14.02 Principles of Macroeconomics

Problem Set 3

Fall 2017

Question 1 (Chapter 6)

Consider the IS-LM model described in the slides of Lecture 6. Suppose that the nominal policy rate is $\bar{i} = 5\%$ and that the expected inflation is $\pi^e = 3\%$.

(a)

Write an equation for aggregate demand Z (which in equilibrium is equal to Y), specifying the sign of the dependence of each component on Y and $x + r$.

(b)

Draw the IS and LM curves with Y on the horizontal axis and r on the vertical axis. Take care to specify the intercept of the LM curve.

(c)

Suppose that expected inflation decreases from 3% to 2%. Does the IS curve drawn in the previous subpoint shift? Why? You do not need to draw a new plot to answer this question.

(d)

If the Central Bank remains idle, in what direction will equilibrium output change? Why? What's the real interest rate in this case? Draw a new plot portraying both the previous equilibrium and the new one.

(e)

What is the policy response of the central bank, if it wants to bring back output to its original level? How does the intercept of the LM curve change under this policy, compared to a situation where there is no policy? You do not need to make a plot to answer this question.

(f)

Substitute the definition of the real interest rate in the formula you derived in (a). Draw the IS and LM curves with Y on the horizontal axis and i on the vertical axis. Take care to specify the intercept of the LM curve.

(g)

Suppose that expected inflation decreases from 3% to 2%. Does the IS curve shift? Why? What happens to equilibrium output if the Central Bank stays idle? Does it change by more or less compared to (d)? Draw a new plot portraying both the previous equilibrium and the new one.

(h)

What can the Central Bank do to help output recover to its original level? Does the IS, or the LM curve shift? Is the required intervention the same as before? You do not need to make a plot to answer this question.

Question 2 (Chapter 7)

Suppose the markup rate is $m = 5\%$ and that the wage setting equation is:

$$W = P^e (1 - u)$$

where u is the unemployment rate and P^e is the expected price level. The price setting equation is given by:

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

(a)

Using the price setting equation, determine the equilibrium real wage, W/P.

(b)

Determine the natural rate of unemployment.

(c)

Suppose now that P^e is determined independently of P. Solve for the price P that is determined from the equilibrium in the labor market. You should express P in terms of u, m, and P^e.

(d)

Suppose the markup increases to $m' = 10\%$. What happens to the real wage and to the natural rate of unemployment? Explain.

(e)

Finally, assume that the economy has a total labor force L and a production function given by:

$$Y = N$$

That is, each employed worker produces one unit of output. Express the equilibrium price P found in (c) above in terms of Y, m, P^e, and L.

Question 3 (Chapter 7)

Suppose that the non-institutional civilian population of Hairlandia is 250 million, of which 125 million are employed, 14 million are unemployed, and the rest don't have a job and are not actively looking for one.

(a)

How is the labor force defined? What is the labor force of Hairlandia?

(b)

Define and compute the unemployment rate.

(c)

Define and compute the employment rate.

(d)

Define and compute the labor force participation rate.

(e)

Suppose that some unemployed Hairlanders are fed up with the state of the labor market in Hairlandia and stop actively looking for a job. In particular, suppose now there are only 10 million people looking for a job. Compute the unemployment and employment rates. Comment.

(f)

Suppose we wish to examine the determinants of the equilibrium real wage and equilibrium level of employment N. In a graph with the real wage on the vertical axis, and the level of employment on the horizontal axis, draw the price-setting and wage-setting relations.

What happens when the markup increases? What happens when unemployment benefits increase? Draw the change in the equilibria in two separate graphs and comment.