

14.02 Principles of Macroeconomics

Spring 2014

Problem Set 3

Due: April 4, 2014

1 Labor Market (30 points)

1. Let the price-setting equation be given by $P = (1 + \mu)W$ and the wage-setting equation be given by $W = P^e \frac{z}{u}$, where z are unemployment benefits and u is the unemployment rate. Derive the real wage and unemployment consistent with equilibrium in the labor market in the medium run. Is this the natural rate of unemployment? Does this equilibrium rate of unemployment change if unemployment benefits increase? (10 points)

Answer:

In the medium run, Equilibrium in the labor market needs $P = P^e$: Then, from the WS and PS we get

$$1 = (1 + \mu) \frac{z}{u} \Rightarrow u = z(1 + \mu)$$

and the real wage is given by $\frac{W}{P} = \frac{1}{1 + \mu}$. This, is the natural rate of unemployment. If we increase benefits, unemployment will increase: mainly, because employees have more bargaining powers.

2. Initially, the labor market is in equilibrium at wages W_0 and prices P_0 with unemployment equal to u_0 . Suppose competition suddenly becomes less intense, thereby firms increase their markups. In the short run, suppose P^e is fixed, what happens to the equilibrium real wage. Compare the equilibrium real wage in the short run and the medium run. (10 points)

Answer:

In the short run, higher markup lead firms to increase prices, which results in a lower real wage (note nominal wage may also change). In the medium run, although there are adjustments in P^e and u , the price setting equation still holds, implying that real wage remains the same.

3. Suppose that the price-setting equation also takes into account the price of energy (another input in production). In particular, $P = (1 + \mu)Wq^{1-a}$ where q is the price of one unit of energy. The wage-setting equation is given by $W = P^e \frac{z}{u}$. Derive the real wage and unemployment consistent with equilibrium in the labor market in the medium run. How does the equilibrium unemployment rate change when the price of energy increases? What is the intuition for this result? (10 points)

Answer:

$$u = z(1 + \mu)q^{1-\alpha}$$

$$\frac{W}{P} = \frac{1}{(1 + \mu)q^{1-\alpha}}$$

An increase in the energy prices increases unemployment. Intuitively, higher energy prices increase the cost of production, so firms set higher price for given wage rate. This leads to a decrease in real wage, which in turn results in a higher unemployment rate.

2 AS-AD (40 points)

For this question, specify what happens in the money market, goods market and labor market, when appropriate (use IS-LM diagrams and AS-AD diagrams when necessary).

1. Explain using graphs and words why and how the AD curve shifts when money supply increases. (8 points)

Answer:

An increase in the money supply shifts the AD curve to the right. Intuitively, when supply of money increases, the LM curve shifts to the right, as people needs to have higher income to restore equilibrium in the financial market. The IS curve doesn't change, which further implies that for any given price level, equilibrium output is higher. Hence, AD curve shifts to the right.

Note that when AD curve shifts to the right, the equilibrium price level increases, leading to a decrease in real supply of money. This shifts the LM curve to the left. However, the net effect in the short run is still to have LM shifts to the right, and AD shifts to the right.

2. Explain using graphs and words why and how the AD curve shifts when there is an increase in the government spending. (8 points)

Answer:

AD curve shifts to the right. The increase in government spending shifts the IS curve to the right, but LM curve remains the same when price is fixed. Hence, for any given price level, the equilibrium output is higher, resulting in a higher aggregate demand.

However, this is not the end of the story. The right shift of AD curve results in a higher price, which in turn leads to a decrease in the real supply of money. As a result, the LM curve shifts to the left, forcing the AD curve to shift to the left, partially mitigates the initial right shift of the AD curve when price level is fixed.

3. Explain using graphs and words why and how the AD curve shifts if there is an increase in autonomous consumption (recall that this is the share of consumption that does not depend on disposable income. So with our linear consumption function $C = c_0 + c_1(Y - T)$ autonomous consumption is c_0). (8 points)

Answer:

AD curve shifts to the right. Argument is similar to part 2).

4. Explain using graphs and words why and how the AS curve shifts in the short run (when expected price level is fixed) and medium run (when expected price level is equal to the equilibrium price level) if there is an increase in markups. (8 points)

Answer:

AS curve shifts to the left. In the short run, expected price level is fixed. Higher markup results in higher prices for any level of output. Then because expected price level gradually adjusts upward, workers ask for a higher nominal wage, which further increases price level. Hence, in the medium run, AS curve shifts further to the left.

5. Explain using graphs and words why and how the AS curve shifts in the short run and medium run if there is an increase in unemployment benefits. (8 points)

Answer:

The AS curve shifts to the left. An increase in unemployment benefits increases wages and hence prices in the short run, shifting the AS curve to the left. In the medium run, the same adjustment as in part 4) happens, shifting the AS curve further to the left.

3 AS-AD: The paradox of savings revisited (30 points)

Suppose that the economy begins with output equal to its natural level Y_n . Now suppose that there is a decrease in consumer confidence which results in households attempting to increase their savings, for a given disposable income.

1. Using the AS-AD and IS-LM diagrams, show the effects of the decline in consumer confidence in the short run and in the medium run. Explain why the curves shift in your diagrams. (10 points)

Answer:

A decrease in autonomous spending shifts the AD curve to the left. The AS curve does not shift in the short run. There are two underlying forces for the shift of AD curve: the IS curve shifts to the left due to a lower consumer confidence. This tends to decrease output and shift the AD curve to the left, resulting a lower price level. Note that there is an opposing force: the LM shifts to the right because the decrease in price level (increase in real supply of money). This tends to increase output and shift the AD curve to the right. But the first effect is always larger because the second effect is a by-product of the first effect (i.e. the shift in LM curve is caused by the shift in IS curve). Hence, in the short run equilibrium, the AD curve shifts to the left. Since the expected price level is higher than the current price level, people adjust expected price level down gradually. In the medium run, the AS curve shifts to the right until the new equilibrium output is equal to the original one, because natural rate of output doesn't change. During this process, the price level decreases which implies that the LM curve is shifting to the right. Note the LM curve shifts exactly to the location where the new equilibrium output in the IS-LM diagram is equal to the original one. So in the medium run, the only effect of the decrease in consumer confidence is a lower interest rate and price, leaving equilibrium output unchanged. This means that in the medium run, total savings increases, so the paradox is gone.

2. What happens to output, the interest rate, and the price level in the short run? What happens to consumption, investment and private saving in the short run? Is it possible that the decline in consumer confidence will lead to a fall in private savings in the short run? (10 points)

Answer:

Output, interest rate and the price level will decrease in the short run. It is not clear what happens to investment since both output and interest rate are lower. The change in private spending is also not clear: consumers are consuming less, but their income is also lower. We have the paradox of savings.

Notice that the paradox of savings here is a bit different to the one you learned in class. In class, the paradox of savings refers to the case that private savings is always unchanged regardless how you change c_0 . The reason there is that investment is fixed, and private savings is always equal to investment minus public saving (which is also fixed). When we start the IS-LM model, we relaxed the assumption on investment and made it endogenous, depending on both Y and i . That's why here we get an ambiguous result on the investment and private savings.

3. Repeat 2 for the medium run. Is there any paradox of savings in the medium run? (10 points)

Answer:

See part 1).

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