IAS 107: Spring 2011: Problem Set 2

Due at the start of lecture on Th Feb 3

1. Jean Baptiste Say in 1803 claimed that because nobody makes anything without intending to use it or sell it, and nobody sells anything without intending to buy something else, that there could be no general shortage of demand in an economy--that there could be a planned excess of supply of some commodities, but it would be balanced by a planned excess of demand of some other commodities. Was he wrong? Why was he wrong?

2. About how many people were unemployed in the United States back in 2007? How does this compare to the number unemployed today?

3. Roughly, what is the gap between real per capita GDP in Canada today, real per capita in Brazil, and real GDP per capita in Zimbabwe?

4. Consider an economy with the production function: $Y=K^{\alpha}(EL)^{(1-\alpha)}$ on its steady-state balanced-growth path:

   a. Suppose $\alpha = 1/2$, E=1, L=100, and K=64; what is output per worker Y/L?
   b. Suppose $\alpha = 1/2$, E=3, L=196, and K=49; what is output per worker Y/L?
   c. If both capital K and labor L triple, what happens to total output Y?
   d. Holding E=1, suppose that capital per worker increases from 4 to 8 and then from 8 to 12. What happens to output per worker?

5. Consider an economy with the production function: $Y=K^{\alpha}(EL)^{(1-\alpha)}$ on its steady-state balanced-growth path:

   a. Suppose $\alpha = 1/3$, E=1, L=100, and K=64; what is output per worker Y/L?
   b. Suppose $\alpha = 1/3$, E=3, L=196, and K=49; what is output per worker Y/L?
   c. If both capital K and labor L double, what happens to total output Y?
   d. Holding E=1, suppose that capital per worker increases from 1 to 4 and then from 4 to 9. What happens to output per worker?

6. Suppose that an economy's production function is $Y = K^{0.5}(EL)^{0.5}$; suppose further that the savings rate s is 40% of GDP, that the depreciation rate δ is 4% per year, the population growth rate n is 0% per year, and the rate of growth g of the efficiency of the labor force is 2% per year.

   a. What is the steady-state balanced-growth capital-output ratio?
   b. How fast does output per worker grow along the steady-state balanced-growth path?
   c. How fast does total output grow along the steady-state balanced-growth path?

7. Suppose that all variables are the same as in problem 5 save the production function, which instead is: $K^{0.8}(EL)^{0.2}$; how would your answers to 6a, b, and c be different? Why would your answers are different?

8. Botswana: In the 1950s Botswana's savings rate averaged 6% of GDP. In 1960 Botswana's level of GDP per capita was $900 of today's dollars per year. Since 1960 Botswana's savings rate has averaged 30% of GDP. Today Botswana's level of GDP per capita is $15000 per year. Assume that the diminishing-returns parameter α in our production function for Botswana is 0.5, that Botswana's population growth rate n has been constant at 2% per year, and that its depreciation rate δ has been constant at 4% per year. Assume that Botswana was back in 1960 on its old steady-state balanced-growth path (for an s=0.06) and is now on its new steady-state balanced-growth path (for an s=0.30)

   a. Suppose there had been no growth in the efficiency of labor in Botswana between 1960 and 2011, what do you predict that the level of GDP per capita would be in Botswana today?
   b. How fast has the efficiency of labor grown in Botswana over the past 50 years?
   c. What was the value of the efficiency of labor in Botswana in 1960?
   d. What is the value of the efficiency of labor in Botswana today?

9. Zambia: In the 1950s Zambia's savings rate averaged 24.5% of GDP. In 1960 Zambia's level of GDP per capita was $1800 of today's dollars per year. Since 1980 Zambia's savings rate has averaged 24.5% of GDP. Today Zambia's level of GDP per capita is $1300 per year. Assume that the diminishing-returns parameter α in our production function for Zambia is 0.5, that Zambia's population growth rate n has been constant at 3% per year, and that its depreciation rate δ has been constant at 4.64% per year. Assume that Zambia's was back in 1960 on its old steady-state balanced-growth path (for an s=0.3) and is now on its new steady-state balanced-growth path (for an s=0.2)

   a. Suppose there had been no growth in the efficiency of labor in Zambia between 1960 and 2011, what do you predict that the level of GDP per capita would be in Zambia today?
   b. How fast has the efficiency of labor grown in Zambia over the past 50 years?
   c. What was the value of the efficiency of labor in Zambia in 1960?
   d. What is the value of the efficiency of labor in Zambia today?

10. France: Since 1946 French population growth (including illegal immigration) has been constant at about 1% per year and France has had a savings share of 25% of GDP. Today France has a GDP per capita level of about $35,000 per year. The rate of growth of the efficiency of labor in France since the end of World War II in France has been constant at about 2% per year. Assume that France is today on its steady-state balanced-growth path.

a. If France remains on its current steady-state balanced-growth path, what will GDP per capita be in France in 2050?
b. If France remains on its current steady-state balanced-growth path, what will GDP per capita be in France in 2100?
c. What would France's level of GDP per capita have been back in 1946 if it had then been on today's steady-state balanced-growth path?
d. In fact, France's level of GDP per capita back in 1946 was about $3,000 per year even though its efficiency of labor has grown at 2% per year since the end of World War II. Why do you think its level back then was so low

11. Japan has had a very high savings rate and a high growth rate of output per worker over the past half century, starting from an initial post-WWII very low level of capital per worker. What does the analysis of chapter 4 suggest about Japan's ability to sustain a higher growth rate than other industrial countries?

12. Suppose that environmental regulations lead to a diversion of investment spending from investments that boost the capital stock to investments that replace polluting with less-polluting capital. In our standard growth model, what would be the consequences of such a diversion for the economy's capital-output ratio and for its balanced-growth path? Would it make sense to say that these environmental regulations diminished the economy's wealth?