The Optimal Degree of Discretion in Monetary Policy

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What is discretion?

- Society designs the optimal rules governing the conduct of monetary policy by the monetary authority.
- Agreed-upon social welfare function depends on random state of the economy.
- Monetary authority is assumed to observe this state while agents do not.
- Monetary authority has *discretion* if its policy is allowed to vary with its private information.

Introduction

- What is the optimal level of discretion in monetary policy?
  How does it depend on the time inconsistency problem and on the private information?
- Canzoneri (1985): "There are incentive compatible policy rules that could be legislated, but they are more complicated than what is usually envisioned..."
- Can the optimal mechanism be characterized?
- How can the society implement the optimal mechanism by legislating some policy rules?

Model Setup: General Structure

- At beginning of period t, agents choose growth rate of individual's (aggregate) nominal wage z_t (x_t).
- Next, monetary authority observes θ_t where $\theta_t \sim$ *iid* with mean 0 and density $p(\theta) > 0 \ \forall \theta \in [\underline{\theta}, \overline{\theta}]$.
- Given θ_t, monetary authority chooses money growth $\mu_t \in [\underline{\mu}, \overline{\mu}]$ to maximize:

$$R(x_t, \mu_t, \theta_t) = -\frac{1}{2}[(U + x_t - \mu_t)^2 + (\mu_t - \alpha\theta_t)^2]$$

- For any x, let $\mu^*(\theta; x)$ be the *static best response*, i.e. $R_\mu(x, \mu(\theta), \theta) = 0$.

Two Ramsey Benchmarks with Full Information

- *Ramsey policy* solves

$$\begin{aligned} \max_{x,\mu(\theta)} & \int R(x,\mu(\theta),\theta)p(\theta)d\theta \\ \text{s.t. } x &= \int \mu(\theta)p(\theta)d\theta \end{aligned}$$

- *Expected Ramsey policy* solves

$$\begin{aligned} \max_{x,\mu} & \int R(x,\mu,\theta)p(\theta)d\theta \\ \text{s.t. } x &= \mu \end{aligned}$$

Mechanism Design Problem: Direct Revelation Game

- Society specifies *monetary policy* $\left\{\mu_t(h_t, \widehat{\theta}_t)\right\}$, for all $h_t, \widehat{\theta}_t$ where $h_t = (\widehat{\theta}_0, \widehat{\theta}_1, ..., \widehat{\theta}_{t-1})$.
- Monetary authority chooses *reporting strategy* $\{m_t(h_t, \theta_t)\}$ for all $h_t, \widehat{\theta}_t$, where $m_t(h_t, \theta_t) \in [\underline{\theta}, \overline{\theta}]$.
- Given $\mu_t(h_t, \theta_t)$, each agent chooses $z_t(h_t)$:

$$z_t(h_t) = \int \mu_t(h_t, \theta) p(\theta) d\theta$$

- Aggregate wages:

$$x_t(h_t) = z_t(h_t)$$

- *Optimal monetary policy* maximizes:

$$(1-\beta) \sum_{t=0}^{\infty} \int \beta^t R(x_t(h_t), \mu_t(h_t, \theta_t), \theta_t) p(\theta_t) d\theta_t$$

Perfect Bayesian Equilibrium (PBE)

A PBE is given a monetary policy$\{\mu_t(\theta_t)\}$, a reporting strategy$\{m_t(\theta_t)\}$, a strategy for individual wages $\{z_t(h_t)\}$ and average wages $\{x_t(h_t)\}$ such that:

(1) Average wages equal expected inflation:

$$z_t(h_t) = \int \mu_t(h_t, \theta)p(\theta)d\theta$$

(2) monetary policy is incentive-compatible (truth-telling equilibria)

$$m_t(h_t, \theta_t) = \theta_t$$

Recursive Formulation: APS factorization

- Any *payoff* of the repeated game can be factorized into a *current payoff* and a *continuation value* $w(\widehat{\theta})$.
- Actions x, $\mu(\cdot)$ and continuation value $w(\cdot)$ are *enforceable by W* if:

$$
\begin{aligned}
w(\widehat{\theta}) &\in W \\
x &= \int \mu(\theta) p(\theta) d\theta \\
(1-\beta)R(x,\mu(\theta),\theta) + \beta w(\theta) &\geq (1-\beta)R(x,\mu(\widehat{\theta}),\theta) + \beta w(\widehat{\theta})
\end{aligned}
$$

Recursive Formulation: APS factorization cont'd

The expected payoff corresponding to x, $\mu(\cdot)$ and $w(\cdot)$ is:

$$V(x, \mu(\cdot), w(\cdot)) = \int [(1-\beta)R(x, \mu(\theta), \theta) + \beta w(\theta)] p(\theta) d\theta$$

Define the operator T as:

$$T(W) = \{v \mid \exists \;\; x, \mu(\cdot), w(\cdot) \text{ enforceable by } W : v = v(x, \mu(\cdot), w(\cdot))\}$$

The set of IC payoffs W^* is given by the largest W such that:

$$W = T(W)$$

Define $\overline{w} = \max W^*$

Static and Dynamic Mechanisms

- A mechanism is *static* if $w(\theta) = \overline{w}$ for all θ.
- A mechanism is *dynamic* if $w(\theta) < \overline{w}$ for some set of θ with strictly positive probability.
- An allocation is *locally incentive-compatible* if it satisfies:

$$\mu(\theta) \text{ is non-decreasing in } \theta$$

$$R_\mu(x, \mu(\theta), \theta)\frac{d\mu(\theta)}{d\theta} + \frac{dw(\theta)}{d\theta} \quad = \quad 0$$

Given the *single-crossing assumption (SCA), i.e.* $R_{\mu\theta}(x, \mu, \theta) > 0$, an allocation is incentive-compatible iff it is locally incentive-compatible.

Static and Dynamic Mechanisms Cont'd

- *Monotone hazard condition (MHC):*

$$\frac{1-P(\theta)}{p(\theta)} R_{\theta\mu}(x, \mu(\theta), \theta) \text{ is strictly decreasing in } \theta$$

Proposition 1: Under SCA and MHC, the optimal mechanism is static.

Discretion

- The monetary policy $\mu(\theta)$ has *no discretion* if $\mu(\theta) = \mu$ for some constant μ.
- The monetary policy $\mu(\theta)$ has *bounded discretion* if it takes the form:

$$u = \begin{cases} \mu^*(\theta; x) & \text{if } \theta \in [\underline{\theta}, \theta^*) \\ \mu^* = \mu^*(\theta^*, x) & \text{if } \theta \in [\theta^*, \overline{\theta}] \end{cases}$$

where $\mu^*(\theta, x)$ is the static best response given $x = \int \mu(\theta) p(\theta) d\theta$

Proposition 2: Under SCA and MHC, the optimal policy $\mu(\theta)$ has either no discretion or bounded discretion.

Time Inconsistency and Private Information

$$\textit{Ramsey policies} \quad : \quad \mu^R(\theta) = \alpha\frac{\theta}{2} \qquad x^R = 0$$

$$\textit{Nash policies} \quad : \quad \mu^*(\theta; U) = U + \alpha\frac{\theta}{2} \qquad x^N = U$$

Proposition 3: Under SCA and MHC:

(i) If $\frac{U}{\alpha} \leq -\underline{\theta}$, the optimal policy has bounded discretion with $\theta^* < \overline{\theta}$. The optimal degree of discretion θ^* is decreasing in $\frac{U}{\alpha}$.

(ii) If $\frac{U}{\alpha} > -\underline{\theta}$, the optimal policy is the expected Ramsey policy with no discretion.

Time Inconsistency and Private Information Cont'd