Economics 100N
UCSC

Professor K. Kletzer
Spring 2010

Selected Answers for Problem Set 3

1. Problem 5 of Chapter 7

a. In your AS-AD diagram, you will show a downward (or, equivalently, inward) shift of the AD curve as c_0 decreases. Y falls from the natural level of output, Y_n, and the price level falls below the expected price level, $P_1 < P_1^e = P_0$. $P_1^e = P_0$ equals the price before consumer confidence fell.
The next month, t=2, the expected price level falls so that $P_2^e = P_1$ and the AS curve shifts down. As you shift the AS curve down, the economy returns to the medium run with $Y = Y_n$ but P is lower than P_0 so that real balances, $\frac{M}{P}$, are higher than they were originally (at t=0).
b. In your IS-LM diagram, you will show that the IS curve shifts inward when the AD curve shifts inward. The interest rate falls as output falls in the short run. Consumption falls, but investment rises as a share of output (investment may fall in value, but it rises as a ratio of GDP).

c. As the economy adjusts to the medium run, real balances rise and the interest rate falls. In the new medium run, $Y = Y_n$ but the interest rate is lower than it was in the initial medium run. Consumption is lower in the new medium run and investment is higher in the medium run. The increase is the saving rate leads to a rise in medium-run investment. Hence, there is no paradox of saving in the medium run.

2. Problem 8 of Chapter 7

a. In this problem, b_0 declines. As investment demand falls, aggregate demand decreases and the AD curve shifts down. In the short run, the AS curve does not shift. Output and the price level fall in the short run. As the economy adjusts to the medium run, the AS curve shifts down as the expected price level falls to equal last month's price level, $P_2^e = P_1 < P_1^e = P_0$. As the AS curve shifts down, the price level continues to fall but output rises back towards the natural level. Output rises because as P falls, real balances rises. As real balances rise, the interest rate falls and investment demand rises. As investment demand rises, aggregate demand rises and equilibrium output rises.
In the new medium run, the price level and interest rate are lower than in the initial medium run. Since there has been no change to G, T or consumer confidence, investment has returned to its original level.

b. In the short run, unemployment rises above the natural rate as output falls below the natural rate:

$$u = \frac{L - N}{L} = 1 - \frac{Y}{L}.$$

u falls as Y increases.

Now, suppose the Fed responds in the short run:

a. By increasing M, the Fed would reduce the downward shift in the AD curve. That is, you would have a smaller decrease in the AD curve. Alternatively, you could answer that the Fed acts after it sees the decrease in output. In this case, increasing M moves the AD curve back towards where it started.

b. Suppose the Fed got it just right: they increased M enough so that the AD curve immediately goes back to where it started. Real balances are higher because the price level didn't change but M rose. Interest rates are lower (M/P is higher and $Y = Y_n$ so that i must fall to maintain financial market equilibrium) so that the fall in investment caused by the fall in b_0 is just made up for by a decrease in the interest rate.

More generally, if the Fed raises M in response to the decline in business confidence, output will return to the natural level faster as the AD curve shifts out while the AS curve shifts down. The idea is to shift the AD curve back toward the original AD curve. In your graph, you will see that the price level in the new medium run with Fed intervention will not be as low as in the medium run without a monetary expansion.

c. The unemployment rate will not fall as far in the short run if the Fed acts immediately. If the Fed increases M after it sees the recession, then unemployment will rise back to the natural rate faster.

3. Problem 9 from Chapter 7

a. An increase in the price of oil is reflected by an increase in the markup. This results in an increase in the natural rate of unemployment. An increase in u_n means a decrease in Y_n. This shifts the AS curve upward. In your AS-AD graph, you should shift the AS curve so that the price level equals the expected price level at the new, lower, level of Y_n.

Output in the medium run falls because Y_n fell as the markup rose.

Output in the short run falls as well, but not as much (use your diagram to see this) because the price level rises in the short run.

b. Unemployment rises in the medium run (u_n rises with the oil price shock) and in the short run. In the short run, as the AS curve shifts upward, the price level begins to rise and output falls. Output falls because as P rises, real balances, M/P, decline leading to a rise in the interest rate and decrease in investment. Because output falls in the short run, unemployment rises in the short run (again, due to to $u = \frac{L - N}{L} = 1 - \frac{Y}{L}$)

c. Increasing M shifts the AD curve up (and out), raising output and lowering unemployment in the short run. To prevent the unemployment rate from rising in the short run, the Fed needs to raise M enough when the AS curve shifts upward to keep output at the same level.

Use the AS-AD graph to show this: when you shift the AS upward, then shift the AD upward, the price level rises, so M has to rise more than P rises.

d. In the short run, the price level rises more if the Fed increases M but output does not decline. It did decrease in the short run when the Fed did not respond. In the medium run, unemployment still goes to the new higher natural rate of unemployment, u_n, and output to the new lower natural level. The increase in M led to a larger increase in P in the medium run. In the medium run, real balances, M/P, are the same whether the Fed increases M or not.

e. In the short run, unemployment is lower when the Fed reacts by increasing M, but in the medium run, money is neutral – the increase in M has no effect on medium-run unemployment.

4. Problem 3 from Chapter 8

a. You should have the Phillips curve,

$$\pi_t = 0 + 0.1 - 2u_t$$

for parts b and c, and the Phillips curve,

$$\pi_t = \pi_{t-1} + 0.1 - 2u_t$$

for parts d, e and f.

However, you can use the equation,

$$\pi_t = \pi_t^e + 0.1 - 2u_t,$$

to find the natural rate of unemployment by letting $\pi_t = \pi_t^e$. You get $u_n = 0.05$, or that is u_n is 5 percent.

b. Just use the curve,

$$\pi_t = 0 + 2(0.05 - u_t)$$

replacing u_t with 0.03. Then plug in the number to get

$$\pi_t = 0.04$$

for t, t+1 and so forth.

c. You get constant higher inflation from this Phillips curve. It is A.W. Phillips original formulation but it does not allow inflation to rise if unemployment remains below the natural rate.

d. You should explain how people with expect inflation to continue.

e. Now, use the Phillips curve,

$$\pi_t = \pi_{t-1} + 2(0.05 - u_t)$$

and let u_t equal 0.03 so that

$$\pi_t = \pi_{t-1} + 0.04 .$$

You can see that the inflation rate rises each month by 4%. For example, from 4% to 8% to 12% and so forth.

f. You should explain that this makes sense because people adjust their expectation of inflation to what they have observed, but they are also always forecasting inflation 4% less that it actually turns out to be. Maybe, they will also learn that and expect inflation for the next month higher than inflation for this month.

5. Problem 4 from Chapter 8

a. A rise in oil prices results in a rise in the markup because about half of the oil used in the US is imported, so its value is not reflected in GDP. The price level rises over wages because the cost of an imported immediate good rises. For Japan, the effect would be larger (no oil reserves) and for Kuwait a rise in the price of oil would be an increase in real and nominal GDP but not the markup.

b. Use the equation to find u_n by letting $\pi_t = \pi_t^e$:

$$0 = 0.08 + 0.1\mu_t - 2u_n$$
$$\Rightarrow u_n = 0.04 + 0.05\mu_t$$

A 0.1 rise in μ_t leads to a one-half percentage point increase in u_n.

Problem 5 from Chapter 8

a. Use the Phillips curve given:

$$\pi_t - \pi_{t-1} = 0.1 - 2u_t$$

and substitute u_t equals 0.04 (the natural rate is 0.05 for this Phillips curve – see problem 3). You get

$$\pi_t - \pi_{t-1} = 0.02$$

so that the inflation rate rises by 2% each year.

b. The Phillips curve with indexation becomes

$$\pi_t = 0.5\pi_{t-1} + 0.5\pi_t + 0.1 - 2u_t$$

which you can rewrite as

$$0.5(\pi_t - \pi_{t-1}) = 0.1 - 2u_t$$

which becomes

$$\pi_t - \pi_{t-1} = 0.2 - 4u_t .$$

c. For u_t equals 0.04, you get the equation,

$$\pi_t - \pi_{t-1} = 0.04$$

so that inflation rises by twice as much each year (4% instead of 2%).

d. Wage indexation makes the Phillips curve steeper. It's slope is twice as large so that the price level accelerates twice as fast.

6. Problem 7 from Chapter 8

a. Use the given relationship for the natural rate of unemployment $u_n = \frac{\mu + z}{\alpha}$ to get 0.06 (6 percent) if α equals 1 and 0.03 (3 percent) if α equals 2.
An increase in α lowers the natural rate of unemployment. Since this means that real wages are more responsive to unemployment, it means that the labor market is more flexible. People will accept jobs more readily because wages respond to the availability of workers and availability of jobs faster.

b. Use the equation $u_n = \frac{\mu + z}{\alpha}$ again. An increase in μ affects the natural rate of unemployment through the term $\frac{\mu}{\alpha}$. If α is twice as large, an increase in μ leads to half as large an increase in the natural rate. That is, if μ increases by 0.03, u_n goes up by 0.03 (3 percent) if α equals 1 and by half as much, 0.015 (1.5 percent) if α equals 2.