Industry Supply

Supply From A Competitive Industry

◆ **How are the supply decisions of the many individual firms in a competitive industry to be combined to discover the market supply curve for the entire industry?**

Supply From A Competitive Industry

◆ **Since every firm in the industry is a price-taker, total quantity supplied at a given price is the sum of quantities supplied at that price by the individual firms.**

Short-Run Supply

◆ **In a short-run the number of firms in the industry is, temporarily, fixed.**

◆ **Let n be the number of firms; i = 1, … ,n.**
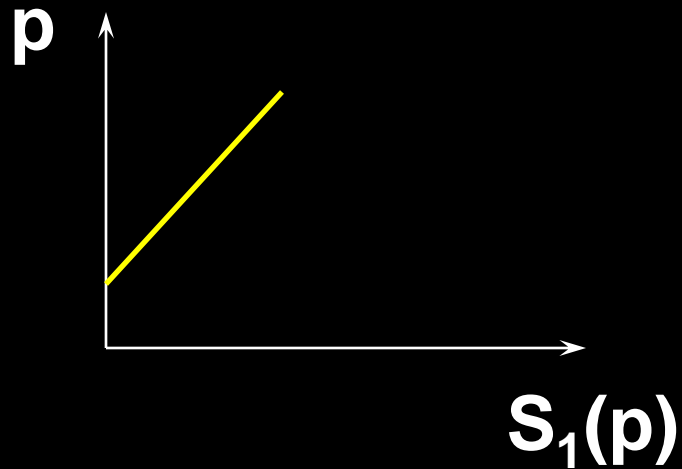
◆ **$S_i(p)$ is firm i's supply function.**

Short-Run Supply

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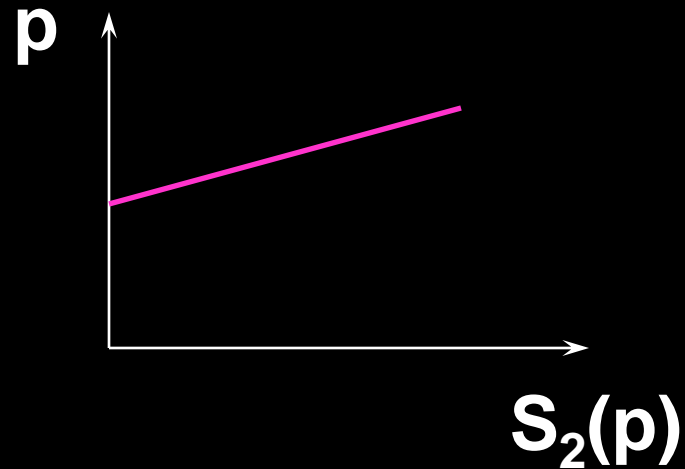
◆ **The industry's short-run supply function is**
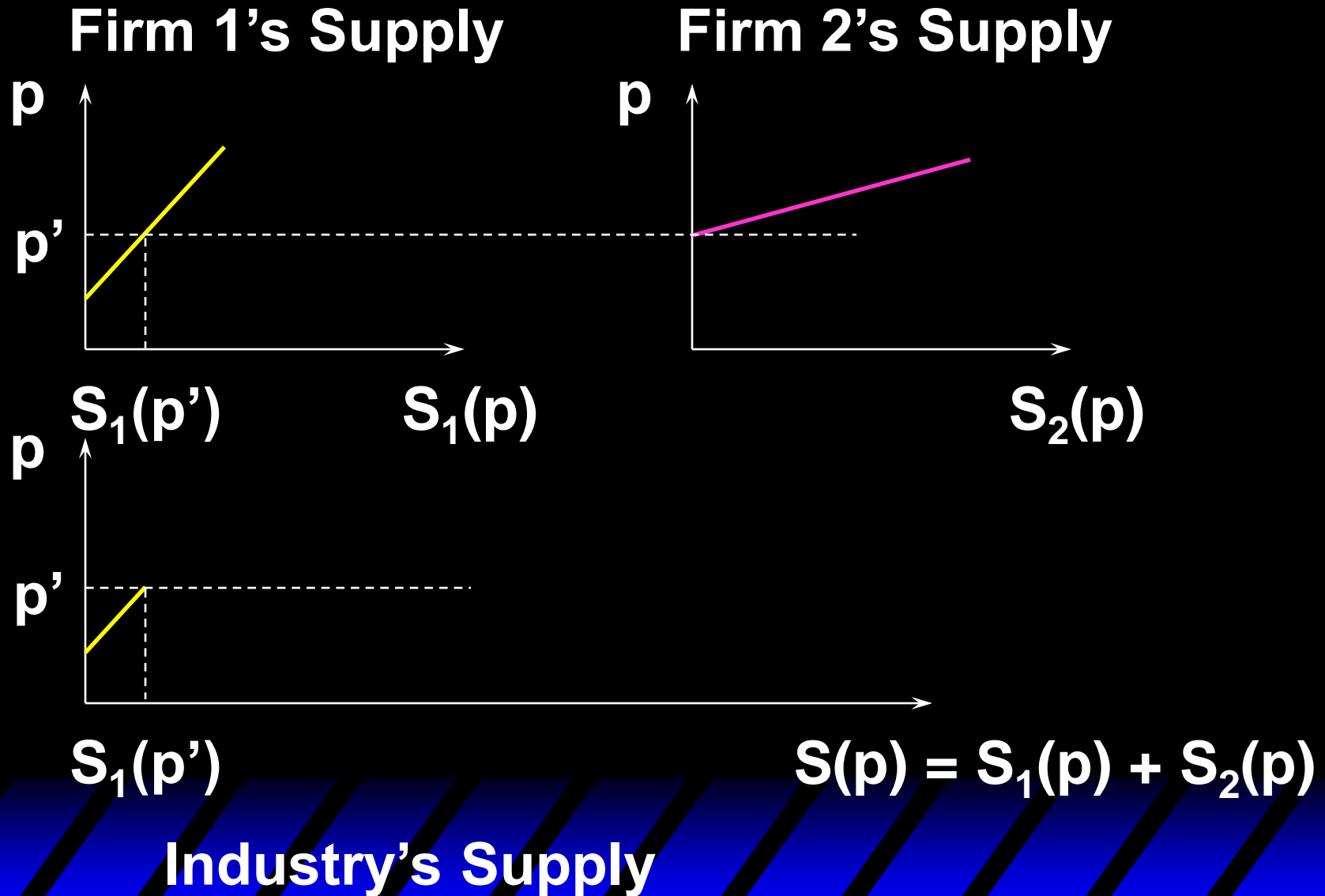$$S(p) = \sum_{i=1}^{n} S_i(p).$$
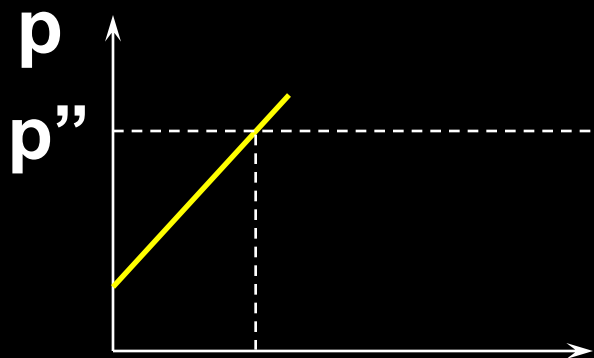
Supply From A Competitive Industry

Firm 1's Supply

p

$S_1(p)$

Firm 2's Supply

p

$S_2(p)$

Supply From A Competitive Industry

Firm 1's Supply

Firm 2's Supply

p

p

p'

p'

$S_1(p')$

$S_1(p)$

$S_2(p)$

p

p'

$S_1(p')$

$S(p) = S_1(p) + S_2(p)$

Industry's Supply

Supply From A Competitive Industry

Firm 1's Supply

p

p''

$S_1(p'') \qquad S_1(p)$

Firm 2's Supply

p

p''

$S_2(p'') \; S_2(p)$
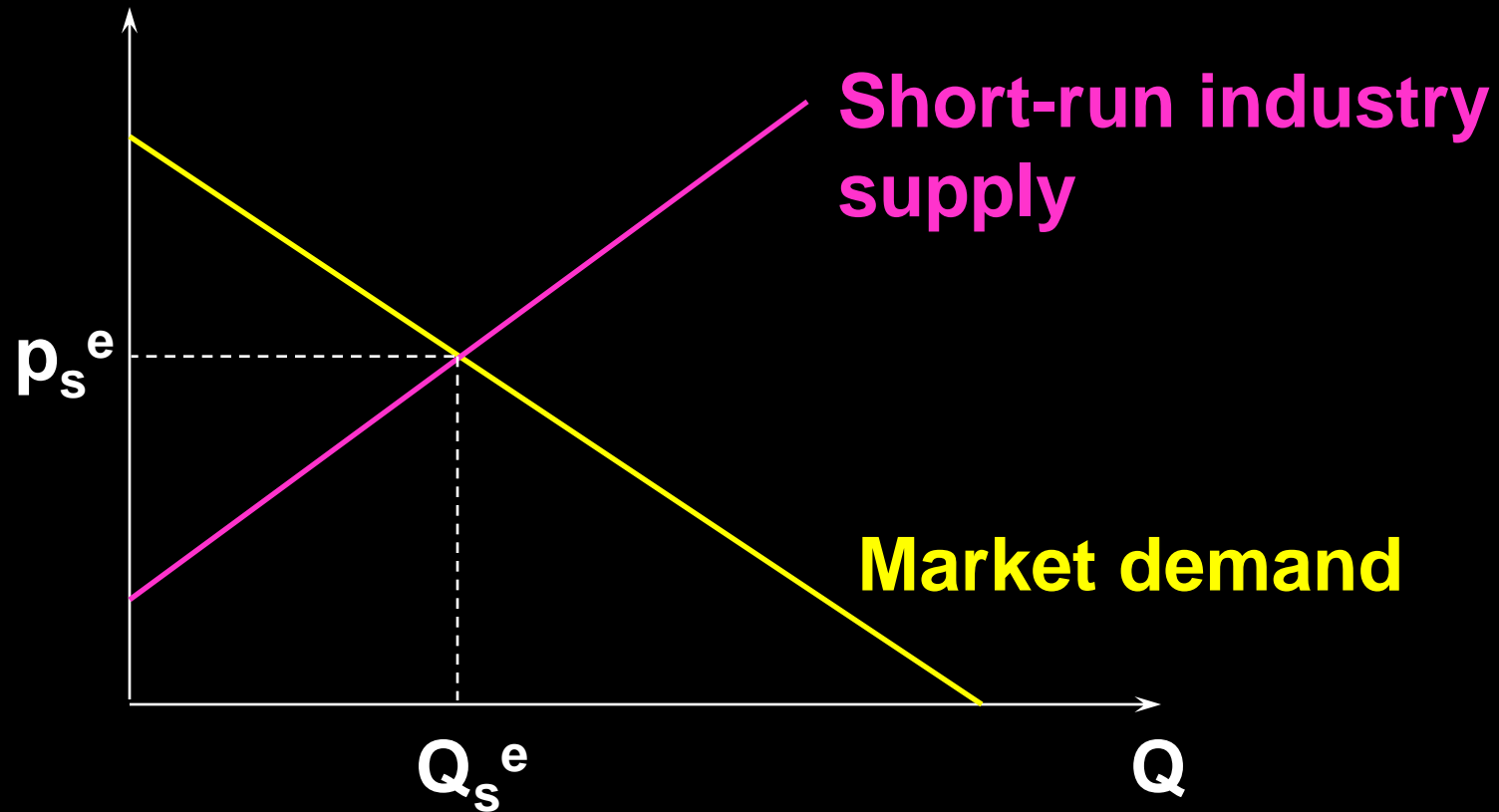
p
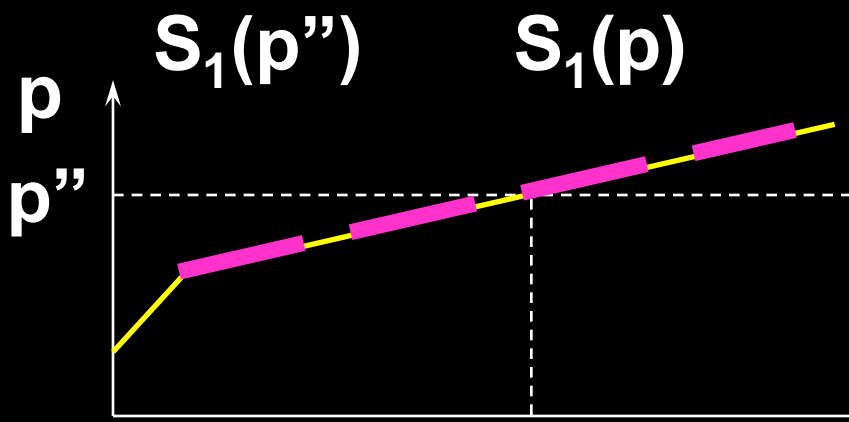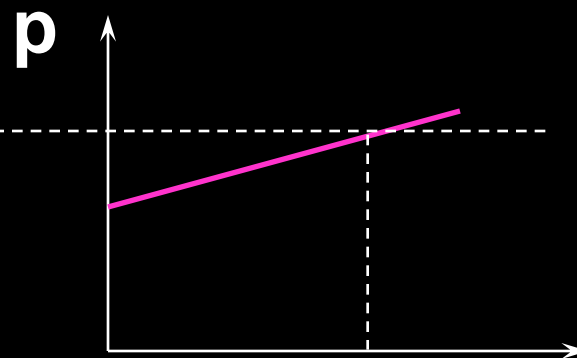
p''

$S_1(p'')+S_2(p'') \qquad\qquad S(p) = S_1(p) + S_2(p)$

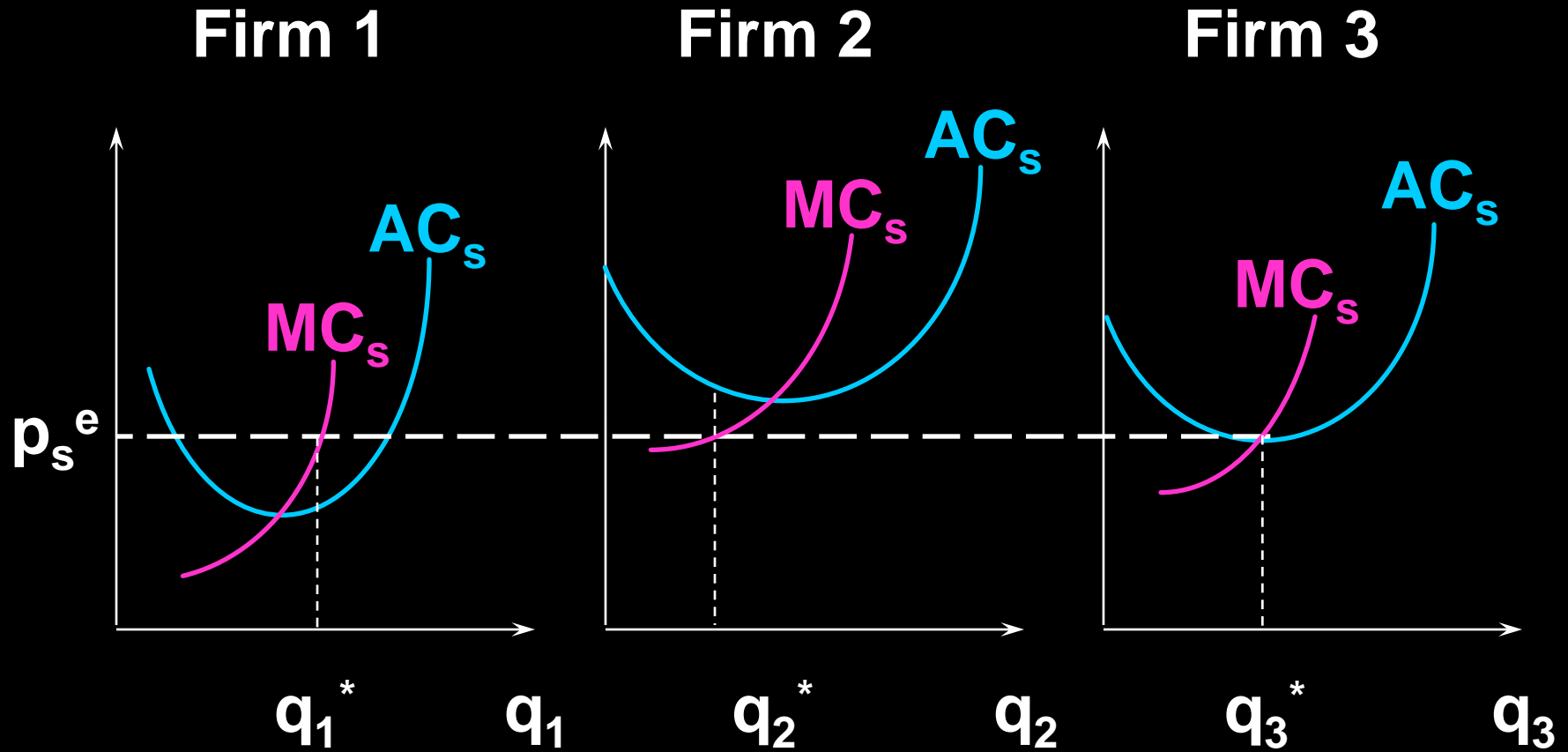**Industry's Supply**

Short-Run Industry Equilibrium

◆ **In a short-run, neither entry nor exit can occur.**

◆ **Consequently, in a short-run equilibrium, some firms may earn positive economics profits, others may suffer economic losses, and still others may earn zero economic profit.**
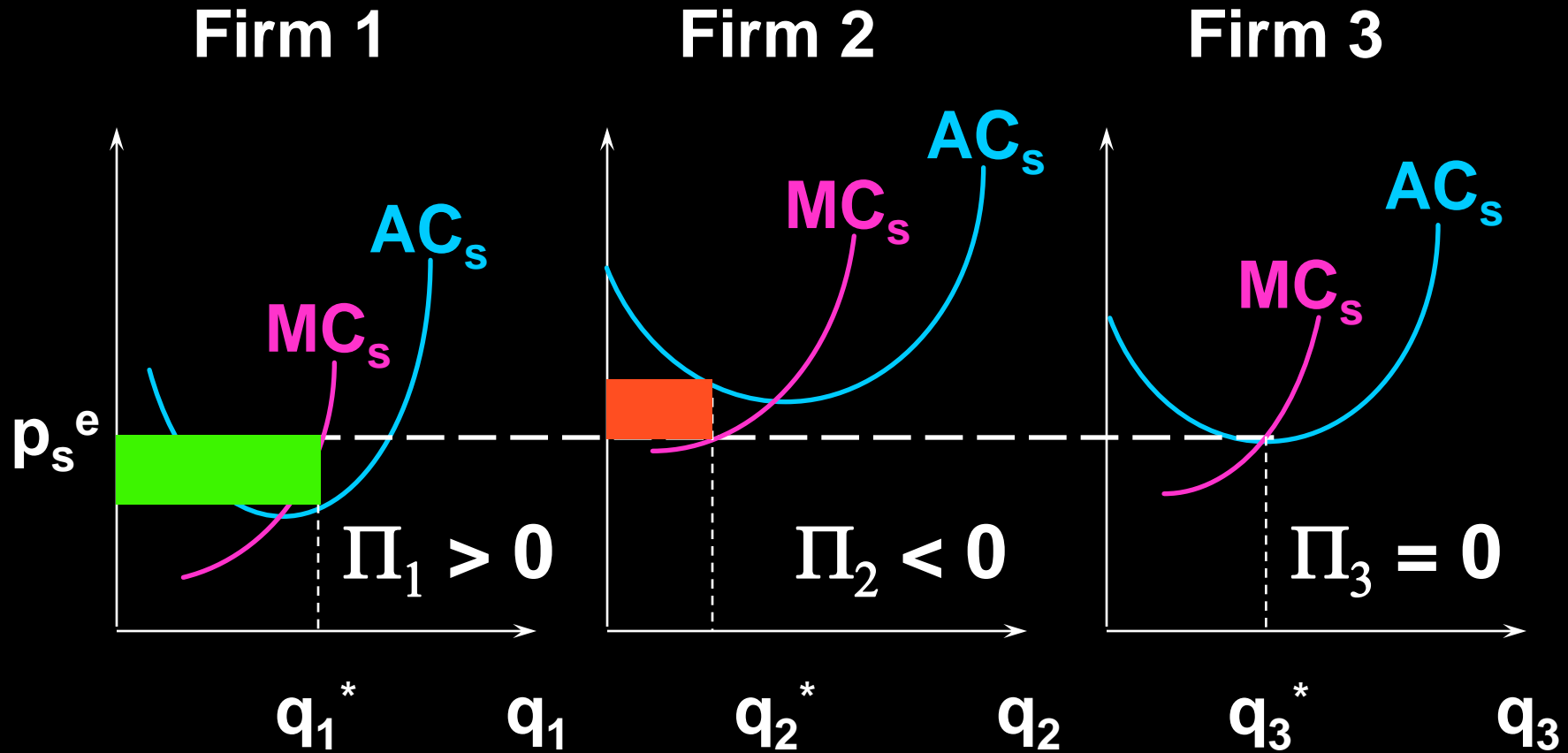
Short-Run Industry Equilibrium

Short-run equilibrium price clears the market and is taken as given by each firm.

Short-Run Industry Equilibrium

Firm 1 **Firm 2** **Firm 3**

Short-Run Industry Equilibrium

Firm 1

Firm 2

Firm 3

AC_s

MC_s

p_s^e

$\Pi_1 > 0$

q_1^* q_1

Firm 1 wishes to remain in the industry.

AC_s

MC_s

$\Pi_2 < 0$

q_2^* q_2

Firm 2 wishes to exit from the industry.

AC_s

MC_s

$\Pi_3 = 0$

q_3^* q_3

**Firm 3 is indifferent.**

Long-Run Industry Supply

◆ **In the long-run every firm now in the industry is free to exit and firms now outside the industry are free to enter.**

◆ **The industry's long-run supply function must account for entry and exit as well as for the supply choices of firms that choose to be in the industry.**

◆ **How is this done?**
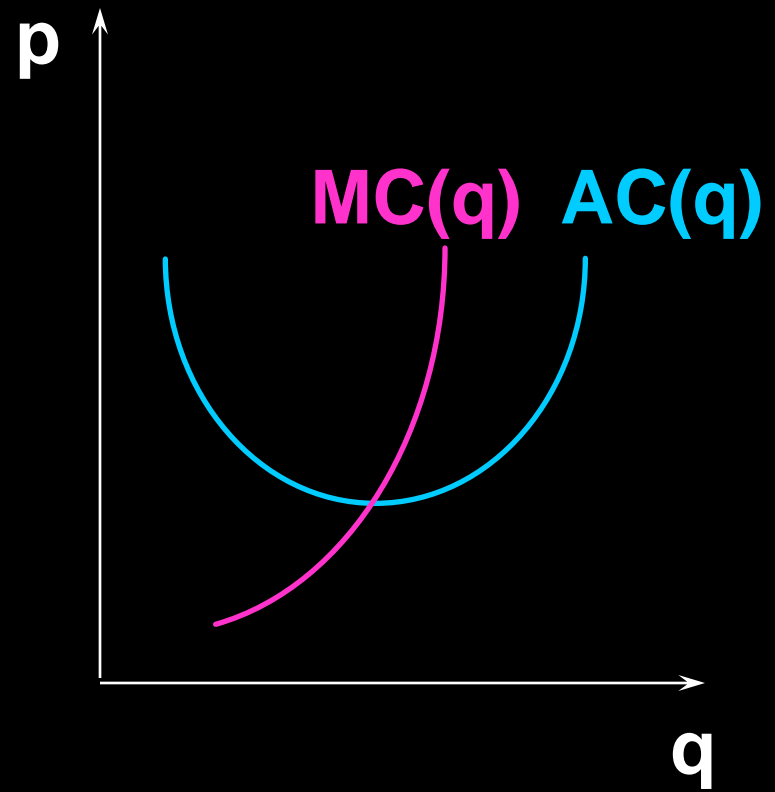
Long-Run Industry Supply

◆ **Positive economic profit induces entry.**

◆ **Economic profit is positive when the market price p_s^e is higher than a firm's minimum av. total cost; $p_s^e > \min AC(q)$.**

◆ **Entry increases industry supply, causing p_s^e to fall.**

◆ **When does entry cease?**

Long-Run Industry Supply

The Market

Mkt. Demand

$S^2(p)$

Mkt. Supply

p

Q

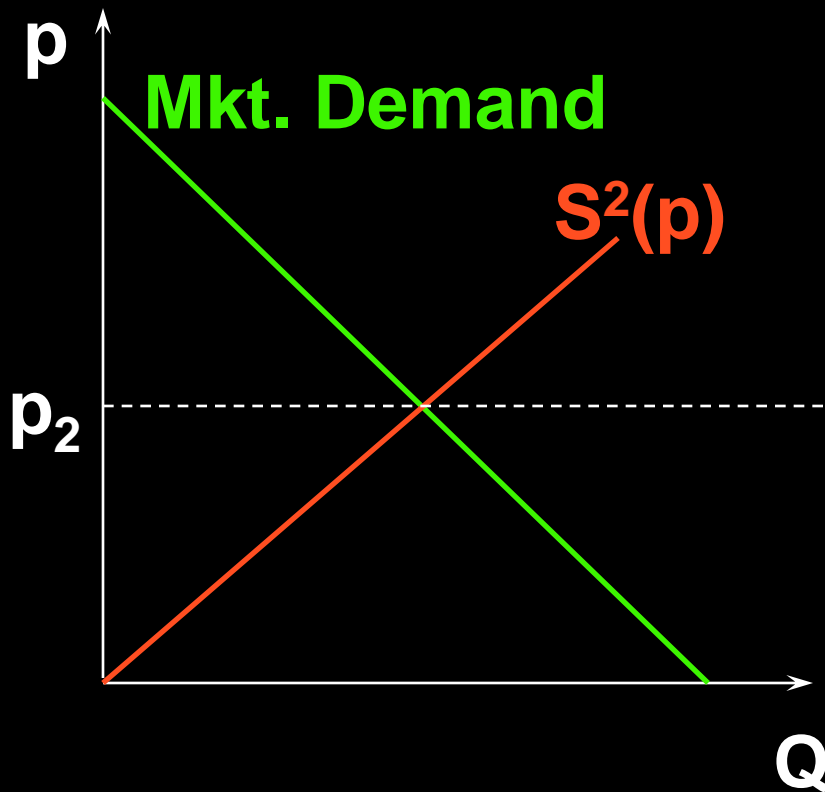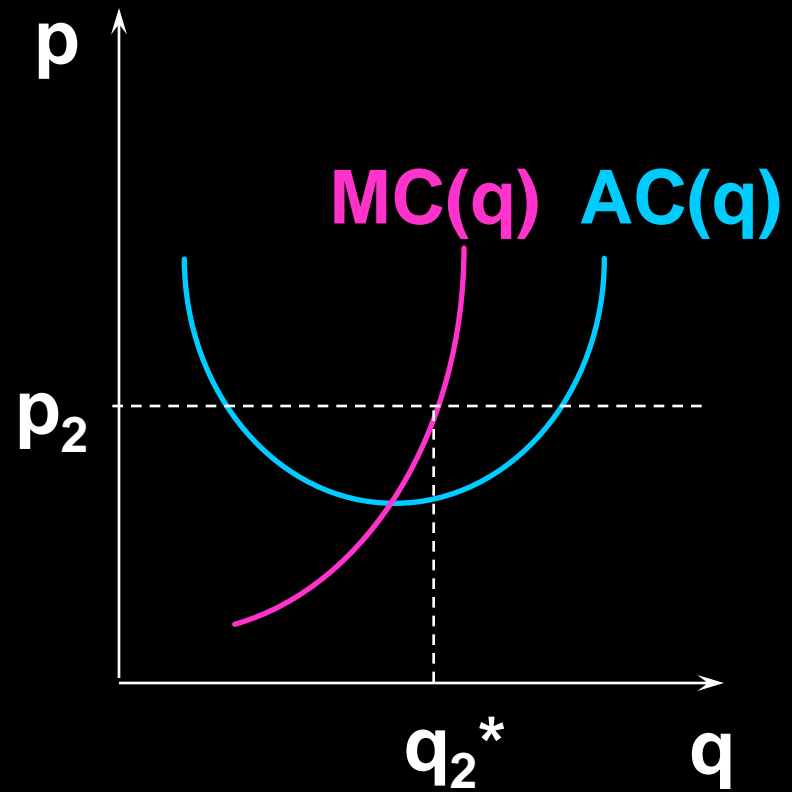## A "Typical" Firm

MC(q) **AC(q)**

p

q
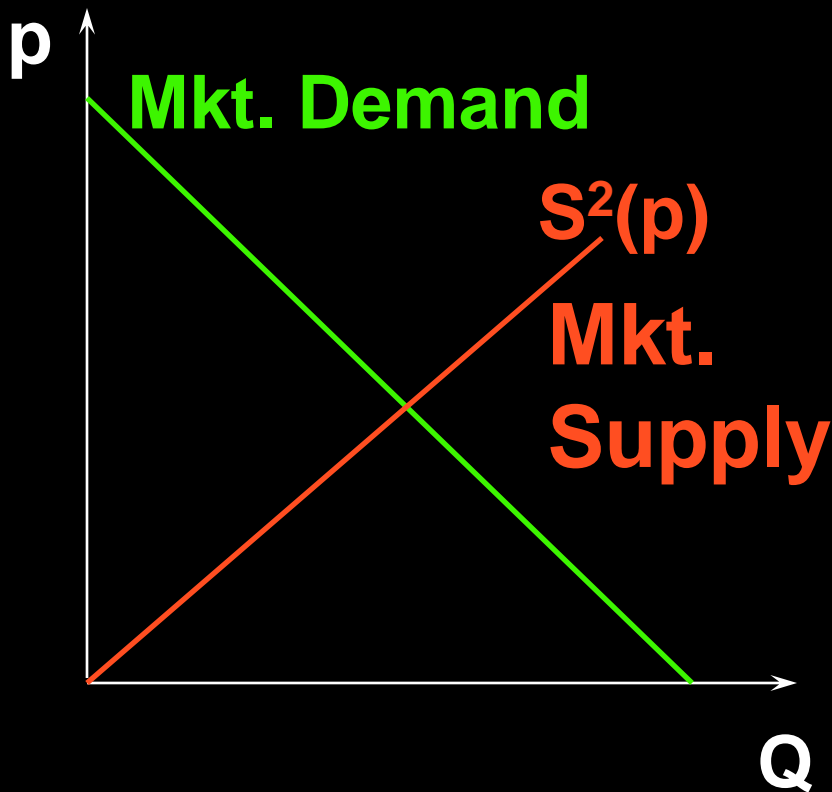
Suppose the industry initially contains only two firms.
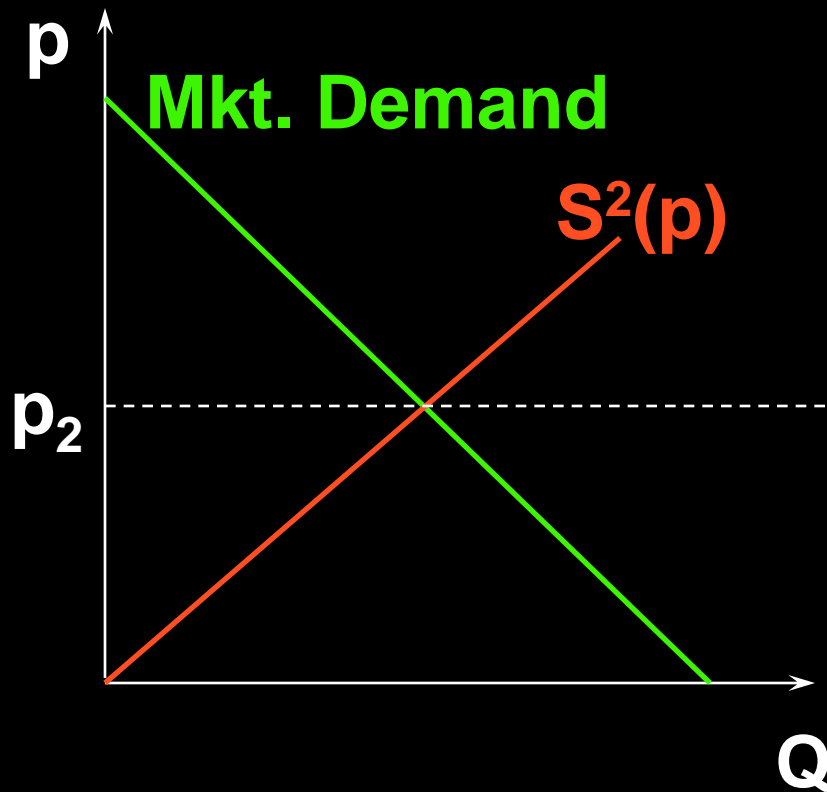
Long-Run Industry Supply
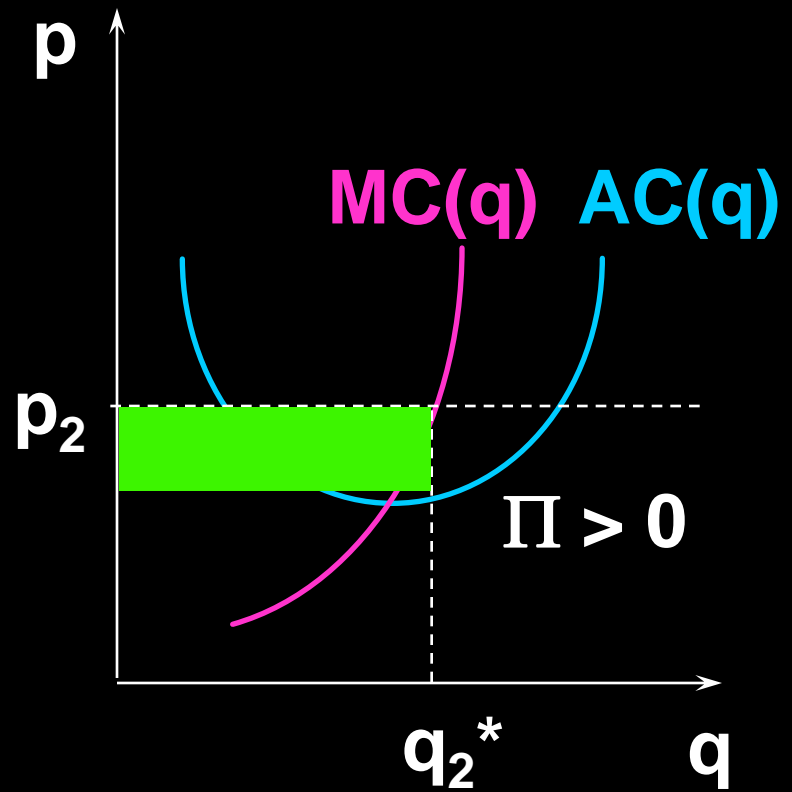
The Market

A "Typical" Firm

Then the market-clearing price is p_2.
Each firm produces q_2^* units of output.

Long-Run Industry Supply

The Market

A "Typical" Firm

Mkt. Demand

$S^2(p)$

p

p_2

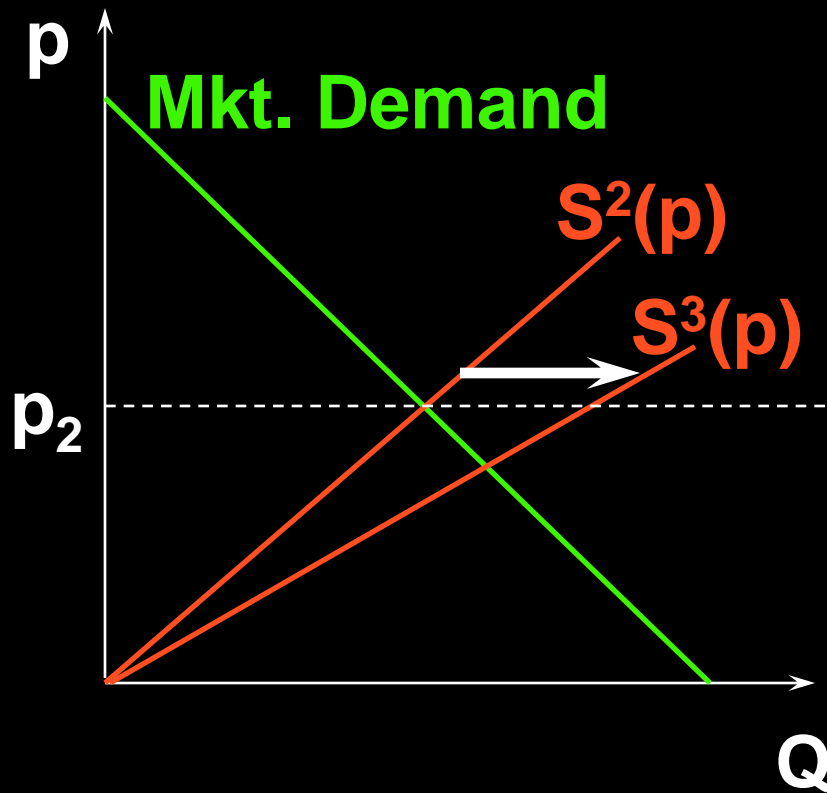Q

p
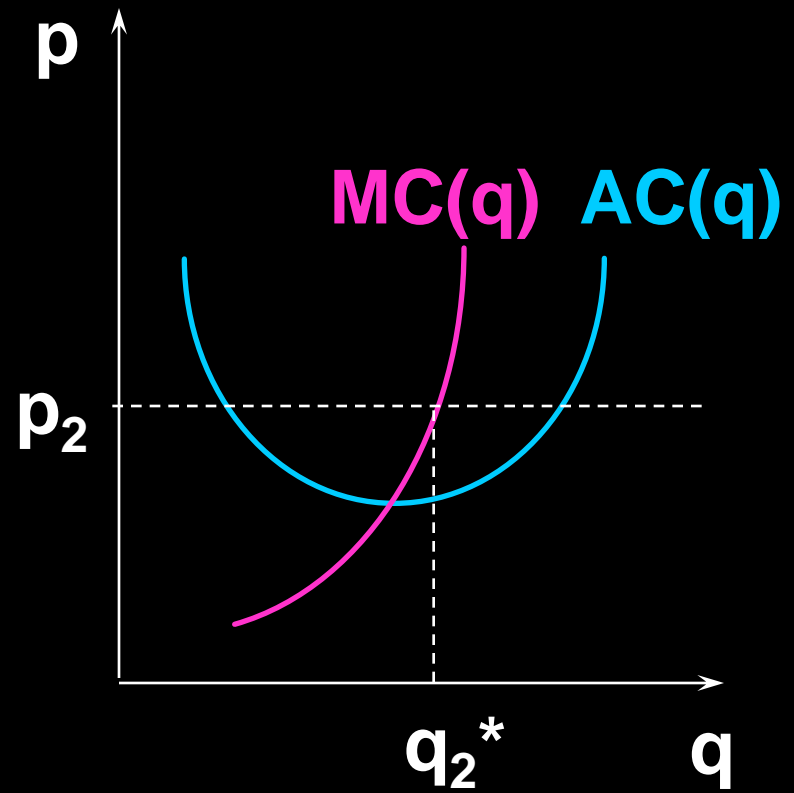
MC(q)   AC(q)

p_2

$\Pi > 0$

q_2^* q

Each firm makes a positive economic profit, inducing entry by another firm.

Long-Run Industry Supply

The Market

A "Typical" Firm

Mkt. Demand

$S^2(p)$

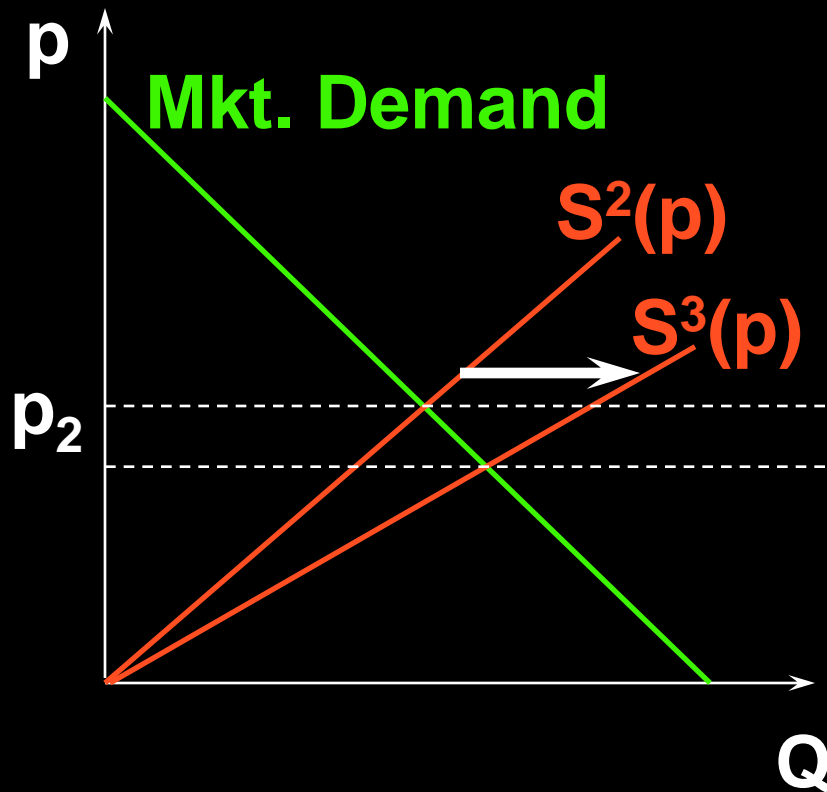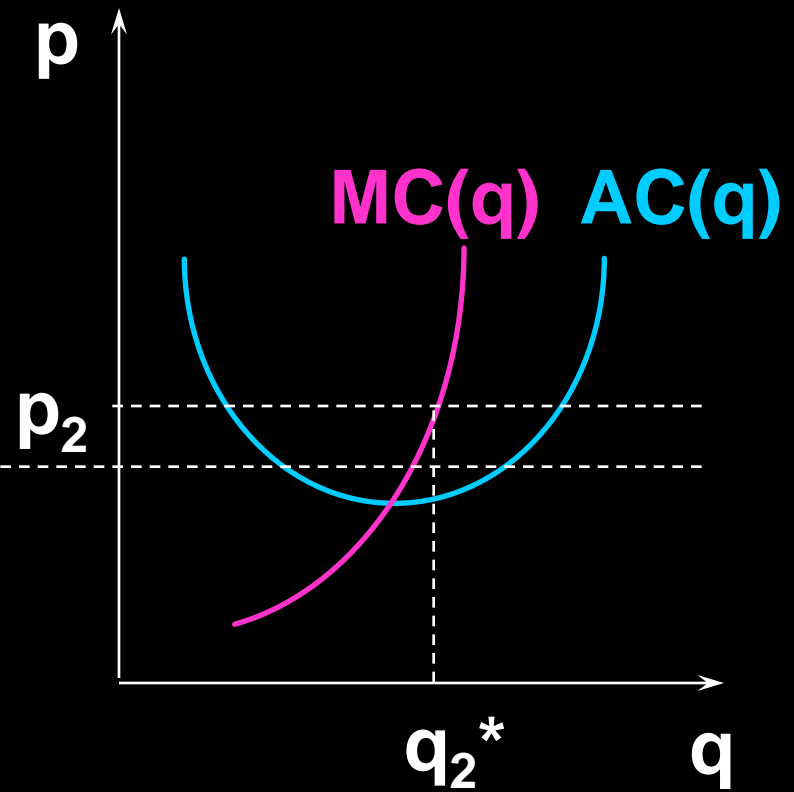$S^3(p)$

p_2

Q

$MC(q)$ $AC(q)$

p_2

q_2^*

q

Market supply shifts outwards.

Long-Run Industry Supply

The Market

A "Typical" Firm

p

Mkt. Demand

$S^2(p)$

$S^3(p)$

p_2

Q

p

MC(q) AC(q)

p_2

q_2^* q

Market supply shifts outwards.
Market price falls.

Long-Run Industry Supply

The Market

A "Typical" Firm

p

Mkt. Demand

$S^2(p)$

$S^3(p)$

p_3
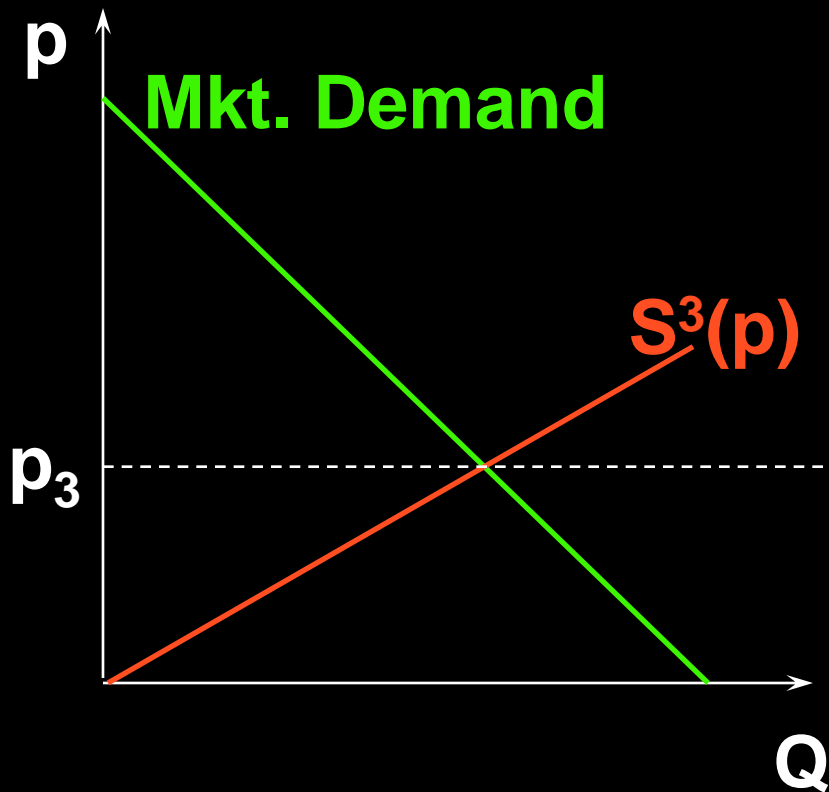
Q

p

MC(q) **AC(q)**

p_3

$\Pi > 0$

$q_3{}^*$ q
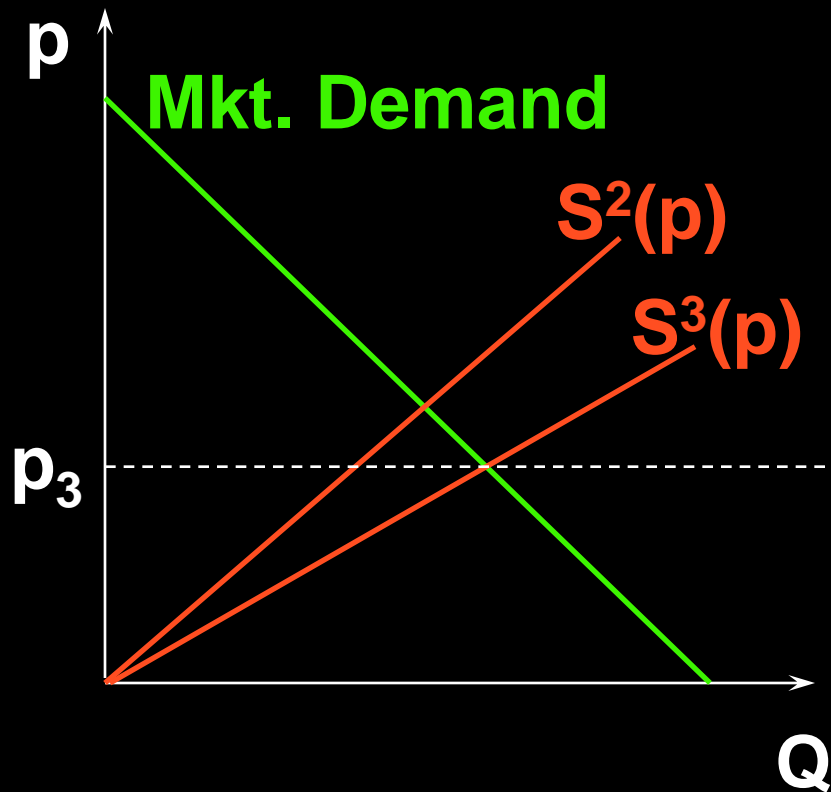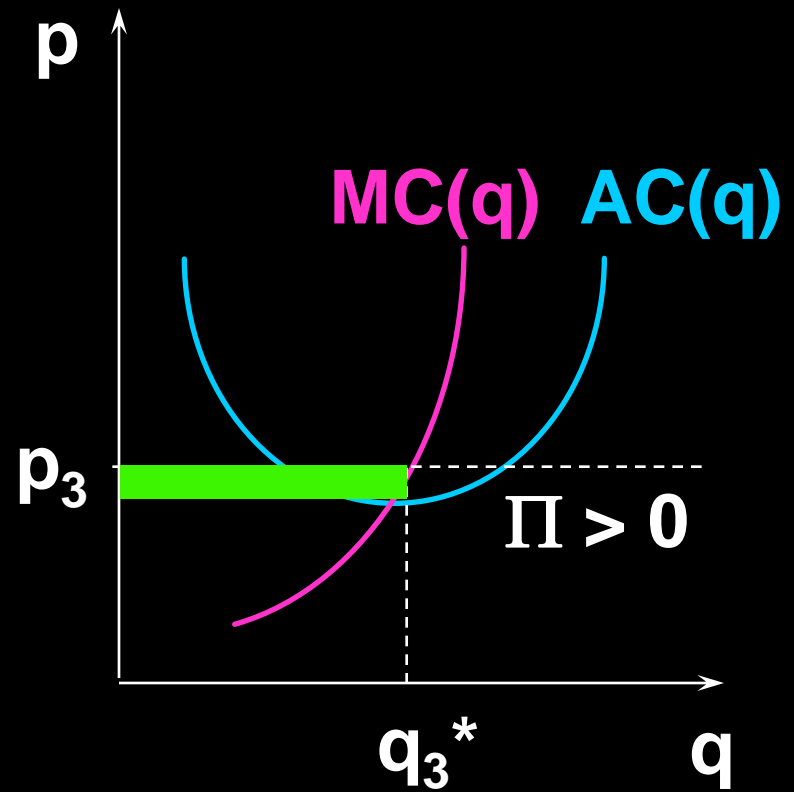
Each firm produces less.
Each firm's economic profit is reduced.

Long-Run Industry Supply

The Market

A "Typical" Firm

Mkt. Demand

$S^3(p)$

p

p_3

Q

MC(q) **AC(q)**

p

p_3

$\Pi > 0$

$q_3{}^*$

q
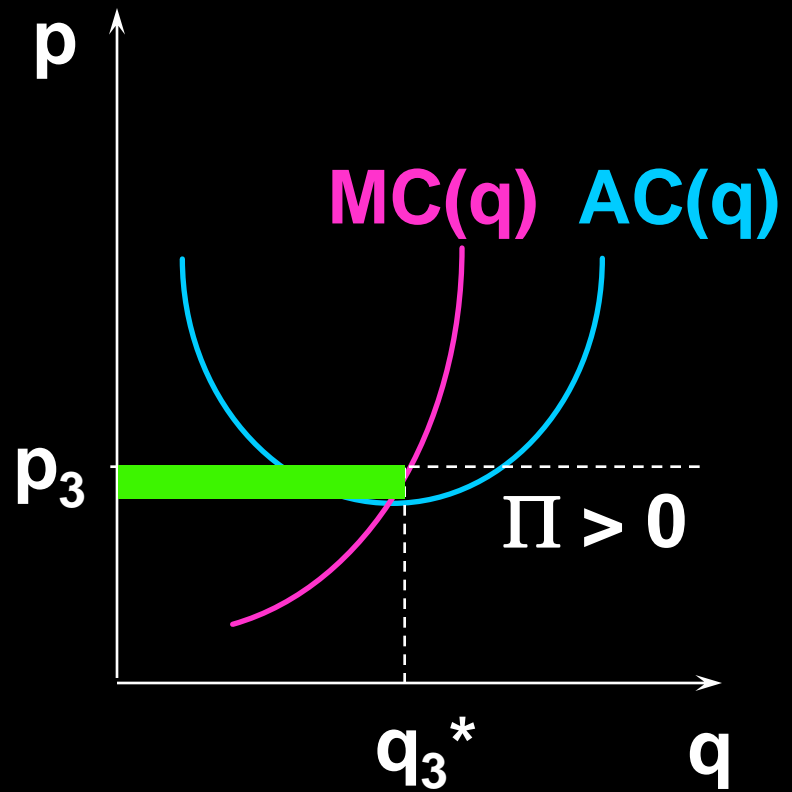
Each firm's economic profit is positive. Will another firm enter?

Long-Run Industry Supply

The Market

Mkt. Demand

p

$S^3(p)$

$S^4(p)$

p_3

Q

A "Typical" Firm

p

MC(q) **AC(q)**

p_3

q_3^*

q
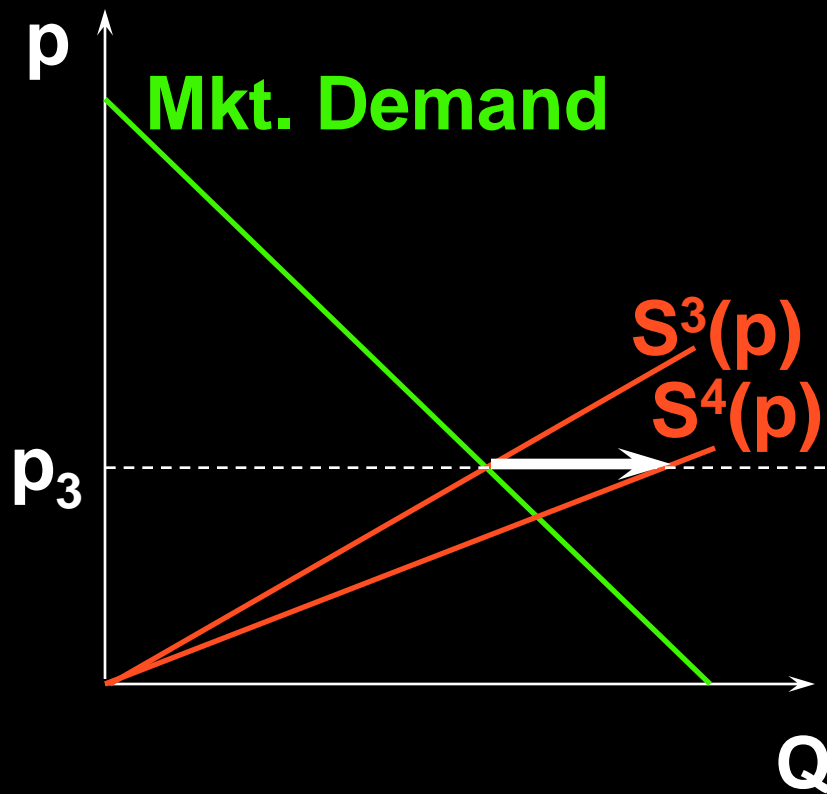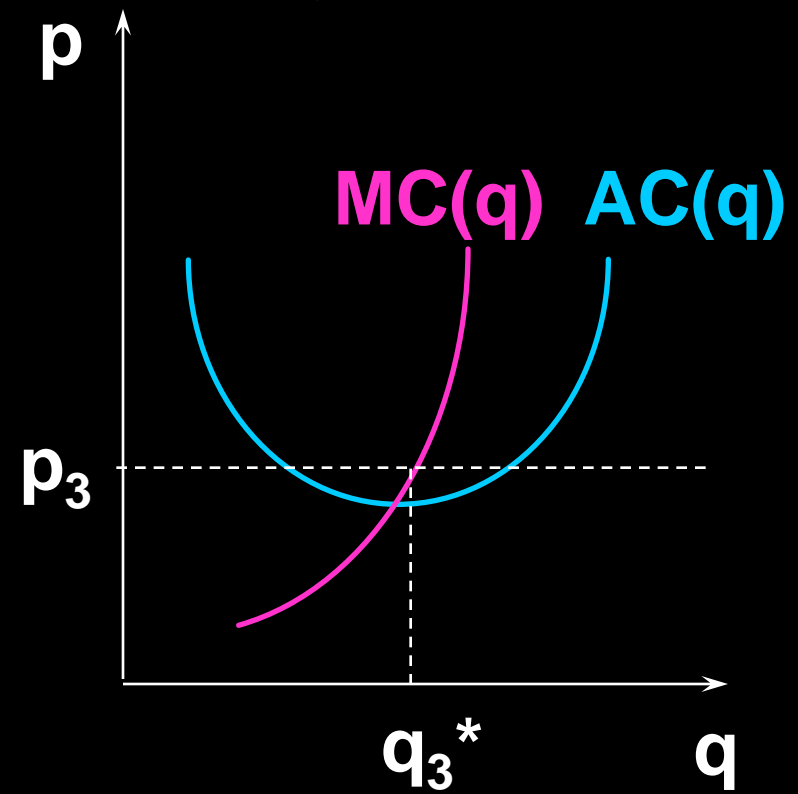
Market supply would shift outwards again.

Long-Run Industry Supply

The Market　　　　**A "Typical" Firm**

Mkt. Demand

$S^3(p)$

$S^4(p)$

p_4

Q

MC(q) AC(q)

p_4

$\Pi < 0$

q_4^*　　q
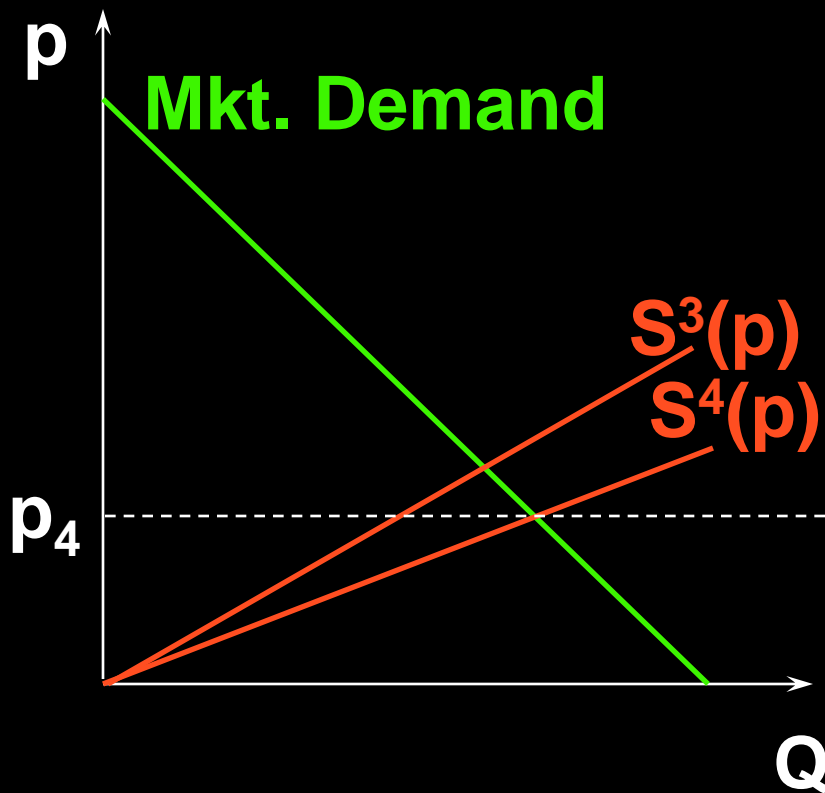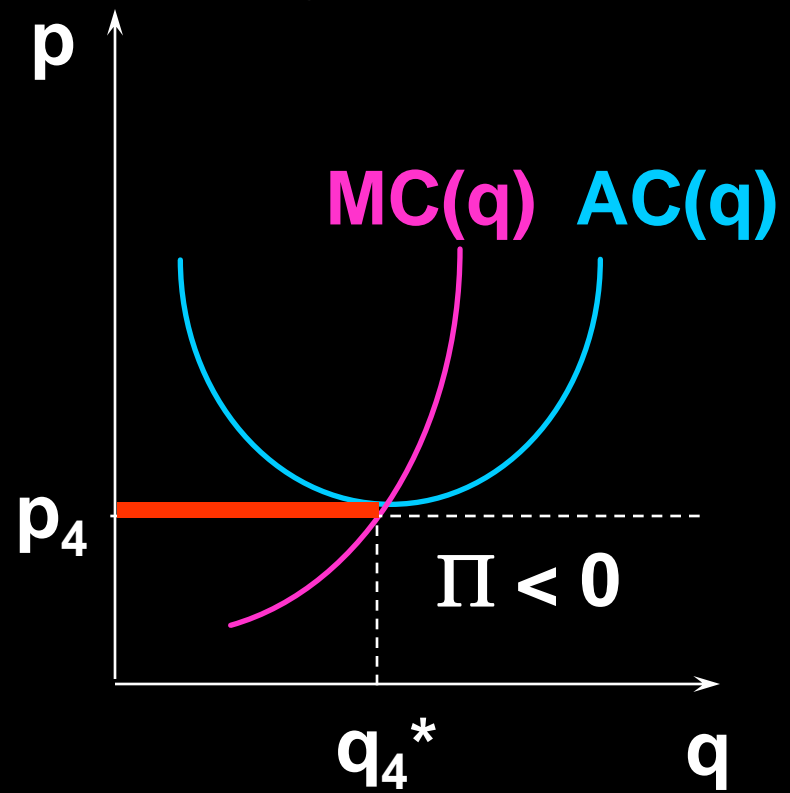
Each firm would produce less again. Each firm's economic profit would be negative. So the fourth firm would not enter.

Long-Run Industry Supply

◆ **The long-run number of firms in the industry is the largest number for which the market price is at least as large as min AC(q).**

◆ **Now we can construct the industry's long-run supply curve.**
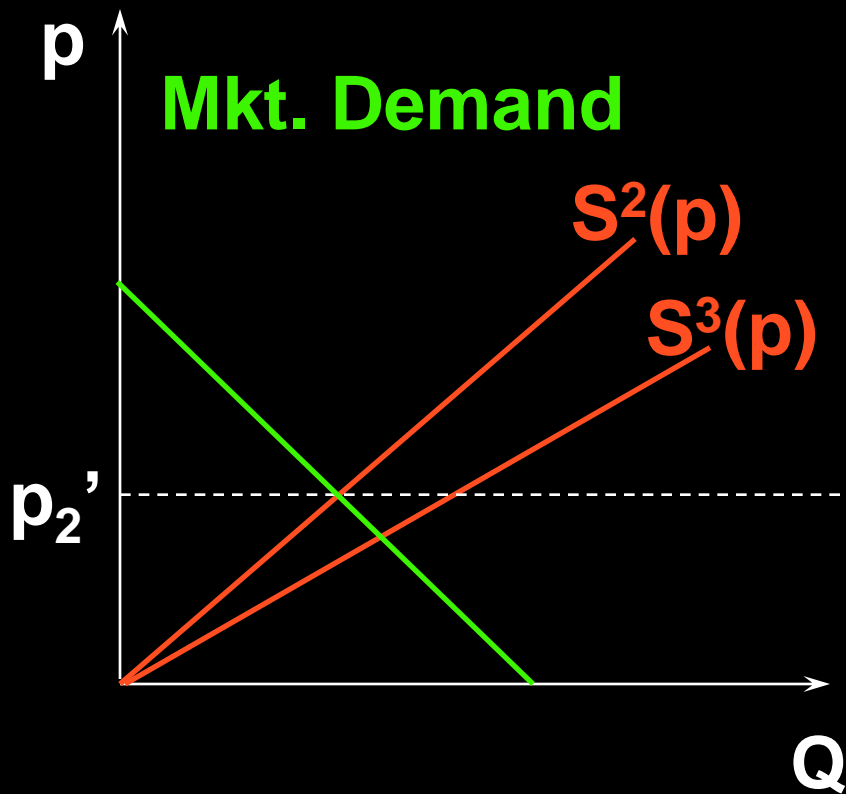
Long-Run Industry Supply

◆ **Suppose that market demand is large enough to sustain only two firms in the industry.**
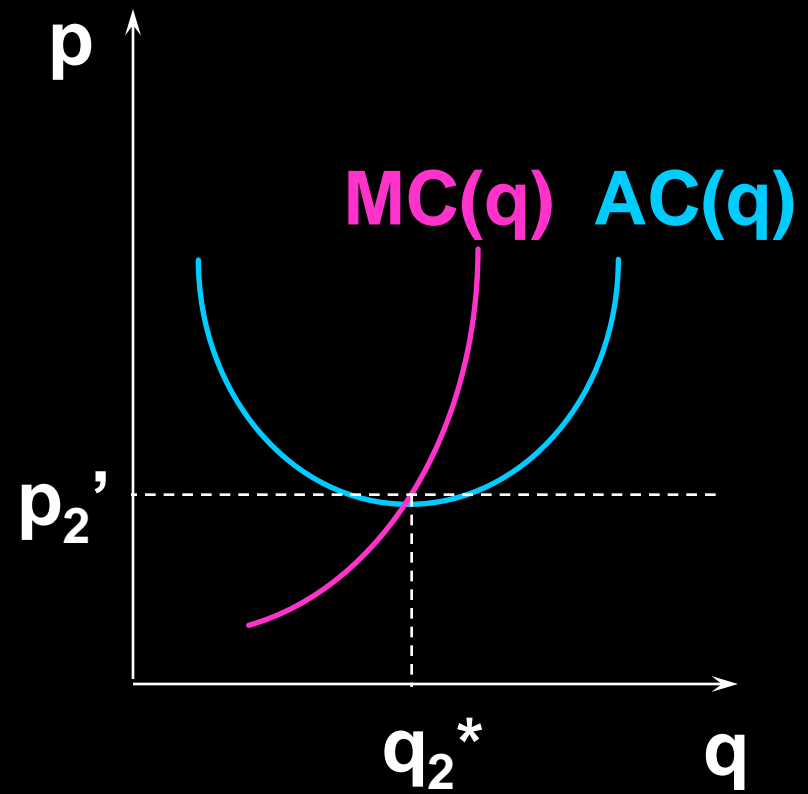
Long-Run Industry Supply

◆ **Suppose that market demand is large enough to sustain only two firms in the industry.**

◆ **Then market demand increases, the market price rises, each firm produces more, and earns a higher economic profit.**
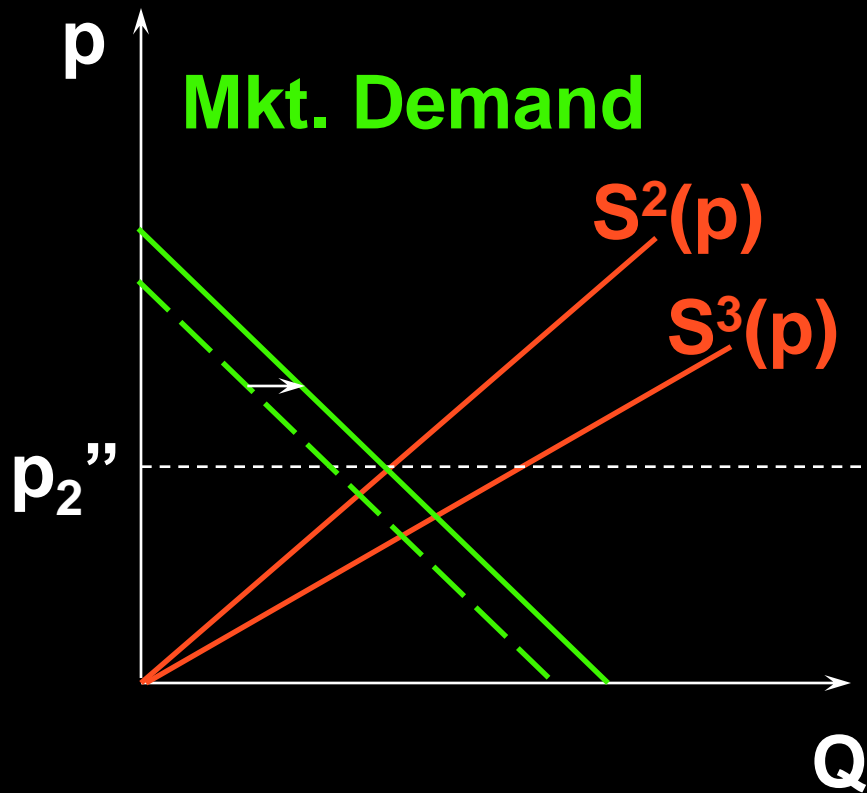
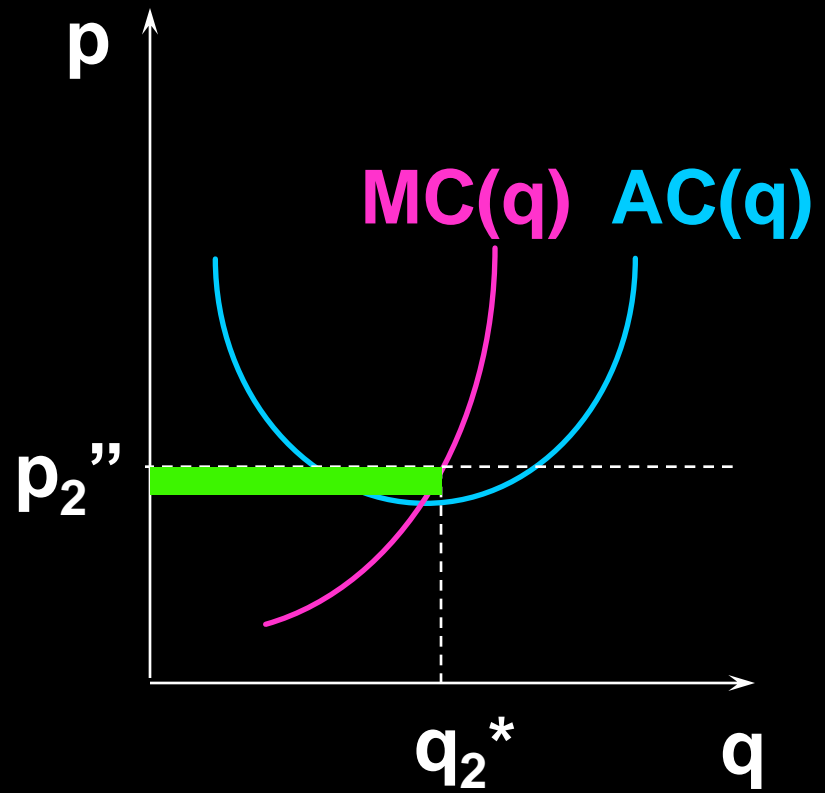# Long-Run Industry Supply

The Market

A "Typical" Firm

p

Mkt. Demand

$S^2(p)$

$S^3(p)$

p_2'

Q

p

MC(q)   **AC(q)**
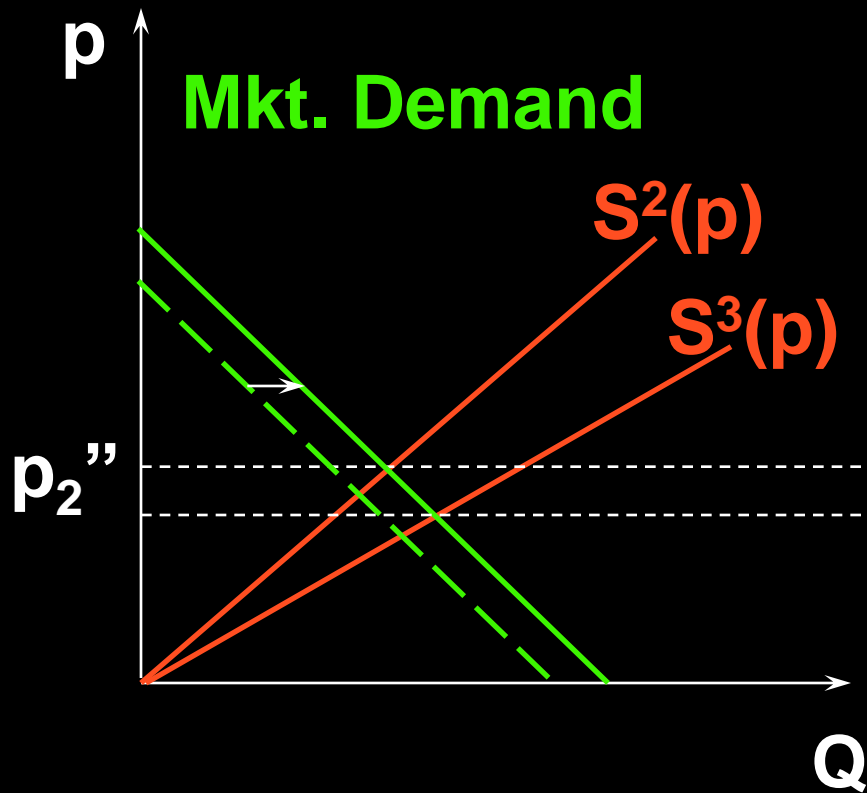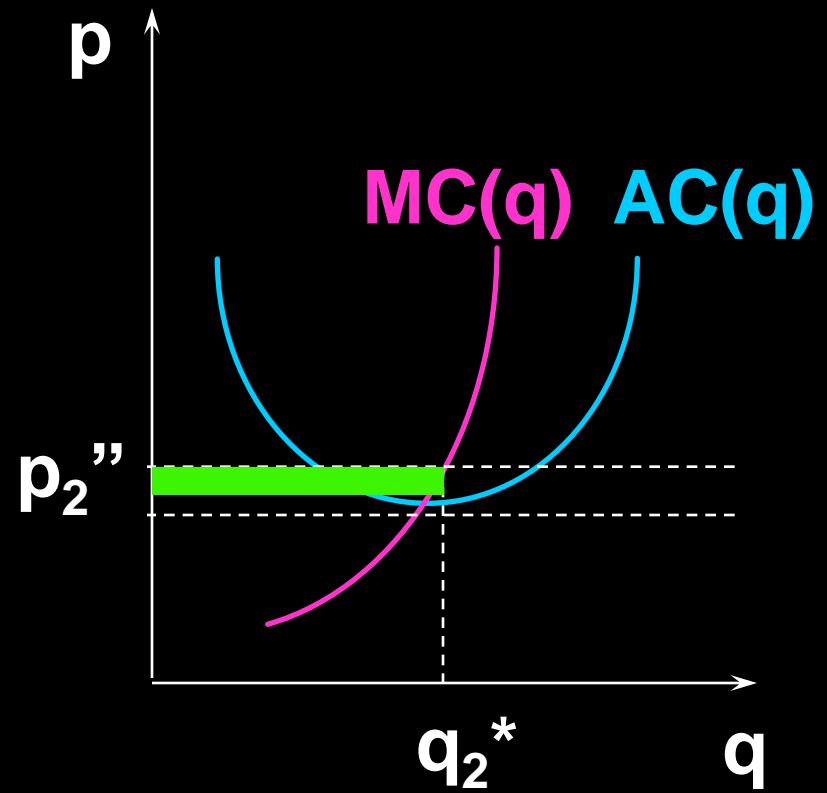
p_2'

q_2*

q

Long-Run Industry Supply

Long-Run Industry Supply

The Market

A "Typical" Firm

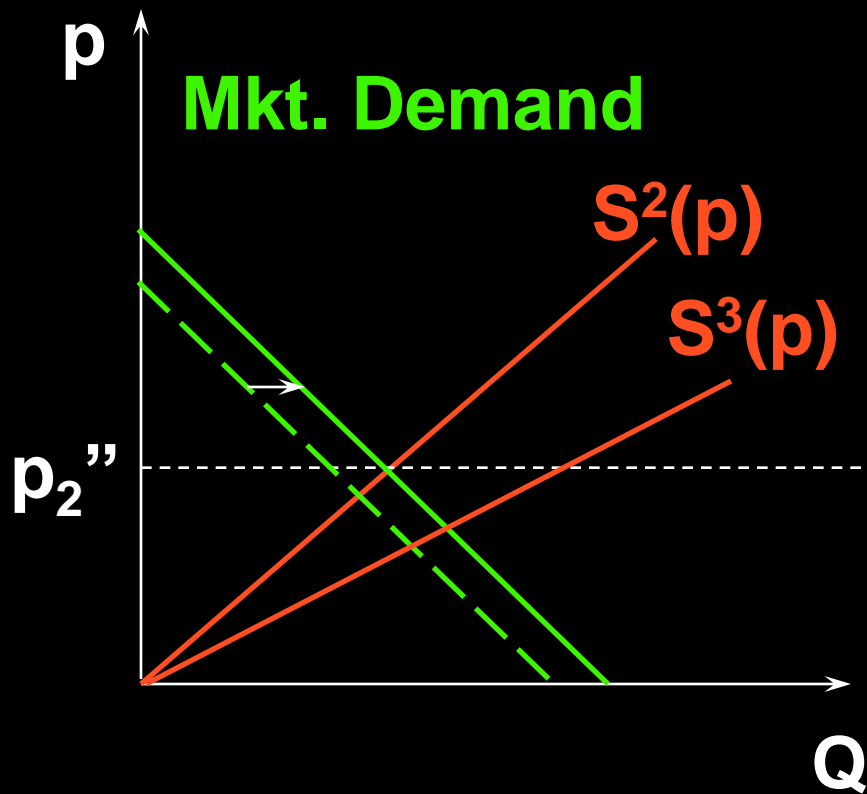**Notice that a 3rd firm will not enter since it would earn negative economic profits.**

Long-Run Industry Supply

◆ **As market demand increases further, the market price rises further, the two incumbent firms each produce more and earn still higher economic profits -- until a 3rd firm becomes indifferent between entering and staying out.**

Long-Run Industry Supply
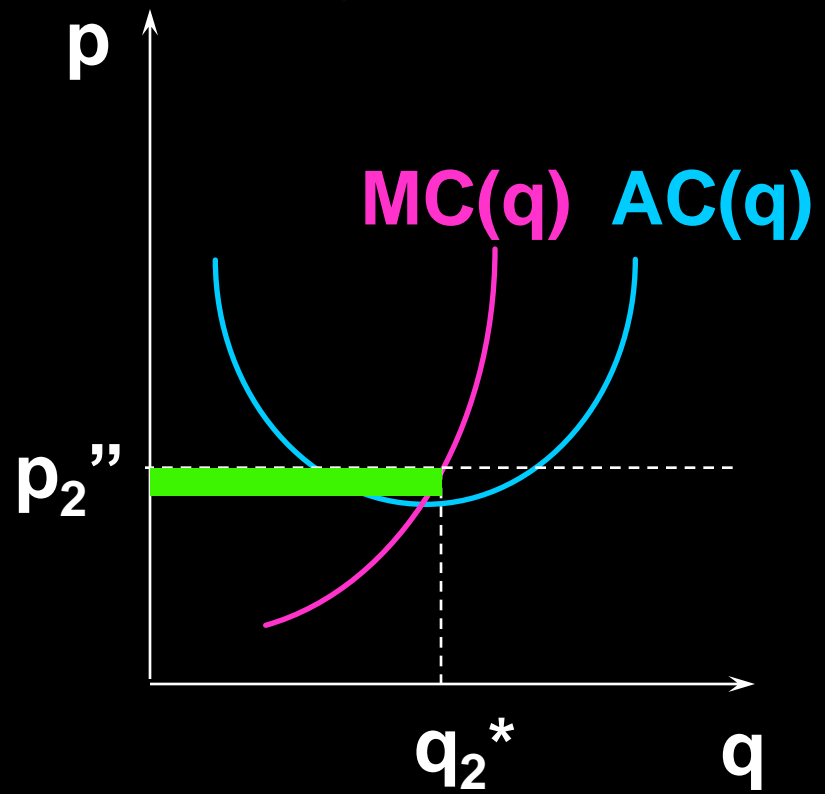
The Market

A "Typical" Firm

Long-Run Industry Supply

The Market

A "Typical" Firm

Mkt. Demand

$S^2(p)$

$S^3(p)$

p_2'''

MC(q) **AC(q)**

p_2'''

p

p

Q

q

q_2^*
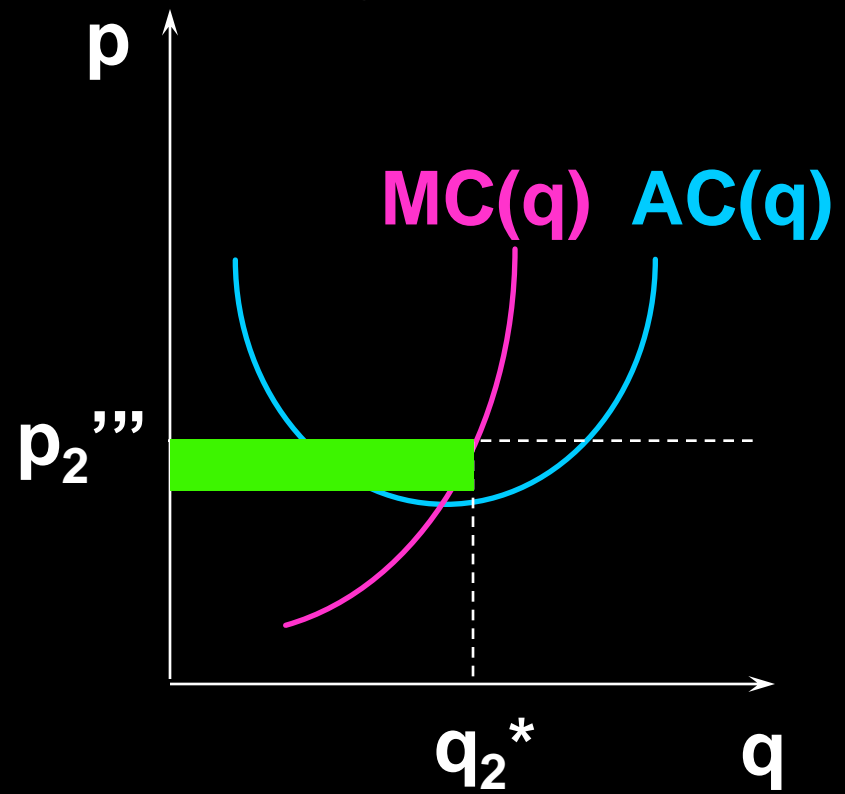
Long-Run Industry Supply

The Market

A "Typical" Firm
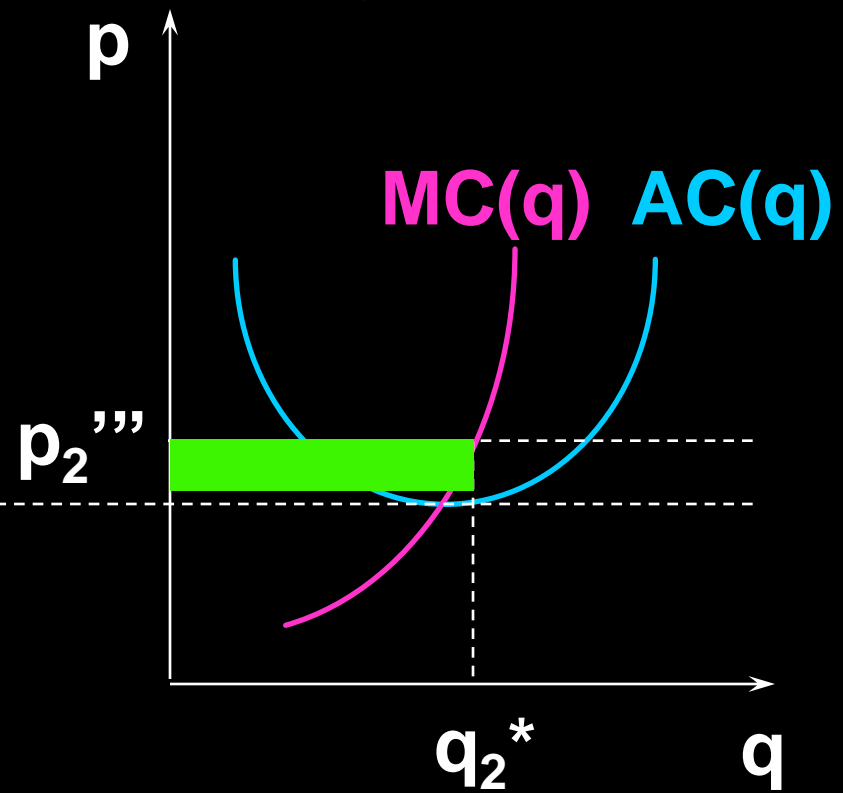
A third firm can now enter, causing all firms to earn zero economic profits.
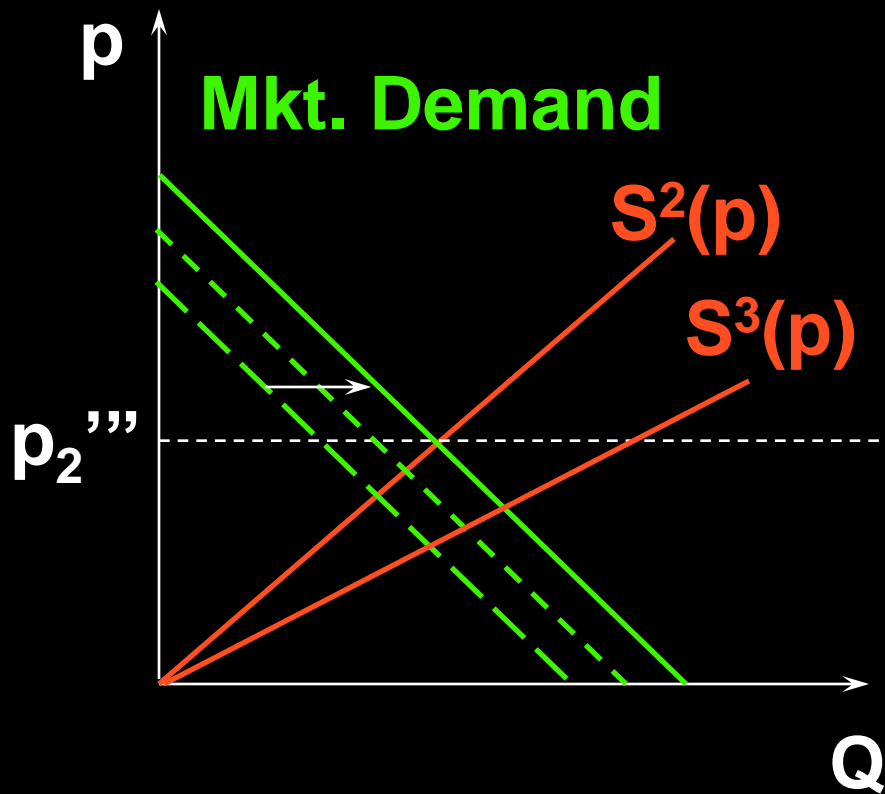
Long-Run Industry Supply

◆ **So any further increase in market demand will cause the number of firms in the industry to rise to three.**

Long-Run Industry Supply

The Market

A "Typical" Firm

p

Mkt. Demand

$S^2(p)$

$S^3(p)$

p_2'''

Q

p

MC(q) **AC(q)**

p_2'''

q_2^* q
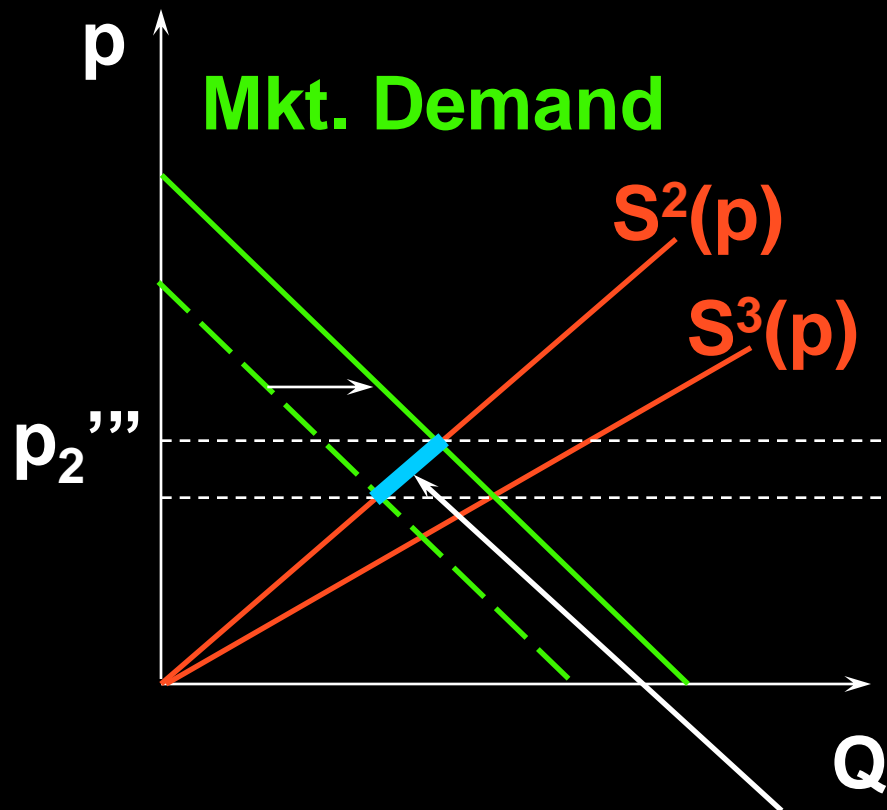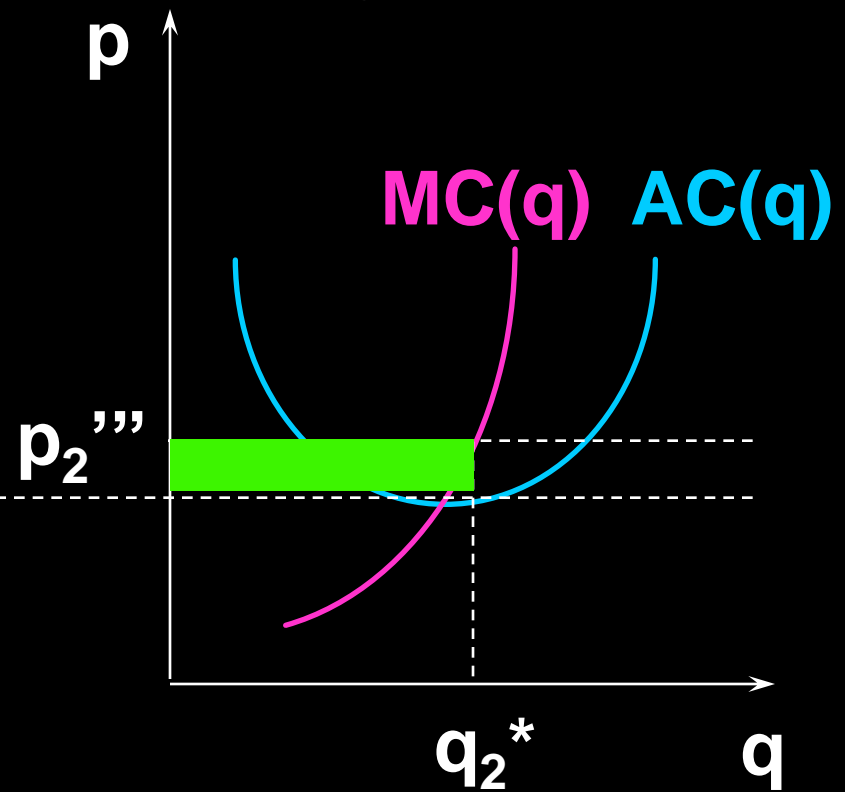
The only relevant part of the short-run supply curve for n = 2 firms in the industry.

Long-Run Industry Supply

◆ **How much further can market demand increase before a fourth firm enters the industry?**

Long-Run Industry Supply

The Market

Mkt. Demand

p

$S^3(p)$

$S^4(p)$

p_3'

Q

A "Typical" Firm

p

MC(q) **AC(q)**

p_3'

q_3^*

q
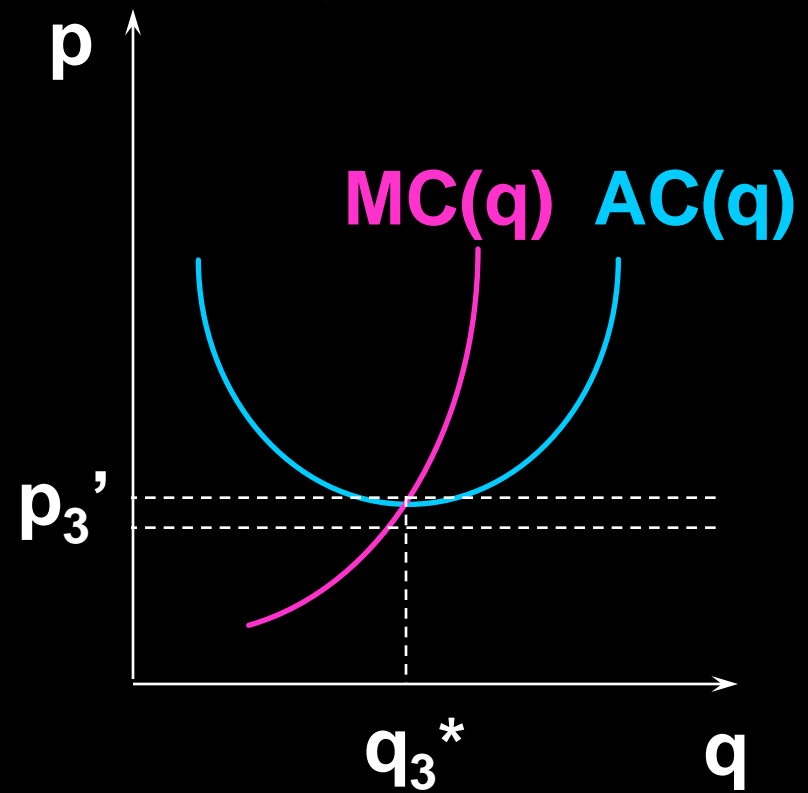
A 4th firm would now earn negative economic profits if it entered the industry.

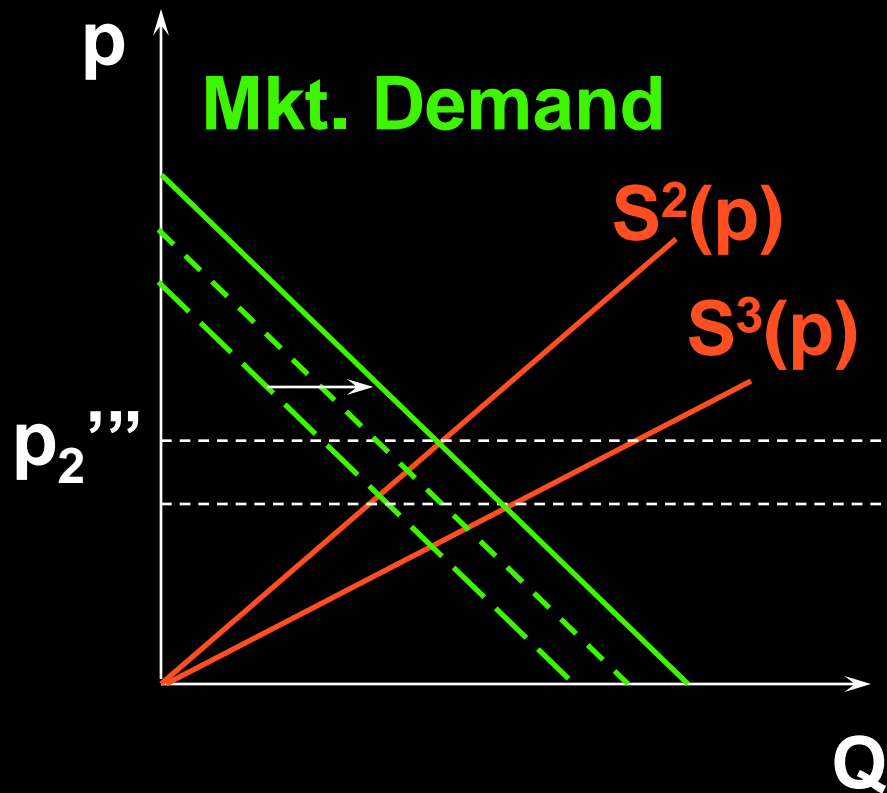# Long-Run Industry Supply

The Market A "Typical" Firm

p **Mkt. Demand**

p

MC(q) **AC(q)**

$S^3(p)$

$S^4(p)$

p_3'

p_3'

Q

$q_3{}^*$ q
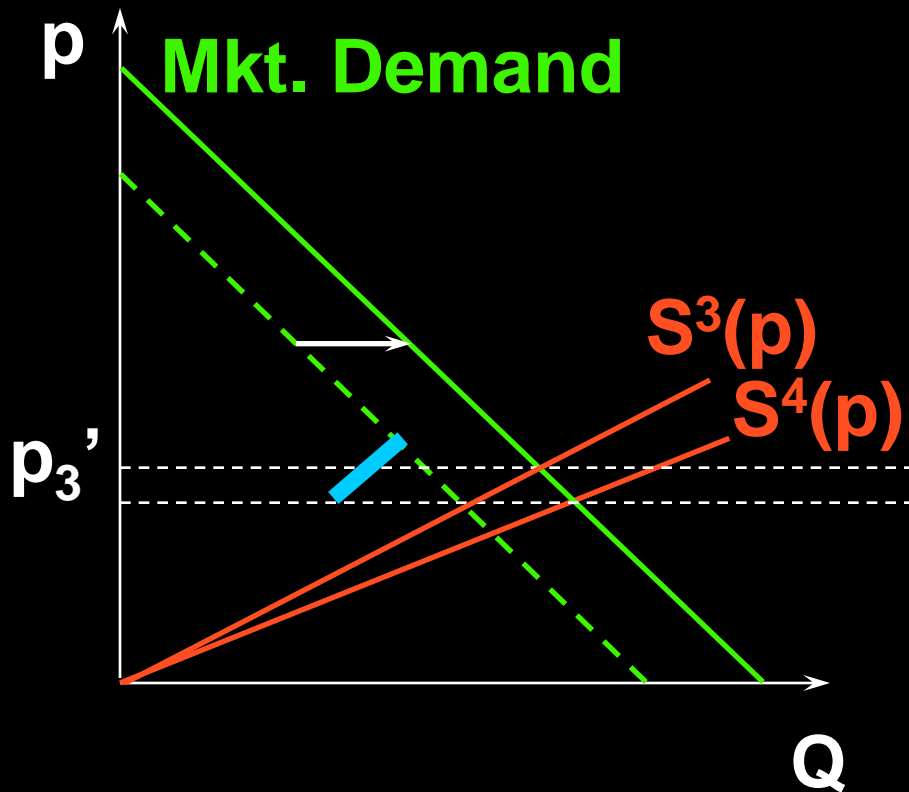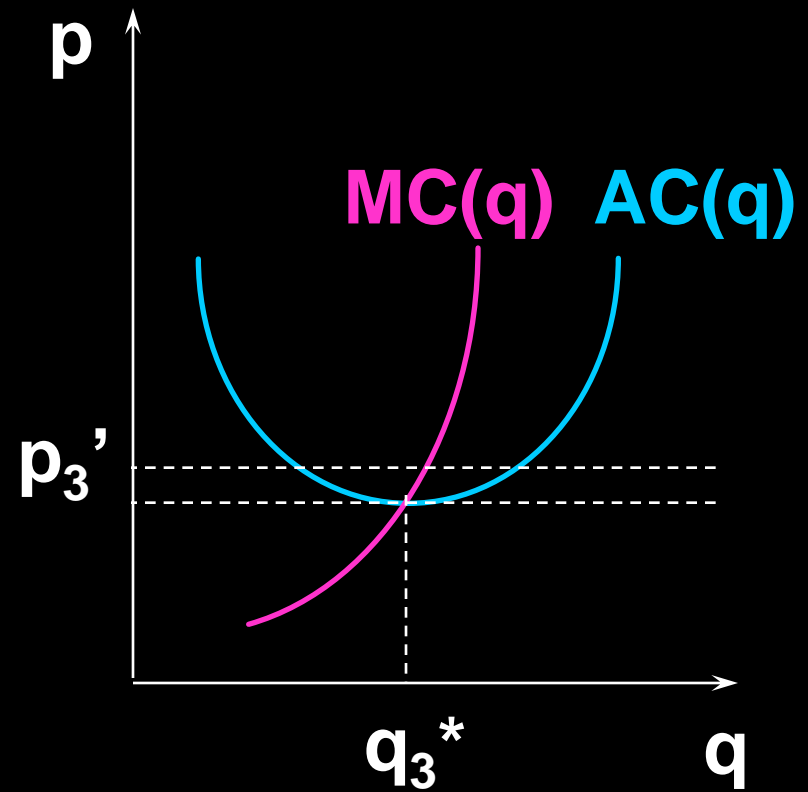
But now a 4th firm would earn zero economic profit if it entered the industry.

Long-Run Industry Supply

The Market

Mkt. Demand

p

p_3'

$S^3(p)$

$S^4(p)$

Q

A "Typical" Firm

p

MC(q) **AC(q)**

p_3'

q_3*

q

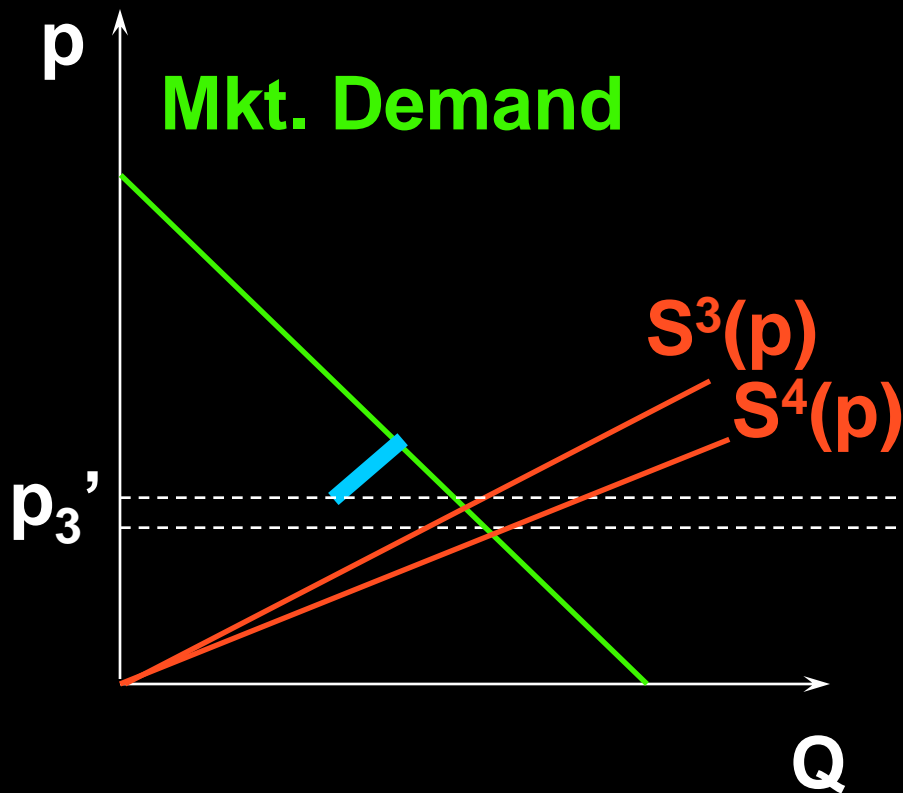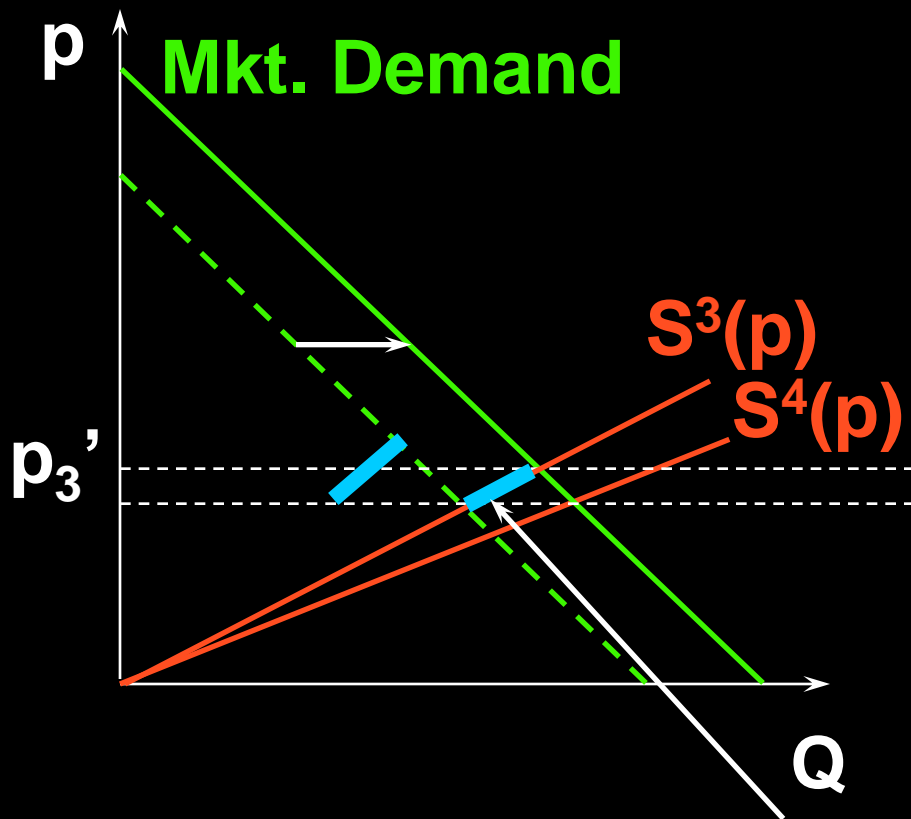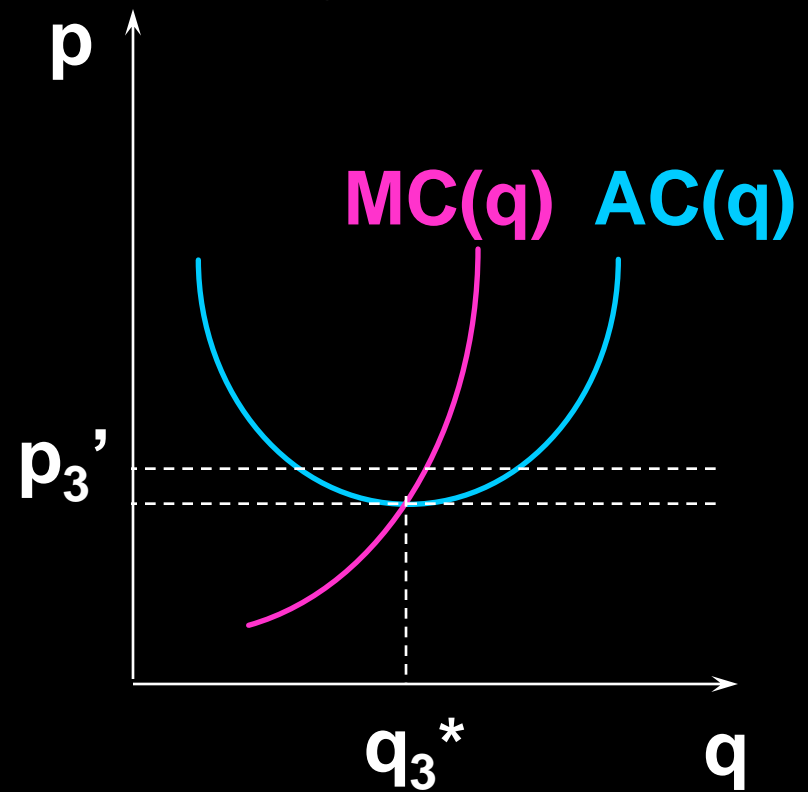**The only relevant part of the short-run supply curve for n = 3 firms in the industry.**

Long-Run Industry Supply

◆ **Continuing in this manner builds the industry's long-run supply curve, one section at-a-time from successive short-run industry supply curves.**

Long-Run Industry Supply

The Market Long-Run Supply Curve

A "Typical" Firm

MC(q) AC(q)

q_3^*

p   Q

p   q
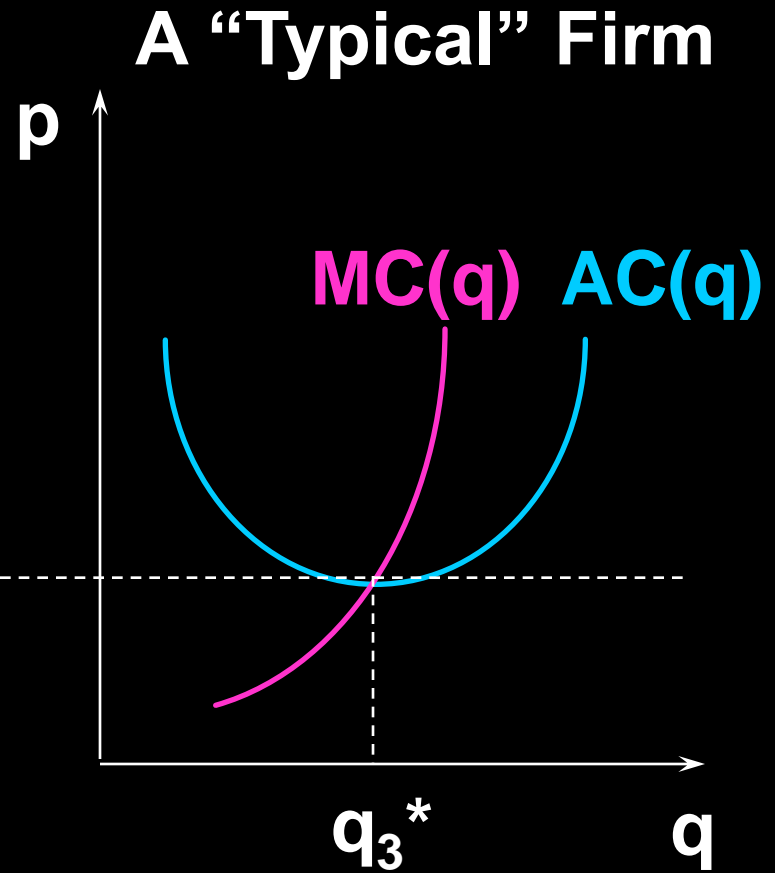
Notice that the bottom of each segment of the supply curve is min AC(y).

Long-Run Industry Supply

◆ **As each firm gets "smaller" relative to the industry, the long-run industry supply curve approaches a horizontal line at the height of min AC(q).**
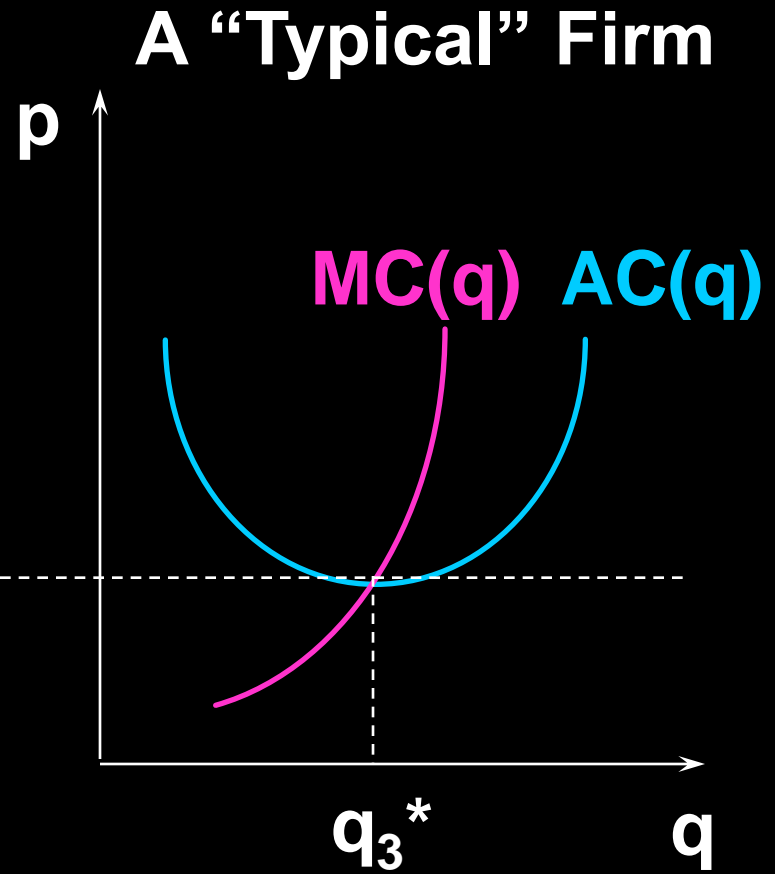
Long-Run Industry Supply

The Market Long-Run Supply Curve

A "Typical" Firm

p

MC(q) **AC(q)**

p

Q

q_3^* q

Notice that the bottom of each segment of the supply curve is min AC(q).

Long-Run Industry Supply

The Market Long-Run Supply Curve

A "Typical" Firm

p

MC(q)

AC(q)

Q

q*　q
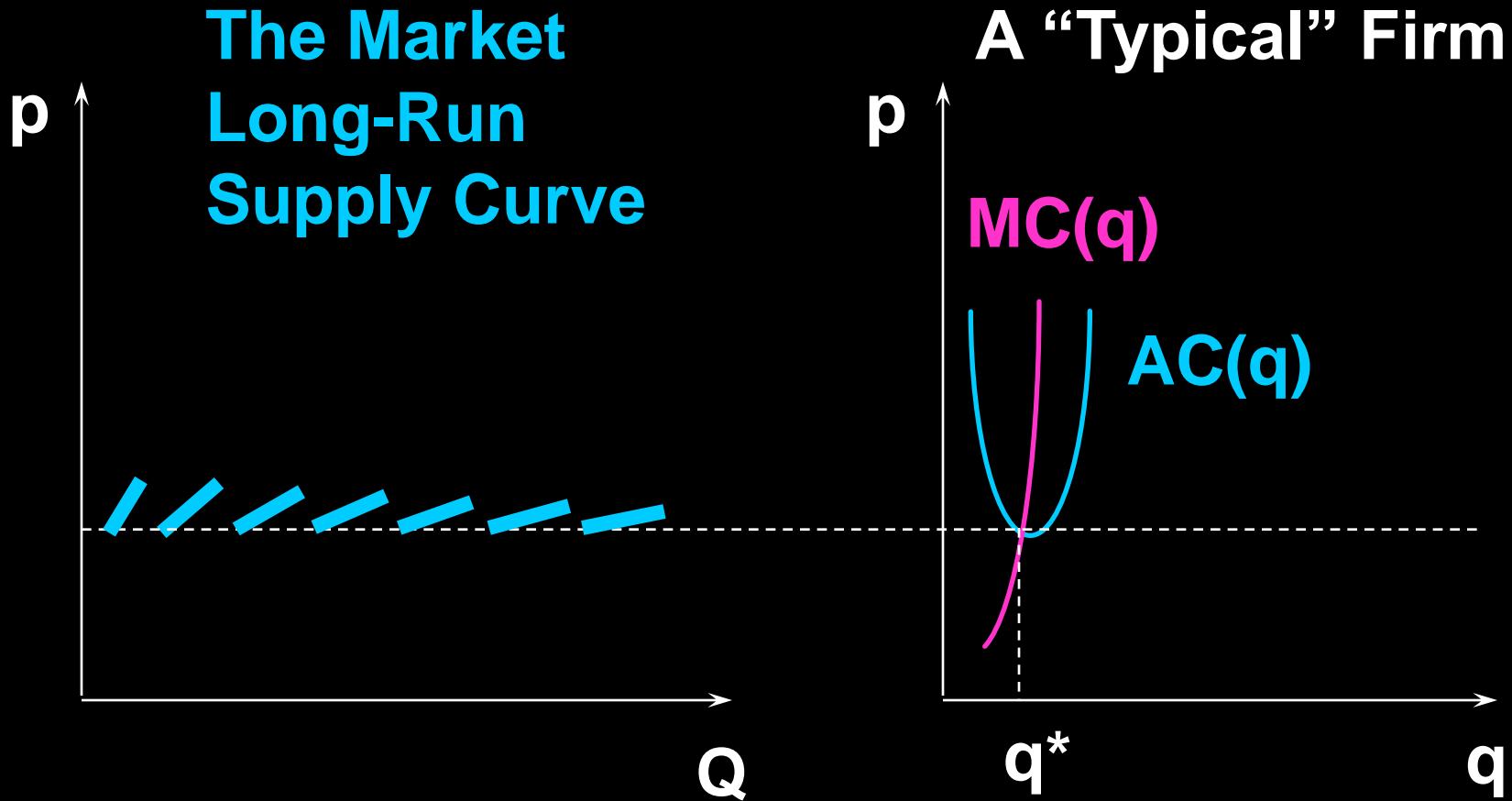
The bottom of each segment of the supply curve is min AC(q). As firms get "smaller" the segments get shorter.

Long-Run Industry Supply

The Market Long-Run Supply Curve
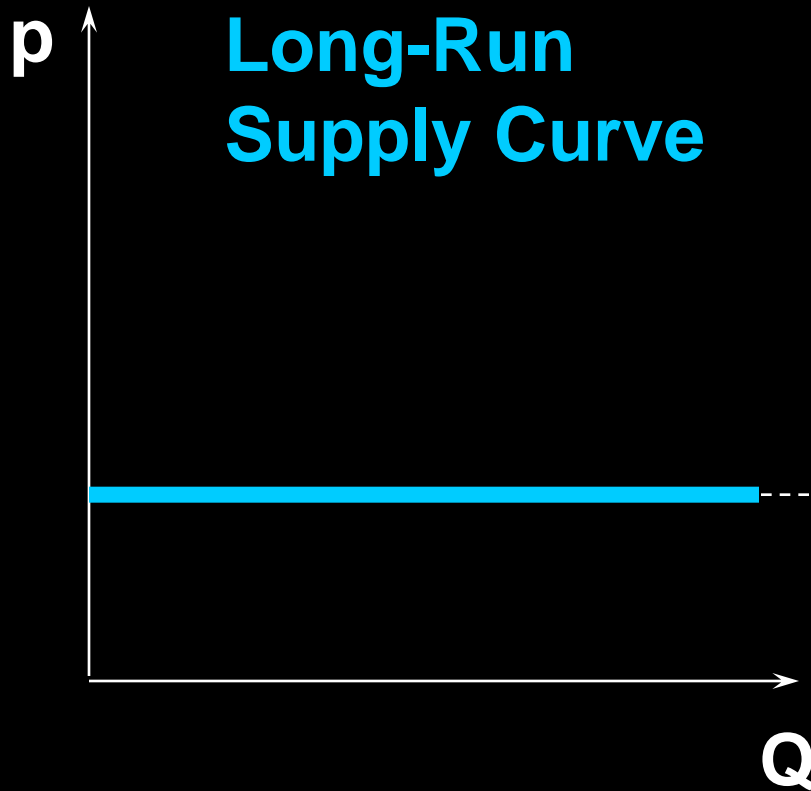
A "Typical" Firm
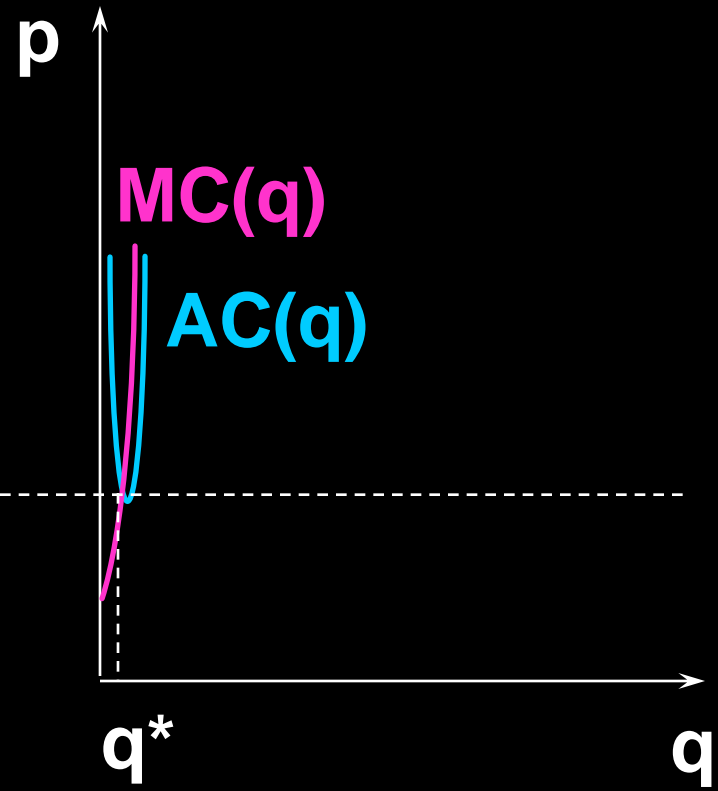
In the limit, as firms become infinitesimally small, the industry's long-run supply curve is horizontal at min AC(q).

Long-Run Market Equilibrium Price

◆ **In the long-run market equilibrium, the market price is determined solely by the long-run minimum average production cost.**

Long-run market price is

$$p^e = \min_{q>0} AC(q).$$

Long-Run Implications for Taxation

◆ **In a short-run equilibrium, the burden of a sales or an excise tax is typically shared by both buyers and sellers, tax incidence of the tax depending upon the own-price elasticities of demand and supply.**

◆ **Q: Is this true in a long-run market equilibrium?**

Long-Run Implications for Taxation
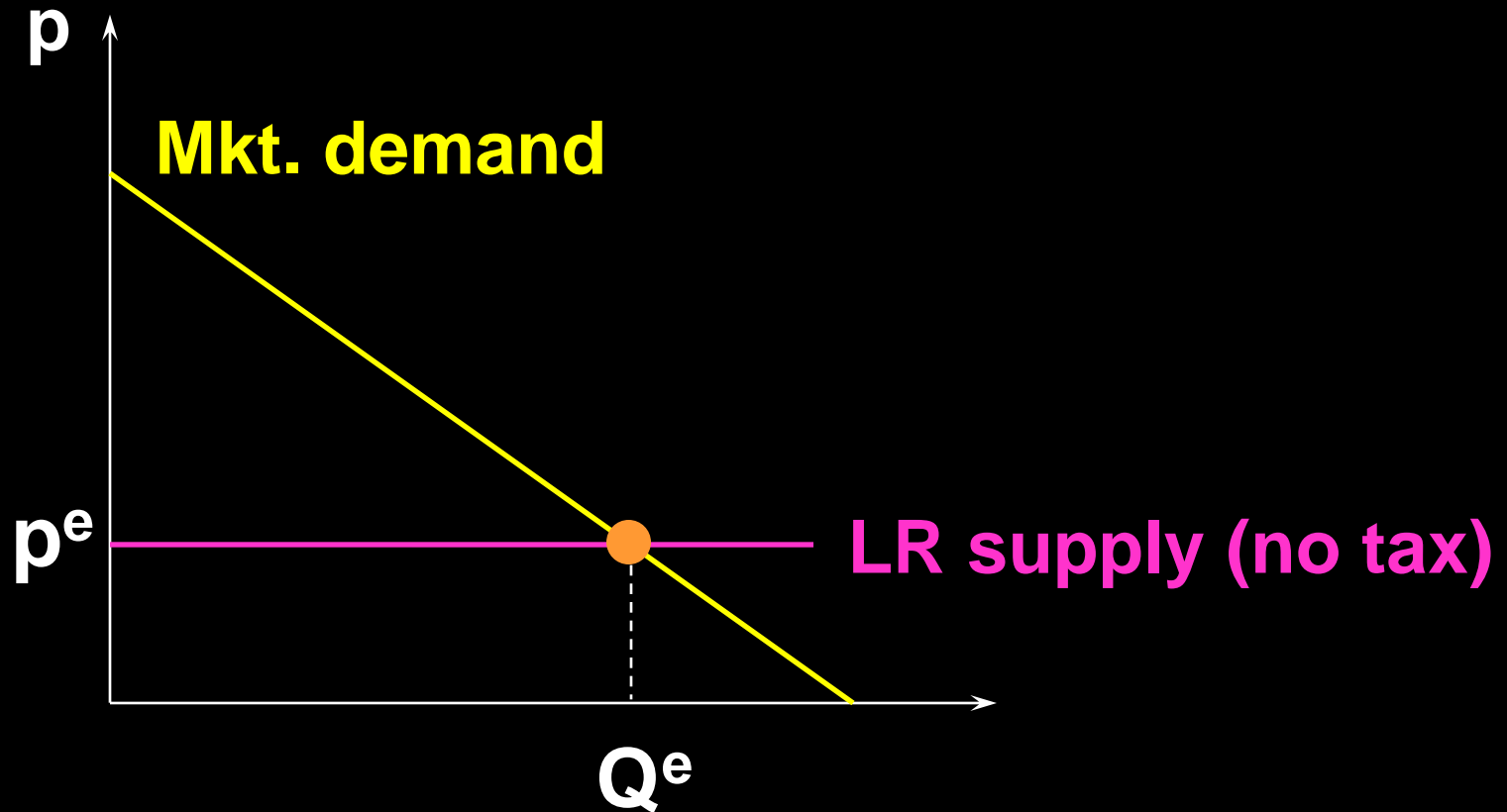
Long-Run Implications for Taxation

In the long-run the buyers pay all of a sales or an excise tax.
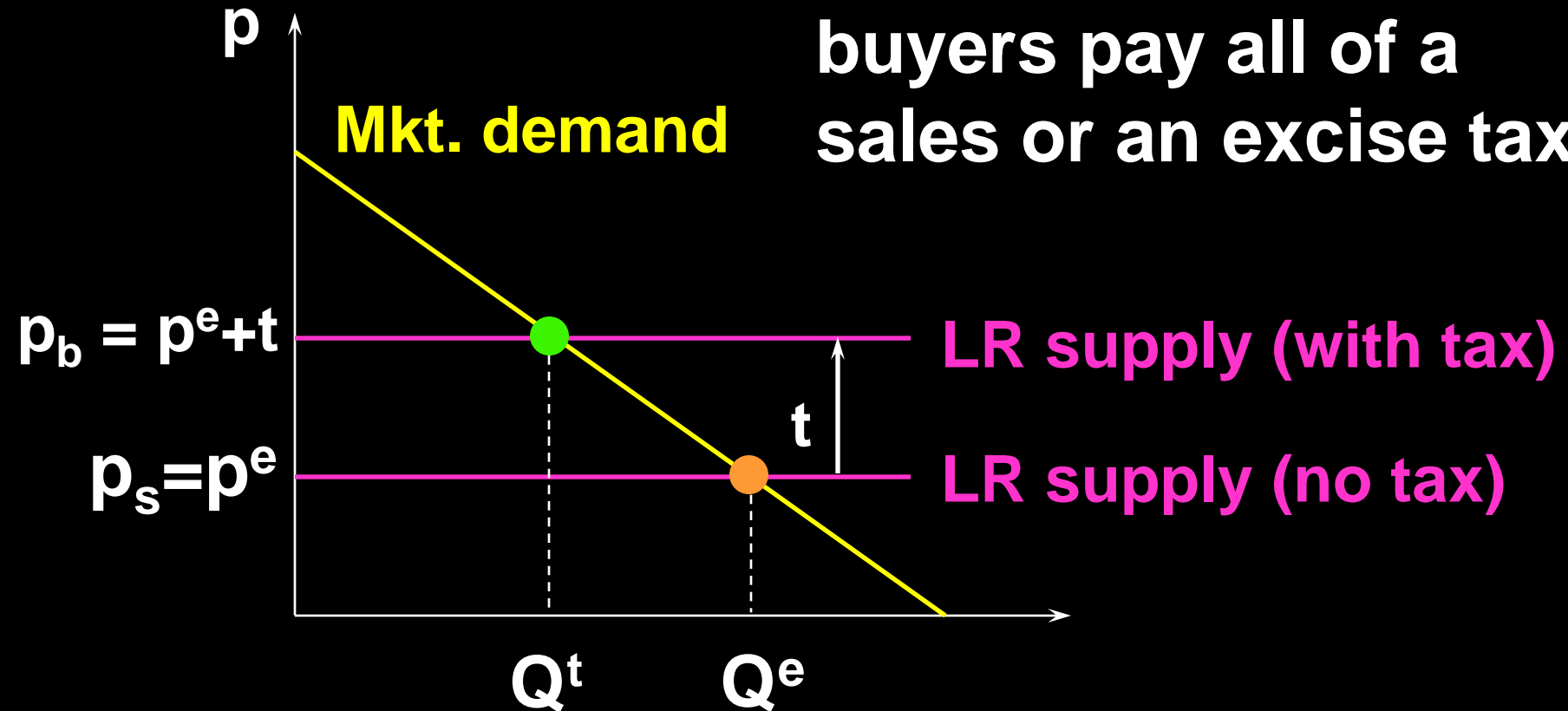
Fixed Inputs and Economic Rent

◆ **What if there is a barriers to entry or exit?**

◆ **E.g., the taxi-cab industry has a barrier to entry even though there are lots of cabs competing with each other.**

◆ **Liquor licensing is a barrier to entry into a competitive industry.**

Fixed Inputs and Economic Rent

◆ **Q: When there is a barrier to entry, will not the firms already in the industry make positive economic profits?**

Fixed Inputs and Economic Rent

◆ **Q: When there is a barrier to entry, will not the firms already in the industry make positive economic profits?**

◆ **A: No. Each firm in the industry makes a zero economic profit. Why?**

Fixed Inputs and Economic Rent

◆ **An input (e.g. an operating license) that is fixed in the long-run causes a long-run fixed cost, F.**

◆ **Long-run total cost, $c(q) = F + c_v(q)$.**

◆ **And long-run average total cost,**
  $AC(q) = AFC(q) + AVC(q)$.

◆ **In the long-run equilibrium, what will be the value of F?**
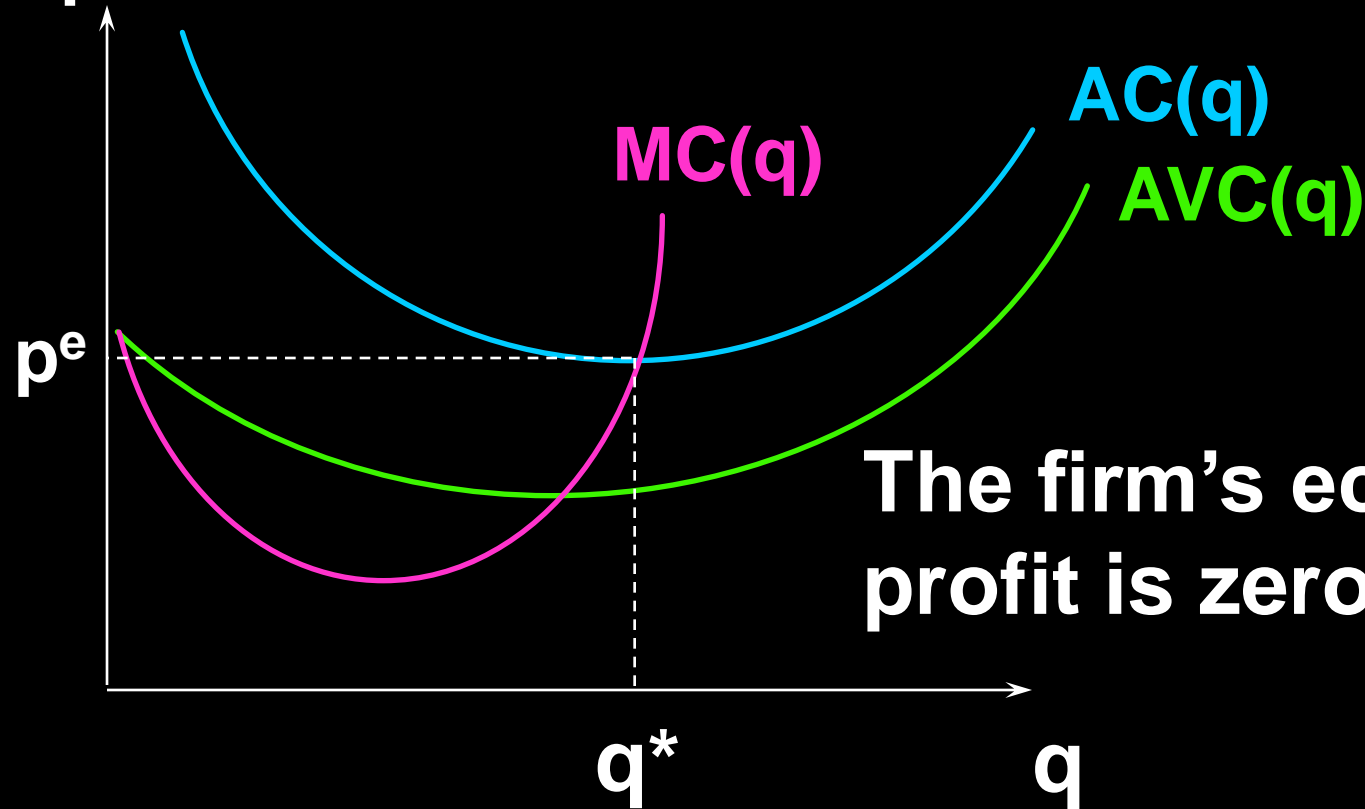
Fixed Inputs and Economic Rent

◆ **Think of a firm that needs an operating license -- the license is a fixed input that is rented but not owned by the firm.**

◆ **If the firm makes a positive economic profit then another firm can offer the license owner a higher price for it. In this way, all firms' economic profits are competed away, to zero.**

Fixed Inputs and Economic Rent

◆ **So in the long-run equilibrium, each firm makes a zero economic profit and each firm's fixed cost is its payment for its operating license.**
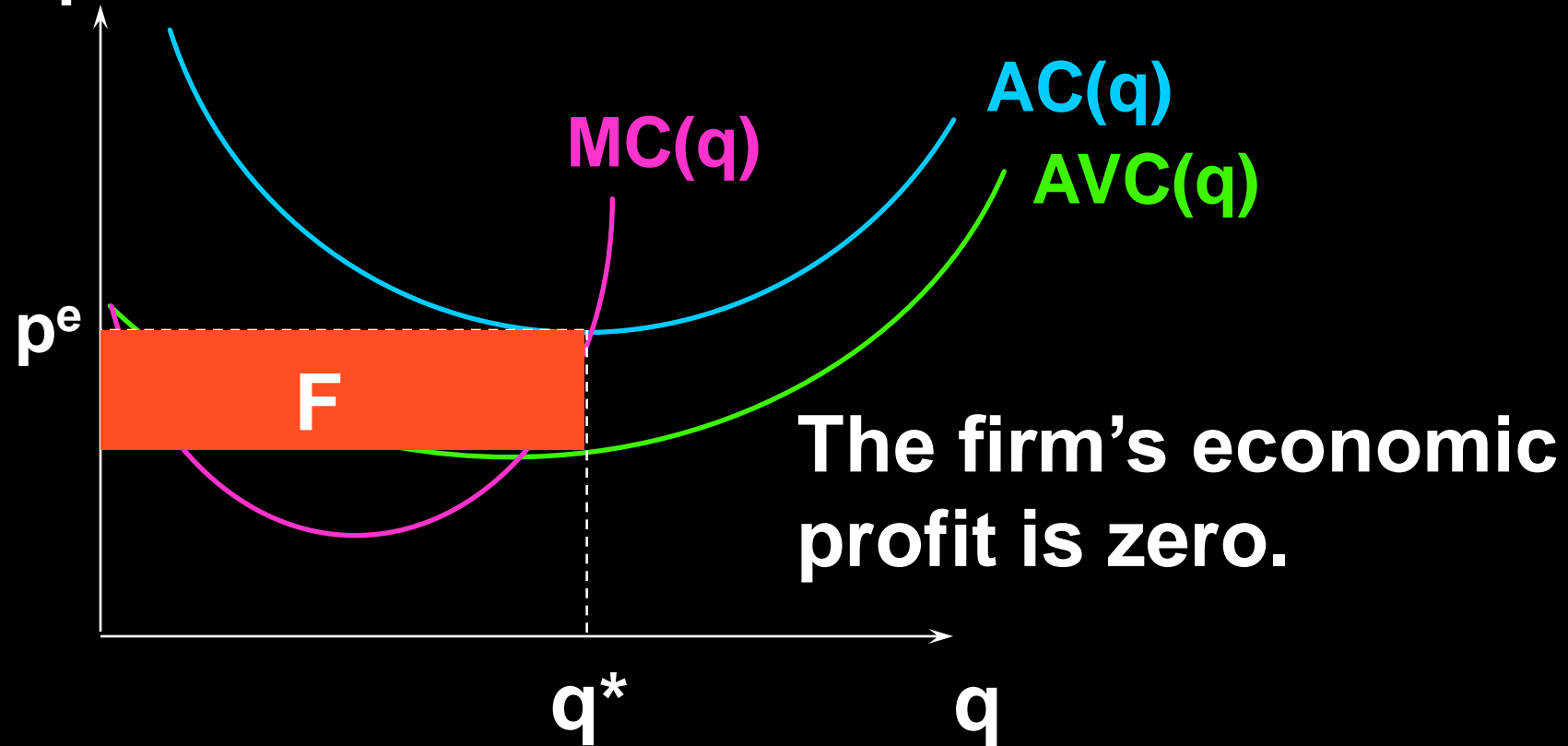
Fixed Inputs and Economic Rent

$/output unit

AC(q)

MC(q)

AVC(q)

p^e

The firm's economic profit is zero.

q*

q

Fixed Inputs and Economic Rent

$/output unit

p^e

F

MC(q)

AC(q)

AVC(q)

The firm's economic profit is zero.

q*   q

F is the payment to the owner of the fixed input (the license).

Fixed Inputs and Economic Rent

◆ **Economic rent is the payment for an input that is in excess of the minimum payment required to have that input supplied.**

◆ **Each license essentially costs zero to supply, so the long-run economic rent paid to the license owner is the firm's long-run fixed cost.**

Fixed Inputs and Economic Rent

$/output unit

AC(q)

MC(q)

AVC(q)

p^e

F

The firm's economic profit is zero.

q*

q
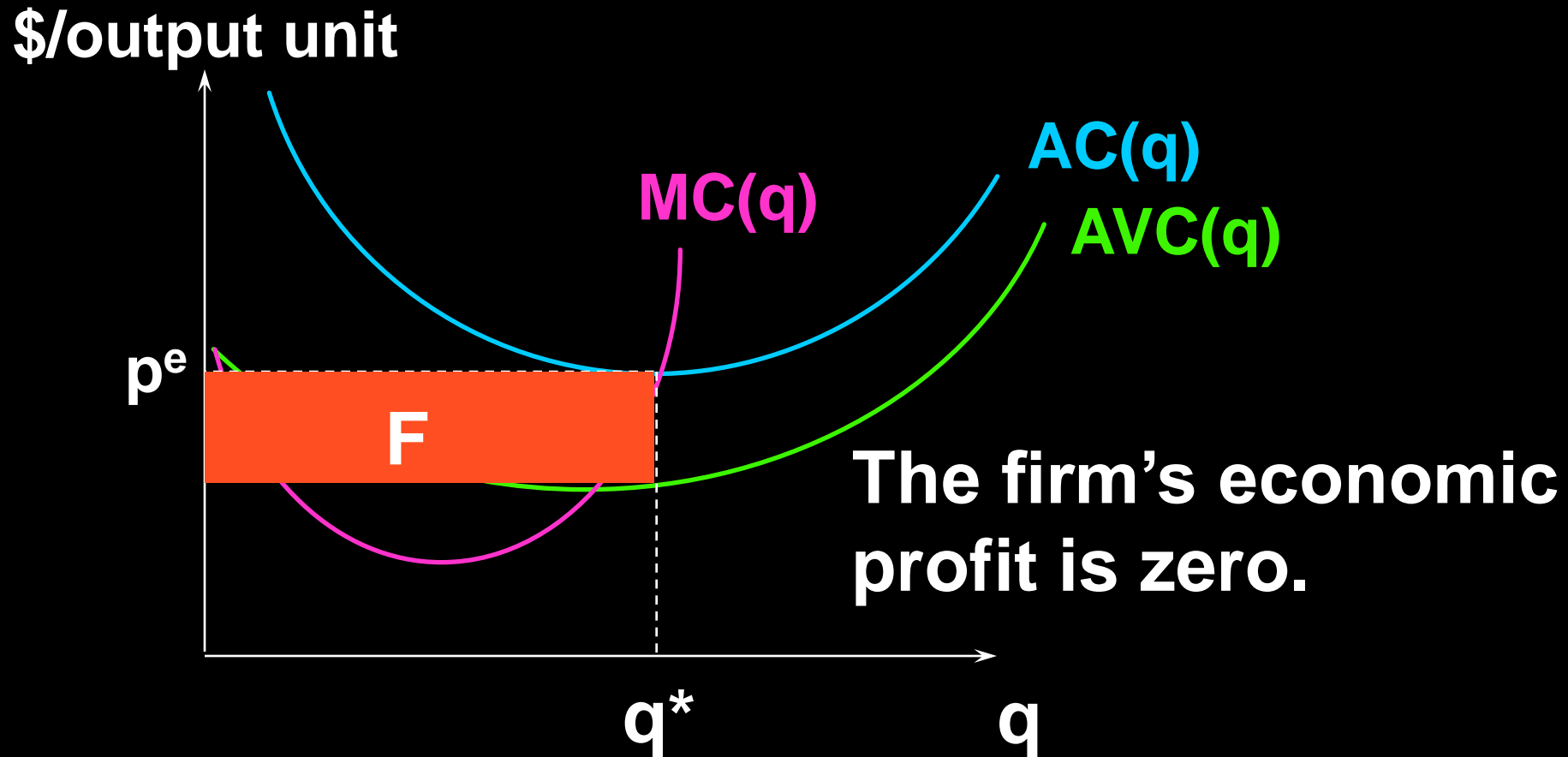
F is the payment to the owner of the fixed input (the license); F = economic rent.