Lecture III:

Monetary Policy Design: Discretion, Commiment and Targeting Rules

Monetary Policy Discretion, Commitment, and Targeting Rules

- A policy is time consistent when it is optimal to adopt at t and remains optimal to adopt it in t+1

- E.g. Policy towards hostage ransom

- In many practical situations, time-consistent policies are hard to implement: the incentive for discretion is non-trivial and (almost always) there.

- What we will discuss: How this affects average inflation?

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- The underlying motivation/assumption is, of course, that inflation is costly.

- That said, there is considerable disagreement on the threshold above which inflation becomes really costly…

- Despite many studies on the relationship between inflation & growth

- Yet, there is considerable agreement also that inflation should not be optimally zero (risk of falling on a liquidity trap).

- For now, we skip this threshold debate and simply assume, for the sake of model exposition, that inflation is costly.

The Barro and Gordon Model

[We shall closely follow Wash (2010, ch.7]

The central bank objective is to max the expected value of:

$$U = \lambda(y - y_n) - \frac{1}{2}\pi^2 \qquad \text{(I.44)}$$

[But shortly we'll see a variant where the CB loss depends on output variability around natural output]

[We will also discuss more of what actually enters and what *should* enter the central bank utility (or its converse, the central bank loss function ”V”) later].

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with output no longer given (as in the endowment economy of previous lectures), but determined by a Lucas-type supply function:

$$y = y_n + \alpha(\pi - \pi^e) + e \qquad \text{(I.45)}$$

One rationale is that wages are "sticky" in the short-run so inflation "surprises" increase output above "natural".

And the central bank controlling inflation through money supply as the policy instrument (today's equivalent being the interest rate):

$$\pi = \Delta m + v \qquad \text{(I.46)}$$

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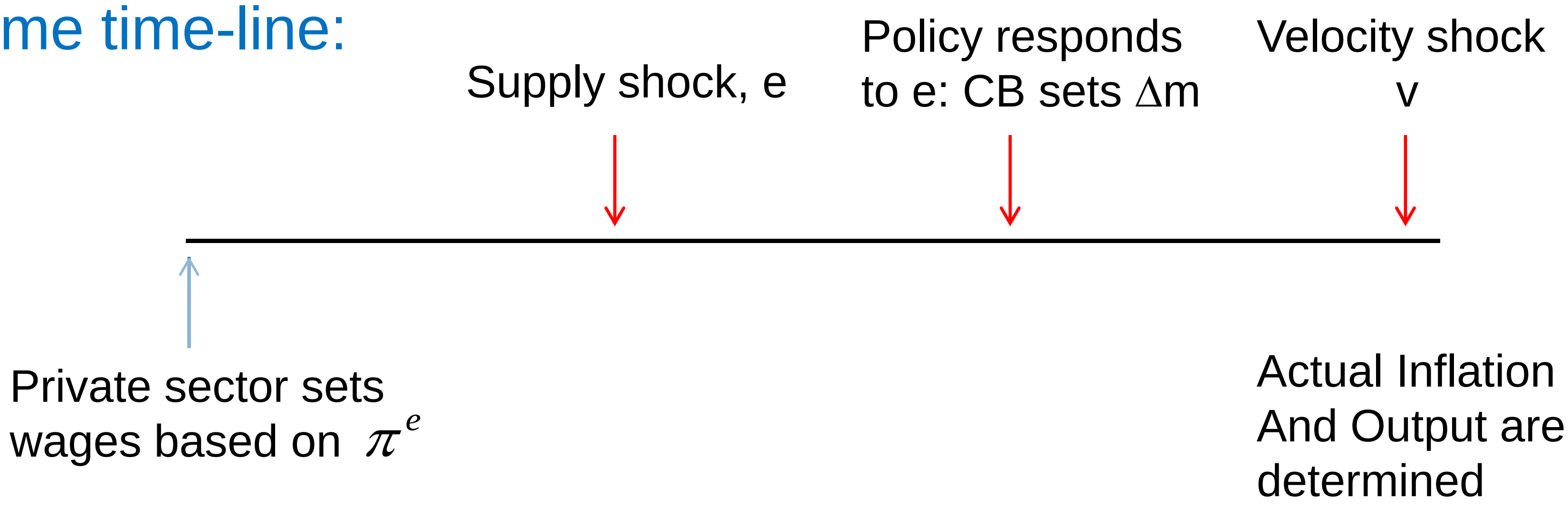
where e and v are uncorrelated shocks:

$$cor(e, v) \approx 0$$

Game time-line:



The critical point is that the central bank can observe the supply shock, e, ahead of any reaction by the private sector.

One rationale is that the CB has an informational advantage over the private sector in observing "supply shocks" (e.g., output statistics are known to policy makers before made public, at least in some cases).

Another rationale for this sequencing is that it is much less costly for the CB to react (e.g. more frequent monetary policy meetings) than for the private sector to reset contracts based on the post e-shock inflation expectations.

Model's Solution:

Substituting (I.45) and (I.46) into (I.44) yields:

$$U = \lambda(\alpha(\Delta m + v - \pi^e) + e - \frac{1}{2}(\Delta m + v)^2$$

FOC wrt Δm (recall: taking π^e as given) yield:

$$\Delta m = a\lambda > 0$$

This implies from (I.46) that actual inflation will be:

$$\pi = a\lambda + v$$

But now agents are forward-looking: Unlike in the Cagan Model, they anticipate the incentives of the central bank in setting inflation expectations. Hence:

$$\pi^e = E(\Delta m) = a\lambda > 0$$

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So, average inflation is positive and fully anticipated!

But how about output? Do we gain anything from higher inflation?

From (I.45), we have:

$$y - y^{n} = av + e$$

So, CB policy does not improve output! In fact with v and e being N(0,σ2), on average actual output=natural output!

Summing up:

- Central bank discretion makes the economy “suffer” from a positive inflation bias with no tangible gains in output.
- This is, of course, only so as long as $\lambda > 0$.
- Later we will see that the so-called “strict” inflation targeting postulates this output “weight” factor =0 in CB objective function.
- The inflation bias rises with nominal rigidity, i.e., **a** higher.

- So, why any CB would undertake this policy?

- With a>0, and with the central banker caring about output and employment (i.e. $\lambda > 0$), it is easy to see that its marginal benefit=marginal cost when π*>0. So, there is an incentive "in the margin".

- To see what happens to the central bank utility (and hence social utility if the latter is fully benevolent), compute the CB expected utility using (I.44):

Monetary Policy Discretion, Commitment, and Targeting Rules

- Expected Utility under discretion:

$$E(U^d) = E\left[\lambda(av+e) - \frac{1}{2}(a\lambda + v)^2\right] = -\frac{1}{2}\left[a^2\lambda^2 + \sigma_v{}^2\right] \quad \text{(I.48)}$$

- It is easy to see that utility would be higher if the central bank could commit to a zero inflation policy, i.e., if would not care about output. In this case $\pi = v$ and, using I.48 expected utility would be higher:

$$E(U^c) = -\sigma_v{}^2 > E(U^d)$$

Solutions to the Inflation Bias

- A large literature followed the Barro-Gordon set up.

- Partly was to show what happens to the inflation bias incentive in a repeated game (recall Barro-Gordon was a one-shot game) framework.

- Another, influential strand consisted of asking the kind of preferences should feature in optimal central bank design so that the incentive to deviating from low inflation commitment is mitigated.

- Perhaps the most influential idea there is that of a “conservative central bank” due to K. Rogoff (1985)
- This means a central bank having a more “conservative” stance than society regarding inflation, i.e., that puts a higher weight on the inflation component of central bank (dis)utility.
- To formalize this in the context more akin to that of Rogoff’s and the later literature, consider the converse of central bank utility – namely, its loss of function of the form:

- Central Bank Loss Function:

$$V = \frac{1}{2}\lambda(y - y_n - k)^2 - \frac{1}{2}\pi^2 \qquad \text{(I.49)}$$

which differs from (I.42) for the quadratic term in the output gap (y-yn), meaning that output *volatility*, not just output *levels* matter.

As shown in Wash (homework: do work out the full derivations), inflation under discretion is given by:

- Inflation under discretion with quadratic CB loss:

$$\pi^d = \Delta m + v = a\lambda k - (\frac{a\lambda}{1+a^2\lambda})e + v \qquad (I.50)$$

- What Rogoff suggests is a central bank that places a weight 1+δ>1 in V so that:

$$\pi^d = \frac{a\lambda k}{1+\delta} - (\frac{a\lambda}{1+\delta+a^2\lambda})e + v \qquad (I.51)$$

"distortion" in CB response to supply shocks

- So, the key parameter to be determined is δ.

- To find that out compute the central bank E(V), similar to done for E(U); then min wrt to δ to obtain:

$$\delta = \frac{k^2}{\sigma_e^2}\left(\frac{1+\delta+a^2\lambda}{1+\delta}\right)^3 \qquad \text{(I.52)}$$

- Since g(0)>0 and $\lim_{\delta -> \infty} g(\delta) = \frac{k^2}{\sigma_e^2}$, there will always be a

Solution where $\delta>0$ and finite.

- Yet, the down-side is that inflation response to output shocks is now also distorted by δ.

- Further, the higher , the greater the variance of output to the shock e:

$$\mathrm{var}(y) = a^2\sigma_v^2 + \left(\frac{1+\delta}{1+\delta+a^2\lambda}\right)^2 \sigma_e^2$$

- This fleshes out a perennial trade in monetary policy: you reduce the inflation bias and the inflation variability at the cost of higher output variability.

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- Within this trade-off an important practical question is how a government commits to $\delta>0$.

- After all, one could always hire a “conservative” central bank with $\delta>0$, and then fire her/him, i.e., still maintain a time-inconsistent policy.

- Central bank independence has been one solution.

- But quite aside from the different forms of central bank independence (full vs. operational), the trade-off between inflation and output stabilization remains a crucial issue.

- This trade-off can be exacerbated by many things, including economic structure, current politics, as well as history of credible/non-credible policies.

- This suggests that δ can (optimally) vary significantly across countries and time, so no "one-size-fits-all".

- Other issues also arise. E.g. why would a government have an incentive to keep someone in a key public institution that does not share society's average preferences?

- A potentially more fruitful approach is to think of a contract which is "incentive-compatible".

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- A key trade-off in practice is between flexibility and credibility.

- No one (or few) would deny that some flexibility is good, specially if σ_e is high.

- But this too much flexibility may seriously impair credibility.

- Hence the basis for the “contracting approach”: once the incentives are correct to attain a clear pre-specified target.

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- Assuming that the chosen target reflects societal preferences for an inflation rate π (which is not necessarily zero), then (I.49) becomes:

$$V = \frac{1}{2}\lambda(y - y_n - k)^2 - (1+h)\frac{1}{2}E(\pi^2 - \pi^*)$$

where h is analogous to Rogoff's conservative central banker parameter $\delta>1$.

- Both approaches clearly dominate discretion and still allow for some flexibility through λ and κ.

Monetary Policy Discretion, Commitment, and Targeting Rules

- Strict inflation targeting is then nested in the general targeting rule, by setting $\lambda=0$ (or $h \to \infty$) .
- Yet, in general, the optimality of such strict rules impose stringent restriction on σ_e not being too large (see discussion in Wash, 2010, pp.313-16).
- As we shall see, these trade-offs get more complex in the open economy, with the degree of exchange rate flexibility being another concern, but the underlying trade-offs remain of a similar nature.