

# IAS 107: Spring 2011: Problem Set 8

Due at the start of lecture on Th Apr 14

1. Quantity Theory of Money: Suppose that the rate of labor force growth is 1% per year, the efficiency of labor is growing at 2% per year, and the economy is on its steady state growth path. Suppose also that the trend is that the velocity of money is growing at 1% per year.

- How fast should the Federal Reserve seek to make the growth rate of the money stock if its inflation target is price stability--a 0% per year rate of growth of the CPI?
- How fast should the Federal Reserve seek to make the growth rate of the money stock if its inflation target is a 2% per year rate of growth of the CPI?
- How fast should the Federal Reserve seek to make the growth rate of the money stock if its inflation target is a 5% per year rate of growth of the CPI?

2. Economic Growth: With the ebbing of the computer revolution and the growing worry that an increasing share of economic activity in the future will be concentrated in high labor-cost low productivity-growth sectors, many economists fear that the rate of growth of the efficiency of labor in the United States will average 1.2 percent per year in the future rather than the 2.0 percent per year that has been the average since 1900. Assume that the rate of labor force growth remains constant at 0.8 percent per year, that the depreciation rate were to remain constant at 3 percent per year, that the year-2010 efficiency of labor in the United States was \$25,000 per year, that the diminishing-returns-to-capital parameter  $\alpha$  in the production function is  $1/2$ , and that the American savings rate (plus foreign capital invested in America) has averaged 20 percent per year.

- What was the level of output per worker in 2010 if the United States was then on its steady-state balanced-growth path?
- If these fears that productivity growth will fall to 1% per year are justified, what is your forecast of the efficiency of labor in the United States in 2050?
- If these fears that productivity growth will fall to 1% per year are justified, what is your forecast of the level of GDP per worker in the United States in 2050 if the savings rate remains at 20 percent?
- If these fears that productivity growth will fall to 1% per year are justified, what is your forecast of the level of GDP per worker in the United States in 2050 if tax cuts and large deficits lead the savings rate to average 15 percent?
- If these fears that productivity growth will fall to 1% per year are justified, what is your forecast of the level of GDP per worker in the United States in 2050 if wise fiscal policies and government-subsidized savings plans lead the savings rate to average 25 percent?

3. National Income Accounting:

- What was the level of real GDP in 2005 dollars in 1970?
- What was the rate of inflation in the United States in 2000?
- Explain whether or not, how, and why the following items are included in the calculation of GDP: (i) rent you pay on an apartment, (ii) purchase of a used textbook, (iii) purchase of a new tank by the Department of Defense, (iv) watching an advertisement on youtube.

4. Depression Economics: In the simple income-expenditure model with real GDP  $Y$  equal to the sum of consumption spending by households  $C$ , investment spending by businesses  $I$ , government purchases  $G$ , and with

net exports NX; with consumption spending C given by the equation:  $C = c_0 + c_y Y(1-t)$ ; and with imports IM given by the equation:  $IM = i_m Y$ ...

- a. Suppose  $I = \$1.7$  trillion,  $G = \$2$  trillion,  $G_X = \$1.3$  trillion,  $c_0 = \$3$  trillion,  $c_y = 0.85$ , the tax rate  $t=0$ , and  $i_m = .10$ . What is GDP Y?
- b. Suppose  $I = \$1.7$  trillion,  $G = \$3.5$  trillion,  $G_X = \$0.8$  trillion,  $c_0 = \$3$  trillion,  $c_y = 0.65$ , the tax rate  $t=0$ , and  $i_m = .15$ . What is GDP Y?
- c. Suppose  $I = \$2.3$  trillion,  $G = \$4$  trillion,  $G_X = \$1.7$  trillion,  $c_0 = \$3$  trillion,  $c_y = 0.6$ , the tax rate  $t=0.67$ , and  $i_m = .2$ . What is GDP Y?
  - d. Suppose  $I = \$1.5$  trillion,  $G = \$2.5$  trillion,  $G_X = \$1.0$  trillion,  $c_0 = \$3$  trillion,  $c_y = 0.67$ , the tax rate  $t=0$ , and  $i_m = .0$ . What is GDP Y?

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

- a. If  $E(\pi) = 2\%$  per year,  $u^* = 6\%$ , and  $u = 10\%$ , what is the inflation rate  $\pi$  going to be if the Phillips Curve slope parameter  $\beta = 1/2$ ?
- b. If  $E(\pi) = 3\%$  per year,  $u^* = 4\%$ , and  $u = 6\%$ , what is the inflation rate  $\pi$  going to be if the Phillips Curve slope parameter  $\beta = 1/2$ ?
- c. If  $E(\pi) = 6\%$  per year,  $u^* = 7\%$ , and  $u = 3\%$ , what is the inflation rate  $\pi$  going to be if the Phillips Curve slope parameter  $\beta = 1/3$ ?
- d. If  $E(\pi) = 1\%$  per year,  $u^* = 7\%$ , and  $u = 9\%$ , what is the inflation rate  $\pi$  going to be if the Phillips Curve slope parameter  $\beta = 2/3$ ?
- e. If  $E(\pi) = 4\%$  per year,  $u^* = 8\%$ , and  $u = 5\%$ , what is the inflation rate  $\pi$  going to be if the Phillips Curve slope parameter  $\beta = 1$ ?

6. Monetary Policy: Suppose we have an economy with a natural rate of unemployment of 6%, current expected inflation of 4%, and a Phillips Curve slope parameter of 1/2. Suppose that the Federal Reserve has a target  $u_0$  for the unemployment rate and a target  $\pi_t$  for the inflation rate.

- a. If the target for the inflation rate is 4% and the target for the unemployment rate is 6%, what will inflation and unemployment be?
- b. If the target for the inflation rate is 2% and the target for the unemployment rate is 6%, what will inflation and unemployment be if for each extra percentage point of inflation the Federal Reserve raises unemployment by an extra two percentage points?
- c. If the target for the inflation rate is 2% and the target for the unemployment rate is 6%, what will inflation and unemployment be if for each extra percentage point of inflation the Federal Reserve raises unemployment by an extra half a percentage point?
- d. If the target for the inflation rate is 2% and the target for the unemployment rate is 6%, what will inflation and unemployment be if for each extra percentage point of inflation the Federal Reserve raises unemployment by an extra percentage point?

7. 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  $u_0$  for the unemployment rate and a target  $\pi_t$  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 3% and its target for the unemployment rate at 5%, 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?

8. Monetary Policy: Suppose we have an economy with a natural rate of unemployment of 6%, and a Phillips Curve slope parameter of  $1/2$ . Suppose that the Federal Reserve has a target  $u_0$  for the unemployment rate and a target  $\pi$  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 two percentage points above its target level.

- a. If the Federal Reserve's target for the inflation rate is 2% and its target for the unemployment rate is 4%, what will the long run rate of inflation be?
- b. If the Federal Reserve's target for the inflation rate is 2% and its target for the unemployment rate is 6%, what will the long run rate of inflation be?
- c. If the Federal Reserve's target for the inflation rate is 4% and its target for the unemployment rate is 4%, what will the long run rate of inflation be?
- d. If the Federal Reserve's target for the inflation rate is 4% and its target for the unemployment rate is 8%, what will the long run rate of inflation be?