PROBLEM SET 3
14.02 Macroeconomics
March 15, 2006
Due March 22, 2006

I. Answer each as True, False, or Uncertain, and explain your choice.

1. Wages are usually below the reservation wage in Europe because the unemployment rate in Europe is so high.

2. Powerful labor unions will decrease the natural rate of unemployment.

3. The aggregate supply curve is upward sloping because firms produce more goods at higher prices.

4. The US unemployment rate will not increase as long as there is positive output growth.

5. If Lucas and Sargent were right, it would be possible to decrease inflation without an increase in unemployment.

6. Taylor's analysis of staggered wage contracts makes the case for a slow approach to disinflation, but the traditional Phillips curve analysis implies the opposite.

II. Short Questions

1. The AS-AD Model
   Suppose that the interest rate has no effect on investment.

   a. Can you think of a situation where this may happen?
   b. What does this imply for the slope of the IS curve?
   c. What does this imply for the slope of the LM curve?
   d. What does this imply for the slope of the AD curve?

   Continue to assume that the interest rate has no effect on investment. Assume that the economy starts at the natural level of output. Suppose there is an increase in z, so that the AS curve shifts up.

   e. What is the short-run effect on the price level and output? Explain in words.
   f. What happens to output and the price level over time? Explain in words. (Hint: Show that the price level keeps increasing forever.) (This is clearly an extreme case, due to the assumption that the interest rate has no effect on investment.)

2. Demand Shocks and Demand Management
   Assume that the economy starts at the natural level of output. Now suppose there is a decline in business confidence, so that investment demand falls for a given interest rate.

   a. In an AD-AS diagram, show what happens to output and the price level in the short run and the medium run.

b. What happens to the unemployment rate in the short run? In the medium run?

Suppose that the Federal Reserve decides to respond immediately to the decline in business confidence in the short run. In particular, suppose that the Fed wants to prevent the unemployment rate from changing in the short run after the decline in business confidence.

c. What should the Fed do? Show how the Fed's action, combined with decline in business confidence, affects the AD-AS diagram in the short and medium run.

d. How do short-run output and the short-run price level compare to your answers from part (a)?

e. How do the short-run and medium-run unemployment rates compare to your answers from part (b)?

III. Long Question: the Effects of Change in Oil Price

Suppose firms produce goods using labor and oil. Suppose the technology is such that to produce one unit of output requires one unit of labor and one barrel of oil. Suppose the nominal wage is equal to W. Suppose the nominal price of a barrel is equal to P_o, where $P_o = Px$ (Equivalently, the price of a barrel in terms of goods is $\frac{P_o}{P} = x$.) An increase in the (real) price of oil is an increase in x.

1. What is the nominal cost of producing one unit of output? (Hint: P_o should not appear in your final answer.)

2. Assume that the markup is zero, and that firms set prices equal to nominal cost (i.e. in terms of the textbook formulation, assume that $\mu = 0$) Derive the price level as a function of W and x. (Assume $x < 1$: this assumption just says that the price of one of the inputs, oil, is less than the price of the product, a reasonable condition.) What happens to P as x increases?

3. Derive the real wage implied by price setting. Discuss: "An increase in the price of oil necessarily implies a decrease in the real wage."

4. Assume wage setting is given by $W = P^e F\left(1 - \frac{Y}{L}, z\right)$. Derive the aggregate supply equation. Characterize the natural level of output Y_n.

5. Assume the aggregate demand equation is given by $Y = Y\left(\frac{M}{P}, G, T\right)$. Draw the aggregate demand and aggregate supply curves. Characterize the equilibrium.

6. Assume that the economy is at the medium-run equilibrium Y_n. Consider an increase in the price of oil, i.e. an increase in x. Show, graphically, the short-run and the medium-run effects of the increase on output and the price level. Show how the economy adjusts over time. Explain in words.

7. Discuss: "An increase in the price of oil is bad in two dimensions. It leads to an increase in prices (and so higher inflation for some time), and it leads to lower output, both in the short and the medium run."

8. Extra credit: What happened to the (nominal, and real) price of oil in 2005? What happened to inflation? What happened to output growth? (Hint: The effects were not as bad as the model above predicts, and not as bad as most economists fear.)