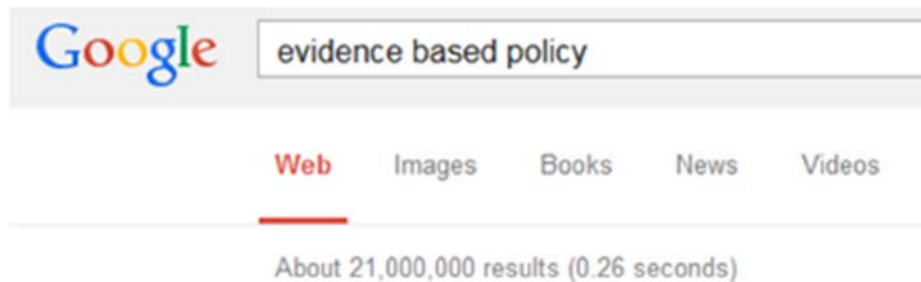

Real-time model-based fiscal and monetary policy analysis

Verein für Socialpolitik
Hamburg, 9. September 2014

Prof. Volker Wieland, Ph.D.
Professor for Monetary Economics
IMFS, Goethe University Frankfurt

Introduction

- I checked for „evidence-based policy“ on Google to find out what others think about the theme of this year's German Economic Association Annual Meeting and to see how the approach to macroeconomic policies that I will present today fits in.
- A selection of hits follows, wikipedia was at the top.



Evidence-based policy: Methodologies

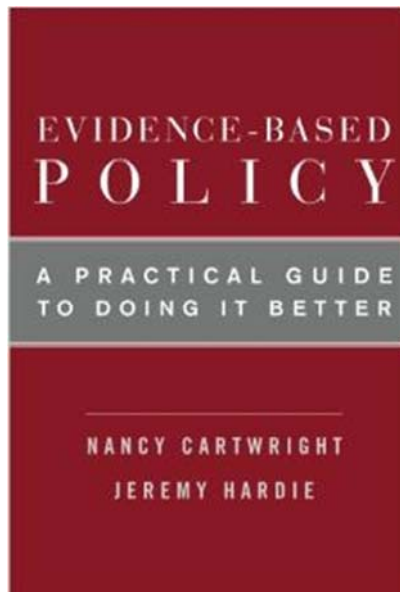
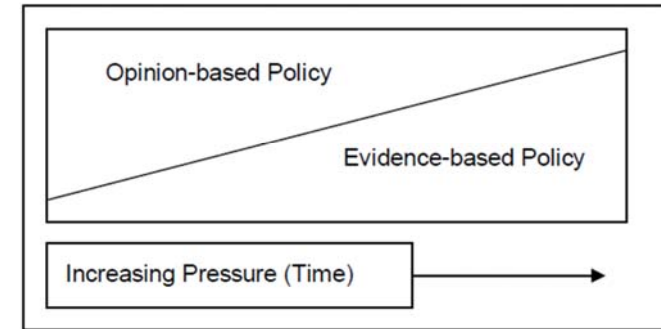
- Test theory about the impact of the policy
- Include counterfactual (if policy not implemented)
- Measure the impact
- Examine direct and indirect effects
- Separate uncertainties and control for other influences
- Should be replicable by a third party



Over the past 13 years, the Coalition's work with Executive Branch and Congressional policymakers has advanced important evidence-based reforms in U.S. social programs, which have been enacted into law.

U.K. based institute on experience with „Evidence-based policy“ in the U.K.

Figure 1: The Dynamics of Evidence-based Policy



Quack Policy
Abusing Science in the Cause of Paternalism



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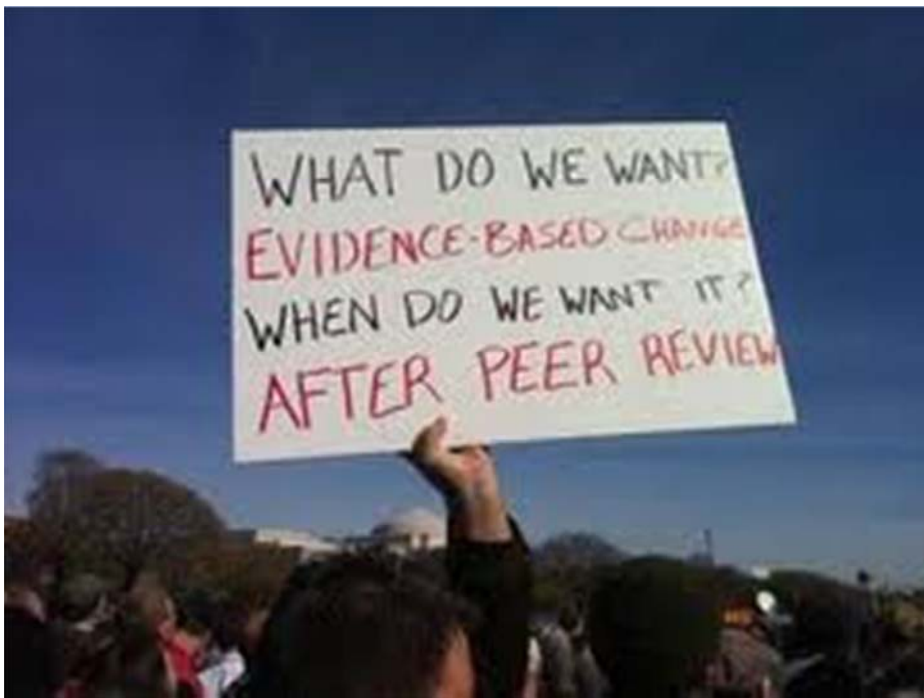
PH.D. PROGRAM

APPLICATION

Evidence Based Economics

14.12.2012 - 30.04.2020

The graduate program's doctoral students have to attend core courses on "Behavioral theory and experimental methods" and "Econometric methods for causal effects and structural inference".



One essay in the EU report notes:

For policy makers, a comparative approach to macro-economic modelling broadens their perspective, helping them to see 'blind spots' they might otherwise have missed. That's because any given policy can be seen to have different effects depending on what model is used for its evaluation.

From a due diligence perspective, it is therefore advisable to assure that policy measures perform reasonably well not just in one model but in several.

The comparative approach should enable researchers to offer recommendations with a stronger empirical base, and that, in turn, should allow decision makers to come up with policy rules that will be regarded as more 'robust'.

The essay's author footnotes

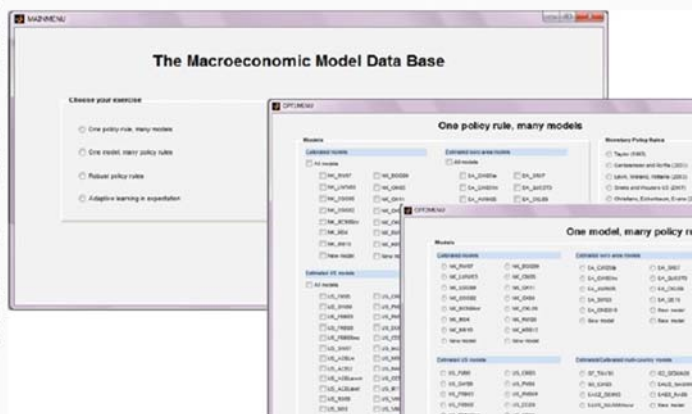
„A new comparative approach to macroeconomic modeling and policy analysis, V. Wieland, Tobias Cwik, Gernot Müller, Sebastian Schmidt and Maik Wolters, August 21, 2009.

(since published in *Journal of Economic Behavior and Organisation*, 2012).

Greater function: A user-friendly interface

The MMB 2.0 offers: The interface for MMB 2.0 is easy and efficient to operate. The user can set key parameters to compute and compare important model and policy characteristics. The interface is flexible (allows the user to go back or to load previous choices) and information-rich (easily accessed model and policy rules descriptions and guides).

- Exercises to perform
 - One policy rule, many models
 - One model, many policy rules
- Models to choose from:
 - Calibrated
 - Estimated
 - Estimated models (7)
 - Estimated
- Monetary policy rules:
 - Common
 - User-specific
 - Model-specific



Outline: Real-time model-based fiscal and monetary policy analysis

1. What about model diversity?
2. What about real-time policy analysis?
3. Fiscal policy example.
4. Monetary policy example.
5. Macro-prudential policy example.

1. What about model diversity?

1.1. Evaluating policy across models

- International institutions and central banks are quite serious about this.
- See „Effects of Fiscal Stimulus in Structural Models“



by Coenen, Erceg, Freedman, Furceri, Kumhof, Lalonde, de Laxton, Lindé, Mourougane, Muir, Mursula, Resende, Roberts, Roeger, Snudden, Trabandt, in't Veld, AEJ-Macro, 2012.
17 authors, 7 models, IMF, OECD, ECB, FRB (2), BoC, EU Commission.

1.2. GDP impact of ARRA planned spending

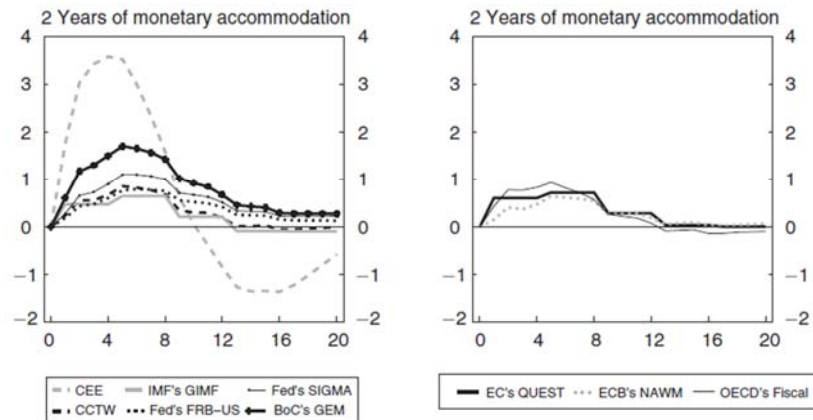


FIGURE 7. INSTANTANEOUS FISCAL MULTIPLIERS FOR THE ARRA STIMULUS PACKAGE

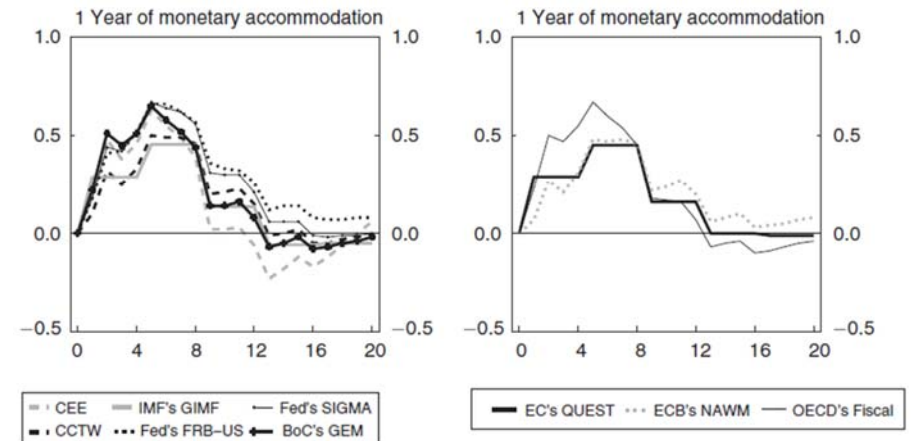
Vertical axis: real GDP in percent; horizontal axis in quarters.
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Model-based

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1.3. GDP impact with 1-year of monetary accommodation



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Model-based

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Mechanism and drivers

- Government purchases increase, greater demand, greater work effort.
- Crowding-in or crowding-out of private consumption and investment?
- Key drivers: (i) share of permanent-income vs rule-of-thumb behavior by consumers, (ii) monetary policy response.

1.4. A source of model diversity: Behavioral economics features

Driscoll, J.C. and S. Holden, „Behavioral Economics and Macroeconomic Models, FEDS, 2014-43.

„Over the past 20 years researchers have incorporated an increasing number of results from behavioral economics into macroeconomic models.“

- Examples include habit formation, rule-of-thumb decisions, loss aversion, bounded rationality, myopia, sticky information, adaptive learning, simple forecasting rules, downward nominal wage rigidity, fairness considerations.

1.5. Other sources of model diversity

Driscoll & Holden:

„an open issue is whether macroeconomic models should incorporate behavioral features or other deviations from the standard economic model, like financial frictions, limited information and agency problems.“

➔ Many of these behavioral features as well as other deviations such as financial frictions and limited information are incorporated in models available through the *Macroeconomic Model Base*.

2. What about real-time policy analysis?

2.1. Ex-ante

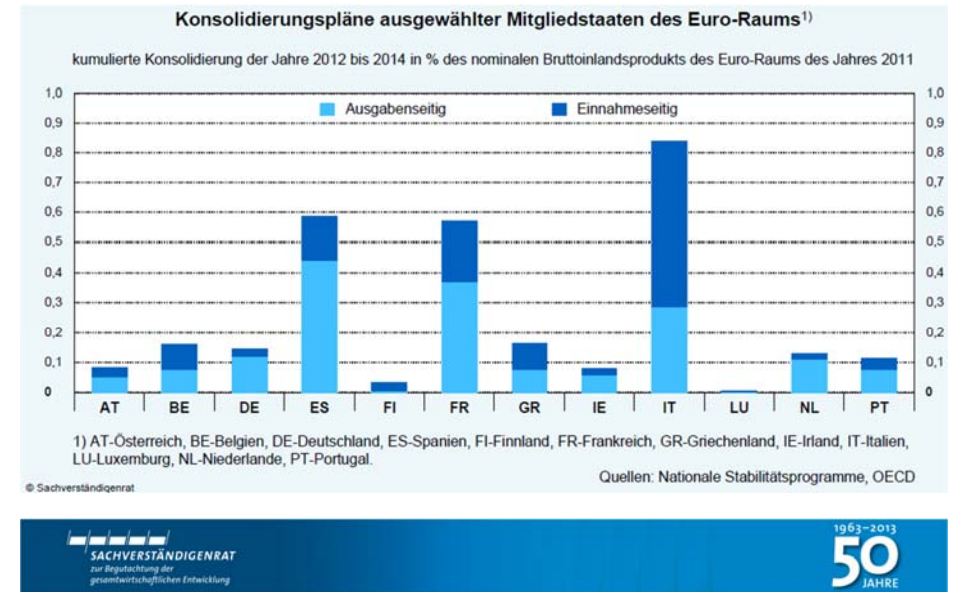
- Policy makers have information on plans.
- Governmental institutions have resources for impact modelling.
- Problems:
 - Information on government plans not necessarily available to outsiders.
 - Framework used by government institutions not always available for replication and comparison.
 - Regular reestimation and impact assessment based on new data vintages is cumbersome.

2.2. Ex-post

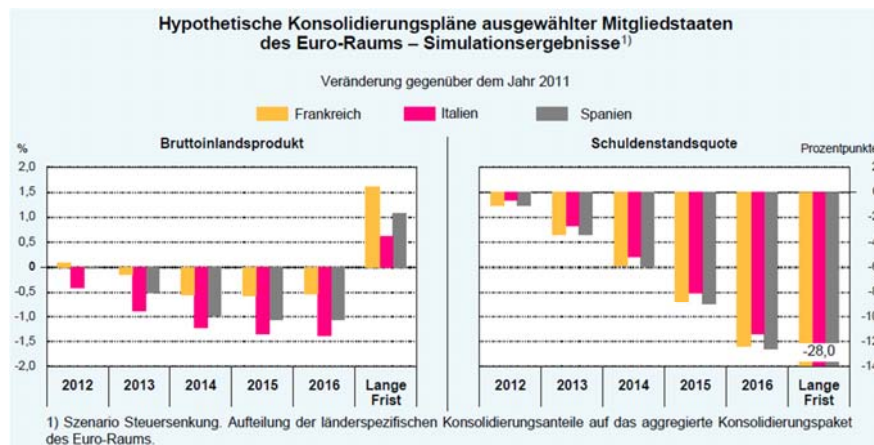
- Policy makers have information on implementation.
- Macroeconomic data gets revised regularly.
- Problems:
 - Information on implementation typically not available in sufficient detail.
 - Implementation may be different from original plans (Cogan-Taylor on ARRA).
 - Past evaluations need to make use of information on policy plans, market participant's anticipations, actual policy implementation, data revisions.

3. Fiscal policy example.

3.1 Consolidation plans: National policy mix



3.2. Impact of national mix on euro area level



Maik Wolters (2013), ECB's New Area Wide Model (US-Euro version).

3.3. Mechanism and drivers

- Drop in government purchases or transfers versus tax hikes.
- Behavioral response to tax changes.
- Crowding-in or crowding-out of private consumption and investment?
- Share of permanent-income versus rule-of-thumb or financially constrained households.
- Monetary policy responses.

4. Monetary policy example.

4.1. Equilibrium real interest rates and monetary policy

- Equilibrium real rate r^* in Taylor's rule.

$$i_t = r^* + \pi^* + 1.5(\pi_t - \pi^*) + 0.5(y_t - y_t^*)$$

- Equilibrium nominal rate $i^* = r^* + \pi^*$
- Has it come down recently and should policy be adjusted?

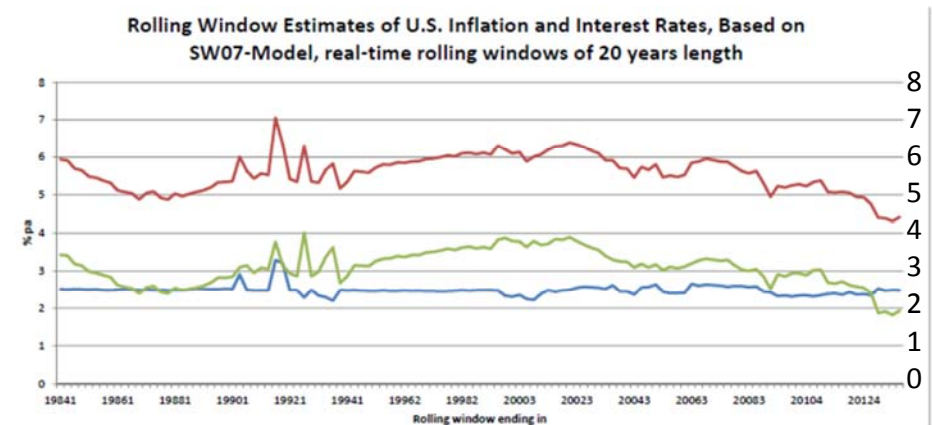
4.2. Estimate equilibrium rate using a structural macroeconomic model

Model: Smets, Frank, and Rafael Wouters. 2007. "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach." *American Economic Review*, 97(3): 586-606.

- The model exhibits a constant long-term equilibrium real interest rate.
- Change estimation window to capture change in empirical estimates.

4.3. Estimates of equilibrium rates

$$i^* = r^* + \pi^*$$



5. Macroprudential policy example.

EZB: Sabine Lautenschläger, 8.9.14, zu makroprudenzieller Politik und Geldpolitik

Grundsätzlich sollte es durch die Ausweitung des Instrumentariums (der EZB),... einfacher sein, eine klare Aufgabentrennung zwischen den beiden Politikfeldern herzustellen.

Die Geldpolitik sollte sich auf die Preisstabilität fokussieren,... Im Mittelpunkt der makroprudenziellen Politik sollte die Finanzstabilität stehen. ...

Es mag jedoch Umstände geben, unter denen eine saubere Trennung nicht so einfach ist.“

5.1. Some of the models with financial frictions in MMB

- Kannan, P., P. Rabbanal and A. Scott, (2012), Monetary and macroprudential policy rules in a model with house price booms, *B.E. Journal in Macroeconomics: Contributions*, Vol. 12,1.
- Gerali, A., S. Neri, L. Sessa, and F. Signoretti (2010), Credit and banking in a DSGE model of the euro area, *Journal of Money, Credit and Banking*, Vol. 42, 6.
- Meh, C. , and K. Moran, The role of bank capital in the propagation of shocks, *Journal of Economic Dynamics and Control*, Vol. 34.

Kannan et al, Monetary and macroprudential policy rules in a model with house price booms

Model related to Iacoviello (AER 2005), Iacoviello and Neri (AEJ-Macro 2010). (also in MMB)

- Households decide on consumption, housing investment, saving, work.
- Two types: Patient and impatient households.
- Financial intermediaries take deposits from savers and lend them to borrowers.
- Borrowers face collateral constraints (house).
- Spread of lending over policy rate depends on loan to value ratios, mark-up charged over funding, and a macro-prudential instrument.

Kannan et al 2012: Determination of lending spread

$$\frac{R_t^L}{R_t} = v_t F \left(\frac{B_t^B}{P_t^D D_t^B} \right) \tau_t$$

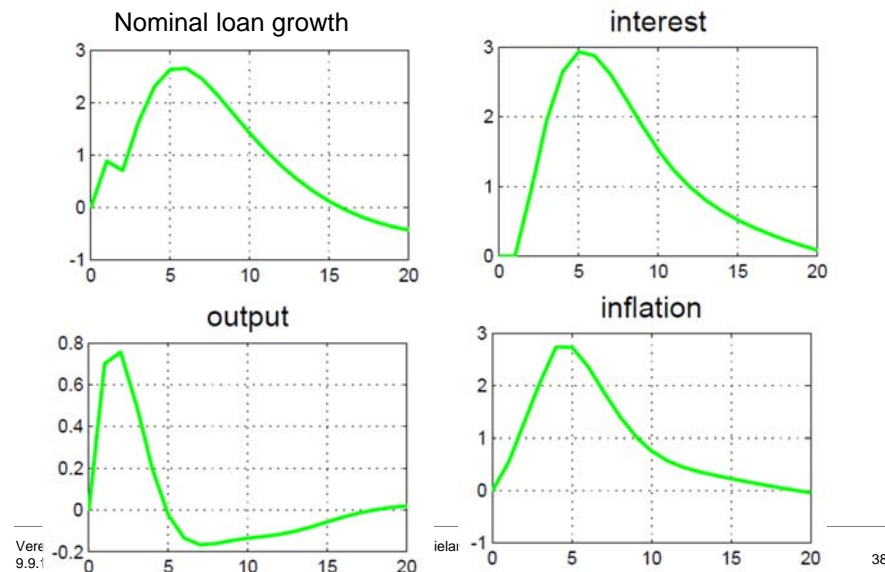
R^L : Lending rate.

v : financial shock: down if greater bank competition and quest for market share, or reduction in perceived risk.

B : debt of home-owners, PD : value of house, B/PD loan to value ratio. $F(.)$ increasing in leverage.

τ : macroprudential instrument , i.e. loan provisions.

Financial shock driving credit boom



Mechanism

Credit accelerator at work:

- Relaxation of lending standards, lending rates down, increase in housing investment and housing prices, collateral values increase, lending rates are lowered, households take out more loans.

Monetary rule in Kannan et al

$$i_t = 0.7i_{t-1} + 0.3(i^* + 1.3(\pi_{t-1} - \pi^*) + 0.125(y_{t-1} - y_{t-1}^*))$$

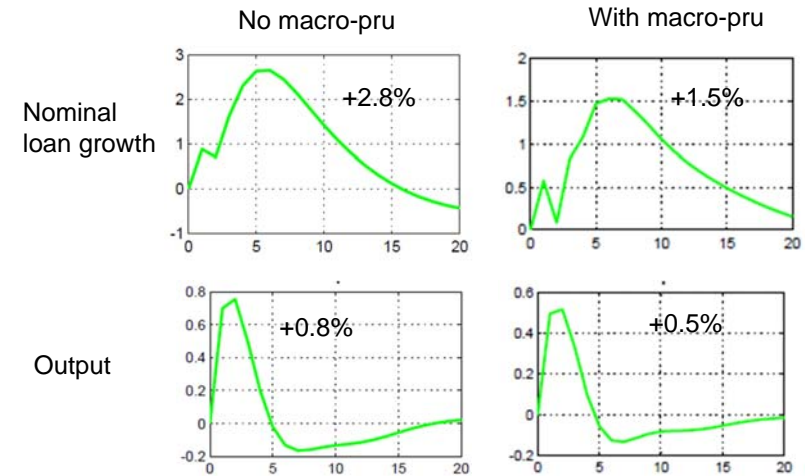
Differs from Taylor's rule in terms of interest rate smoothing and coefficients.

Macroprudential rule in Kannan et al

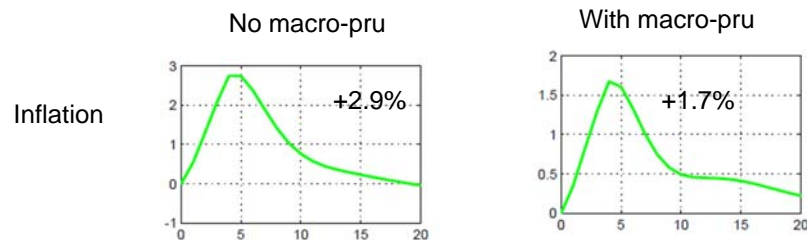
$$\tau_t = 0.3(b_{t-1}^b - b_{t-2}^b)$$

Macro-prudential rule responds to credit growth.

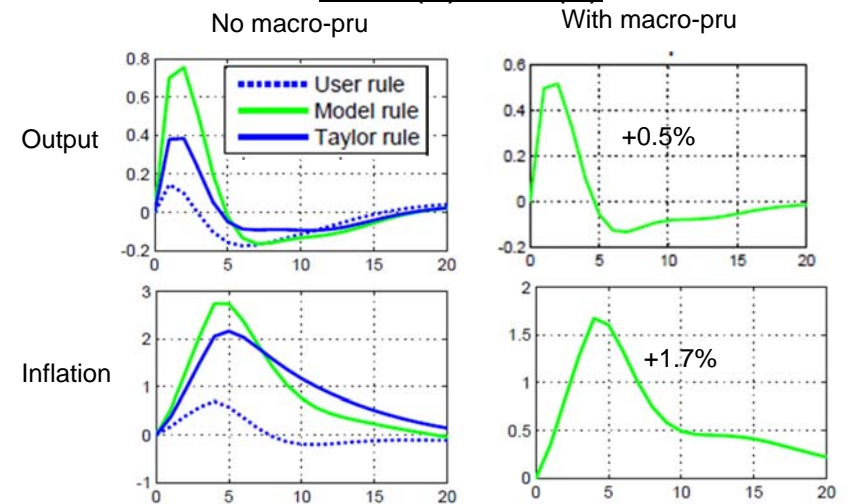
Financial shock with macro pru: (1)+(3)



Financial shock with macro pru: (1)+(3)



But, other monetary rules may perform better than (1) and (3)



User rule

$$i_t = i_{t-1} + 0.5(\pi_t - \pi^*) + 0.5(y_t - y_t^*)$$

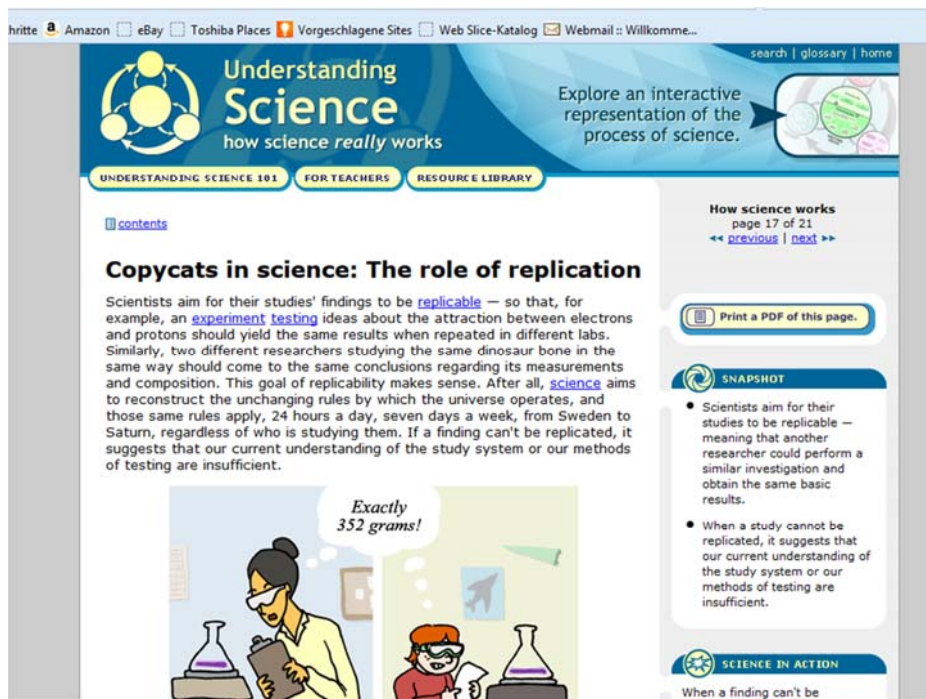
Implications

- The effects of monetary and macro-prudential policy on output in the presence of the financial shock are similar. The interaction precludes a simple separation of duties as advocated in Sabine Lautenschlägers (ECB) speech.
- The performance of the benchmark monetary policy rule (model rule) in Kannan et al in the credit boom is improved by adding the macro-prudential rule.
- However, the original Taylor rule performs better than the models interest rate rule even without adding macro-prudential policy.

6. In conclusion

- MacroModelBase, an open platform for **introducing your model** of the macro-economy.
- **Transparency** about policy makers' plans, policy makers' models and implemented policies would allow effective outside assessments of the policy impact and public debate.
- **Robustness** across competing reference models improves policy, because it is not possible to isolate the „true“ model.

**APPENDIX: Macroeconomic
model data base: New test
release 2.0**



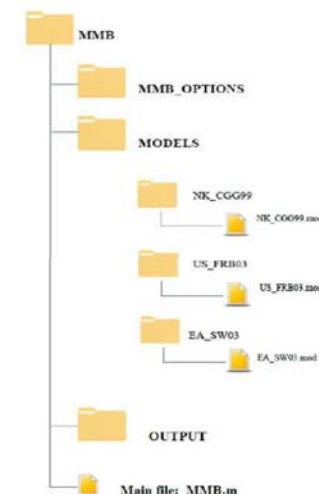
Appendix 1. Wieland, Cwik, Müller, Schmidt, Wolters, *Journal of Economic Behavior and Organisation*, 2012

1. Formal exposition of comparative approach (augment models with common policy rules and common, comparative variables).
2. A macroeconomic model archive. <http://www.macromodelbase.com>.
3. A computational platform (Matlab, Dynare) that allows individual researchers to conduct comparisons relatively easily, frequently and on a large scale.

A 2. Macroeconomic model data base: New test release 2.1

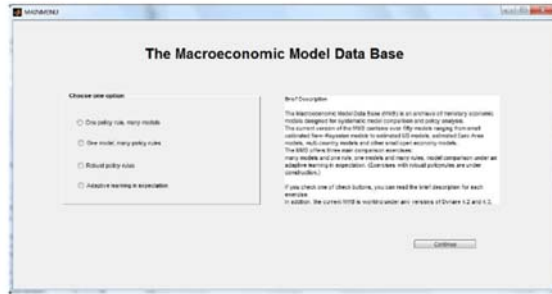
- *Test Version 2.1* offers
 - new user-friendly interface,
 - new models with financial frictions and banking sector (now 61 models),
 - many new functions for comparative and exploratory model analysis.
- Software requirements
 - Matlab
 - Dynare 4, www.dynare.org
 - Model base files, www.macromodelbase.com

A.3: Structure of model files and archive



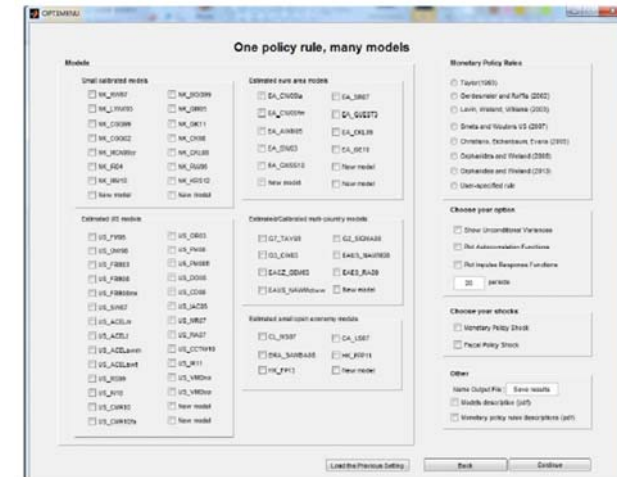
A.4. Main file: MMB.m

- Run MMB.m, a menu with 4 options (with descriptions) appears.
 - One policy rule, many models
 - One model, many policy rules
 - Robust policy rules
 - Adaptive learning in expectation



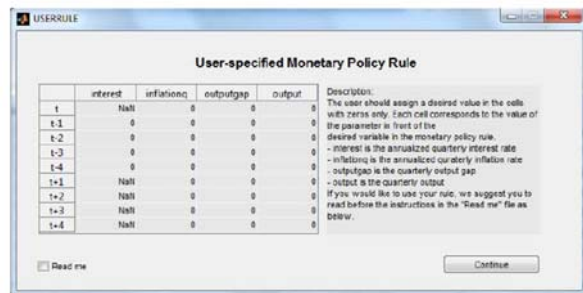
- Currently available option 1 and 2.

A.5. Option 1: One policy rule, many models



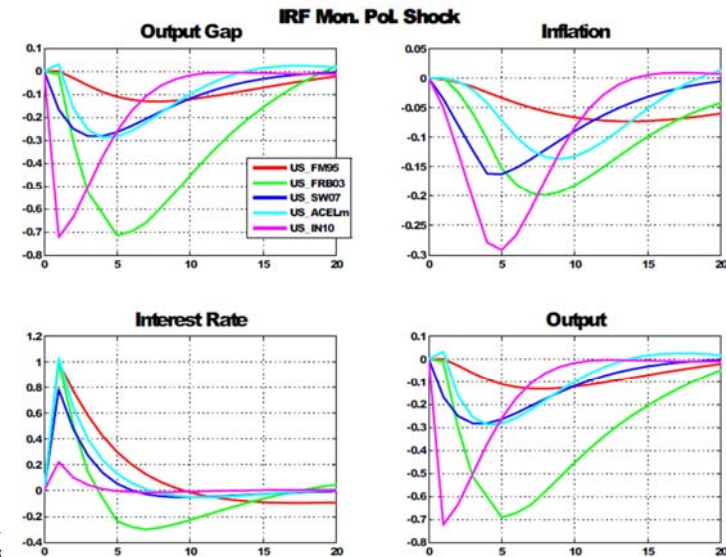
A.6. Model comparison features

- 61 models to compare.
- 7 common monetary policy rules, from Taylor (1993) to Orphanides and Wieland (2013).
- User-specified rule:



- Output to be displayed (unconditional variances, ACFs, impulse responses).
- Results stored in OUTPUT folder. You can name your output file.

A.7. Example: Impulse responses



A.8. Option 2: One model, many policy rules



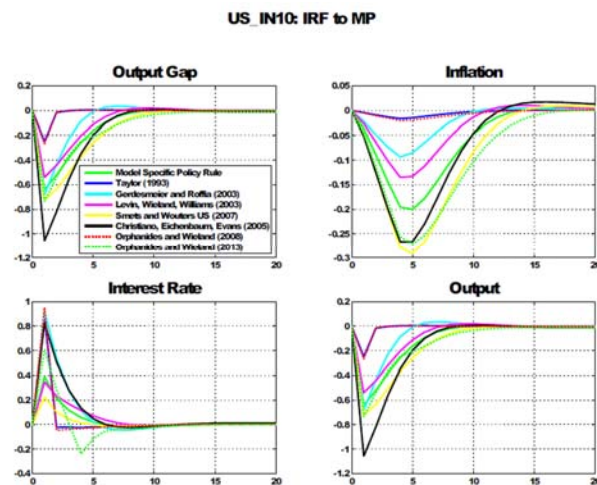
A.9. Model exploration features

- 61 models.
- 7 common monetary policy rules.
- User-specified rule.
- Model specific rules (available for 43 models).
- Model specific shocks (example, the NK_RW97 model).



- Output to be displayed (unconditional variances, ACFs, impulse responses).
- Results stored in OUTPUT folder. Name your output file.

A.10. Example: Impulse responses



A.11 More to come ...

- Model-averaging for policy rules
- Adaptive learning versus rational expectations
- Forecasting

A.12. Recent related publications

Modelling:

- “The New Keynesian Approach to Dynamic General Equilibrium Modeling: Models, Methods and Macroeconomic Policy Evaluation,” with Sebastian Schmidt, in, Peter Dixon and Dale Jorgenson (eds), Handbook of Computable General Equilibrium Modeling, Elsevier, 2013.
- “Model Comparison and Robustness: A Proposal for Policy Analysis after the Financial Crisis,” in Robert M. Solow and Jean-Philippe Touffut (eds), What's Right with Macroeconomics?, E. Elgar, 2013.

Forecasting:

- “Forecasting and Policy Making,” with Maik Wolters, in, Graham Elliott and Allan Timmermann (eds), Handbook of Economic Forecasting: Vol 2, Elsevier, 2013.
- “The Diversity of Forecasts from Macroeconomic Models of the U.S. Economy,” with M. Wolters, Economic Theory, 47, May 2010.

A.13. Recent related publications

Robust policy design under model uncertainty:

- “Complexity and Monetary Policy,” with Athanasios Orphanides, International Journal of Central Banking, 9, January 2013.
- “Surprising Comparative Properties of Monetary Models: Results from a New Data Base,” with John B. Taylor, Review of Economics and Statistics, 94(3), August 2012.

Fiscal stimulus and consolidation:

- The Role of Tax Policy in Fiscal Consolidation: Insights from Macroeconomic Modelling,” with Matthias Burgert, in, S. Princen and G.Moure, European Economy, August 2013.
- “Fiscal Consolidation Strategy,” with J. Cogan, J.Taylor, M. Wolters, Journal of Economic Dynamics and Control, 37(2), February 2013.
- “Keynesian Government Spending Multipliers and Spillovers in the Euro Area,” with Tobias Cwik, Economic Policy, 26 (67), July 2011.