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
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
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.

SVAR and model-based impulse responses to MP shock

Output (y)

Hours (l)

Real Wage (w)

Price Inflation (π)
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?
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.

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
Simple policy rule (like a Taylor rule):

\[ r_t = \pi_{p,t-1} + \phi_{r^n}\hat{r}_{t-1}^n + \phi_{x}\hat{x}_{t-1} + \phi_{p}\pi_{p,t-1} + \phi_{w}\pi_{w,t-1} \]

Coefficients minimizing loss function:

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>No uncertainty</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\phi_{r^n})</td>
<td>0.84</td>
<td>1.00</td>
</tr>
<tr>
<td>(\phi_{x})</td>
<td>0.12</td>
<td>1.46</td>
</tr>
<tr>
<td>(\phi_{p})</td>
<td>391.40</td>
<td>480.86</td>
</tr>
<tr>
<td>(\phi_{w})</td>
<td>693.78</td>
<td>780.89</td>
</tr>
</tbody>
</table>

- 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 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.