Central Bank Forward Guidance and the Signal Value of Market Prices

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Two way flow:

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- But market prices inform the central bank on \textit{where} to steer the economy.
paul samuelson and the “reflection problem”

• Samuelson (1994) at Boston Fed:

When Dr Greenspan says he must do this or that to be in accord with the bond market, I am reminded of a monkey who for the first time has seen a mirror. He sees an image of himself in the mirror and thinks that by looking at the reactions of that monkey – including its surprises – he is getting new information. Well, what Greenspan is getting from the market is what the market heard Greenspan say before.
central bank communication and commitment

- Communication:

  - Communication problem arises when CB communication is about future policy actions (forward guidance).
  - More weight on forward guidance as policy rates have hit the effective lower bound.

- Commitment:

  - Time consistency of actions: will central bank follow through on high interest rates after lowering inflationary expectations?
  - Time consistency in choice of information set: use of market signal reduces the informativeness of market signal....
  - CB gains from committing to reduced weight on market signals, focusing on non-market information.
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The more CB relies on market signal, the less market participants incorporate private signal, rendering market signal less informative.

Lesson: CB must strike a balance between market information and other information.

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• the central bank chooses an action $r$
• private sector agents choose actions $a_i$ in anticipation of central bank action and the central bank can condition on them as well as $z$
• central bank wants to set action appropriate for fundamentals: it minimizes

$$(r - \theta)^2$$
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• market participants want (mostly) to guess central bank action but also (a bit) to match fundamentals: agent \(i\) minimizes

\[w (a_i - r)^2 + (1 - w) (a_i - \theta)^2;\]

where \(w \approx 1\)... we will consider limit as \(w \to 1\) (limit \(w = 1\) case will be degenerate)
market participant actions depend on CB reaction function

- central bank reaction function

\[ r = \lambda \bar{a} + (1 - \lambda) z \]

where \( \bar{a} \) is market signal (average action) and \( \lambda \) is "weight on market"
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- market participant \( i \)'s strategy
  \[ a_i = w E_i(r) + (1 - w) E_i(\theta) \]
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  \[ = \xi x_i + (1 - \xi) y \]
  with "informativeness"
  \[ \xi = \tilde{\xi}(\lambda) = \frac{\beta (1 - w \lambda)}{\alpha + \beta (1 - w \lambda)} \]
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- "reflection effect":
  - high \( \lambda \) and high \( w \) reduce \( \xi \)… etc.
  - in \( w \to 1 \) limit, as \( \lambda \to 1 \), we have \( \xi \to 0 \), rendering market signal uninformative
- \( w = 1, \alpha = 1, \beta = 2, \gamma = 1 \)
solution with commitment: Odyssean or Stackelberg

- CB chooses $\lambda$ to minimise

$$\lambda^2 (1 - \xi)^2 \frac{1}{\alpha} + (1 - \lambda)^2 \frac{1}{\gamma}$$

subject to $\xi = \tilde{\xi} (\lambda)$. 

![Diagram](image-url)
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- Stackelberg equilibrium $\lambda^* = 0.63$ and $\xi^* = 0.42$
solution without commitment: Delphic or Cournot

- CB chooses $\lambda$ as a best reply to $\xi$

$$\lambda = \frac{\alpha}{\alpha + \gamma (1 - \xi)^2}$$
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- Nash Equilibrium $\lambda^{**} = 0.71 > \lambda^*$ and $\xi^{**} = 0.36 < \xi^*$
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$$\lambda^2 \frac{\alpha}{(\alpha + \beta (1 - w \lambda))^2} + (1 - \lambda)^2 \frac{1}{\gamma}$$
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\[
\chi^2 \frac{\alpha}{(\alpha + \beta (1 - w \lambda))^2} + (1 - \lambda)^2 \frac{1}{\gamma}
\]

same conclusion about forward guidance if CB puts weight on \( (\bar{a} - \theta)^2 \) as well as \( (r - \theta)^2 \)