Perfect Competition

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HKUST ECON

Announcements

- Assigned reading:
  - Textbook, Chapter 12, 13
- Problem set 6
  - Ch10: 1-3, 5, 7, 10, 18
  - Ch11: 2-14, 19
  - Due: Sunday Nov. 11
- Quiz 4 options
  - Thursday Nov. 15 or Monday Nov. 19 or Tuesday Nov. 20

Revision Question (1)

- Which of the following shifts the ATC curve upward at the XYZ Co.?

1) an increase in the hourly wage that XYZ pays its workers
2) a decrease in the hourly wage that XYZ pays its workers
3) an increase in the fixed amount of liability insurance premiums that XYZ pays for its business
4) Both answers 1) and 3) are correct.
5) None of the above.

Revision Question (1)

FIRMS IN PERFECT COMPETITION

Firms in Perfect Competition

- We have discussed a firm's cost curves (TC, TFC, TVC, ATC, AVC, AFC) and their relationships.
- Next:
  - How does a firm make production decisions based on its cost curves?
  - How does each competitive firm interact (change in market supply) in response to changes in market demand?

Revisit: Perfect Competition

- Characteristics of perfect competition:
  - Many buyers and sellers
  - Identical products
  - Full information
  - **Firms can freely enter or exit the market.**

Implications:

- A firm's production capacity is small relative to the market supply and market demand.
- Price takers
- Firms can choose to quit the market.

Competitive Firms' decision

- A perfectly competitive firm's goal is to maximize economic profit, given the constraints it faces.
  - What quantity to produce?
  - How to produce at minimum cost (different in SR and LR)?
  - Whether to produce or not
  - Whether to enter or exit a market

Profit Maximizing Q

- A competitive firm's output decision is to maximize profit:

  Profit = Total Revenues – Total Costs

  Profit = P x Q – Total Cost

  Profit = P x Q – [TFC + TVC(Q)]

Besides MC and AC,

- Marginal Revenue ("MR") = $\frac{\Delta TR}{\Delta Q}$
- Average Revenue ("AR") = $\frac{TR}{Q} = P$

Profit Maximizing Q – Any Firm

- What Q maximizes any firm's profit? **Think at the margin!**
- If Q increases by one unit:
  - Revenue rises by MR.
  - Cost rises by MC.
- If **MR > MC**, then producing and selling this unit raises firm's profit.
- IF **MR < MC**, then reducing Q raises profit.
- **At equilibrium: MR = MC (Golden rule for firm's profit maximizing output level!!!)**

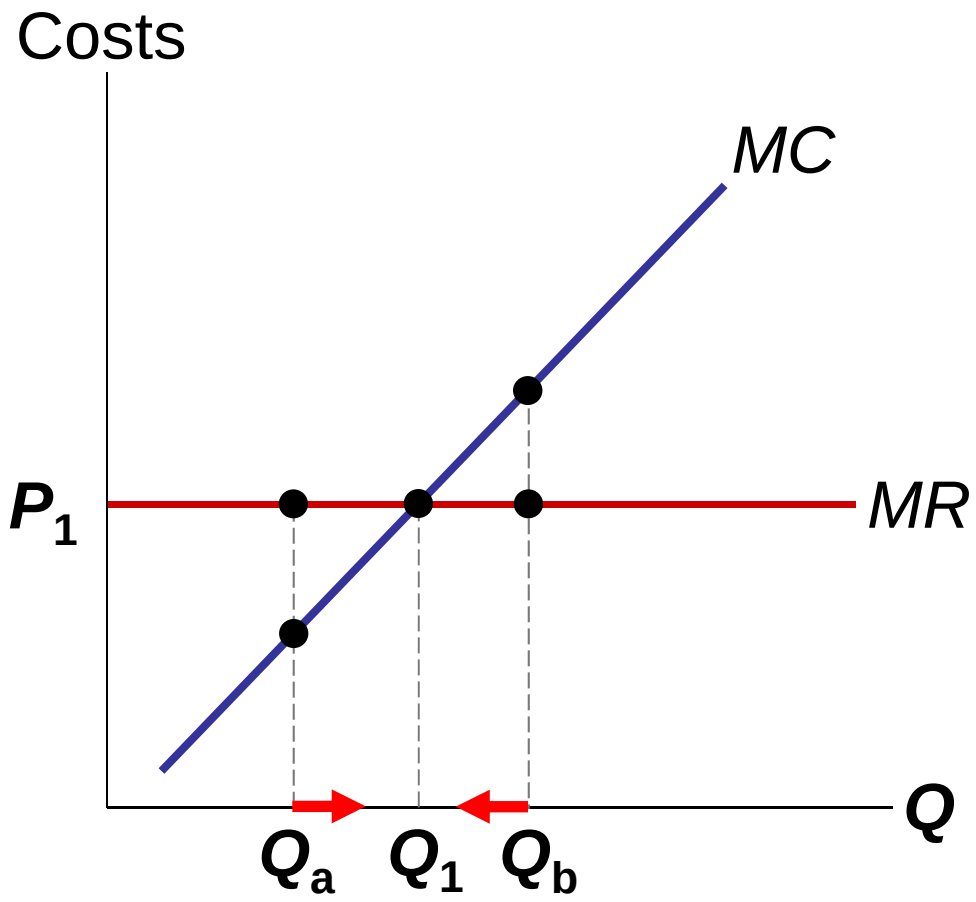
MR of a Competitive Firm

- **The MR of a competitive firm: MR = P**
  - A **competitive firm** can keep increasing its output without affecting the market price. Why?
  - Thus, one more unit sold increases revenue by P for competitive firms.
- From the perspective of **a competitive firm**, the demand for its product is therefore **perfectly elastic: MR = P.**
  - The market demand is STILL downward sloping!

Profit Maximization

Rule: *MR* = *MC* at the profit-maximizing ***Q***.

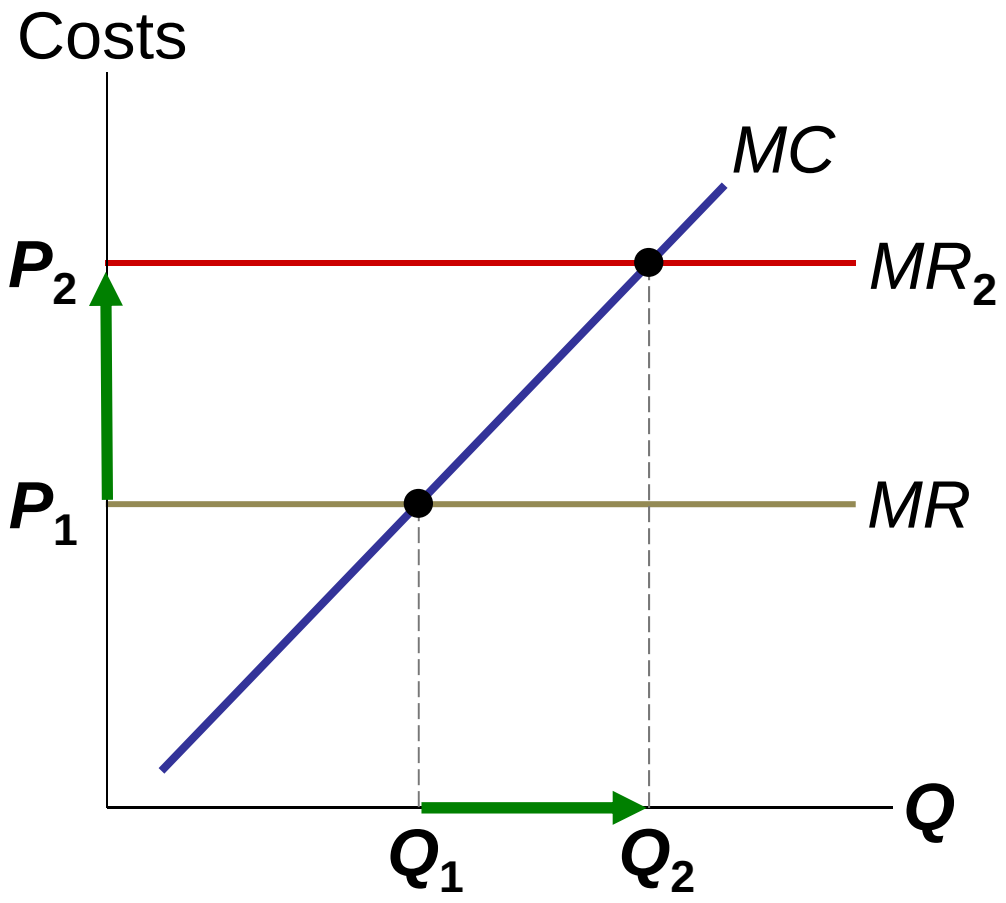
- At Q_a, MC < MR.
- So, increase ***Q*** to raise profit.
- At Q_b, MC > MR.
- So, reduce ***Q*** to raise profit.
- At Q_1, MC = MR.
- Changing ***Q*** would lower profit.



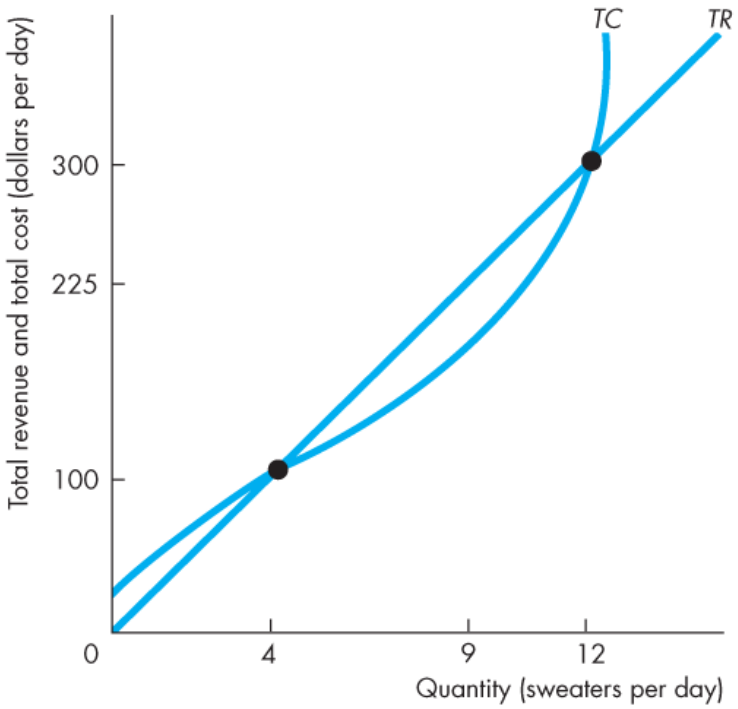
Profit Maximization

- If price rises to P2,
- then the profit-maximizing quantity rises to Q2.
- The MC curve determines the firm's Q at any price.
- Hence,

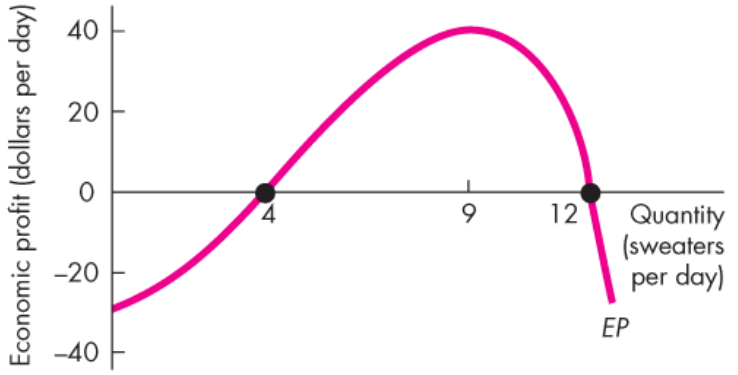
the *MC* curve <u>is</u> the firm's supply curve.



- From another perspective:
  - TR and TC
- Diagram (a) shows Total Revenue (**TR**) and Total Cost (**TC**) curves.
- TR minus TC = economic profit (or loss), shown by the curve EP in (b).
- At what Q is profit maximized?
  - MR = MC
  - Can you see that?

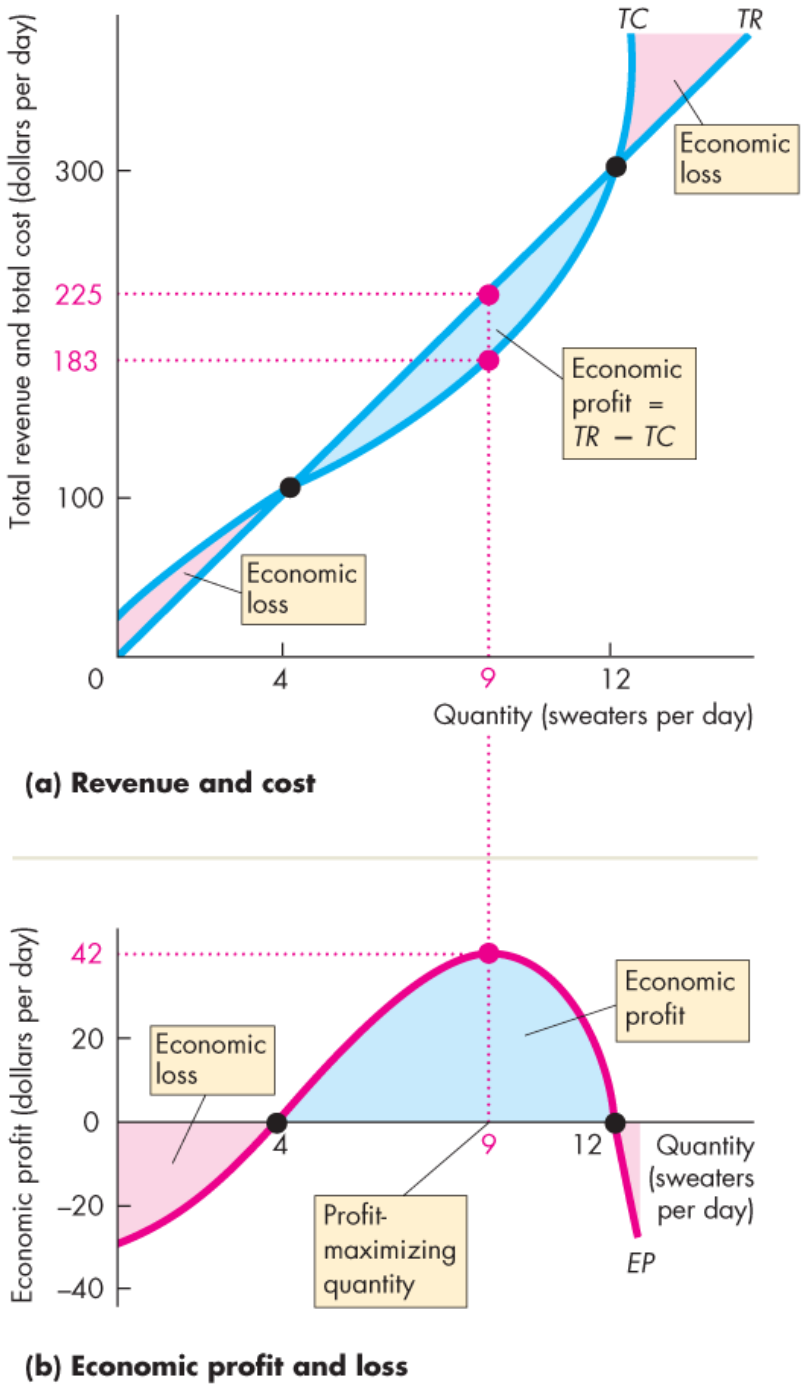


(a) Revenue and cost



(b) Economic profit and loss

- The firm maximizes its economic profit when it produces 9 sweaters a day.
- At higher output levels, the firm again incurs an economic loss—now the firm faces steeply rising costs because of diminishing returns.



Quick check

The market for fish is perfectly competitive. So, the price elasticity of demand for fish from a single fishing boat

A) is less than the elasticity of demand for fish overall.

B) equals the elasticity of demand for fish overall.

C) is greater than the elasticity of demand for fish overall.

D) is sometimes greater than and sometimes less than the elasticity of demand for fish overall.

Quick check

To Produce or Not – SR and LR

- **Shutdown:** A decision under short-run NOT to produce anything because of market conditions.
- **Exit:** A decision under long-run to leave the market permanently.
- A key difference:
  - Even shutdown (in SR), still have to pay TFC.
  - If exit (in LR), no costs involved.

Shutdown Decision (SR)

- In SR, given fixed costs have been incurred, a firm has to decide whether to produce or not.
  - If produce → Profit or Loss?
  - If shutdown → profit or loss?
- A decision to minimize the firm's loss
  - Loss comparison between "produce" and "shutdown"

Shutdown Decision (SR)

Decision: Loss comparison

- Economic Loss = TR – TVC – TFC

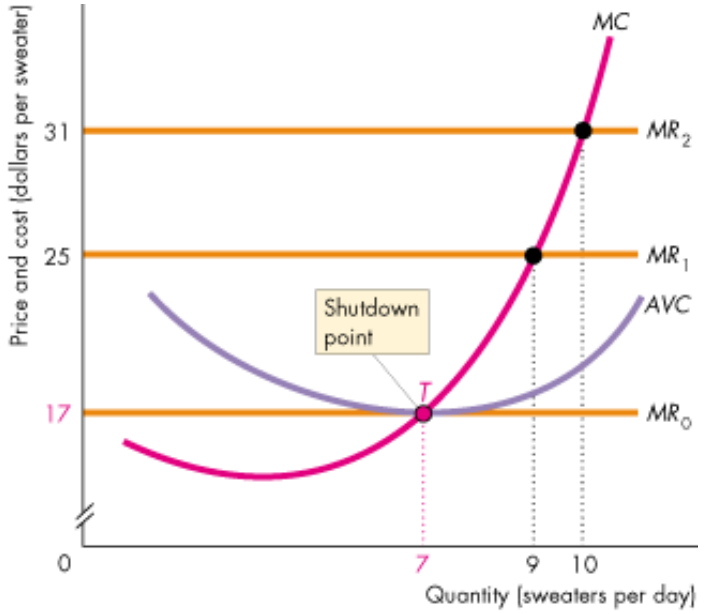
  = P x Q – AVC x Q – TFC

  = (P – AVC) x Q – TFC

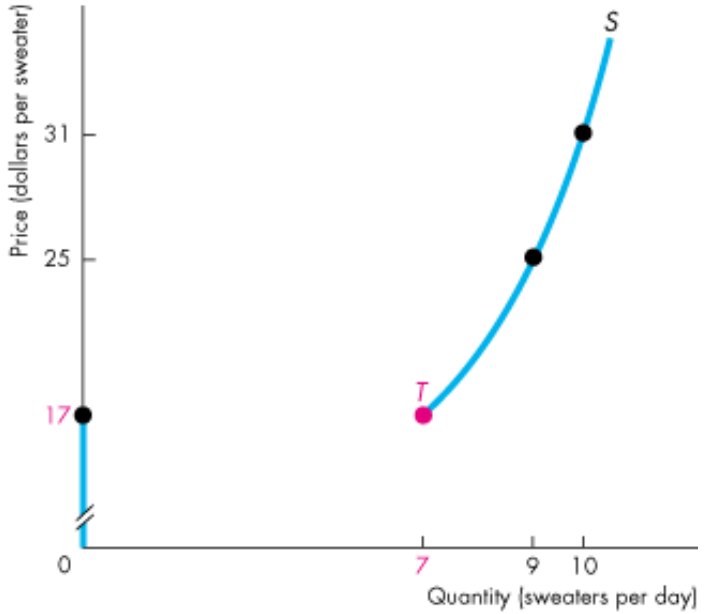
- If shutdown, Q = 0 and the firm already paid TFC, so TFC will be the loss.
- If (P – AVC) > 0 and Q > 0, then Loss < TFC.
- **Shutdown Point: (P – AVC) = 0**

Intuition:

- If the price is **$25**, the firm produces **9** sweaters a day, the quantity at which **P = MC.**
- If the price is **$31**, the firm produces **10** sweaters a day, the quantity at which P = MC.
- The blue curve in part (b) traces the firm's short-run supply curve.
- At $17, the firm produce 7 sweaters or shutdown.



(a) Marginal cost and average variable cost



(b) Campus Sweaters short-run supply curve

Shutdown Decision (SR)

Decision: Loss comparison

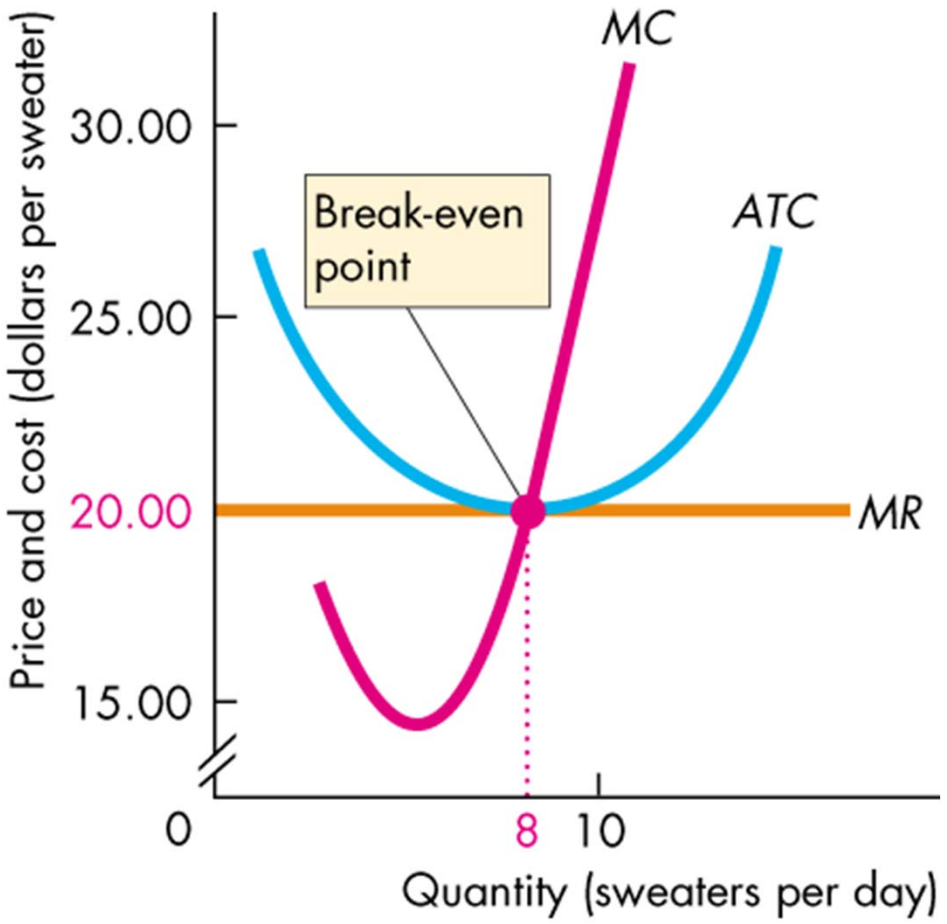
- If **(P – ATC) < 0**, but **(P – AVC) = > 0**, the firm will continue to produce in the SR.
- **Why? We will see.**

- In SR, a firm might make an economic profit, break even, or incur an economic loss.

Shutdown Decision (SR)

A case of "Breakeven"

- In SR, a firm might make an economic profit, break even, or incur an economic loss.
- P=MR=20, Q=8
- Firm **breaks even**!
  - TR=20*8
  - TC=ATC*8=20*8

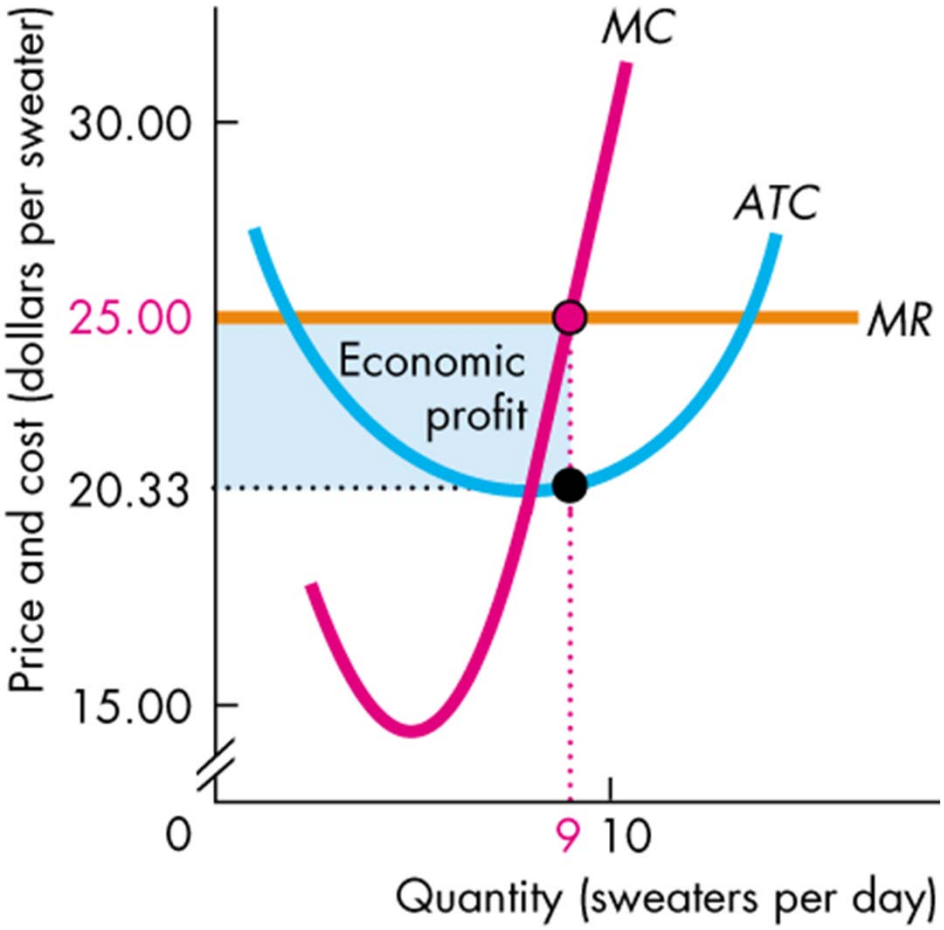


(a) Break even

SR – Shutdown Decision

A case of "Econ Profit"

- P=MR=25, Q=9 (higher than breakeven output)
- Firm earns positive profit: Blue shaded area.
  - TR=25*9
  - TC=ATC*9=20.33*9

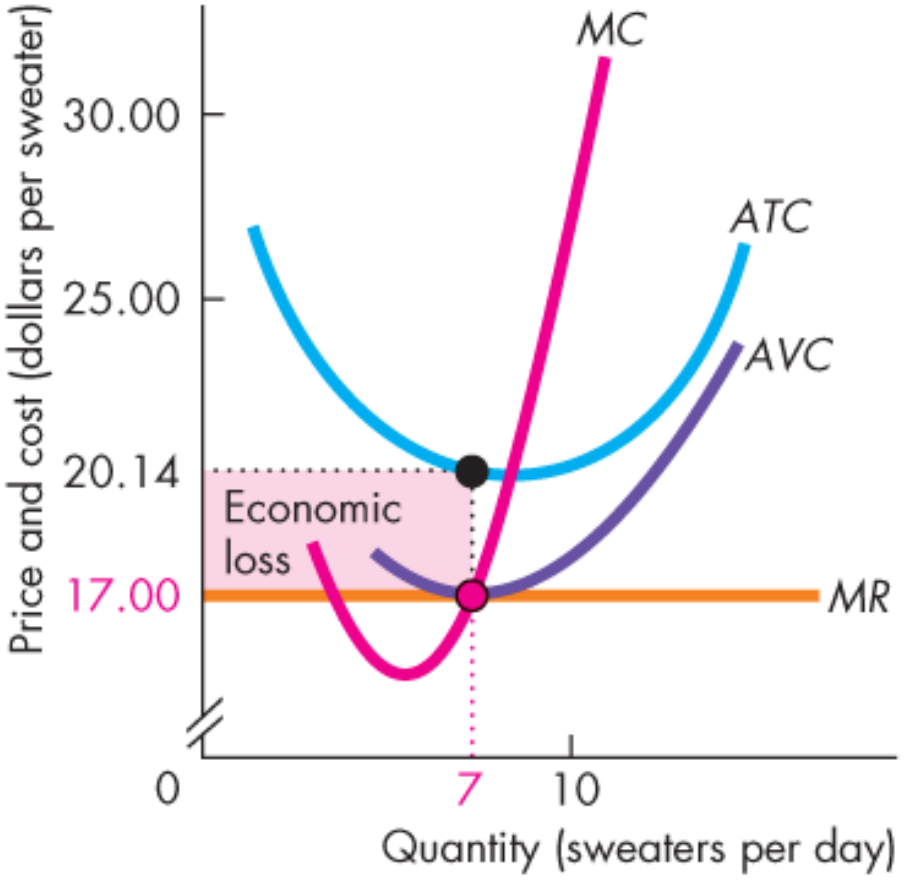


(b) Economic profit

SR – Shutdown Decision

A case of "loss"

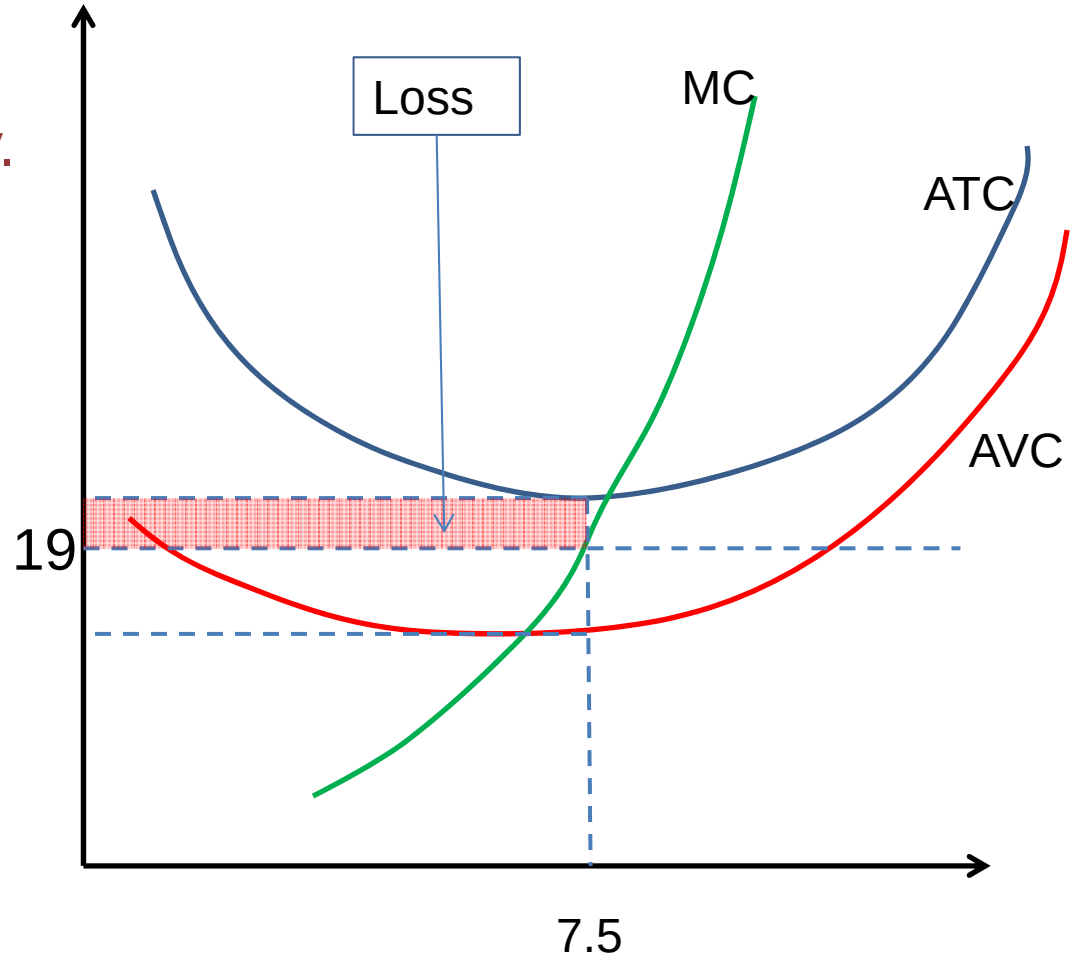
- P=MR=17, Q=7 (lower than breakeven output)
- Firm earns negative profit: Pink shaded area.
  - TR=17*7
  - TC=ATC*7=20.14*7



(c) Economic loss

SR – Shutdown Decision

- How about P=MR=19?
- How many will be produced? 7.5, let's say.
- What is the loss?
  - Pink shaded area
- Should the firm continue production?
  - Shutdown: Loss=TFC
  - Produce: Loss=pink shaded area
- Which is bigger?
  - Loss comparison



Quick check

If the price of its product just equals the average variable cost of production for a competitive firm,

A) total revenue equals total fixed cost and the firm's loss equals total variable cost.

B) total revenue equals total variable cost and the firm's loss equals total fixed cost.

C) total fixed cost is zero.

D) total variable cost equals total fixed cost.

E) None of the above.

Quick check

COMPETITIVE FIRMS IN THE LONG RUN

Entry and Exit Decision (LR)

- In LR, the decision is different from SR, because no more “FC”.
- Example: facing a new business proposal and considering whether or not to do it.
- In LR, a firm will decide
  - Existing firms: whether to stay.
  - New firms: whether to enter if the business is “profitable” or economic profit is positive.
  - (Some) existing firms may leave (exit), if the business is not profitable or economic profit is negative (economic loss).

Entry and Exit Decision (LR)

- Different from SR:
- Not AVC, but ATC to determine the “Exit Point” for competitive firms in LR!
- Note: All inputs are variable in LR, so ACTULLY there is no AFC or AVC in LR, **JUST** long-run ATC! ☺

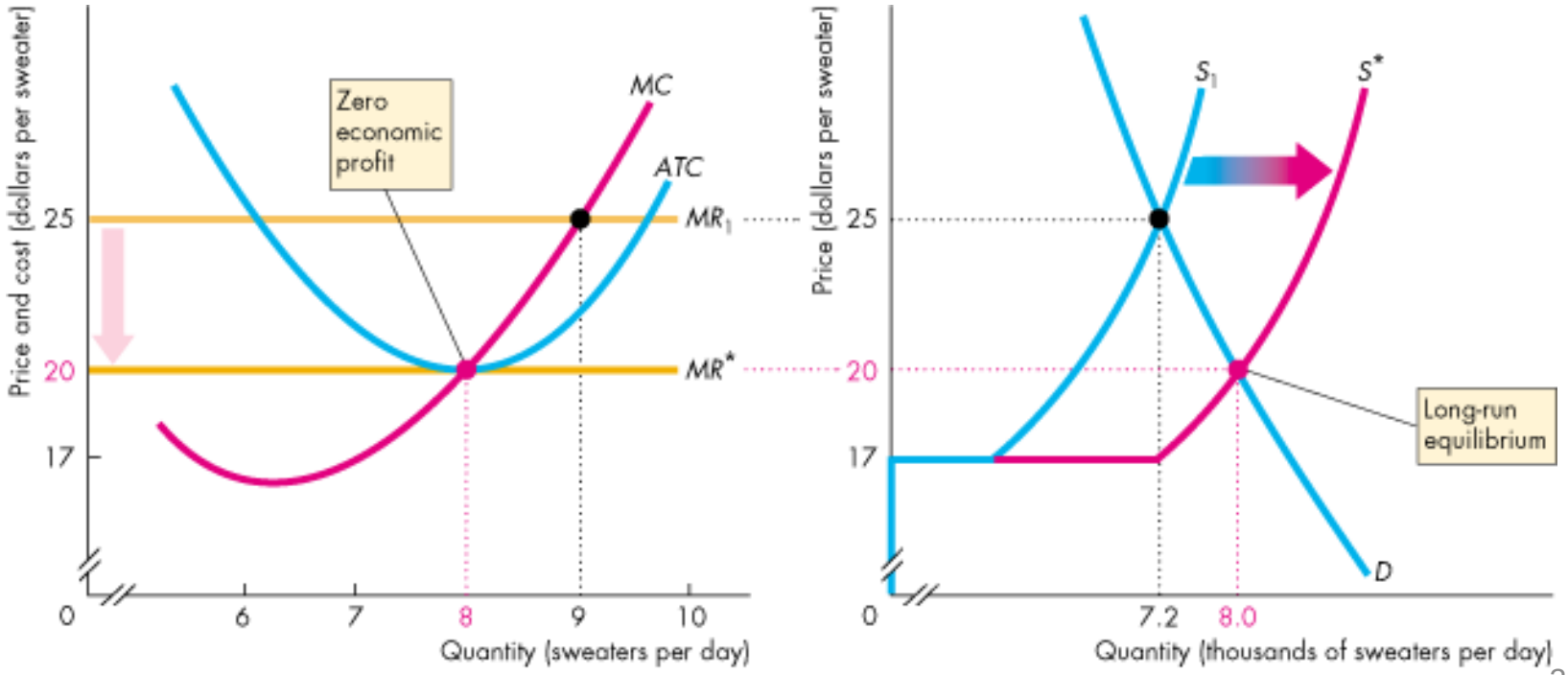
Entry and Exit Decision (LR)

In LR: Given U-shaped LR ATC, all existing firms (in an industry) **have to** produce at their efficient scale. Why?

- If a firm does not produce at its "optimal scale", in a competitive market, it will be "eliminated" by competition – the lowest ATC.
- Since a competitive firm's capacity is "small" relatively to market demand,
- **Need many firms together to satisfy it !!!**

Entry and Exit Decision (LR)

- P=25, firms in the market are making economic profit.
- New firms have an incentive to enter. (wow…money!!! ~~~)
- Market supply increases and the market price falls (no. of firms in the market increases), UNTIL…

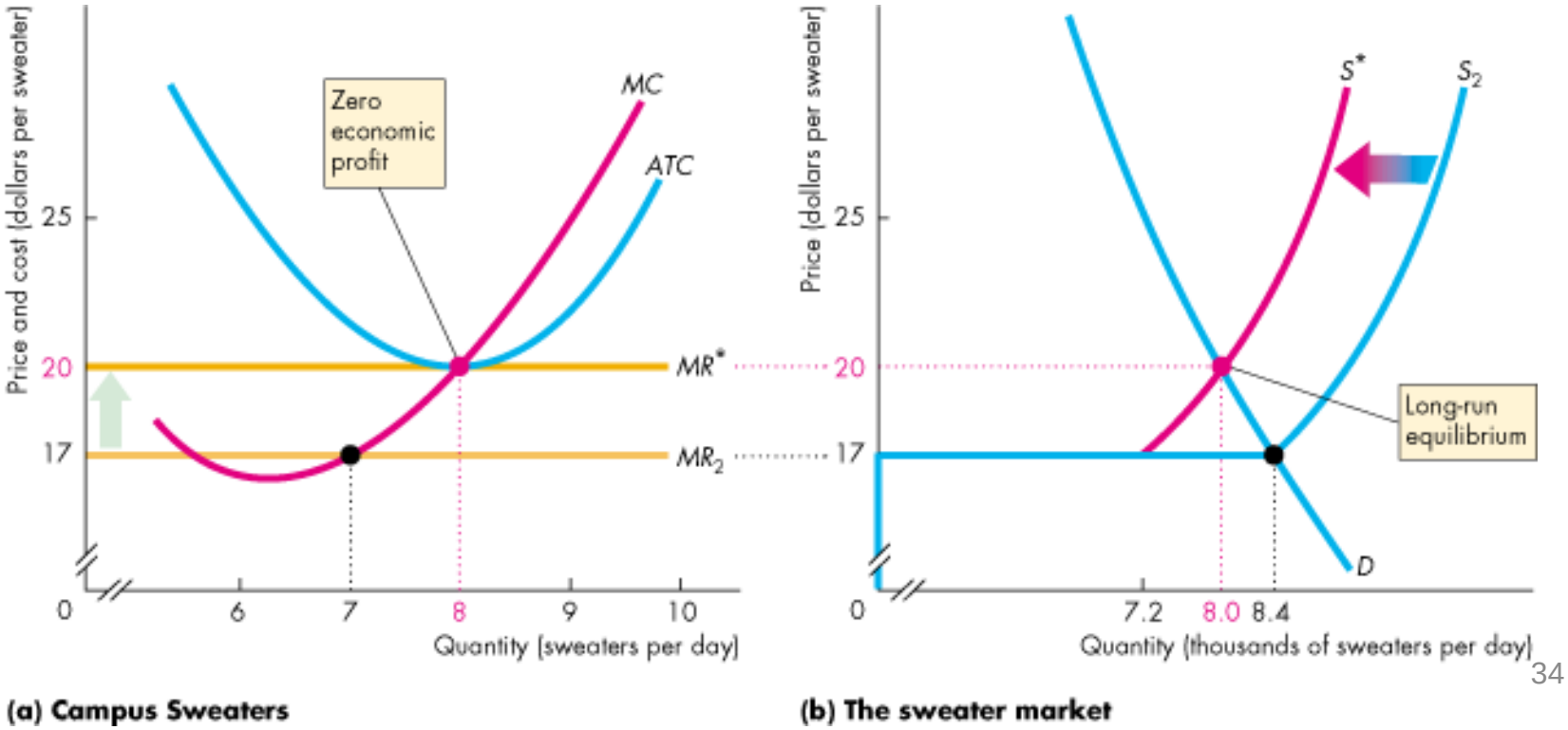


(a) Campus Sweaters

(b) The sweater market

Entry and Exit Decision (LR)

- P=17, firms in the market are incurring economic loss.
- Firms in the market have an incentive to exit the market.
- When they do, the market supply decreases and the market price falls (no. of firms in the market decreases) until…



(a) Campus Sweaters

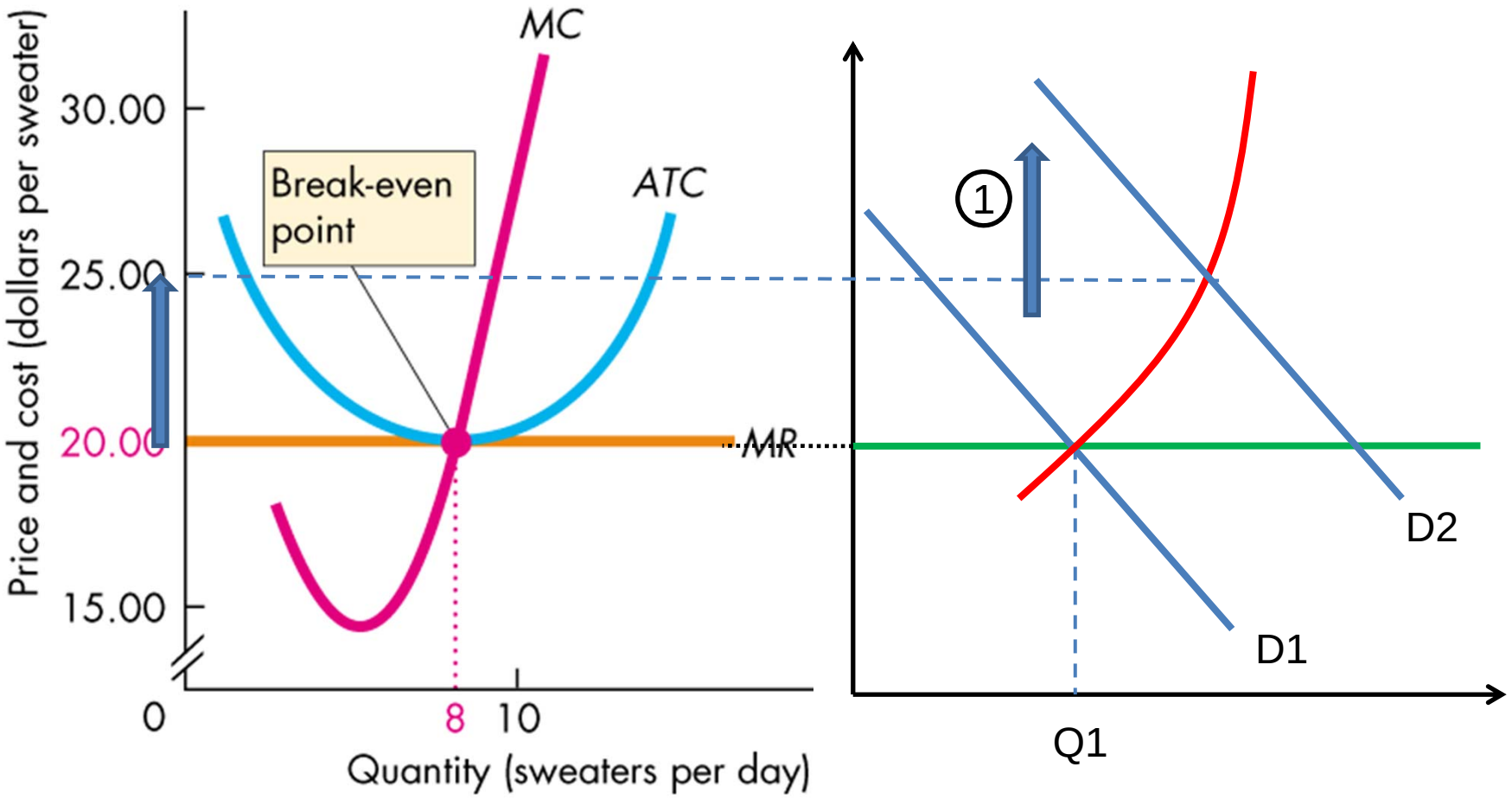
(b) The sweater market

Entry and Exit Decision (LR)

In LR: No. of firms producing "changes" due to "entry & exit" of existing and new firms.

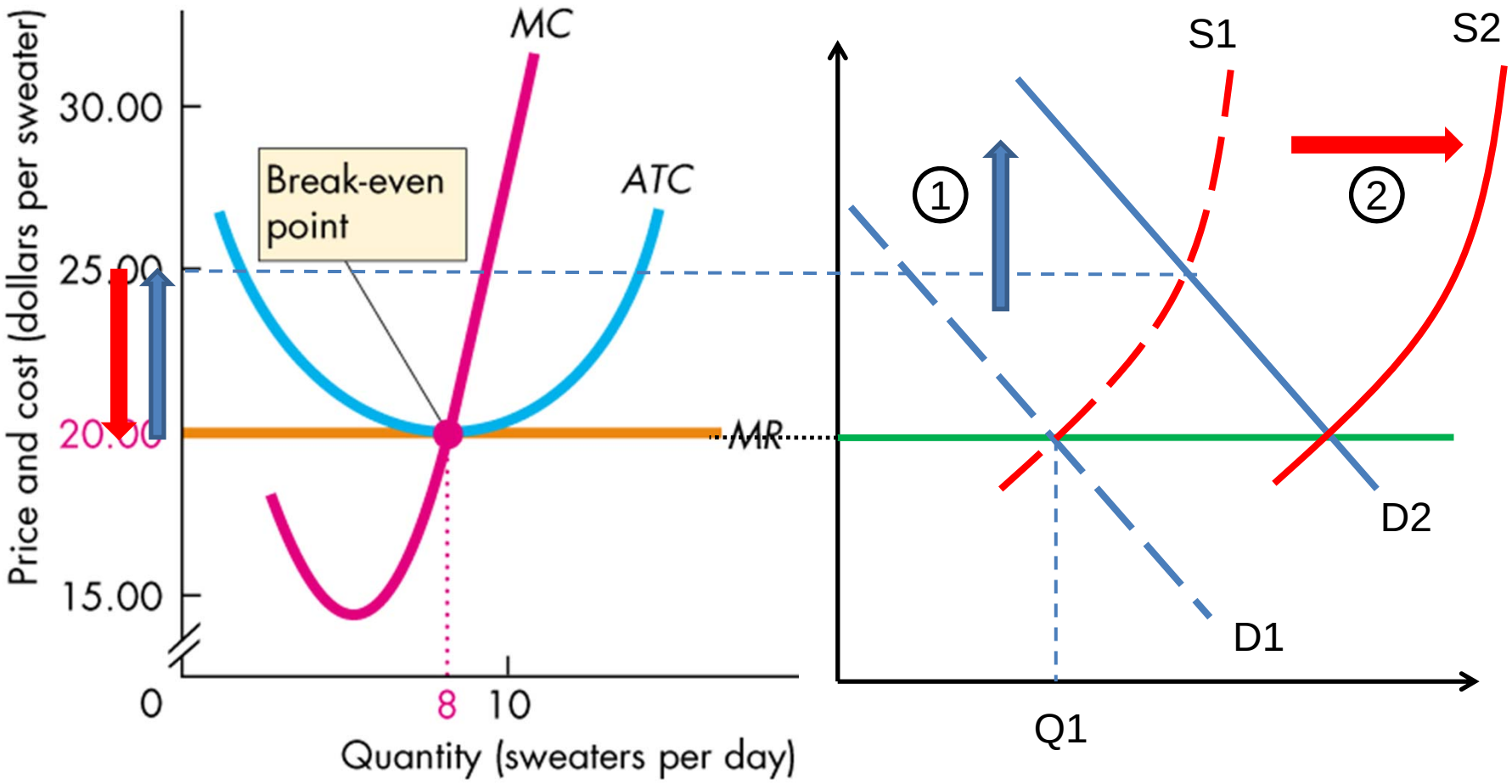
- If existing firms earn positive economic profit:
  - Attract new firms to enter, market supply shifts right, so P falls, until econ profit disappears.
- If existing firms incur losses:
  - Some firms exit, market supply shifts left, so P rises, until no more loss and exit.
- "No. of firms" adjusts to accommodate the change in market demand!!!

Entry and Exit Decision (LR)



(a) Break even

Entry and Exit Decision (LR)



(a) Break even

Entry and Exit Decision (LR)

At LR equilibrium,

- The process of entry or exit keeps firms in production earn **ZERO** economic profit.
- Zero economic profit occurs when P = ATC.
- **So, you can say LR Supply is a "price level" or "horizontal line": P = Min ATC!**

Explanatory Note – Summary of the adjustment mechanism in LR

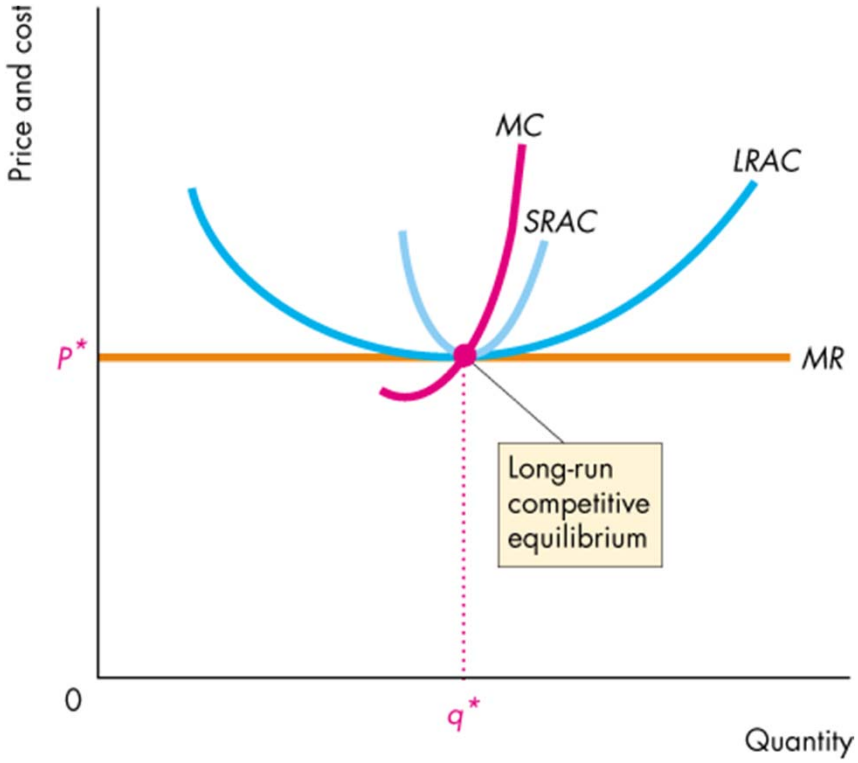
- Please note that in the above diagrams:
- Left-hand side panel is the SR ATC at the efficient scale for an individual firm.
- Right-hand side panel is the SR “Market demand” and SR “Market supply” and the SR market equilibrium price (P*) and quantity (Q*).
- LR supply should be a flat line (perfectly elastic)!

Explanatory Note – Summary of the adjustment mechanism in LR

- When firms are identical:
  - As demand increases, market price rises to $25 and existing firms would earn positive profit.
  - In response to profit, new firms enter in LR.
  - As a result, market supply shifts out until market price falls back to $20 (zero profit condition) and Q* is now bigger than Q1. Why Q* > Q1?
  - Individual firm have to produce at efficient scale to remain competitive in the market, therefore the output level of an individual firm remains the same (at efficient scale).
  - The bigger Q* is the result of more firms producing at efficient scale!

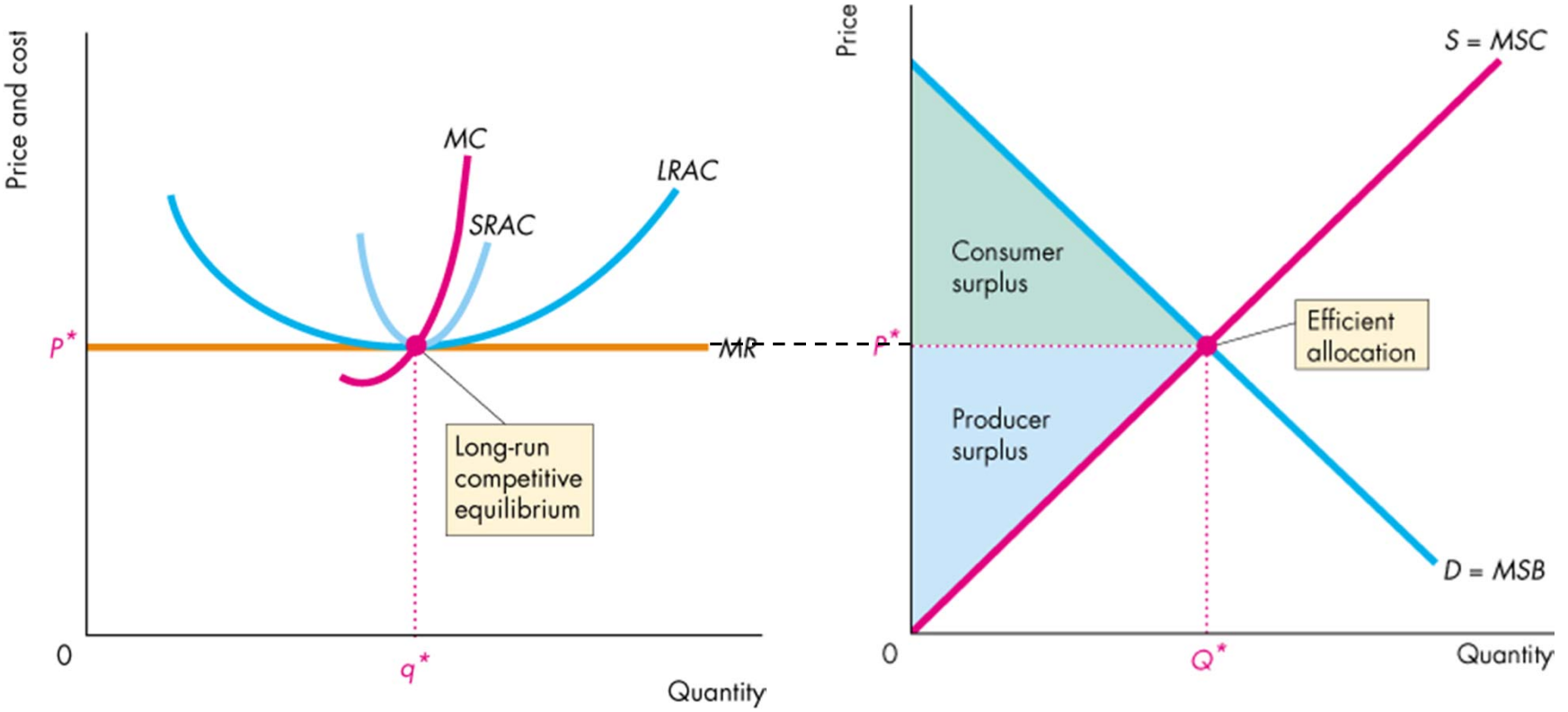
Efficiency of Perfect Competition

- The figure illustrates an efficient allocation of resources in a perfectly competitive market for each firm.
- At the market price P* (=20, as in previous diagram), each firm produces q* at its lowest LR ATC.



(a) A single firm

Efficient of Perfect Competition



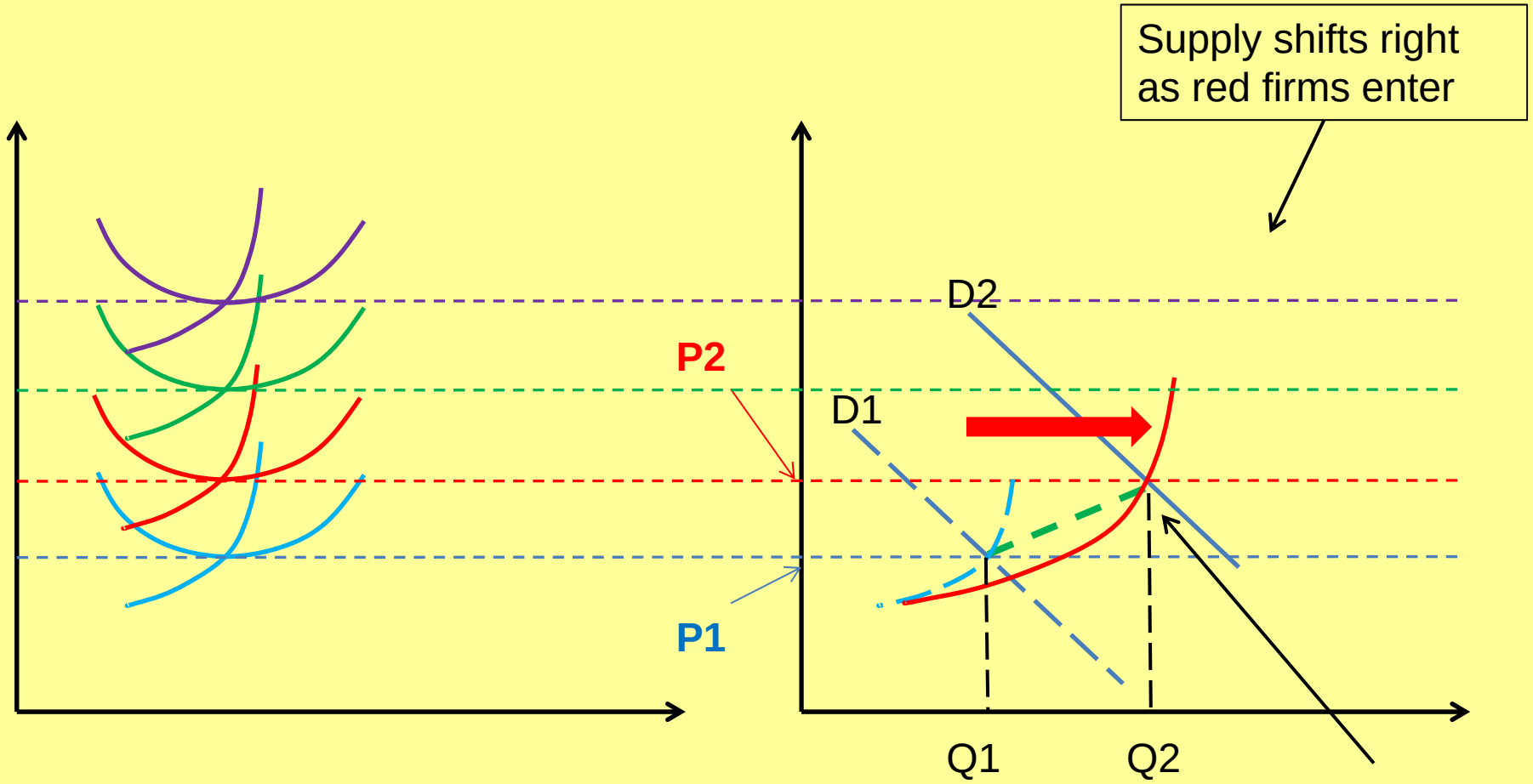
Upward sloping LR Supply Curve

- The LR market supply curve is P = Min ATC or a horizontal line, if
  - All firms have **identical costs**, and
  - Costs do not change as other firms enter or exit the market.
- For example, if firms have different ATC, then LR supply curve slopes upward.
- But if not all firms are the same, this cannot be classified as a “complete” perfect competitive market.

Explanatory Note –LR Supply if firms are not identical - Example

- Assume firms have different cost structures, where Blue Firm is the “cheapest” one, then Red, Green & Purple.
- As demand is at D1, only Blue firm produces.
- When demand increases to D2, given that D2 is served by Blue Firm the market price will rise sharply and attracts Red Firm to enter the market.
- If the entrance of Red Firm can push the market price below the lowest ATC of Green Firm, both Blue and Red Firms will produce in the market (and satisfy the market quantity demand at Q2).

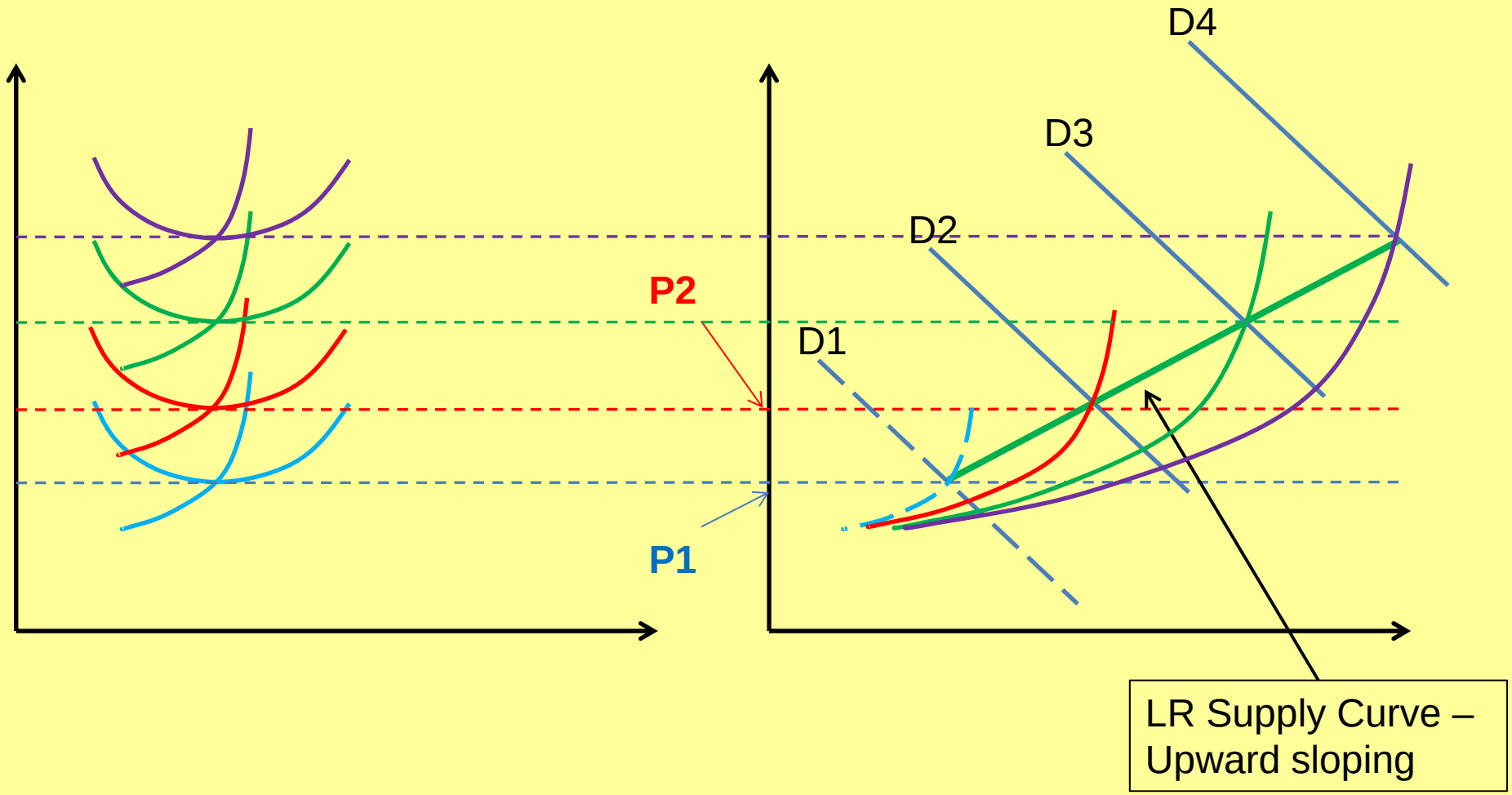
Entry and Exit Decision (LR)



Explanatory Note –LR Supply if firms are not identical-Another Example

- If Demand further rises (i.e. D3, D4), the rise in market price will attract Green Firm to enter into the market and then the Purple Firm.
- As illustrated in the next diagram, the LR Supply can be represented by the green line.
- In other words, when demand increases, consumers has to pay a higher price to induce more firms to enter the market (to produce), so the LR Supply Curve is a **upward-sloping line.**
- For the case of **identical firms**, when demand increases, consumers do not need to pay a higher price to induce more firms to enter, so the LR Supply Curve is a **horizontal line.**

Entry and Exit Decision (LR)



Quick check

Suppose a perfectly competitive market is in long-run equilibrium. If there is a permanent increase in demand,

A) at least in the short run, some firms will increase their output.

B) at least in the short run, the price will increase initially.

C) new firms will enter the market.

D) All of the above answers are correct.

E) None of the above.

Quick check

Exercise

New Medium Enterprises claims the quality of its new system, HD VMD, is equal to Blu-ray's but at $199 it's cheaper than the $300 Blu-ray player. The Blu-ray Disc Association says New Medium will fail because it believes that Blu-ray technology will always be more expensive. But mass production will cut the cost of a Blu-ray player to $90.

Source: *The New York Times*, March 10, 2008

- Explain how technological change in Blu-ray production may support the prediction of lower prices in the long run. Illustrate your explanation with a graph.

Exercise

Exercise

- Even if Blu-ray prices do drop to $90 in the long run, why might the HD VMD still end up being less expensive at that time?

Revision Question

- Which of the following statement(s) is correct?

1) For all firms, marginal revenue equals the price of the good.
2) Only for competitive firms does average revenue equal the price of the good.
3) Marginal revenue can be calculated as total revenue divided by the quantity sold.
4) Only for competitive firms does average revenue equal marginal revenue.
5) None of the above.

Revision Question

End for today ☺

Thank you very much

See you next time !