

**Chapter 10 Applications of Demand and Supply (b)**

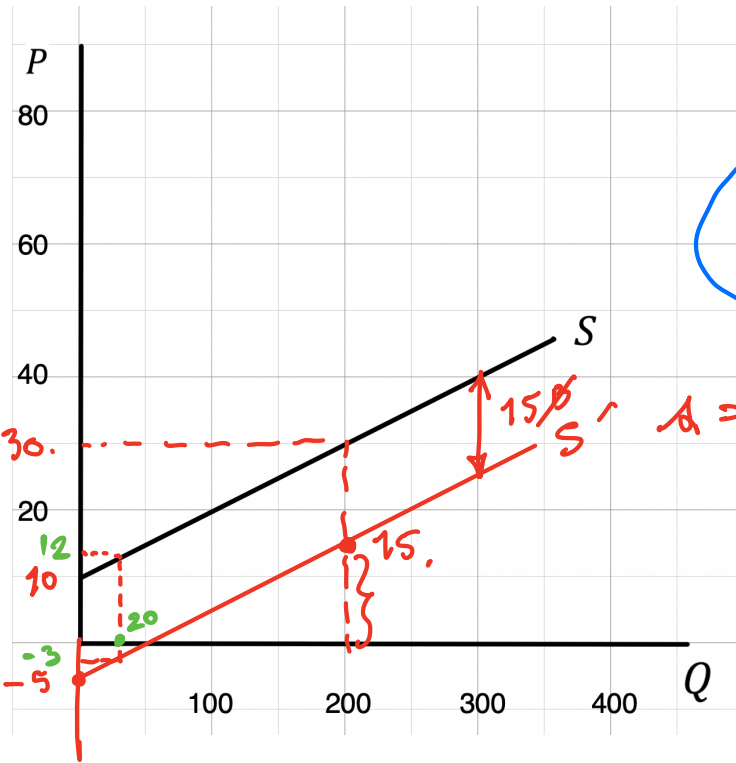
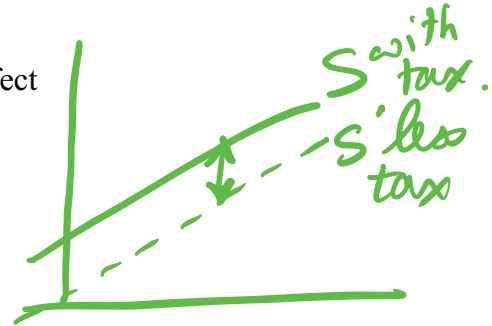
**4. Subsidy** The government gives a subsidy of  $s$  bahts/unit to the sellers.

*subsidy = negative tax. - same analysis is if govt reduce tax.*

(Note: The government can also choose to give subsidy to the buyers and you can check that the results will be identical to this case)

Subsidy  $s = 15$  bahts / unit given to the sellers will affect the Supply curve. How?

$$\text{Supply: } P = 10 + \frac{1}{10}Q_s$$



$$S: P = 10 + \frac{1}{10}Q_s$$

$$S': P = (10 - 15) + \frac{1}{10}Q_s$$

$$-3 = 10 - 15 + \frac{1}{10}Q_s$$

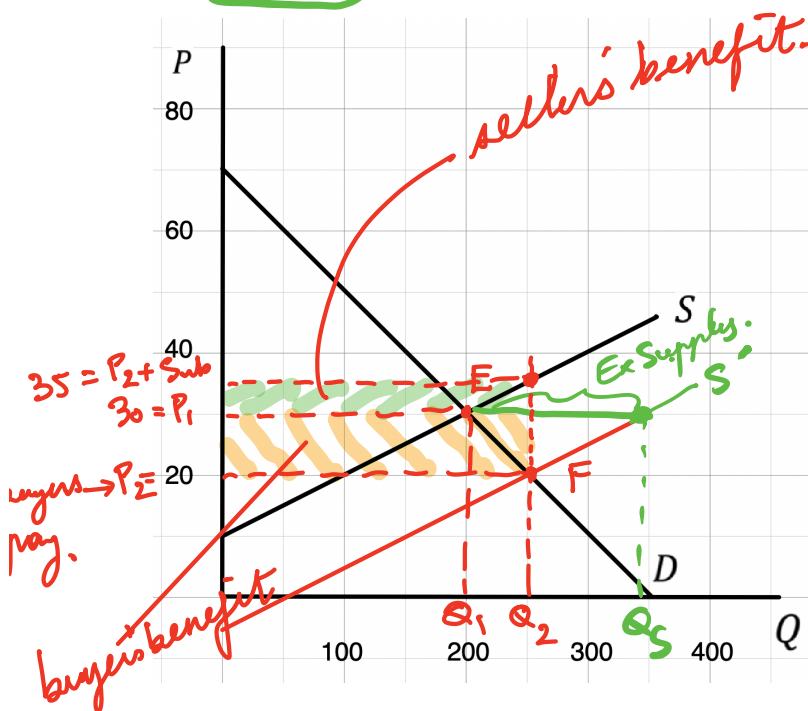
$$P = 12 \Rightarrow Q_s = 20$$

$$P = -3 \Rightarrow Q_s = 20$$

*Subsidy = 1,000 B/unit.*

Given the Demand and Supply:

$$D: P = 70 - \frac{1}{5}Q_D \quad S: P = 10 + \frac{1}{10}Q_S \quad S': P = (10 - 5) + \frac{1}{10}Q_S = -5 + \frac{1}{10}Q_S$$



$$\text{Solve } 70 - \frac{1}{5}Q_D = -5 + \frac{1}{10}Q_S$$

$$Q_2 = Q_D = Q_S \Rightarrow Q_2 = 250.$$

Before subsidy, the equilibrium is at  $E = (Q_1, P_1) = (200, 30)$ .

Once subsidy is given, at the original equilibrium price  $P_1$

there is an Excess  $S = Q_S - Q_1$

$\Rightarrow$  The price thus will ~~increase~~/decrease

The new equilibrium will be at  $F = (Q_2, P_2) = (250, 20)$

Solving equations to find the new equilibrium:

With subsidy,  
the eq. quantity increases/decreases from  $Q_1 = 200$  to  
 $Q_2 =$

the eq. price increases/decreases from  $p_1 = 30$  to  $p_2 =$

Question: Is  $p_2$  the price the buyers pay or the sellers receive in their pockets?

**Subsidy Benefits** (Compare the total payment out of the pockets of buyers and total amount received by the sellers)

**Before:**

Price the buyers pay  $p_1 = 30$ , sellers receive  $p_1 = 30$

**After:**

Price the buyers pay  $p_2 = 20$ , sellers receive =  $20 + 15 = 35$ .

**Subsidy benefit:** Buyers' =  $30 - 20 = 10$  bahts/unit

Sellers' =  $35 - 30 = 5$  bahts/unit

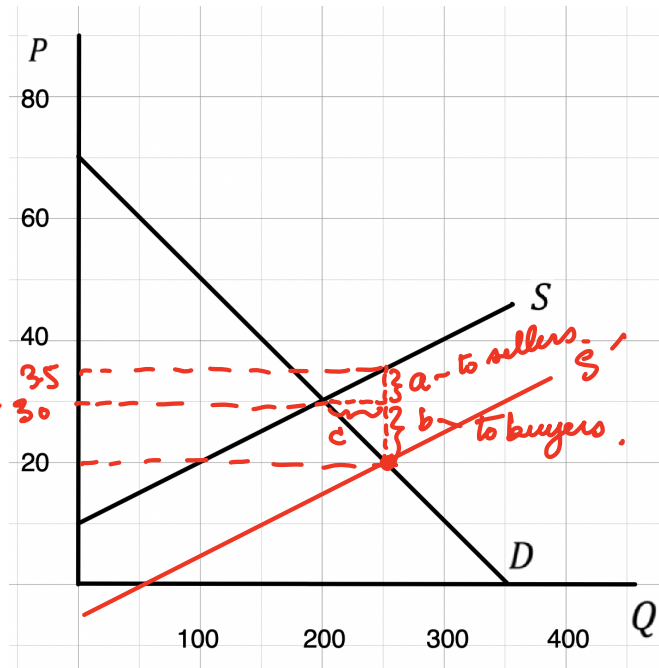
$$\begin{aligned} &= P_1 - P_2 \\ &= P_2 + \text{subsidy} - P_1 \end{aligned} \quad \text{total = Subsidy}$$

**Total Subsidy:** Buyers' =  $10 \times 250 = 2,500$  bahts = Area  $(P_1 - P_2)Q_2$

Sellers' =  $5 \times 250 = 1,250$  bahts = Area  $(P_2 + \text{subsidy} - P_1)Q_2$

**Total Subsidy Paid:**  $\rightarrow 3,750 = (\text{Subsidy}) \times Q_2$

**Share of Subsidy Benefit**



Both buyers and sellers share the total subsidy paid. The share of subsidy is determined by the relative value of the price elasticities of demand and supply—but not exactly like in the case of specific tax.

Let

$$a = \text{benefit to sellers/unit} = P_2 + s - P_1$$

$$b = \text{benefit to buyers/unit} = P_1 - P_2$$

Note  $a + b = s = \text{subsidy}$

At the original equilibrium,  $E = (Q^1, P^1) = (200, 30)$ , the price elasticity of demand and price elasticity of supply are

$$\eta_D = \frac{1}{\text{Slope of } D \text{ at } E} \frac{P^1}{Q^1} =$$

$$\eta_S = \frac{1}{\text{Slope of } S \text{ at } E} \frac{P^1}{Q^1} =$$

Thus

$$\frac{a}{b} = \frac{\text{benefit to sellers / unit}}{\text{benefit to buyers / unit}} = \frac{|\eta_D|}{\eta_S}$$

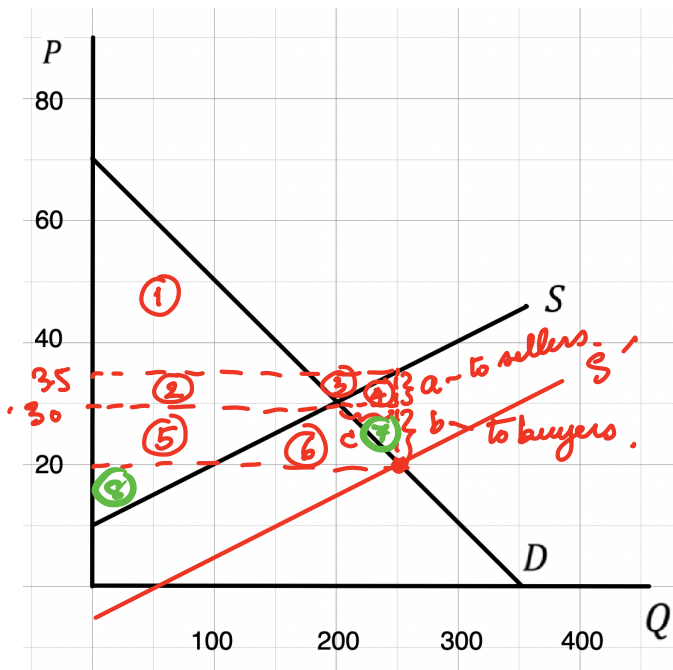
If  $\eta_S > |\eta_D|$ , buyers will receive **more/less** subsidy benefit than sellers do. Those who are more sensitive to price change will have **more/less** benefit.

**Example** At the point  $(Q_1, P_1) = (200, 30)$ ,  $\eta_S = 1.5$ ,

$|\eta_D| = 0.75$ , then  $\frac{|\eta_D|}{\eta_S} = \frac{0.75}{1.5} = \frac{1}{2}$ . That means the benefit

to buyers is twice that to sellers.

**Change in Consumer's and Producer's Surpluses**



	Before	After	Change
Consumer's Surplus			
Producer's Surplus			

Deadweight Loss = ?

What is the value the buyers place on the last unit bought?

What is the cost of producing the last unit sold?

**HW** Repeat the analysis above with the subsidy  $s = 15$  bahts / unit paid to the buyers.

**HW** What kind is subsidy given in the assistance program of 50-50 (คนละครึ่ง)? Is this subsidy given to the buyers or sellers?

Friday Feb 25.  
9 PM  
Discussion.