

EE211

PRINCIPLES OF MICROECONOMICS

Topic 4:

Consumer Surplus, Producer Surplus, and the
Efficiency of Markets

Topics

- Consumer Surplus
- Producer Surplus
- Market Efficiency

Welfare Economics

- Recall: the allocation of resources refers to:
 - how much of each good is produced
 - which producers produce it
 - which consumers consume it
- **Welfare economics**: the study of how the allocation of resources affects economic well-being
 - Consumer's well-being is measured by **consumer surplus**.
 - Producer's well-being is measured by **producer surplus**.
 - Both contribute to **total surplus (or social welfare)**.

Willingness to Pay (WTP)

- A consumer's **willingness to pay** for a good is the **maximum amount the buyer will pay for that good**.
 - WTP measures how much s/he values the good.
- Example: 4 buyers' WTP for an iPhone

Consumer	WTP
Nadech	\$250
James	175
Ken	300
Boy	125

Suppose the price of an iPhone is \$200.

Q: Who will buy an iPhone?

➔ *Nadech & Ken*

Q: What is quantity demanded?

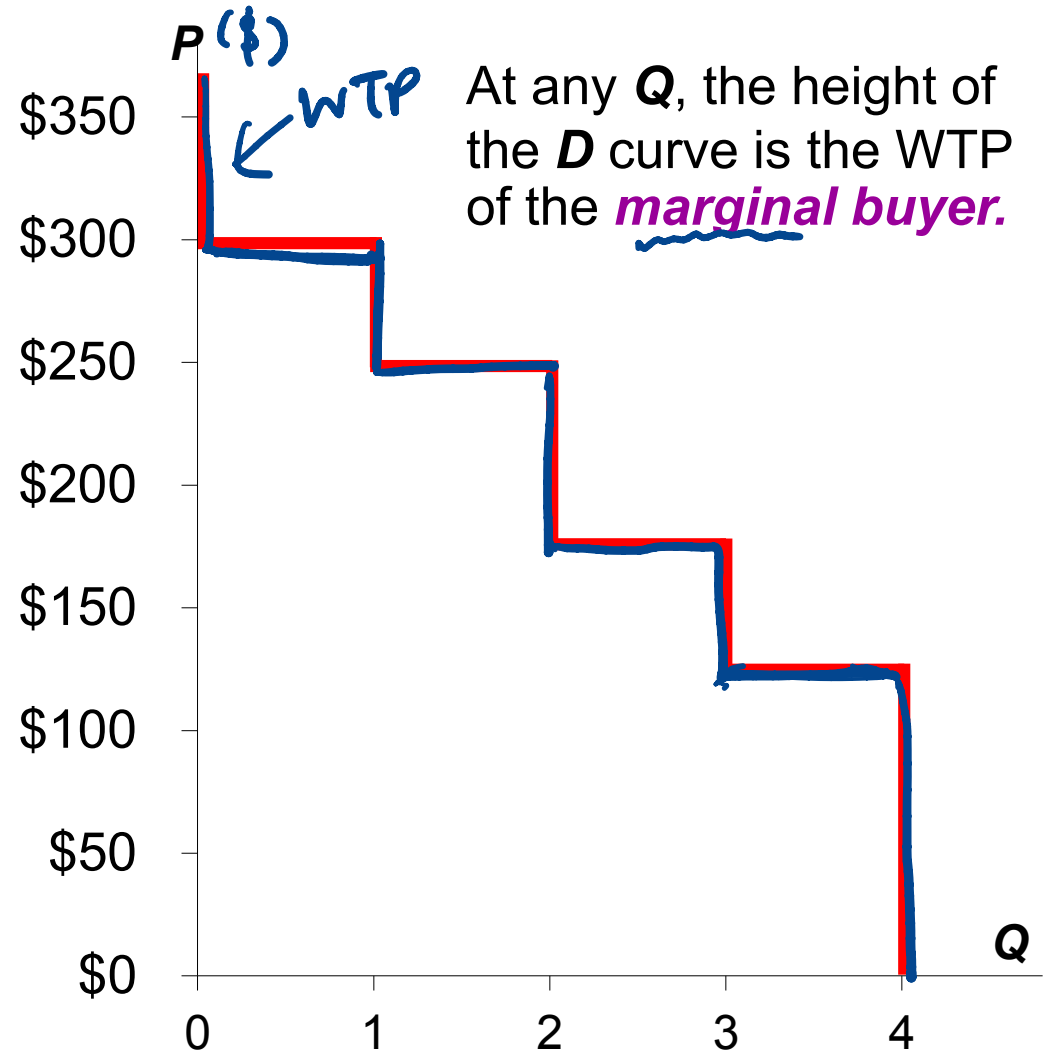
➔ *2*

Deriving the Demand Curve

Consumer	WTP
Nadech	\$250
James	175
Ken	300
Boy	125

↓

P	Q^d
\$301+	0
251 – 300	1
176 – 250	2
126 – 175	3
0 – 125	4



Consumer Surplus

- **Consumer surplus (CS)** is the difference between what a consumer is willing to pay and what s/he actually pays.
- Mathematically, $CS = \underline{WTP} - \underline{P}$.
- Example:

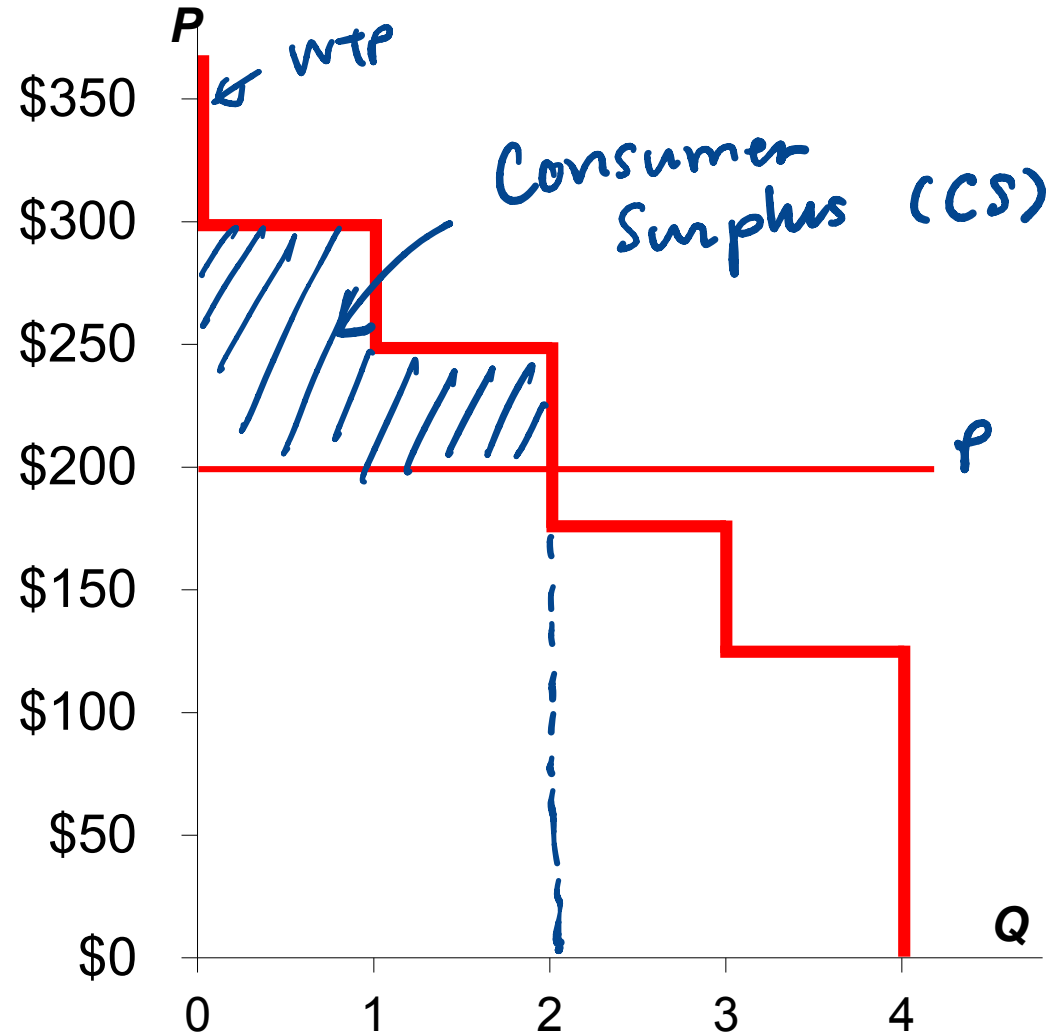
Consumer	WTP
Nadech	\$250
James	175
Ken	300
Boy	125

Suppose $P = \$200$.

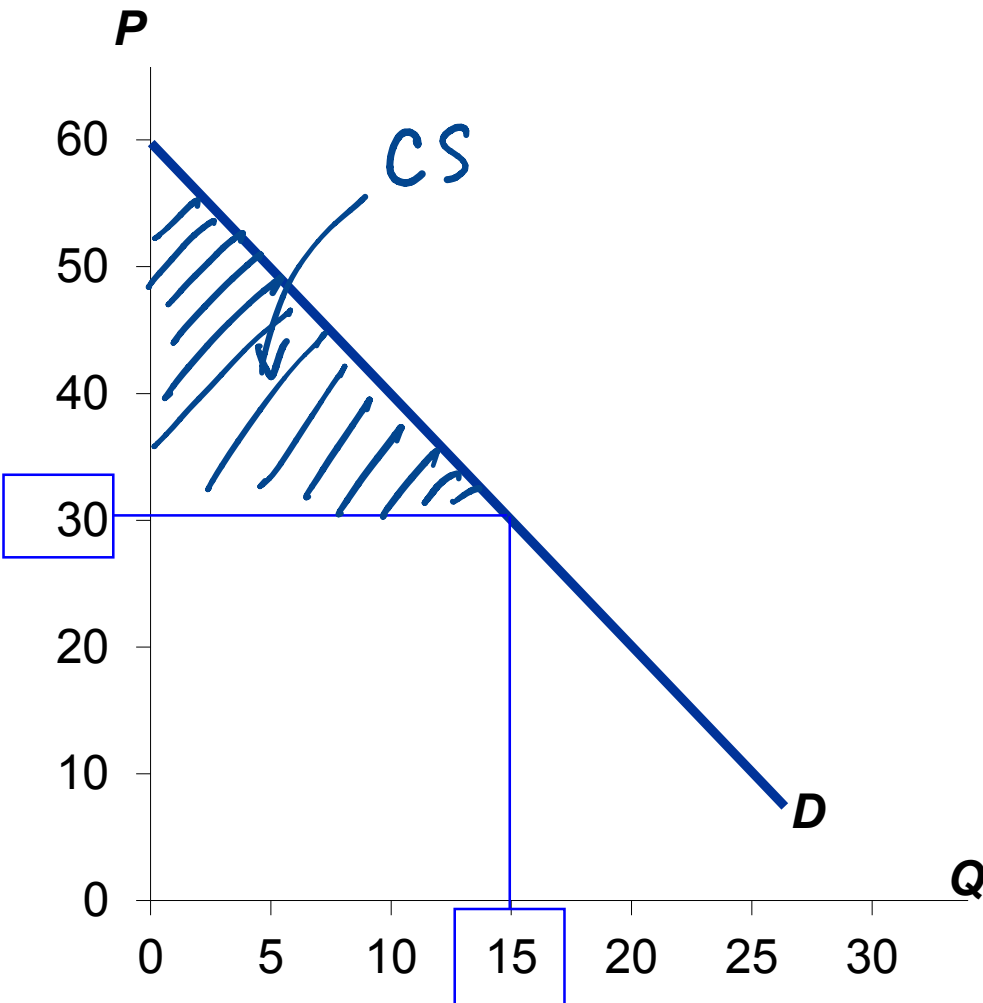
- Nadech's CS = 50
- James' CS = 0 b/c $WTP < P$
- Ken's CS = 100
- Boy's CS = 0 b/c $WTP < P$
- Total CS = 150

Consumer Surplus and WTP

Total CS equals the area under the demand curve above the price, from 0 to Q.



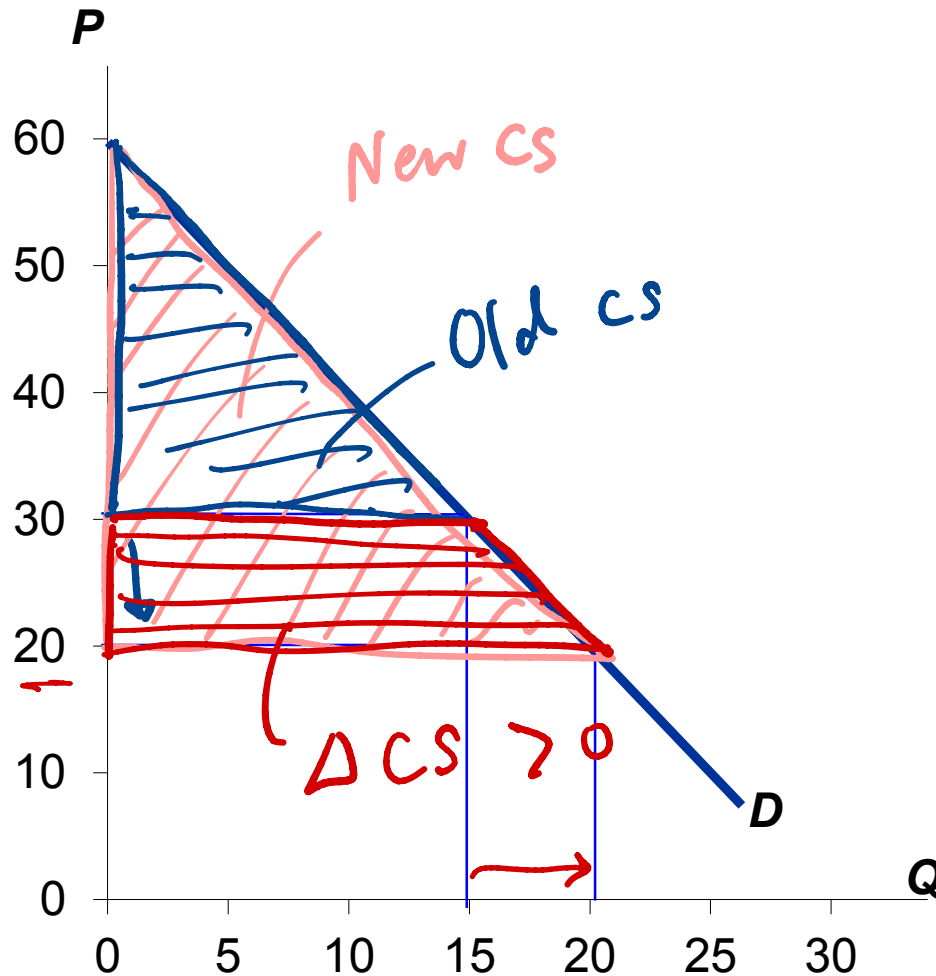
Consumer Surplus: Many Buyers and Smooth Demand Curve



- Consumer surplus is the area under the demand curve above the price line.
- Suppose $P = 30$.

$$\begin{aligned} \text{CS} &= \frac{1}{2} \times 30^{15} \times 15 \\ &= \$225 \end{aligned}$$

Consumer Surplus When Price is lower.



- When the price is lower, the CS will be higher.
- Suppose price decreases from 30 to 20.

➤ New CS = $\frac{1}{2} \times 20 \times 40 = \400

➤ $\Delta CS = 400 - 225 = \175

Cost and the Supply Curve

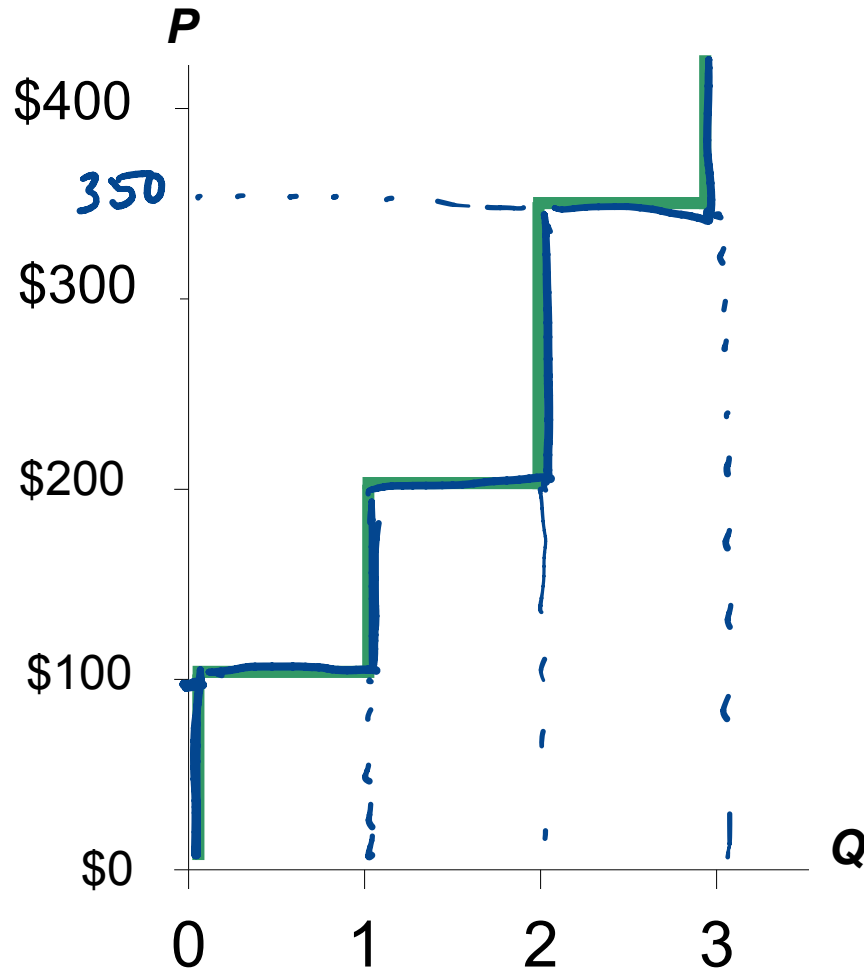
- **Cost** is the value of everything a seller must give up to produce a good (*i.e.*, opportunity cost).
- It includes cost of all resources used to produce good, including value of the seller's time.
- Example: Costs of 3 sellers of iPhones.

Seller	cost
I-store1	\$100
I-store2	200
I-store3	350

A seller will only produce and sell the good if the price exceeds his or her cost.

Hence, **cost is a measure of willingness to sell.**

Cost and the Supply Curve



P	Q^s
\$0 – 99	0
100 – 199	1
200 – 349	2
350 & up	3

- At each Q , the height of the S curve is the cost of the *marginal seller*.
 additional

Producer Surplus

- **Producer surplus (PS)** is the difference between what a seller is willing to sell (i.e. cost) and the price at which s/he actually sells.
- Mathematically, $PS = P - \text{Cost}$.
- Example:

Seller	cost
I-store1	\$100
I-store2	200
I-store3	350

150 - 4

PS, Suppose $P = \$150$.

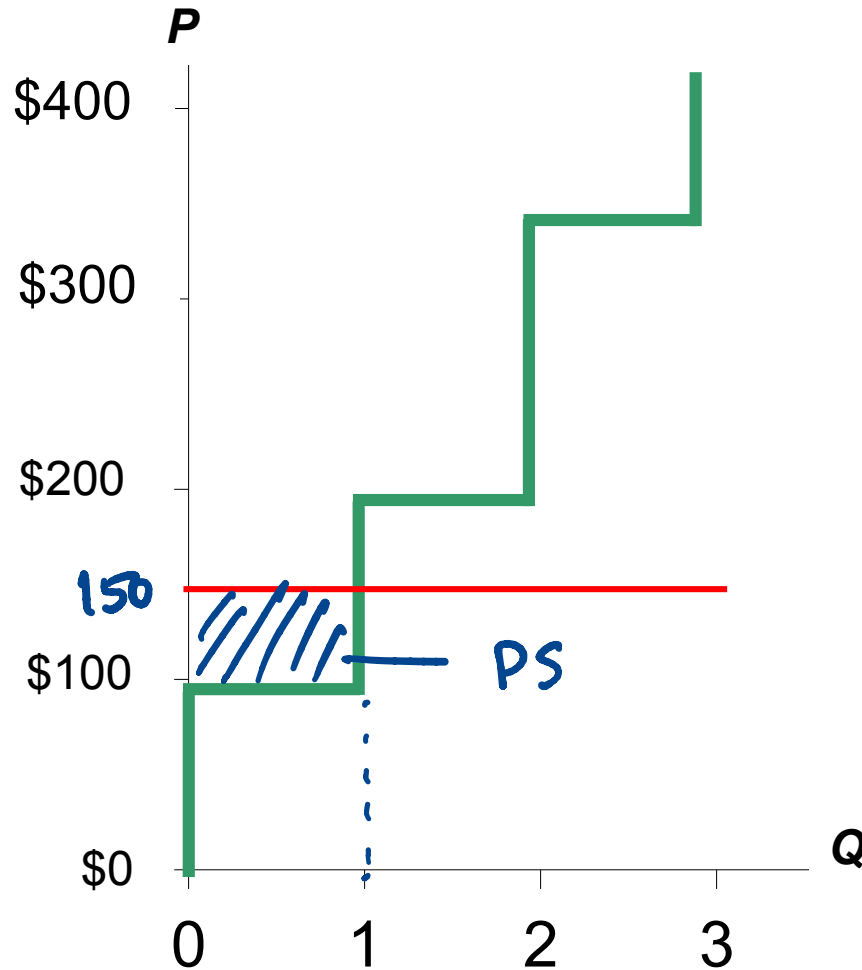
50 | ➤ Total PS = 50

0 |

0 |

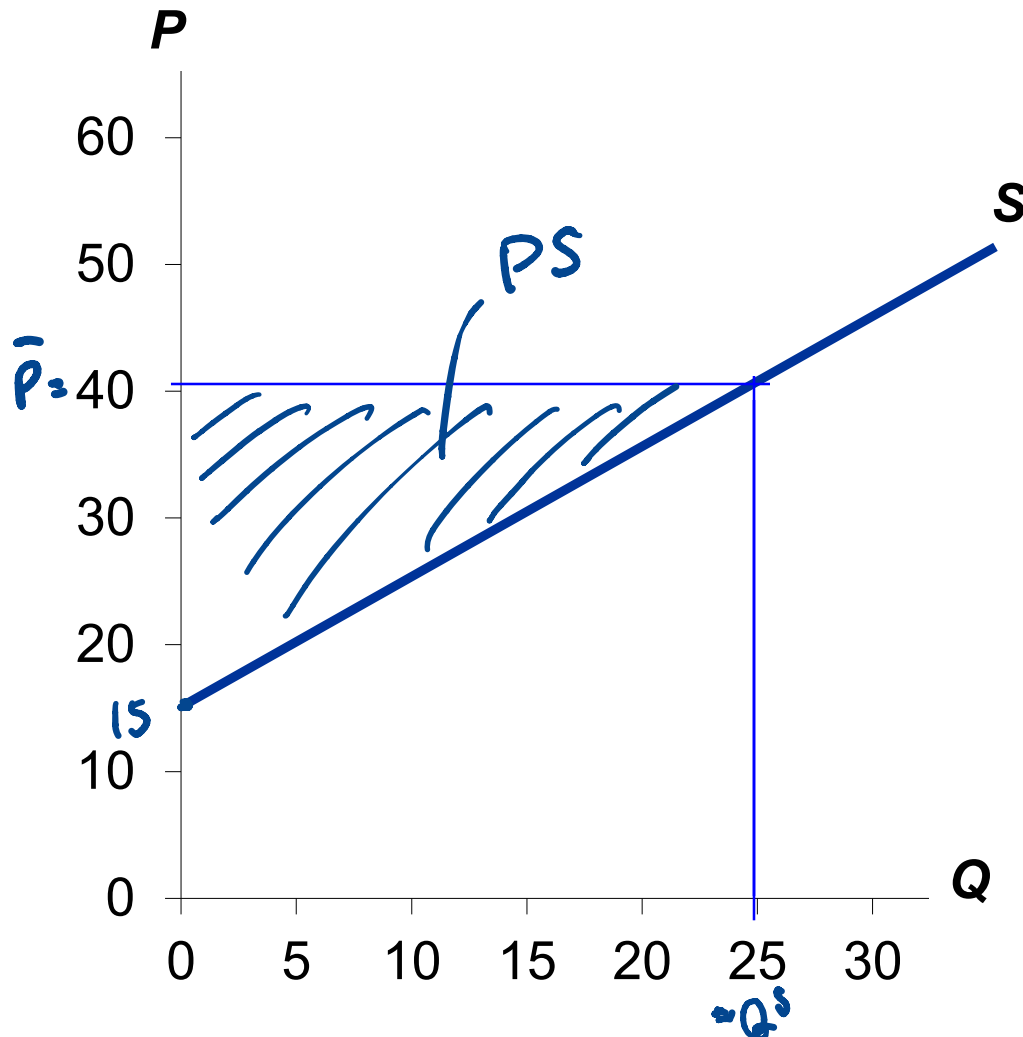
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Producer Surplus and the Supply Curve



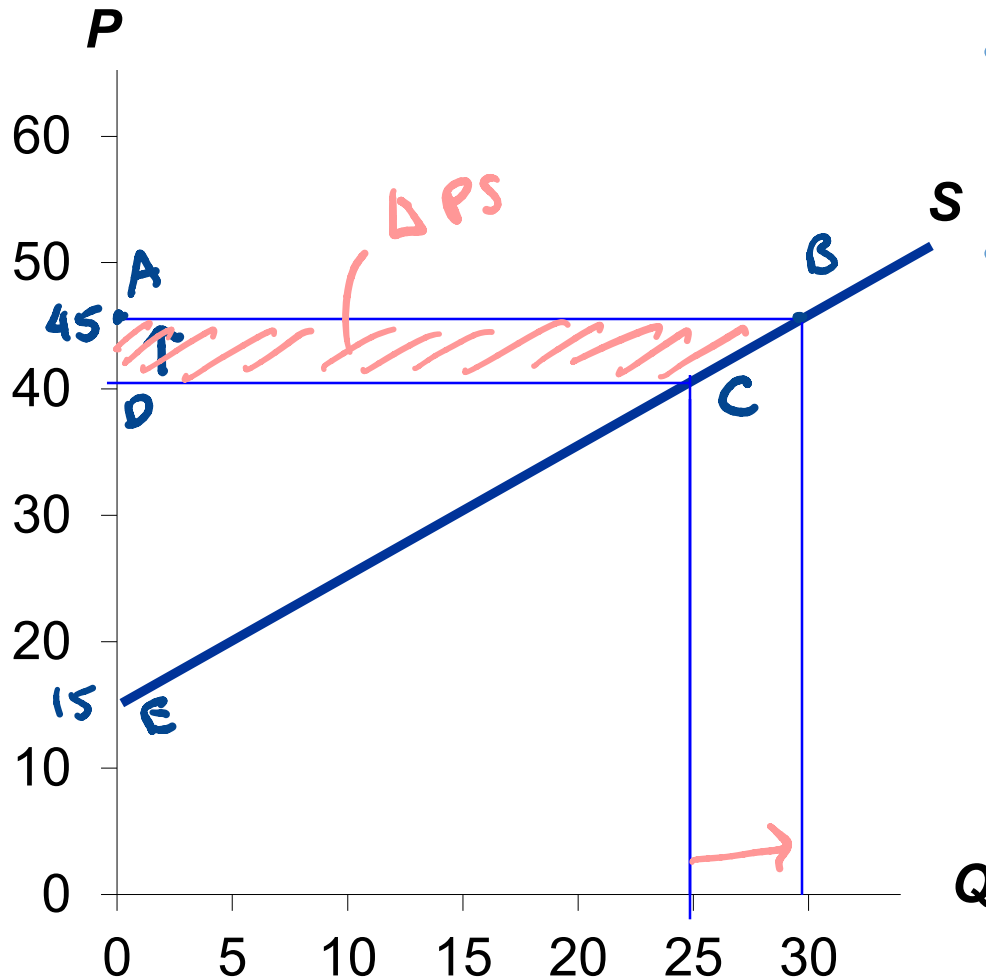
Total PS equals the area above the supply curve under the price, from 0 to Q .

Producer Surplus: Many Sellers and Smooth Supply Curve



- Producer surplus is the area above the supply curve and under the price line.
- Suppose $P = 40$.
- $PS = \frac{1}{2} \times 25 \times \$ (40 - 15)$
 $= \frac{625}{2} = \$312.5$

Producer Surplus When Price is Higher



- When the price is higher, the PS will be higher.
- Suppose price increases from 40 to 45.

$$\begin{aligned} \text{New PS} &= \Delta ABE \\ &= \frac{1}{2} \times 30 \times 30 = 450 \\ \Delta PS &= \Delta ABE - \Delta OCE \\ &= 450 - 312.5 \\ &= \$137.5 \end{aligned}$$

Total Surplus (a.k.a. Social Welfare)

- $CS = (\overset{WTP}{\text{value to buyers}}) - (\overset{P}{\text{amount paid by buyers}})$
 - CS measures the benefit buyers receive from participating in the market.
- $PS = (\overset{P}{\text{amount received by sellers}}) - (\overset{\text{cost}}{\text{cost to sellers}})$
 - PS measures the benefit sellers receive from participating in the market.
- $\text{Total surplus} = CS + PS = (WTP - \cancel{P}) + (\cancel{P} - \text{cost})$
 - TS measures the total gains from trade in a market.
 - We use total surplus as a measure of society's well-being.

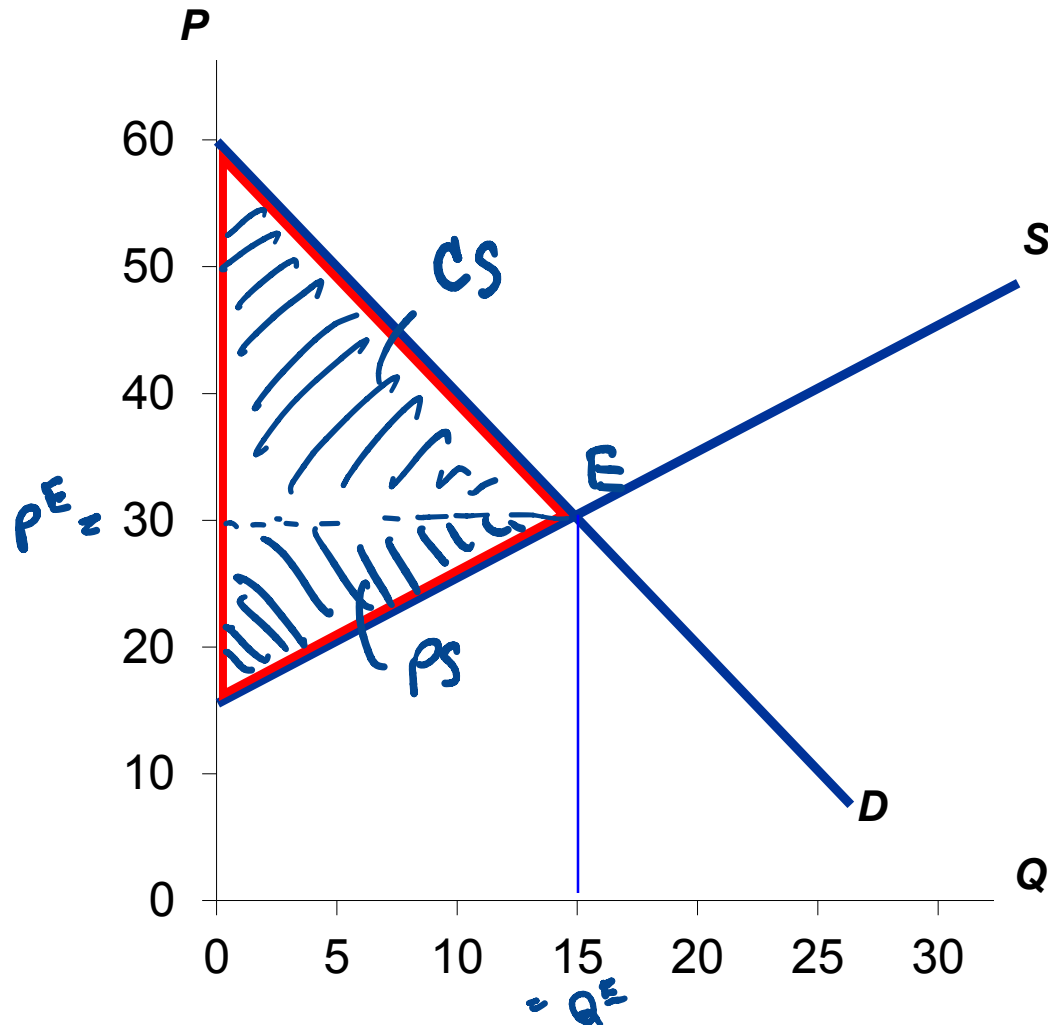
$\Rightarrow TS = WTP - \text{cost}$

Efficiency

Social welfare

- Total Surplus = CS + PS
- Total Surplus = (value to buyers) – (cost to sellers)
= WTP - cost
- An allocation of resources is efficient if it maximizes total surplus. Efficiency means:
 - Raising or lowering the quantity of a good would not increase total surplus.
 - The goods are being produced by the producers with lowest cost.
 - The goods are being consumed by the buyers who value them most highly.

Market Equilibrium

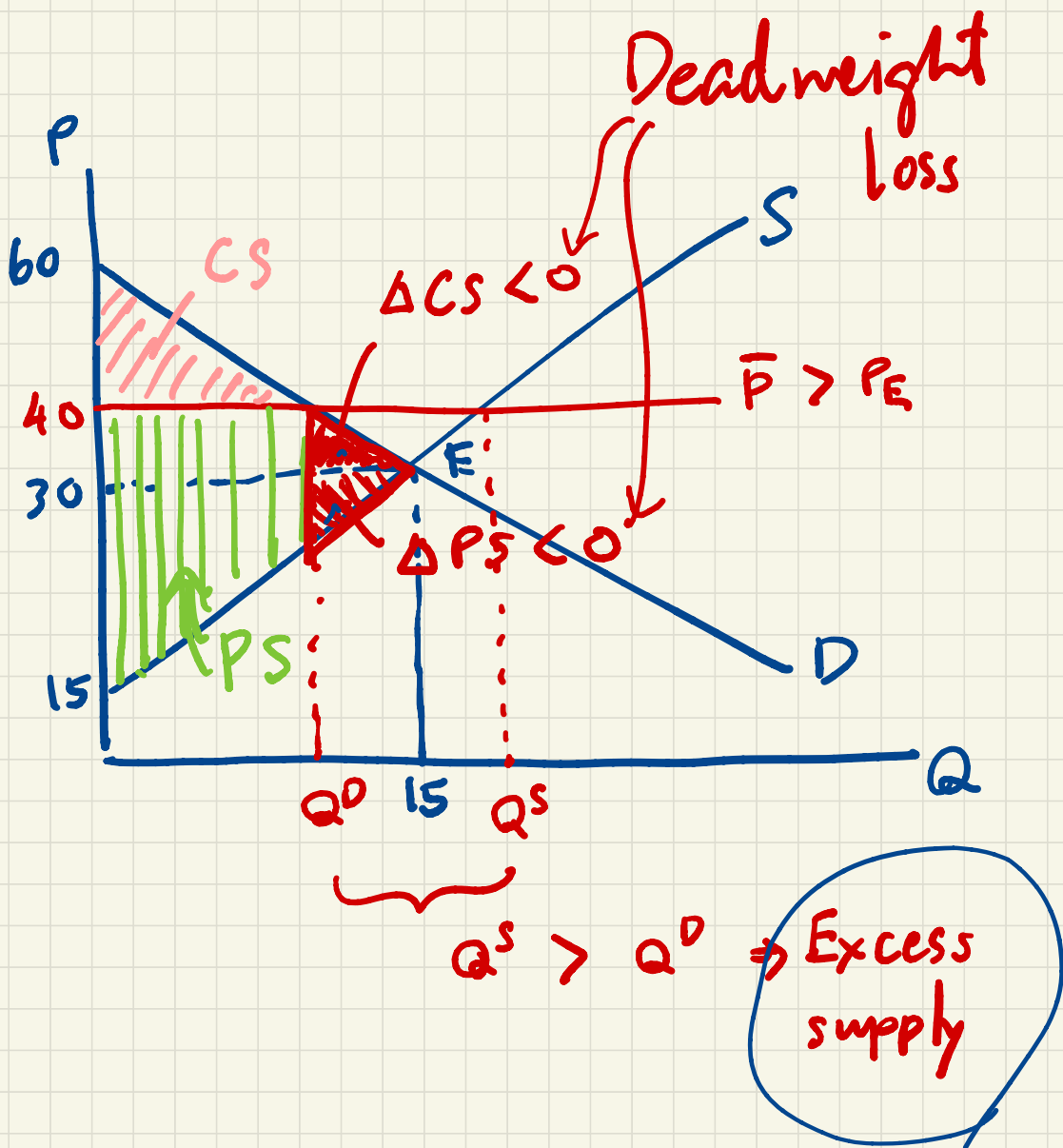


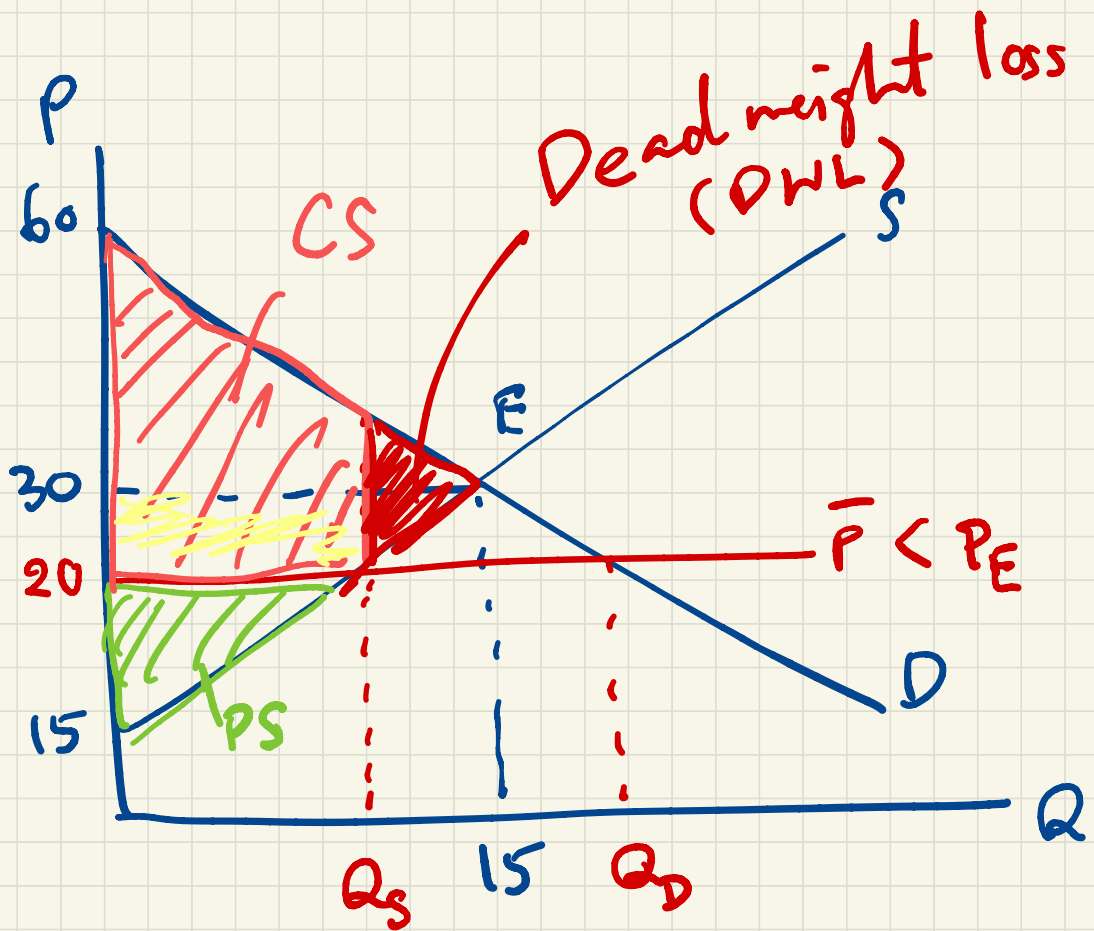
- The equilibrium quantity maximizes total surplus.

- Why?

b/c at P^E & Q^E
there is no excess
supply nor excess
demand.

⇒ No DWL.





$Q_D > Q_S$

$\Rightarrow$ Excess Demand

Applications (Next Topics)

- Price floors
- Price ceilings
- Tax/subsidy