

Homework 2
Economics 101 - Chapter 7 and part of Chapter 8
Due in class 10-19-09

- 1) Country A and country B both have the production function: $Y = F(K,L) = K^{1/2}L^{1/2}$. Assume that in both countries capital depreciates at a rate of 10% each year. (Assume no population growth and no technological progress in either country.) Assume further that country A saves a constant 20 percent of its income each year and that country B saves 30 percent.
 - a) Compute the “per-worker” form of the production function above.
 - b) Using this and the steady-state condition, compute the steady-state level of capital per worker for each country.
 - c) Now compute the steady state level of consumption per worker in each country. Since the golden rule is defined as the level of capital that allows the greatest level of consumption in steady state, which of these two countries has a steady state closer to the golden rule steady state? Why does a smaller marginal propensity to consume here result in a higher *steady state level* of consumption?
 - d) Check your conclusion above by computing the golden rule level of capital stock, and the saving rate necessary to achieve it.

 - 2) China’s real per-person GDP growth rate (percent change in output) has been much greater than that in the U.S. in the last decade. For example, China grew about 10% last year, compared to about 3% for the U.S.
 - a) Using the Solow growth model, is there reason to believe this disparity in growth rates will disappear in time? What about the disparity in income levels per person?
 - b) How is your conclusion affected if China has a higher saving rate than the U.S.?
 - c) What if the saving rates are the same, but China has a higher population growth rate?
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This one is hard, but give it a try. (It was used on a midterm for this class several years ago.)

- 3) Suppose we know that workers tend to receive 70% of all the income earned in Germany, that the German depreciation rate is 10%, and that there is no population growth or technological progress. Suppose we CANNOT assume the production function in Germany takes the convenient Cobb-Douglas form (Do not assume $Y = AK^\alpha L^{1-\alpha}$). But we can assume that whatever the production function is, it has constant returns to scale, that the only two factors of production are capital and labor, that markets are competitive, and that firms maximize profits. Using just this information, compute what saving rate Germany should try to have, if it wants to enjoy the maximum amount of consumption per person in steady state (that is, to achieve the golden rule). [You might find this one difficult. Hint: Make use of Euler’s theorem from chapter 3, along with the key Solow model equations from chapter 7.]
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