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: *No*. Secrecy constitutes an optimal commitment policy in a range of NK models.

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 show how revealing and responding to private news are detrimental to welfare even in other models.

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).
  - Ours is new:
    — No information asymmetry within private agents.
    — Focus is on news in forward-looking NK models.
    — Result is global, not limited to a subset of the parameter space.
- News shocks as a source of economic fluctuations:
  - Beaudry and Portier (2006, 2014), Jaimovich and Rebelo (2009), Fujiwara, Hirose, and Shintani (2011), Schmitt-Grohe and Uribe (2012)
    — Focus is mainly on the role of anticipated technology shocks.
  - Milani and Treadwell (2011)
    — Estimation of an NK model with anticipated shocks hitting the Taylor rule.

Today's talk

- Set up a canonical NK model.
- Identify the main mechanism behind the optimality of secrecy.
- Work through a numerical example to understand the mechanism.
- Discuss extensions.
- Conclude.

A canonical NK model

A canonical NK model

- The model is purely forward-looking.
- Shocks to the Phillips curve only.
- Contemporaneous shocks are known to the private sector.
- A central bank has superior information about future shock.

A set-up

- Linear-Quadratic (LQ) framework (Woodford, 2003; Gali, 2005).
- A benevolent CB
  - Minimizes social welfare loss:

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

— π_t: inflation
— x_t: the output gap

  - Subject to the New Keynesian Phillips curve (NKPC):

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

— u_t: markup shock
— $\mathbb{E}_t^P$: private sector's expectation

What's behind this loss function?

- An RBC model without capital + sticky price friction
- Assume no distortion from monopolistic competition in the SS.
- Socially desirable to “mimic" the first-best allocation:
  - Max the rep. household's utility s.t. the resource constraint.
  - FB allocation is not affected by news.
- Socially desirable to achieve price stability because non-zero inflation:
  - Incurs direct costs of price changes (Rotemberg), or
  - Induces mis-allocation of production factors (Calvo).
- Second-order approximation of the rep. HH's utility implies this function.

Why is NKPC "the" constraint?

- HH's optimality condition doesn't impose an effective constraint on CB.
  - Can stabilize the output gap at zero for any inflation process.
- Does the zero output gap imply the price stability?
  - In general, no. (Exception: "divine coincidence".)
  - Price setters may have incentives to change prices even when the output gap is zero.
- “The" tradeoff in the canonical NK model.
  — Price setters' incentives are not aligned with society's.

A canonical NK model: price setters' incentives

- Price setters change their prices if either of the following changes:
  1. Marginal cost ($\sim$ the output gap in a loglinearized economy),
  2. Desired mark-up (modeled as a mark-up shock),
  3. Expected, future inflation (because of the sticky price friction).
- Summarized by the new Keynesian Phillips curve:

$$\pi_t = \kappa \underbrace{x_t}_{(1)} + \underbrace{u_t}_{(2)} + \beta \underbrace{\mathbb{E}_t^P[\pi_{t+1}]}_{(3)}.$$

- Undesirable if (2)+(3) is non-zero and fluctuates a lot.

A canonical NK model: gains from commitment

$$\pi_t = \kappa x_t + \underbrace{u_t}_{(2)} + \beta \underbrace{\mathbb{E}_t^P[\pi_{t+1}]}_{(3)}.$$

- Given the information structure, creating negative correlation between (2) and (3) is better than setting (3) to zero.
- Gains from commitment: move π_{t+1} (on average) negatively with u_t.
- Are there gains from more precise forecasts?

The effect of information revelation

- More precise forecast by the private sector **increases society's loss**.
- Based on the two results:

Result 1

A solution to the optimal commitment problem where the private sector's info. structure is fixed at the original one does not utilize CB's superior info.

Result 2

For any $\{\pi_t, x_t\}$ satisfying NKPC with "improved" info. for the private sector, can find $\{\tilde{\pi}_t, \tilde{x}_t\}$ such that

1. It is in the constraint set of the problem considered in Result 1;
2. It achieves (weakly) lower loss than $\{\pi_t, x_t\}$.

The effect of information revelation

- Reason: Inflation expectation moves with additional information about future.
- This increases the variability of inflation and the output gap.
- Hence, if information revelation about future shocks is a choice for the CB, it finds it optimal to commit to secrecy.
- Note: firms' profits may increase with information.

A sketch of the proof: Result 1

- Note that

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

- $\mathbb{E}_t^P$ is based on the "original" information.
- RHS depends only on the private sector's information.
- Let

$$(\tilde{\pi}_t, \tilde{x}_t) = (\mathbb{E}_t^P[\pi_t], \mathbb{E}_t^P[x_t]).$$

- Then

$$\tilde{\pi}_t = \kappa \tilde{x}_t + u_t + \beta \mathbb{E}_t^P[\tilde{\pi}_{t+1}],$$

(law of iterated expectation) and

$$\mathbb{E}[\pi_t^2 + \lambda x_t^2] \geq \mathbb{E}[\tilde{\pi}_t^2 + \lambda \tilde{x}_t^2]$$

(Jensen's inequality).

A sketch of the proof: Result 2

- $\{\pi_t, x_t\}$ satisfies
$$\pi_t = \kappa x_t + u_t + \beta \mathbb{E}_t^{P+}[\pi_{t+1}].$$
- $\mathbb{E}_t^{P+}$ is based on the "improved" information.
- Let
$$(\tilde{\pi}_t, \tilde{x}_t) = (\mathbb{E}_t^{P}[\pi_t], \mathbb{E}_t^{P}[x_t]).$$
- Then
$$\tilde{\pi}_t = \kappa \tilde{x}_t + u_t + \beta \mathbb{E}_t^{P}[\tilde{\pi}_{t+1}],$$
(law of iterated expectation) and
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The mechanism (only a sketch)

For a given process $\{x_t\}_{t=0}^{\infty}$, NKPC implies that improving the private sector's information results in a more volatile inflation process.

- Solving the NKPC forward,

$$\pi_t = \kappa x_t + u_t + \beta \mathbb{E}_t^P [\sum_{j=1}^{\infty} \beta^{j-1} \{\kappa x_{t+j} + u_{t+j}\}].$$

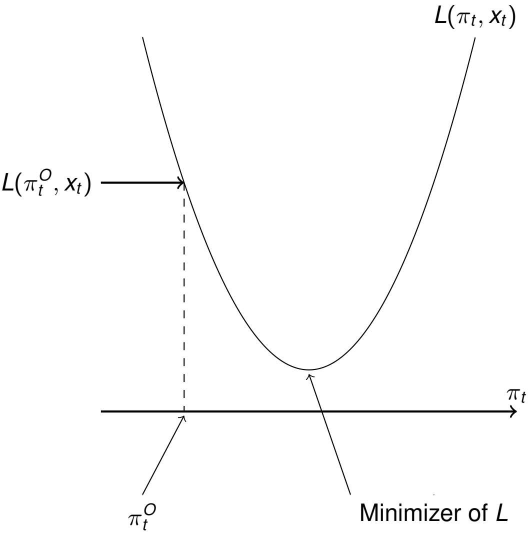
- π_t^O: conditional on the "original" info.
- π_t^I: conditional on the "improved" info.

$$\pi_t^I = \pi_t^O + \epsilon_t \text{ (updating term)}.$$

- Because $\pi_t^O \perp \epsilon_t$,

$$\mathbb{E}[(\pi_t^I)^2] = \mathbb{E}[(\pi_t^O)^2] + \mathbb{E}[\epsilon_t^2] \geq \mathbb{E}[(\pi_t^O)^2] \quad \Rightarrow \text{Higher loss!}$$

Graphical illustration (x_t is fixed)



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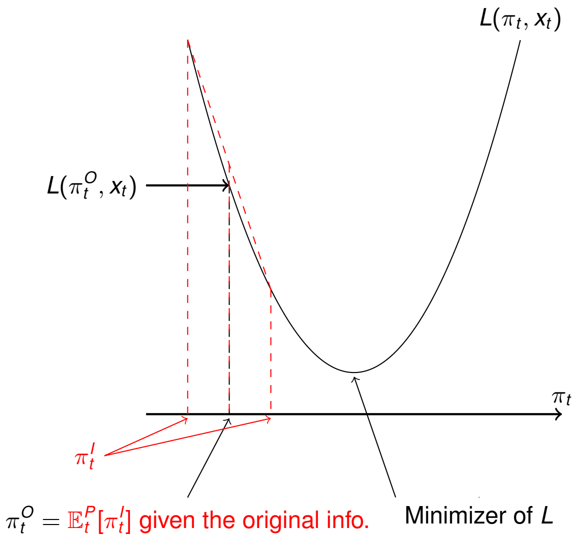

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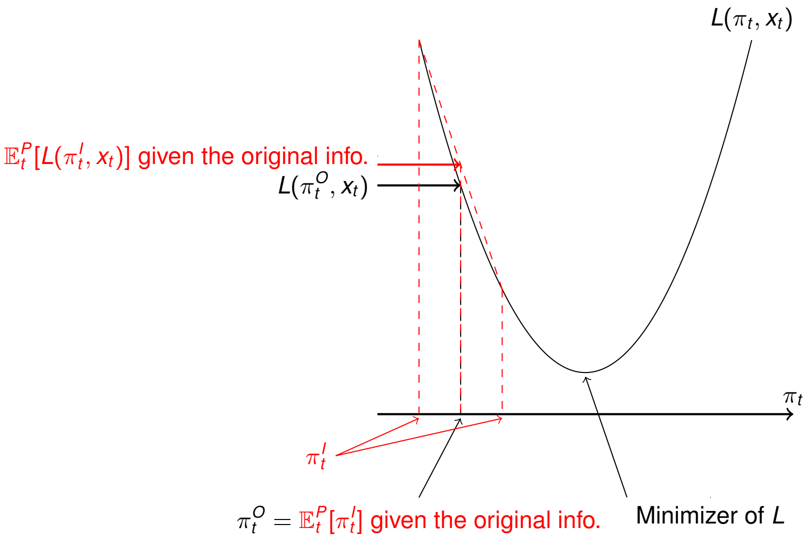


Optimal commitment policy: a numerical example

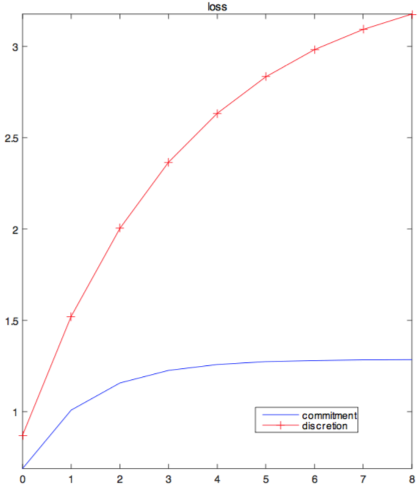
- How does optimal commitment policy change as the private sector has more access to future shock information?
- Experiment: private sector observes the n-period ahead cost-push shock.
- Vary n and solve for the optimal policy for each n.
- Assume: cost-push shock is iid over time and has mean 0.
- Parameterization is standard (see the paper).

Role of commitment

- Undesirability of information revelation
  $\leftarrow$ Variance of the "updating" term ≥ 0.
- With commitment, CB can reduce this variance by reducing future inflation's dependence on shocks that are anticipated.
- This increases the output gap response.

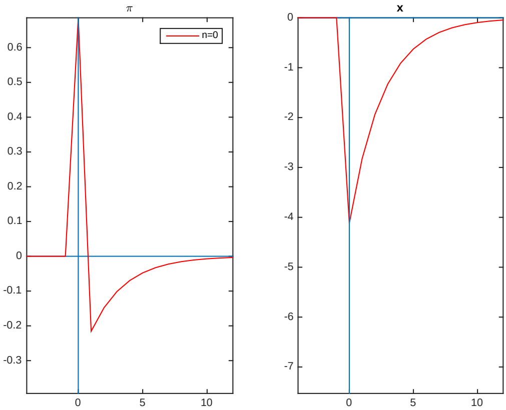
Welfare loss increases with n

Welfare loss vs. n.



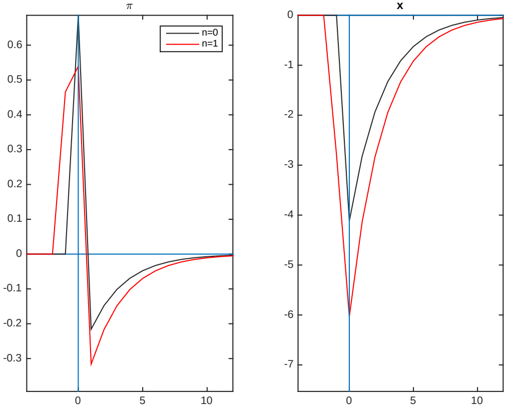
Gains from commitment also increase with n.

Impulse response under optimal commitment policy



- Inflation response at 0 decreases with *n*.
- Responses before and after 0 change.

Impulse response under optimal commitment policy



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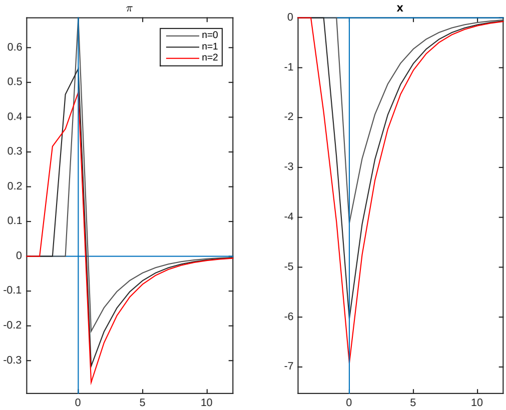

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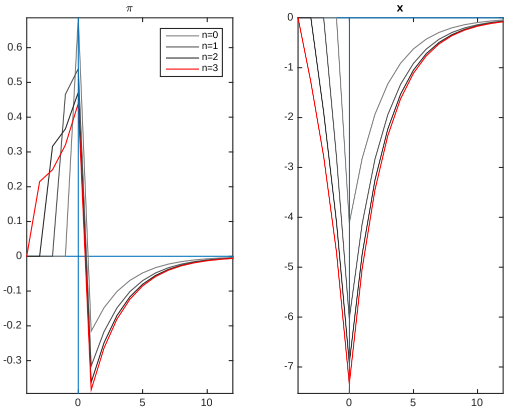

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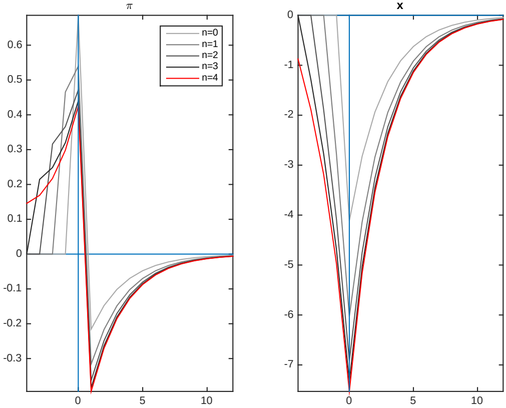

- Inflation response at 0 decreases with *n*.
- Responses before and after 0 change.

Discussion

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- In the canonical NK model, optimal commitment policy features secrecy about future shocks.
- Generalizes to any strictly convex loss function: $L(\pi, x)$.
- Theoretical result extends to NK models that are (log)**linear** and have **no endogenous state variables**.
- Ex. 1: CB's objective is hit by a shock.
- Ex. 2: Nominal rate has an effective lower bound and the natural rate shock hits. (Eggertsson and Woodford, 2003.)
- Ex. 3: Taylor rule coefficients change randomly.

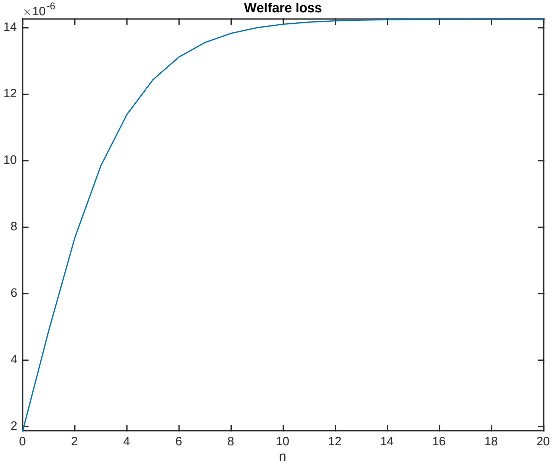
Robustness: models with endogenous state variables

- Early resolution of risk may have some benefits when a model has endogenous state variables.
- E.g. households can adjust their capital with anticipated, future shocks.
- We compute optimal commitment policy in two LQ models:
  - A model with backward price indexation.
  - A model with capital accumulation.
- Welfare loss increases when more future markup shocks are known to the private sector in advance.
- Future work: models with preferences for early resolution of risk.

Robustness: nonlinear models

- Theoretical results rely on the loglinear NKPC.
- Small shocks and modest nonlinearity won't change the results.
- Our results still hold for a nonlinear, canonical NK model using 2nd order approximation of the Ramsey policy.

A nonlinear Calvo model: welfare loss increases with *n*



Conclusion

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- In a range of NK models, making the private sector better-informed about future shocks has a negative effect on welfare.
- 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 atomic agent, obtaining info. about news is (weakly) beneficial.

Future research

- Information revelation in fully nonlinear, full-fledged NK models.
- Cf. Fujiwara and Waki (2015b): a nonlinear model with fiscal news.