

Perfect Competition

EE311

Kittichai Saelee

This lecture note is adapted from the original material prepared by Prof .

Chayun Tantivasadakarn

Topics to be Discussed

- Perfectly Competitive Markets
- Firm's behavior
- Profit Maximization
- Marginal Revenue, Marginal Cost, and Profit Maximization
- Choosing Output in the Short-Run
- The Competitive Firm's Short-Run Supply Curve
- Short-Run Market Supply
- Choosing Output in the Long-Run

Perfectly Competitive Markets

- The model of perfect competition can be used to study a variety of markets (Agricultural products, stock market, exchange rate)
- Basic assumptions of Perfectly Competitive Markets
 - Many small firms --> Price taking
 - Product homogeneity
 - Free entry and exit
 - Perfect information

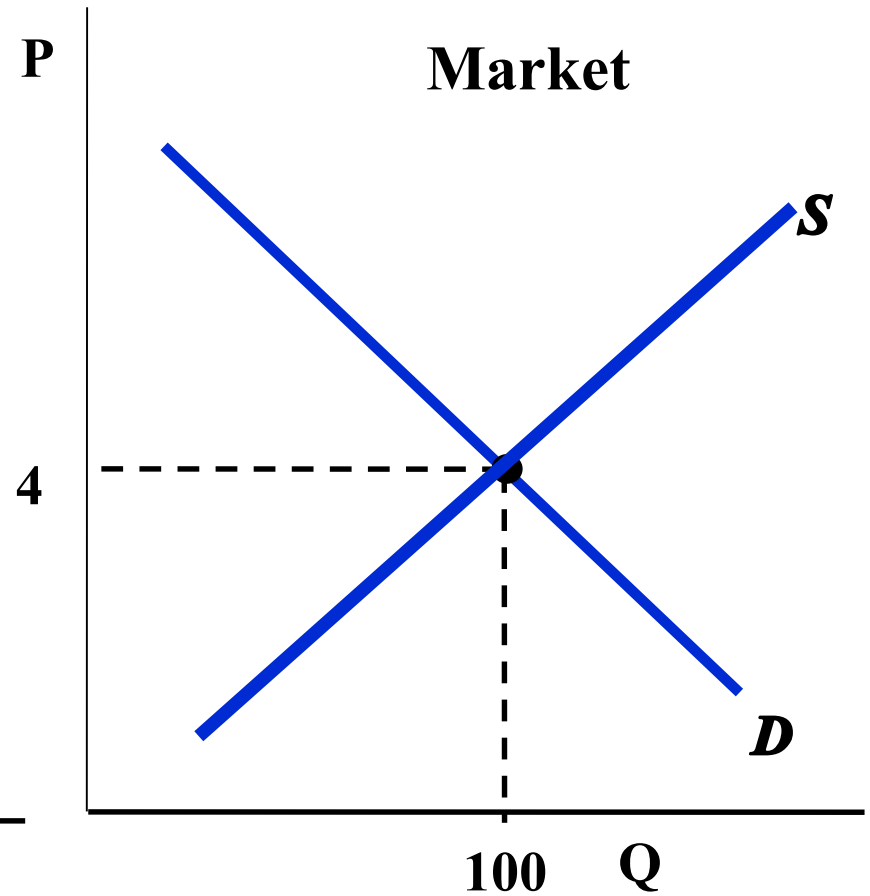
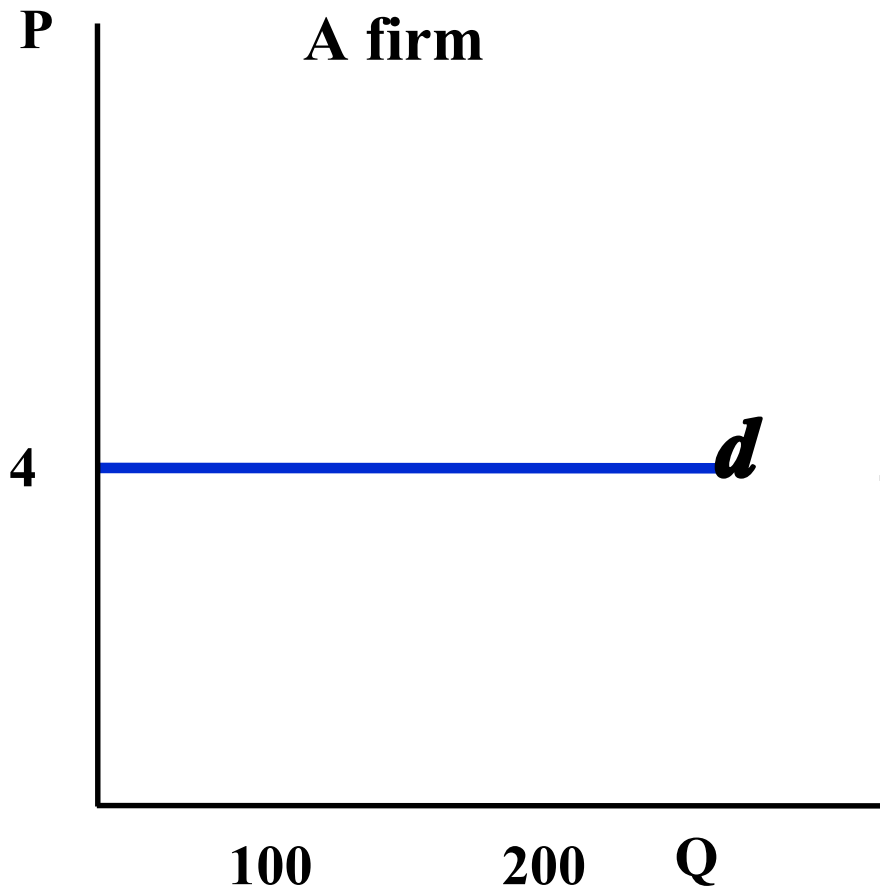
Perfectly Competitive Markets

1. Price Taking

- The individual firm sells **a very small share of the total market output** and, therefore, **cannot influence market price.**
- Each firm takes market price as given – **price taker**
- The facing **demand curve of each firm** is horizontal.



Facing demand curve for a competitive firm



Perfectly Competitive Markets

2. Product Homogeneity

- The products of all firms are **perfect substitutes**.
- **Product quality is relatively similar as well as other product characteristics**
- Example: Agricultural products, copper ore, lumber
- Heterogeneous products, such as brand names, can charge higher prices because they are **perceived as better**



Perfectly Competitive Markets

3. Free Entry and Exit

- When there are no special costs that make it difficult for a firm to enter (or exit) an industry (no laws or regulations, free factor mobility)
 - Buyers can easily switch from one supplier to another.
 - Suppliers can easily enter or exit a market.
- Pharmaceutical companies not perfectly competitive because of the large costs of R&D required



Perfectly Competitive Markets

4. Perfect Information

- No information cost for buyers and sellers
- **Perfect information and homogenous products imply one market price.**
- Perfect information and free entry and exit imply **zero profit in the long run.**
 - Excess profits attract new entry which increases market supply. Price is then decreased until profit is zero.
 - Losses force firms to exit which decreases market supply. Price is then increased until profit is zero.

Profit Maximization

- We can study profit maximizing output for any firm whether perfectly competitive or not
 - Profit (π) = Total Revenue - Total Cost
 - If q is output of the firm, then total revenue is price of the good times quantity
 - Total Revenue (TR) = $TR(q)$

Profit Maximization

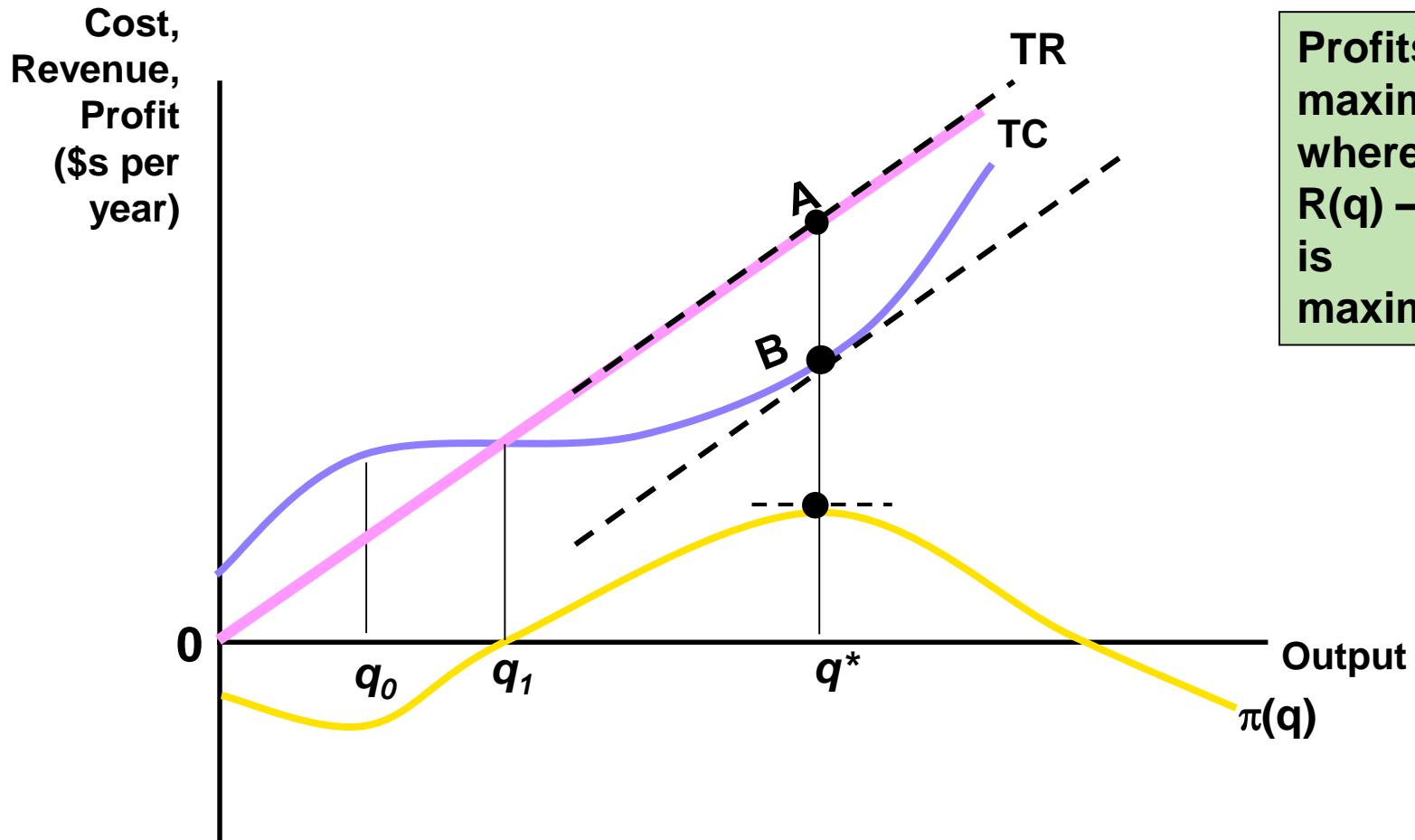
- Costs of production depends on output
 - Total Cost (TC) = $TC(q)$
- Profit for the firm, π , is difference between revenue and costs

$$\pi(q) = TR(q) - TC(q)$$

- Firm selects output to maximize the difference between revenue and cost

Profit Maximization – Short Run

Profits are maximized where MR (slope at A) and MC (slope at B) are equal or slope of $\pi(q) = 0$



Profits are maximized where $R(q) - C(q)$ is maximized

Profit Maximization

- If the producer tries to raise price, sales are zero.
- Profit is negative to begin with since revenue is not large enough to cover fixed and variable costs
- As output rises, revenue rises faster than costs increasing profit
- Profit increases until it is maxed at q^*
- Profit is maximized where $MR = MC$ or where slopes of the $TR(q)$ and $TC(q)$ curves are equal

Profit Maximization

- Profit is maximized at the point at which an additional increment to output leaves profit unchanged

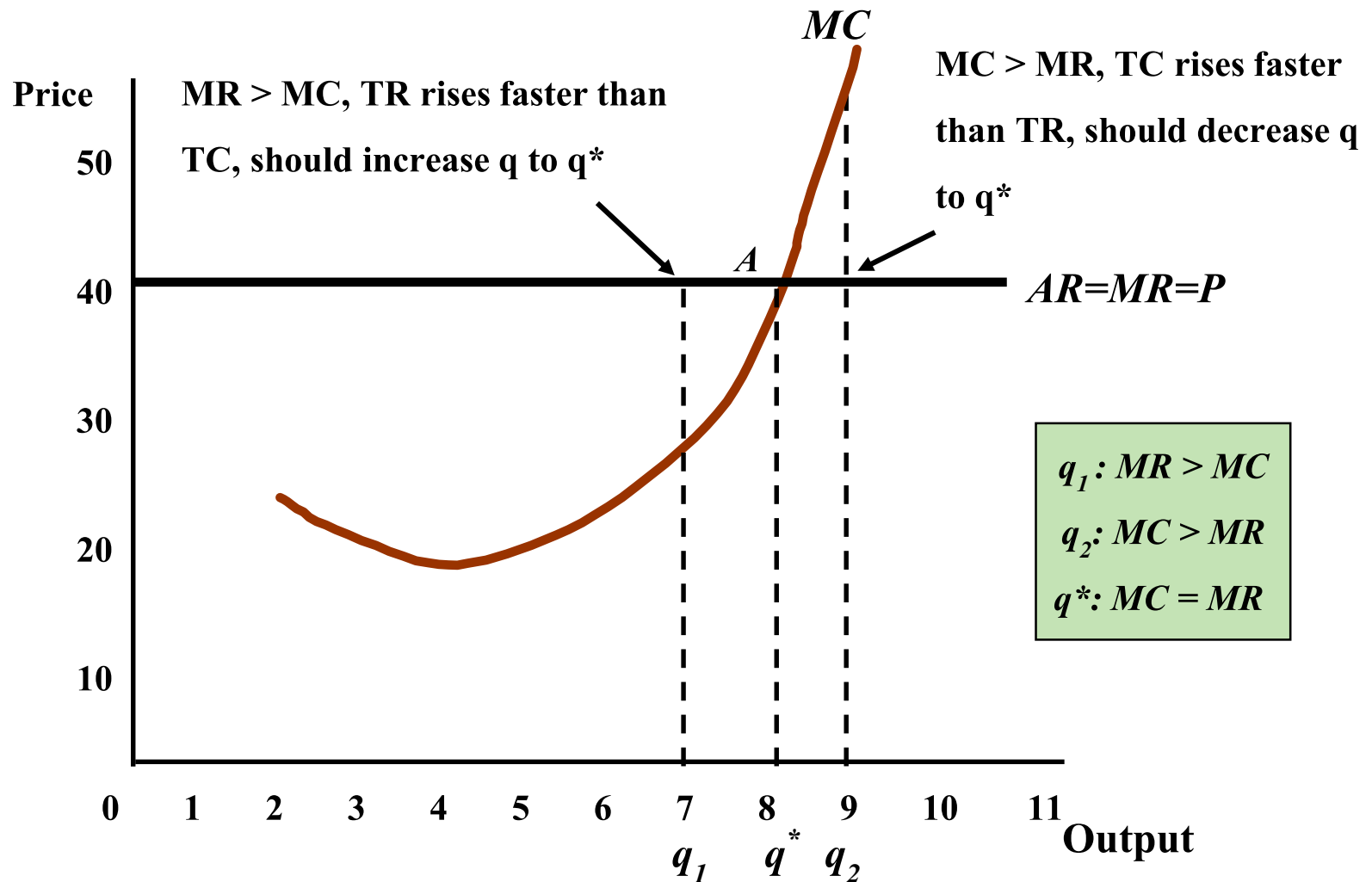
$$\text{Max } \pi = \text{TR} - \text{TC}$$

$$\frac{d\pi}{dq} = \frac{d\text{TR}}{dq} - \frac{d\text{TC}}{dq} = 0$$

$$= \text{MR} - \text{MC} = 0$$

$$\text{MR} = \text{MC}$$

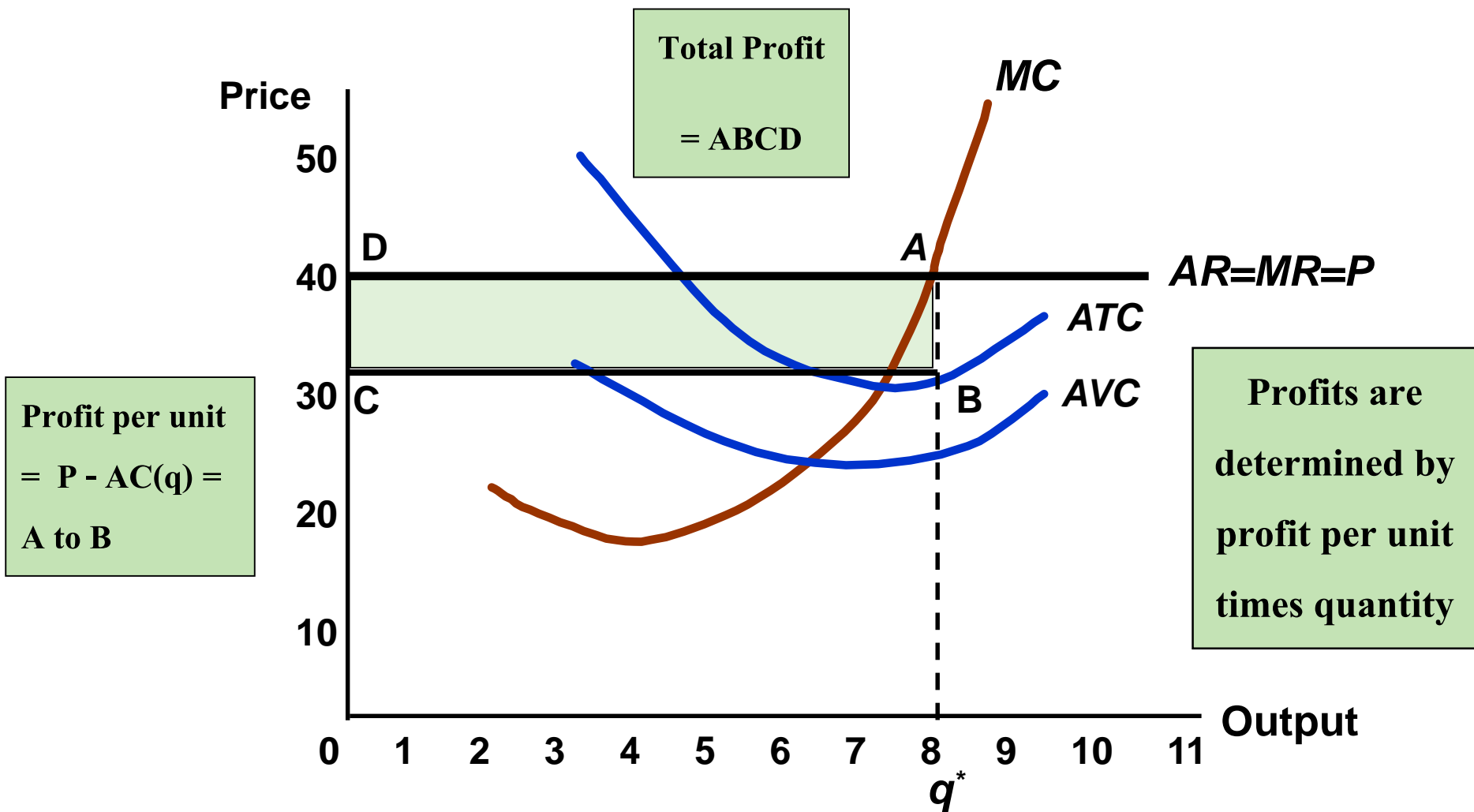
Profit Maximization: $MR = MC$



Choosing Output: Short Run

- The point where $MR = MC$, the profit maximizing output is chosen
 - $MR=MC$ at quantity, q^* , of 8
 - At a quantity less than 8, $MR > MC$ so more profit can be gained by increasing output
 - At a quantity greater than 8, $MC > MR$, increasing output will decrease profits

Choosing output: Positive Profits



Exercise

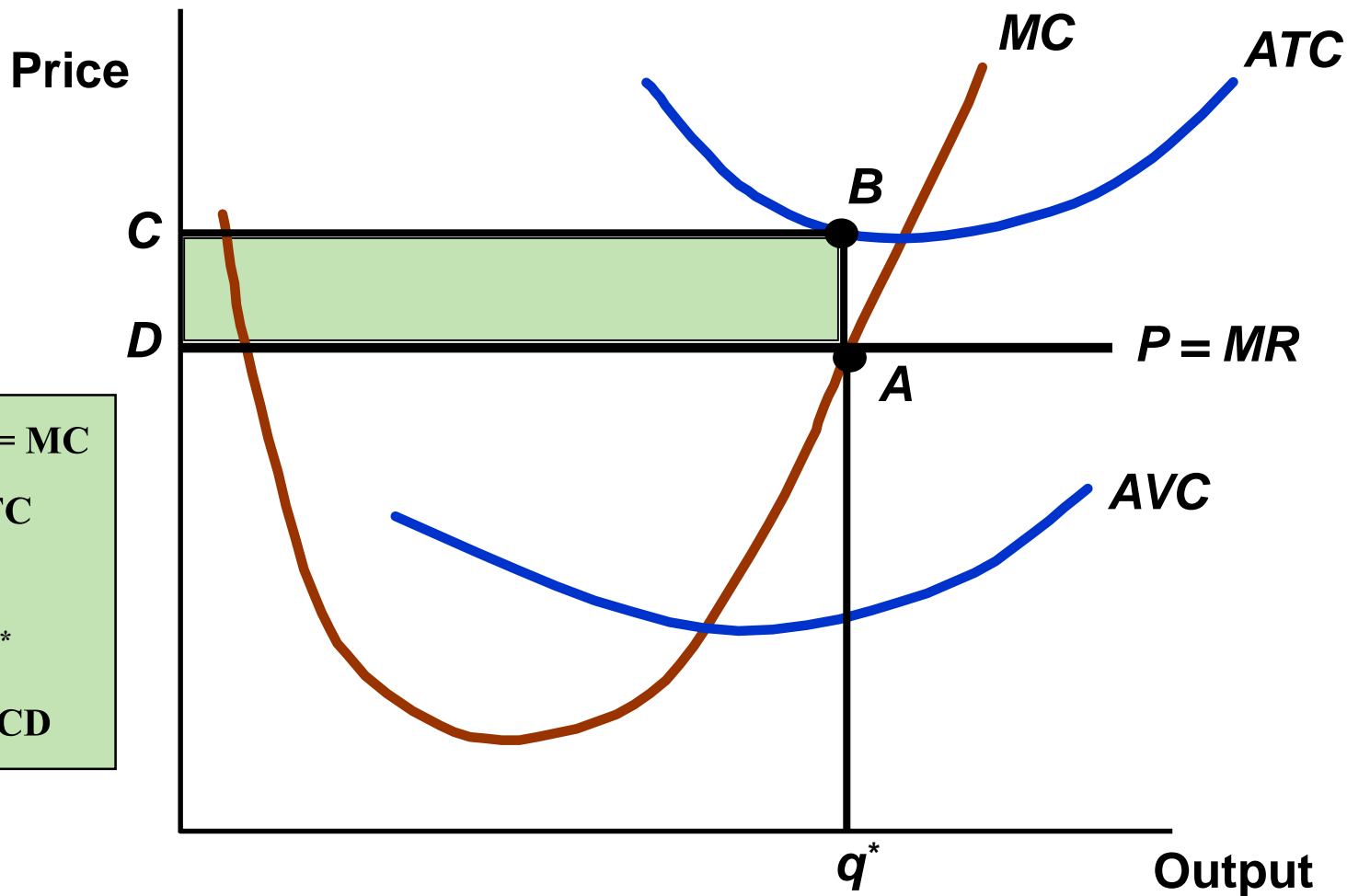
- A fruit vender in a perfectly competitive market is producing at the quantity where it maximizes profits. One day the mafia who controls the area forces the vender to pay a protection fee = 100 Baht per day. The vender is still making some profits. Should the vender increase the price or increase the output to cover the extra cost?



Choosing output: Losses

- A firm does not always make profits
- It is possible for a firm to incur losses if the $P < AC$ at the profit maximizing quantity
 - Still measured by profit per unit times quantity
 - Profit per unit is negative ($P - AC < 0$)

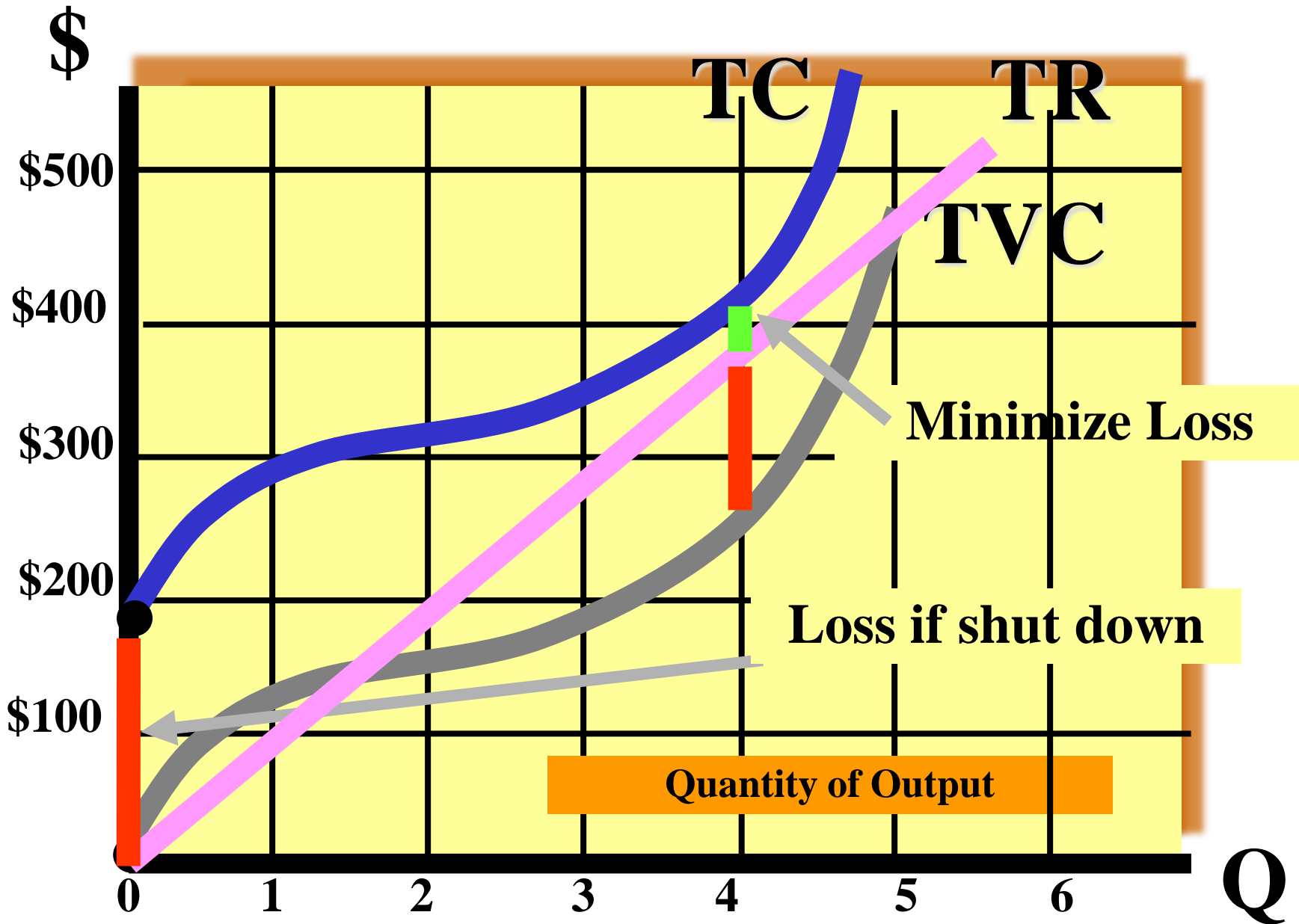
Choosing output: Losses



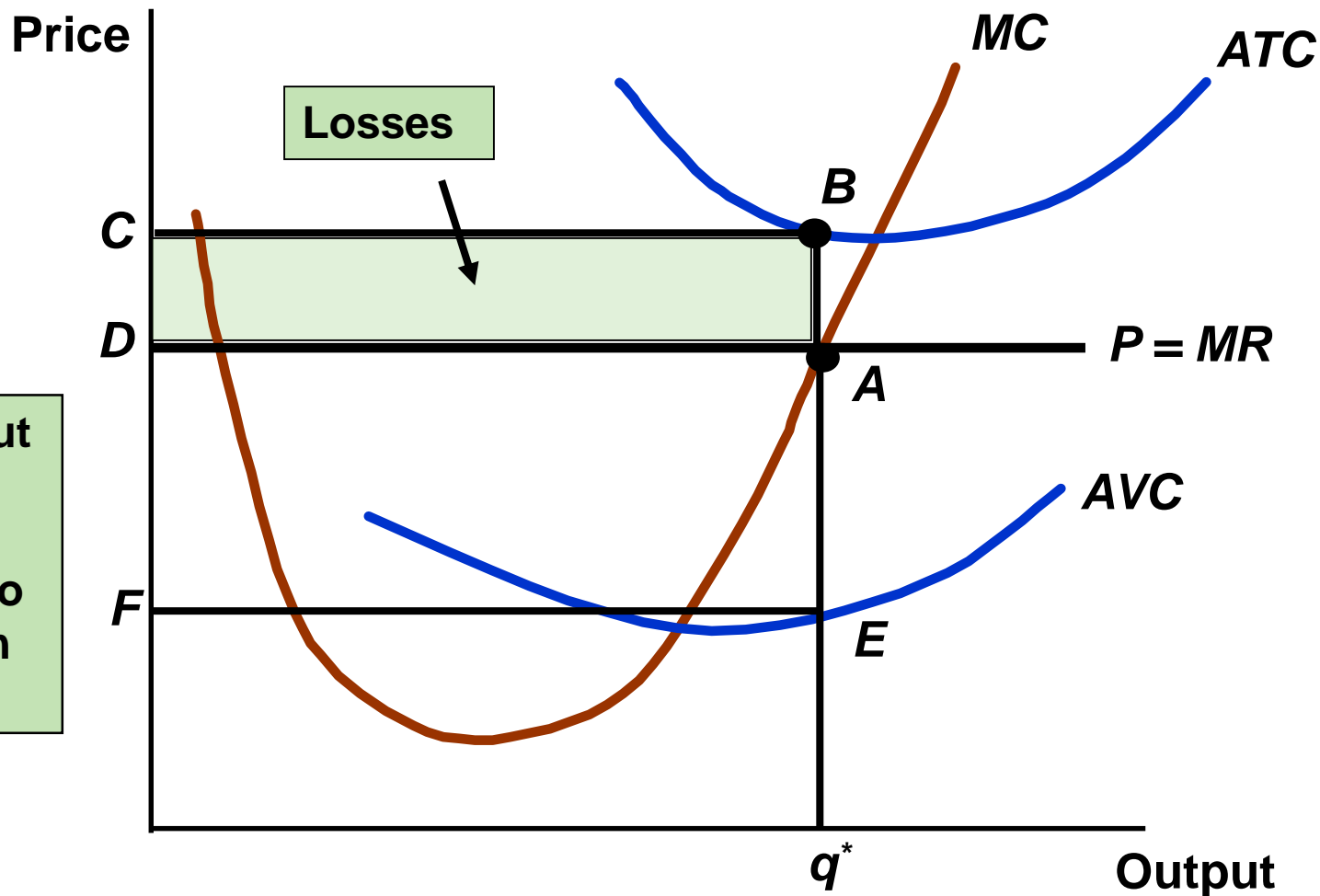
At q^* : $MR = MC$
and $P < ATC$
Losses =
 $(P - AC) \times q^*$
or area ABCD

Choosing output: Losses

- Why would firm produce at a loss?
 - Might think price will increase in near future
 - Shutting down and starting up could be costly
 - The loss may be smaller than when shut down
- Firm has two choices in short run
 - Continue producing
 - Shut down temporarily
 - Will compare profitability of both choices



Choosing output: Losses but should operate



$P < ATC$ but
 $> AVC$ so
firm will
continue to
produce in
short run



When should the firm shut down?

Operate: net revenue = $PQ - TVC - TFC$.

Shut down: net revenue = $-TFC$.

It should **operate** if $PQ - TVC - TFC > -TFC$

$$PQ - TVC > 0$$

or

$$TR > TVC$$

$$P > AVC$$

It should **shut down** if $P \leq \text{minimum } AVC$

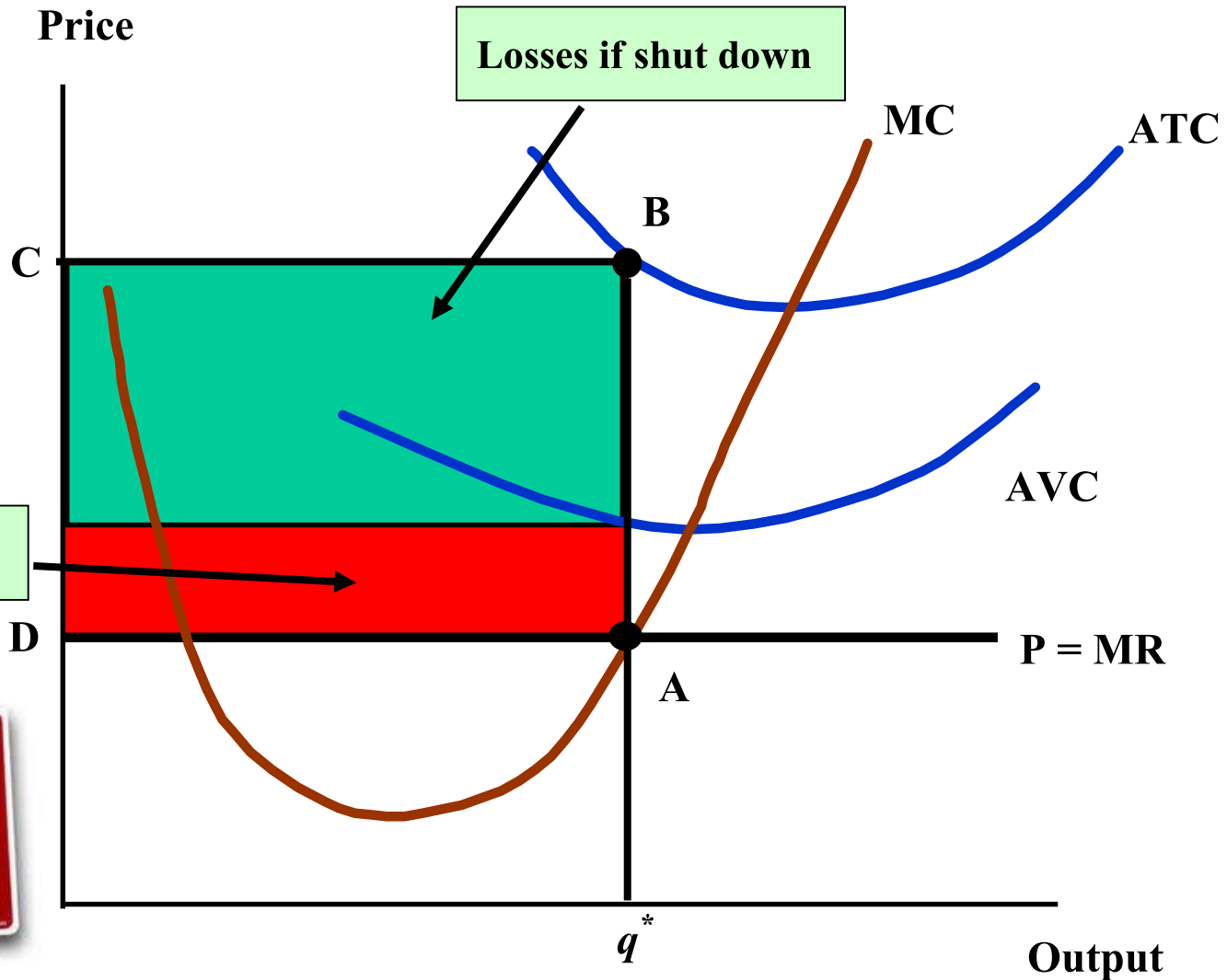
When should the firm shut down?

- When should the firm shut down?
 - If $AVC < P < ATC$ the firm should continue producing in the short run
 - Can cover **all** of its variable costs and **some** of its fixed costs
 - If $P < AVC < ATC$ the firm should shut-down.
 - Can not cover even its variable costs

Choosing output: Losses and should shut down

$P < AVC < ATC$
➤ Should shut
down temporary

Losses if operates



Exercise

A fruit vender is currently making a zero profit.

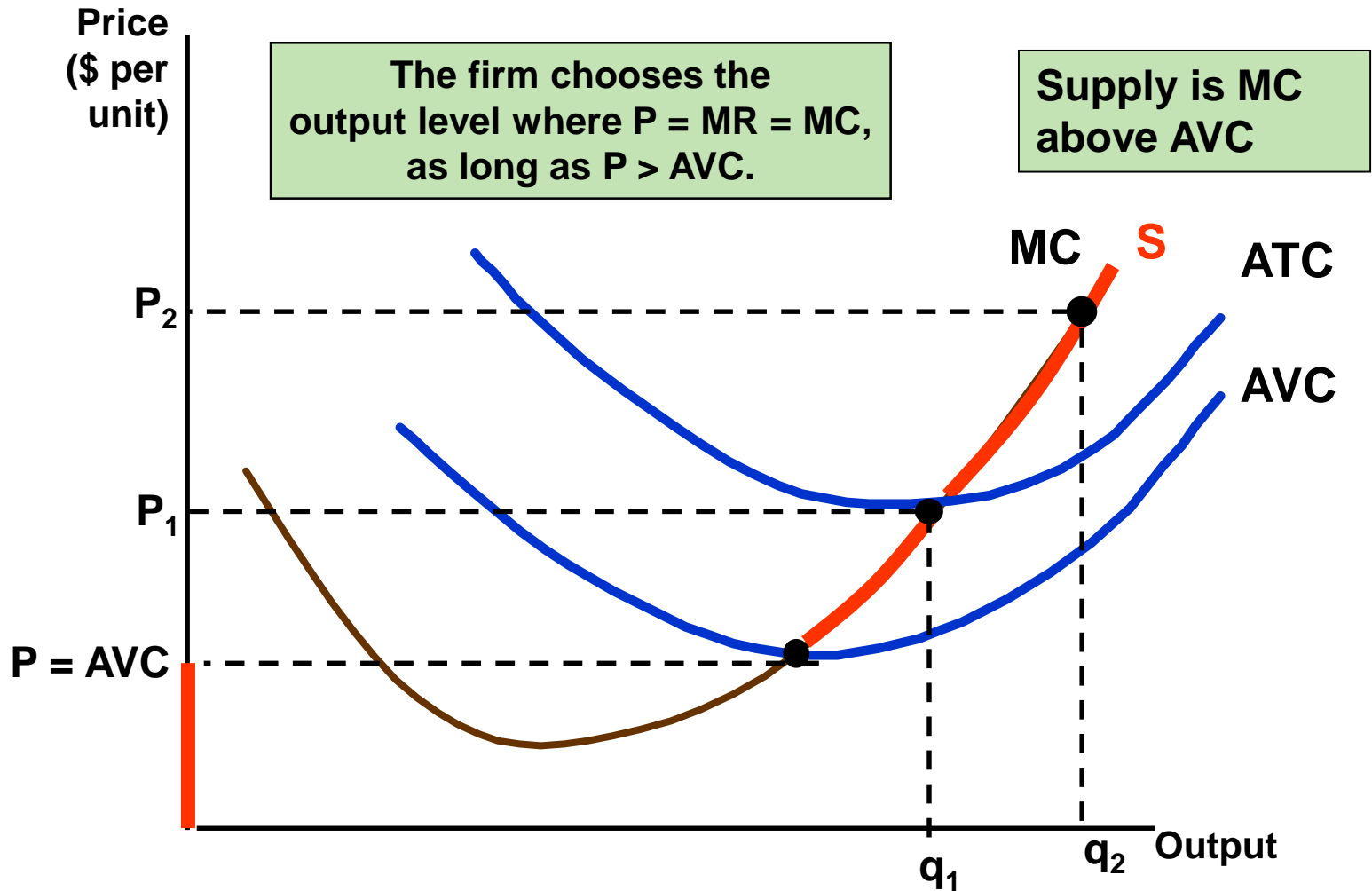
- (a) What will be the impact of the economic recession on this vender's sales and profit?
- (b) Should the fruit vender continue to operate or close its operation?



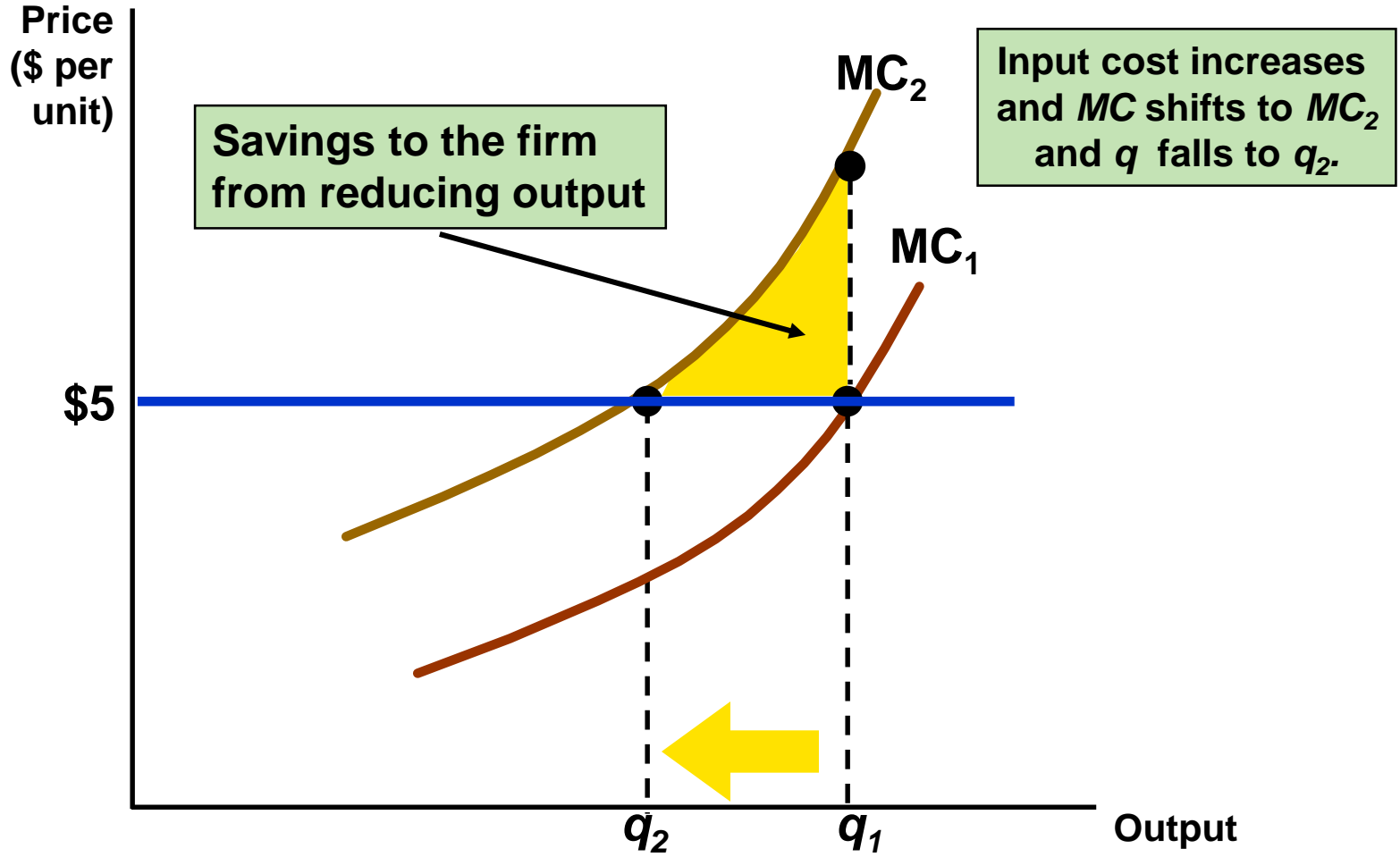
Competitive Firm – Short Run Supply

- Supply curve tells how much output will be produced at different prices
- Competitive firms determine quantity to produce where $P = MC$
 - Firm shuts down when $P < AVC$
- Competitive firms supply curve is portion of the marginal cost curve above the AVC curve

A Competitive Firm's Short-Run Supply Curve



The Response of a Firm to a Change in Input Price



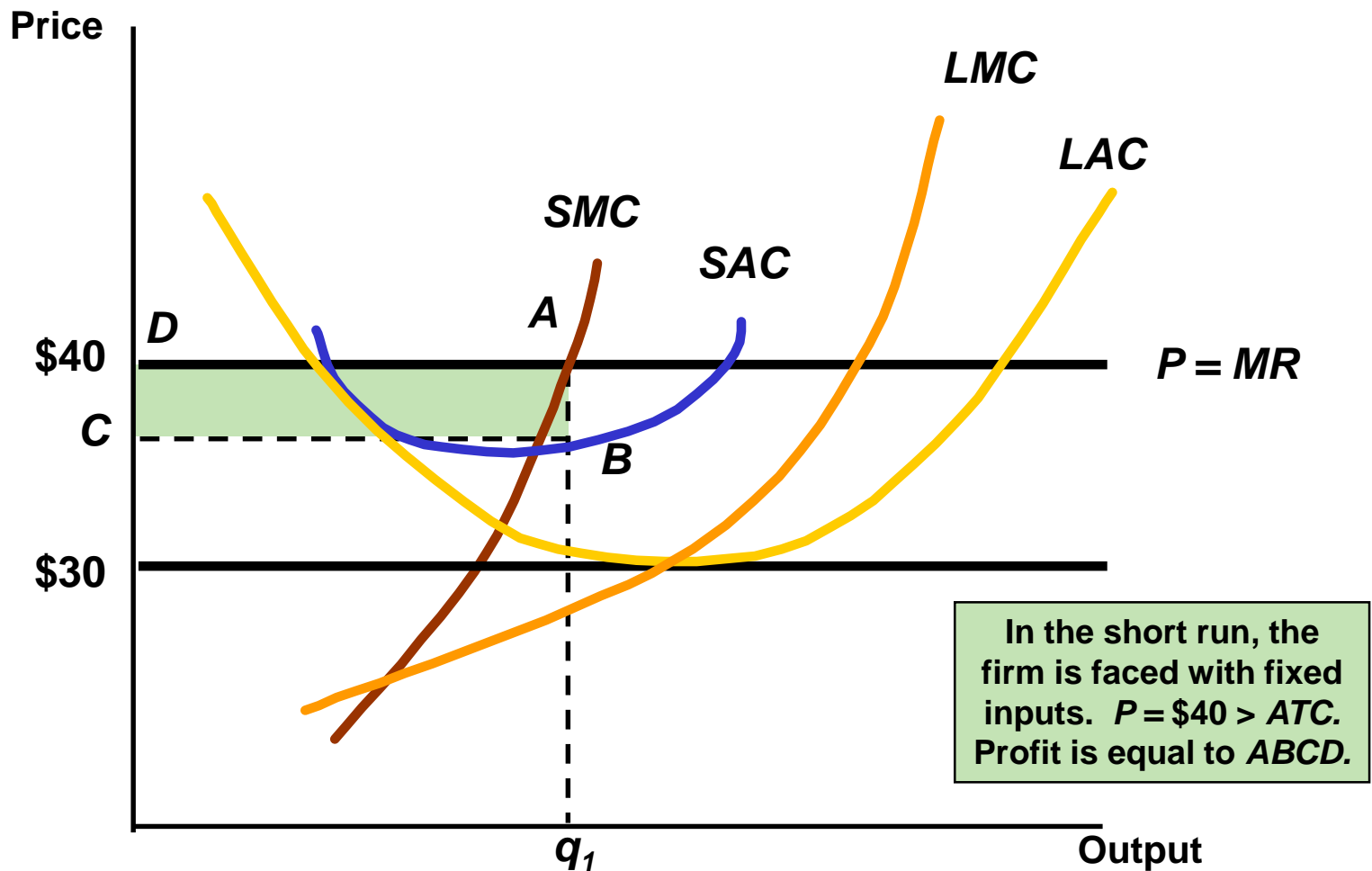
Choosing Output in the Long Run

- In short run, one or more inputs are fixed
 - Depending on the time, it may limit the flexibility of the firm
- In the long run, a firm can alter all its inputs, including the size of the plant.
- We assume free entry and free exit.
 - No legal restrictions or extra costs

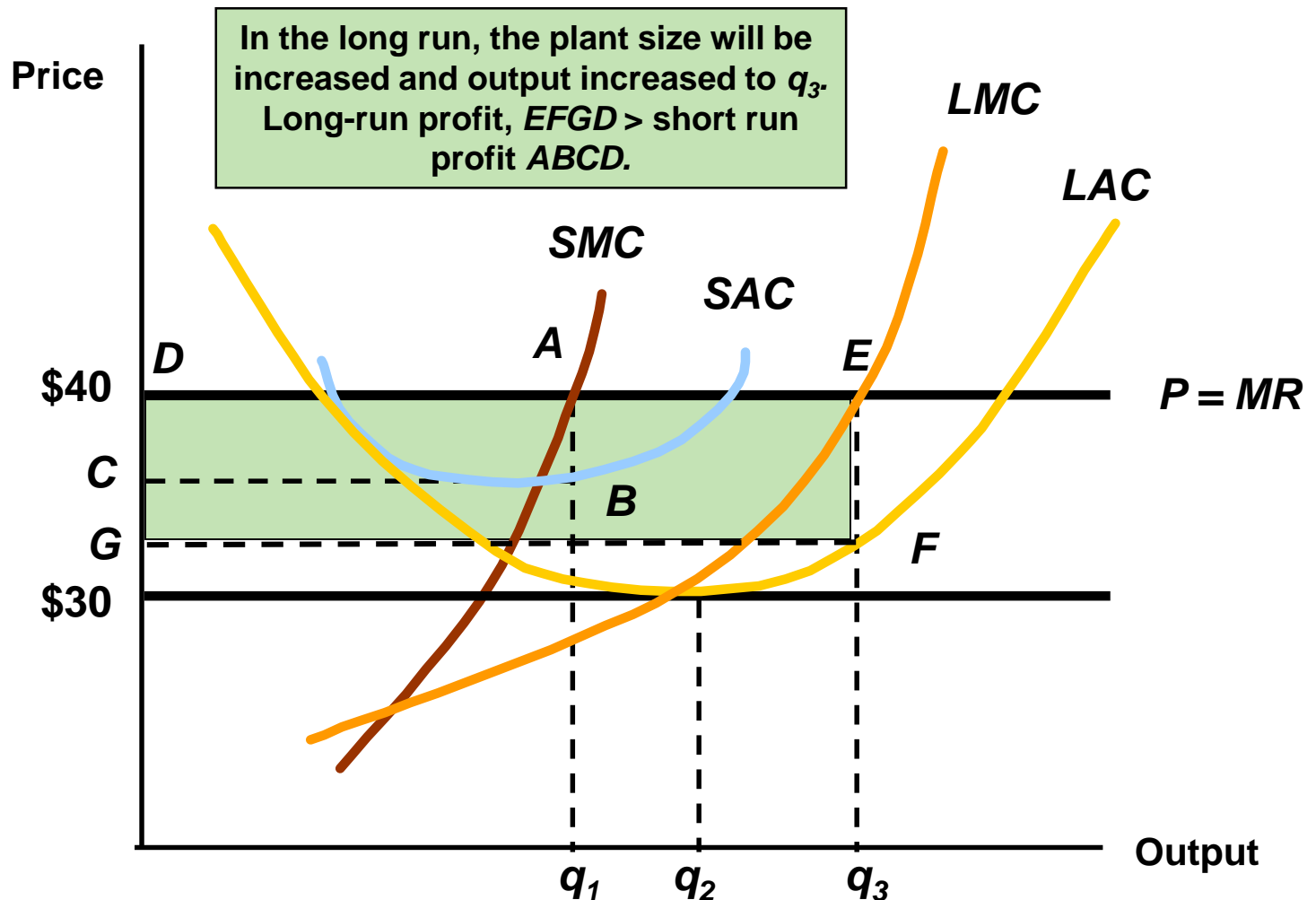
Choosing Output in the Long Run

- In the short run a firm faces a horizontal demand curve
 - Take market price as given
- The short-run average cost curve (SAC) and short run marginal cost curve (SMC) are low enough for firm to make positive profits (ABCD)
- The long run average cost curve (LRAC)
 - Economies of scale to q_2
 - Diseconomies of scale after q_2

Output Choice in the Long Run



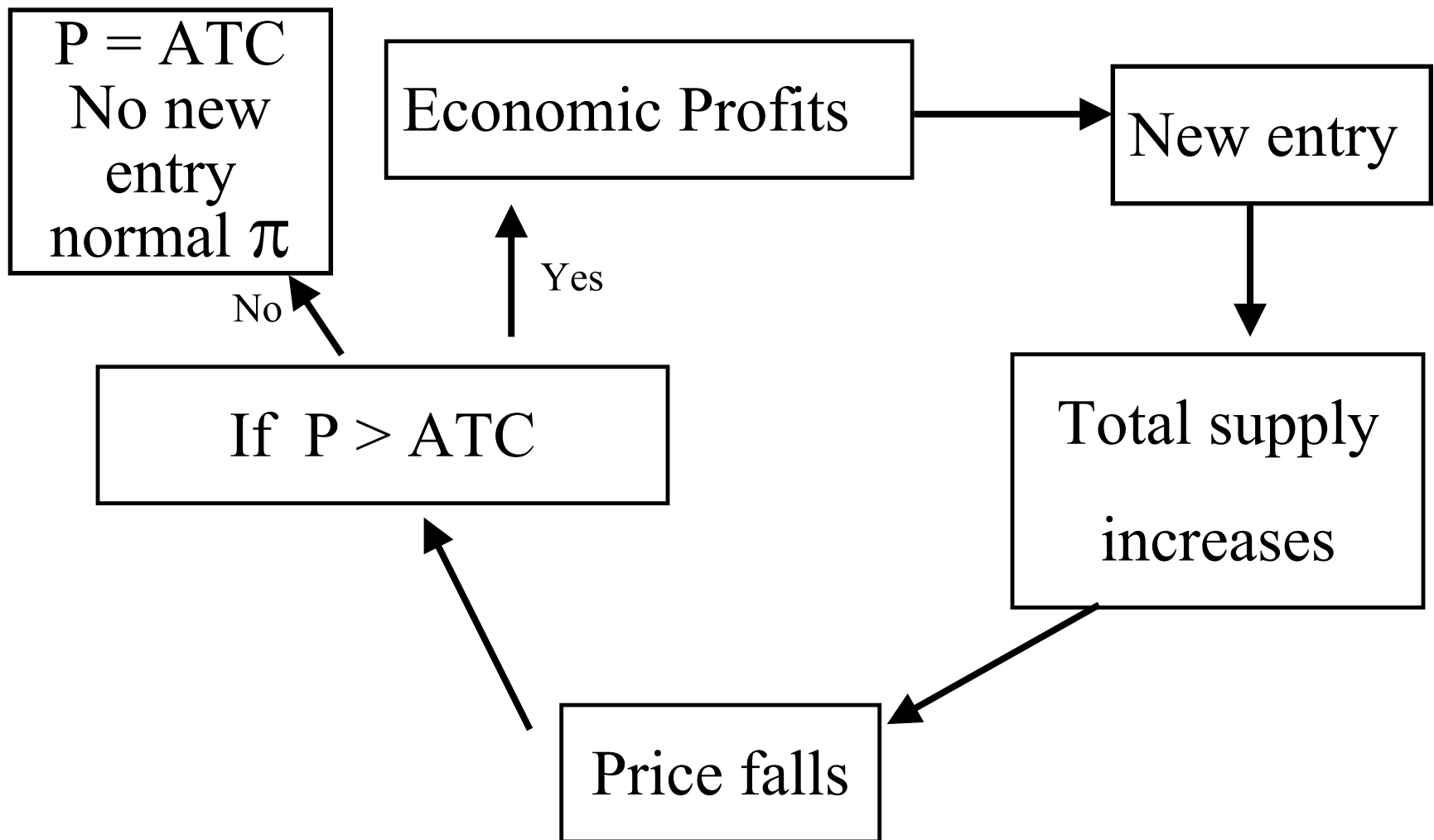
Output Choice in the Long Run



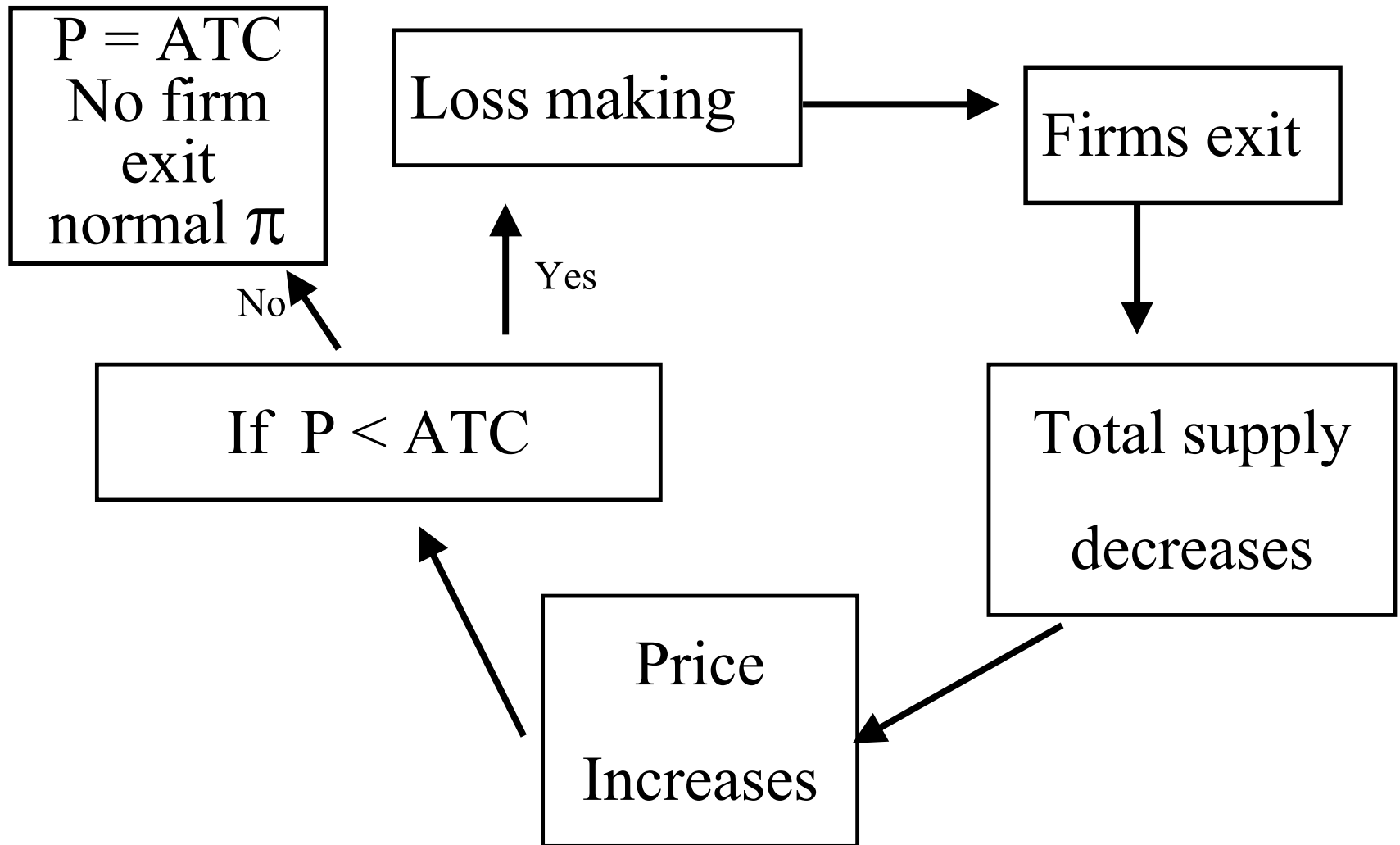
Long-run Competitive Equilibrium

- For long run equilibrium, firms must have no desire to enter or leave the industry
- Zero-Profit
 - A firm is earning a normal return on its own resources
 - Doing as well as it could by using its resources elsewhere
 - Normal profit is firm's opportunity cost of using its own resources instead of using them elsewhere

Long run Equilibrium: New Entry

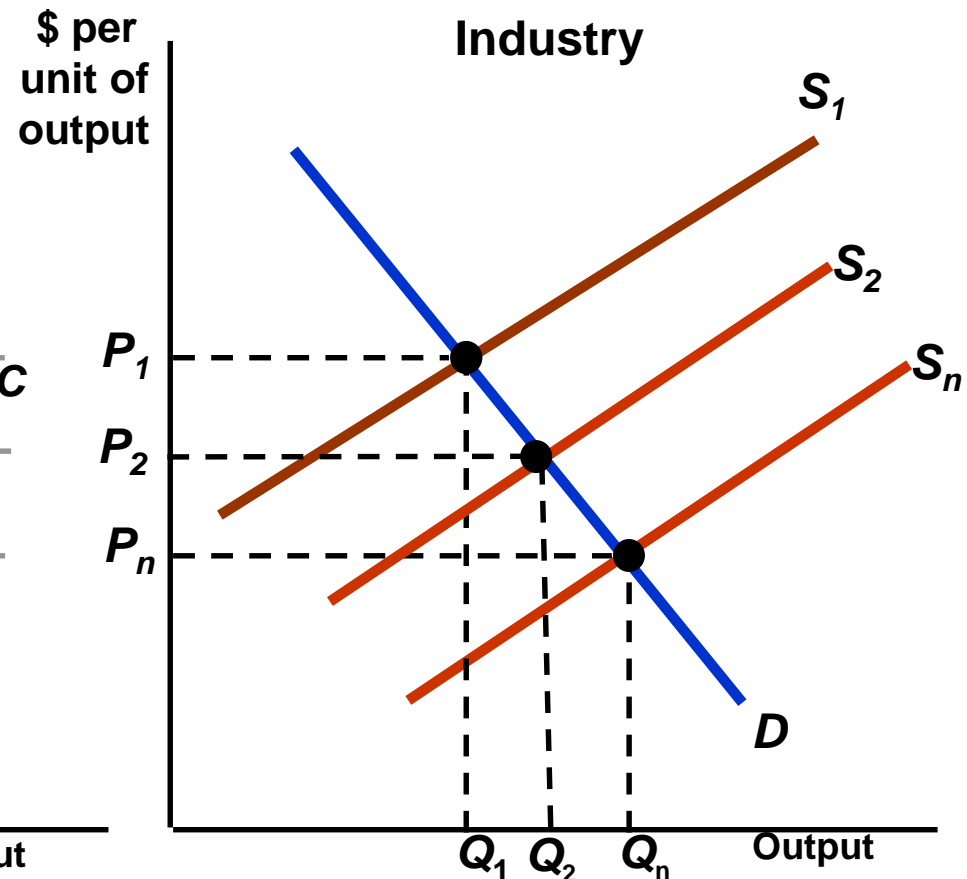
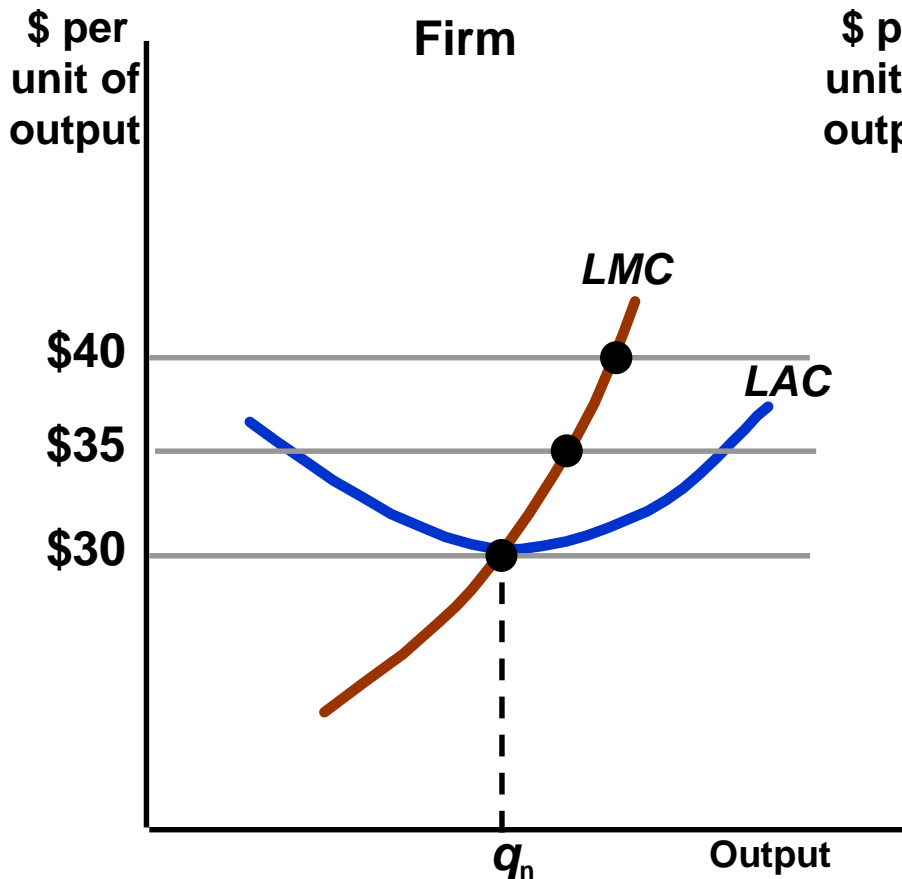


Long run Equilibrium: Exit



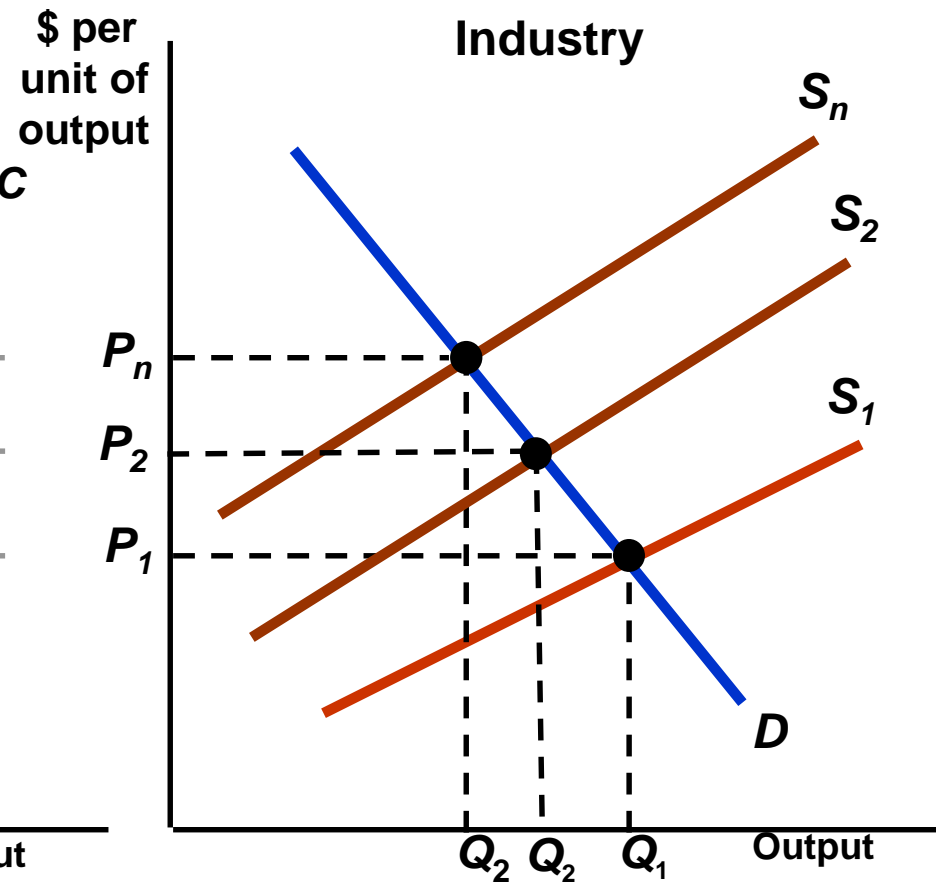
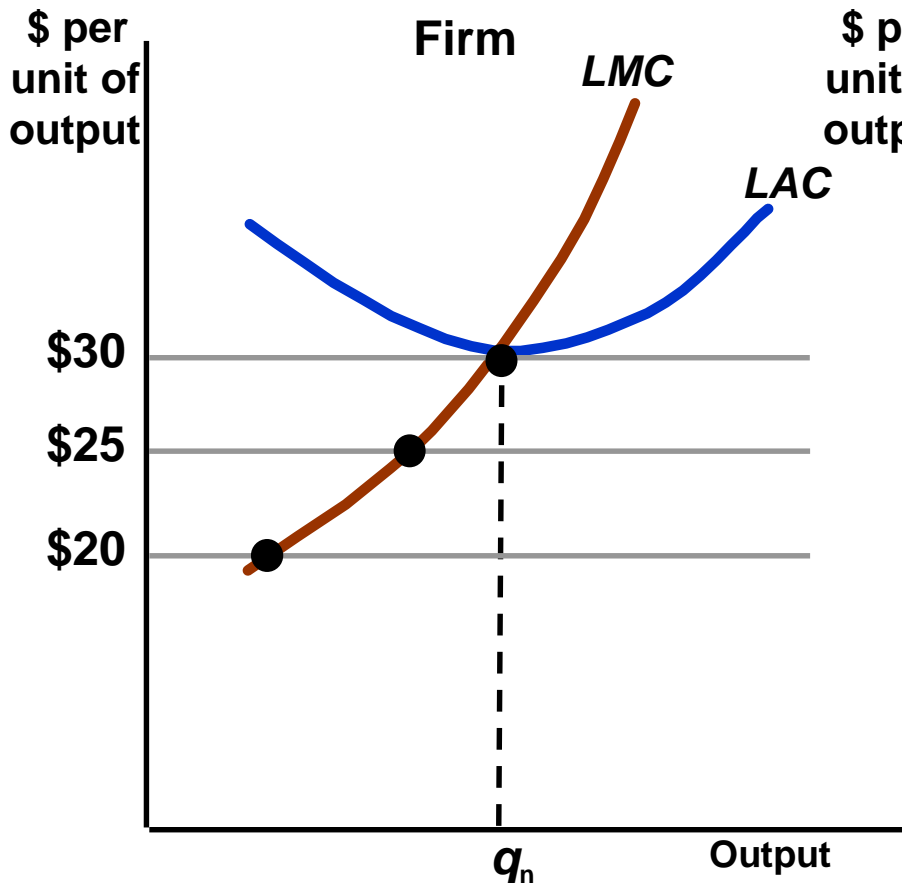
Long-Run Competitive Equilibrium – Profits

- Profit attracts firms
- Supply increases until profit = 0



Long-Run Competitive Equilibrium – Losses

- Losses cause firms to leave
- Supply decreases until profit = 0



Long-Run Competitive Equilibrium

1. All firms in industry are maximizing profits
 - $P = MR = LMC = LAC$
2. No firm has incentive to enter or exit industry
 - Earning zero economic profits

Efficiency

- Perfectly competitive market is the most efficient market
- Produce at the lowest possible cost
 - $P = \text{Minimum LAC}$ or
 - It has productive efficiency
- Generate the highest social welfare
 - $D = S$ and $CS + PS$ are largest
 - $P = LMC$, marginal benefit = marginal cost
 - It has **allocative efficiency**

Exercise

Suppose the owner of a firm in a perfectly competitive market has special management ability better than the rest of the firm. The special ability helps this firm to have a lower production costs than others. Does it mean that this firm will have excess profit even in the long run? If so, why? If not, why not?

The Industry's Long-Run Supply Curve

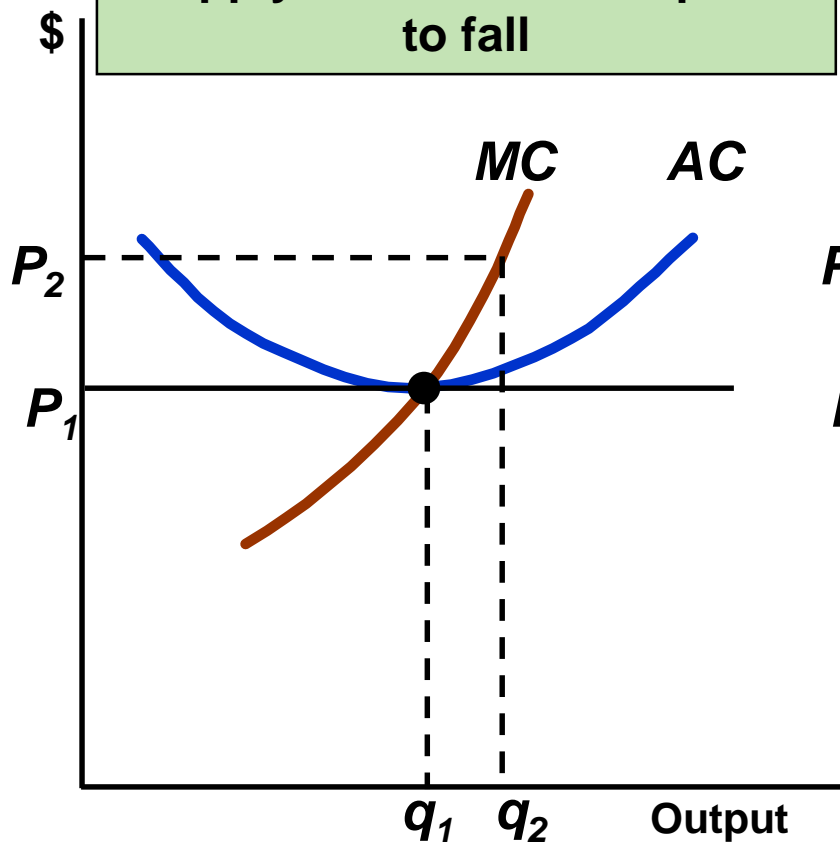
- The shape of the long-run supply curve depends on the extent to which changes in industry output affect the prices the firms must pay for inputs.
- Assume
 - All firms have access to the available production technology
 - Output is increased by using more inputs, not by invention
 - The market for inputs does not change with expansions and contractions of the industry.

Constant-Cost Industry

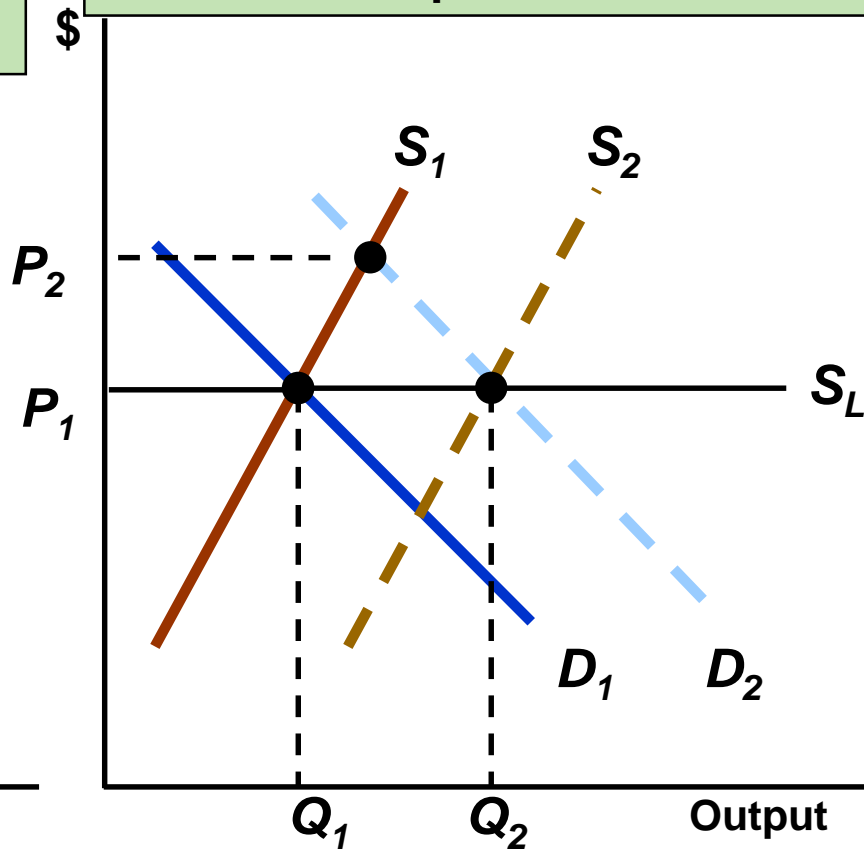
- Industry whose long-run supply curve is horizontal
- Assume a firm is initially in equilibrium
 - Demand increases causing price to increase
 - Individual firms increase supply
 - Causes firms to earn positive profits in short-run
 - Supply increases causing market price to decrease
 - Long run equilibrium – zero economic profits

Constant-Cost Industry

Increase in demand increases market price and firm output
Positive profits cause market supply to increase and price to fall



Q_1 increases to Q_2 .
Long-run supply = $S_L = LRAC$.
Change in output has no impact on input cost.



Long-Run Supply in a Constant-Cost Industry

- Price of inputs does not change
 - Firms cost curves do not change
- In a constant-cost industry, long-run supply is a horizontal line at a price that is equal to the minimum average cost of production.

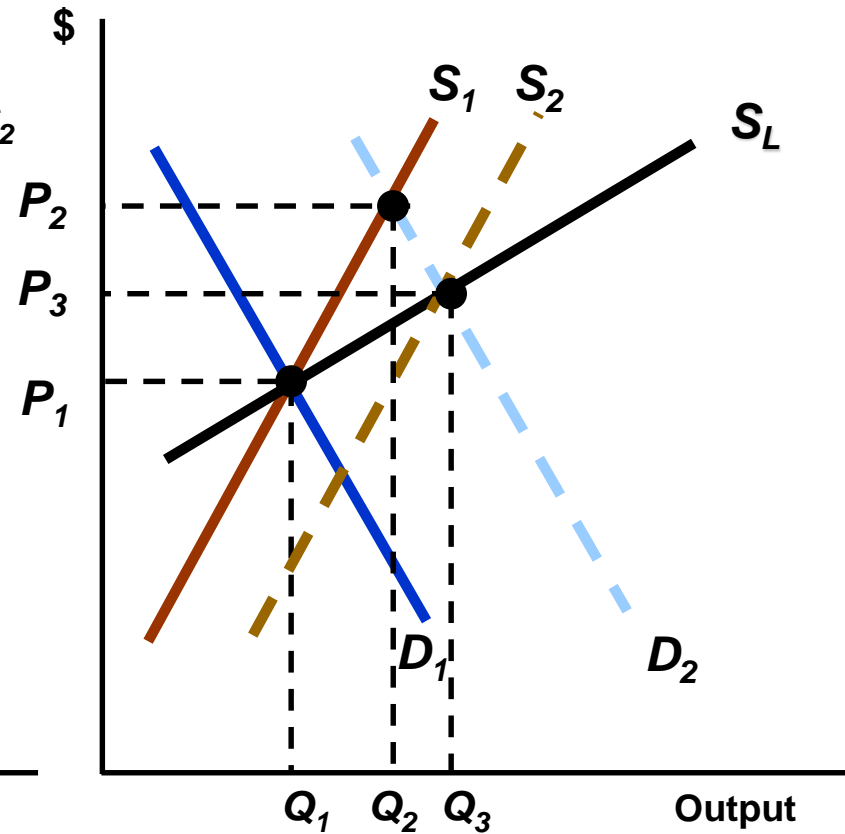
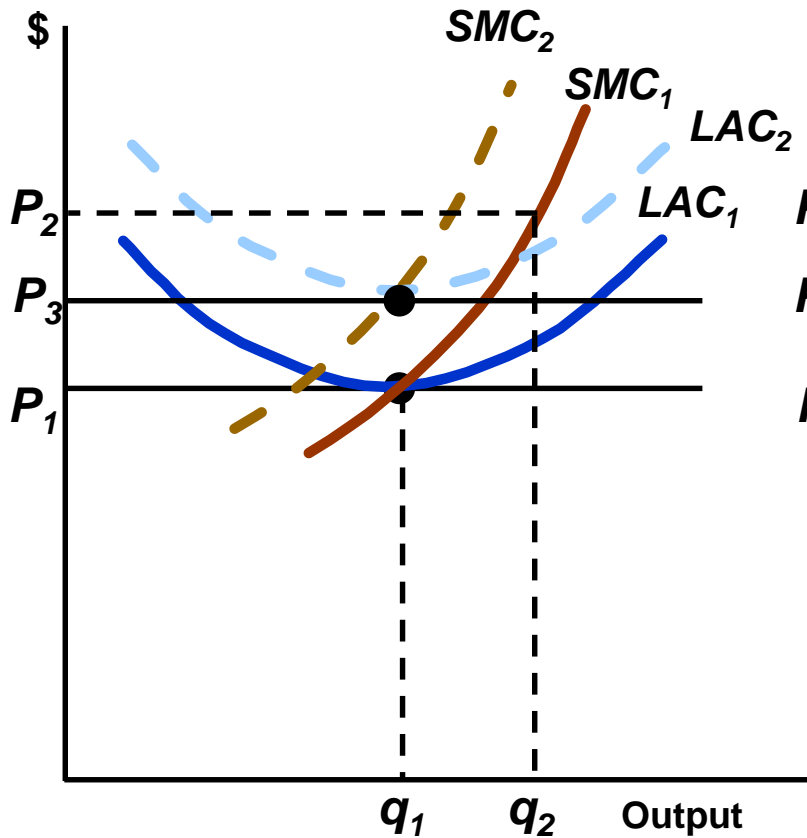
Increasing-Cost Industry

- Prices of some or all inputs rises as production is expanded when demand of inputs increases
- When demand increases causing prices to increase and production to increase
 - Firms enter the market increasing demand for inputs
 - Costs increase causing an upward shift in supply curves
 - Market supply increases but not as much

Long-run Supply in an Increasing-Cost Industry

Due to the increase in input prices, long-run equilibrium occurs at a higher price.

Long Run Supply is upward Sloping



Long-Run Supply in a Increasing-Cost Industry

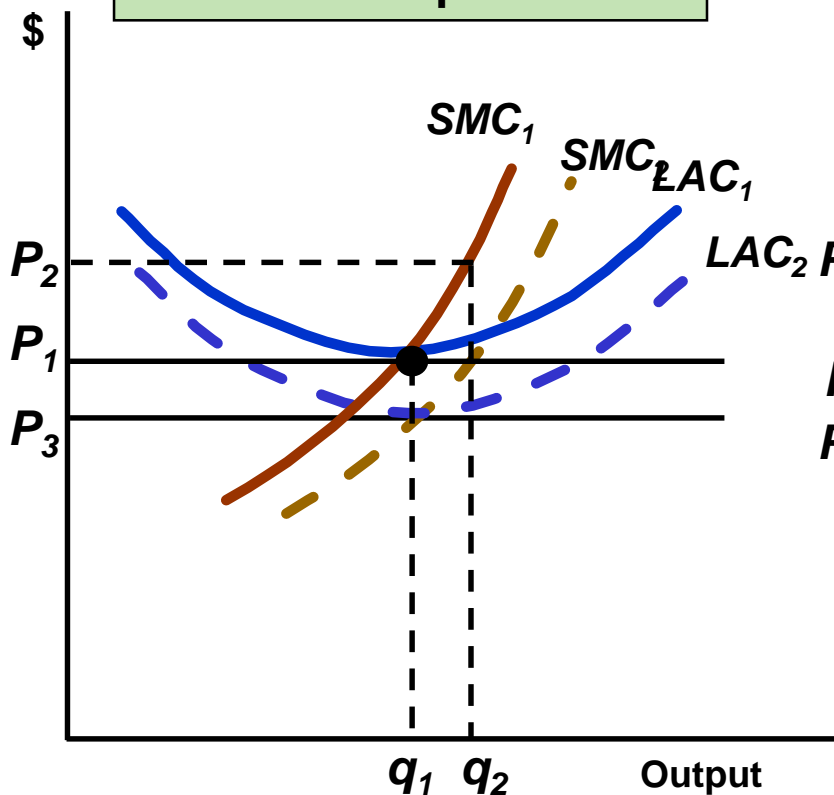
- In an increasing-cost industry, long-run supply curve is upward sloping.
- More output is produced, but only at the higher price needed to compete for the increased input costs

Decreasing-Cost Industry

- Industry whose long-run supply curve is downward sloping
- Increase in demand causes production to increase
 - Increase in size allows firm to take advantage of size to get inputs cheaper
 - Increased production may lead to better efficiencies or quantity discounts
 - Costs shift down and market price falls

Long-run Supply in a Decreasing-Cost Industry

Due to the decrease in input prices, long-run equilibrium occurs at a lower price.



Long Run Supply is Downward Sloping

