Forward Guidance: Communication, Commitment, or Both?

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The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Chicago or the Federal Reserve System

Campbell, Evans, Fisher, Justiniano (2012)

Distinction between:

- "Odyssean" forward guidance: meant as a form of commitment
- "Delphic" forward guidance: central bank has superior information, reveals it to the public

Forward Guidance as Cheap Talk

- Forward guidance: a set of statements about *likely future policy* that:
  - does not directly constrain central bank actions
  - does not directly change future decision process
  - does not directly affect payoffs

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- Forward guidance is cheap talk (in the technical sense)

Goal of this Project

- When does forward guidance work?
- How does it work?
- What does it communicate?

Necessary Ingredients for a Model

- A monetary game
- Expectations about future policy must be important
- Must study repeated interaction (the role of credibility, reputation, "embarrassment")
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- Must study repeated interaction (the role of credibility, reputation, "embarrassment")
- Must be simple enough to be transparent
- Will work with (a variant of) the Barro-Gordon model
- Insights carry over to standard DSGE models...
- ... with no need to deal with complications (neo-Fisherian solutions, fiscal theory,...)

The Model: Shocks

- Potential output $\hat{y}_t$
- Inflation target π_t^*
- Sunspot (public randomization device) s_t (only for technical reasons)

Timing

- At time 0: Nature draws $\{\hat{y}_t, \pi_t^*, s_t\}_{t=0}^{\infty}$
- At time t:
  - Government, private sector receive information: filtration $\mathcal{G}_t$ and $\mathcal{F}_t$
  - Government may send messages $M_t \in \mathcal{M}$
  - Households set their expectations y_t^e, π_t^e (either no heterogeneity or aggregation through linearity).
  - Government sets inflation π_t
  - Output realized
  - Households observe gov't information

The Phillips curve

$$y_t = \theta \hat{y}_t + (1-\theta) y_t^e + \lambda(\pi_t - \pi_t^e).$$

- $\hat{y}_t$: potential output
- In Barro-Gordon, $\theta = 1$
- $\theta < 1$ allows imperfect information about $\hat{y}_t$ to matter

Gov't loss function, household behavior

$$E \sum_{t=0}^{\infty} \beta^t \left\{ (y_t - \hat{y}_t - k)^2 + \alpha [\pi_t - \pi_t^* - f(\hat{y}_t)]^2 \right\}$$

- As in Barro-Gordon, k distortion implies gov't wants to overstimulate
- Allow for inflation-output interaction through $f(\hat{y}_t)$
- $f(\hat{y}_t) \not\equiv 0$ will mean that optimal ex ante inflation is not constant wrt output

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- Households set

$$y_t^e = E[y_t|\mathcal{F}_t, m_t]$$

$$\pi_t^e = E[\pi_t|\mathcal{F}_t, m_t]$$

▸ Go to definition of strategies, equilibrium

Equilibrium set

- Big in general (trigger strategies, tit-for-tat, repeated Nash, multiple possible partitions,...)
- Can be computed using Abreu-Pierce-Stacchetti methods.

Road map

- Study a sequence of economies
- In the first one, messages are redundant
- In the second one, they have an important role, but they are not about policy
- Finally, in the last two forward guidance emerges

A Simple Model without Private Information

- Assume $\mathcal{F}_t = \mathcal{G}_t$
- Government has no information advantage over the private sector

An Equivalence Theorem

- Compare a case in which $\mathcal{M} = \emptyset$ (no messages) and one where $\mathcal{M} \neq \emptyset$
- In both games, equilibrium strategies induce a prob. distr. over equilibrium sequences for $\{\pi_s, y_s\}_{s=0}^{\infty}$.
- The set of prob. distr. over equilibrium sequences is the same in the two games
- Forward guidance is a redundant instrument

Intuition

- Public announcement is supposed to cause "embarrassment" if policy deviates (Odyssean forward guidance)
- But everybody knows what the right action is
- Trigger based directly on action
- No need to speak, but just to *act!*

Go to example

Adding private information about the Economy

- Assume gov't observes same info as households + advance signal $\tilde{y}_t$
- Assume $f(\hat{y}_t) \equiv 0$ (that is, optimal policy π_t^* is independent of output)

▸ What if $f(\hat{y}_t) \not\equiv 0$?

Optimal Policy under Commitment (before observing $\tilde{y}_0$)

- Reveal signal truthfully: $m_t = \tilde{y}_t$;
- Set inflation to π_t^*.
- Note: announcement strictly improves welfare (cheap talk is essential)

Result under discretion

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- When β close to 1 or gov't info sufficiently more precise than private, sending messages expands set of equilibrium payoffs
- When β close to 1 and $\bar{\pi}$ (maximal possible inflation) sufficiently high, sending messages only expands towards high payoffs

▸ More details

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- In the example, when best=commitment, policy (inflation) unaffected by information
- Reporting policy would not substitute for direct report of information

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- Symmetric info about $\hat{y}_t$; for simplicity, assume $f(\hat{y}_t) \equiv 0$
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- Symmetric info about $\hat{y}_t$; for simplicity, assume $f(\hat{y}_t) \equiv 0$
- Asy info about π_t^*
- Given policy, private sector has all the info needed to take decisions
- Asy. info only relevant for forecasting CB policy

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- Announce truthfully $m_t = \pi_t^*$;
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- Forward guidance is directly about CB policy

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- Forward guidance is directly about CB policy
- With β sufficiently close to 1 or target sufficiently dispersed, cheap talk valuable under discretion, expands set of eq. payoffs

Delphic forward guidance: asy info over beliefs

- Assume symmetric info about π_t^*
- Households observe $\hat{y}_t$ perfectly (only need better than gov't)
- Gov't observes imperfect signal $\tilde{y}_t$

Optimal Policy under Commitment (best equilibrium outcome for large β)

- Two options:
  - Announce truthfully $\tilde{y}_t$
  - Announce $\pi_t^* + E[f(\hat{y}_t)|\mathcal{G}_t]$
- Set inflation to $\pi_t^* + E[f(\hat{y}_t)|\mathcal{G}_t]$

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What Does this Suggest about Forward Guidance in Practice?

- Can communicate insights into decision process
- Can signal agreement, disagreement among policymakers
- Can signal models policymakers believe in (Krugman-Woodford-Eggertsson)

Conclusion

- Forward guidance useful when CB has superior information about its preferences and beliefs
- Credibility and forward guidance interact, but are not the same

Histories and Strategies

- A (public) history at the message stage is $h^t := \{m_s, \pi_s\}_{s=0}^{t-1}$.
- A (public) history at the expectations-setting stage $h^{et} := (\{m_s, \pi_s\}_{s=0}^{t-1}, m_t)$
- Set of histories: H^t, H^{et} (use Borel σ-algebra)
- Underlying state of nature: ω
- A CB strategy is a $\mathcal{G}_t$-measurable mapping σ^g from (Ω, H^t) into a distribution over $\mathcal{M}$, and from (Ω, H^{et}) into a distribution over $[\underline{\pi}, \bar{\pi}]$
- A (symmetric) household strategy is a $\mathcal{F}_t$-measurable mapping σ^p from (Ω, H^{et}) to $[\underline{\pi}, \bar{\pi}] \times [y^\ell, y^h]$

From strategies to outcomes

- Given a pair (σ^g, σ^p)...
- ... obtain a probability distribution over histories (ω, H^∞)

Equilibrium (using one-deviation principle)

- A strategy profile (σ^g, σ^p) such that:
- Given any (ω, h^t) and given that future play will occur according to σ^g, σ^p, any message in the support of $\sigma^g(\omega, h^t)$ is optimal for gov't
- Given any (ω, h^{et}) and given that future play will occur according to σ^g, σ^p, any inflation rate in the support of $\sigma^g(\omega, h^{et})$ is optimal for gov't
- Given any (ω, h^{et}) and σ^g,

$$y_t^e = E[y_t | \mathcal{F}_t, m_t; \sigma^g]$$

$$\pi_t^e = E[\pi_t | \mathcal{F}_t, m_t; \sigma^g]$$

Back to equilibrium set

An example

- Set $\lambda = 40$, $\hat{y} = 0.01$, $\beta = 0.96$, $\pi^* = 0.02$, $\alpha = 1$
- One equilibrium (trigger strategy):
- CB offers "forward guidance" that inflation will be 2%;
- Private sector believes announcement if and only if previous announcements were truthful (and announced value less than 43%)
- Otherwise, private sector disregards announcement, expects repeated Nash, 43%
- CB sets π_t equal to announcement (2%) if truthful in the past (and announcement less than 43%), to 43% otherwise

Equilibrium without Cheap Talk

- Private sector expects 2% inflation, unless different inflation rate occurred in the past
- Otherwise, private sector expects 43%
- CB sets π_t to 2% if it never deviated from 2% in the past, to 43% otherwise

Back to no private information

Intuition

- Folk theorem (for β), standard cheap talk (for y^{ℓ})
- Why no expansion towards low payoffs? Announcements...
  - Improve best payoff, allow for better continuation promises after punishment stage of worst
  - Tighten incentive-compatibility constraint of worst, harder to punish gov't (may both misreport and choose different inflation)

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- Folk theorem (for β), standard cheap talk (for y^ℓ)
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  - Improve best payoff, allow for better continuation promises after punishment stage of worst
  - Tighten incentive-compatibility constraint of worst, harder to punish gov't (may both misreport and choose different inflation)
  - For high $\beta, \bar{\pi}$, continuation of worst is not best, first element not present

▸ Back to Delphic announcements

Announcements when $\hat{y}_t$ affects optimal inflation

- Under commitment, $\pi_t = \pi_t^* + E[f(\hat{y}_t)|\mathcal{G}_t]$
- Announcement about π_t would reveal information
- Still imperfect, households would want to know signal
- ... also more natural, when people really care about state

▸ Back to Delphic announcements