Perfect Competition

Chapter 9, Roger Arnold

Videos for Review:

https://www.youtube.com/watch?v=Z9e_7j9WzA0

https://www.youtube.com/watch?v=BQvtnjWZ0ig

- **Every** firm has to answer certain questions:

  1) What price to charge?

  2) How many units to produce?

  3) How much resources it needs?

- The answers to depend on the **market structure** in which the firm operates in.

  Market structure - The environment of a firm, whose characteristics influence the firm's pricing and output decisions.

The Theory of Perfect Competition (PC)

Depends on 4 major **assumptions**

*A firm that exists in a perfectly competitive market is called a *perfectly competitive firm*.

*We use the terms market and industry interchangeably.

Assumption 1) There are many sellers and many buyers

- **None** of the sellers or the buyers is large in relation to total sales or purchases.

- Cannot influence the price individually.

- A firm's output as a % of the market output is very small. **E.g.** 10,00,000 sellers sell onion. Just imagine how small each one's share is compared to this!

Examples include agricultural products like rice, foreign exchange such as USD, gold, free software.

- Homogenous = **identical**.

- The consumers will not be able to easily distinguish between different producers.

- **E.g.** markets for plain envelopes, brown paper bags, rice, lentils, eggs, rickshaw service, etc.

An opposite scenario would be

Assumption 3) **Buyers and sellers have all relevant information about prices, product quality, sources of supply, and so forth.**

- **Buyers and sellers know** who is selling what, at what prices, at what quality, and on what terms.

- In short, they know everything that relates to buying, producing, and selling the product.

## *Assumption 4)* **Firms have easy entry and exit.**

- New firms can enter/exit the market easily

- There are **no barriers** to entry or exit such as government regulations, limited access to key resources or additional costs related to shutting down the firm.

- **For example** the market for electricity generation (such as setting up a powerplant would **NOT** be considered a perfectly competitive firm)

Both buyers and sellers are price-takers.

- A perfectly competitive firm is a price taker, meaning it sells **all** of its product at the price determined in the market.

- **It is a consequence of the first 3 assumptions.**

  - *Cannot influence the price due to its small share of supply/production relative to the market.*

  - *Cannot charge a higher price as everyone is selling essentially same good/service and all buyers and sellers are aware of this.*

The Demand Curve for a Perfectly Competitive Firm

- It will be **horizontal**. *(what other term can you use to describe this demand curve?)*

- The **market demand curve will look like a typical downward sloping** demand curve we have seen earlier.

- As we know, the market demand curve and market supply curve intersect to establish the equilibrium price for a good/service.

- A single perfectly competitive firm faces a horizontal demand curve **at the equilibrium price**.

- Thus, sells all its different levels of output at this price.

(a) Market

(b) Single Firm

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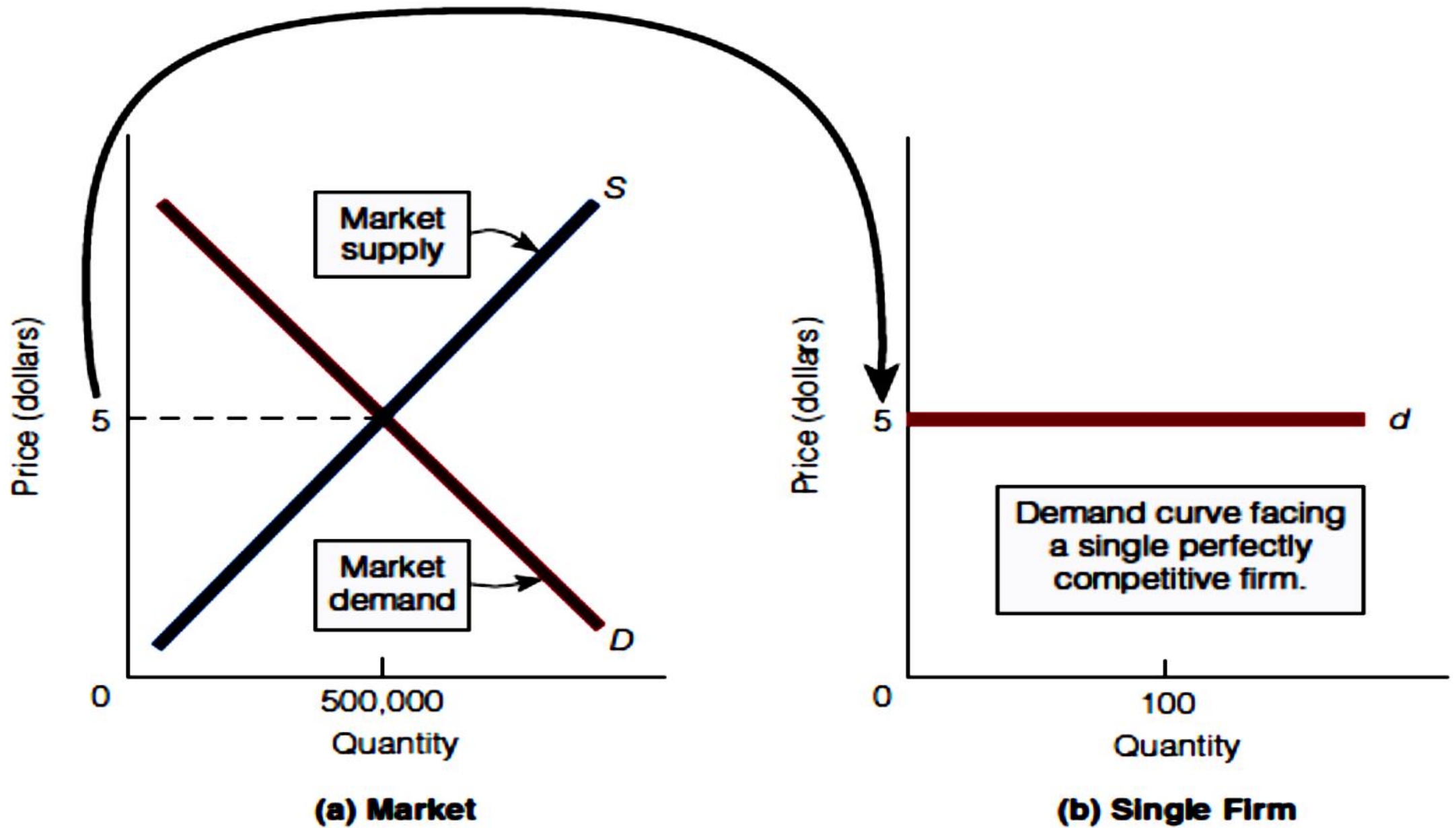
Why Does It Sell At The Equilibrium Price?

- If it tries to charge a **higher price → NO SALE!**

- Will not charge a **lower price**. Foolish to do so as will be able to sell the same or a higher amount at the equilibrium price.

- *From your knowledge of elasticity, can you tell me why the demand curve for a perfectly competitive firm is perfectly elastic?*

Marginal Revenue (MR) Curve and Demand Curve

- **Recall**: Total Revenue (TR) = The price of a good multiplied by the quantity sold.

  TR = P x Q

- **Recall**: Every firm wants to **maximize profit. Profit = TR – TC**

- *Marginal revenue (MR) = the change in total revenue (TR) that results from selling one additional unit of output (Q).*

  $$MR = (\Delta Total\ Revenue \div \Delta Q)$$

- For a perfectly competitive firm, **P = MR**

- This means that the marginal revenue curve for the perfectly competitive firm is the **same** as its demand curve.

- **Demand** curve plots the relationship between **P and Q** whereas **MR** curve plots the relationship between **MR and Q**.

- **As P = MR, the Demand and MR curves are the same.**
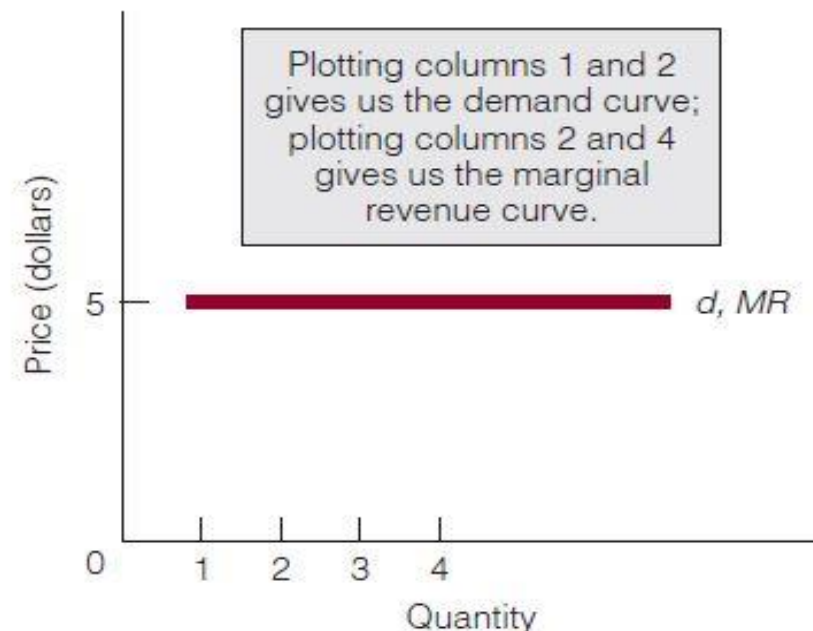
For a Perfectly Competitive Firm, $P = MR$

exhibit 2

The Demand Curve and the Marginal Revenue Curve for a Perfectively Competitive Firm

(a) By computing marginal revenue, we find that it is equal to price. (b) By plotting columns 1 and 2, we obtain the firm's demand curve; by plotting columns 2 and 4, we obtain the firm's marginal revenue curve. The two curves are the same.

(1) Price	(2) Quantity	(3) Total Revenue = (1) × (2)	(4) Marginal Revenue = $\Delta TR/\Delta Q$ = $\Delta(3)/\Delta(2)$
$5	1	$ 5	$5
5	2	10	5
5	3	15	5
5	4	20	5

(a)

Plotting columns 1 and 2 gives us the demand curve; plotting columns 2 and 4 gives us the marginal revenue curve.

Price (dollars)

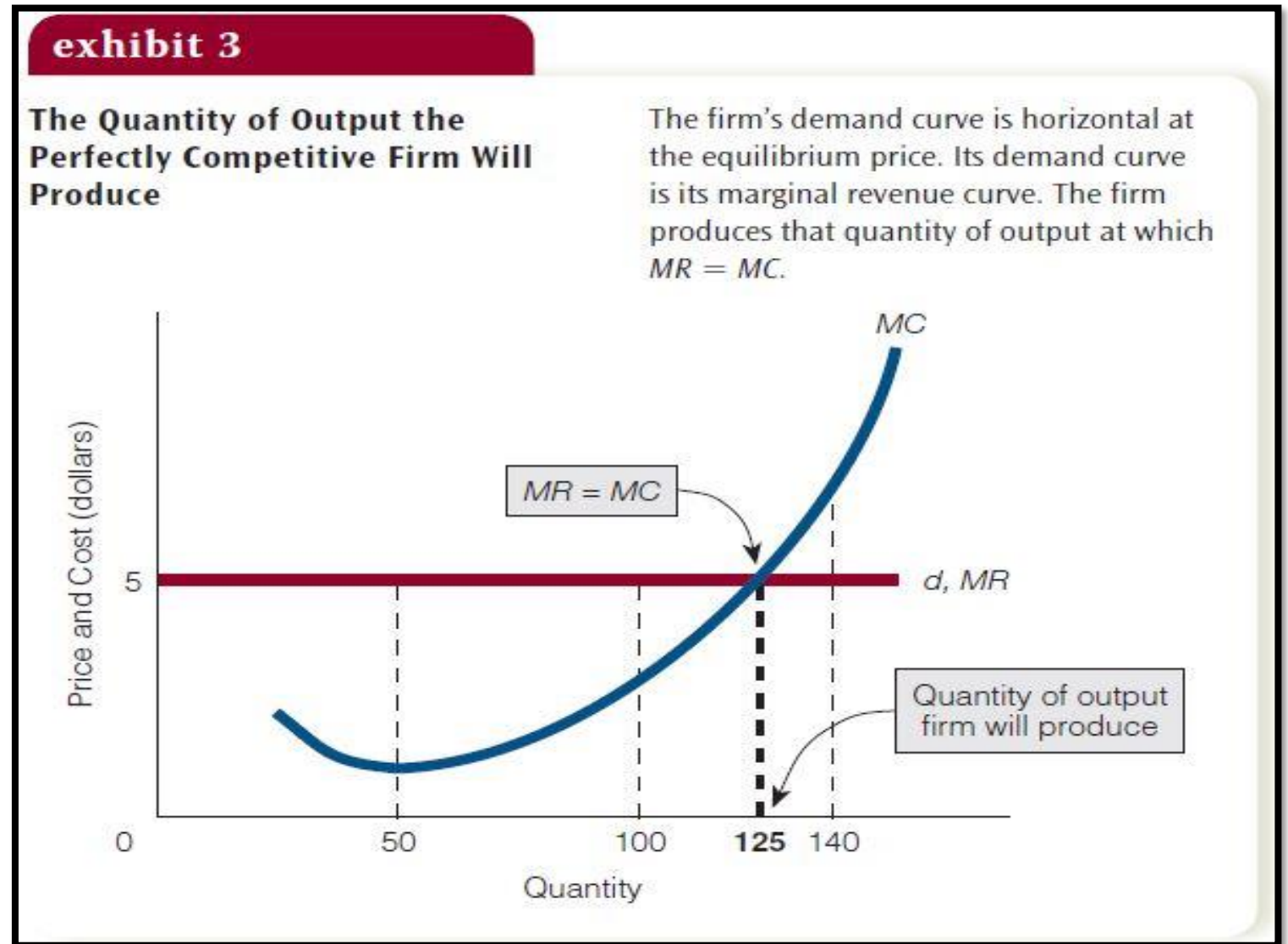5 ———————————— d, MR

0 1 2 3 4

Quantity

(b)

PC in the Short Run (SR)

- *Who remembers what the difference between the SR and the LR is?*

- How do firms decide how much of a good should they produce?

- We want to know **how much** a firm should produce.

- It would will produce the amount that helps to achieve its goal → maximizing profit.

- So we need to find the **profit-maximizing (or loss-minimizing) level of output.**

- As the owner/manager of a firm I'm always asking myself, should I produce one more unit or not? = **MARGINAL DECISION MAKING**

- So what is the effect on a producer's profit of increasing output by one unit**.**

- Let's rewind to our previous topics. Efficiency is reached when marginal benefit (MB) of something = marginal cost (MC) of that. That is the optimal situation.

- In the case of a firm, the **MB is the MR** it will receive **from selling** that **one more unit** whereas the **MC is the cost of producing** that **one more unit.**

What Level of Output Does the Profit-Maximizing Firm Produce?

- Should the firm continue production if MR>MC? Why?

- Should the firm continue production if MR<MC? Why?

exhibit 3

The Quantity of Output the Perfectly Competitive Firm Will Produce

The firm's demand curve is horizontal at the equilibrium price. Its demand curve is its marginal revenue curve. The firm produces that quantity of output at which $MR = MC$.

Profit Maximization Rule (for all firms)

- The firm **will continue** to increase its quantity of output as long as **MR > MC**.

- It will **not produce** units of output for which **MR < MC**.

- The firm **will stop** increasing its quantity of output when **MR = MC**

- The **profit maximization rule** for a firm says *produce the quantity of output at which MR = MC.*

- For the perfectly competitive firm, *P = MR*

  In perfect competition, *profit is maximized when P = MR = MC*

The Perfectly Competitive Firm and Resource Allocative Efficiency

- P = Social Benefit and MC = Social Cost (opportunity cost).

- *Producing a good—any good—until price equals marginal cost ensures that all units of the good are produced that are of greater value to buyers than the alternative goods that might have been produced.*

- A firm that produces the quantity of output at which price equals marginal cost (**P = MC**) is said to exhibit **resource allocative efficiency**.

- If the perfectly competitive firm produces the output at which *MR = MC* and if for this firm *P = MR,* then it follows that the firm produces the output at which *P = MC.*

- **In short, the** **perfectly competitive firm** *is* **resource allocative efficient**.

- **Accomplishes resource allocative efficiency (*P = MC*) when it maximizes profit (*MR = MC*).**

- **P = MR → MR = MC (when maximizing profit) → P = MR = MC**

  Therefore, P = MC

To Produce or Not to Produce: That Is the Question

When should a firm stop producing?

exhibit 4

Profit Maximization and Loss Minimization for the Perfectly Competitive Firm: Three Cases

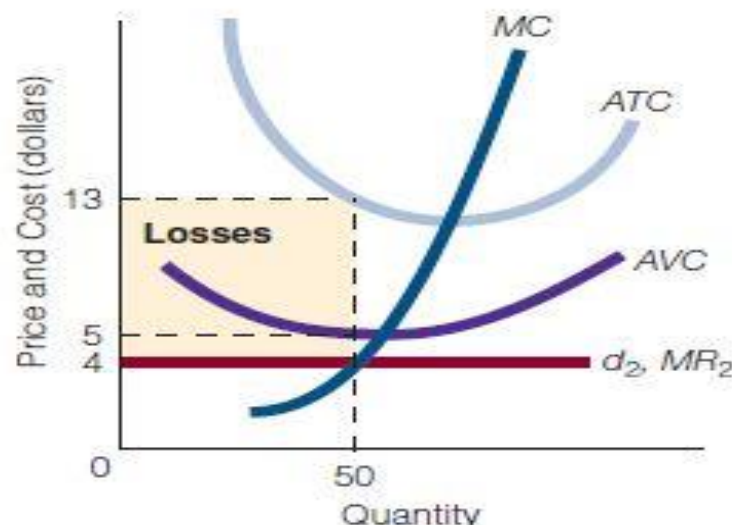(a) In case 1, $TR > TC$ and the firm earns profits. It continues to produce in the short run.

(b) In case 2, $TR < TC$ and the firm takes a loss. It shuts down in the short run because it minimizes its losses by doing so; it is better to lose $400 in fixed costs than to take a loss of $450. (c) In case 3, $TR < TC$ and the firm takes

a loss. It continues to produce in the short run because it minimizes its losses by doing so; it is better to lose $80 by producing than to lose $400 in fixed costs.

$P > ATC \ (> AVC)$

TR = $1,500
TC = $1,100
TVC = $700
TFC = $400

Profits = $400

Continue to produce in the short run.

$P < AVC \ (< ATC)$

TR = $200
TC = $650
TVC = $250
TFC = $400

Losses = $450

Shut down in the short run.

$ATC > P > AVC$

TR = $720
TC = $800
TVC = $400
TFC = $400

Losses = $80

Continue to produce in the short run.

(a) Case 1

(b) Case 2
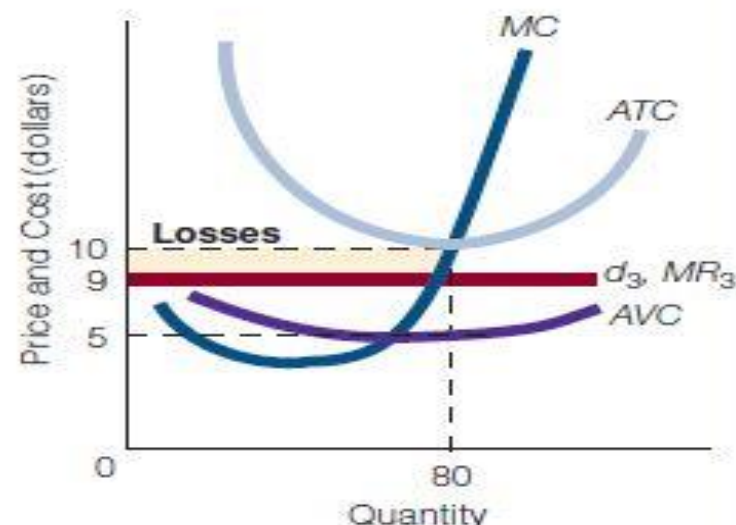
(c) Case 3

CASE 1: PRICE IS ABOVE AVERAGE TOTAL COST

Case 1

Equilibrium price (P)	=	$15
Quantity of output produced (Q)	=	100 units
Total revenue (P × Q = $15 × 100)	=	$1,500
Total cost (ATC × Q = $11 × 100)	=	$1,100
Total variable cost (AVC × Q = $7 × 100)	=	$700
Total fixed cost (TC − TVC = $1,100 − $700)	=	$400
Profits (TR − TC = $1,500 − $1,100)	=	$400

If **P > ATC** for the perfectly competitive firm, the firm maximizes profits by producing the quantity of output at which *MR = MC.*

CONTINUE PRODUCTION

CASE 2: PRICE IS BELOW AVERAGE VARIABLE COST

Case 2

Equilibrium price (P)	=	$4
Quantity of output produced (Q)	=	50 units
Total revenue ($P \times Q = \$4 \times 50$)	=	$200
Total cost ($ATC \times Q = \$13 \times 50$)	=	$650
Total variable cost ($AVC \times Q = \$5 \times 50$)	=	$250
Total fixed cost ($TC - TVC = \$650 - \$250$)	=	$400
Profits ($TR - TC = \$200 - \$650$)	=	$-\$450$

If **P < AVC** , the perfectly competitive firm **minimizes losses** by choosing to *shut down—that is, by not producing.*

SHUT DOWN

CASE 3: PRICE IS BELOW AVERAGE TOTAL COST BUT ABOVE AVERAGE VARIABLE COST

Case 3

Equilibrium price (P)	=	$9
Quantity of output produced (Q)	=	80 units
Total revenue ($P \times Q = \$9 \times 80$)	=	$720
Total cost ($ATC \times Q = \$10 \times 80$)	=	$800
Total variable cost ($AVC \times Q = \$5 \times 80$)	=	$400
Total fixed cost ($TC - TVC = \$800 - \$400$)	=	$400
Profits ($TR - TC = \$720 - \$800$)	=	$-\$80$

P < ATC but *above* AVC (AVC<P<ATC) , the perfectly competitive firm minimizes its losses by *continuing to produce* in the short run instead of shutting down.

CONTINUE PRODUCTION

Case 2:

Profit if continue = TR – TC = $(200 – 650) = **- $450**

Profit if shut down = TR – TC (*TC = FC at Q = 0*) = $(0 – 400) = **- $400**

Case 3:

Profit if continue = TR – TC = $(720 – 800) = **- $80**

Profit if shut down = TR – TC (*TC = FC at Q = 0*) = $(0 – 400) = **- $400**

SUMMARY OF CASES 1–3 *A perfectly competitive firm produces in the short run as long as price is above average variable cost (cases 1 and 3).*

$$P > AVC \rightarrow \text{Firm produces}$$

A perfectly competitive firm shuts down in the short run if price is less than average variable cost (case 2).

$$P < AVC \rightarrow \text{Firm shuts down}$$

We can summarize the same information in terms of total revenue and total variable costs. *A perfectly competitive firm produces in the short run as long as total revenue is greater than total variable costs (cases 1 and 3).*

$$TR > TVC \rightarrow \text{Firm produces}$$

A perfectly competitive firm shuts down in the short run if total revenue is less than total variable costs (case 2).
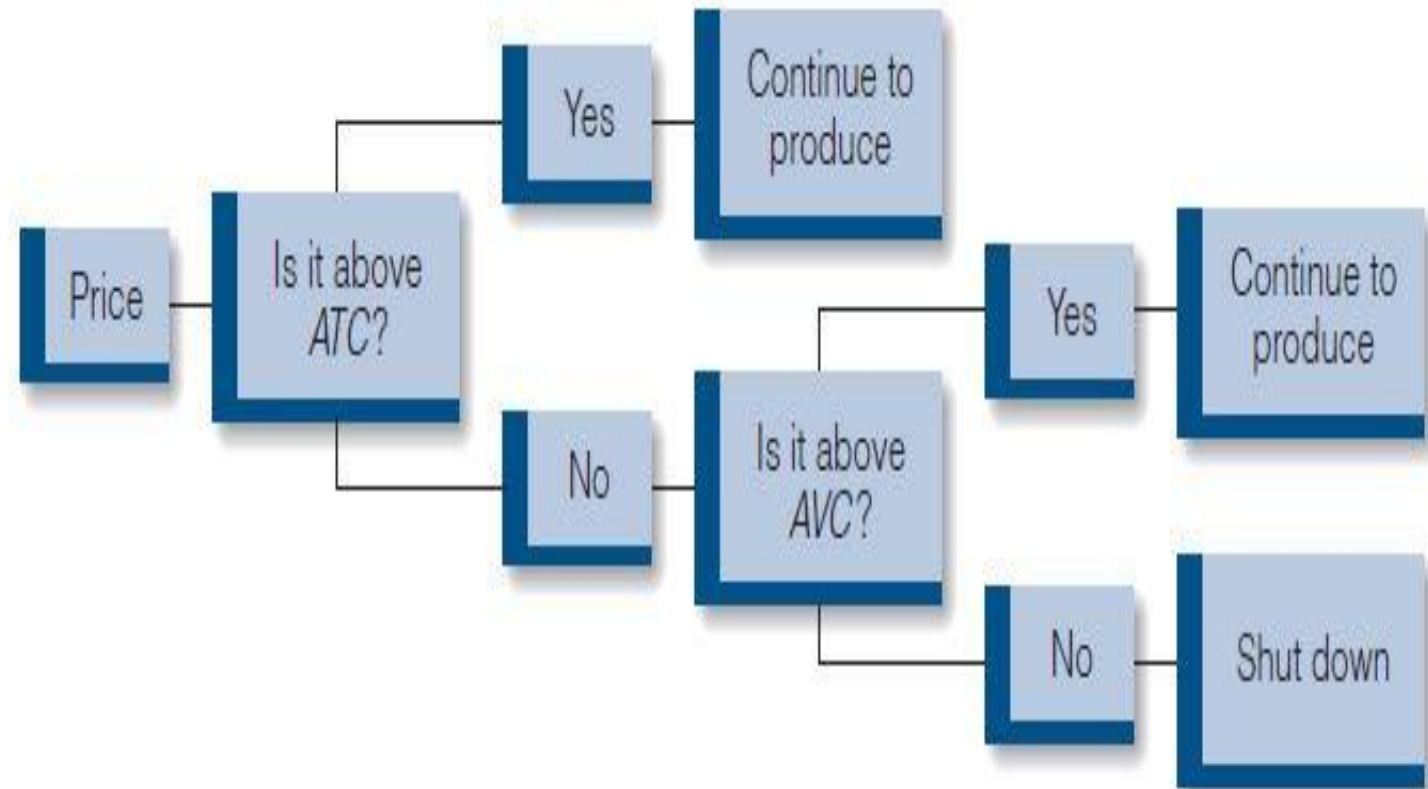
$$TR < TVC \rightarrow \text{Firm shuts down}$$

- Not always does a loss imply shutting down.

- Often shutting down is more costly than continuing in loss.

- P > SRATC = Supernormal Profit

- P < SRATC = Loss

- P = SRATC = 0 Economic Profit/Normal Profit

exhibit 5

What Should a Perfectly Competitive Firm Do in the Short Run?

The firm should produce in the short run as long as price (P) is above average variable cost (AVC). It should shut down in the short run if price is below average variable cost.

Price → Is it above *ATC*?
- Yes → Continue to produce
- No → Is it above *AVC*?
  - Yes → Continue to produce
  - No → Shut down

SR Supply Curve

- So far we have established that a perfectly competitive firm will only produce/supply as long as P>AVC.

- This implies that in the SR the **Supply curve** of a perfectly competitive firm is that **portion of the MC curve that is _above_ the AVC curve.**

- Only a **P>AVC** will encourage firms to supply the good in the market.

EXHIBIT 7

The Perfectly Competitive Firm's Short-Run Supply Curve

The short-run supply curve is that portion of the firm's marginal cost curve that lies above the average variable cost curve.
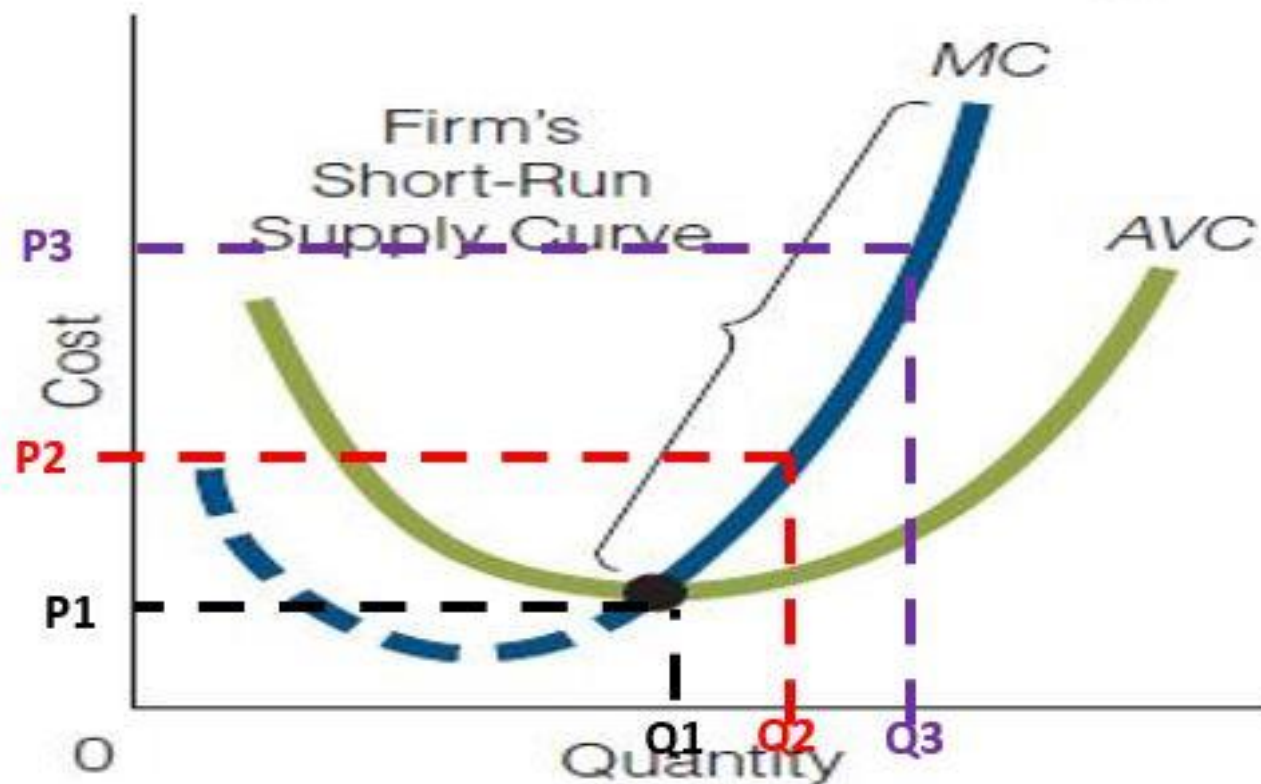
Industry Supply Curve

- *The law of diminishing marginal returns → MC curves are upward sloping → because MC curves are upward sloping → market supply curves also slope upwards.*

EXHIBIT 8

Deriving the Market (Industry) Supply Curve for a Perfectly Competitive Market

In (a) we add (horizontally) the quantity supplied by each firm to derive the market supply curve. The market supply curve and the market demand curve are shown in (b). Together, they determine equilibrium price and quantity.
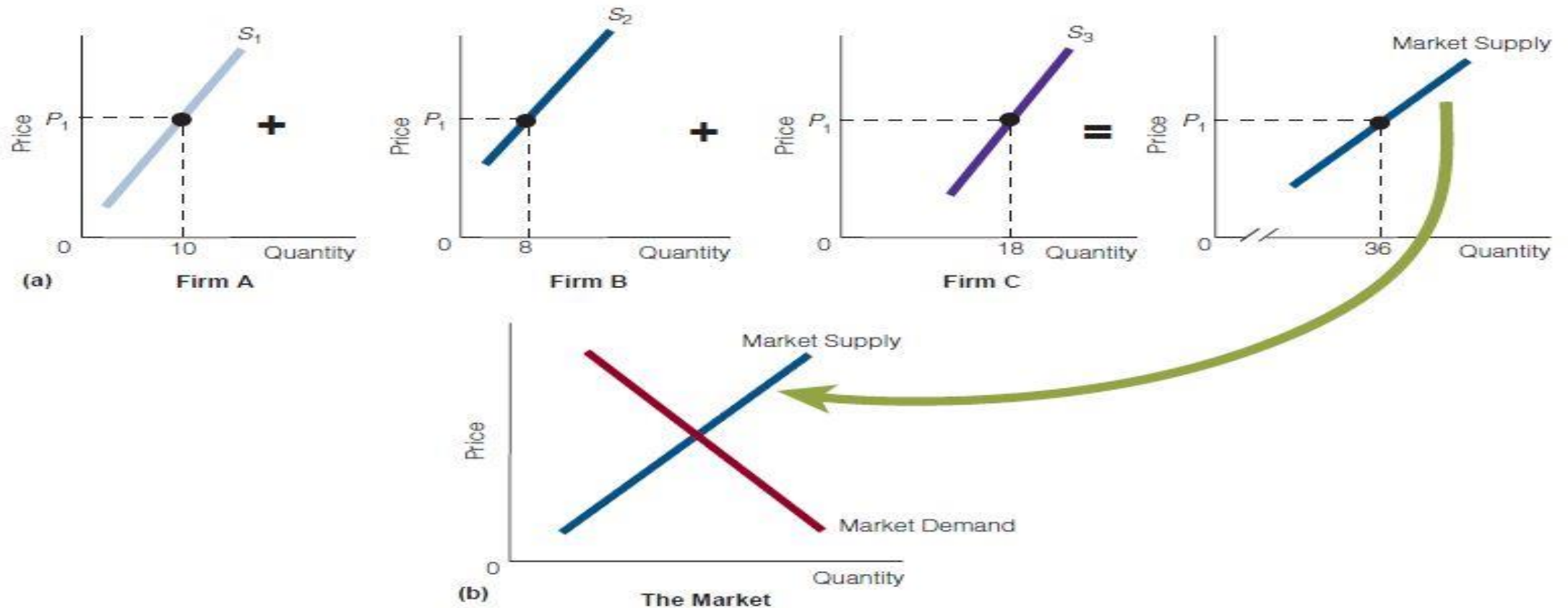
PC in the Long Run

- We focus on one major condition: **Economic Profit = 0 in the LR.**

- The firms earn normal economic profit in the LR.

- Why? → **P = SRATC** (meaning TR = TC) → **NO INCENTIVE TO ENTER OR EXIT.**

- When **P > SRATC** → supernormal profits attract new firms = **entry**

- When **P < SRATC** → losses repel existing firms = **exit**

- **Scenario 1: Current P>SRATC**
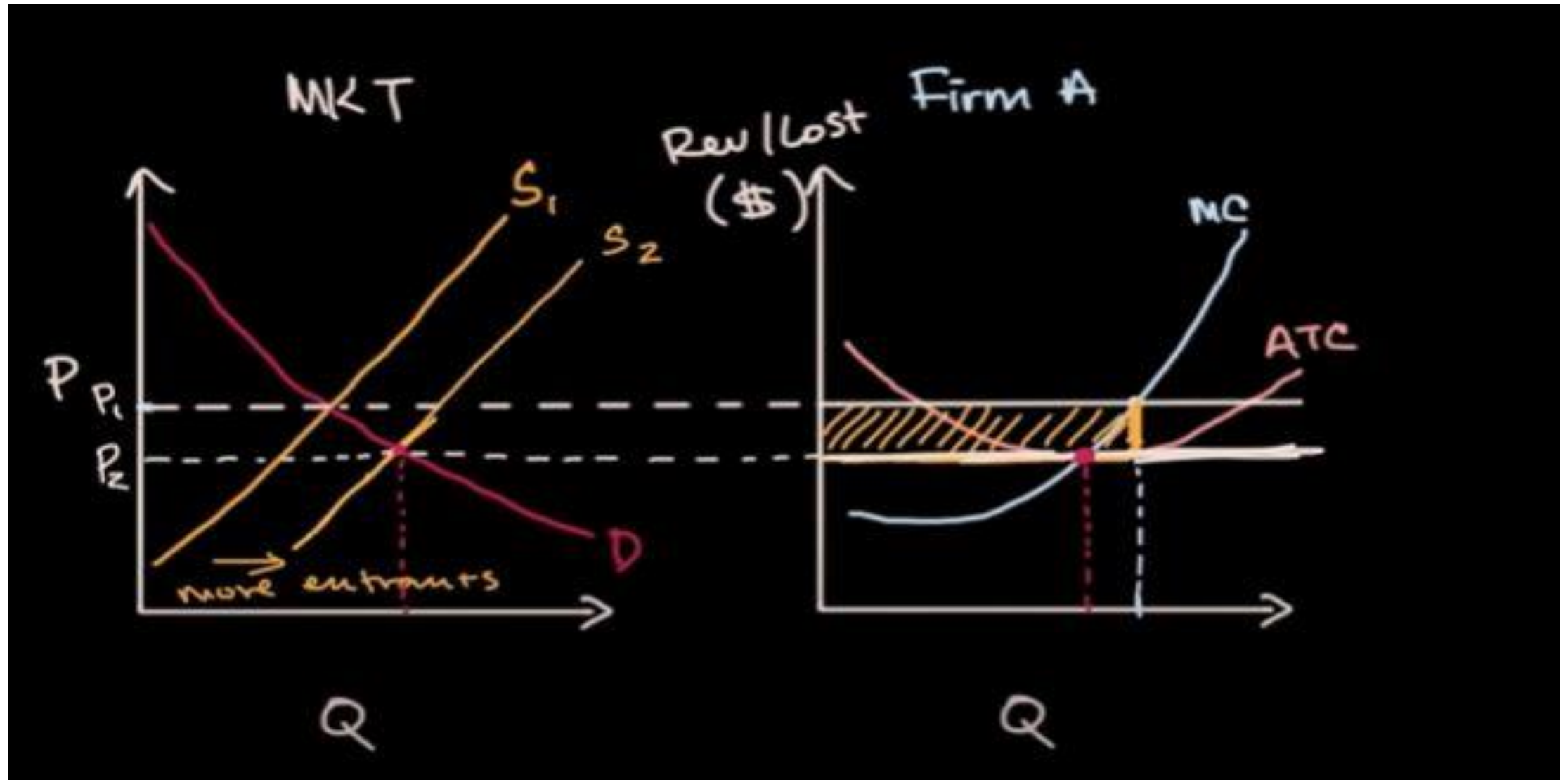
- **Scenario 2:** P increases and results in P>SRATC.

- *Can you tell me one reason for why P may have increased in the market?*

- Demand rises in the market → Equilibrium P will increase
- As firms are price takers, the MR curve for the existing individual firms will shift upwards.
- This is because P = MR.
- Now MR cuts MC at a higher Q.
- The P is now above the individual firm's SRATC = supernormal profit
- This supernormal profit encourages new firms to enter.
- More firms = increase in Supply in the market.
- Increased supply → lowers the equilibrium P in the market.
- The process continues until the LR equilibrium has been established and firms are making 0 economic profits again.
- So, MR curve for individual firms shifts down, and now P = SRATC.

Panel (a)
Market

Panel (b)
One Firm
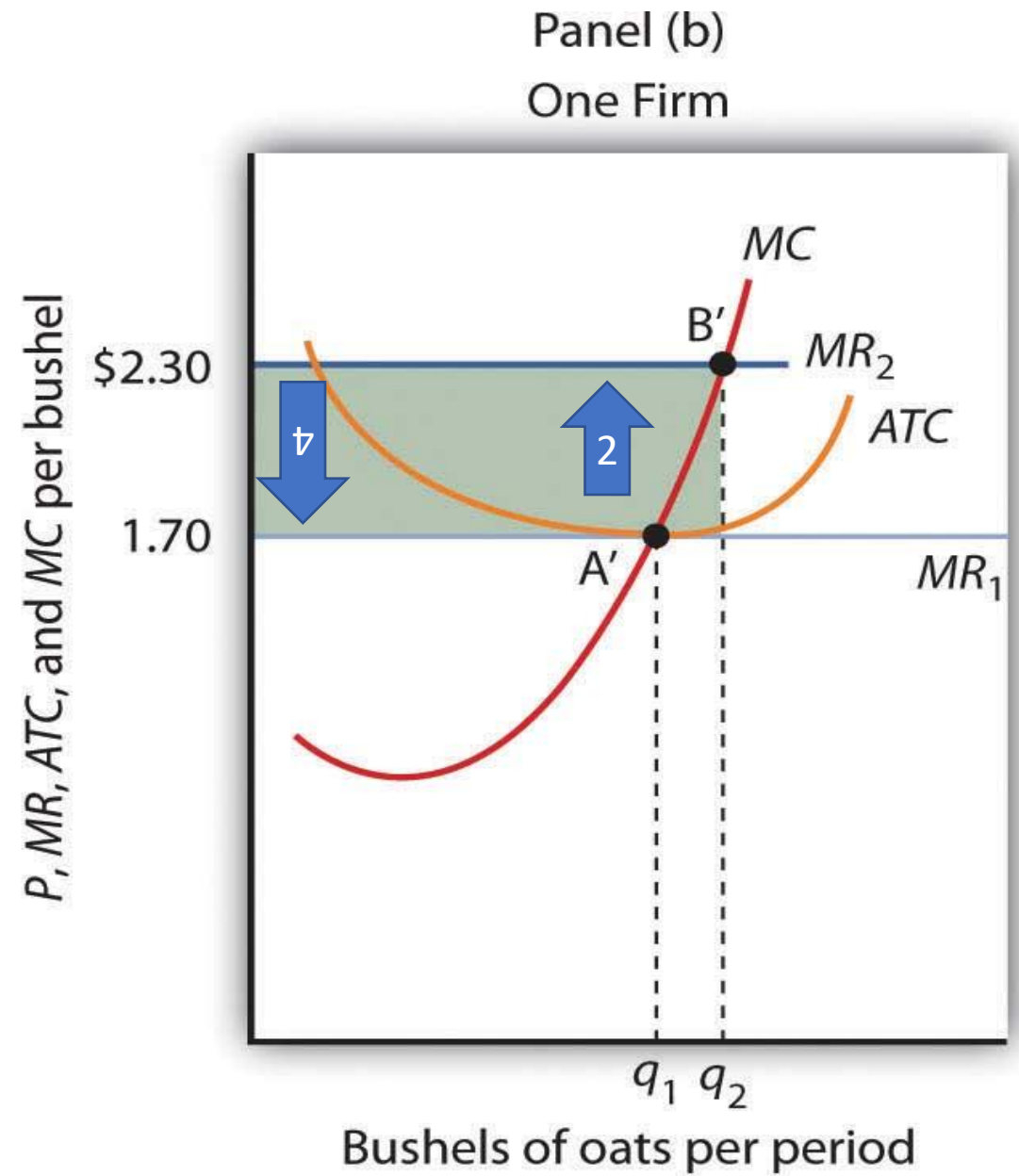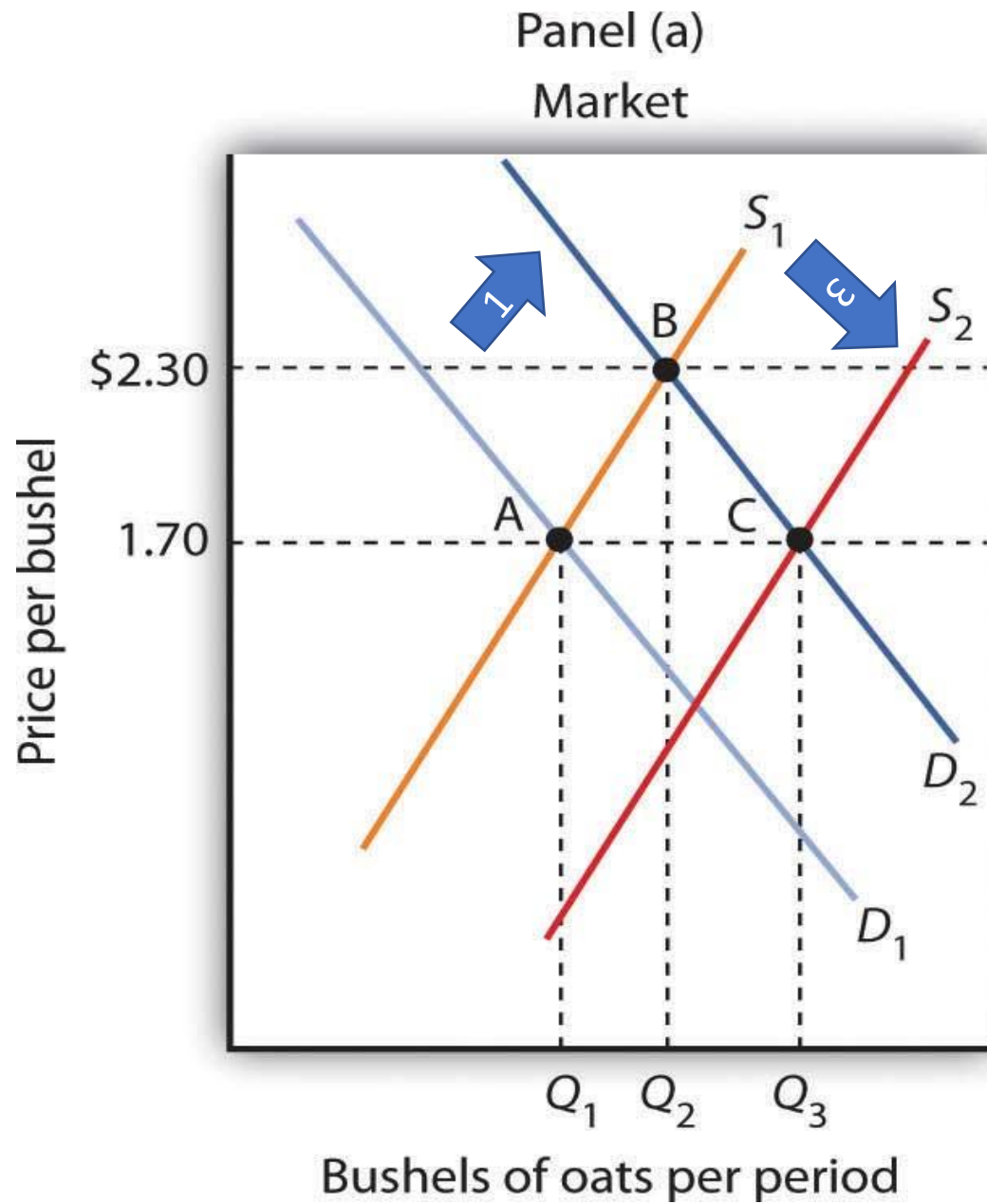
Productive Efficiency

- **Productive Efficiency: Occurs when a firm produces its output at the lowest possible cost per-unit cost (lowest average total cost).**

- This is desirable for any society since it means the firm is efficiently using the limited resources of the society = obtaining the maximum output using the given resources

- E.g. the lowest ATC for producing ballpoint pens is 4 taka when a firm produces 2000 pens. So, TC = 4 x 2000 = 8000 taka

- However, the firm produces the 2000 pens at an ATC of 4.2 taka. TC = 4.2 x 2000 = 8400 taka.

- Fortunately, **in the LR a perfectly competitive firm is productive efficient**
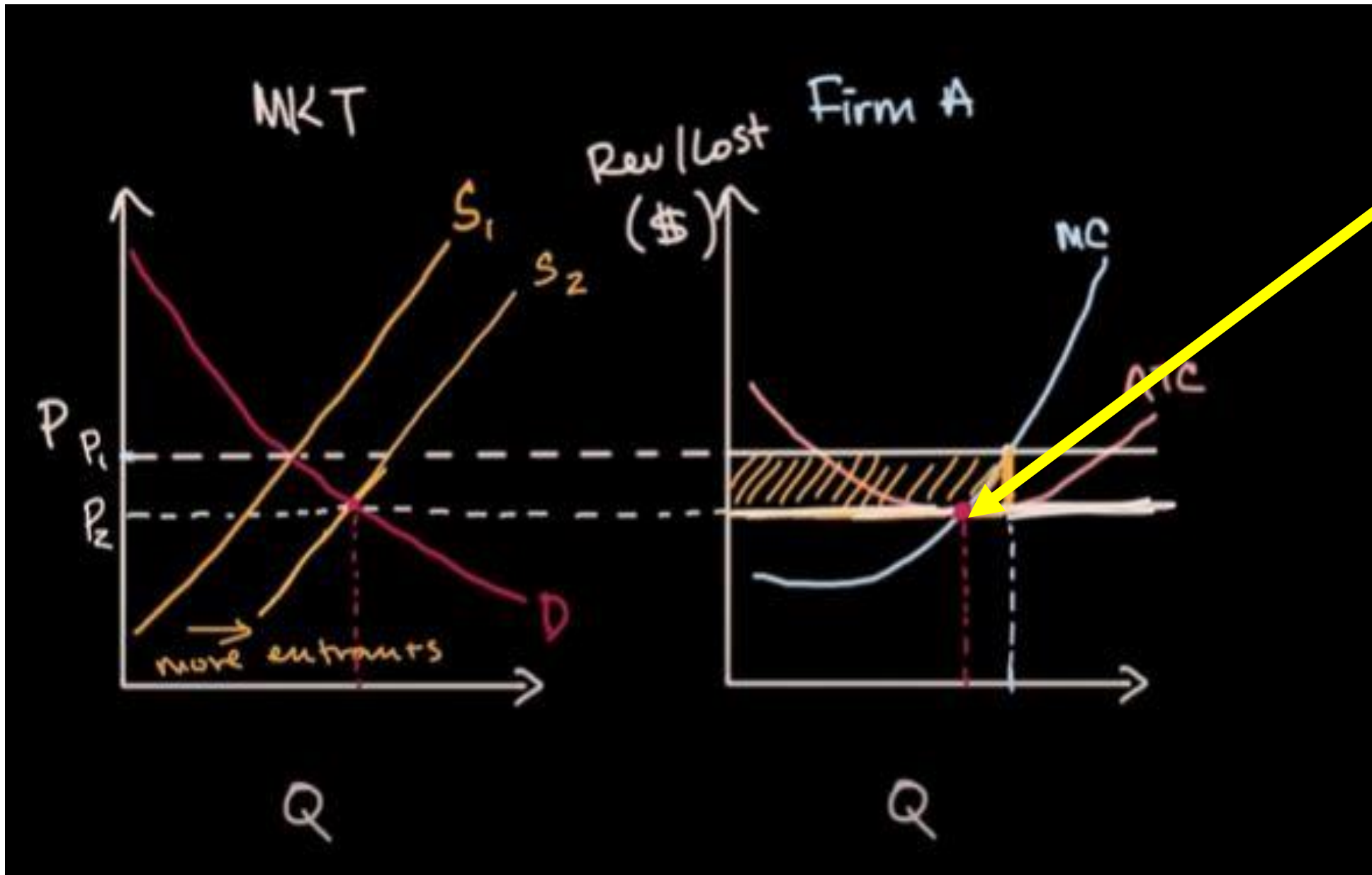
P = MC = Min. ATC
Resource allocative efficiency *and* productive efficiency