

Econ 105, Spring 2008
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Problem set 2
Due: In class, April 22, 2008

1. Suppose the central bank's objective is to minimize

$$V = \frac{1}{2}\lambda(u - ku_n)^2 + \frac{1}{2}\pi^2,$$

where u is the unemployment rate and u_n is the natural rate of unemployment, with $k < 1$. Assume the economy is described by

$$u = u_n - a(\pi - \pi^e).$$

For simplicity, assume the central bank can control inflation directly.

- (a) What is the equilibrium rate of inflation under discretion?
- (b) How does a fall in u_n affect the equilibrium rate of inflation? Explain.
- (c) During the 1970s, the natural rate of unemployment in the US rose due to the entry of the baby boomers into the labor force. Using your results from part (b), could this rise in u_n explain the rise in inflation in the 1970s?

2. Suppose the economy is subject to productivity shocks e_t , so that

$$u = u_n - a(\pi - \pi^e) + e_t.$$

Assume e has expected value zero and is serially uncorrelated. Assume the central bank's loss function is the same as in question 1. Also assume that private agents must form expectations before observing the realization of e_t , but the central bank can set policy after observing e_t .

- (a) What is the equilibrium rate of inflation under discretion?
- (b) What is the equilibrium unemployment rate under discretion?
- (c) What is the equilibrium rate of inflation under commitment?
- (d) What is the equilibrium unemployment rate under commitment?
- (e) How do the reactions of inflation and the unemployment rate to a productivity shock compare under discretion and commitment?

3. Suppose social loss is given by

$$V^s = \frac{1}{2}\lambda^s(y - y^*)^2 + \frac{1}{2}\pi^2,$$

and

$$y = \bar{y} + a(\pi - \pi^e) + e.$$

Assume $y^* = \bar{y} + k$, where $k > 0$. Policy is conducted by a central bank whose preferences are to minimize

$$V^{cb} = \frac{1}{2}\lambda^{cb}(y - y^*)^2 + \frac{1}{2}\pi^2.$$

Policy is conducted under discretion and private agents must form expectations before observing e . Let e have a mean of zero and variance of σ_e^2 .

- (a) Derive the equilibrium for output and inflation.
- (b) Find the expected value of V^s .
- (c) Explain why society might achieve a lower value of expected loss if $\lambda^{cb} < \lambda^s$ than if $\lambda^{cb} = \lambda^s$.
- (d) Does an increase in σ_e^2 increase or decrease the “optimal degree of central bank conservatism”? (Discuss – no derivations necessary.)