Policy Evaluation and Robustness with the Macroeconomic Model Data Base

Jinhyuk Yoo

Goethe University Frankfurt, IMFS

January 16, 2014

Outline I

Outline I

The state of macro modelling 2015

- Criticism and debate following macroeconomists' failure to provide sufficient warning of the risk of financial crisis
- New modelling approaches: Financial sector and banking, money and credit, labor markets, international linkages, instruments and effects of monetary, fiscal and macroprudential policies
- Need of a level-playing field on which models can compete in terms of empirical benchmarks and robustness of policy recommendations

Macroeconomic Model Data Base 2.0

- A tool that can be useful for research and policy analysis using structural macroeconomic models (in development since 2007)
- in the spirit of...

  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'.

Systematic approach to model comparison

- Many models, few comparisons, why?
- The standard approach to model comparison is cumbersome and requires a lot of resources, multiple research teams, each working with its own model, multiple meetings, limited set of exercises
  - Brookings Institution:1988-89-93, Bryant, Currie, Frenkel, Masson, Portes (eds.) (1989); Bryant, Hooper, Mann (eds.) (1993)
  - NBER: Taylor (ed.) (1999)
  - IMF: Coenen et al. (2010), 17 authors, 7 models.

Wieland et al.(2012), *Journal of Economic Behavior and Organisation*

- Formal exposition of comparative approach (augmenting models with common policy rules and common, comparative variables)
- A macroeconomic model archive
- A computational platform (Matlab, Dynare) that allows individual researchers to conduct comparisons relatively easily, frequently and on a large scale

Macroeconomic model data base: new release 2.0 (2014 March)

- New Version offers:
  - new user-friendly interface
  - new models with financial frictions or banking sector (61 models as of now)
  - many new functions for comparative and exploratory model analysis
- Software requirements

- Matlab
- Dynare 4: www.dynare.org
- Model Base files: www.macromodelbase.com

Outline I

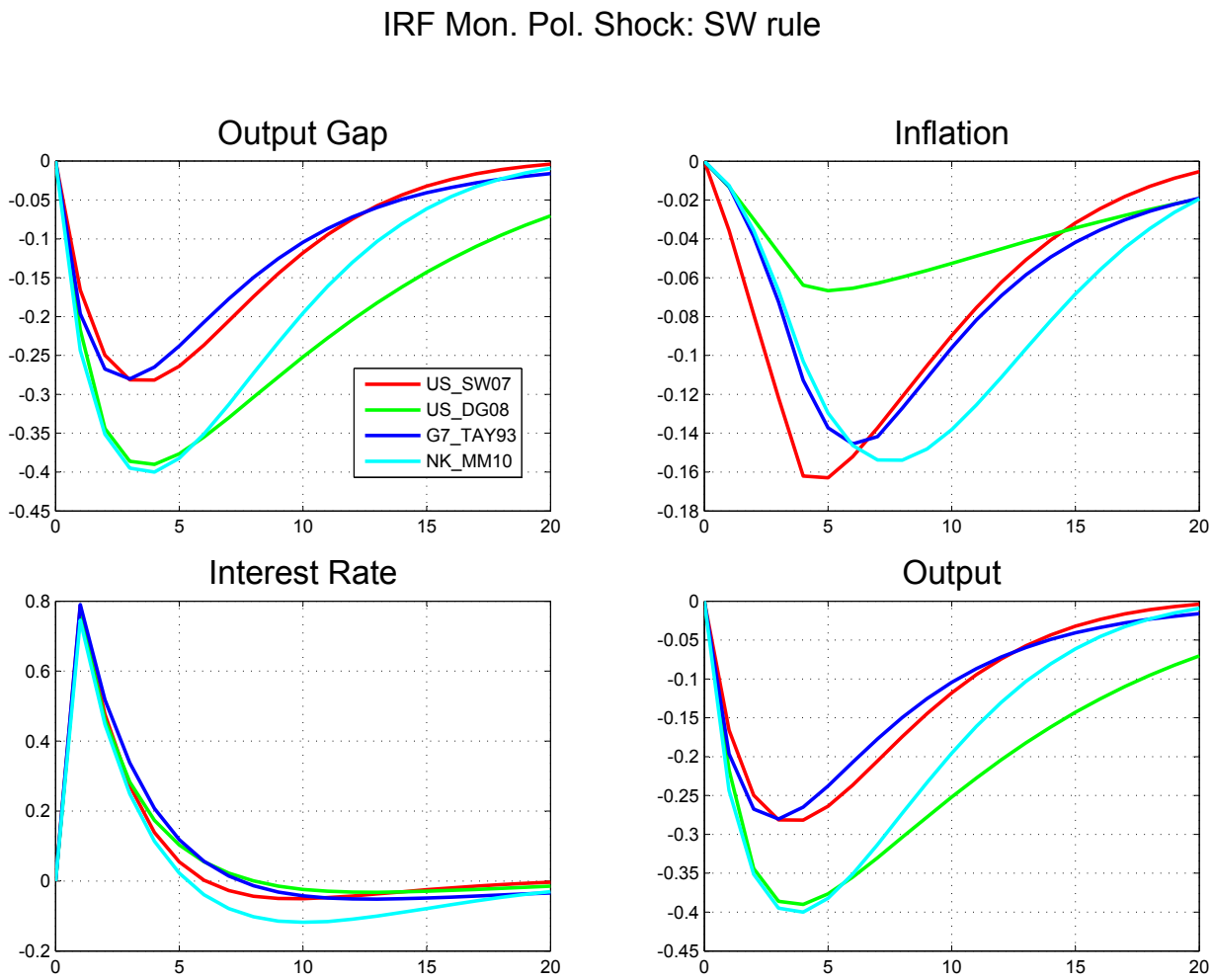
Exercise 1: Implications for monetary policy transmission

- Consequences of economic activity and inflation in response to an unexpected change in policy rate?
- It is hard to identify effects that monetary policy alone causes.
- A solution: build a structural macroeconomic model and conduct a policy experiment.
- Implications drawn from the model are model-specific by construction.
- Let's do a comparative exercise with four models from Modelbase to gauge the extent of differences between models regarding to monetary policy transmission.
- A monetary policy shock is defined as a surprise deviation from systemic policy behavior.

Choices of models and a policy rule

- The models chosen:
  - Taylor (1993) G7 countries model (G7_TAY93), used in original design of the Taylor rule.
  - Smets and Wouters (2007) US model (US_SW07), one of the best-known (New Keynesian) models.
  - De Graeve (2008) US model (US_DG08), (New Keynesian) model enriched with a macro-financial linkage.
  - Meh and Moran (2010) US model (NK_MM10), (New Keynesian) model with banking sector.
- A common policy rule used: Smets and Wouters (2007) rule.
- Let's do the exercise now!

Comparative performance of models under monetary policy shock



Exercise 2: Interactions of monetary and macroprudential policies

- Motivation: which policies should address financial imbalances?
- Model: Kannan, Rabanal and Scott (2012), Monetary and macroprudential policy rules in a model with house price booms, *B.E. Journal in Macroeconomics: Contributions, Vol. 12,1*
- Brief overview on model structure
  - Two types of households: patient HHs and impatient HHs.
  - Households decide on consumption, housing investment, saving and work.
  - Banks take deposits from savers and lend them to borrowers.
  - Following the spirit of BGG financial accelerator, the lending deposit spread positively depends on households' leverage (LTV ratios).
  - The spread also relies on mark-up charged over funding and a macro-prudential instrument.

Credit spread in Kannan et al. (2012)

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

v_t: financial shock, down if greater bank competition, or reduction in perceived risk.

B_t: debt of home-owners, $P_t^D D_t^B$: housing value, $\frac{B_t^B}{P_t^D D_t^B}$: loan to value ratio, $F(\cdot)$ increasing in leverage.

τ_t: macroprudential instrument $\tau_t = f(B_t^B)$, i.e. loan provisions, bank capital requirement

- Credit accelerator at work:
- Relaxation of lending standards, lending rates down, increase in housing prices and investment, collateral value increase, households take out more loans and so on.

Four policy regimes

- KRS baseline interest rate rule

$$i_t = 0.7i_{t-1} + 0.3[i^* + 1.3(\pi_{t-1} - \pi^*) + 0.5q_{t-1}] \quad (1)$$

- KRS baseline & leaning rule

$$i_t = 0.7i_{t-1} + 0.3[i^* + 1.3(\pi_{t-1} - \pi^*) + 0.5q_{t-1} + 0.1b_{t-1}]$$

- KRS baseline (1) & macroprudential policy rule

$$\tau_t = 0.1b_{t-1}$$

- Taylor's rule

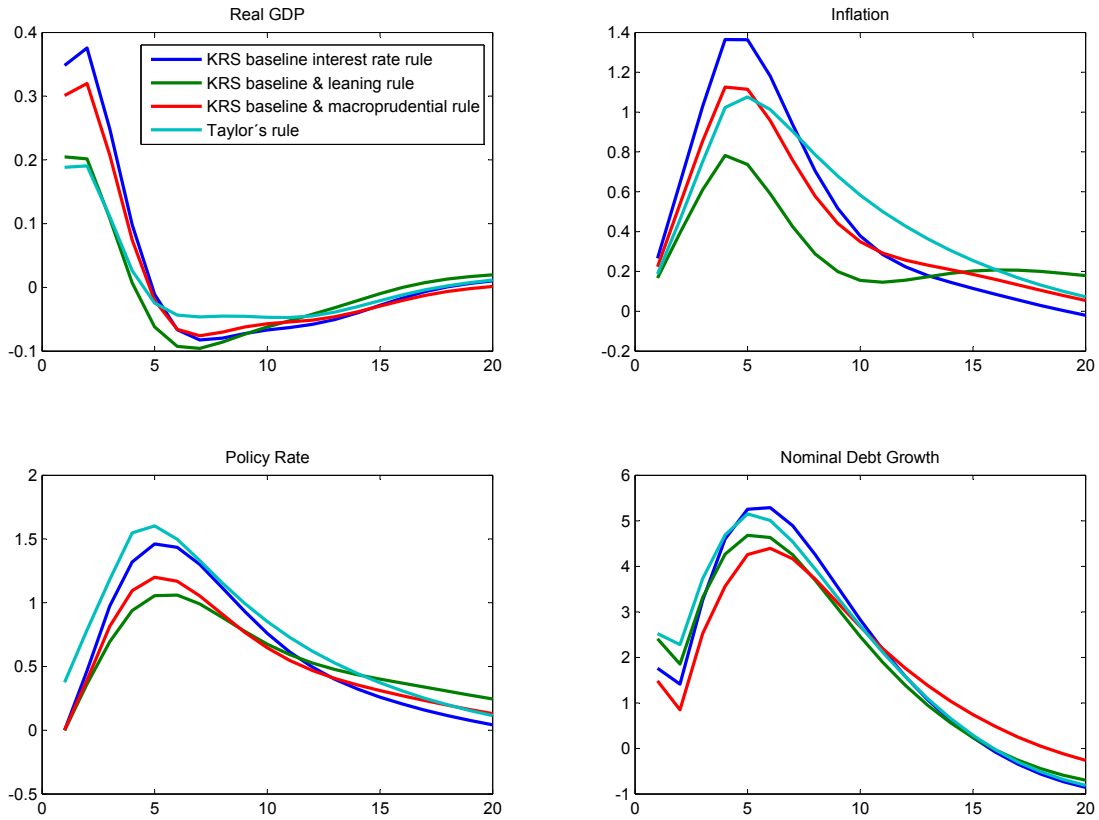
$$i_t = i^* + 1.5(\pi_t^a - \pi^*) + 0.5q_t$$

i: policy rate, π: the annualized q-to-q rate of inflation, π^*: inflation target

q: output gap, π^a: the annualized y-on-y rate of inflation,

b: the credit growth

Effects of a financial shock across policy regimes



▸ a larger set of variables

Stabilisation performances under all shocks

- Two other shocks, a technology shock and a housing demand shock.
- The shock processes are calibrated to match the second moments of several macro variables.
- We compute the unconditional variances of inflation and output gap in the presence of all shocks.

Table: Performances of Policy Regimes (Standard Deviations)

	Inflation	Output gap
KRS baseline interest rate rule	1.901	0.372
KRS baseline & macroprudential rule	1.835	0.361
KRS baseline & leaning rule	1.525	0.341
Taylor's rule	1.452	0.339

Implications

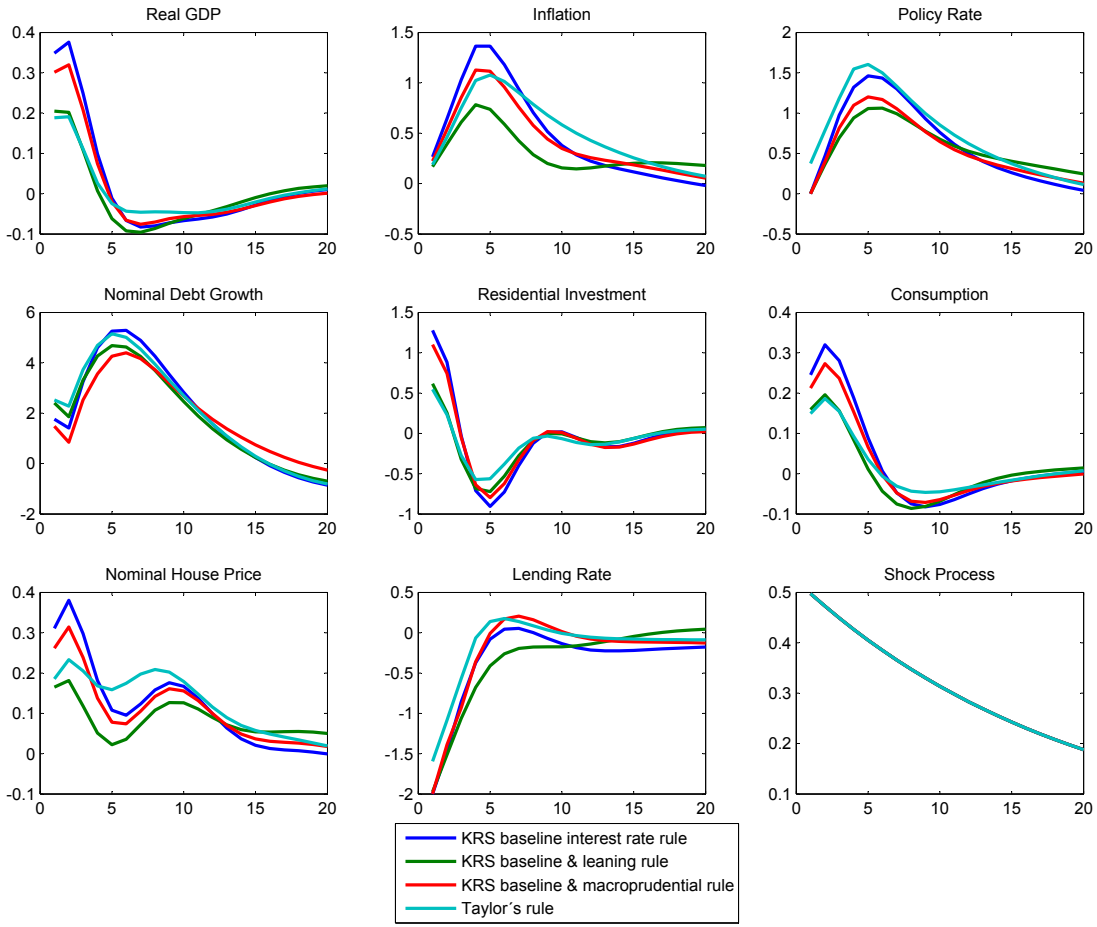
- The stabilization performance of the economy facing credit boom can be improved either by monetary policy leaning against credit market development or by including macroprudential policy.
- However, the original Taylor rule performs quite well even without adding macroprudential policy.

Outline I

Conclusion

- MacroModelBase is an open platform for comparative macro-financial modelling and policy evaluation.
- Comparative exercises across competing reference models or across policy prescriptions improve policy advice.
- More to come: including more macro models with financial sector, forecasting and effects of alternative expectation formations, robustness analysis for policy rules

Appendix: Efffects of a financial shock



▸ Back