

## Economics 101b: Fall 2005: Problem Set 6

(Due in class on November 2, 2005)

1. Begin our very simple Phillips Curve:

$$\pi_t = \pi_t^e + \beta(u_t^* - u_t)$$

with simple adaptive expectations:

$$\pi_t^e = \pi_{t-1}$$

But add a difference: the natural rate of unemployment depends on what unemployment was last year:

$$u_t^* = (1 - \theta)u_{t-1}^* + \theta u_{t-1}$$

for some parameter  $\theta$  between zero and one. Suppose that the central bank induces a recession and raises the unemployment rate one percentage point above its natural rate for one year, and then lets unemployment fall back to its natural rate. What is the time path of inflation as a result of this one-year shift in policy? What is the time path of unemployment?

2. In problem 1, how does the *Sacrifice Ratio*—the amount of excess point-years of unemployment that must be run in order to permanently reduce the inflation rate by one percent—depend on the parameter  $\theta$ ? What actions can you think of that the central bank might take that could reduce the value of  $\theta$ ?

3. Suppose that a supply shock hits the economy—that is, that for one year the Phillips curve is not:

$$\pi_t = \pi_t^e + \beta(u_t^* - u_t)$$

But is instead:

$$\pi_t = \pi_t^e + \beta(u_t^* - u_t) + s_t$$

where  $s_t$  is some positive shock to inflation caused by, say, a spike in oil prices. And suppose that inflation expectations are adaptive:

$$\pi_t^e = \pi_{t-1}$$

What happens to inflation over time if the central bank keeps unemployment at its natural rate always? What happens to the unemployment rate over time if the central bank adjusts unemployment to keep inflation at its initial value  $\pi_0$  always?

4. Suppose we have our standard Phillips curve:

$$\pi_t = \pi_t^e + \beta(u_t^* - u_t)$$

with our standard adaptive inflation expectations:

$$\pi_t^e = \pi_{t-1}$$

But that the natural rate of unemployment  $u^*$  is subject to *hysteresis*:

$$u_t^* = u_{t-1}$$

Is there any way you can think of that this situation is different from that of a constant natural rate of unemployment combined with static inflation expectations?

5. Former Federal Reserve Vice Chair Alan Blinder has remarked that Alan Greenspan's policies at fighting unemployment have been much more aggressive in attempting to reduce unemployment than any Federal Reserve Chair with less of a reputation as an inflation hawk would dare attempt. Can you make sense of this remark?

6. Suppose that you believe that investors, businesses, and workers in your economy have rational expectations of inflation. Suppose that you have a choice between two candidates to head your central bank—one of whom believes that the central bank must always do whatever is necessary to keep inflation low, and the other of whom believes that if the central bank were to push unemployment above the natural rate to try to reduce inflation it would be making a serious mistake. Which candidate would you prefer to run your central bank, and why?

7. The fact that the central bank cannot push the short-term nominal interest rate below zero raises the possibility of a *liquidity trap*—an inability of the central bank to push the long-term real interest rate down to a level that produces enough investment to get full employment. Back in 1992 Brad DeLong and Larry Summers argued that this made it desirable for the Federal Reserve to have an inflation target of 4-5% per year rather than 1-2% per year: the higher inflation target, you see, would give the Federal Reserve more ability to reduce the long-term real interest rate when necessary. The Fed didn't think much of this argument. What do you think of it?

