Market-friendly Central Bankers and the Signal Value of Prices

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RBNZ Macro-Finance Conference
13-14 December 2018

How aloof should central banks be from financial markets?

- *"...Central bankers are only human; they want to earn high marks – from whomever is handing out the grades... the markets provide a giant bio-feedback machine that monitors and publicly evaluates the central bank's performance in real time. So central bankers naturally turn to the markets for instant evaluation."*

  Alan S. Blinder (1998)

- There is a risk that central banks dutifully deliver on the policies implied by asset price signals.

Dual role of market prices for monetary policy

- Should the central bankers be independent of the financial market?
  - Market prices reveal the collective wisdom of all agents in the economy;
  - But markets tend to run in herds and adopt excessively short time horizons for investment decisions.

Monkey in the mirror

"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, that the Fed is getting worried about inflation, independently worried."

Paul Samuelson (1994)

Reflection problem

- When central banks follow market forecasts which, in turn, are based on the central bank's assessment of the economic outlook, the potential circularity can lead to excessively volatile monetary policy.
  - Woodford and Bernanke (1997) – non-existence of equilibrium.
  - Bond, Goldstein, Prescott (2010) – multiple equilibria.
  - Morris & Shin (2018) – reflection problem in the context of forward guidance.

Contribution

- Our paper formalises Blinder's concern, and uses the Morris & Shin (2018) framework to ask when asset prices reveal useful information and when they reflect back the central bank's pronouncement.
- Draws lessons for how independent central banks should be from financial markets. Results echo Stein and Sunderam (2017).
- Morris and Shin (2018) assume that the monetary policy rule depends on market signals and private information of the central bank. Public information is treated as a "fad".
  - We allow the monetary policy rule to include both public information (the "inflation forecast") as well as central bank private information.

Model ingredients

- Market participants each have private information about economic fundamentals, as well as a noisy public signal.
- Central bank bases its monetary policy rule on the market signal (average action of financial market participants), public information and information that is private to the policymaker.
- Central bank aims to match fundamentals; market participants aim to match CB's monetary policy as well as the fundamentals.
- Social planner aims to ensure that the collective wisdom of market participants is as closely aligned to the fundamentals as possible.

Key insights

- Central bank optimally displays excess dependency on financial market signals.
  - Beyond the level that a social planner would exhibit.
  - That is, CB becomes too market-friendly.
- The reliance on financial market signals is self-defeating.
  - In trying to match CB's action, market participants over-weight public information and underweight own private information.
  - Due to an exaggerated "beauty contest" effect, in the spirit of Morris and Shin (2002).
  - Hence information value of financial prices in equilibrium is diminished.

Model

- A central bank + a continuum of market participants.
- Fundamental state θ has a diffuse (uniform) distribution.
- Central bank observes a private signal $z = \theta + \nu$ where $\nu \sim \mathcal{N}(0, \gamma^{-1})$.
- Market participants observe private signals $x_i = \theta + \epsilon_i$ where $\epsilon_i \sim \mathcal{N}(0, \beta^{-1})$.
- The public signal $y = \theta + \eta$, where $\eta \sim \mathcal{N}(0, \alpha^{-1})$, is common knowledge among all agents.
- The central bank chooses its monetary policy rule r.
- Financial market participants choose actions a_i in anticipation of central bank action and the central bank can condition on them as well as y and z.

Payoffs

- Central bank aims to minimise the quadratic loss in the distance between its action and the fundamentals:

$$L_{CB} = (r - \theta)^2.$$

- Market participants want to match the central bank action as well as fundamentals: agent i maximises

$$u_i = -\omega(a_i - r)^2 - (1 - \omega)(a_i - \theta)^2,$$

where $\omega \in (0, 1)$ is the weight placed on matching the CB's action.

Monetary policy rule and market best response

- Central bank monetary policy rule is

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

where $\lambda \in (0, 1)$ denotes the (exogenous) weight on market-based signal, $\bar{a}$, and CB chooses $\mu \in [0, 1]$ to minimise the loss.

- market participant i's strategy

$$\begin{aligned} a_i &= \omega \mathbb{E}_i[r] + (1 - \omega)\mathbb{E}_i[\theta] \\ &= \xi x_i + (1 - \xi)y \end{aligned}$$

where $\xi \in (0, 1)$ reflects the *information value* of market participants' signals.

Equilibrium

- A Stackelberg equilibrium obtains when the CB commits to an optimal choice of μ^*.
- There exists a critical threshold $\widehat{\lambda} = \widehat{\lambda}(\alpha, \beta, \gamma, \omega) \in (0, 1)$ such that:
  - when $\lambda \geq \widehat{\lambda}$, $\mu^* = 1$ (boundary optimum).
  - when $\lambda < \widehat{\lambda}$,

$$\mu^* = \frac{\gamma(\alpha + \beta)[\alpha + \beta(1 - \lambda)]}{(1 - \lambda)\left\{\gamma(\alpha + \beta)^2 + \alpha[\alpha + \beta(1 - \lambda\omega)]^2\right\}} \in (0, 1).$$

Information value of market participants' signals

Given the central bank's choice of μ^*, when $\lambda \geq \widehat{\lambda}$,

$$\xi^* = \frac{\beta(1-\lambda\omega)}{\alpha+\beta(1-\lambda\omega)}.$$

When $\lambda < \widehat{\lambda}$,

$$\xi^* = \frac{(\alpha+\beta)\beta\gamma + \alpha\beta(1-\omega)[\alpha+\beta(1-\lambda\omega)]}{(\alpha+\beta)^2\gamma + \alpha[\alpha+\beta(1-\lambda\omega)]^2}.$$

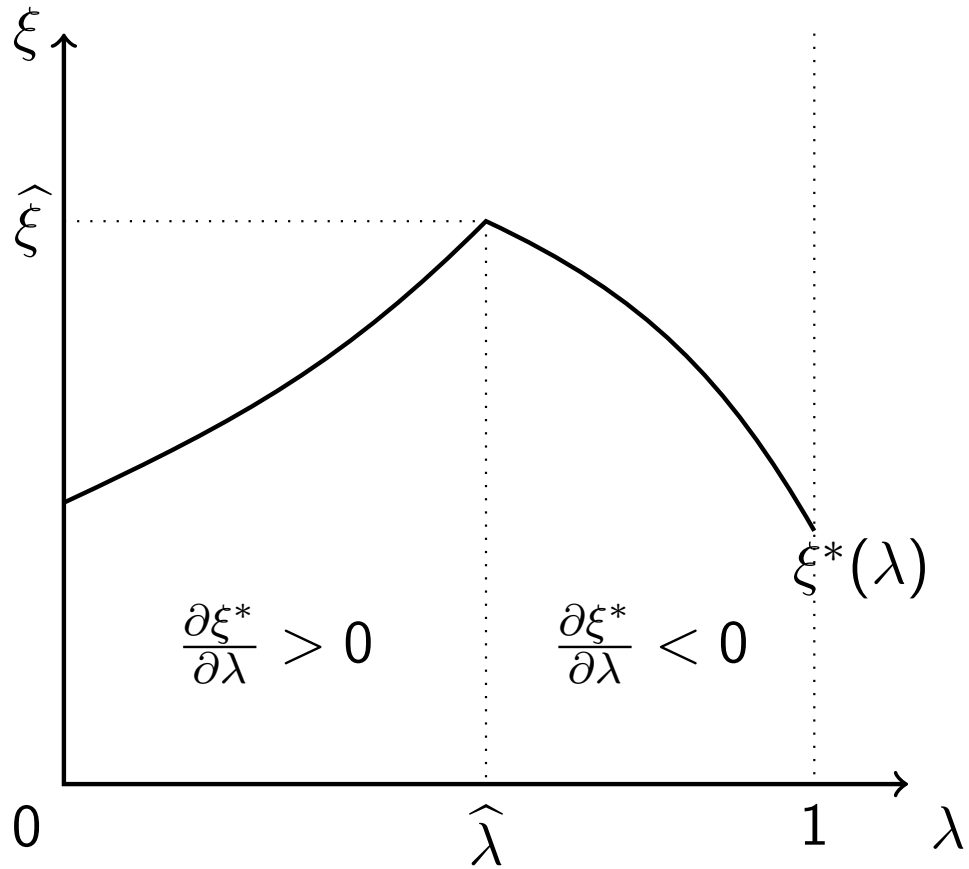
Main results

The central bank's monetary policy rule induces a *reflection problem* if $\partial \xi^* / \partial \lambda < 0$.

- if $\lambda > \widehat{\lambda}$, then $\partial \xi^* / \partial \lambda < 0$ and there is a reflection problem.
- if $\lambda < \widehat{\lambda}$, then $\partial \xi^* / \partial \lambda > 0$ and there is no reflection problem.

Main results

The maximum informational content that market participants can reveal is $\widehat{\xi} = \xi^*(\widehat{\lambda})$.



Social planner

- Endogenise the degree of dependence, λ, by having a prior stage to the game.
- A social planner chooses λ to minimise

$$\mathbb{E}[L_S] = \mathbb{E}[(\bar{a} - \theta)^2] = (1 - \xi)^2 \frac{1}{\alpha}.$$

- The degree of dependence on financial markets that minimises the social planner's expected loss is $\widehat{\lambda}$.
- The optimal degree of dependence on financial markets chosen by the CB exceeds the critical threshold, i.e. $\lambda^* > \widehat{\lambda}$.

Conclusion

- Link between monetary policy and financial prices is a two-way street.
- Model suggests that a central bank might, optimally, choose to overemphasise market signals relative to a social planner.
  - Central bank downplays its private information and, in trying to match the central bank, market participants end up overweighting public information and so induce a reflection problem.
- Policy implication – society may wish to appoint market insensitive central bankers. Mechanism (beauty contest) differs from the time-inconsistency mechanism of Stein and Sunderam (2017).

Thank You