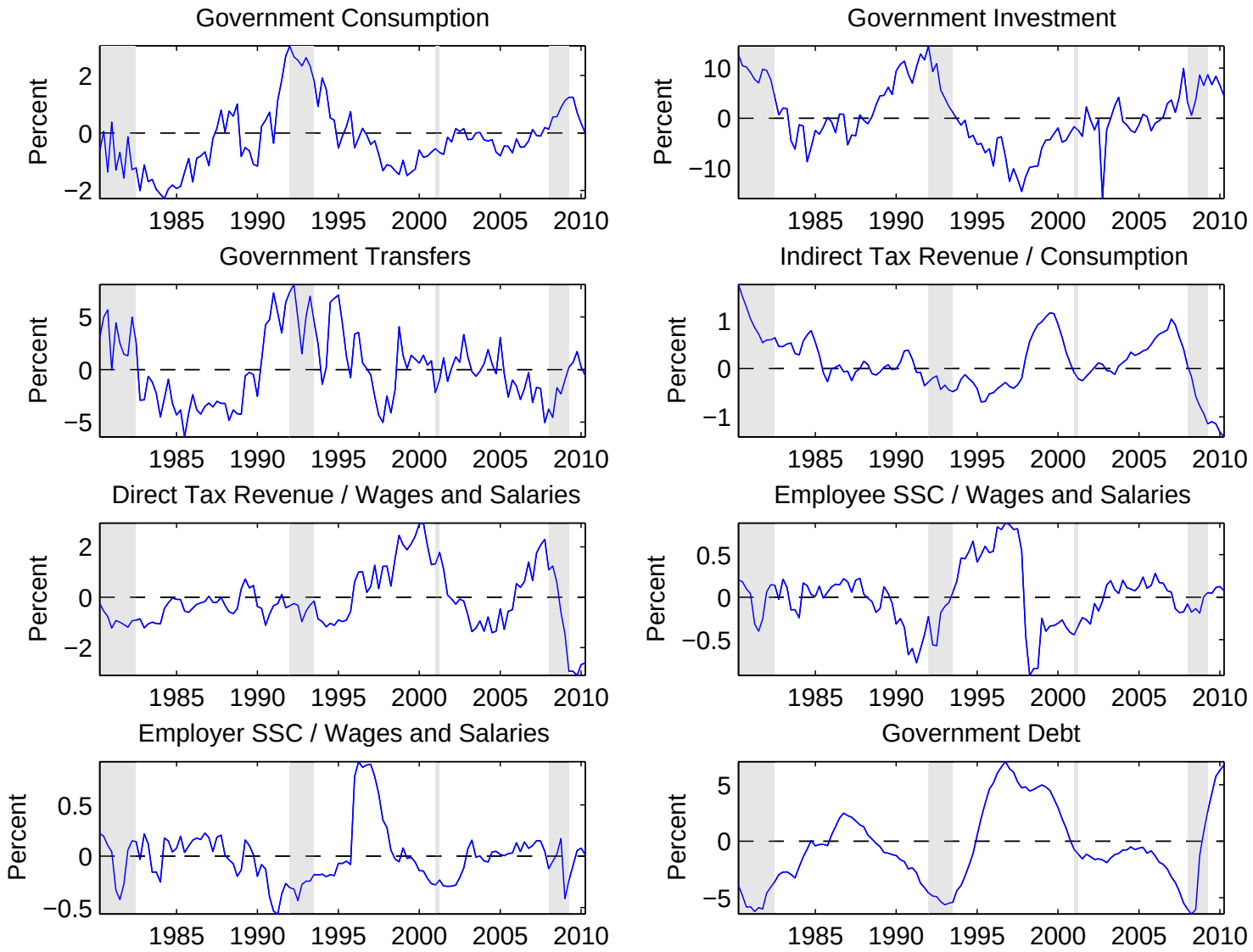
Outline

The data

- Macro data:
  - 17 euro area macro time series of baseline NAWM
  - Area-Wide Model database (Fagan et al., 2001)
- Fiscal data:
  - 8 euro area fiscal time series:
    - government consumption, investment, transfers (in real terms)
    - direct and indirect tax revenues (as a ratio to wage income/ consumption spending)
    - employees' and employers' SSC (as a ratio to wage income)
    - government debt (in real terms)

    with (broken) linear or HP-trends removed
  - newly available quarterly fiscal database (Paredes et al., 2009)

The data


Government Consumption
Percent
2
0
−2
1985 1990 1995 2000 2005 2010
Government Investment
Percent
10
0
−10
1985 1990 1995 2000 2005 2010
Government Transfers
Percent
5
0
−5
1985 1990 1995 2000 2005 2010
Indirect Tax Revenue / Consumption
Percent
1
0
−1
1985 1990 1995 2000 2005 2010
Direct Tax Revenue / Wages and Salaries
Percent
2
0
−2
1985 1990 1995 2000 2005 2010
Employee SSC / Wages and Salaries
Percent
0.5
0
−0.5
1985 1990 1995 2000 2005 2010
Employer SSC / Wages and Salaries
Percent
0.5
0
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1985 1990 1995 2000 2005 2010
Government Debt
Percent
5
0
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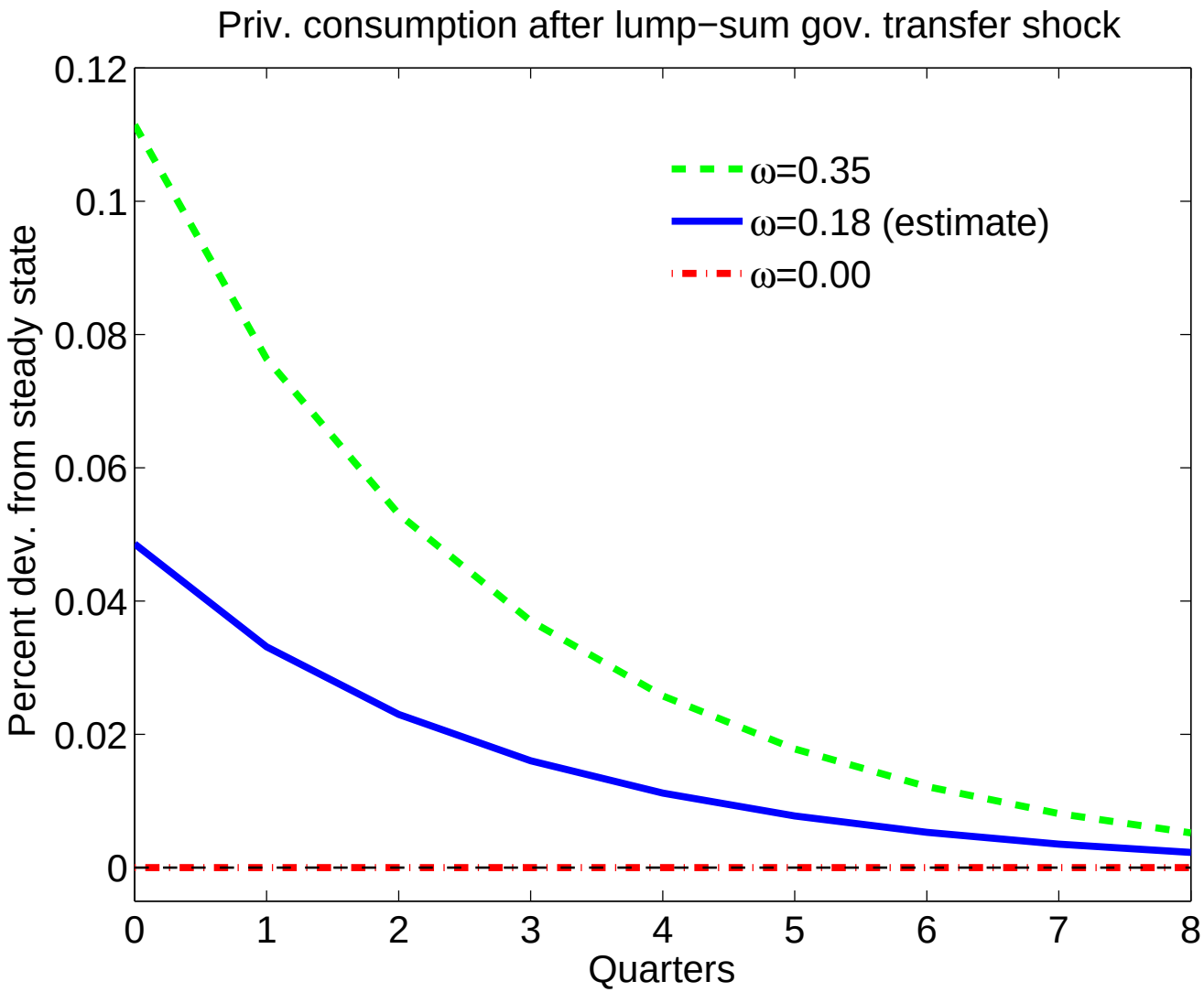
Selection of calibrated parameters

Parameter	Description	Value
A. CES aggregates		
α_G	Private consumption share	0.75
α_K	Private capital share	0.9
B. Fiscal policy		
τ^C	Consumption tax rate	22.3
τ^N	Labour income tax rate	11.6
τ^{W_h}	Employees' SSC rate	12.7
τ^{W_f}	Employers' SSC rate	13.2
τ^K	Capital income tax rate	35.0
B_Y	Government debt-to-output ratio	2.4

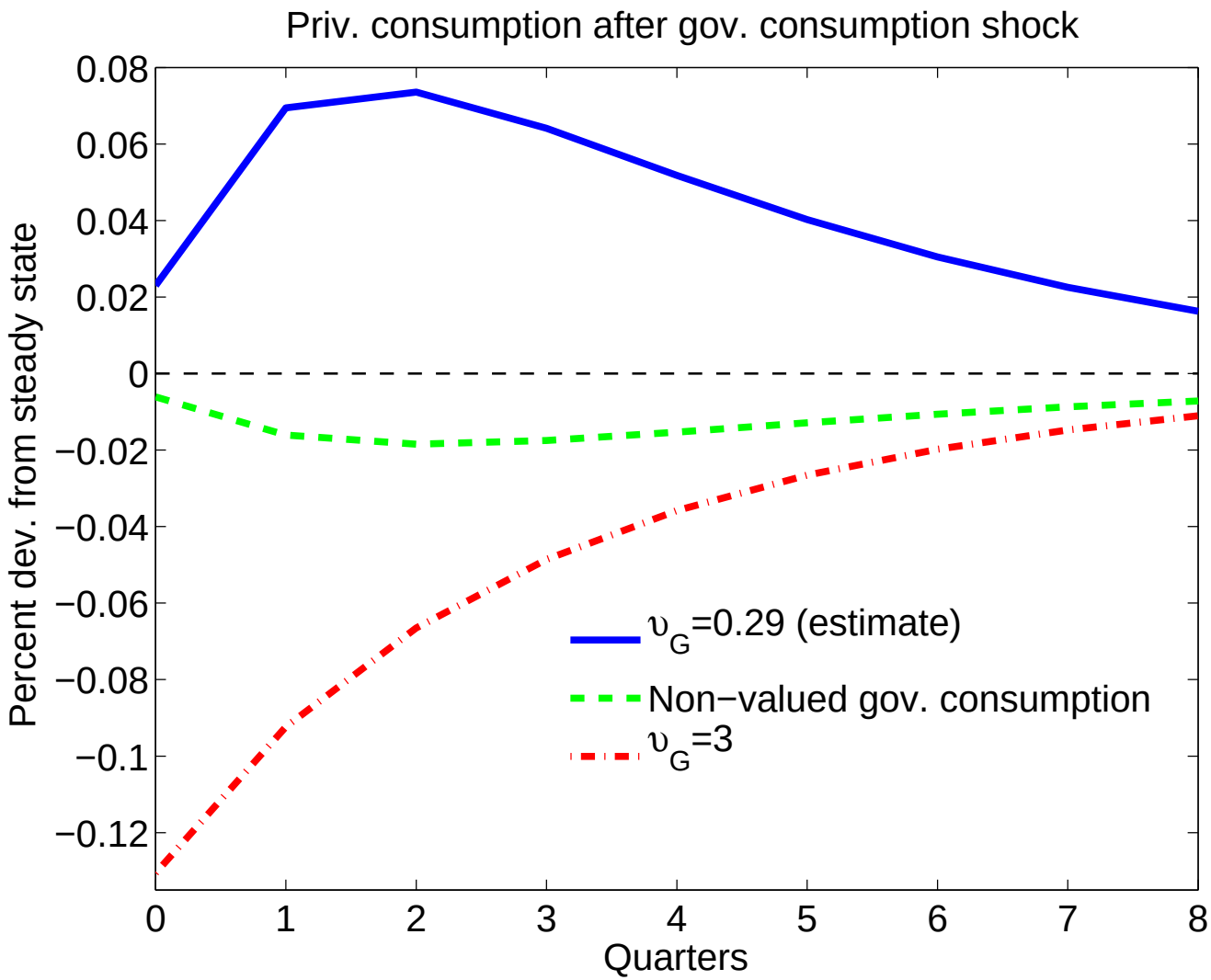
Selection of estimated parameters

Parameter	Prior distribution	Posterior distribution			
		mode	mean	5%	95%
A. Share of non-Ricardian households					
ω	B(0.5,0.1)	0.18	0.18	0.12	0.24
B. Elasticity of substitution in CES aggregates					
υ_G	$N^{tr}(1,0.5;0)$	0.29	0.37	0.00	0.61
υ_K	$N^{tr}(1,0.5;0)$	0.84	0.98	0.17	1.69
C. Output feedback coefficients in fiscal rules					
$\theta_{G,Y}$	N(0,2)	0.06	0.08	0.00	0.15
D. Debt feedback coefficients in fiscal rules					
$\theta_{G,B}$	N(0,2)	-0.02	-0.02	-0.06	0.02

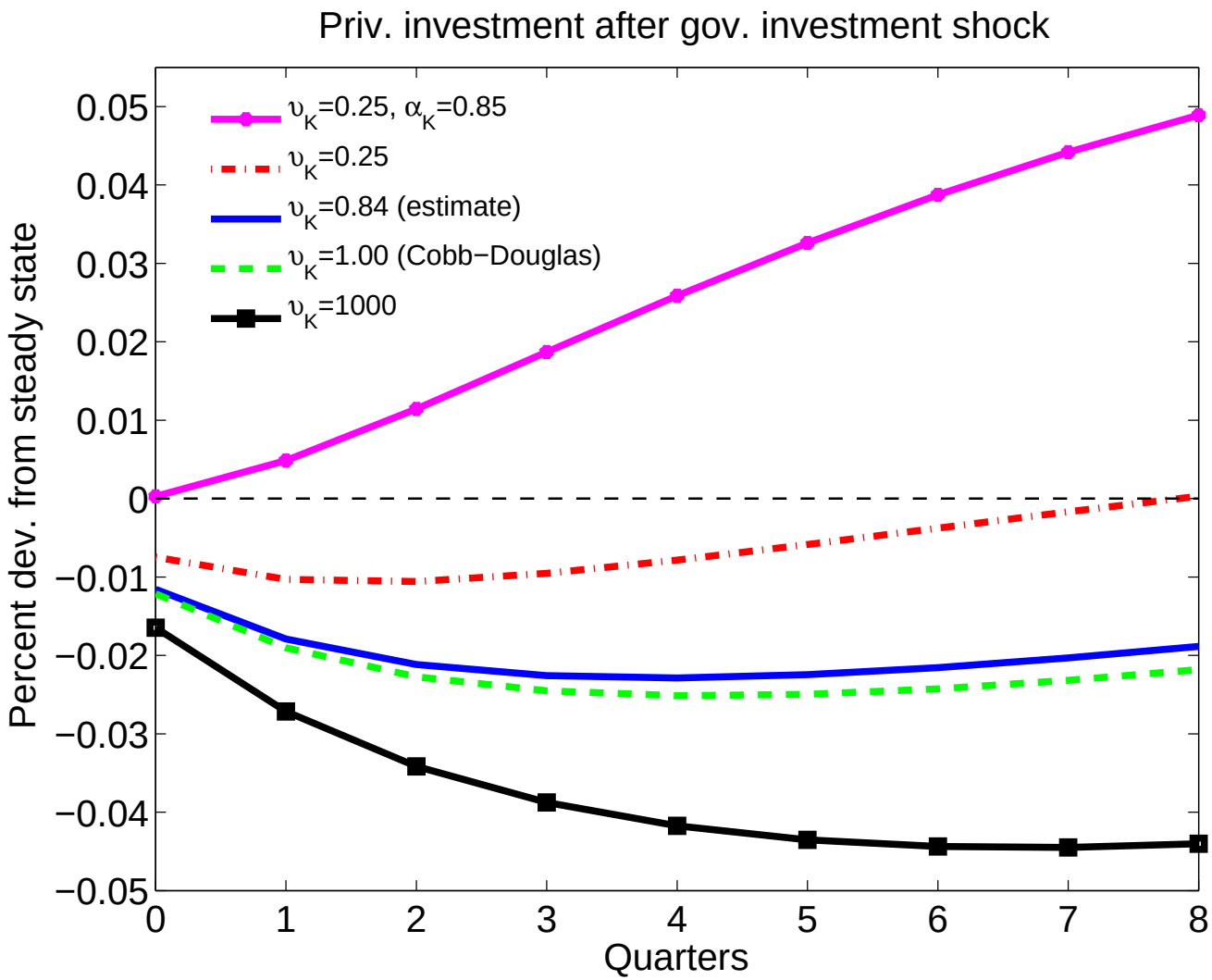
Rule-of-thumb households



Valued government consumption

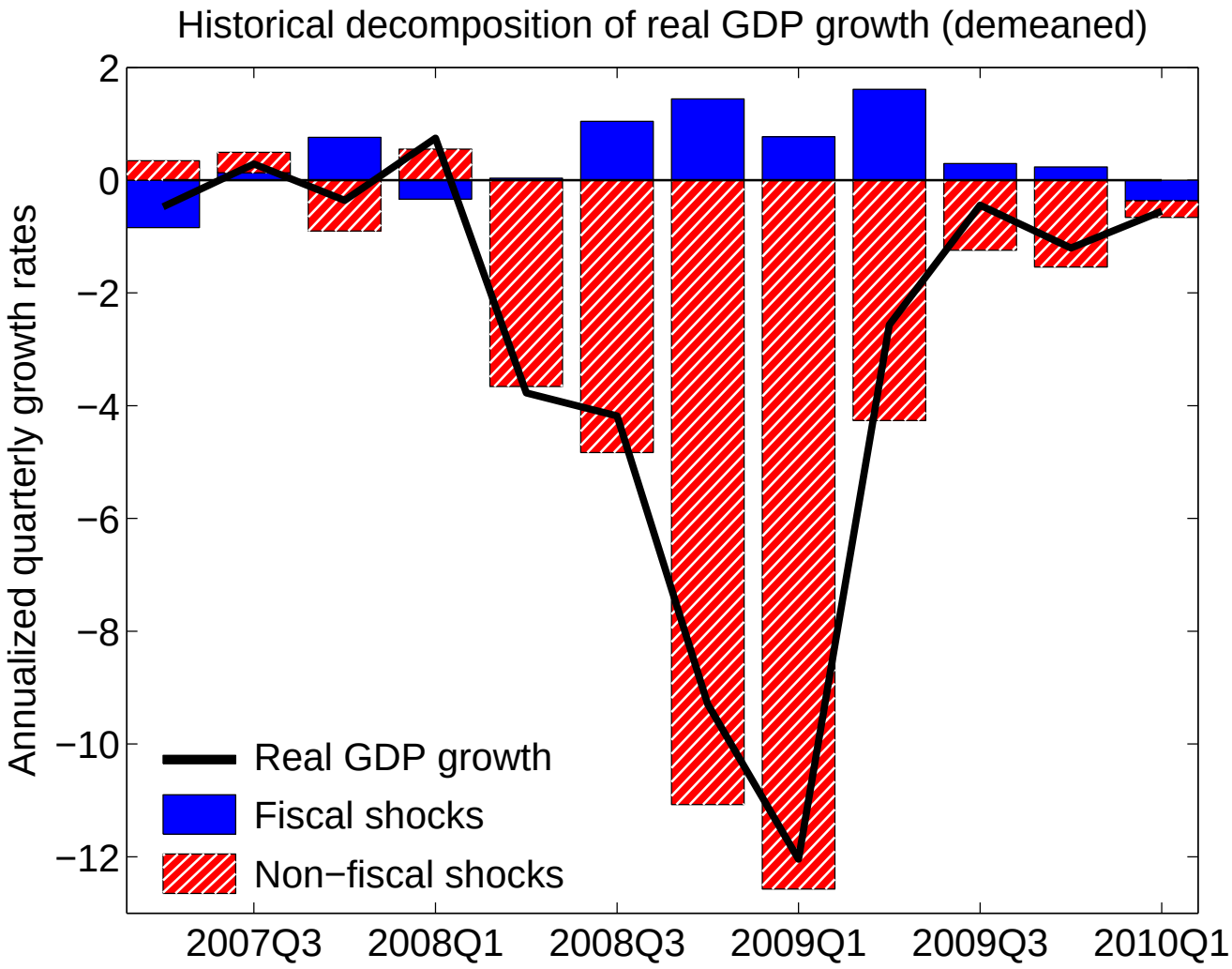


Productive public capital

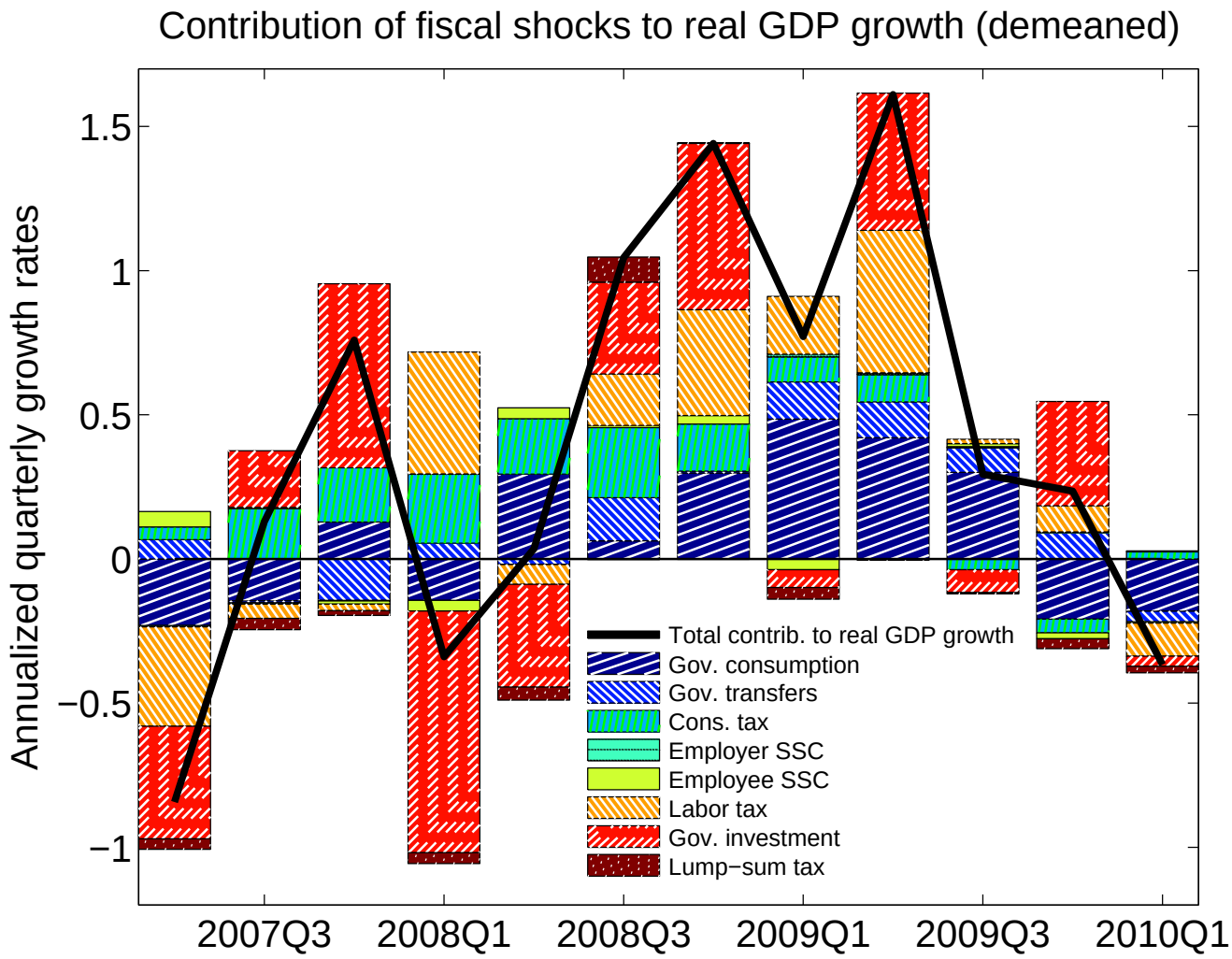


Outline

The overall contribution of fiscal shocks



The contributions of individual fiscal shocks



Present-value fiscal multipliers

- We compute present-value fiscal multipliers as in Uhlig (2010); e.g. for government consumption we obtain:

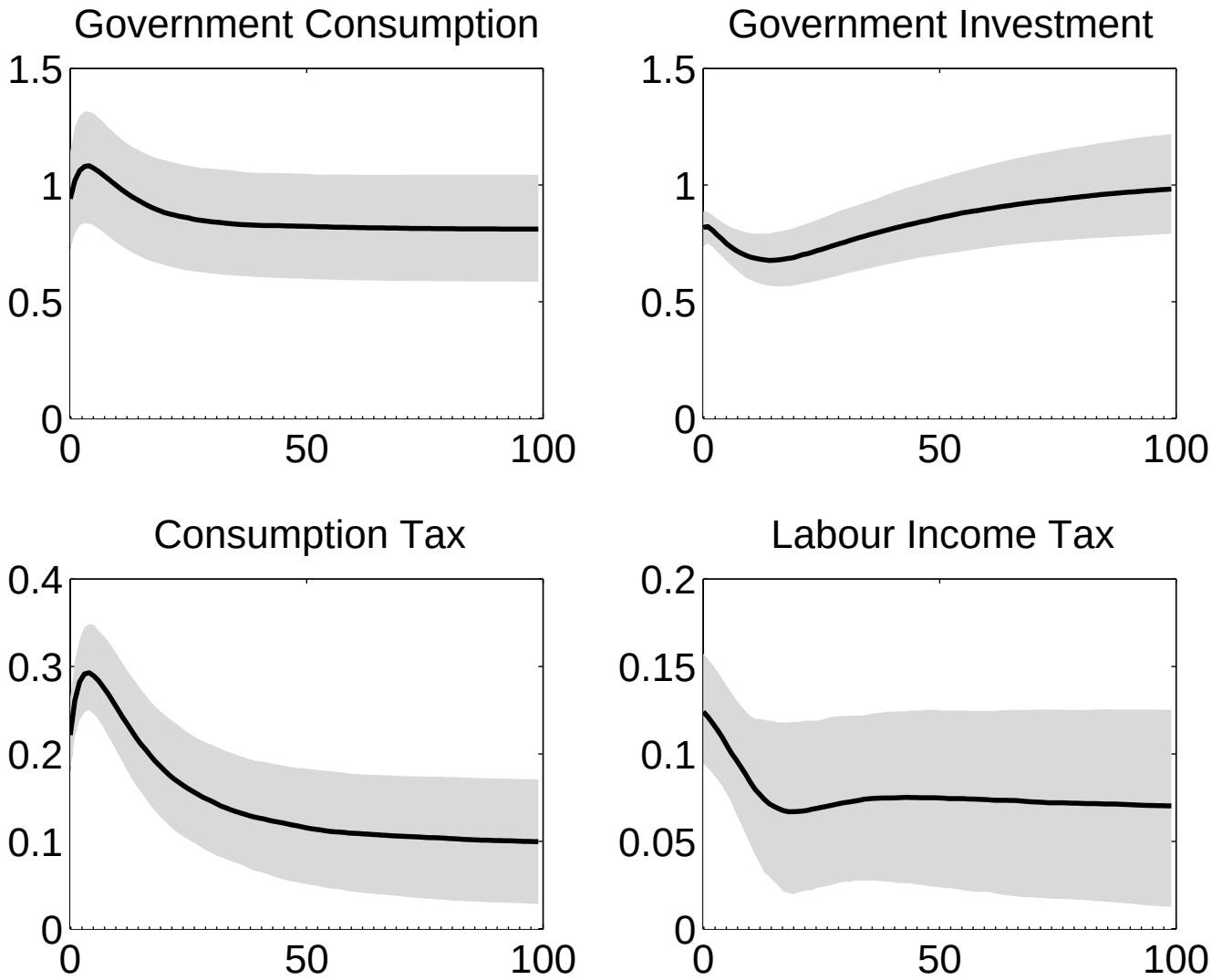
$$\mathcal{M}_t^{PV} = \left(\sum_{s=0}^{t}(1+rr)^{-s}(y_s - y)\right) \Big/ \left(\sum_{s=0}^{t}(1+rr)^{-s}(g_s - g)\right)$$

- We compute two types of multipliers:
  1. multipliers based on estimated impulse-response functions
  2. multipliers based on standardised fiscal stimuli:
     - 2-year fiscal stimulus of 1% of GDP
     - nominal interest rate fixed for 2 years, standard Taylor rule thereafter
     - no fiscal feedback, except for lump-sum taxes after 2 years
     - no pre-announcement

Fiscal multipliers based on estimated impulse responses

	Quarters				Long run
	1	4	8	16	
Gov. consumption, G	1.02	1.15	1.11	0.98	0.84
Gov. investment, I_G	0.95	0.85	0.77	0.74	1.13
Gov. transfers, TR	0.06	0.05	0.04	0.04	0.03
Consumption taxes, τ^C	0.25	0.28	0.26	0.21	0.13
Labour income taxes, τ^N	0.11	0.09	0.08	0.08	0.10
SSC: employees, τ^{W_h}	0.12	0.10	0.09	0.09	0.10
SSC: employers, τ^{W_f}	-0.01	0.00	0.03	0.07	0.07

Fiscal multipliers: The role of parameter uncertainty



Fiscal multipliers based on standardised fiscal stimuli

	Quarters				Long run
	1	4	8	16	
Gov. consumption, G	1.26	1.55	1.62	1.67	1.63
Gov. investment, I_G	1.08	1.08	1.08	1.13	1.55
Gov. transfers, TR	0.06	0.07	0.06	0.06	0.06
Consumption taxes, τ^C	0.36	0.46	0.48	0.48	0.48
Labour income taxes, τ^N	0.13	0.12	0.12	0.15	0.15
SSC: employees, τ^{W_h}	0.13	0.12	0.13	0.04	0.15
SSC: employers, τ^{W_f}	-0.04	-0.04	-0.00	0.05	0.04

Evaluating the EERP

- The stimulus measures foreseen in the European Economic Recovery Plan (EERP) amount to around 2% of euro area GDP over the period 2009-10 (cf. European Commission, 2010).
- We compute present-value multipliers and output effects:
  - EERP stimulus measures allocated to 6 fiscal variables
  - nominal interest rate fixed for 2 years, standard Taylor rule thereafter
  - no fiscal feedback, except for lump-sum taxes after 2 years
  - no pre-announcement

Composition of the EERP

Stimulus measures	2009	2010	Fiscal instruments
Measures aimed at households	0.4	0.3	τ^C, τ^N, τ^{W_h}, TR
Measures aimed at businesses	0.2	0.2	τ^{W_f}
Increased public investment	0.3	0.2	I_G
Increased spending on labour mkt	0.1	0.1	G
Total	1.1	0.8	

Note: Stimulus measures are expressed as a percentage of GDP.

EERP fiscal multiplier, output effects and sensitivity

	2009Q1	2009Q4	2010Q4	2012Q4	Long run
A. Baseline results: Impact of EERP					
Fiscal multiplier	0.52	0.57	0.59	0.61	0.73
Output effects in % of GDP	0.55	0.59	0.49	0.02	0.00
B. Sensitivity of EERP multiplier wrt. model specification					
υ_G=1, α_G=1	0.50	0.53	0.54	0.57	0.68
$\alpha_K = 0.85$, υ_K=0.25	0.50	0.55	0.59	0.70	1.36
$\omega = 0.5$	0.66	0.70	0.72	0.74	0.85
Prices/wages less rigid	1.07	1.27	1.16	1.17	1.55

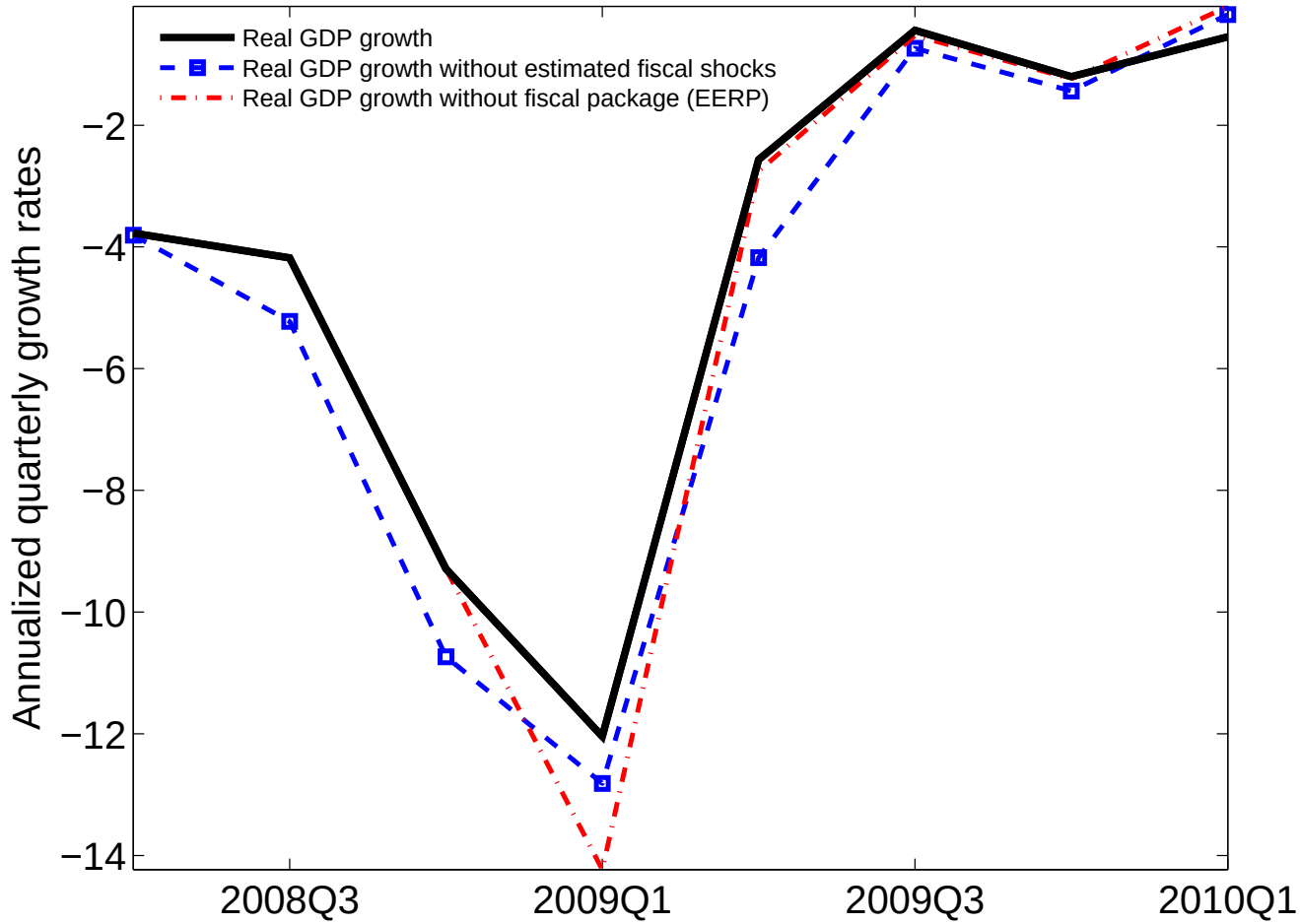
EERP fiscal multiplier, output effects and sensitivity (cont'd)

	2009Q1	2009Q4	2010Q4	2012Q4	Long run
C. Sensitivity of EERP multiplier wrt. implementation					
No monetary accommodation	0.42	0.43	0.44	0.44	0.55
Est. interest rate rule	0.60	0.71	0.78	0.96	1.16
Est. fiscal feedback rules	0.53	0.58	0.61	0.72	1.07
AR(1) for fiscal variables $\rightarrow 1$	0.29	0.23	0.23	0.36	0.73
Full package allocated to G	1.26	1.55	1.62	1.67	1.63
Package delayed by one year	–	–	0.33	0.39	0.49

Evaluation of EERP based on Cwik and Wieland (2011)

	2009				2010	2011-12
	Q1	Q2	Q3	Q4		
A. Input: Cwik and Wieland gov. spending fiscal stimulus						
G in % of GDP	0.24	0.48	0.60	0.60	0.20	0.00
B. Output effects (% dev. from ss): no monetary accommodation						
Cwik and Wieland	0.20	0.40	0.50	0.49	0.10	-0.04
This paper	0.18	0.49	0.71	0.79	0.28	-0.03
This paper, $\alpha_G = 1$	0.18	0.39	0.51	0.51	0.13	-0.02
C. Output effects (% dev. from ss): 2 years of monetary accommodation						
Cwik and Wieland	0.31	0.57	0.69	0.68	0.26	0.00
This paper	0.31	0.68	0.93	1.00	0.41	0.01
This paper, $\alpha_G = 1$	0.26	0.52	0.65	0.65	0.22	-0.01

Effects of discretionary fiscal shocks versus EERP



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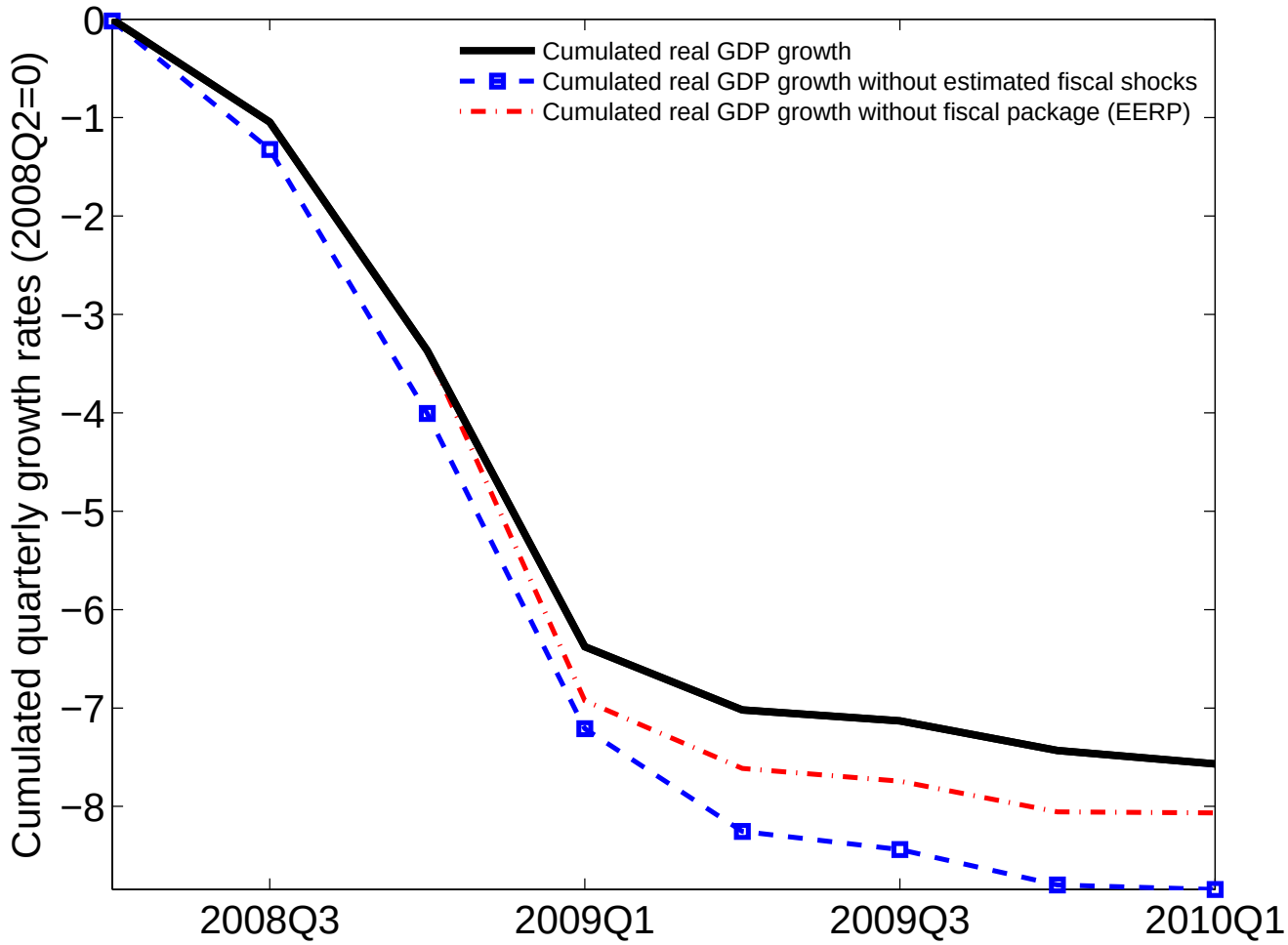


Outline

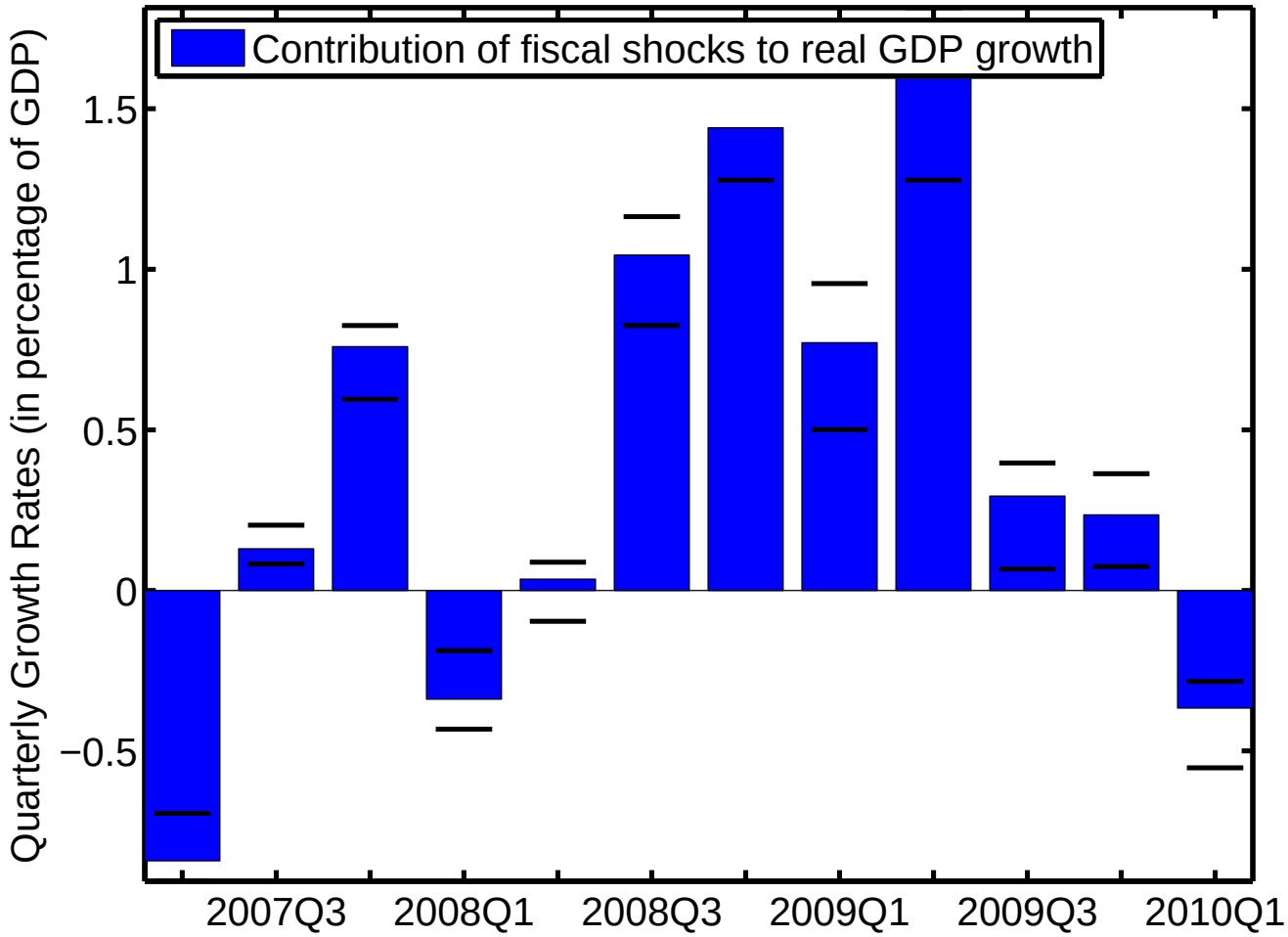
Summary

- The Great Recession triggered a large-scale fiscal policy response in the euro area.
- **Question:** How much did discretionary fiscal policy contribute to euro area real GDP growth?
- **Our answer:**
  - The EERP—if implemented as enacted—had a sizeable, albeit short-lived impact on GDP, with a multiplier below unity.
  - Historical decompositions point to the presence of stronger fiscal support, namely by up to 1.6 pp of annualised quarterly GDP growth.
- Important factors in our analysis are the detailed modelling of the fiscal sector and the incorporation of (lots of) fiscal data.

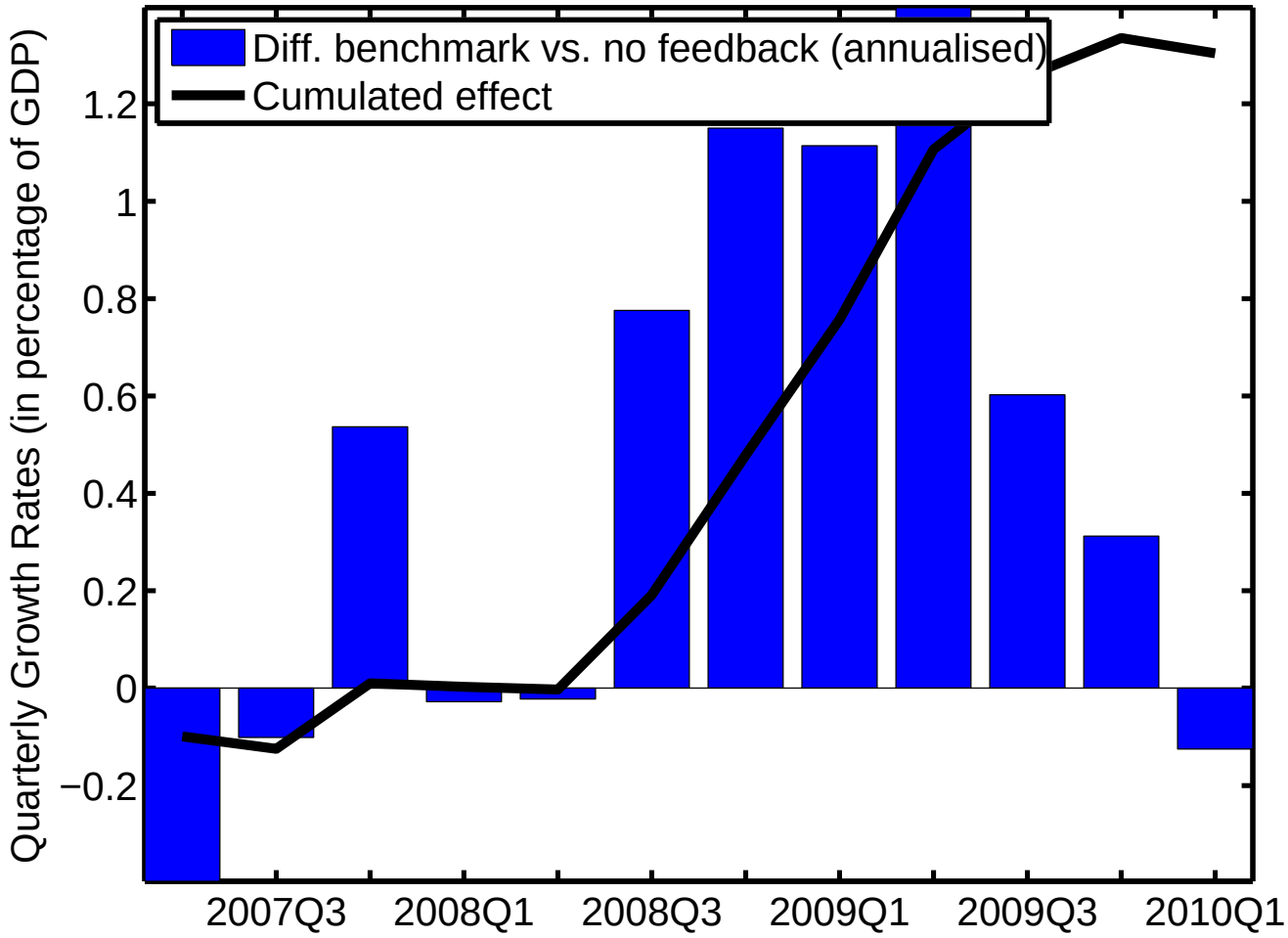
Looking forward

- The financial crisis and the ensuing Great Recession have led—partly as a consequence of the enacted fiscal stimulus measures—to a severe deterioration of public finances.
- Future research ought to be extended towards examining the effects of fiscal consolidation strategies aimed at curtailing government deficits and debt levels.
- Accounting for the endogenous nature of government bond premia will be a fundamental challenge.

Historical decomposition: The role of parameter uncertainty



Historical decomposition: The role of fiscal rules



Nominal interest rate and ZLB