ECONOMICS 1 (sem 2)

Tutorial 3

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Questions to cover today

- Q10
- Q12
- Q13
- Q15
- Q17
- Q21
- Q26

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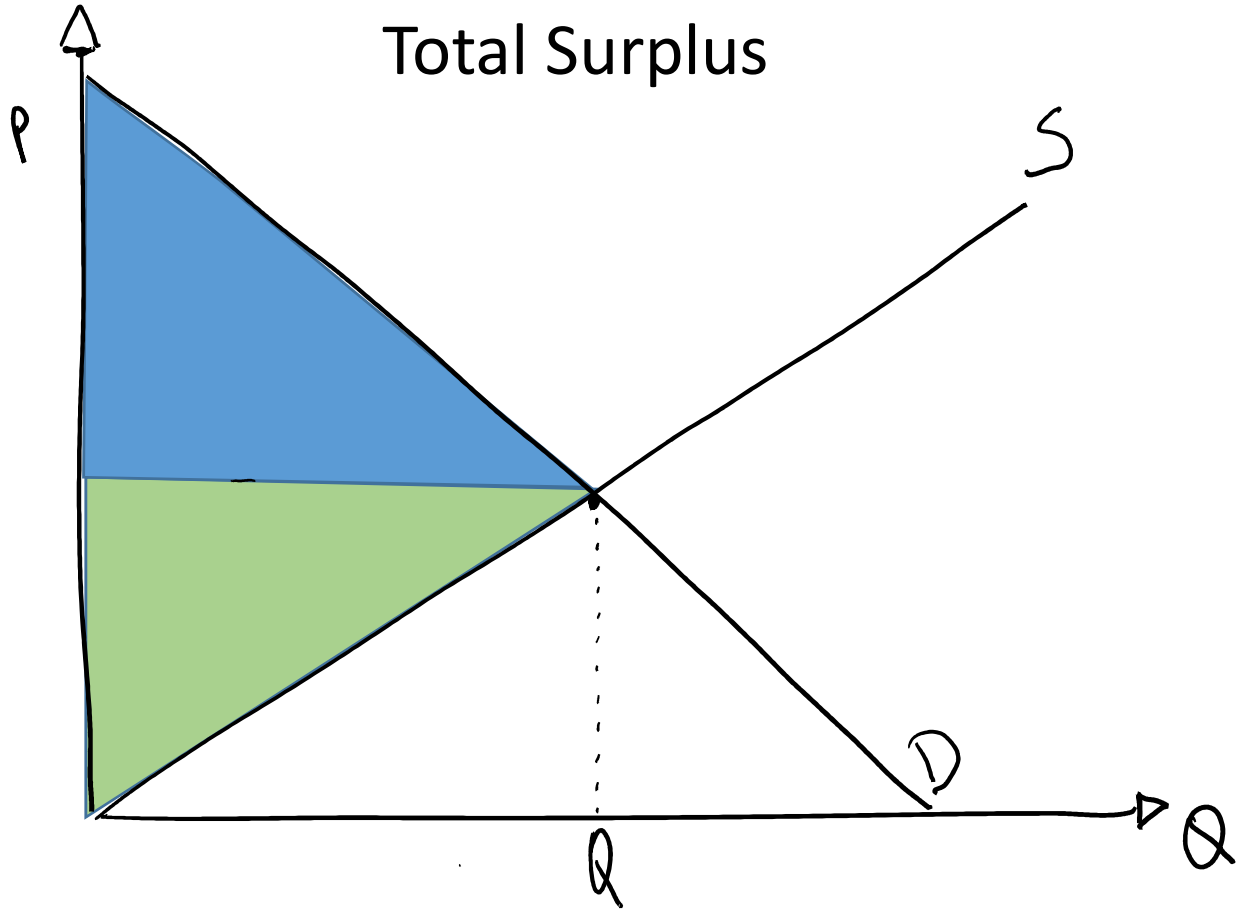
Q10. What do economists mean when they say that the short-run competitive equilibrium is efficient?



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Q12. If average variable costs exceed the market price, what level of output should the firm produce? What if there are no fixed costs?

- First, derive optimal production rule

$$Profits = PQ - TC(Q)$$
$$= PQ - FC - VC(Q)$$

$$FOC: \qquad P = MC(Q^*)$$

But this is optimal as long as $Profits \geq 0$

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- P < AVC

$$Profits = PQ - FC - VC(Q)$$

$$= Q(\underbrace{P - AVC}_{< 0}) - FC$$

$Q = 0$ is optimal with or without FC

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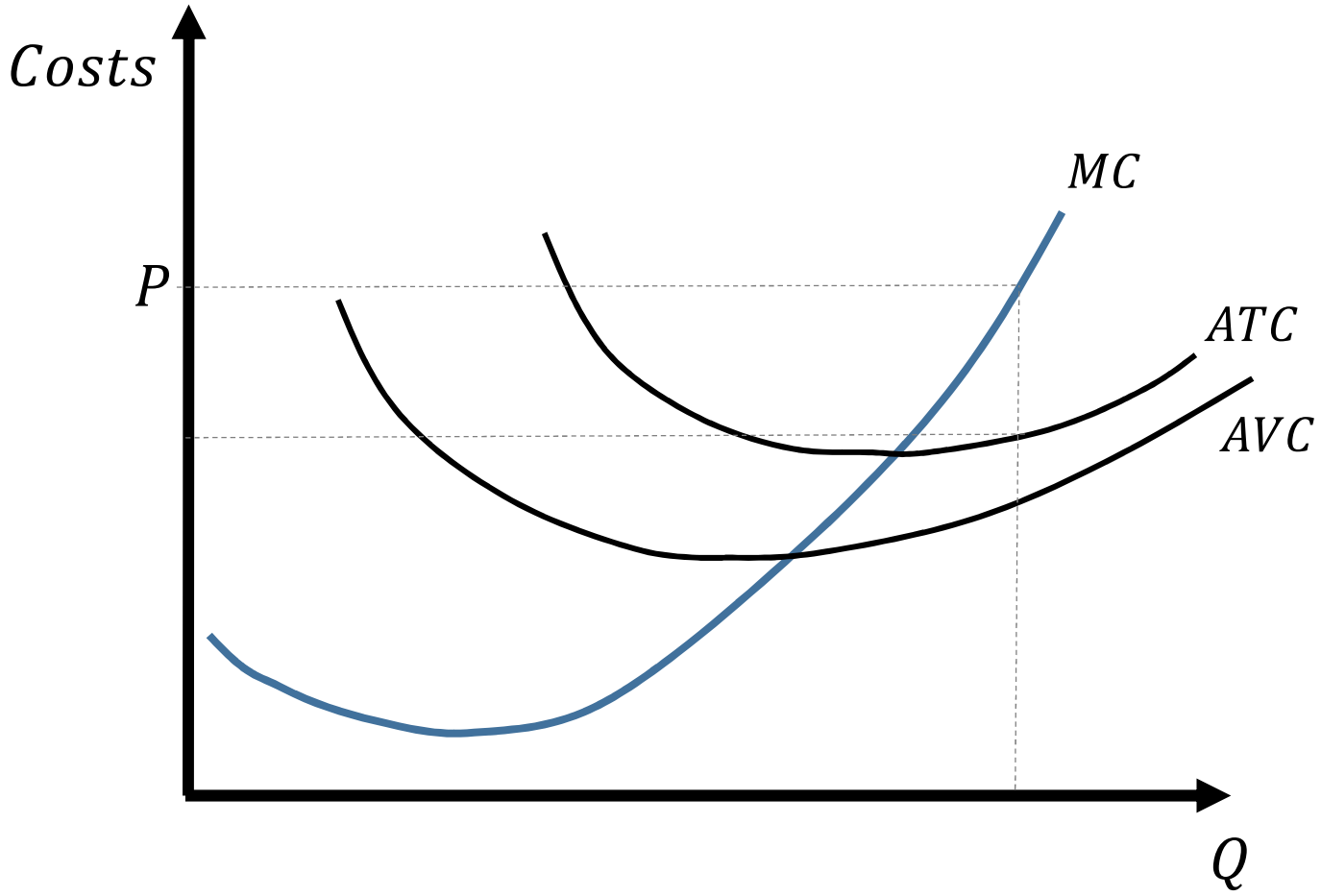
- Graphically: Case with P > ATC



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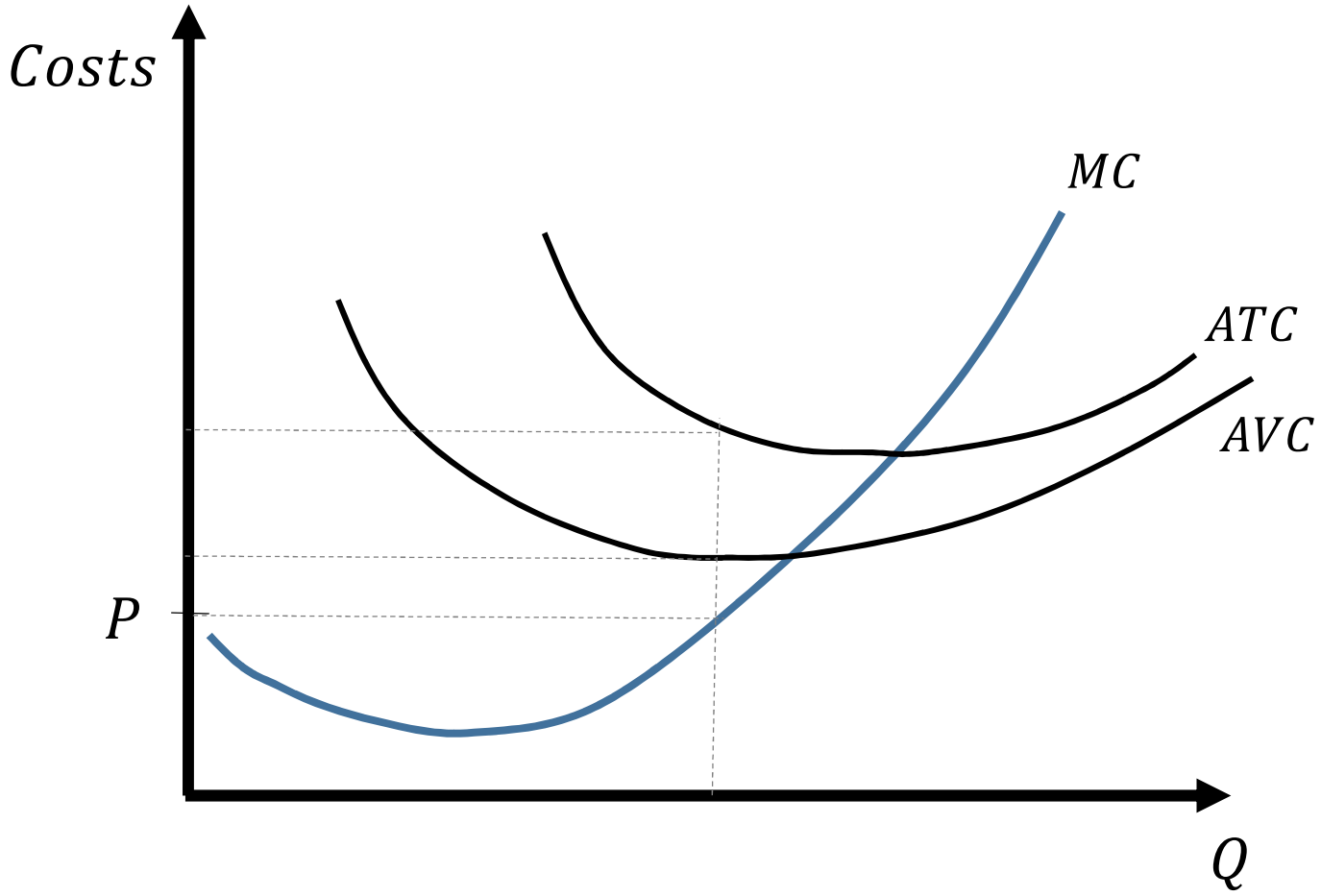
- This exercise: P < AVC



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Q13. Is it ever better for a perfectly competitive firm to produce output even though it is losing money? If so, when?

- Consider case AVC < P < ATC

$$Profits = PQ - FC - VC(Q) < 0$$

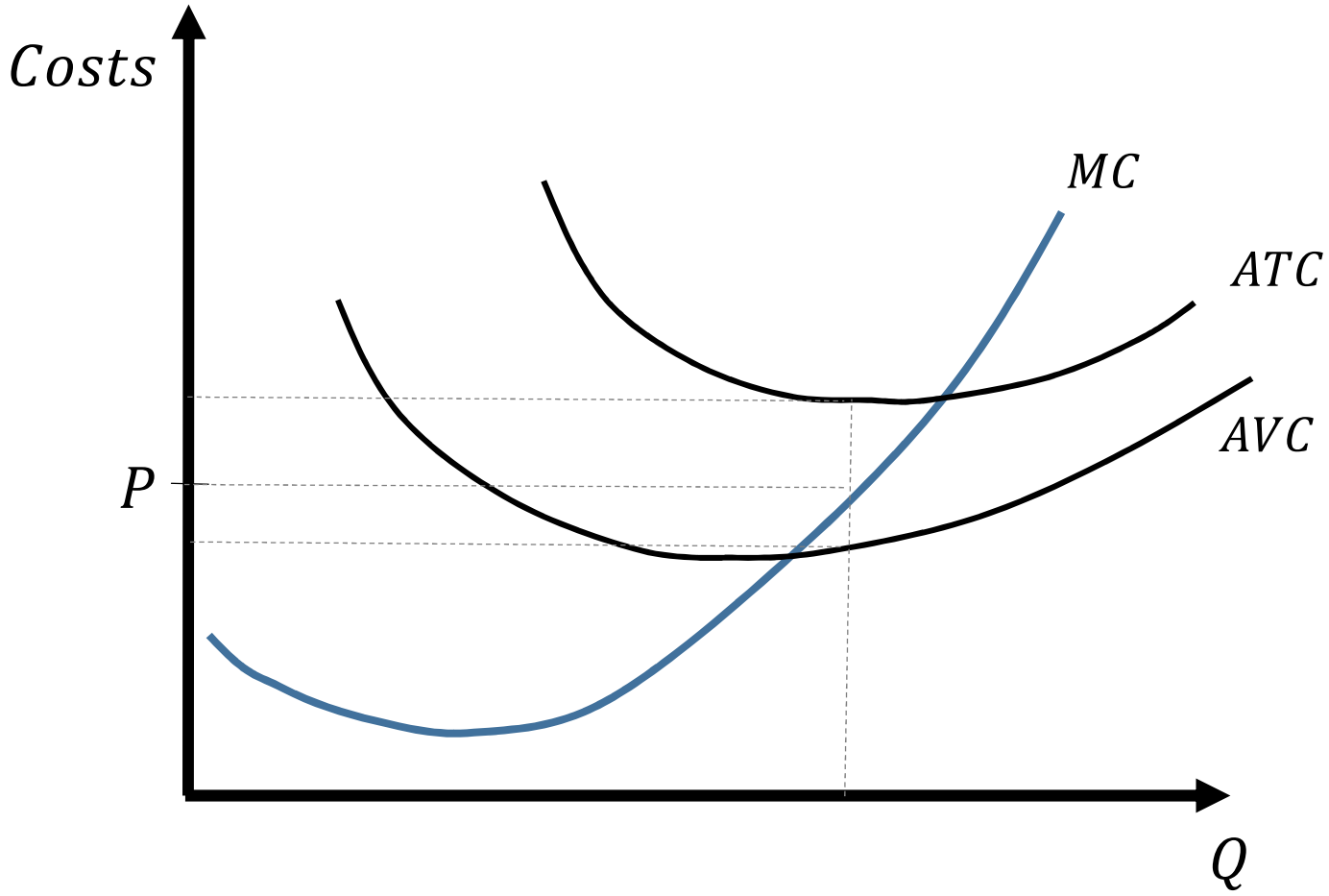
$$= Q(P - AVC) - FC < 0$$

$$> 0$$

$Q > 0$ is better than $Q = 0$

$P = MC$ maximizes the positive first term

- Graphically



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Q15. In a perfectly competitive market, what is the relationship between the market price and the cost of production for all firms in the industry?

- Unique price for all firms (price takers)
- Every firm sets MC = P as we derived in Q12

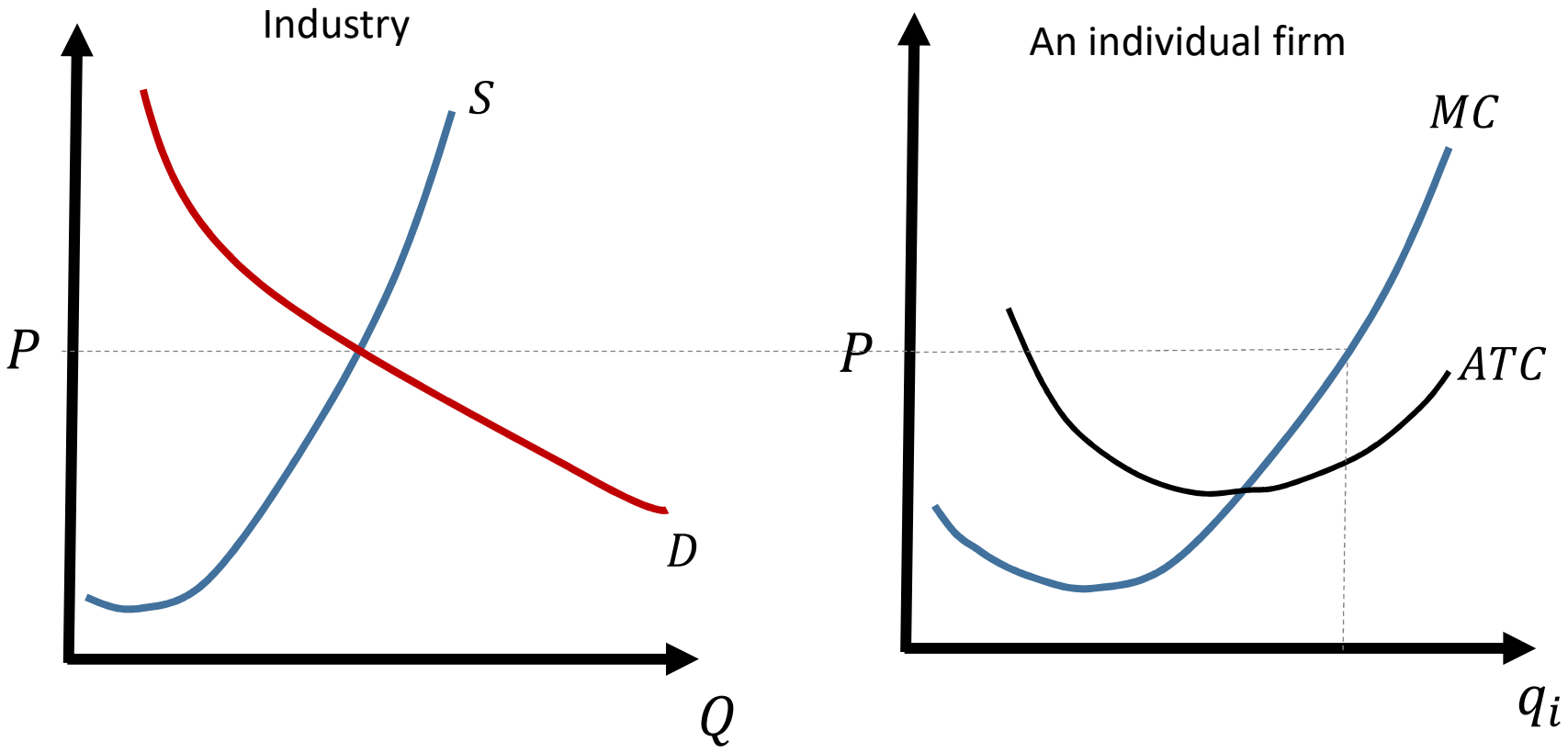
Q17. Suppose all firms in a competitive industry are operating at output levels for which price is equal to long-run marginal cost. True or false: This industry is necessarily in long-run equilibrium.

- P = LR MC
- Industry Equilibrium?

In perfect competition, industry equilibrium is when profits are 0 for all the firms

Why?

- Is this a LR equilibrium? What should happen?



Q21.

- 1,000 identical firms competitive peanut butter industry
- Short-run marginal cost curve $SMC = 4 + Q$
- Demand curve for this industry $P = 10 - \frac{2Q}{1000}$

Find short-run loss in producer and consumer surplus if an outbreak of aflatoxin suddenly makes it impossible to produce any peanut butter?

- Industry Supply

Every firm sets $P = MC_i = 4 + Q_i$

$$\Rightarrow \; Q_i = P - 4$$

Whole industry produces:

$$Q = \sum_i Q_i = \sum_i (P - 4)$$

$$= 1000(P - 4)$$

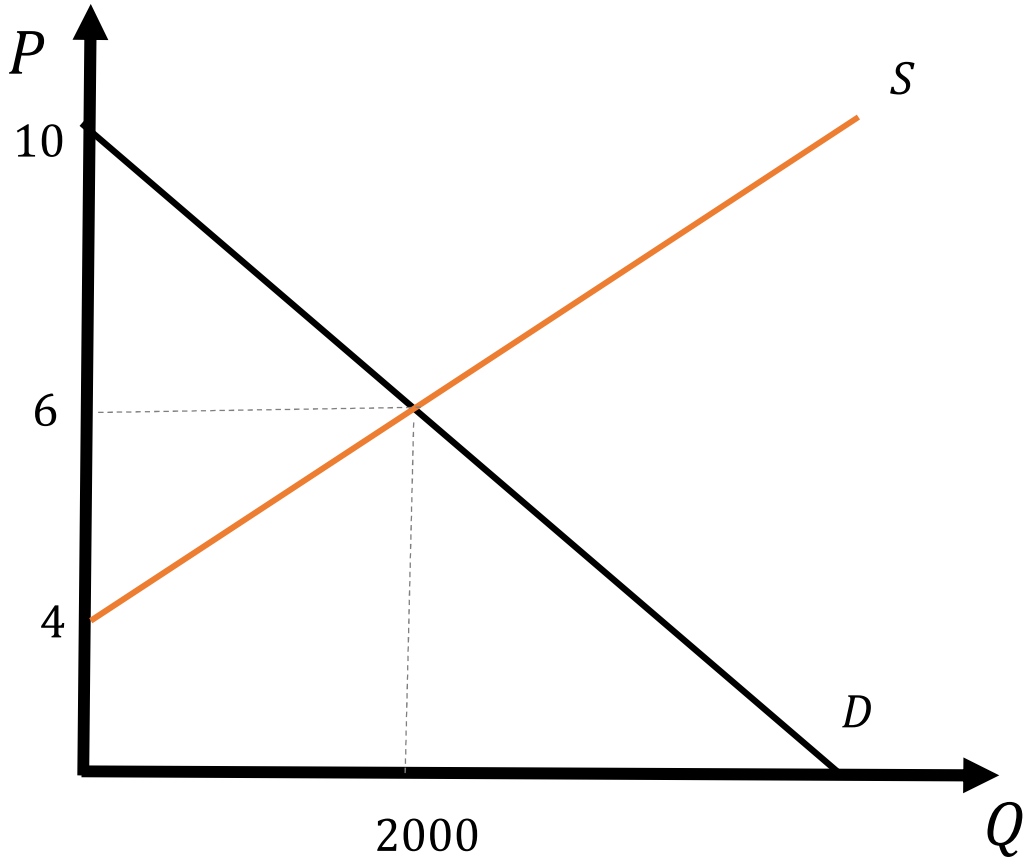
$$\Rightarrow \; \boxed{P = 4 + \frac{Q}{1{,}000}}$$

- Equilibrium S = D

$$4 + \frac{Q}{1{,}000} = 10 - \frac{2Q}{1000}$$

$$\Rightarrow \quad \boxed{Q = 2000} \quad \text{and} \quad \boxed{P = 6}$$

- Consumer and Producer Surplus



$\text{CS} = 4{,}000$

$\text{PS} = 2{,}000$

Q26.

- You own a small competitive farm that grows carrots.
- 1,000 competitors. All have total cost $TC = 8 + 2Q + 2Q^2$
- The industry is in long-run equilibrium.
- You are approached by an inventor who holds a patent on a process that will reduce your costs by half at each level of output.

a) What is the most you would be willing to pay for the exclusive right to use this invention?

- Industry Equilibrium

Condition $P = Min\ LAC$

$$LAC = \frac{8}{Q} + 2 + 2Q$$

LAC Minimum when: $\frac{dLAC}{dQ} = 2 - \frac{8}{Q^2} = 0$

$$\Rightarrow \boxed{Q_i^* = 2} \quad \text{and} \quad \boxed{LAC = 10 = P^*}$$

- Profits if P=10 but TC is half

$$TC^{new} = 4 + Q + Q^2 \quad \Rightarrow \quad \boxed{MC^{new} = 1 + 2Q}$$

Optimal Production: $MC^{new} = 10$

$$1 + 2Q = 10$$

$$\Rightarrow \quad \boxed{Q_i^* = 4.5} \quad \text{and} \quad \boxed{Profits = 16.25}$$

Pay a max of $16.25 for the exclusive rights

b) Would the inventor be willing to sell at that price?

- Total cost of all firms without invention = 20
- With the invention, min LAC is still at Q=2 (check yourself) but cost is 10
- Each firm could save 10 in cost
- If all the firms adopt the invention, profits are zero again, so not clear that all of them will adopt it
- But inventor could sell it to some firms.
  - E.g. selling exclusivity to <u>two</u> firms at $10 will not change much the industry price
  - But each firm can make more than $10 with the invention

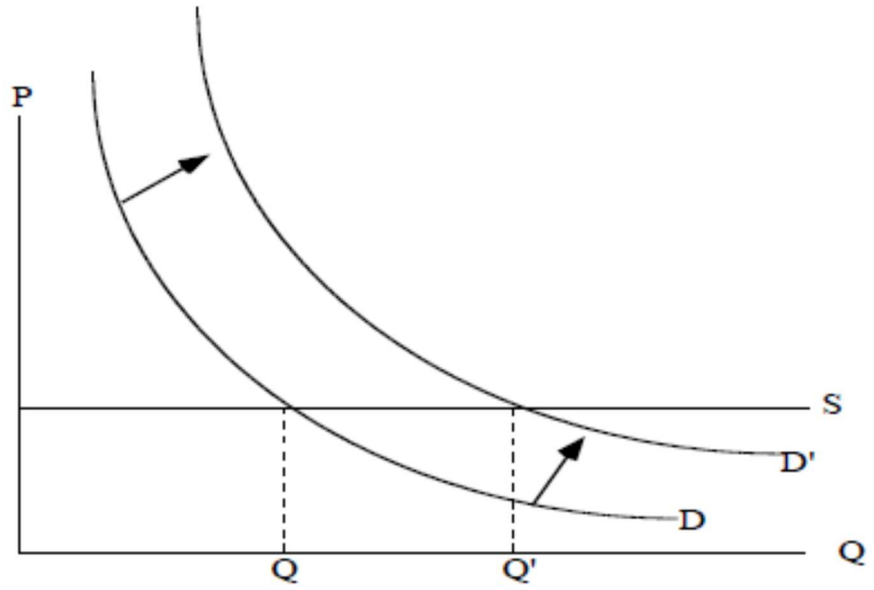
Q27. Suppose that bicycles are produced by a perfectly competitive, constant-cost industry. Which of the following will have a larger effect on the long-run price of bicycles: **(i)** a government programme to build a widespread cycle network alongside advertisements of the health and environmental benefits of cycling, or **(ii)** a government programme of bridge building that increases the demand for steel, an input in the manufacture of bicycles (supposing that steel that is produced in an increasing cost industry)?

Key info:

- Constant (mg) cost
- Perfect competitive market

1) advertise benefits + cycle path → increase demand
2) increase cost of labour → shift MC upwards

1)



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