

Assignment 2 – Graduate Macroeconomics

Fall 2020

Problem Set Due: December 10, 2020

1 Phillips curve

Consider the framework of chapter 7, with a wage-setting relation given by

$$W_t = P_t^e(1 - \alpha u_t + z)$$

where W is the nominal wage, P^e the expected price level, u represents the unemployment rate and z captures unemployment benefits. Consider the standard price-setting relation

$$P = (1 + m) W$$

where m denotes the mark-up.

1. Let $\pi_t = \left(\frac{P_t}{P_{t-1}}\right) - 1$ and $\pi_t^e = \left(\frac{P_t^e}{P_{t-1}^e}\right) - 1$
 - (a) Derive the Phillips curve, i.e. show, step by step, how you can derive the following equation from the equations above:

$$\pi_t = \pi_t^e - \alpha u_t + (m + z) \tag{1}$$

- (b) If you used any approximations to derive this equation, state them and also discuss which assumptions are required in order for them to work.
2. Given expected inflation and unemployment, what is the effect of increasing unemployment benefits z in period t on the inflation rate in period t , π_t ? Explain both intuitively and analytically (i.e. with algebra).
3. Show that you can eliminate m and z from equation (1) and express it as

$$\pi_t = \pi_t^e - \alpha(u_t - u_n)$$

where u_n is the natural rate of unemployment. What is the value of u_n in this economy? Is u_n the NAIRU? If yes, why?

4. Suppose that expectations of inflation are formed according to the rule

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

Explain briefly in word what this equation means.

5. Can a single value of θ be used to account for the observed pattern of inflation and unemployment in the U.S. between 1950 and 2000?

2 The IS-LM-PC model

The two paths to the medium-run equilibrium explored in this chapter make two different assumptions about the formation of the level of expected inflation. One path assumes the level of expected inflation equals lagged inflation. The level of expected inflation changes over time. The other path assumes the level of expected inflation is anchored to a specific value and never changes. Begin in medium-run equilibrium where actual and expected inflation equals 2% in period t .

- a. Suppose there is an increase in consumer confidence in period $t+1$. How does the IS curve shift? Assume that the central bank does not change the real policy rate. How will the short-run equilibrium in period $t+1$ compare to the equilibrium in period t ?
- b. Consider the period $t+2$ equilibrium under the assumption that $\pi_{t+2}^e = \pi_{t+1}$. If the central bank leaves the real policy rate unchanged, how does actual inflation in period $t+2$ compare to inflation in period $t+1$? How must the central bank change the nominal policy rate to keep the real policy rate unchanged? Continue to period $t+3$. Making the same assumption about the level of expected inflation and the real policy rate, how does actual inflation in period $t+3$ compare to inflation in period $t+2$?
- c. Consider the period $t+2$ equilibrium making the assumption $\pi_{t+2}^e = \bar{\pi}$. If the central bank leaves the real policy rate unchanged, how does actual inflation in period $t+2$ compare to inflation in period $t+1$? How must the central bank change the nominal policy rate to keep the real policy rate unchanged? Continue to period $t+3$. Making the same assumption about the level of expected inflation and the real policy rate, how does actual inflation in period $t+3$ compare to inflation in period $t+2$?
- d. Compare the inflation and output outcomes in part b to that in part c.
- e. Which scenario, part b or part c, do you think is more realistic. Discuss.
- f. Suppose in period $t+4$, the central bank decides to raise the real policy rate high enough to return the economy immediately to potential output and to the period t rate of inflation. Explain the difference between central bank policies using the two assumptions about expected inflation in part b and part c.

3 Okun's Law

Okun's Law is written as $u_t - u_{t-1} = -0.4 (g_{Yt} - 3\%)$

- a. What is the sign of $u_t - u_{t-1}$ in a recession? What is the sign of $u_t - u_{t-1}$ in a recovery?
- b. Explain where the 3% number comes from.
- c. Explain why the coefficient on the term $(g_{Yt} - 3\%)$ is -0.4 and not -1.
- d. Suppose the number of immigrants per year allowed to enter the United States is sharply increased. How would Okun's law change?