

ESM 204: Calculating Tax Incidence

The government is exploring ways to raise revenue and is considering taxing the paper industry. The demand curve for paper is given as $Q_D = 50 - 3P$ and the supply curve is: $Q_S = 2P$. For part one, assume there are no externalities in the consumption or production of paper, and the paper industry is perfectly competitive.

- 1) Calculate the pre-tax market equilibrium price and quantity.
- 2) The government decides to raise revenue by taxing producers \$1.67 per sweater purchased. What will be the new quantity demanded? Price?
- 3) Calculate the price paid by consumers and the price received by producers.
- 4) Who bears more of the burden of the tax?

SOLUTIONS ON FOLLOWING PAGE

ESM 204: Calculating Tax Incidence SOLUTION

1A) Solve for before-tax market Equilibrium by setting $Q_D = Q_S$:

$$50 - 3P = 2P \\ \Rightarrow P^* = 10, Q^* = 20$$

2A) When a tax is implemented, we can add the amount of the tax to the marginal cost curve to find the new market equilibrium quantity. This is most easily done when writing the demand and supply curves in "inverse" form (i.e. solving for P- the marginal cost/benefit curves).

S_0 Inverse Supply Before-tax:

$$P = Q_S / 2$$

S_1 After-tax Supply Curve:

$$P = Q_S / 2 + T \\ = Q_S / 2 + 5/3$$

Rewrite demand and supply curves solving for inverse form (solve for P):

$$\text{Inverse Demand: } P = 50/3 - 1/3 Q_D \\ \text{Inverse Supply (with tax): } P = Q_S / 2 + 5/3$$

Set Inverse Demand equal to inverse supply to determine the equilibrium quantity with tax

$$50/3 - 1/3Q = Q/2 + 5/3 \\ 45/3 = 5/6Q \\ Q(\text{tax}) = 18$$

3A) To determine the price that consumers pay, we insert the quantity of 18 back in to our original demand equation.

$$P^c = 50/3 - 1/3 * 18 \\ P^c = 32/3 = \$10.67$$

4) To determine the price that producers receive, we insert the quantity of 18 back in to our original supply equation.

$$P^p = Q/2 = 18/2 = \$9.00$$

5) Calculating the tax burden:

$$\text{Consumer tax burden} = 10 \frac{2}{3} - 10 = \frac{2}{3} \\ \text{Producer tax burden} = (10 - 9) = 1 \\ \text{Total tax burden} = \text{Consumer tax burden} + \text{Producer tax burden} = \frac{2}{3} + 1 = \frac{5}{3}$$

