

University of Toronto
Economics 336Y – Public Economics

Problem Set #3

1. The market for tires is perfectly competitive, and the demand for tires is given by the function

$$D(p) = \frac{8}{p}$$

while the market supply of tires is given by the function

$$S(p^s) = 2p^s$$

where $p^s = p - t$ is the producer price and t is the excise tax rate. Calculate the equilibrium price of tires when there is no tax, and when the tax is $t = 3$. What do you conclude about the economic incidence of this tax?

2. Firms in a small open economy combine domestic labour (which is supplied inelastically) and imported capital to produce output under constant returns to scale. Studies show that, if K units of capital are employed per worker, the wage received by domestic workers is

$$W(K) = 10K - \frac{1}{2}K^2 - rK$$

where r is the rental price paid per unit of imported capital. Find an expression for the optimal demand for capital $K^*(r)$. Calculate the equilibrium wage rate when there is no tax on imported capital, and the world rental price of capital is $r_w = 4$. Now suppose that foreign capitalists must pay a tax of $t = 2$ on each unit of capital that they rent to firms in this country, and that the revenues generated are divided equally among the workers. Calculate the after-tax wage rate $W(K^*) + tK^*$. Is this a good tax? Explain your answer.

3. A consumer lives for two periods and has utility function

$$U(C_1, C_2) = \log C_1 + \log C_2$$

where (C_1, C_2) is consumption during the two periods of life. The consumer earns Y in period 1 and saves $S = Y - C_1$ in order to consume $C_2 = (1 + r)S$ in period 2.

- (a) Show that the lifetime present value budget constraint is

$$C_1 + \frac{1}{1+r}C_2 = Y$$

- (b) Substitute the budget constraint into the utility function in order to express utility as a function of C_1 alone (not C_2).
- (c) Show that this consumer's optimal savings rate is $S^*/Y = 1/2$ for any interest rate r .

4. Now suppose that the utility function is

$$U(C_1, C_2) = 2\sqrt{C_1} + 2\sqrt{C_2}$$

- (a) Follow the same steps as in the previous question to show that the optimal savings rate in this case is

$$\frac{S^*}{Y} = \frac{1+r}{2+r}$$

- (b) Would a tax on interest income decrease saving for this utility function?