IAS 107: SPRING 2011: UC BERKELEY: PROBLEM SET 7 (Due April 5, 2011):

Due Tuesday April 5 at Lecture...

1. **Monetary Policy**: Suppose that the Federal Reserve issues this press release:

> The Federal Open Market Committee decided today to raise its target for the federal funds rate by 25 basis points to 4 percent. Elevated energy prices and hurricane-related disruptions in economic activity have temporarily depressed output and employment. However, monetary policy accommodation, coupled with robust underlying growth in productivity, is providing ongoing support to economic activity that will likely be augmented by planned rebuilding in the hurricane-affected areas. The cumulative rise in energy and other costs has the potential to add to inflation pressures; however, core inflation has been relatively low in recent months and longer-term inflation expectations remain contained. The Committee perceives that, with appropriate monetary policy action, the upside and downside risks to the attainment of both sustainable growth and price stability should be kept roughly equal. With underlying inflation expected to be contained, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured. Nonetheless, the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability.

Explain what the Federal Reserve thinks that it is doing by raising the short-term safe nominal interest rate it controls

2. **Quantity Theory of Money**: Suppose that the rate of labor force growth is 3% per year, the efficiency of labor is constant, and the economy is on its steady state growth path. Suppose also that the rate of growth of the nominal money stock is 10% per year. Do you think that it is likely that the inflation rate is less than 5% per year? Why or why not?

3. **Economic Growth**: Because of the computer revolution the rate of growth of the efficiency of labor in the United States doubled from 1.0 percent per year in the generation before 1995 to about 2.0 percent per year since. Suppose the rate of labor force growth remains constant at 1 percent per year, the depreciation rate were to remain constant at 3 percent per year, and the American savings rate (plus foreign capital invested in America) remains constant at 20 percent per year. Assume that the efficiency of labor in the U.S. in 2010 was $25,000 per year, and that the diminishing- returns-to-capital parameter α is 1/2.

a. What was the level of output per worker in 2010 if the United States was then on its steady-state balanced-growth path?

b. If the rate of growth of the efficiency of labor remains at 2%/year. What is your forecast of the level of output per worker in the United States in 2050?

c. Suppose that the rate of growth of the efficiency of labor were to fall back to its pre-1995 productivity slowdown rate of 1%/year. What would the economy's steady-state capital output ratio be?

d. Suppose that the rate of growth of the efficiency of labor were to fall back to its pre-1995 productivity slowdown rate of 1%/year. What is your forecast of the level of output per worker in the United States in 2050?

4. **Quantity Theory of Money**:

a. Suppose that the level of real potential output Y* is $14 trillion, the nominal money stock M is $2 trillion, and the velocity of money V is 7. What is the price level P?

b. Suppose that the level of real potential output Y* is $14 trillion, the nominal money stock M is $2.5 trillion, and the velocity of money V is 5. What is the price level P?

c. Suppose that the level of real potential output Y* is $14 trillion, the nominal money stock M is $4 trillion, and the velocity of money V is 7. What is the price level P?

d. Suppose that the level of real potential output Y* is $15 trillion, the nominal money stock M is $4 trillion, and the velocity of money V is 5. What is the price level P?

5. **Phillips Curve**: In the Phillips Curve framework in which $\pi = E(\pi) + \beta(u^* - u)$—the inflation rate π equals the previously-expected inflation rate $E(\pi)$ plus the Phillips Curve slope parameter β times the difference between the economy's natural rate of unemployment u^* and the current rate of unemployment u...

a. If $E(\pi) = 9\%$ per year, $u^* = 6\%$, and $u = 8\%$, what is the inflation rate π going to be if the Phillips Curve slope parameter $\beta = 1/2$?

b. If $E(\pi) = 3\%$ per year, $u^* = 4\%$, and $u = 4\%$, what is the inflation rate π going to be if the Phillips Curve slope parameter $\beta = 1/2$?

c. If $E(\pi) = 1\%$ per year, $u^* = 7\%$, and $u = 3\%$, what is the inflation rate π going to be if the Phillips Curve slope parameter $\beta = 1/3$?

d. If $E(\pi) = 1\%$ per year, $u^* = 7\%$, and $u = 3\%$, what is the inflation rate π going to be if the Phillips Curve slope parameter $\beta = 2/3$?

e. If $E(\pi) = 1\%$ per year, $u^* = 7\%$, and $u = 3\%$, what is the inflation rate π going to be if the Phillips Curve slope parameter $\beta = 1$?

6. **Phillips Curve**: In the Phillips Curve framework in which π = E(π) + β(u* - u)—the inflation rate π equals the previously-expected inflation rate E(π) plus the Phillips Curve slope parameter β times the difference between the economy's natural rate of unemployment u* and the current rate of unemployment u...

    a. Suppose that the economy starts out with an expected rate of inflation of 2%/year, a Phillips Curve slope parameter of 1/2, and a natural rate of unemployment of 5%. Suppose that the Federal Reserve decides to reduce the rate of unemployment to 3% through expansionary monetary policy and does so. What is the inflation rate?
    b. Now look one year ahead to next year. Next year, expectations of inflation will be adaptive: that is, expectations of inflation next year will be equal to what inflation was this year. What will expectations of inflation be next year?
    c. What will actual inflation be next year if the Federal Reserve continues to pursue expansionary monetary policies to keep the rate of unemployment at 3%?
    d. If inflation expectations continue to be adaptive in this sense that each year's expected is the previous year's actual inflation, what will actual inflation be two years from now?

7. **Phillips Curve**: In the same situation as Problem 6...

    a. If inflation expectations continue to be adaptive and if the Federal Reserve continues to follow policies to keep the unemployment rate at 3%, what will actual inflation be five years from now?
    b. If inflation expectations continue to be adaptive and if the Federal Reserve continues to follow policies to keep the unemployment rate at 3%, what will actual inflation be ten years from now?
    c. If inflation expectations continue to be adaptive and if the Federal Reserve continues to follow policies to keep the unemployment rate at 3%, what will actual inflation be twenty years from now?
    d. Do you think that inflation expectations will continue to be adaptive in this sense as this process rolls forward over the next twenty years, or do you think the process by which expectations of inflation are formed will change?
    e. If you think it will change, what do you think it will change to?

8. **Monetary Policy**: Suppose we have an economy with a natural rate of unemployment of 6%, current expected inflation of 2%, and a Phillips Curve slope parameter of 1/2. Suppose that the Federal Reserve has a target u^t for the unemployment rate and a target π^t for the inflation rate, and suppose that for each percentage point inflation is above its target level the Federal Reserve raises unemployment by an extra percentage point above its target level.

a. If the target for the inflation rate is 2% and the target for the unemployment rate is 6%, what will inflation and unemployment be?
b. If the target for the inflation rate is 3% and the target for the unemployment rate is 4%, what will inflation and unemployment be?
c. If the target for the inflation rate is 6% and the target for the unemployment rate is 8%, what will inflation and unemployment be?
d. If the target for the inflation rate is 4% and the target for the unemployment rate is 4%, what will inflation and unemployment be?

9. **Monetary Policy**: Suppose we have an economy with a natural rate of unemployment of 6%, current expected inflation of 10%, and a Phillips Curve slope parameter of 1/2. Suppose that the Federal Reserve has a target u^t for the unemployment rate and a target π^t for the inflation rate, and suppose that for each percentage point inflation is above its target level the Federal Reserve raises unemployment by an extra percentage point above its target level.

a. Suppose that from this year forward the Federal Reserve sets its target for the inflation rate at 2% and its target for the unemployment rate at 4%, what will inflation and unemployment be this year?
b. Suppose expected inflation is adaptive in that each year's expected inflation is the previous year's actual inflation. What will inflation and unemployment be next year?
c. Suppose expected inflation is adaptive in that each year's expected inflation is the previous year's actual inflation. What will inflation and unemployment be two years from now?
d. Suppose expected inflation is adaptive in that each year's expected inflation is the previous year's actual inflation. What will inflation and unemployment be five years from now?
e. Suppose expected inflation is adaptive in that each year's expected inflation is the previous year's actual inflation. What will inflation and unemployment be ten years from now?

10. **Economic Growth:** Japan today has a level of GDP per worker of $60,000 and a savings-investment share of output of 25%. Assume that the depreciation rate in Japan is 3% per year, the population growth rate is zero, the rate of growth of the efficiency of labor is 2% per year, and the efficiency-of-labor parameter in the production function is ½. Assume that Japan has a labor force of 60 million.

a. What is Japan's current capital-output ratio if it is on its steady-state balanced growth path?
b. What is Japan's current efficiency of labor?

c. What is Japan's current capital stock per worker?

d. What is Japan's current capital stock?

e. Suppose that a catastrophic earthquake and tsunami were to kill 50,000 people and destroy $360 billion of capital. By about how much would you anticipate that Japanese output per worker would drop?