

Homework #4

1. In its introduction to the Solow Model without technological progress, Lecture 5 contains a derivation of the marginal product of capital.
 - a. If the production function is given by: $Y = K^\alpha L^{1-\alpha}$, what is the marginal product of labor?
 - b. Assuming that $\alpha = 0.5$ and that $K = 1$, calculate the marginal product of labor from one unit of labor input to five units. Hint: Use a calculator!
 - c. On a graph, plot the marginal product of labor using the values you just calculated.
 - d. Assuming that $\alpha = 0.5$ and that $K = 2$, calculate the marginal product of labor from one unit of labor input to five units.
 - e. On the same graph, plot the marginal product of labor using the values you just calculated.
 - f. What happens to the marginal product of labor when the economy's stock of capital increases?

2. In Lecture 2, you learned that a firm hires labor up to the point where the wage equals the price times the marginal product of labor (MPL), i.e. $w = p \cdot MPL$, where labor is supplied at wage rate, w , and the labor demand is given by $p \cdot MPL$. Since we're now discussing economy-wide aggregates, it's convenient to normalize the price level to $p = 1$.
 - a. If we assume that the wage rate, w , is constant at a given point in time, then how will the quantity of labor that the economy demands respond to a sudden increase in the capital stock?
 - b. If we assume that the quantity of labor supplied, L , is constant at a given point in time, then how will the wage rate respond to a sudden increase in the capital stock?
 - c. Which assumption does the Solow Model make?

3. In 2003, Pres. George W. Bush convinced Congress to reduce the maximum tax rate that shareholders pay on dividends from 38.6 percent to 15 percent. In lobbying for this measure, he argued that cutting the tax would encourage people to invest more – i.e. increase the economy's saving rate.

Opponents of the policy argued that cutting the tax on dividends was a giveaway to Pres. Bush's rich friends and that it would not benefit workers.

Answer the following questions using the Solow Model without technological progress. Throughout the problem, assume that the U.S. economy was in steady state when Pres. Bush announced his dividend tax plan. Until part e., assume that Pres. Bush's tax policy would increase the saving rate.

 - a. Under what condition would Pres. Bush's tax policy increase steady-state consumption per worker? Under what condition would it decrease steady-state consumption per worker?
 - b. How would the marginal product of labor differ between the initial steady state and the one to which the economy will converge to after reduction of the tax on dividends?
 - c. How would Pres. Bush's tax policy affect wages, w ? **Hint:** remember that: $w = p \cdot MPL$
 - d. Given your answers to the previous three questions, was Pres. Bush's tax policy a giveaway to the rich without any benefit for workers?
 - e. Now assume that Pres. Bush's tax policy would not increase the saving rate. Under this assumption, was the tax policy a giveaway to the rich without any benefit for workers?