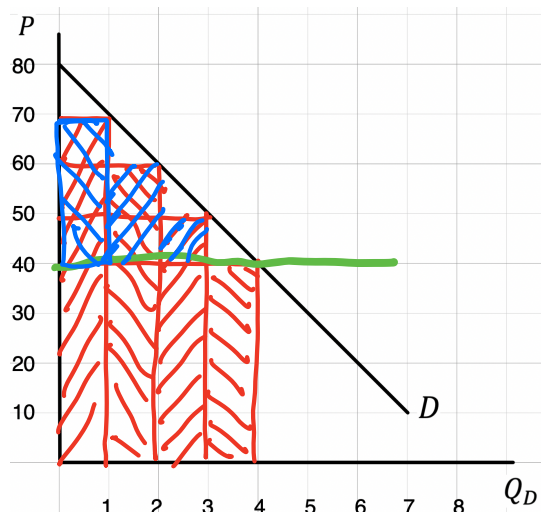


Chapter 9 Consumer's and Producer's Surpluses

Consumer's Surplus is the value of the quantity bought in the mind of the buyer(s) subtracted by the total amount paid.

Given an individual demand D , suppose the buyer buys in full unit 0, 1, 2, ...



If price = 40.
the quantity demanded = 4
Total paid = $40 \times 4 = 160$

Total value in the mind of buyers = $70 + 60 + 50 + 40 = 220$

Q_D	P
1	70
2	60
3	50
4	40
5	

Price Paid | Consumer's Surplus

40	30
40	20
40	10
40	0
60	

Total Consumer's Surplus

$220 - 160 = 60$,
— assuming the buyers can buy 1 unit at a time

- If the price is set at $P = 40$,

Total amount spent = 220

The total value the buyer receives = 160

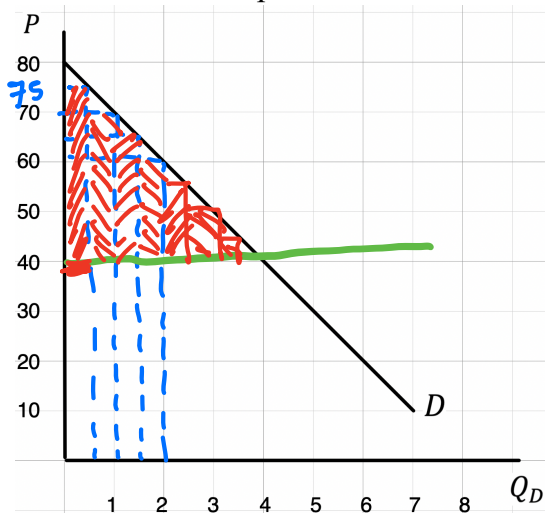
Consumer's Surplus = $220 - 160 = 60$.

- If the buyer is allowed to buy in half units, 0, 0.5, 1, 1.5, 2, ...

With $P = 40$, total amount spent =

The total value the buyer receives =

Consumer's Surplus =



value the mind of consumer.

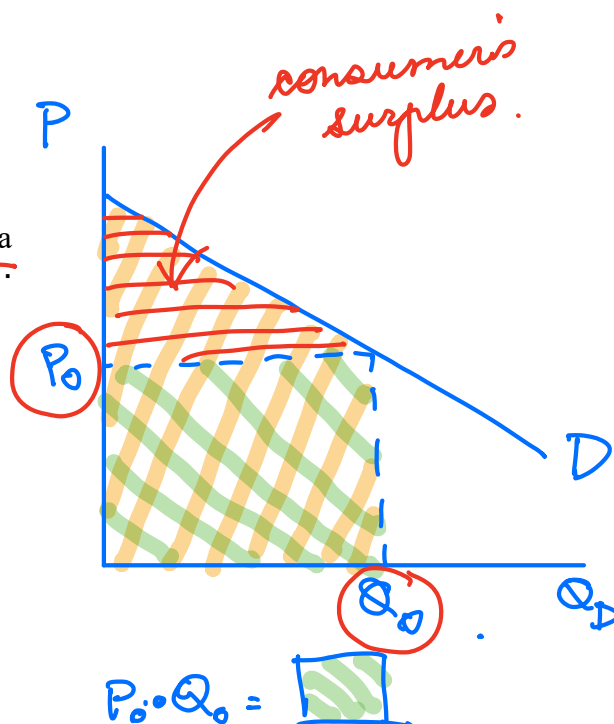
Q_D	P
0.5	75
1	70
1.5	65
2	60
2.5	55
3	50
3.5	45
4	40

Price Paid | Consumer's Surplus

40	(35) (0.5)
40	
40	
...	
...	
...	
40	

- What if the buyer can buy 0.25 unit at a time.

Given a price P_0 , the consumer's surplus will be the area under the Demand, subtracted by the amount paid ($P_0 \cdot Q_0$)

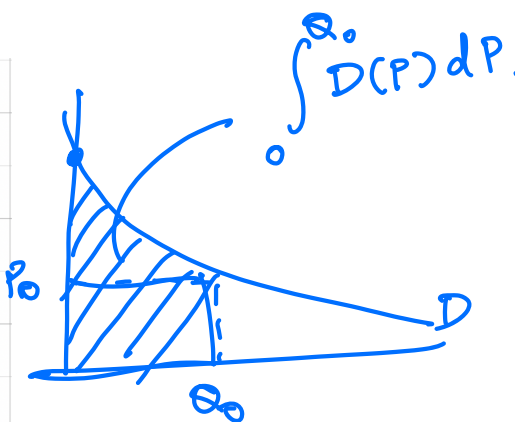
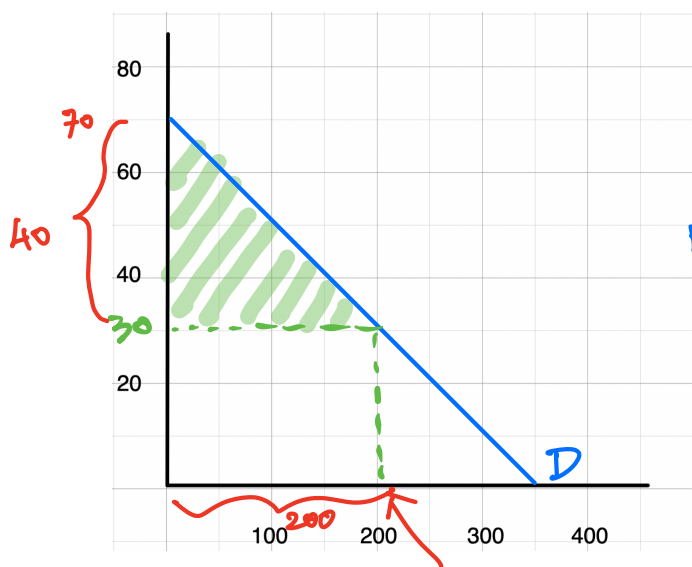


Given a price P_0 , the individual demand tells us

1. Quantity demanded Q_0 at the price P_0 ✓
2. The consumer's surplus

If the market demand is given

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



Given a price P_0 , with similar reasoning as in the case of individual demand, the market demand tells us at $P_0 = 30$.

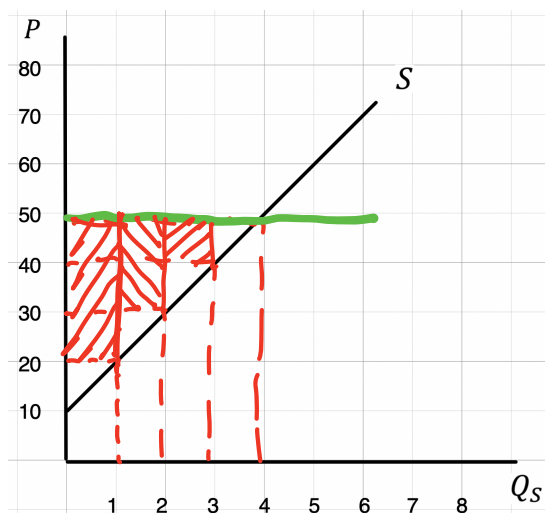
1. Quantity demanded Q_0 at the price $P_0 = 30$ $= 200$
2. Consumer's surplus $= \frac{1}{2} \cdot 200 \cdot 40 = 4,000$
3. The value of the last unit bought in the mind of the buyer is equal to the price $P_0 = 30$.

because if the value of the last unit is less than 30.
- the consumer would not have bought the last unit.
if the value of the last unit is more than $30 = P_0$.

Producer's Surplus of a quantity sold is the total revenue earned subtracted by the sum of the price the seller(s) is (are) willing to produce each consecutive unit of output.

and able to.

Given an individual supply S , suppose the seller sells in full unit 0, 1, 2, ...



Q_s	P
1	20
2	30
3	40
4	50
5	

Price Received

Producer's Surplus

50
50
50
50
60

30
20
10
0
60

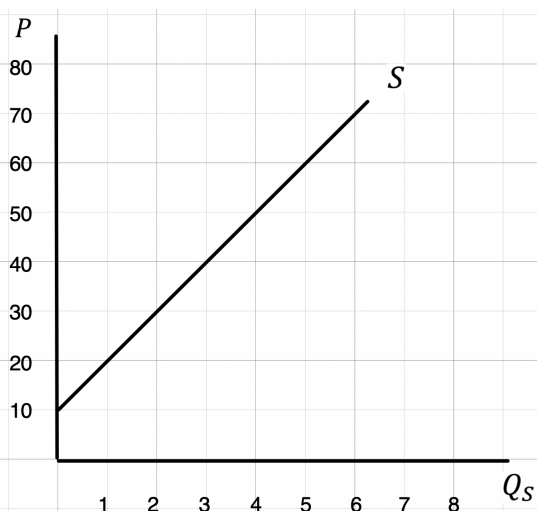
- If the price is set at $P = 50$,

The total revenue received = $50 \times 4 = 200$.

The total of prices seller is willing to sell each unit = $20 + 30 + 40 + 50 = 140$.

Producer's Surplus = $200 - 140 = 60$.

- If the seller is allowed to sell in half units, 0, 0.5, 1, 1.5, 2, ...



Q_s	P
0.5	
1	
1.5	
2	
2.5	
3	
3.5	
4	

With $P = 40$, the total revenue received =

The total of prices seller is willing to sell each unit =

Producer's Surplus =

- What if the seller can sell 0.25 unit at a time.

Given a price P_0 , the producer's surplus will be the total revenue $(P_0 \cdot Q_0)$ subtracted by the area under the Supply S .

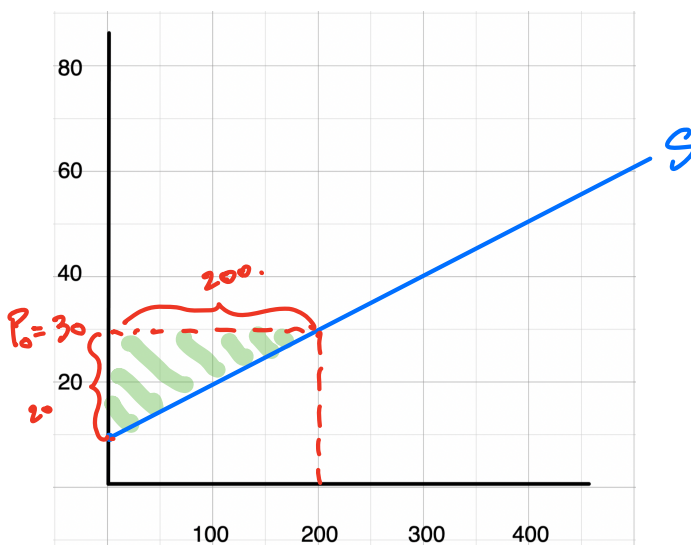
$$(P_0 \cdot Q_0) - \text{area under the supply curve.}$$

Given a price P_0 , the individual supply tells us

1. Quantity supplied Q_0 at the price P_0
2. The producer's surplus

If the market supply is given

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



Given a price P_0 , with similar reasoning as in the case of individual supply, the market supply tells us

1. Quantity supplied Q_0 at the price P_0 .
2. Producer's surplus $\frac{1}{2} \cdot 20 \times 200 = 2,000$
3. The cost of the last unit sold is equal to the price P_0

because if the cost of last unit $> P_0$, the seller would not sell the last unit

$< P_0$, the seller would sell more to get more profit.

*Price = value of last unit bought
= cost of last unit sold.*

Market Equilibrium, Market Efficiency and Social Welfare Maximization

At the equilibrium of a market with perfect competition, we have

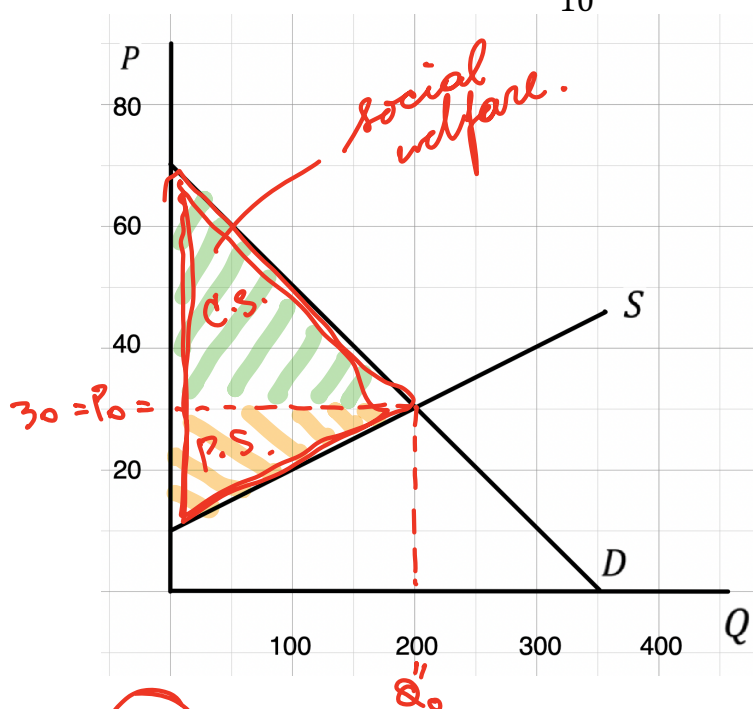
1. Equilibrium Condition: At $E = (Q_0, P_0)$

a) Excess Demand = 0, or equivalently

b) $Q_D = Q_S$

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

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



2. At equilibrium $E = (Q_0, P_0) = (200, 30)$, the equilibrium price

in the mind of the consumers.

$P_0 =$ value the placed on the last unit bought
= cost of producing the last unit sold

Producers gather resources (land, labor and capital) to produce until the cost of the last unit made is equal to the value the consumers placed on the last unit bought.

} efficiency.

3. Social Welfare = Consumer's Surplus + Producer's Surplus

At the equilibrium $E = (Q_0, P_0)$, this social welfare is maximized. That is, at any price other than P , social

welfare will be less than this. This will be demonstrated
in the next section on Applications.

