Private News and Monetary Policy

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Introduction

- Central banks' communication strategies have been changing from secrecy to greater transparency (Yellen, 2012 and 2013).
- Forward guidance has been extensively used particularly since the onset of the global financial crisis.
- The literature of optimal policy in New Keynesian models emphasizes the importance of commitment to a state-contingent, future action plan.
  - Expectations of future economic variables matter.
  - "Managing expectations"

Introduction

- Is it always good to provide to the private sector more information that makes future policy actions more predictable in these models?
- Future policy actions depend on the realization of *future* economic conditions.
  - Changes in (shocks to) the policy objectives
  - Changes in (shocks to) economic fundamentals
- Q: If a central bank has superior information about these shocks, should it reveal and respond to these *private news*?
- A: *Not always*. Additional information can destabilize expectations.

Our approach

- News shocks are added to an otherwise standard New Keynesian model.
- Shocks to a Phillips curve/the policy objective/the natural rate (at ZLB).
- Theoretically show secrecy is optimal in purely forward-looking, linear models.
- Numerically examine the welfare effects of revealing news in various models with or without frictions.

Literature

- Empirical literature of private information on the part of CB's:
  - Romer and Romer (2000): "the Federal Reserve has considerable information about inflation beyond what is known to commercial forecasters."
  - Fujiwara (2005) — professional forecasters' forecasts tend to be revised following a revision of central bank forecasts.
  - Campbell, Evans, Fisher, and Justiniano (2012) suggest the importance of "Delphic" forward guidance:
    - Publicly stating "a forecast of macroeconomic performance and likely or intended monetary policy actions based on the policymaker's potentially superior information about future macroeconomic fundamentals and its own policy goals". It "does not publicly commit the policymaker to a particular course of action."

Literature

- Being secretive about superior info. may be – but not always – beneficial in some theoretical models:
  - E.g. Morris and Shin (2002), Angeletos and Pavan (2007), Cukierman and Meltzer (1986).
  - Differences:
    — No information asymmetry within private agents.
    — Focus is on news in forward-looking NK models.
- Closely related to Fujiwara and Waki (2017), “Fiscal forward guidance”:
  - The welfare effects of fiscal news shocks
  - Revealing non-distortionary shocks (spending) is welfare-improving while knowing distortionary shocks (taxes) is detrimental to welfare.

Today's talk

- Theoretical results with simple NK models
  - Optimality of secrecy in purely forward-looking models
  - The main mechanism
- Numerical experiments with general DSGE models

Theoretical results with simple NK models

Simple NK models

- Agents:
  - Private agents: the rep. household and monopolistically competitive firms
  - Central bank
- Purely forward-looking, i.e. with no endogenous state variables
- Information:
  - PAs observe contemporaneous shocks and are homogeneously informed.
  - CB has superior information about future shocks.
- Results: being secretive is optimal!
  - Both under the optimal commitment policy and under the Taylor rule

Environment

- LQ framework with a benevolent CB.
- Ex ante welfare loss:

$$\mathbb{E}\sum_{t=0}^{\infty}\beta^t\left\{\pi_t^2+\lambda x_t^2\right\}.$$

- The New Keynesian Phillips curve (NKPC)

$$\pi_t \quad = \quad \kappa x_t+\beta\mathbb{E}_t^P[\pi_{t+1}]+u_t.$$

- The dynamic IS equation:

$$x_t \quad = \quad \mathbb{E}_t^P[x_{t+1}]-\frac{1}{\sigma}\{i_t-\mathbb{E}_t^P[\pi_{t+1}]-r_t^n\}.$$

- $\mathbb{E}_t^P$: the private sector's expectation

The standard formulation of the optimal policy problem

- Minimizes the social loss subject to the NKPC.
- Dynamic IS equation is redundant.
- Information sets for PAs are exogenous and identical to CB's.
- Time-t variables depend only on the time-t information. (**Information constraint**)

What is new in the present setting

- Superior information on the part of CB
- The private sector's information sets will be affected if:
  - CB (credibly) communicates its private information, or
  - CB's actions utilize its private information.
- Our main result is that CB finds it optimal to commit not to do either.
  - Step 1: Taking the private sector's information sets as given, CB finds it optimal not to utilize its superior information.
  - Step 2: The more informed the private sector, the bigger ex ante welfare loss the optimal commitment policy achieves.

Result 1

Taking the PAs' information sets as given, CB finds it optimal not to use its superior information.

- Relax the information constraint in the standard formulation.
- Information sets for the private agents are still exogenous.
- CB's information sets are larger and CB is allowed to choose inflation and the output gap so that they can depend on the information known to CB.
- The solution to this problem depends only on the information available to the private sector and not on the CB's superior information.

Proof

- Pick any $\{(\pi_t, x_t)\}_{t=0}^{\infty}$ that satisfies the NKPC:

$$\pi_t = \kappa x_t + \beta \mathbb{E}_t^P[\pi_{t+1}] + u_t, \quad \forall t.$$

$$\Rightarrow \mathbb{E}_t^P[\pi_t] = \kappa \mathbb{E}_t^P[x_t] + \beta \mathbb{E}_t^P\left[\mathbb{E}_{t+1}^P[\pi_{t+1}]\right] + u_t, \quad \forall t.$$

- Let $\{(\tilde{\pi}_t, \tilde{x}_t)\} := \{(\mathbb{E}_t^P[\pi_t], \mathbb{E}_t^P[x_t])\}$. Then
  - It satisfies the NKPC, and
  - For all t, $(\tilde{\pi}_t, \tilde{x}_t)$ depends only on the time-t information for PAs.
- Jensen's inequality implies

$$\mathbb{E}[\tilde{\pi}_t^2 + \lambda \tilde{x}_t^2] \leq \mathbb{E}[\pi_t^2 + \lambda x_t^2], \quad \forall t.$$

- Equality if and only if $\tilde{\pi}_t = \pi_t$ and $\tilde{x}_t = x_t$ with probability one.

Result 2

PAs' information sets $\uparrow \Rightarrow$ ex ante welfare loss $\uparrow$

- Consider the standard commitment problem formulation where information sets for the private agents $\{I_t^P\}$ are exogenous.
- Compare two economies with $I_t^{P,LESS} \subset I_t^{P,MORE}$ always.
- Minimized ex ante welfare loss is lower in the economy with $\{I_t^{P,LESS}\}$.

Proof

- $\{\pi_t, x_t\}$ — optimal commitment policy in the economy with $\{I_t^{P,MORE}\}$.
- It satisfies
$$\pi_t = \kappa x_t + \beta \mathbb{E}[\pi_{t+1} | I_t^{P,MORE}] + u_t.$$
- Let
$$(\tilde{\pi}_t, \tilde{x}_t) = (\mathbb{E}[\pi_t | I_t^{P,LESS}], \mathbb{E}[x_t | I_t^{P,LESS}]).$$
- Then
$$\tilde{\pi}_t = \kappa \tilde{x}_t + \beta \mathbb{E}[\tilde{\pi}_{t+1} | I_t^{P,LESS}] + u_t,$$
and
$$\mathbb{E}[\tilde{\pi}_t^2 + \lambda \tilde{x}_t^2] \leq \mathbb{E}[\pi_t^2 + \lambda x_t^2].$$
- $\{(\tilde{\pi}_t, \tilde{x}_t)\}$ is in the constraint set in the economy with $\{I_t^{P,LESS}\}$: $\{\pi_t, x_t\}$ and achieves lower welfare loss than $\{\pi_t, x_t\}$.

An intuition

- Additional information about future shocks increases volatility.
- Reason: Inflation expectation moves with the additional information.
- This increases the variability of inflation and the output gap through the forward-looking NKPC, which is undesirable.

An illustrative example: complete stabilization of the output gap

- Full stabilization of the output gap at zero: $x_t = 0$ for all t.
- Solving the NKPC forward, for all t,

$$\pi_t = \mathbb{E}_t^P[\sum_{s=t}^{\infty} \beta^{s-t} u_s].$$

- Information possessed by PAs is the determinant of inflation.
- Suppose that $\{u_t\}$ is a mean zero IID shock with variance σ^2.
- What happens if the n-period ahead shock is observable?

When future shocks are unobserved ($n = 0$)

Because

$$\pi_t = \mathbb{E}_t^P[\sum_{s=t}^{\infty} \beta^{s-t} u_s],$$

we have

$$\begin{aligned} \pi_t &= u_t, \quad \forall t, \\ \mathbb{E}_t^P[\pi_{t+1}] &= 0, \quad \forall t, \\ \mathbb{E}[\pi_t^2] &= \sigma^2, \quad \forall t. \end{aligned}$$

When future shocks are observed ($n \geq 1$)

Because

$$\pi_t = \mathbb{E}_t^P[\sum_{s=t}^{\infty} \beta^{s-t} u_s],$$

we have

$$\begin{aligned} \pi_t &= u_t + \beta u_{t+1} + ... + \beta^n u_{t+n}, \quad \forall t, \\ \mathbb{E}_t^P[\pi_{t+1}] &= u_{t+1} + \beta u_{t+2} + ... + \beta^{n-1} u_{t+n}, \quad \forall t, \\ \mathbb{E}[\pi_t^2] &= \frac{1-\beta^{2(n+1)}}{1-\beta^2}\sigma^2 > \sigma^2, \quad \forall t. \end{aligned}$$

- Inflation expectations become more volatile.
- News shocks act as an additional disturbance.

Counter-intuitive?

- Shouldn't additional information result in better decision making and improve welfare?
- u_t is a shock that hits the profit function of firms (the "mark-up" shock).
- Taking the aggregate price and the real wage processes as given, the firms' profit increases with additional information.
- Social costs of inflation in the NK model here $=$ price dispersion
- The firms do not internalize the social costs. Profit-increasing $\neq$ welfare-improving.
- In our "Fiscal forward guidance" paper, distortionary tax news shocks have a negative welfare effect for the same reason.

Time inconsistency

- Committing to disclosing no such information is ex ante optimal.
- However it is time-inconsistent.
- In the full-stabilization-of-x example:

$$\pi_t = \begin{cases} u_t, & \text{if } n = 0, \\ u_t + \beta u_{t+1}, & \text{if } n = 1. \end{cases}$$

- When the **realized value of** $|\beta u_{t+1} + u_t|$ happens to be smaller than the **realized value of** $|u_t|$, π_t^2 is lower for $n = 1$.
- Ex post gains from information disclosure
- Additional gains from commitment

Robustness

Robustness: optimal commitment policy

- Theoretical result extends to NK models that are (log)**linear** and have **no endogenous state variables**:
  - A general strictly convex loss function: $L(\pi, x)$
  - A shock to the CB's objective
  - An effective lower bound on the nominal interest rate
- The result for markup news shocks is confirmed numerically in two LQ models with endogenous state variables:
  - A model with backward price indexation, and
  - A model with capital accumulation.

A three-equation model

A three-equation model

- What if the monetary policy follows a Taylor rule?
- In addition to the mark-up shock, shocks to the natural rate of interest and to monetary policy affect the economy.
- In a three-equation NK model, additional information about **any** future shocks is shown to reduce ex ante welfare.
- For general DSGE models with many shocks and frictions, we use numerical experiments.

A three-equation model

- The New Keynesian Phillips curve (NKPC)

$$\pi_t = \kappa x_t + \beta \mathbb{E}_t^P[\pi_{t+1}] + u_t.$$

- The dynamic IS equation:

$$x_t = \mathbb{E}_t^P[x_{t+1}] - \frac{1}{\sigma}\{i_t - \mathbb{E}_t^P[\pi_{t+1}] - r_t^n\}.$$

- Taylor rule:

$$i_t = \bar{i} + \phi_t^\pi \pi_t + \phi_t^x x_t + \epsilon_t.$$

Result 3

The more informed the private sector about any future shocks, the bigger ex ante welfare loss.

Numerical experiments with general DSGE models

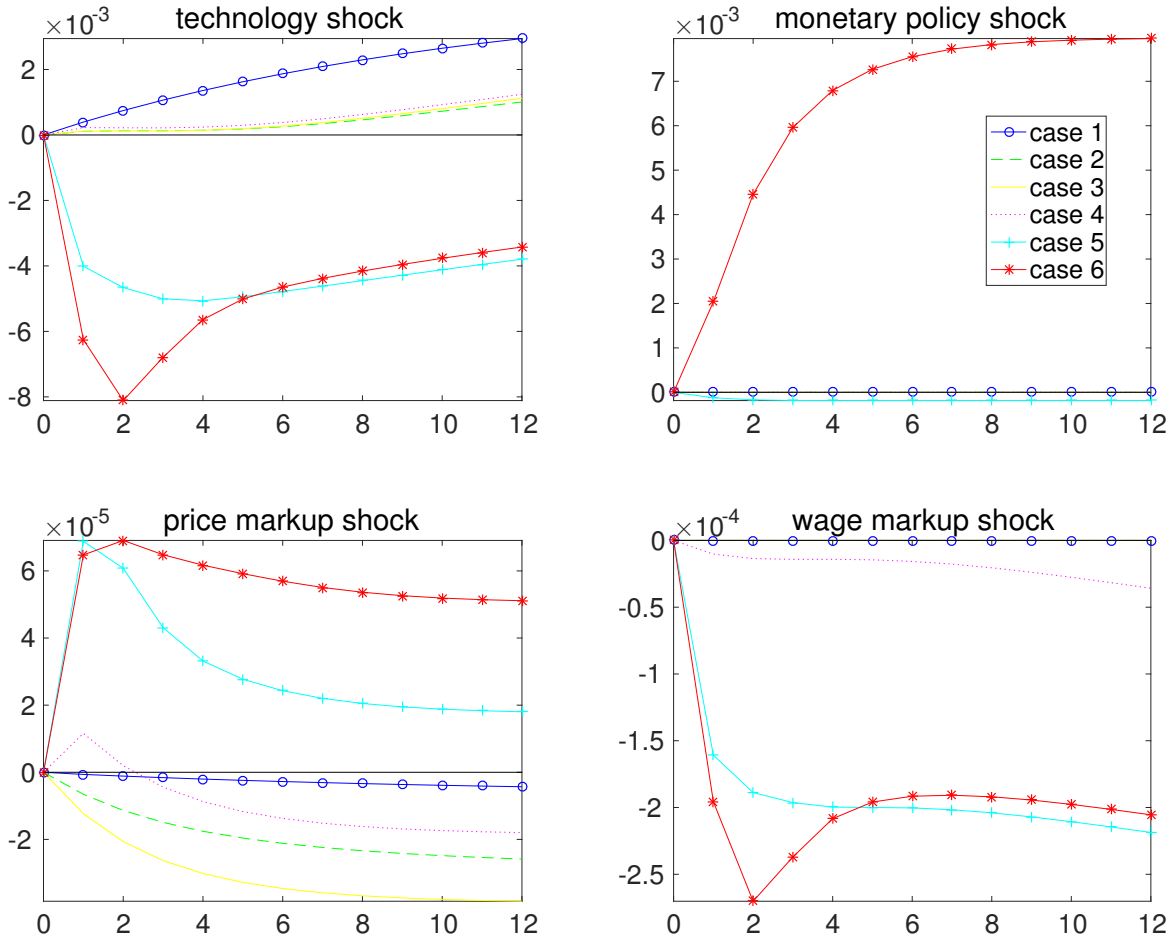
Numerical experiments with general DSGE models

- Over a range of New Keynesian models, helping the private sector form more accurate forecasts of future shocks is undesirable.
- We evaluate whether secrecy remains optimal policy in general DSGE models.
- There are differences from previous experiments:
  - multiple distortions
  - multiple (*efficient* as well as *inefficient*) shocks
- We compute conditional welfare (CEV) with different news horizon n.

Models examined

- We examine six models:
  - Case 1: Simple RBC model
  - Case 2: Case 1 + investment growth adj. cost
  - Case 3: Case 2 + external habit in consumption
  - Case 4: Case 3 + sticky wages
  - Case 5: Case 4 + sticky prices
  - Case 6: Case 5 + policy inertia
- There is no friction in Cases 1 and 2.
- Case 6 is the standard DSGE model based on Christiano, Eichenbaum and Evans (2005) and Smets and Wouters (2003, 2007).
- With distortions, even technology shocks may create inefficiencies.

Welfare gains in CEV by news horizon *n*



Summary: General DSGE models

- *Delphic* forward guidance about efficiency (distortionary) shocks is beneficial (detrimental) to social welfare.
  - In Cases 1 and 2, welfare increases with n for the technology shock, but it decreases for the markup shock.
- It becomes a nontrivial task to offer central banks general and simple policy prescriptions for information strategy about private news when realistic frictions and rigidities are present.
  - In Cases 4 to 6, even a technology shock can cause inefficient markup fluctuations
- No pressing need is necessary for *Delphic* forward guidance.
  - Welfare gains from revealing private news are very small even if there exists any.
  - Disclosure of news shocks is quite often detrimental to social welfare.

Conclusion

Conclusion

- In a range of NK models,
  - Making the private sector better-informed about future shocks has a negative effect on welfare, and
  - Secrecy constitutes optimal commitment policy.
- This result casts doubt on the usefulness of the *Delphic* forward guidance, if it is based on private news about future shocks.

Conclusion

Corollaries:

- CB doesn't have incentives to learn about future shocks when info. acquisition is costly.
- New source of inefficiency in NK models when the private agents obtain info. (not from CB).
  — For an atomless agent, obtaining info. about news is (weakly) beneficial.