Tax Incidence and Elasticities

(Additional Notes)

Ex. Demand : $P = 50 - 0.2Q_d$

Supply : $P = 20 + 0.1Q_s$

Let \$6 per unit tax be imposed on producers.

Before tax equilibrium :

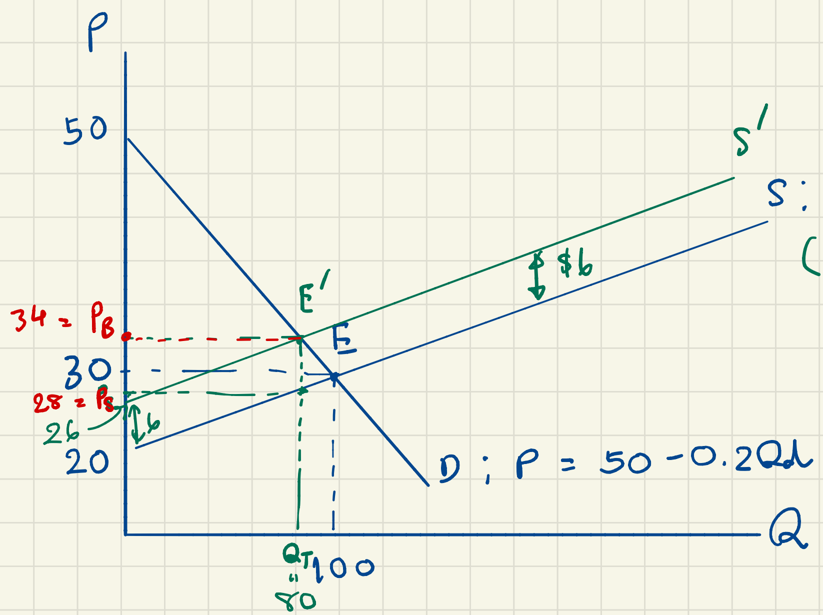
$$50 - 0.2Q^* = 20 + 0.1Q^*$$

$$30 = 0.3Q^*$$

$$\boxed{\begin{aligned} Q^* &= 100 \\ P^* &= 30 \end{aligned}}$$

∴ Eqm price before tax = \$30

Eqm quantity before tax = 100 unit.



Tax imposed on producer ⇒ Supply shifts up.

$$P_B = P_S + t = P_S + 6 \Rightarrow P_S = P_B - 6$$

New supply: $P_S = P_B - 6 = 20 + 0{,}1Q_s$

$$P_B = 26 + 0.1Q_s$$

New eqm (E'): $26 + 0.1Q_T^* = 50 - 0.2Q_T^*$

$$0.3Q_T^* = 24$$

$$Q_T^* = 80$$

$\Rightarrow P_B^* = \$34$ and $P_S^* = \$28$

$\therefore$ After-tax eqm quantity = 80 units.

Buyers pay = \$34.

Sellers get = \$28.

$\Rightarrow$ Per-unit tax burden for buyers = \$34 − \$30

= \$4

" " " " sellers = \$30 − \$28

= \$2.

- That is,

total tax burden for buyers = \$4 × 80 = \$320

total tax burden for sellers = \$2 × 80 = \$160.

- Government receives total tax revenue

= \$6 × 80 = \$480

\$320 paid by buyers

\$160 paid by sellers.

$\therefore$ Consumers or buyers bear more tax burden!

Now, let's calculate ε_d and ε_s.

Given $P = 50 - 0.2Q_d \rightarrow \frac{\Delta P}{\Delta Q_d} = -0.2$

$P = 20 + 0.1Q_s. \rightarrow \frac{\Delta P}{\Delta Q_d} = 0.1$

$$\Rightarrow \varepsilon_d = \frac{\%\Delta Q_d}{\%\Delta P} = \frac{\Delta Q_d / Q_d}{\Delta P / P} = \frac{1}{\Delta P / \Delta Q_d} \cdot \frac{P}{Q_d}$$

$$\varepsilon_d = \frac{1}{-0.2} \cdot \frac{P}{Q_d} = -5 \times \frac{P}{Q_d}$$

At E, $\varepsilon_d = -5 \times \frac{3\cancel{0}}{10\cancel{0}} = -1.5$

$$\Rightarrow \varepsilon_s = \frac{\%\Delta Q_s}{\%\Delta P} = \frac{\Delta Q_s / Q_s}{\Delta P / P} = \frac{1}{\Delta P / \Delta Q_s} \cdot \frac{P}{Q_s}$$

$$\varepsilon_s = \frac{1}{0.1} \times \frac{P}{Q_s}$$

At E, $\varepsilon_s = 10 \times \frac{3\cancel{0}}{10\cancel{0}} = 3$

$\therefore |\varepsilon_d| < |\varepsilon_s|$

(ie. Demand is relatively more INelastic than supply). So, consumers bear more tax burden.