Problem Set #3 ANSWERS

Due Tuesday, March 18, 2008

Problem Sets MUST be word-processed except for graphs and equations.

When drawing diagrams, the following rules apply:

1. Completely, clearly and accurately label all axes, lines, curves, and equilibrium points.
2. The original diagram and any equilibrium points MUST be drawn in black or pencil.
3. The first change in any variable, curve, or line and any new equilibrium points MUST be drawn in red.
4. The second change in any variable, curve, or line and any new equilibrium points MUST be drawn in blue.
5. The third change in any variable, curve, or line and any new equilibrium points MUST be drawn in green.
6. The fourth change in any variable, curve, or line and any new equilibrium points MUST be drawn in brown.
A. **Multiple Choice Questions.** Circle the letter corresponding to the best answer. (1 points each.)

1. An increase in expected inflation is likely to cause:
   - a. A decline in the demand for real money balances.
   - b. An increase in the demand for real money balances.
   - c. No change in the demand for real money balances.
   - d. No change in the demand for real money balances only if the income elasticity of real money demand is zero.

2. If there is a financial panic and increased uncertainty about the returns in the stock market and bond market, what is the likely effect on money demand?
   - a. Money demand declines first, then rises when inflation increases.
   - b. **Money demand rises.**
   - c. The overall effect is ambiguous.
   - d. Money demand declines.

3. If the income elasticity of real money demand is 0.75 and income increases by 8%, by about how much does the price level change when the asset market is in equilibrium?
   - a. Falls by 6%.
   - b. Unchanged.
   - c. Rises by 6%.
   - d. Rises by 8%.

4. A decrease in the effective tax rate on capital would cause the IS curve to:
   - a. **Shift to the right.**
   - b. Shift to the left.
   - c. Remain unchanged.
   - d. Remain unchanged if taxes are fully deductible from income; otherwise, shift to the right.

5. Banks decide to increase the interest rate they pay on checking accounts from 1% to 2%. This action would:
   - a. Increase money demand, shifting the LM curve to the left.
   - b. Increase money demand, shifting the LM curve to the right.
   - c. Decrease money demand, shifting the LM curve to the left.
   - d. Decrease money demand, shifting the LM curve to the right.
6. You have just read that the Federal Reserve has increased the money supply to avoid a recession. For a given price level, you would expect the LM curve to:
   a. Shift to the left as the real money supply falls.
   b. Shift to the left as the real money supply rises.
   c. Shift to the right as the real money supply falls.
   d. **Shift to the right as the real money supply rises.**

7. An increase in taxes—when Ricardian equivalence does NOT hold—causes the real interest rate to ______ and the price level to ______ in general equilibrium.
   a. Rise; rise.
   b. Rise; fall.
   c. Fall; rise.
   d. **Fall; fall.**

8. Suppose that government expenditures decline when the real interest rate increases (and vice versa) because of higher borrowing costs. This would cause:
   a. **The IS curve to be flatter.**
   b. The IS curve to be steeper.
   c. The LM curve to be flatter.
   d. The LM curve to be steeper.

9. Suppose that the government reduces its expenditures but that the central bank follows a monetary policy to keep output fixed. After this policy mix, all of the following are true EXCEPT:
   a. Interest rates are lower.
   b. Investment is higher.
   c. **Consumption is lower.**
   d. Unemployment does not change.

10. Suppose that because of labor market reforms, the supply of labor increases at every real wage rate. Then, in order to keep the economy at its full-employment level of output:
    a. The government should decrease its expenditures.
    b. The government should increase taxes.
    c. **The central bank should increase the money supply.**
    d. The central bank should decrease the money supply.
B. Answer BOTH of the following questions. (10 points each.)

1. **IS-LM Model.** Suppose that the economy is in general equilibrium. Because of ideological differences, one group of the President’s advisors suggests that he raise income taxes (Scenario #1) while another group suggests that he increase government purchases (Scenario #2). Assume that Ricardian equivalence does NOT hold.

   a. Based only on this information, use a single IS-LM diagram to accurately and clearly show:

      1. The initial general equilibrium situation (in black), and
      2. The effects on economic output and the real interest rate from:

         a. Implementing Scenario #1 (in red).
         b. Implementing Scenario #2 (in blue).

   IS1
   IS0
   LM3
   LM0
   LM4
   Y1
   Y*0
   Y2
   Fe
b. Provide a brief economic explanation for the changes you showed in your diagram above as well as the adjustment process that the economy undergoes with respect to economic output and the real interest rate for each of these two scenarios.

**Scenario #1:** An increase in income taxes decreases disposable income which decreases desired consumer spending through the marginal propensity to consume. This reduces output and income and shifts the IS curve to the left from IS0 to IS1. The decrease in income reduces the demand for money. Because the money supply is fixed, the real interest rates fall from r0 to r1. A lower real interest rate stimulates some interest-sensitive spending, especially desired investment and desired consumption, and limits the decrease in equilibrium income from Y*0 to Y1.

**Scenario #2:** An increase in government spending increases output and income directly and shifts the IS curve to the right from IS0 to IS2. The increase in income raises the demand for money. Because the money supply is fixed, the real interest rate rises from r0 to r2. A higher real interest rates restrains some interest-sensitive spending, particularly desired investment and desired consumption, and limits the increase in equilibrium income from Y*0 to Y2.

c. After these fiscal policy choices have been implemented, the Federal Reserve follows a stabilizing policy, i.e., it uses monetary policy to keep economic output at its general equilibrium level. Show how this policy affects Scenario #1 (in green) and Scenario #2 (in brown).
d. For each of the following variables, indicate whether it is higher under Scenario #1, Scenario #2, or whether it is the same after both the fiscal and monetary policy changes have taken place. Also provide a brief explanation of why.

1. Income: **Same.** The stabilizing monetary policy keeps the economy at its full-employment level of output, $Y^*_a$, under both scenarios.

2. Interest rates: **Scenario #2.** The combination of an expansionary fiscal policy and a contractionary monetary policy raises the real interest rate while the combination of a contractionary fiscal policy and an expansive monetary policy reduces the real interest rate.

3. Consumption: **Scenario #2.** Although total income is the same in both scenarios, disposable income is lower in Scenario #1 because of the increase in income tax rates. While the real interest rate is also higher in Scenario #2, which would reduce consumer spending, the disposable income effect is larger than the real interest rate effect.

4. Investment: **Scenario #1.** The real interest rate is lower under Scenario #1; a lower real interest rate stimulates additional investment.

5. Government purchases: **Scenario #2.** There was an increase in government spending in Scenario #2 but not in Scenario #1.

6. Tax revenues: **Scenario #1.** Income is the same in both scenarios. However, taxes are higher in Scenario #1 because of the increase in income tax rates.

7. Private saving: **Scenario #2.** In Scenario #1, higher income tax rates reduce disposable income and consumer spending through the marginal propensity to consume so the change in consumer spending is less than the change in tax revenues. Consumer spending also increases because of a lower real interest rate. On balance, private saving falls slightly. In Scenario #2, private saving increases modestly. Income, tax revenues, and therefore disposable income do not change. Consumption declines slightly because of a higher real interest rate, which increases private saving.

8. Public saving: **Scenario #1.** In Scenario #1, an increase in income tax rates with no change in income will increase tax revenues and increase the budget balance. The increase in government spending reduces the budget balance in Scenario #2.

9. Employment: **Same.** Because the economy returns to its full-employment level of output after the stabilizing central bank action in both scenarios, employment will also return to its full-employment level in both scenarios.

10. The unemployment rate: **Same.** Because the economy returns to its full-employment level of output after the stabilizing central bank action in both scenarios, the unemployment rate will return to its natural rate in both scenarios.

11. The demand for money: **Scenario #1.** Both scenarios have the same income. Scenario #1 has a lower real interest rate, which stimulates the demand for money. Scenario #2 has a higher real interest rate, which restrains the demand for money.

12. The supply of money: **Scenario #1.** With a stabilizing monetary policy the central bank increased the money supply following a contractionary fiscal policy.
2. **IS-LM and AD-AS Models.** Assume that the economy is in general equilibrium, that Ricardian equivalence does NOT hold, and that any adjustment to long-term equilibrium takes 4 years. Suppose that the government then reduces income taxes while the central bank increases the money supply and that the effect on economic output from the fiscal policy change is larger than from the money policy change.

a. Based only on this information, use IS-LM and AD-AS diagrams to accurately and clearly show:

1. The initial general equilibrium situation (in black),
2. The short-run effects on economic output, the real interest rate, and the price level from these policy changes (in red),
3. The effect on economic output, the real interest rate, and the price level during the adjustment process (in blue, green, and brown), and
4. The economy’s long-run equilibrium situation (in black).
b. Provide a brief economic explanation for the changes you showed in your diagrams above as well as the adjustment process that the economy undergoes with respect to economic output, the real interest rate, and the price level. Be sure to compare the level of economic output, the real interest rate, and the price level between the initial and final equilibrium situations.

The economy is initially in general equilibrium with output at $Y^*_0$, which is the full-employment level of output, with the real interest rate at $r_0$, and with the price level as $P_0$.

In Year 1, a reduction in income taxes, with no Ricardian equivalence, will increase desired consumption and shift the IS curve to the right from IS0 to IS1. This will immediately cause an increase in output and income. The increase in income will also increase the demand for money. Because the money supply is fixed (so far), the real interest rate begins to rise.

An increase in the money supply will shift the LM curve to the right from LM0 to LM1. The money supply is now greater than money demand at the initial equilibrium situation so the real interest rate begins to fall.

Because the fiscal policy effect is larger than the monetary policy effect on output, the net result will be that output increases from $Y^*_0$ to $Y_1$ and the real interest rate increases from $r_0$ to $r_1$. The economy is in short-run equilibrium but not general equilibrium.

The rightward shifts of the IS and LM curves also shift the AD curve to the right from AD0 to AD1. This increases output from $Y^*_0$ to $Y_1$ (the same level as in the IS-LM diagram). Because prices adjust to deviations of actual from full-employment output with a one-year lag, there is no change in the price level so $P_1 = P_0$ and SRAS0 = SRAS1.

In Year 2, because output in Year 1 is greater than the full-employment level of output, i.e., $Y_1 > Y^*_0$, the price level rises from $P_1$ to $P_2$ and the SRAS curve shifts up from SRAS1 to SRAS2.

A higher price level reduces the real money supply, which causes the LM curve to shift to the left from LM1 to LM2. At $r_1$, the demand for money is greater than the supply of money and the real interest rate rises from $r_1$ to $r_2$. A higher real interest rate reduces interest-sensitive spending and output falls from $Y_1$ to $Y_2$, both in the IS-LM diagram and in the AD-AS diagram. However, output is still greater than its full-employment level so $Y_2 > Y^*_0$.

In Year 3, because output in Year 2 is greater than the full-employment level of output, i.e., $Y_2 > Y^*_0$, the price level rises from $P_2$ to $P_3$ and the SRAS curve shifts up from SRAS2 to SRAS3.

A higher price level reduces the real money supply, which causes the LM curve to shift to the left from LM2 to LM3. At $r_2$, the demand for money is greater than the supply of money and the real interest rate rises from $r_2$ to $r_3$. A higher real interest rate reduces interest-sensitive spending and output falls from $Y_2$ to $Y_3$, both in the IS-LM diagram and in the AD-AS diagram. Because output in Year 2 is lower than in Year 1, the increase in the price level, the upward shift of the SRAS curve, and the decrease in output are smaller in Year 3 than they were in Year 2. However, output is still greater than its full-employment level so $Y_3 > Y^*_0$.

In Years 4 and 5, this process of higher price levels, upward shifts in the SRAS curve, a lower real money supply, a leftward shift of the LM curve, a higher real interest rate, reduced interest-sensitive spending, and lower output continues in smaller and smaller steps until general equilibrium is re-established.

General equilibrium is re-established with output at $Y_5$, which is the economy’s full-employment level of output so $Y_5 = Y^*_0$. The real interest rate is at $r_5 > r_0$ and the price level is at $P_5 > P_0$. 