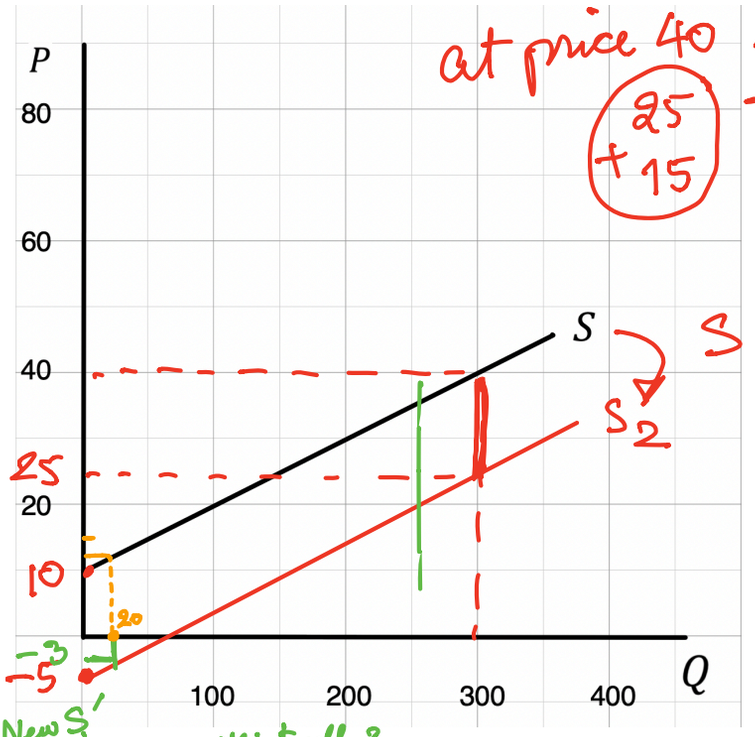
Chapter 10 Applications of Demand and Supply (b)

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

(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?

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



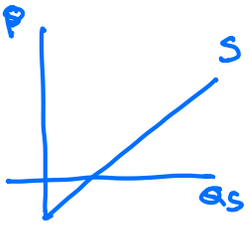
sellers pay to buyer 3 ฿/unit

sellers receive subsidy 15 ฿/unit

sellers keep = 15 - 3 = 12 ฿/unit

$P^{12} = 10 + \frac{1}{10}Q_S$.

$Q_S = 20$ unit.



2 interpretation

- no neg part considered
- ac count neg part

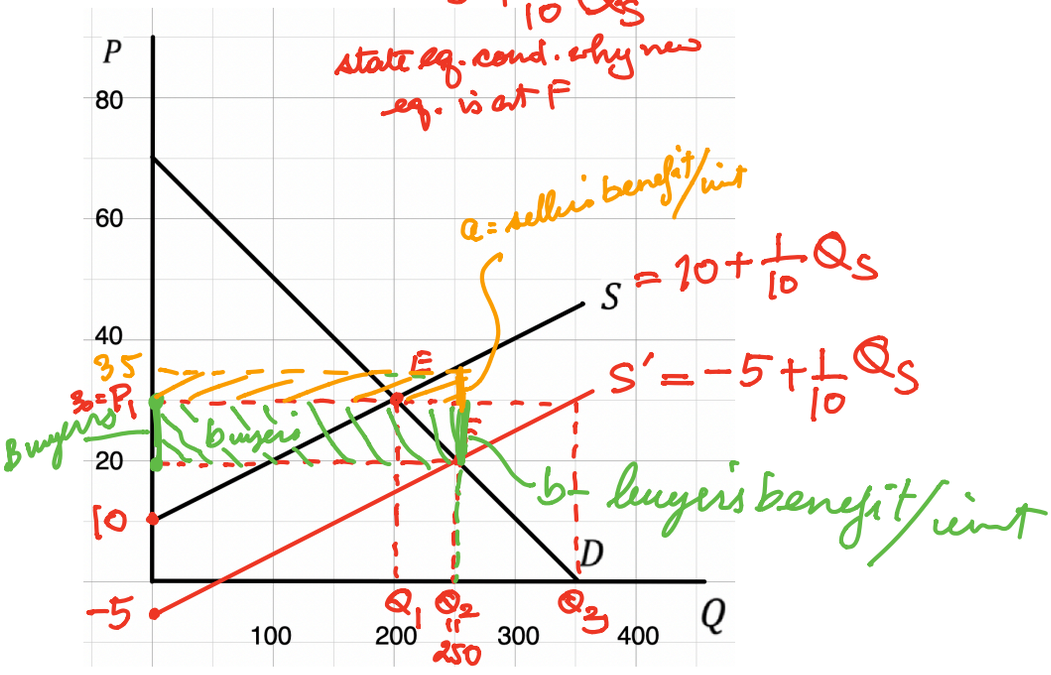
Given the Demand and Supply:

$$D:\ P = 70 - \frac{1}{5}Q_D$$

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

$$S':\ P = (10-15) + \frac{1}{10}Q_S = (10-8) + \frac{1}{10}Q_S$$

$$= -5 + \frac{1}{10}Q_S$$



state eq. cond. why new eq. is at F

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 $S = Q_3 - Q_1 = 350 - 200 = 150$.

$\Rightarrow$ 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:

$$70 - \frac{1}{5}Q_2 = (10-8) + \frac{1}{10}Q_2$$

$$\Downarrow$$

$$Q_2 = 250.$$

$$P_2 = 70 - \frac{1}{5}(250) = 20$$

$$P_2 = -5 + \frac{1}{10}(250) = 20$$

With subsidy,
the eq. quantity increases/~~decreases~~ from $Q_1 = 200$ to $Q_2 =$ 250
the eq. price ~~increases~~/decreases from $P_1 = 30$ to $P_2 =$ 20

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

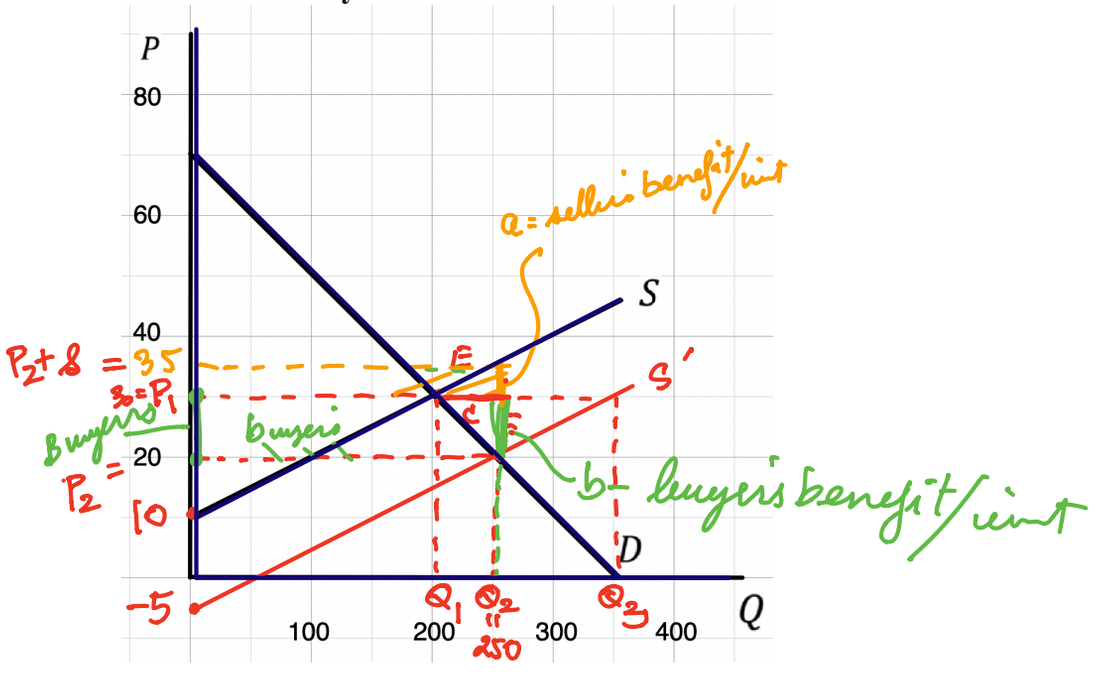
After:
Price the buyers pay $P_2 =$ 20, sellers receive = 20 + 15 = 35.
buyers subsidy.

Subsidy benefit: Buyers' = 30 − 20 = 10 bahts/unit
Sellers' = 35 − 30 = 5 bahts/unit

Total Subsidy: Buyers' = 10 × 250 = 2,500 bahts = Area
Sellers' = 5 × 250 = 1,250 bahts = Area

Total Subsidy Paid: 3,250 = 15 × 250

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

$$a = benefit\ to\ sellers/unit = P_2 + s - P_1$$
$$b = benefit\ to\ buyers/unit = P_1 - P_2$$

Note $a + b = s = subsidy$

At the original equilibrium, $E = (Q_1, P_1) = (200,30)$, the price elasticity of demand and price elasticity of supply are

$$\eta_D = \frac{1}{Slope\ of\ D\ at\ E}\frac{P_1}{Q_1} = \frac{-1}{b/c}\cdot\frac{P_1}{Q_1}$$
$$\eta_S = \frac{1}{Slope\ of\ S\ at\ E}\frac{P_1}{Q_1} = \frac{1}{a/c}\cdot\frac{P_1}{Q_1}$$

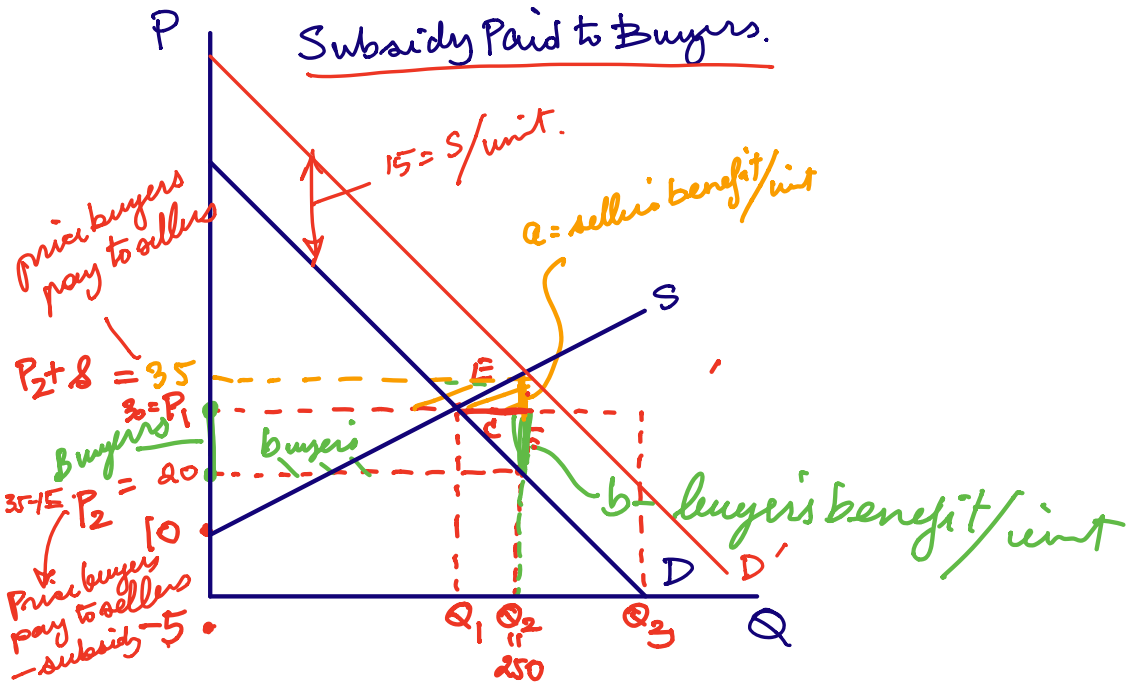
Thus

$$\frac{a}{b} = \frac{benefit\ to\ sellers/unit}{benefit\ to\ buyers/unit} = \frac{|\eta_D|}{\eta_S} = \frac{\frac{1}{b/c}}{\frac{1}{a/c}} = \frac{a}{b}.$$

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.

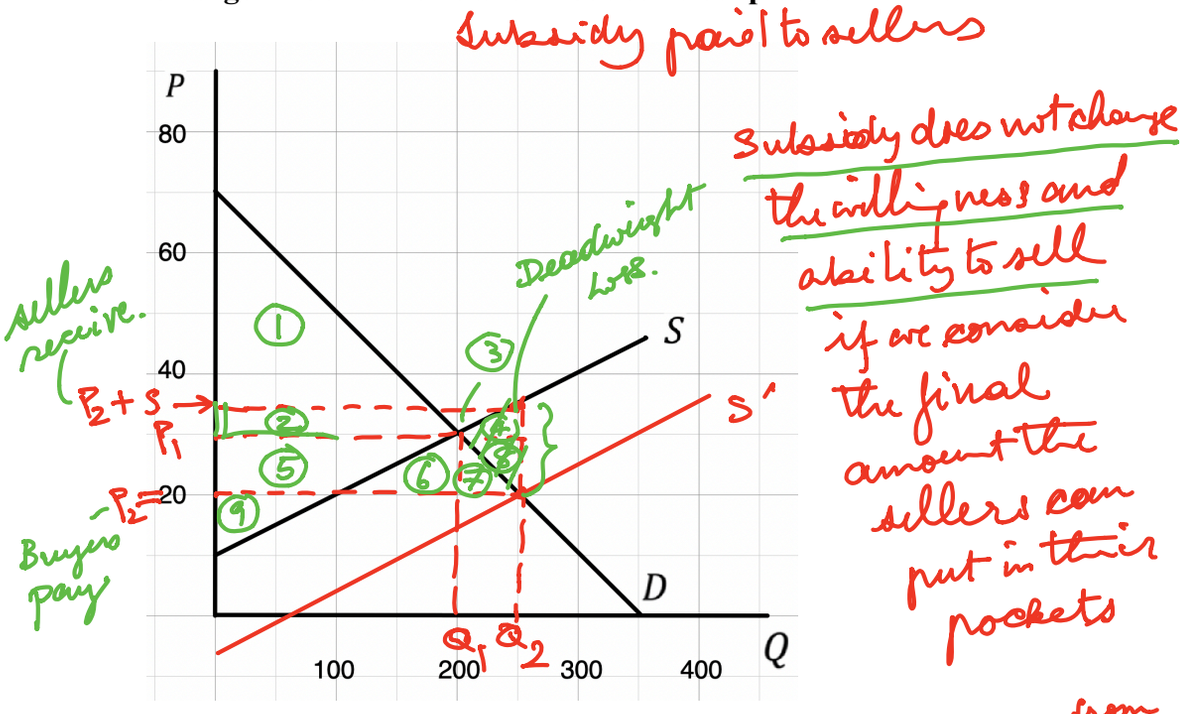
Example At the point $= (Q_1, P_1) = (200,30)$, $\eta_S = 1.5$, $|\eta_D| = 0.75$, then $\frac{|\eta_D|}{\eta_S} = \frac{0.75}{1.50} = \frac{1}{2}$. That means the benefit to buyers is twice that to sellers.

$\frac{a}{b}$ – sellers.
– buyers.



Identical results to the case sellers receive the subsidy.

Change in Consumer's and Producer's Surpluses



	Before	After	Change
Consumer's Surplus	①+②	①+②+⑤+⑥+⑦	⑤+⑥+⑦
Producer's Surplus	⑤+⑨	②+③+⑤+⑨	②+③

comes from subsidy.

Deadweight Loss = ④+⑧

= Total Subsidy − (⑤+⑥+⑦+②+③)

④+⑧ is subsidy that is not accounted for as C.S. or P.S.

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?

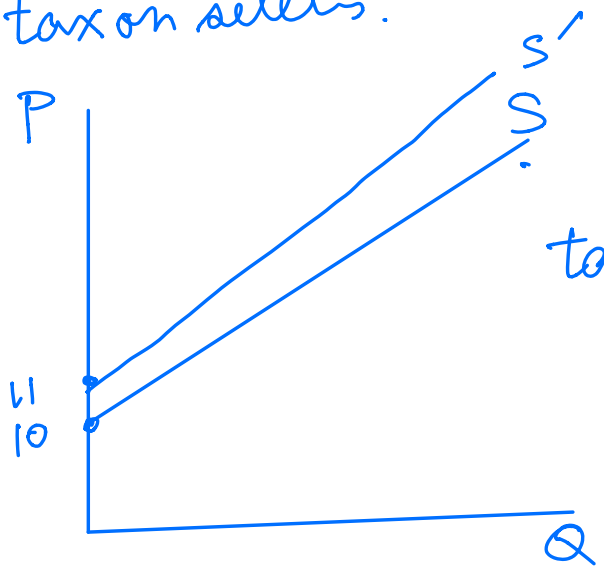
Value placed on last unit bought = 20฿

Cost of producing the last unit sold = 20+15 = 35฿

⇒ Subsidy causes the sellers to produce too much.

Advolorem Tax – tax as % of price

tax on sellers.

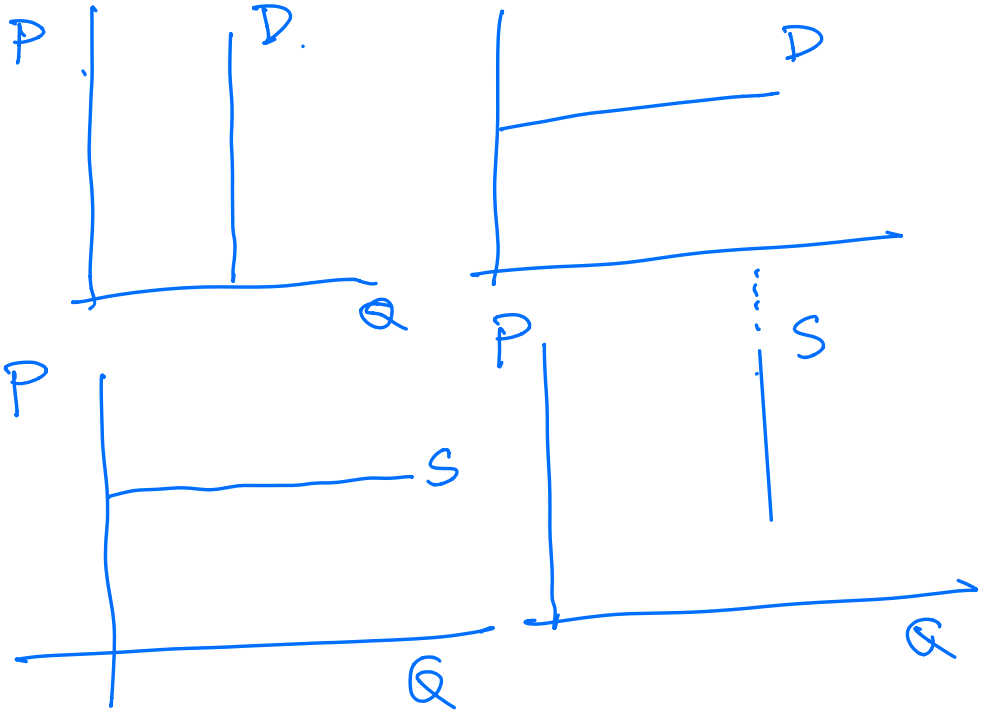


$P = 10 + \frac{1}{10} Q_S$

$P = 11 + \frac{1.1}{10} Q_S$

tax = 10% of price

Subsidy to sellers.



PPC.

D & S. equilibrium.

Applications { min Price
max Price
tax
Subsidy.

Elasticities.