

## Economics 101b; Fall 1999; Problem Set 4

*Due in class October 5, 1999*

1. In the mid-1990s during the Clinton Presidency the U.S. eliminated its federal budget deficit. The national savings rate was thus boosted by 4% of GDP, from 16% to 20% of real GDP. In the U.S. in the mid-1990s, the rate of labor force growth was 1% per year, the depreciation rate was 3% per year, the rate of increase of the efficiency of labor was 1% per year, and that the diminishing-returns-to-investment parameter is  $1/3$ . Suppose that these rates continue into the indefinite future.

Suppose that the federal budget deficit had remained at 4% indefinitely. What then would have been the U.S. economy's steady-state capital-output ratio? If the efficiency of labor in 2000 were \$30,000 per year, what would have been your forecast of output per worker in the U.S. in 2040?

After the elimination of the federal budget deficit, what would be your calculation of been the U.S. economy's steady-state capital-output ratio? If the efficiency of labor in 2000 were \$30,000 per year, what would have been your forecast of output per worker in the U.S. in 2040?

2. How would your answers to the above question change if your estimate of the diminishing-returns-to-scale parameter  $\alpha$  were not  $1/3$  but  $1/2$ , and if your estimate of the efficiency of labor in 2000 were not \$30,000 but \$15,000 a year?

3. At the end of the 1990s it appeared that the rate of growth of the efficiency of labor in the United States had doubled, from 1 percent per year to 2 percent per year. Suppose this increase were to be permanent. And suppose the rate of labor force growth were to remain 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) were to remain constant at 20 percent per year. Assume that the efficiency of labor in the U.S. in 2000 is \$15,000 per year, and that the diminishing-returns-to-investment parameter is  $1/3$ .

What is the change in the steady-state capital-output ratio? What is the new capital-output ratio?

What would such a permanent acceleration in the rate of growth of the efficiency of labor change your forecast of the level of output per worker in 2040?

4. How would your answers to the above question change if your estimate of the diminishing-returns-to-scale parameter  $\alpha$  were not  $1/3$  but  $1/2$ , and if your estimate of the efficiency of labor in 2000 were not \$30,000 but \$15,000 a year?

5. Output per worker in Mexico in the year 2000 is about \$10,000 per year. Labor force growth is 2.5% per year. The depreciation rate is 3% per year. The rate of growth of the

efficiency of labor is 2.5% per year. The savings rate is 16% of GDP. And the diminishing-returns-to-investment parameter is 0.5.

What is Mexico's steady-state capital-output ratio?

Suppose that Mexico today is on its steady-state growth path. What is the current level of the efficiency of labor  $E$ ?

What is your forecast of output per worker in Mexico in 2040?

6. In the framework of the question above...

...how much does your forecast of output per worker in Mexico in 2040 increase if Mexico's domestic savings rate remains unchanged but it is able to finance extra investment equal to 4% of GDP every year by borrowing from abroad?

...how much does your forecast of output per worker in Mexico in 2040 increase if the labor force growth rate immediately falls to 1% per year?

...how much does your forecast of output per worker in Mexico in 2040 increase if both happen?

7. Do you believe that the lower income countries of the world will catch up to--or at least draw nearer to--the high income countries? Why or why not?