Discussion of "Welfare-Maximizing Monetary Policy under Parameter Uncertainty" by Edge, Laubach and Williams

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Overview

- Paper addresses a vitally important question: how does parameter uncertainty affect optimal monetary policy?

> *"Uncertainty is not just an important feature of the monetary policy landscape; it is the defining characteristic of that landscape." — Alan Greenspan*

- Set up a small DSGE model, estimate parameters and standard errors, then see how coefficients of optimal simple rules are affected by uncertainty.

- Parameter uncertainty manifested in three areas:
  1. Uncertainty about constraints (equations of model)
  2. Uncertainty about utility-based loss function
  3. Uncertainty about natural output and natural interest rate

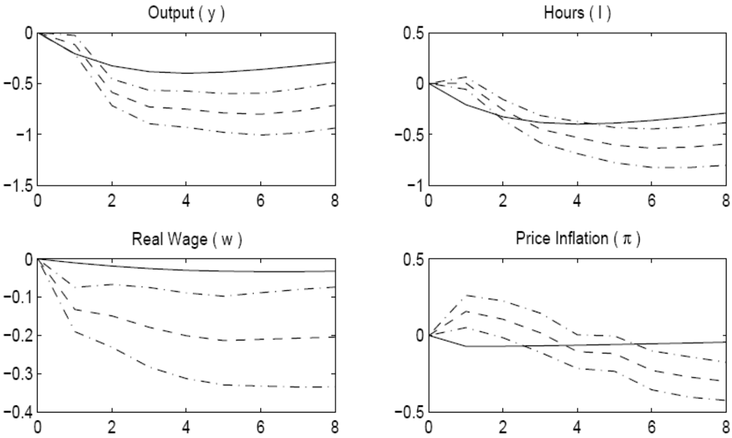
Model

- Small DSGE model:
  - Differentiated intermediate goods and labour inputs
  - Imperfect competition
  - Quadratic adjustment costs for prices and wages (relative to backward-looking indexation)
  - Habit persistence

Empirical estimation

- VAR with U.S. quarterly data.
- Identify structural shocks:
  1. Technology shock — only shock to have a permanent effect on output per hour
  2. Monetary policy shock — economy does not react to policy in short run, but policy can react to economy.
- Add a Taylor rule with interest rate smoothing to small DSGE model: obtain impulse response functions.
- Minimum distance estimation for DSGE parameters: impulse responses as moments to match — Rotemberg & Woodford (1997), Christiano, Eichenbaum & Evans (2005).

SVAR and model-based impulse responses to MP shock



Comments on estimation

- How is DSGE model made consistent with identifying assumptions? (impact response of tech. shock but not monetary policy shock)
- Poor fit of DSGE model for MP shock response (e.g. price puzzle).

Parameters:

- Price indexation to past: $\gamma_p = 1$ (imposed)
- Wage indexation to past: $\gamma_w = 1$ (imposed)
- Habit persistence: $\eta = 0.364$ (compare CEE: 0.65)
- Taylor rule: $\phi_p = 1$ at determinacy boundary — imposed?
- Taylor rule: $\phi_x = 0$ (imposed, otherwise negative)
- Adjustment costs: $\chi_p = 600$, $\chi_w = 1000$ (imply 2% price change costs 6% of output, 2% wage change costs 10% total labour) — too large?

Structural model and structural parameters?

- To what extent are the DSGE model parameters structurally invariant to changes in monetary policy regime — for the exercise of the paper we require more than just a good fit.
- Parameter uncertainty arising because of policy-induced structural breaks?
- Ad hoc features with arguably weak microfoundations:
    - Full backward-looking indexation — why maintain this in a low inflation environment? (see Benati (2008) for evidence of structural breaks for this parameter)
    - Quadratic adjustment costs model for prices and wages is best interpreted as a reduced form (note that average size of a price change approx 10%)
    - Habit persistence could be in internal or external habit — different policy implications?
    - Calvo instead of quadratic adjustment costs: this is considered in the paper — but two models have same reduced form and different utility-based loss functions (not clear why only for wages)

Theoretical benchmarks for parameter uncertainty

1. Brainard (1968) — Policymaker becomes more cautious with multiplicative uncertainty.
2. Wieland (2000) — Parameter uncertainty creates an incentive for policymaker to experiment as a way of speeding up learning.

Optimal policy exercise under uncertainty

- Take standard errors of parameter estimates as measure of uncertainty.
- Analyse optimal policy:
  - Utility-based loss function
  - Shocks to technology, shocks to preferences (why no cost-push shocks or other inefficient shocks?)
  - Optimize within class of simple policy rules (why restrict attention to simple rules — computational feasibility?)

What the policymaker knows (at time t):

  - All data on observables from $t-1$ and earlier
  - The structure of the model

Results

Simple policy rule (like a Taylor rule):

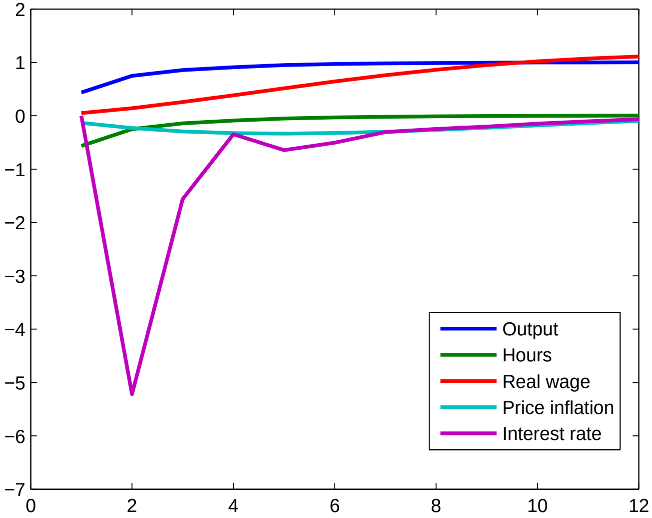
$$r_t = \pi_{p,t-1} + \phi_{r^n}\hat{r}^n_{t-1} + \phi_x\hat{x}_{t-1} + \phi_p\pi_{p,t-1} + \phi_w\pi_{w,t-1}$$

Coefficients minimizing loss function:

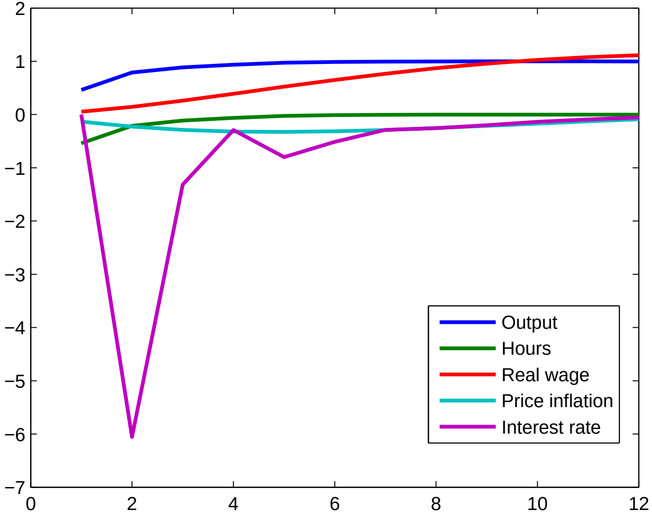
Coefficient	No uncertainty	Uncertainty
ϕ_{r^n}	0.84	1.00
ϕ_x	0.12	1.46
ϕ_p	391.40	480.86
ϕ_w	693.78	780.89

- Responses to price and wage inflation dominate.
- Response to (estimated) output gap reduced by uncertainty, response to price and wage inflation increased.
- Are there significant differences in the response of the economy with these two sets of coefficients?

Impulse responses to tech shock: no uncertainty case (computed at mean values)



Impulse responses to tech shock: uncertainty case (computed at mean values)



Comments on results

- Welfare losses: Report loss if optimal policy rule for case of no uncertainty is used in a world with uncertainty (to quantify loss from policymaker not taking account of uncertainty)
- Decomposition of effects of uncertainty: coefficients in model equations, coefficients in loss function, natural rates (of these, which contributes the most quantitatively to the results)
- It is argued that persistent errors in policymaker's measures of natural output and the natural interest rate provide a rationale for the findings.
- Optimal response to output gap does decrease, but response to natural interest rate rises.
- Perhaps consider policy rules specified in terms of output growth, which are less susceptible to output gap mismeasurement.

Concluding remarks

- An ambitious paper in an important area for monetary policy analysis.
- Interesting findings.
- Would be good to see more work on optimal monetary policy under uncertainty without restriction to simple rules, e.g. look at optimal targeting rules as well.