CESifo Economic Studies Conference

What's wrong with modern macroeconomics?

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A macroeconomic agenda:
Compare competing paradigms and identify robust policy recommendations

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Competing paradigms?

Recently, I read the following in a German newspaper article:

„Already in 1992 leading economists – among them Nobel prize winners Paul Samuelson and Franco Modigliani – warned of the danger of an ‚***intellectual monopoly***´ in economics and demanded a `***pluralistic spirit in economic science that respects different approaches and encourages critical and tolerant dialogue***´.

Source: American Economic Review. (Not confirmed yet).

There exists an established model comparison approach in macro …

Examples:

- Brookings Institution, 1988, 1989, 1993
  - ➔ Bryant, Currie, Frenkel, Masson, Portes, (eds.) (1989), Bryant, Hooper, Mann (eds) (1993)
- NBER:
  Taylor (ed.) (1999)

Note! Comparisons involved several reseacher teams, each team working with its own model.

Identify robust policy recommendations …

- Taylor (1993) credits the 1993 comparison as the crucial testing ground for the Taylor rule. (not an estimated rule / normative).

$$i_t = 2 + \pi_t + 0.5(\pi_t - \pi) + 0.5 y_t$$

- ***Modeling paradigms*** considered in these comparisons:
  Different Keynesian-style macroeconometric models (nominal rigidities) with rational or adaptive expectations.

Proposal: New comparative approach

- Given renewed wide disagreement about appropriate models for monetary, fiscal and financial stabilization policies,

  a **comparative rather than insular approach** would help improve model building and policy analysis.

  ➔ Example: „A New Comparative Approach to Macroeconomic Modelling and Policy Analysis“, Wieland, Cwik, Mueller, Wolters Schmidt, 2009.

A new comparative approach …

➔ Formal exposition of approach (comparability)

➔ Computational implementation

➔ Model archive (U.S., Euro, multi-country models).

➔ Platform makes a wide range of models available for individual researchers to compare and include their own model easily.

(Innovation over earlier NBER, Brookings comparisons).

Which modeling paradigms should be considered and compared today?

- My focus: Models usable as testing grounds for monetary and fiscal stabilization policies.

- Exclusion criteria?

  ➔ Proposal: Compare models that have been estimated to fit the dynamics of key macroeconomic time series.

  Output, inflation and interest rates at a minimum.

Competing modeling paradigms

- Which modeling paradigms should be considered and compared today?
  - ➔New-Keynesian DSGE models with explicit micro-foundations (representative agent, rational expectations)
  - ➔Real-business-cycle models
  - ➔Earlier generation of New-Keynesian macro models, i.e. nominal rigidities and rational expectations (less stringent micro-foundations)
  - ➔More traditional Keynesian-style models with adaptive expectations (used by many business economists)

What other new paradigms could be brought into the comparison?

- Models with learning market participants
  - Available for the case of homogenous expectations: Evans & Honkapohja, Orphanides & Williams, Gaspar, Vestin & Smets, Milani, Slobodyan & Wouters.
- Additional novel approaches with potential relevance for the financial crisis experience.
  - Models in which market participants have heterogenous beliefs and/or exhibit different behavioral responses.

Heterogenous beliefs

- Rational and diverse beliefs (Mordecai Kurz and collaborators). (criteria: fit to sample moments).
- Boundedly rational market participants with diverse prediction rules, evolutionary selection of such rules. (Brock, Hommes and collaborators, De Grauwe).
- Agent-based macroeconomics.
- Behavioral macroeconomics.

A formal approach to model comparison

- Consider a particular model $m \in M$
- Model output is usually not directly comparable
  - Different variables
  - Different structural assumptions
  - Different notation and definitions
- Therefore it is necessary to augment models with a set of common, comparable variables, parameters, equations and shocks.

Notation

Table: Model-Specific Variables, Parameters, Shocks and Equations

Notation	Description
x_t^m	endogenous variables in model *m*
$x_t^{m,g}$	policy variables in model *m* (also incl. in x_t^m)
η_t^m	policy shocks in model *m*
ϵ_t^m	other economic shocks in model *m*
$g_m(.)$	policy rules in model *m*
$f_m(.)$	other model equations in model *m*
γ^m	policy rule parameters in model *m*
β^m	other economic parameters in model *m*
Σ^m	covariance matrix of shocks in model *m*

A general nonlinear model

Define a particular model m as follows:

$$E_t[g_m(x_t^m, x_{t+1}^m, x_{t-1}^m, \eta_t^m, \gamma^m)] = 0 \quad (1)$$

$$E_t[f_m(x_t^m, x_{t+1}^m, x_{t-1}^m, \epsilon_t^m, \beta^m)] = 0, \quad (2)$$

where

$$E([(\eta_t^m)'(\epsilon_t^m)']') = 0 \quad (3)$$

$$E([(\eta_t^m)'(\epsilon_t^m)']'[(\eta_t^m)'(\epsilon_t^m)']) = \Sigma^m = \begin{pmatrix} \Sigma_\eta^m & \Sigma_{\eta\epsilon}^m \\ \Sigma_{\eta\epsilon}^m & \Sigma_\epsilon^m \end{pmatrix} \quad (4)$$

Augment with …

Table: Comparable Common Variables, Parameters, Shocks and Equations

Notation	Description
z_t	common variables in all models
z_t^g	common policy variables in all models (also incl. in z_t)
η_t	common policy shocks in all models
$g(.)$	common policy rules
γ	common policy rule parameters

The augmented model

The augmented model consists of three components:

- The common policy rules $g(.)$ expressed in terms of common variables z_t, policy shocks η_t and policy rule parameters γ.
- A set of new model-specific equations that define the common variables in terms of original model-specific endogenous variables, $h_m(.)$ with parameters θ^m.
- The original set of model equations $f_m(.)$ determining endogenous variables, excluding the model-specific policy rule $g_m(.)$.

$$E_t[g(z_t, z_{t+1}, z_{t-1}, \eta_t, \gamma)] = 0 \quad (5)$$

$$E_t[h_m(z_t, x_t^m, x_{t+1}^m, x_{t-1}^m, \theta^m)] = 0 \quad (6)$$

$$E_t[f_m(x_t^m, x_{t+1}^m, x_{t-1}^m, \epsilon_t^m, \beta^m)] = 0 \quad (7)$$

Model solution

General model solution:

$$z_t = k_z(z_{t-1}, x_{t-1}^m, \eta_t, \epsilon_t^m, \kappa_z) \quad (8)$$

$$x_t^m = k_x(z_{t-1}, x_{t-1}^m, \eta_t, \epsilon_t^m, \kappa_x) \quad (9)$$

where (κ_z, κ_x) denote the reduced-form parameters that are in turn complex functions of the structural parameters, β^m, the policy parameters, γ, and the covariance matrix Σ^m.

Steps

- Approximate and solve.
- Construct measures of interest (volatilities, persistence, ..)
- Evaluate performance under different policy measures or rules.
- Apply criteria for choosing a policy under model uncertainty. (robustness).

Application: Euro area fiscal stimulus, Cwik and Wieland (2009)

- 2008/9: EERP
  - ➔The European Economic Recovery Plan
  - ➔National plans: for example, in Germany, Konjunkturpaket 1 und 2
- Investigate magnitude of government spending increases and tax reductions for 2009 and 2010.
- Use multiple models to assess impact of government spending on euro area GDP

How big is the Euro area stimulus?

Total Package in %GDP: 2009: **1.01** 2010: **0.85**
Expenditures in %GDP: 2010: **0.58** 2010: **0.22**

German stimulus 50 % of EU 11
German gov. expenditures: 43% of EU 11
German package %GDP: 3.37% **(09: 1.44% 10: 1.93%)**

EU 11 Stimuli

	Total fiscal packag (bln Euro)	
country	*2009*	*2010*
Austria	4.9	4.6
Belgium	1.3	1.2
Germany	35.9	48.4
Greece	0	0
Spain	26.8	14.7
Finland	2.4	2.4
France	17	4
Ireland	0	0
Italy	-0.3	-0.8
Netherlands	3.1	2.9
Portugal	1	0.3
EU-11	92	77.6

EU 11 Stimuli

country	Expenditures (bln Euro) 2009	2010
Austria	1.4	1
Belgium	0.9	0.8
Germany	18	13.6
Greece	0	0
Spain	12.1	0
Finland	0.4	0.4
France	16.3	4
Ireland	0	0
Italy	3.1	0.2
Netherlands	0.2	0
Portugal	0.9	0.3
EU-11	53.2	20.4

Table 1: Overview of the fiscal stimulus packages in the euro area

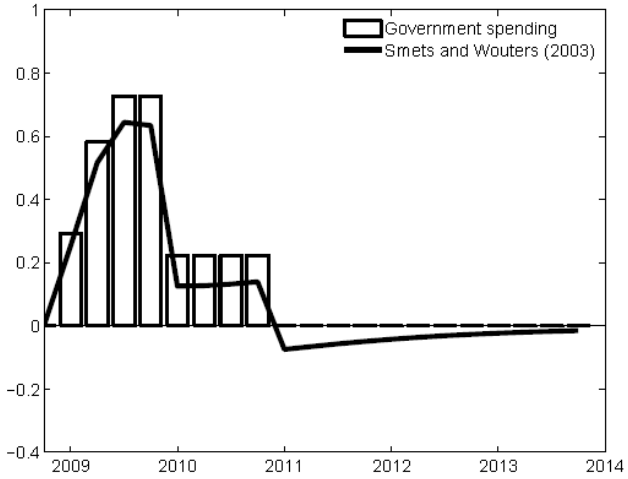
country	Total fiscal package (bln Euro) 2009	2010	Expenditures (bln Euro) 2009	2010	Total fiscal package (percent of GDP) 2009	2010	Expenditures (percent of GDP) 2009	2010
Austria	4.9	4.6	1.4	1	1.71	1.63	0.48	0.36
Belgium	1.3	1.2	0.9	0.8	0.36	0.33	0.27	0.24
Germany	35.9	48.4	18	13.6	1.44	1.93	0.72	0.54
Greece	0	0	0	0	0.00	0.00	0.00	0.00
Spain	26.8	14.7	12.1	0	2.44	1.34	1.10	0.00
Finland	2.4	2.4	0.4	0.4	1.25	1.25	0.23	0.23
France	17	4	16.3	4	0.87	0.2	0.83	0.2
Ireland	0	0	0	0	0.00	0.00	0.00	0.00
Italy	-0.3	-0.8	3.1	0.2	-0.02	-0.05	0.19	0.01
Netherlands	3.1	2.9	0.2	0	0.53	0.49	0.03	0.00
Portugal	1	0.3	0.9	0.3	0.6	0.18	0.54	0.18
EU-11	92	77.6	53.2	20.4	1.01	0.85	0.58	0.22

Source: Saha and von Weizsäcker (2009) "Estimating the size of the European stimulus packages for 2009 An Update" and the stability programs provided by the finance ministries for the European Commission.

What is the GDP effect of the stimulus?

- Focus on government spending which promises the largest multipier.
- Start with Smets and Wouters (2003).
  - ➔Well-known, estimated, state-of-the-art New Keynesian DSGE model.
  - ➔Price and wage rigidities and other frictions.
  - ➔But rational, forward-looking households.

GDP Effect of Euro Area Spending

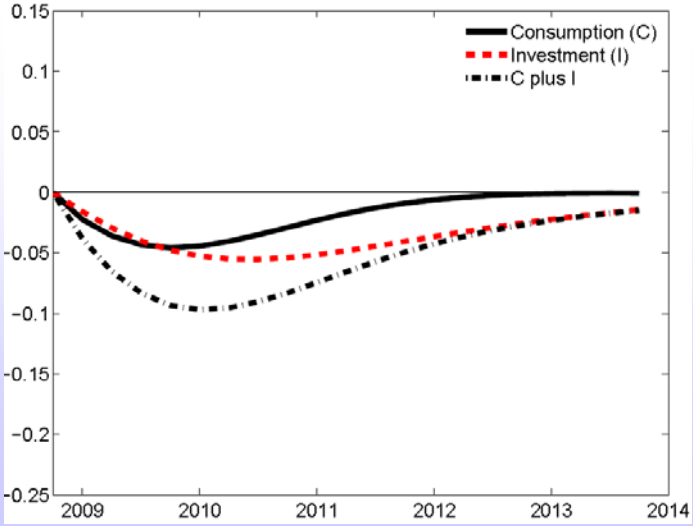


Notes: Quarterly annualized government spending is depicted by the bars in percent of GDP: 0.29085 in 2009Q1, 0.5817 in 2009Q2, 0.727125 in 2009Q3 and 2009Q4 and 0.2225 in 2010.

New-Keynesian DSGE Model

- The increase in GDP quickly produces a permanent contraction in private sector saving and consumption. Big reduction in investment.
- Households anticipate that government debt incurred needs to be paid off with interest by raising taxes in the future. (Smets and Wouters assume lump-sum/ non-distortionary taxes)

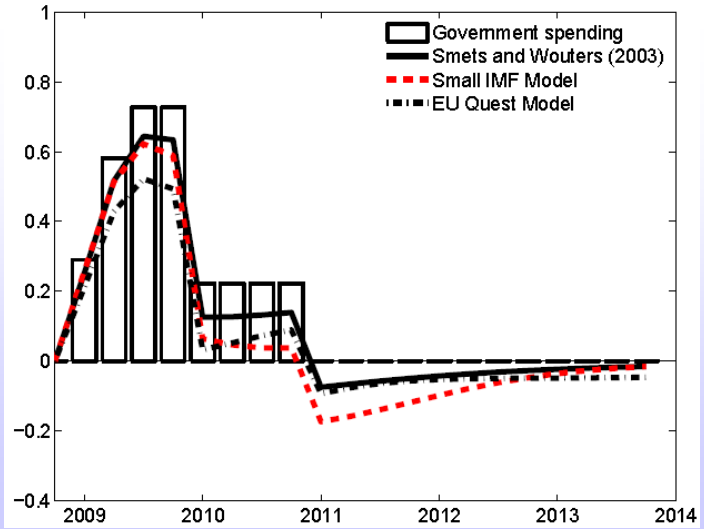
Consumption and Investment



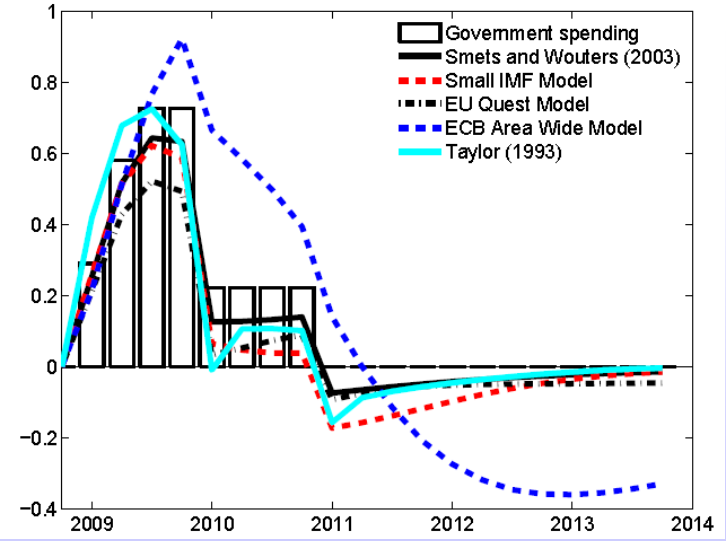
Model Uncertainty & Robustness

- New-Keynesian DSGE models:
  - Smets and Wouters 2003, (ECB), Euro Area
  - Laxton&Pesenti 2003 (IMF), Euro Area +Cz.Rep.
  - EU- Euro area model 2009 (EU-QUEST) (35% liquidity-constrained consumers)
- New-Keynesian
  - Taylor G-7 model, 1993
- Old-Keynesian
  - ECB Area Wide model, 2004

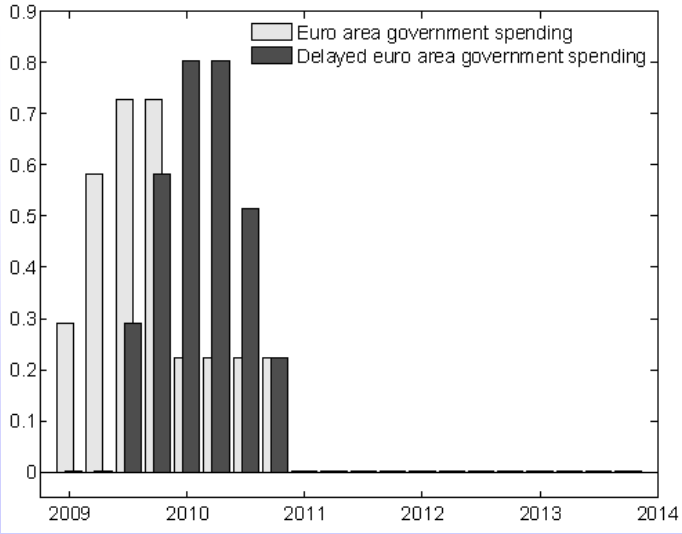
Models of IMF and EU Researchers



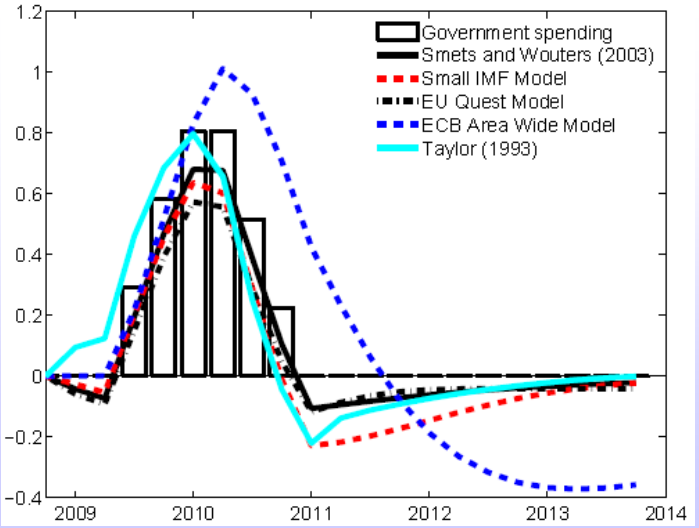
Taylor and ECB-AWM Models



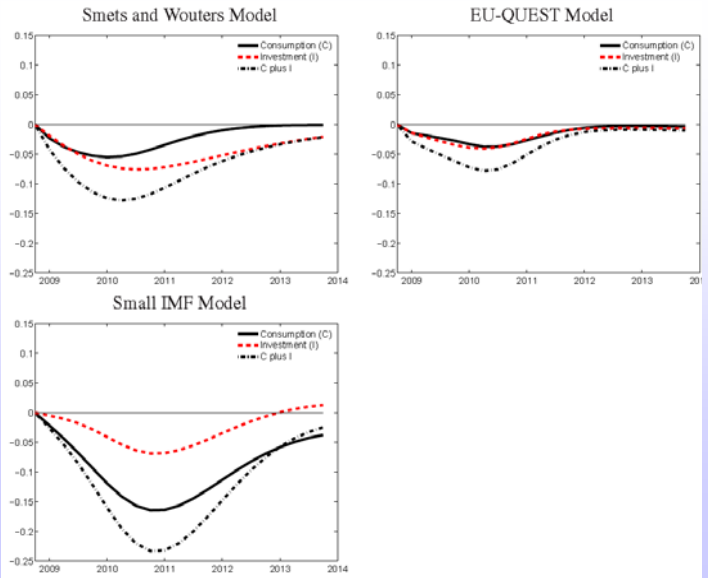
Consider Implementation Lag



GDP Effect with Implementation Lag

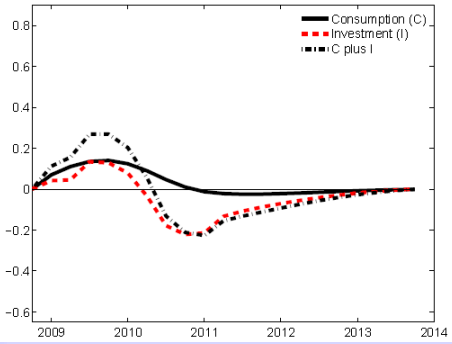


Consumption and Investment

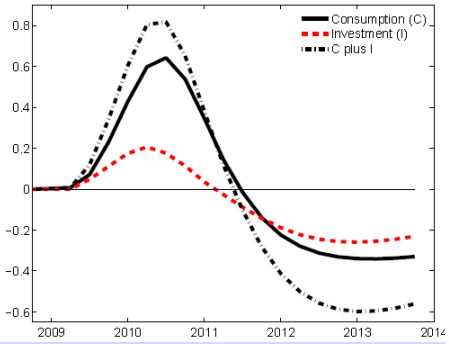


Consumption and Investment

Taylor (1993)



ECB Area Wide Model



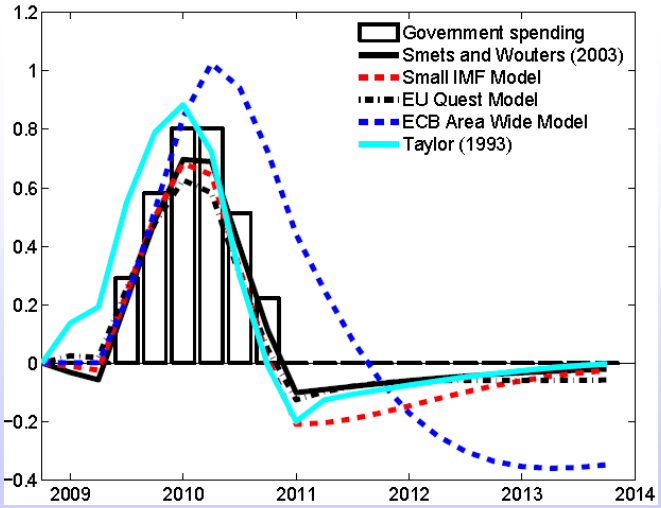
How are interest rates set?

- Gerdesmeier-Roffia, Kuester-Wieland

$$r_t = 0.66 r_{t-1} + 0.66 \pi_t + 0.10 y_t$$

- Consider 1 year of monetary accommodation (constant rate) then return to prescription of the rule.
- Motivation: we are near the zero bound, the central bank may want to set lower rates, therefore it will not increase rates immediately as the stimulus kicks in.

Monetary Accommodation in 2009



Cumulative Effect (output net of government spending)

	Percentage increase in real GDP	
	EU fiscal package (2011Q1)	EU fiscal package (2013Q4)
Smets and Wouters (2003)	-0.20	-0.34
ECB Area Wide Model	0.37	-0.18
Taylor (1993)	0.04	-0.11
Small IMF Model	-0.26	-0.55
EU Quest Model	-0.25	-0.43

- Crowding out dominates.

Conclusions: € Area Stimulus

- Myth: „German package small“
- Spending multipliers: Confirms US analysis with multiple New Keynesian models,
- Concentrated in 2 years, slightly greater multipliers.
- Implementation lags mean effect in 09 Q1-2 negative.
- 1-year constant rate increases multiplier little.
- 2-4 years, signficant crowding-out.