

University of Toronto
Economics 336Y – Public Economics (Taxation)

Practice exercises #1

1. The market demand for and supply of peanuts are given by the functions

$$D(P) = 64P^{-1}$$
$$S(P^s) = 100P^s$$

respectively, where P is the price paid by consumers and

$$P^s = P(1 - \tau)$$

is the price received by producer when the ad valorem tax rate is τ .

Suppose that the tax rate is increased from $\tau_0 = 0.36$ to $\tau_1 = 0.51$. Calculate the fraction of the additional tax burden that is borne by consumers and the fraction that is borne by producers.

There are two solution techniques, either of which is acceptable here.

- (a) We can directly compute the equilibrium prices before and after the tax change. For any τ The market equilibrium price P^* solves

$$\frac{64}{P^*} = 100P^*(1 - \tau)$$

or

$$P^* = \sqrt{\frac{0.64}{1 - \tau}}$$

Therefore prices before and after the tax increase are

$$P_0^* = \sqrt{1} = 1$$

$$P_1^* = \sqrt{\frac{0.64}{0.49}} = \frac{8}{7}$$

The consumer price rises by one-seventh or about 14.2 per cent. The tax increase is 15 percentage points, but because of the increase in price, the tax is actually increasing from 36 cents per unit (given P_0^* is one dollar per unit) to $\tau_1 P_1^* \approx 58.3$ cents per unit. We can express the consumer's share of the increase in tax burden as

$$\frac{P_1^* - P_0^*}{\tau_1 P_1^* - \tau_0 P_0^*} = \frac{14.2}{22.3} \approx 0.64$$

The consumers' share of the burden (incidence) is 64 per cent, and the producers' is 36 per cent.

- (b) We can obtain an approximate answer by using the derivative formula provided in class:

$$\frac{\partial P^*}{\partial \tau} = \frac{P}{1 - \tau} \frac{\epsilon_s}{\epsilon_s + \epsilon_d}$$

We can see that, in this case, supply and demand elasticities are constants, with

$$\epsilon_d = \epsilon_s = 1$$

Therefore, beginning from the initial point with $\tau_0 = 0.36$ and $P_0^* = 1$,

$$\frac{\partial P^*}{\partial \tau} = \frac{1}{0.64} \frac{1}{2} \approx 0.78$$

We would therefore approximate the consumer's share of the increase in tax burden by 78 per cent – too high but close enough.