Problem Set #4 ANSWERS

Due Tuesday, April 1, 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.
A. Multiple Choice Questions. Circle the letter corresponding to the best answer. (1 points each.)

1. Friedman and Phelps suggested that there should NOT be a stable relationship between inflation and unemployment but that there should be a stable relationship between:
   a. Anticipated inflation and frictional unemployment.
   b. Anticipated inflation and cyclical unemployment.
   c. Unanticipated inflation and frictional unemployment.
   d. **Unanticipated inflation and cyclical unemployment.**

2. In the classical model, an anticipated decrease in the money supply would cause output to _____ and the price level to ______ in the short run.
   a. Increase; decrease.
   b. Increase, remain unchanged.
   c. Remain unchanged; increase.
   d. **Remain unchanged; decrease.**

3. In the expectations-augmented Phillips curve, \( \pi = \pi^e - 3(u - 0.06) \), when \( \pi = 0.06 \) and \( \pi^e = 0.03 \), then the unemployment rate is:
   a. 0.04.
   b. **0.05.**
   c. 0.06.
   d. 0.07.

4. If the expected inflation rate is unchanged, a fall in the natural rate of unemployment would:
   a. Shift the Phillips curve to the right.
   b. Not shift the Phillips curve.
   c. **Shift the Phillips curve to the left.**
   d. Shift the Phillips curve to the left and shift the long-run Phillips curve to the right.

5. Classical economists argue that an adverse supply shock would:
   a. Raise neither the natural rate of unemployment nor the actual rate of unemployment.
   b. Raise the actual rate of unemployment but not the natural rate of unemployment.
   c. Raise the natural rate of unemployment but not the actual rate of unemployment.
   d. **Raise both the natural rate of unemployment and the actual rate of unemployment.**
6. Some economics argue that Okun’s Law overstates the cost of cyclical unemployment because:

   a. The cost of retaining workers must be offset against the loss in output that occurs when workers are unemployed.
   b. If efficiency wages prevail and workers are paid their real wage, already employed workers will reduce their effect, thereby reducing output.
   c. It ignores the fact that leisure increases during a recession.
   d. It ignores the loss of government revenue and additional government expenditures that occur when unemployment rises.

7. When actual inflation is greater than expected inflation:

   a. Unemployment falls according to the Phillips curve analysis.
   b. Cyclical unemployment falls according to the Phillips curve analysis.
   c. There are unanticipated wealth transfers from borrowers to lenders.
   d. There are unanticipated wealth transfers from lenders to borrowers.

8. The main determinant of how quickly expected inflation adjusts to changes in monetary policy is:

   a. The slope of the Phillips curve.
   b. The slope of the short-run aggregate supply curve.
   c. The credibility of the central bank.
   d. The degree of indexation in the economy.

9. Suppose that rising inflation causes a permanent rise in precautionary saving as people now face more uncertainty. If there is a sudden increase in the price of oil, then compared to the standard case, in the long-run:

   a. Inflation is now higher.
   b. There is deflation.
   c. Investment is lower.
   d. Inflation is lower.

10. Suppose there is a sudden increase in capital flows into the U.S., leading initially to a dramatic appreciation of the dollar. Then the best description of what happens initially is:

    a. The DAD curve would shift to the left.
    b. The DAD curve would shift to the right.
    c. The SAS curve would shift up.
    d. The SAS curve would shift down.
    e. Both a. and c.
    f. Both a. and d.
B. Answer BOTH of the following questions. (10 points each.)

1. DAD-SAS Model. Assume that the economy is in general equilibrium, that Ricardian equivalence does NOT hold, that any adjustment to long-term equilibrium takes 4 years, and that any long-term effect on full-employment output is greater than any short-term effect. 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 a DAD-SAS diagram to accurately and clearly show:

      1. The initial general equilibrium situation (in black),
      2. The short-run effects on economic output and inflation from these policy changes (in red),
      3. The effects on economic output and inflation during the first 2 years of the adjustment process (in blue and green), and
      4. The economy’s long-run general equilibrium situation (in black).
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 and inflation. Be sure to compare the level of economic output and the rate of inflation between the initial and final general equilibrium situations.

The economy was initially in general equilibrium with output at $Y_0 = Y^*$, the full-employment level of output, and with a steady inflation rate of $\pi_0$.

In Year 1, two events happen.

First, a reduction in income taxes with no Ricardian equivalence will increase desired consumption and shift the DAD curve to the right from DAD$_0$ to DAD$_{1a}$.

Second, an increase in the money supply will reduce the real interest rate and shift the DAD curve further to the right from DAD$_{1a}$ to DAD$_1$.

Because the fiscal policy effect is larger than the monetary policy effect on output, the rightward shift in the DAD curve from the reduction in income taxes, from DAD$_0$ to DAD$_{1a}$, is greater than the rightward shift in the DAD curve from the increase in the money supply, from DAD$_{1a}$ to DAD$_1$.

As a result of these rightward shifts in the DAD curve, output increases from $Y_0$ to $Y_1$ in Year 1. Inflation does not change in Year 1 because there was no change in inflationary expectations (actual inflation was steady in the Year 0) and there was no excess demand in the economy in the prior year ($Y_0 = Y^*$). Consequently, $\pi_1 = \pi_0$.

In Year 2, inflation accelerates from $\pi_1$ to $\pi_2$ because in Year 1 output is greater than the full-employment level of output, i.e., $Y_1 > Y^*$. Excess demand in the economy in Year 1 causes higher inflation in Year 2 and shifts the SRAS curve up from SRAS$_1$ to SRAS$_2$.

Higher inflation reduces the purchasing power of the nominal money supply, causing the LM curve to shift to the left, raising the real interest rate, reducing interest-sensitive spending, and causing output to fall from $Y_1$ to $Y_2$. However, because there is a multiyear adjustment process, output is still greater than its full-employment level so $Y_2 > Y^*$.

In Year 3, inflation accelerates further from $\pi_2$ to $\pi_3$ because in Year 2 there was excess demand in the economy because output was greater than the full-employment level of output, i.e., $Y_2 > Y^*$. Inflationary expectations increases to $\pi_2$ and excess demand in the economy in Year 2 causes higher inflation in Year 3 and shifts the SRAS curve up from SRAS$_2$ to SRAS$_3$. However, because the excess demand in the economy in Year 2 was smaller than the excess demand in the economy in Year 1, the increase in inflation in Year 3 is smaller than the increase in inflation in Year 2.

Higher inflation again reduces the purchasing power of the nominal money supply, causing the LM curve to shift to the left, raising the real interest rate, reducing interest-sensitive spending, and causes output to fall from $Y_2$ to $Y_3$. However, because there is a multiyear adjustment process, output is still greater than its full-employment level so $Y_3 > Y^*$.

In Year 4 and beyond, the adjustment process continues. As long as output is greater than the full-employment level of output, inflation will continue to accelerate, the SRAS curve will continue to shift up, the purchasing power of the nominal money supply will continue to decline, the LM curve will continue to shift to the left, the real interest rate will continue to increase, interest-sensitive spending will continue to decline, and output will also continue to fall in smaller and smaller steps until general equilibrium is re-established.

General equilibrium is re-established with output at $Y_5 = Y^*$, the economy’s full-employment level of output. The inflation rate is now permanently higher at $\pi_5 > \pi_0$.
2. **DAD-SAS Model.** Assume that the economy is in general equilibrium, that Ricardian equivalence does NOT hold, that any adjustment to long-term equilibrium takes 4 years, and that any long-term effect on full-employment output is greater than any short-term effect. Suppose that oil prices then increases substantially. As a result, the stock market drops sharply, reducing wealth significantly. In addition, energy-intensive businesses permanently change their production processes to less efficient techniques. Finally, the government reduces personal income taxes. The effect on economic output from the wealth effect was larger than the effect from the change in taxes.

a. Based only on this information, use a DAD-SAS diagram to accurately and clearly show:

1. The initial general equilibrium situation (in black),

2. The short-run effects economic output and inflation from these events (in red),

3. The effects economic output and inflation during the first 2 years of the adjustment process (in blue and green), and

4. The economy’s long-run general equilibrium situation (in black).
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 inflation. Be sure to compare the level of economic output and the rate of inflation between the initial and final general equilibrium situation.

The economy was initially in general equilibrium with output at \( Y_0 = Y^*_{0} \), which is the full-employment level of output, and with a stable inflation rate of \( \pi_0 \).

In Year 1, four events happen.

First, the substantial increase in oil prices is an inflation shock that immediately shifts the SRAS curve up from SRAS_0 to SRAS_1. This immediately increases inflation from \( \pi_0 \) to \( \pi_1 \).

Second, the substantial increase in oil prices causes a sharp drop in the stock market that reduces wealth significantly. This leads to a decline in desired consumption and shifts the DAD curve to the left from DAD_0 to DAD_{1a}.

Third, the government reduces personal income taxes. With no Ricardian equivalence, this increases desired consumption and shifts the DAD curve to the right from DAD_{1a} to DAD_1.

Because the wealth effect is larger than the fiscal policy effect, the rightward shift of the DAD curve from the reduction in income taxes is smaller than the leftward shift of the DAD curve from reduced wealth. On a net basis, the DAD curve has shifted to the left.

Fourth, the substantial increase in oil prices causes changes in production processes to less efficient techniques. This is a supply shock that reduces the economy’s full-employment level of output from \( Y^*_{0} \) to \( Y^*_{1} \).

Because the long-run effects on full-employment output are greater than the short-run effects on output, the change in \( Y^* \) from \( Y^*_{0} \) to \( Y^*_{1} \) is greater than the decline in actual output from the inflation shock (along the original DAD curve).

As a result of the upward shift in the SRAS curve and the (net) leftward shift of the DAD curve, inflation increased from \( \pi_0 \) to \( \pi_1 \) and output declined from \( Y_0 \) to \( Y_1 \) in Year 1.

In Year 2, whether inflation accelerates, decelerates, or remains stable depends on whether \( Y_1 \) is greater than, less than, or equal to the new, lower full-employment level of output at \( Y^*_{1} \). The diagram above shows \( Y_1 < Y^*_{1} \). If \( Y_1 < Y^*_{1} \), then inflation will decelerate from \( \pi_1 \) to \( \pi_2 \), the SRAS curve will shift down from SRAS_1 to SRAS_2, the purchasing power of the nominal money supply will increase, the LM curve will shift to the right, the real interest rate will decline, interest-sensitive spending will increase, and output will rise from \( Y_1 \) to \( Y_2 \). However, because there is a multiyear adjustment process, output is still less than its (new, lower) full-employment level so \( Y_2 < Y^*_{1} \).

In Year 3 and beyond, this adjustment process will continue. As long as output is less than full-employment level of output, inflation will continue to decelerate, the SRAS curve will continue to shift down, the purchasing power of the money supply will continue to increase, the LM curve will continue to shift to the right, the real interest rate will continue to decline, interest-sensitive spending will continue to increase, and output will continue to increase until general equilibrium is re-established.

General equilibrium will be re-established when output has risen to \( Y_5 = Y^*_{1} \), the economy’s new, lower full-employment level of output. The level of output is below the economy’s initial general equilibrium level of output, i.e., \( Y_5 < Y^*_{0} \). Inflation will be permanently higher at \( \pi_5 > \pi_0 \).