

Problem Set #7
Suggested solutions

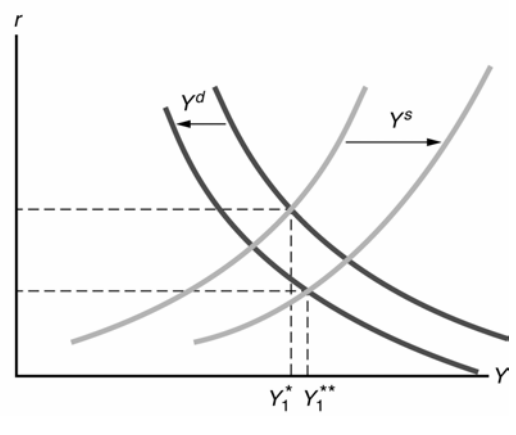
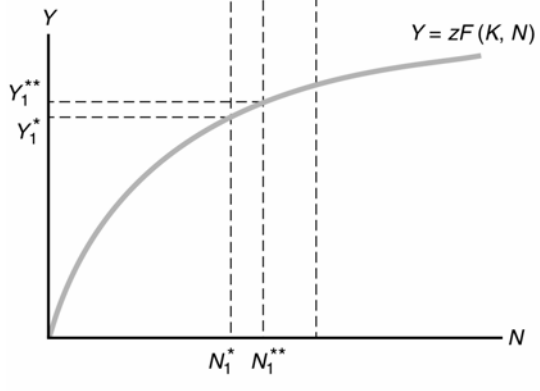
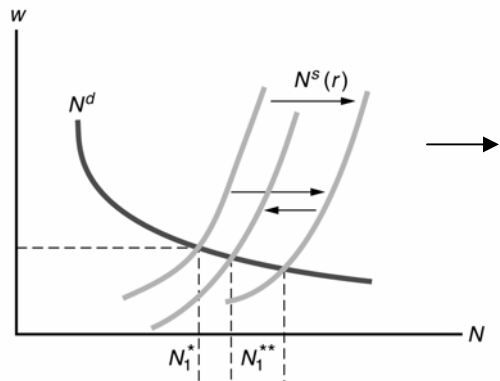
1. There are two effects of an increase in the depreciation rate. First, there is the direct effect, which implies that, given the marginal product of capital in period two, MP'_K , the net marginal product of capital, $MP'_K - d$, will decrease when the depreciation rate increases. For any given real interest rate, this effect lowers investment demand, and so the investment demand schedule shifts to the left. This direct effect is the result of the fact that a higher depreciation rate implies that the scrap value of the capital the firm invests in will be lower at the end of period two.

In addition to this direct effect, there is also an indirect effect of the depreciation rate on investment. Since $K' = (1 - d)K + I$, given the initial capital stock, K , the quantity of capital in period two will be smaller, for any I , if the depreciation rate is higher. Therefore, when d increases, the investment schedule shifts to the right. The direct and indirect effects work in opposite directions, and so, given the real rate of interest, investment may either rise or fall with an increase in the depreciation rate.

3. The costs of the output subsidy and the investment subsidy would each require an increase in other (lump-sum) taxes to satisfy the government budget constraint with unchanged government purchases. This increase in taxes reduces consumer wealth and so labor supply shifts to the right and output supply also shifts to the right. This effect tends to increase output and decrease the real interest rate.

In the case of the output subsidy, the decrease in the real interest rate increases both consumption spending and investment spending to match the increase in output. In the case of the subsidy to investment, there is also a shift to the right in the output demand curve. This effect provides an additional increase in output. Also the increase in the real interest rate (or the smaller-sized decrease in the real interest rate) reduces consumption spending so that more of the increase in output goes to investment spending and less goes to consumption spending. Therefore, the investment subsidy is likely to be more effective in increasing investment.

7. A future increase in government spending generates a negative income effect. Therefore, current-period consumption declines and current-period labor supply increases. The increase in current-period labor supply shifts the output supply curve to the right. The real interest rate falls, and the levels of employment and output likely increase. The results are summarized in the figures below. The equilibrium level of output increases from Y^* to Y^{**} , and the level of employment rises from N^* to N^{**} . The equilibrium rate of interest unambiguously declines. This decline in the real rate of interest is responsible for the second, leftward shift in the labor supply curve. If, on net, employment and output increase, then it must be the case that the real wage falls. (If, on the other hand, output falls on net, then employment must fall and the real wage must rise.) The reduction in the real interest rate assures us that investment increases. The income effect tends to lower consumption, while the decline in the real rate of interest tends to increase consumption. Most likely, consumption falls, although consumption may also increase.



11. A temporary increase in the price of energy is best modeled as a reduction in current-period total factor productivity. Such a disturbance shifts output supply to the left. Therefore, output falls and the real interest rate increases. In question 3, above, we showed that a larger value for the marginal propensity to consume implied a flatter output demand curve. In the figure below, we show the shift in output supply with two alternative output demand curves. When the marginal propensity to consume is high, the output demand curve is flatter and the reduction in z results in a large reduction in output and a small increase in the real interest rate. When the marginal propensity to consume is smaller, there is a smaller reduction in output, and a larger increase in the real interest rate.

