Discussion

"Monetary Policy under Uncertain Economic State and Learning: A Bayesian DSGE Approach" by Xiaohan Ma

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What is done in this paper? Why?

- Topic $\longrightarrow$ Imperfect Information:
  - Current state of economic fundamentals not perfectly observed due to information frictions.
- Study characteristics of monetary policy under **uncertainty in current state** of the economy in a **micro-founded framework**:
  - Particular question: What are the effects of uncertainty on monetary policy?
- So... Why is this interesting? Why on monetary policy in particular?
  - Quotations: William Poole (1998) and Ben Bernanke (2007).

What is done in this paper? Why?

- *Monetary Policy, Inflation and the Business Cycle*, Galí (2008):
  - Chapter 8: Main Lessons and Some Extensions → Extensions → **Imperfect Information and Learning**

"A great deal of research in macroeconomics over the past decade has sought to relax some of those assumptions, which are widely regarded as unrealistically strong. Much of that work has focused on monetary applications and has adopted a normative perspective, exploring the implications of imperfect information and learning for the optimal design of monetary policy."

1. Generally speaking, incredibly relevant topic and question → Emphasize this.

What has been done? Why is this different?

- Paper points out:
  - Problem investigated in terms of data uncertainty.
- In general:
  - Focus either on imperfect information and learning by private agents only, or by central bank.
  - *Orphanides and Williams* (*2002*, 2004), Aoki (2003), Svensson and Woodford (2003, 2004), *Svensson and Williams (2008)*.
- Difference:
  - Develop micro-founded framework $\longrightarrow$ Information frictions partially decouples expectations from fundamentals, but connects them with signals and subjective beliefs.
  - Provide tractable solution strategy.

2. Very different and novel $\longrightarrow$ I had trouble finding where is all this novelty. Suggestion: emphasize and work on this.

Main Idea

Standard RBC Model with Investment Shock

- Bellman equation:

$$\begin{aligned} V(k,z,q) &= \max_{c,n,i,k'} \left\{ u(c,n) + \beta \mathbb{E}\left[V\left(k',z',q'\right) | z,q \right] \right\} \text{ s.t.} \\ c+i &= zk^{\alpha} n^{1-\alpha}, \\ k' &= qi + (1-\delta)k, \end{aligned}$$

where $\begin{bmatrix} z' & q' \end{bmatrix} = G\left(\begin{bmatrix} z & q \end{bmatrix}\right) + \varepsilon$, $\varepsilon \sim N(\mathbf{0}, \mathbf{\Sigma})$.

  - Solution $\longrightarrow$ value function, $V(k,z,q)$, and policy functions:

$$\begin{aligned} c &= g_c(k,z,q), n = g_n(k,z,q), \text{ and} \\ k' &= g_k(k,z,q). \end{aligned}$$

  - Key assumption: (k,z,q) know. Ex: $\frac{u_n(c,n)}{u_c(c,n)} = (1-\alpha)\frac{y}{n}$.

Main Idea

Nonobservable Shocks ("Sloppy") and No Learning

- Assumption: z and q are not observed $\Rightarrow$ k is not observed either.
- State variables: $f^k, f^z, f^q \rightarrow$ beliefs on distributions of capital, productivity and investment shocks (update f^k):

$$\bar{V}\left(f^k, f^z, f^q\right) = \mathbb{E}\left[V\left(k, z, q\right) | f^k, f^z, f^q\right].$$

- Decision based on expectations $\Rightarrow$ **Expectational errors**.
  - Ex: $\mathbb{E}\left[\frac{u_n(c,n)}{u_c(c,n)}\right] = (1-\alpha)\,\mathbb{E}\left[\frac{y}{n}\right]$.
- Add learning $\Rightarrow$ very difficult problem to solve where structure of information revelation and timing of decisions is very important.

3. Nicely micro-founded. Importance of being very clear in intuition and timing. Specially given DSGE structure of model which is relevant for monetary policy issues.

Points on Numerical Experiments

- Business Cycles $\longrightarrow$ Role of IST shocks on output attenuated by uncertainty.

4. Interesting results that should be emphasized. Still skeptical about mechanisms.

- Uncertainty and Monetary Policy: Correct Beliefs
  - Changes in policy: TFP: if inflation crucial for monetary policy / IST: in response to output, but no inflation.

5. Main message of the paper $\Rightarrow$ Still skeptical on how to interpret some things. Great if something said about optimal policy.

- Twisted Beliefs
  - "Twisted beliefs can significantly weaken (or strengthen) the effectiveness of monetary policy. It is especially important when monetary authority tries to stimulate the economy during recessions."

6. Interesting point $\longrightarrow$ Emphasize