

Plan for today:

Transparency of Monetary Policymaking

1. A formal model of the effects of transparency
2. Pros and cons of transparency

Literature: Jensen (2002, *Scandinavian Journal of Economics*).

Supplementary reading: Faust and Svensson (2001); Geraats (2002).

Thanks for the evaluations (much more responses than last time)!!

They will be essential in refining the course for next year. THANKS!

Introductory remarks

- Many recent developments in monetary policy conduct/design:

Monetary reforms in several countries; e.g., Sweden, England, New Zealand, Canada, “Euroland”

Key matter of some controversy:

transparency in policymaking

- “Webster’s Encyclopedic Unabridged Dictionary (1989):”

transparent, *adj.* **1.** having the property of transmitting rays of light through its substance so that bodies situated beyond or behind can be distinctly seen (...) **4.** open; frank; candid: the man’s transparent earnestness. (...) —**Ant.** **1.** opaque. **4.** secretive.

- So . . . transparency must be “good”
- Recent debate on ECB’s — according to some — lack of transparency:
 - “*the enforcer for the ECB Opaqueness Squad*” (W. Buiter on O. Issing)
 - “*transparency — appropriately defined — can be regarded as absolutely crucial for the effectiveness of monetary policy and the credibility of a young institution like the ECB*” (O. Issing)

- Recommending more transparency is hardly surprising, and nobody would admit being non-transparent
- A consensus about the virtues of transparency *per se* appears to exist: transparency is a self-evident necessity for sound monetary policy (also securing accountability and “democracy”)
- Little *formal* research on the economic consequences of transparency has existed
- The formation of, e.g., the EMU has, however, triggered interest in the issue
- Purpose of paper is to examine the optimal degrees of transparency in a simple model of monetary policymaking
- Qualifier: Transparency is a multi-faceted concept. In my model, more transparency implies that policy *intentions* can to a larger extent *be distinctly seen* (like Faust and Svensson, 2001); \implies it facilitates private sector’s expectation formation about future policy
- **Main result:** Full transparency needs *not* be socially optimal. The optimal degree of transparency involves — as all institutional designs — trade-offs.
- One main trade-off is an “old friend”: *Credibility versus flexibility*

Some recent results of the literature

- Faust and Svensson (2001):
 - Builds on Cukierman and Meltzer (1986); Barro and Gordon (1983) inflation bias type model
 - Control errors in policy and shocks to output goals
 - Transparency is synonymous with information disclosure of control errors
 - Implication: With more transparency, inflation expectations become *more sensitive* to the central bank’s actions
 - * Reason: a deliberate expansion signals now *more precisely* a higher output goal \implies inflation expectations in the future increases \implies higher marginal cost of expansion
 - Main result: Full transparency is preferable as it reduces the inflation bias at no cost of shock stabilization (a “free lunch”)
- Geraats (2000):
 - Related to Faust and Svensson (2001); Full transparency is implemented through publication of conditional inflation (and output) forecasts
- Gersbach (1998), Cukierman (2001): Argue against any transparency
 - Surprise inflation is needed for shock stabilization

The model

- Conclusions of recent literature so far
 - Transparency is mainly good (with a few exceptions)
 - Transparency, when good, is a “free lunch”
 - Much builds on Barro-Gordon, Lucas style models

- Main novelties introduced by my paper:

- **Abandon** the Lucas style model in favor of a **New Keynesian Phillips Curve** model type with *forward-looking* inflation determination
- This is standard model in most recent monetary analyses (cf. contributions in Taylor, 1999)
- This is a specification receiving increasingly empirical support:
 - a) US: Galí and Gertler (1999); Rudebusch (2002)
 - b) Euroland: Galí et al. (2001); Smets (2000)

- A closed economy in two periods, 1 and 2 (“short” and “long run”)
- Monetary policy aimed at inflation and output gap stabilization
- Supply side: New-Keynesian “Phillips-curve”

$$\pi_1 = \mathbf{E} [\pi_2 | I_1^P] + \kappa x_1 + \varepsilon, \quad \kappa > 0, \quad (1)$$

$$\pi_2 = \mathbf{E} [\pi_3 | I_2^P] + \kappa x_2, \quad (2)$$

π_i : inflation rate in period i ; x_i : output gap; ε : supply shock; I_i^P : info.set of price setters

- Demand side:

$$x_1 = x_1^I + \eta, \quad (3)$$

x_1^I : central bank’s *intention* for the output gap; $\eta \sim \mathbf{N}(0, \sigma_\eta^2)$: “control error” (x_2 is controlled perfectly).

- Social loss function:

$$L^S = \mathbf{E} \left[\sum_{i=1}^2 \left[\lambda (x_i - x_i^*)^2 + \pi_i^2 \right] \right], \quad \lambda > 0, \quad x_i^* > 0. \quad (4)$$

- Central bank’s loss function:

$$L^{CB} = \mathbf{E} \left[\sum_{i=1}^2 \left[\lambda (x_i - x_i^*)^2 + \pi_i^2 \right] \right], \quad (5)$$

x_0^* given \approx “initial credibility”;

$x_2^* = x_1^* = x_0^* + \theta$, $\theta \sim \mathbf{N}(0, \sigma_\theta^2)$: idiosyncratic shock to the central bank’s output target (e.g., “political pressures”)

- Credibility is synonymous of having output goal compatible with inflation target

- *Transparency* (following Faust and Svensson, 2001)

$$\eta = \xi + v, \tag{7}$$

$\xi \sim N(0, \sigma_\xi^2)$ is observed by price setters;
 $v \sim N(0, \sigma_v^2)$ is not.

If more of η is observed, policy intentions can to a larger extent be *distinctly seen*

- Formally,

$$\sigma_\xi^2 = \tau \sigma_\eta^2, \quad \sigma_v^2 = (1 - \tau) \sigma_\eta^2, \tag{8}$$

$0 \leq \tau < 1$: *index of transparency*.

Table 1: Timeline of events and actions

Period 0 :	drawn				
	x_0^* is				
Period 1 :	realized	chosen	realized	realizes	revealed
	ε, θ are	x_1^I is	η is	x_1 mate-	ξ is
				realizes	revealed
					formed
Period 2 :	chosen	realizes			formed
	x_2 is	π_2 mate-			$E[\pi_2 I_1^P]$ is
		realizes			realizes
					π_1 mate-
					realizes

- Information structure

- When central bank chooses intentions $(x_1^I), I_1^{CB} = \{x_0^*, \varepsilon, \theta\}$

- When price setters act, $I_1^P = \{x_0^*, \varepsilon, x_1, \xi\}$. $\theta, v \notin I_1^P$

Central issue: estimate x_1^* and thereby x_2^* ; latter value crucial determinant of π_2

Signal extraction problem: E.g., is high x_1 due to high x_1^I (accruing from high x_1^*) or high η ?

- Final assumption: Terminal condition

$$E[\pi_3 | I_2^P] = (\lambda/\kappa) x_2^*. \quad (9)$$

Solution with full information

- Period 2 equilibrium:

$$x_2 = 0, \quad \pi_2 = (\lambda/\kappa) x_1^*. \quad (10)$$

Output at natural rate; inflation above target if $x_1^* > 0$ (case of credibility problems)

- Period 1 equilibrium:

$$x_1 = -\frac{\kappa}{\lambda + \kappa^2} \varepsilon + \eta, \quad \pi_1 = (\lambda/\kappa) (x_0^* + \theta) + \kappa\eta + \frac{\lambda}{\lambda + \kappa^2} \varepsilon. \quad (11)$$

- Optimal for society to have central bank with $x_0^* = 0 < x^*$.
- Under asymmetric information, can transparency help if $x_0^* > 0$?

Solution with informational asymmetries

- Period 2 equilibrium just as under full information

$$x_2 = 0, \quad \pi_2 = (\lambda/\kappa) x_1^*.$$

- Period 1 equilibrium: **Crucial matter** is to find $E[\pi_2 | I_1^P]$ and, thus, $\partial E[\pi_2 | I_1^P] / \partial x_1^I$, and thus $\partial E[\pi_1 | I_1^{CB}] / \partial x_1^I$

- We have $x_1^* = x_0^* + \theta$, so we must find $E[\theta | I_1^P]$

- Model is solved conjecturing

$$x_1^I = k - k_\varepsilon \varepsilon + k_\theta \theta, \quad (12)$$

$k, k_\varepsilon > 0$ and $k_\theta > 0$ to be identified

- Price setters construct the “signal”

$$s_1 = x_1 - \xi - k + k_\varepsilon \varepsilon. \quad (13)$$

$$(12) \iff x_1 = k - k_\varepsilon \varepsilon + k_\theta \theta + \eta, \text{ so } s_1 = k_\theta \theta + v$$

- Hence, (minimize forecast error variance)

$$E[\theta | s_1] = S(k_\theta) s_1, \quad S(k_\theta) \equiv \frac{k_\theta \sigma_\theta^2}{k_\theta^2 \sigma_\theta^2 + \sigma_v^2} > 0, \quad (15)$$

- Inflation expectations thus follow as

$$E[\pi_2 | I_1^P] = (\lambda/\kappa) [x_0^* + S(k_\theta) s_1]. \quad (16)$$

- Implication: $\partial E[\pi_2 | I_1^P] / \partial x_1^I = (\lambda/\kappa) S(k_\theta)$

- * More noise in $s_1 \implies S(k_\theta) \downarrow \implies$ expectations are less sensitive to x_1^I

- * Less noise, less $\sigma_v^2 = (1 - \tau) \sigma_\eta^2$, *expectations are more sensitive to the central bank's actions*

- * So, more transparency — higher τ — can achieve this “additional sensitivity”

- Impact of transparency on central bank behavior? The period 1 first-order condition

$$0 = \lambda (x_1^I - x_0^* - \theta) \quad (18)$$

$$+ \underbrace{\left(\frac{(\lambda/\kappa) [x_0^* + S(k_\theta) s_1] + \kappa x_1^I + \varepsilon}{E[\pi_2 | I_1^I]} \right)}_{\pi_1} [\kappa + (\lambda/\kappa) S(k_\theta)]$$

- Validates conjecture and identifies uniquely κ , k_ε and k_θ .
- Main insight: Higher τ — “less noise” — increases $S(k_\theta) \approx$ marginal cost of x_1^I in terms of inflation **increases**
 - A deliberate increase in x_1 can be “better detected” by price setters \implies signals higher output goal more precisely \implies inflation expectations, and thereby inflation, raises by more
 - Induces **more emphasis on stabilizing inflation around target**
 - Central bank becomes more “conservative” (Rogoff, 1985)
- A trade-off suggested: **Transparency brings down average inflation** (if $x_0^* > 0$) but **distorts supply shock stabilization** (also, average output may be too low in period 1).
- **Conventional “credibility versus flexibility” trade-off**
- With Lucas-style model (Faust and Svensson, 2001) this trade-off is absent. Transparency affects **future** inflation expectations, and **future** output \implies the intra-temporal trade-off between output and inflation is unaffected (transparency mimics a linear Walsh, 1995, contract)

The optimal degrees of transparency

- Numerical analyses in order to evaluate optimal degrees of transparency (by using social loss function as the criterion)
- Three key concepts are varied in importance
 - *Initial credibility* as quantified by x_0^*
 - “*Independence*” as quantified through σ_θ^2
 - *Stabilization need* as quantified by σ_ε^2

TABLE 2: OPTIMAL DEGREES OF TRANSPARENCY

$\sigma_\theta^2 = 0.05$	$x_0^* = 0.00$	$x_0^* = 1.00$	$x_0^* = 2.00$	$x_0^* = 3.00$
$\sigma_\varepsilon^2 = 0.00$	0.999	0.002	0.921	0.953
$\sigma_\varepsilon^2 = 0.50$	0.868	0.002	0.918	0.952
$\sigma_\varepsilon^2 = 1.00$	0.652	0.000	0.914	0.951
$\sigma_\varepsilon^2 = 2.00$	0.181	0.000	0.907	0.949
$\sigma_\theta^2 = 0.50$	$x_0^* = 0.00$	$x_0^* = 1.00$	$x_0^* = 2.00$	$x_0^* = 3.00$
$\sigma_\varepsilon^2 = 0.00$	0.999	0.001	0.402	0.578
$\sigma_\varepsilon^2 = 0.50$	0.978	0.001	0.378	0.567
$\sigma_\varepsilon^2 = 1.00$	0.909	0.001	0.345	0.558
$\sigma_\varepsilon^2 = 2.00$	0.691	0.000	0.289	0.538
$\sigma_\theta^2 = 1.00$	$x_0^* = 0.00$	$x_0^* = 1.00$	$x_0^* = 2.00$	$x_0^* = 3.00$
$\sigma_\varepsilon^2 = 0.00$	0.999	0.172	0.076	0.246
$\sigma_\varepsilon^2 = 0.50$	0.995	0.032	0.037	0.234
$\sigma_\varepsilon^2 = 1.00$	0.956	0.000	0.000	0.210
$\sigma_\varepsilon^2 = 2.00$	0.818	0.000	0.000	0.172

The optimal values of τ for the case of $\lambda = 1.00$, $x^* = 1.00$, $\kappa = 2/3$ and $\sigma_\eta^2 = 1.00$.

- Case of good initial credibility ($x_0^* = 0$):
 - Transparency is needed to insulate policy from macroeconomic variability induced by political pressure (average inflation is not an issue)
 - Stabilization needs will, however, reduce the optimal degree (most strongly for low σ_θ^2)
 - . . . a central bank with good credibility, subject to little political pressures, with a stabilization need not be transparent
- Case of “moderate” credibility problems ($x_0^* = 1, x_0^* = 2$)
 - No transparency is optimal as output loss outweighs the inflation reduction
- Case of “serious” credibility problems ($x_0^* = 3$)
 - *Some* transparency is optimal
 - The degree is decreasing in σ_ε^2 as stabilization is distorted
- Important qualifier relating to the *magnitudes* involved
 - The period 1 average output loss accruing from transparency *bias*es the magnitudes. If the “short run” played a smaller role in the social loss, probably (conjectures to be examined in infinite horizon version of model)
 - * Some transparency for moderate credibility problems would be optimal
 - * The optimal τ would be more sensitive to σ_ε^2

Summary and Conclusions

- From semantic and democratic points of view, full transparency in the policy conduct of a politically independent central bank is a must
- This paper show from an economic point of view, transparency need not be a must
- Main building blocs in reaching the result
 - Supply-side modelling in accordance with new monetary theory and evidence
 - Transparency makes inflation expectations react more to actions of the central bank
 - With forward-looking price setting, this causes higher current marginal inflation costs of policy
 - The central bank is induced to put more emphasis on inflation stabilization relative to output stabilization
- **Good for credibility, bad for shock-stabilization** (and short-run output) — a potential “straitjacket”

- Broad policy implications:
 - “Irresponsible,” non-credible CBs should be disciplined by transparency
 - “Responsible,” credible CBs should *not* have room of manoeuvre constrained by market sentiments

- Main drawbacks
 - How can transparency be implemented, i.e., information be revealed?
 - Why is it revealed truthfully?
 - Can information be understood by the public?
- Nevertheless, paper demonstrates that full transparency in monetary policy conduct needs not be advantageous, even though
 - The concept *is* operational and well-understood by everyone
 - Information *is* disclosed faithfully
 - Information *is* well-understood by the public
- Transparency in monetary policy conduct is unlikely to be a “free lunch” (or the opposite)

The future?

Coming on the web this week:

- Final recaps
- Final list of curriculum
- A few hints and advice on the exam

GOOD LUCK!!!!!!