23

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

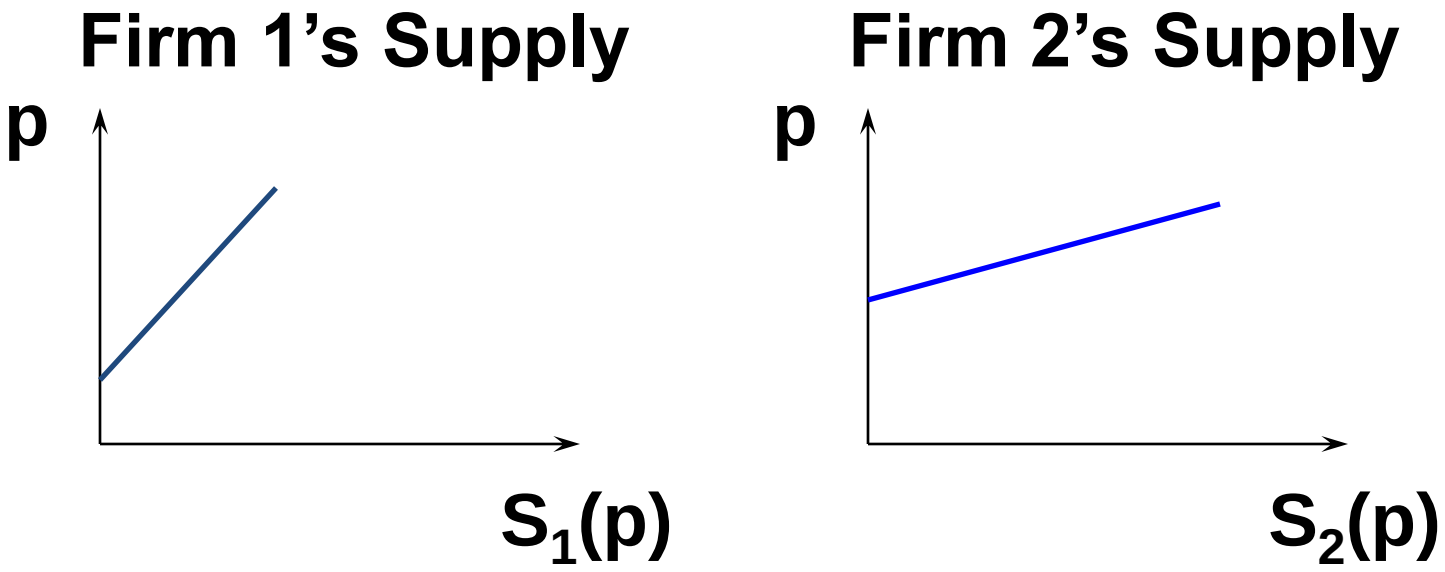
- In a short-run the number of firms in the industry is, temporarily, fixed.
- Let n be the number of firms;
  i = 1, … ,n.
- $S_i(p)$ is firm i's supply function.

Short-Run Supply

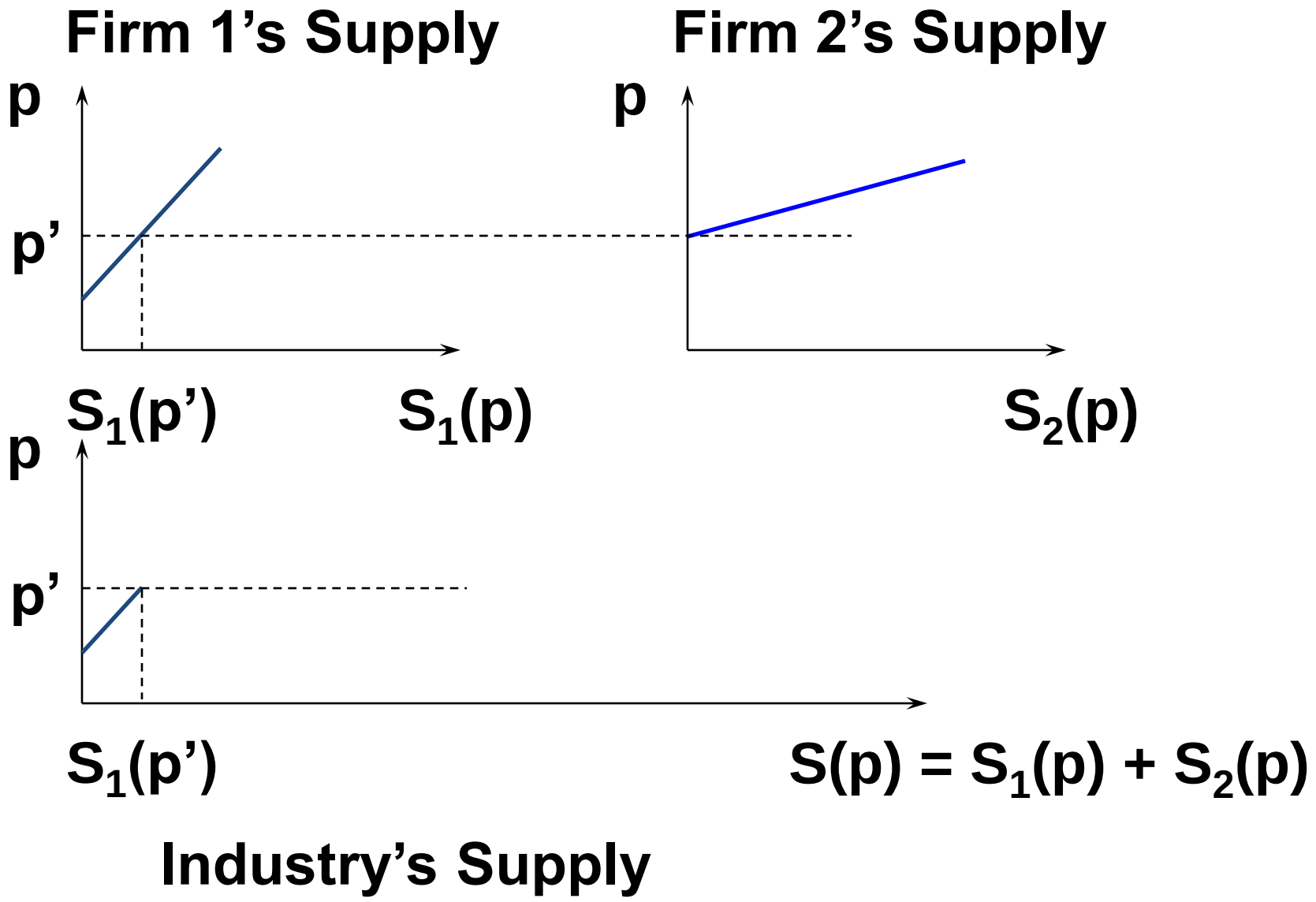
- In a short-run the number of firms in the industry is, temporarily, fixed.
- Let n be the number of firms;
  i = 1, … ,n.
- $S_i(p)$ is firm i's supply function.
- The industry's short-run supply function is

$$S(p) = \sum_{i=1}^{n} S_i(p).$$

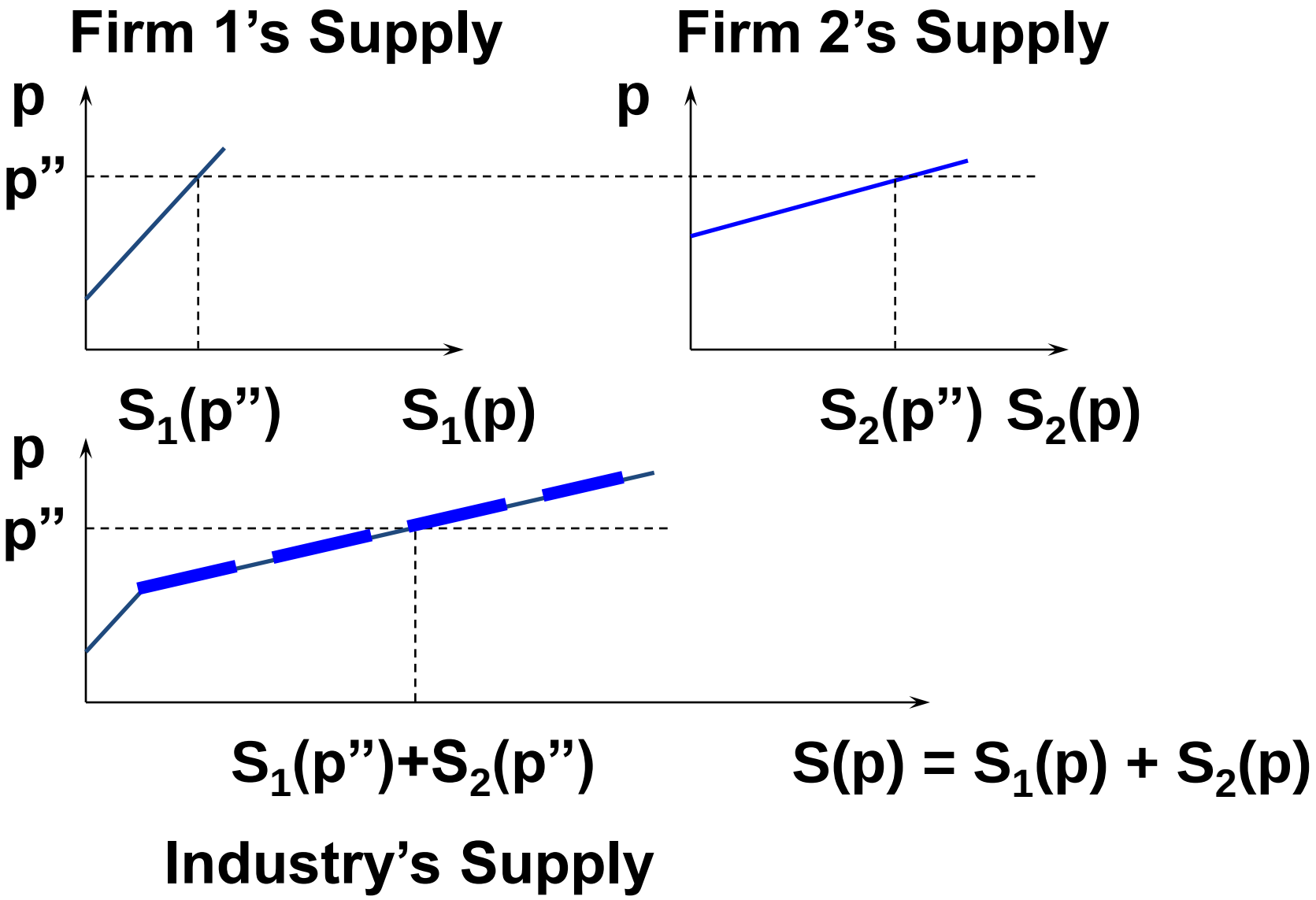
Supply From A Competitive Industry



Supply From A Competitive Industry

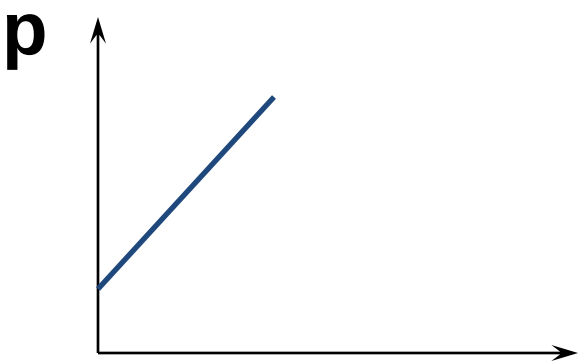


Supply From A Competitive Industry



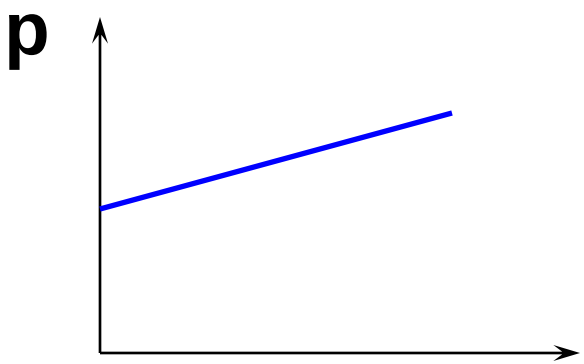
Supply From A Competitive Industry

Firm 1's Supply

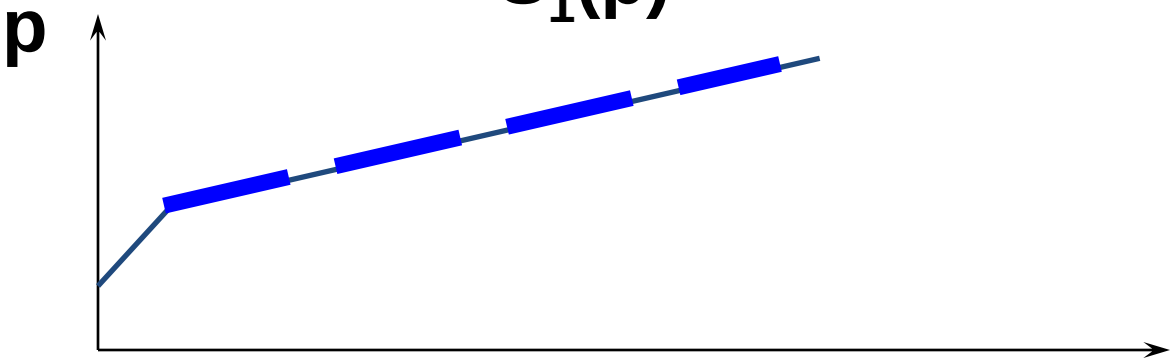


$S_1(p)$

Firm 2's Supply



$S_2(p)$



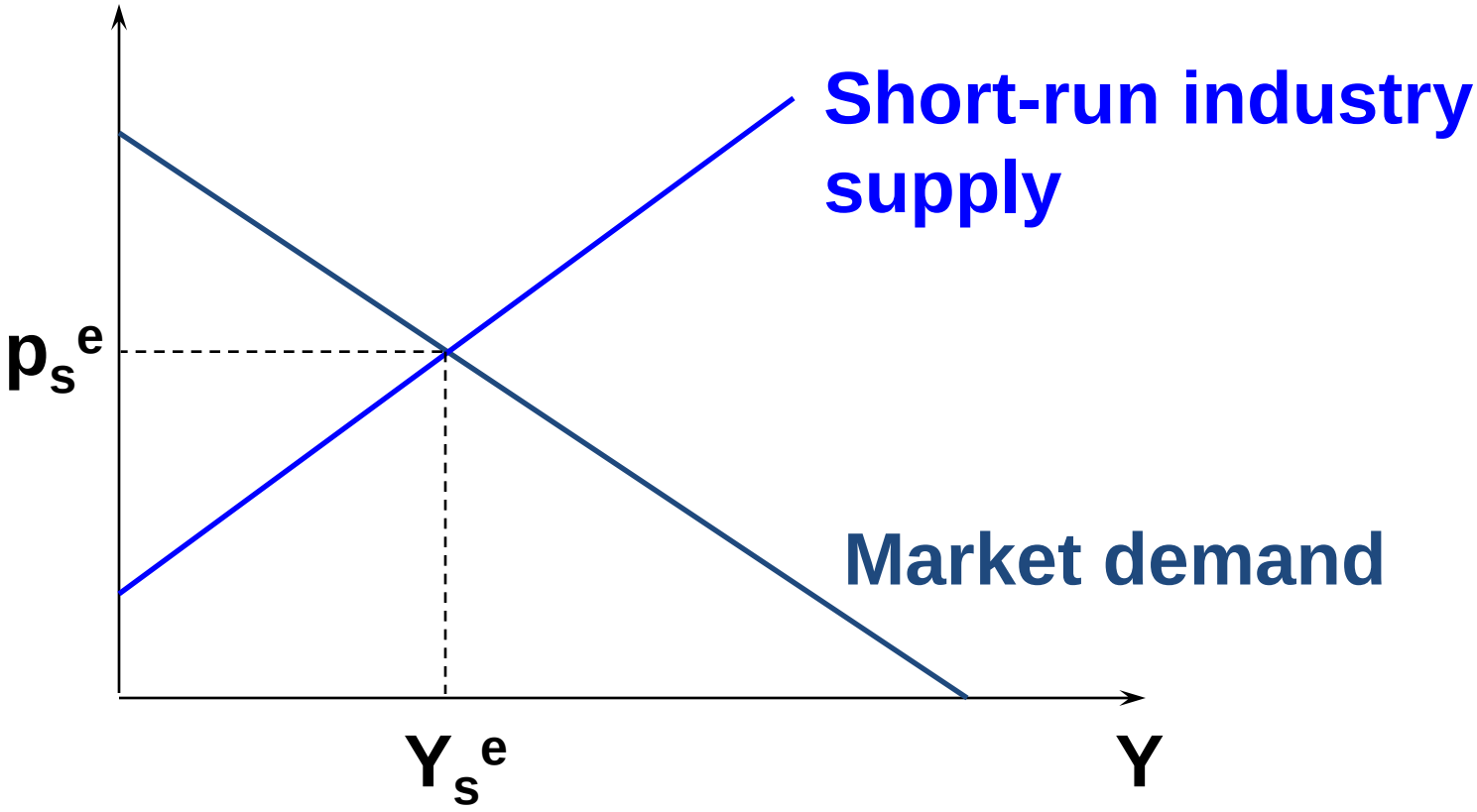
$S(p) = S_1(p) + S_2(p)$

Industry's Supply

Short-Run Industry Equilibrium

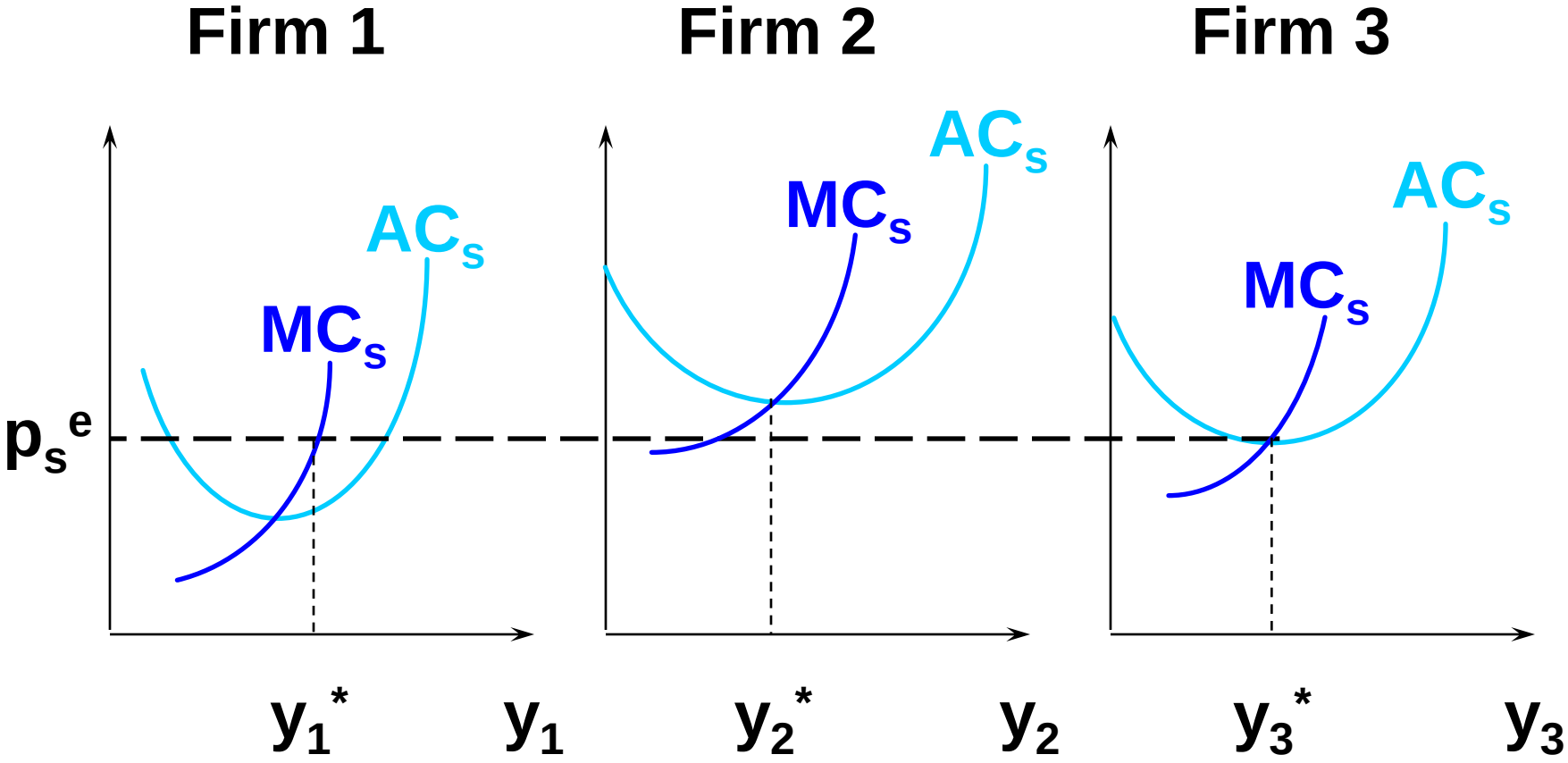
- In a short-run, neither entry nor exit can occur.
- Consequently, in a short-run equilibrium, some firms may earn positive economics profits, others may suffer economic losses, and still others may earn zero economic profit.

Short-Run Industry Equilibrium

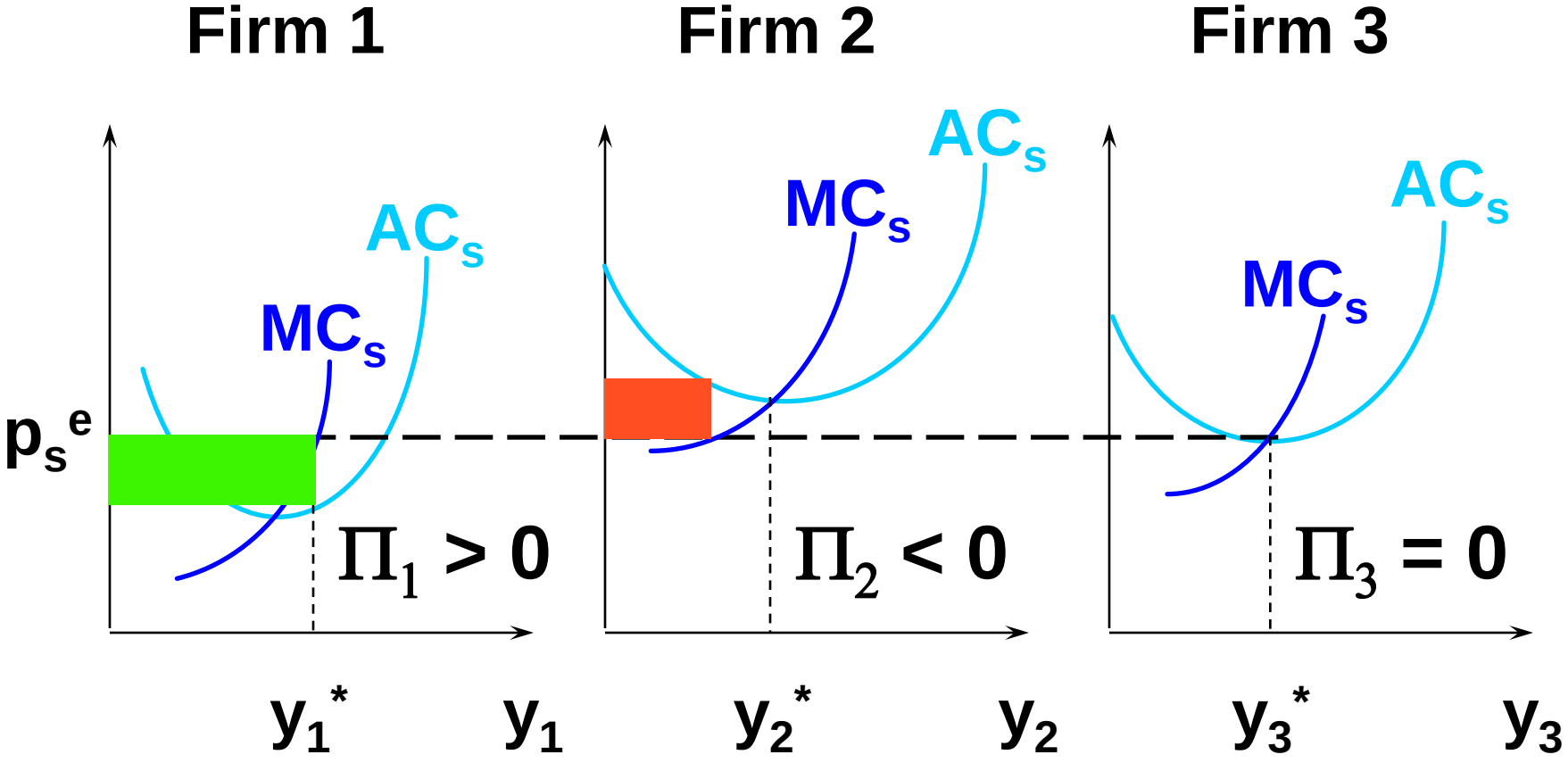


Short-run equilibrium price clears the market and is taken as given by each firm.

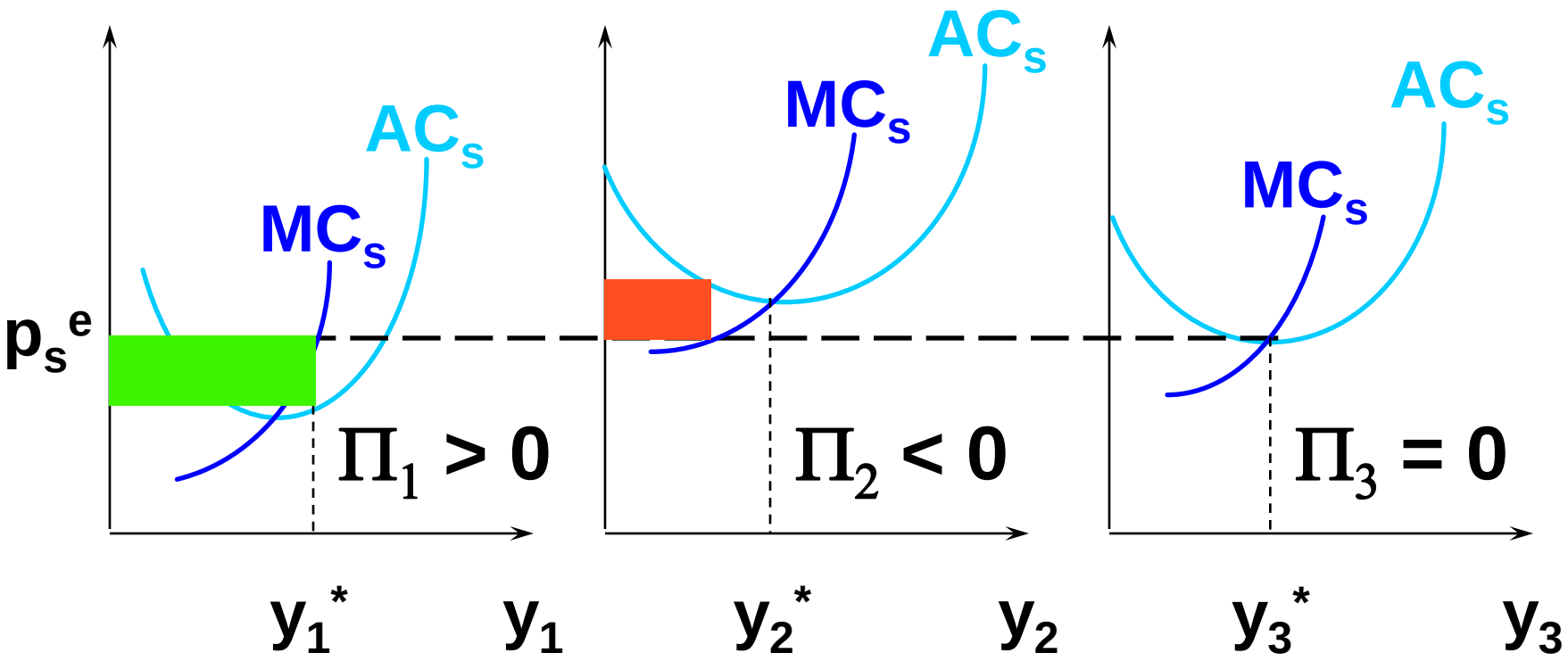
Short-Run Industry Equilibrium



Short-Run Industry Equilibrium



Short-Run Industry Equilibrium



Firm 1 wishes to remain in the industry.

Firm 2 wishes to exit from the industry.

Firm 3 is indifferent.

Long-Run Industry Supply

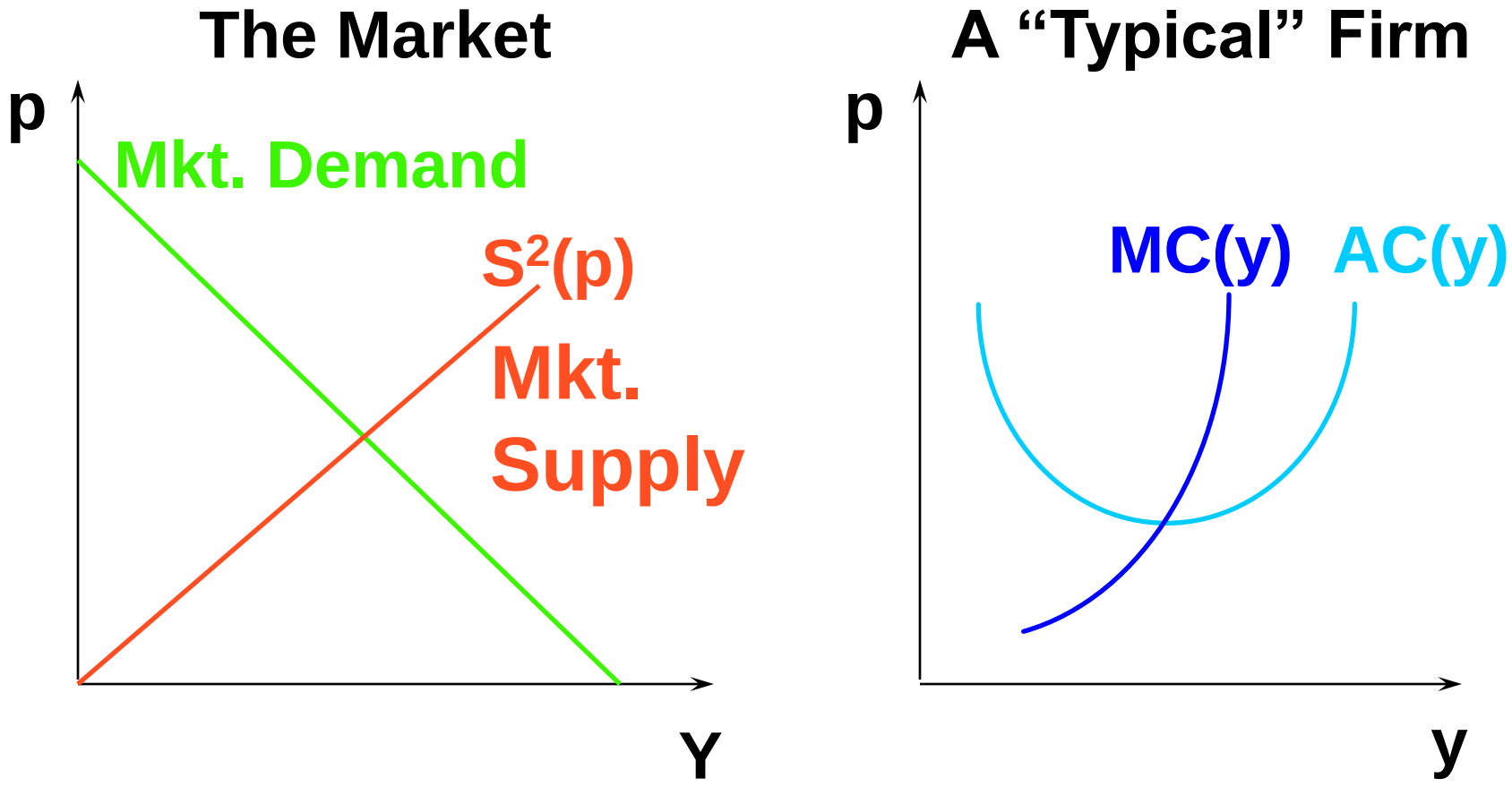
- In the long-run every firm now in the industry is free to exit and firms now outside the industry are free to enter.
- The industry's long-run supply function must account for entry and exit as well as for the supply choices of firms that choose to be in the industry.
- How is this done?

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;

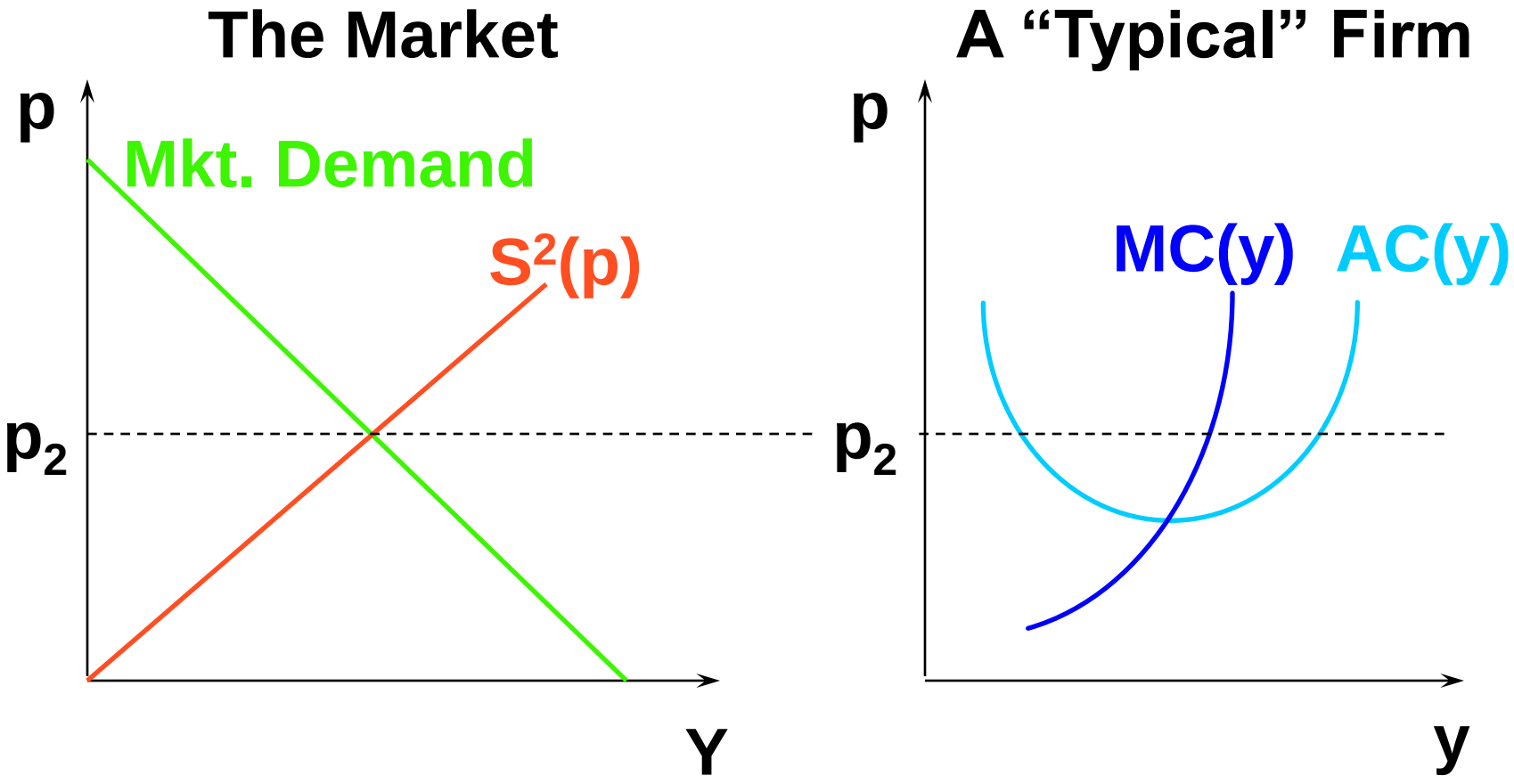
  $p_s^e > \min AC(y)$.
- Entry increases industry supply, causing p_s^e to fall.
- When does entry cease?

Long-Run Industry Supply



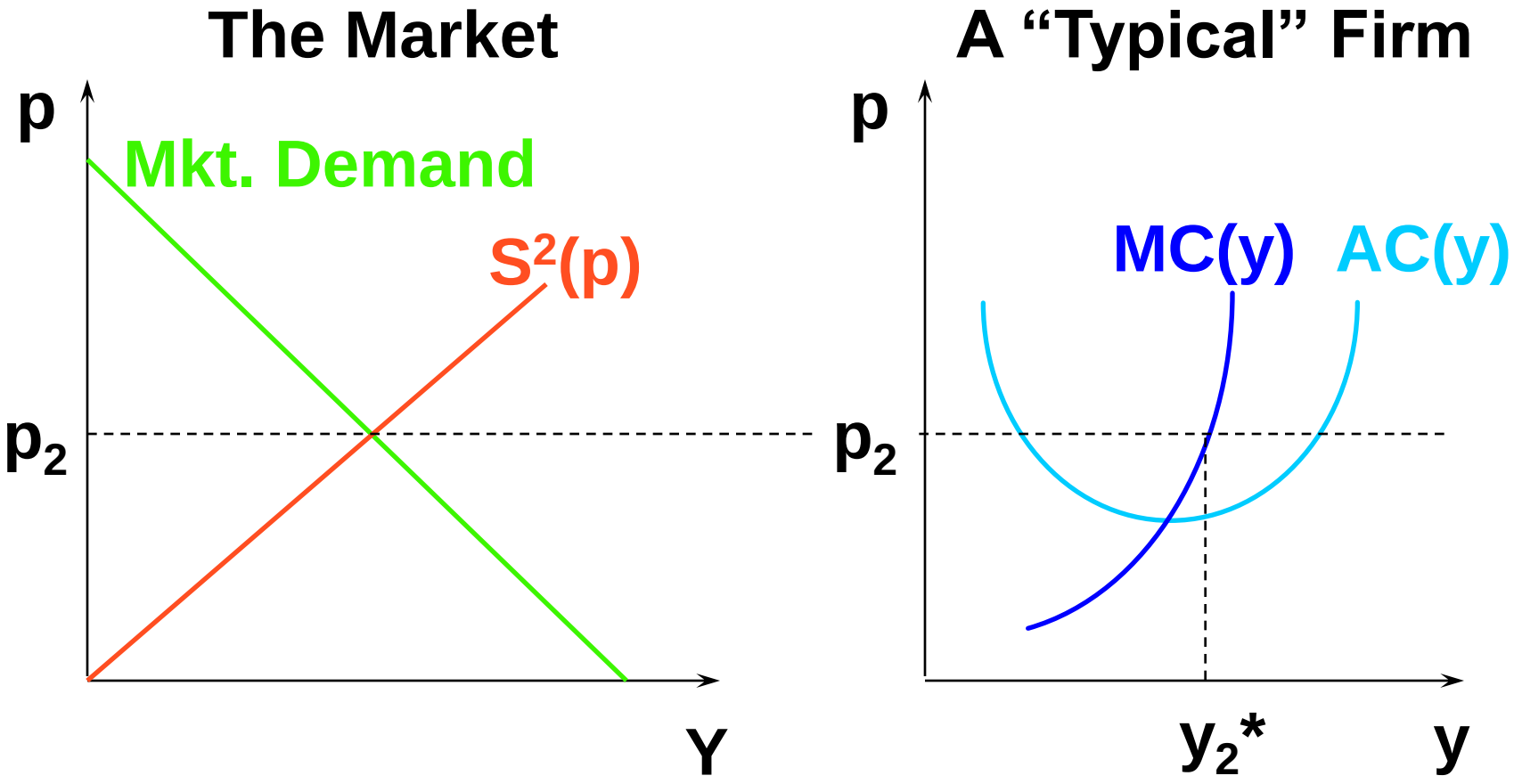
Suppose the industry initially contains only two firms.

Long-Run Industry Supply



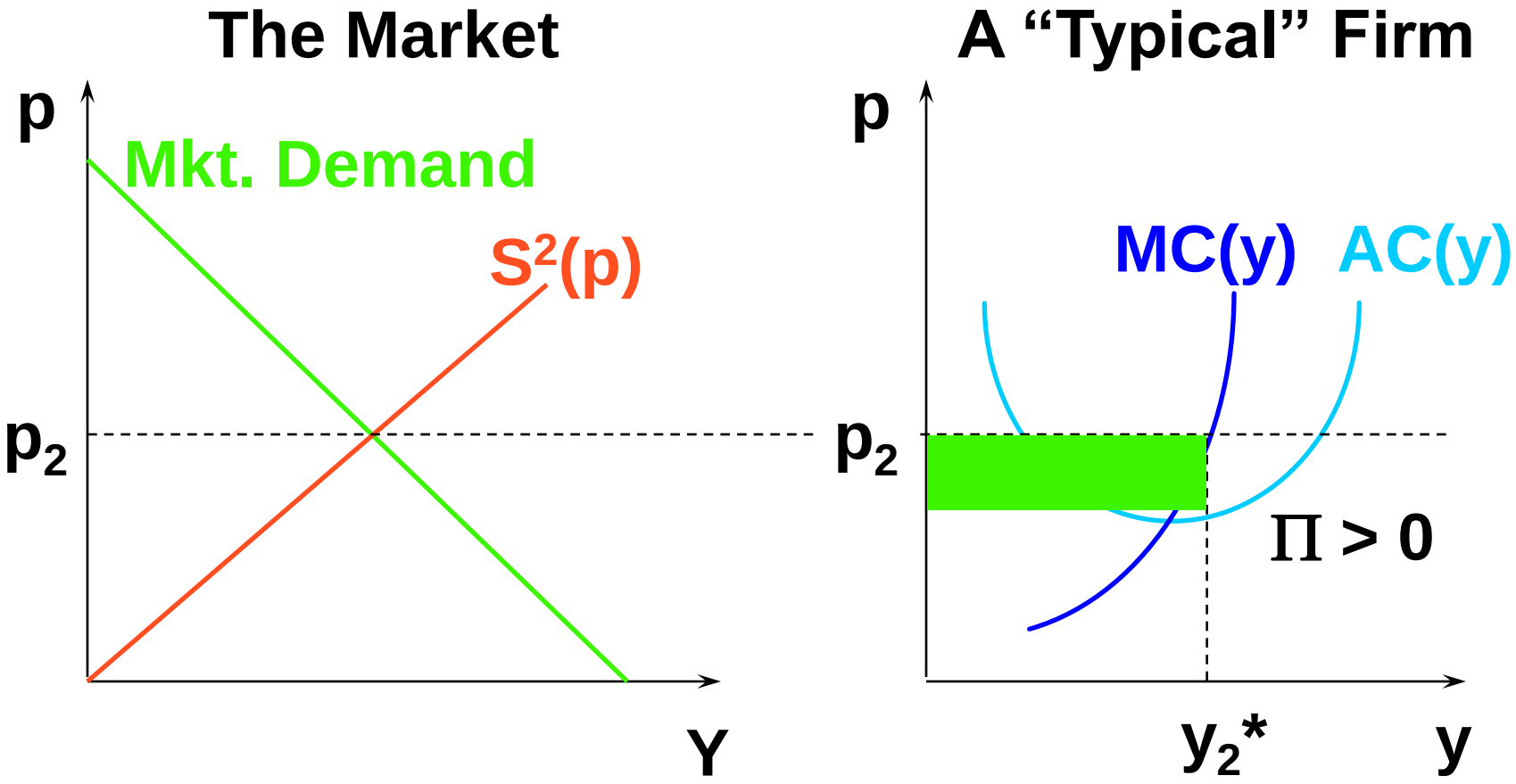
Then the market-clearing price is p_2.

Long-Run Industry Supply



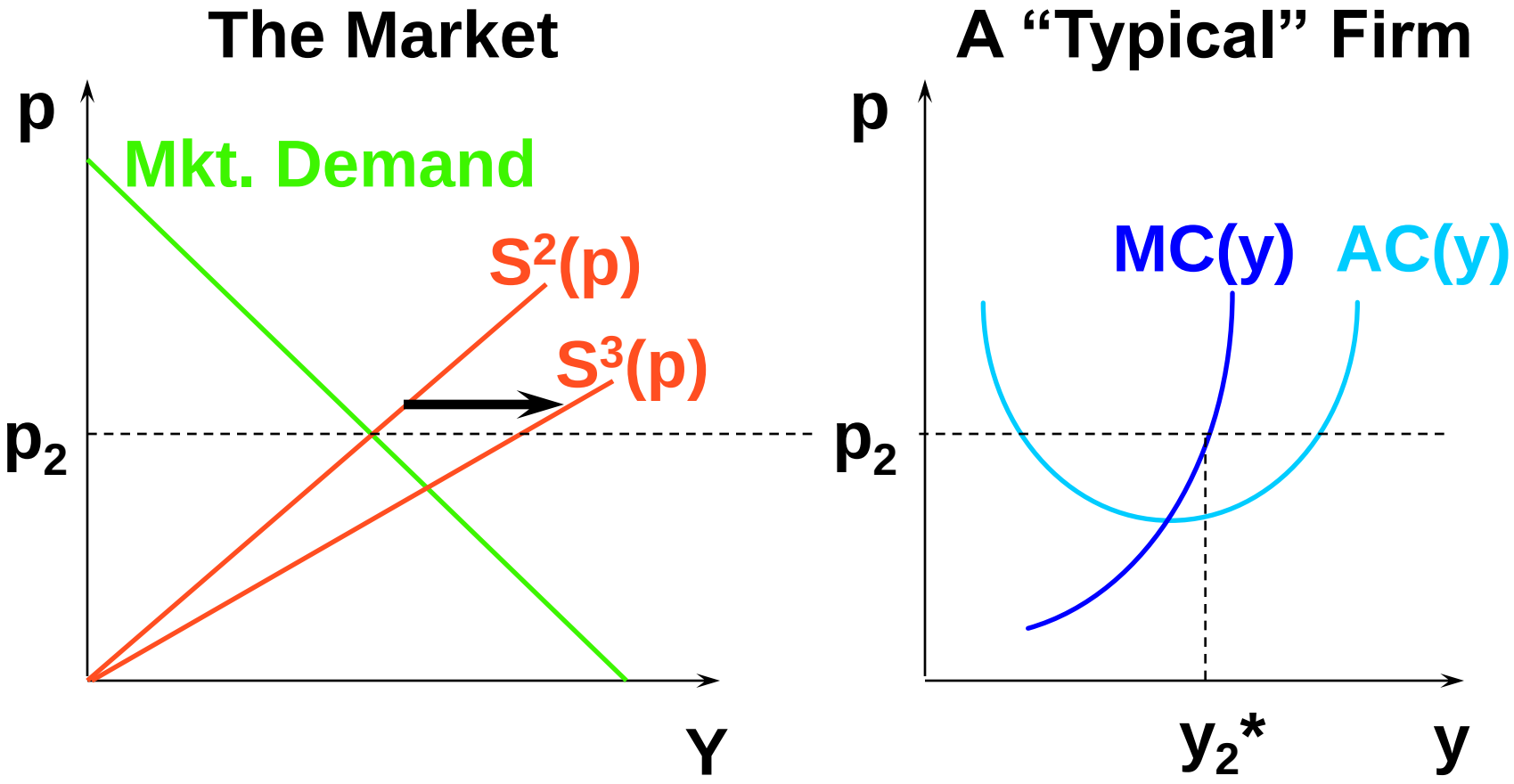
Then the market-clearing price is p_2.
Each firm produces y_2^* units of output.

Long-Run Industry Supply



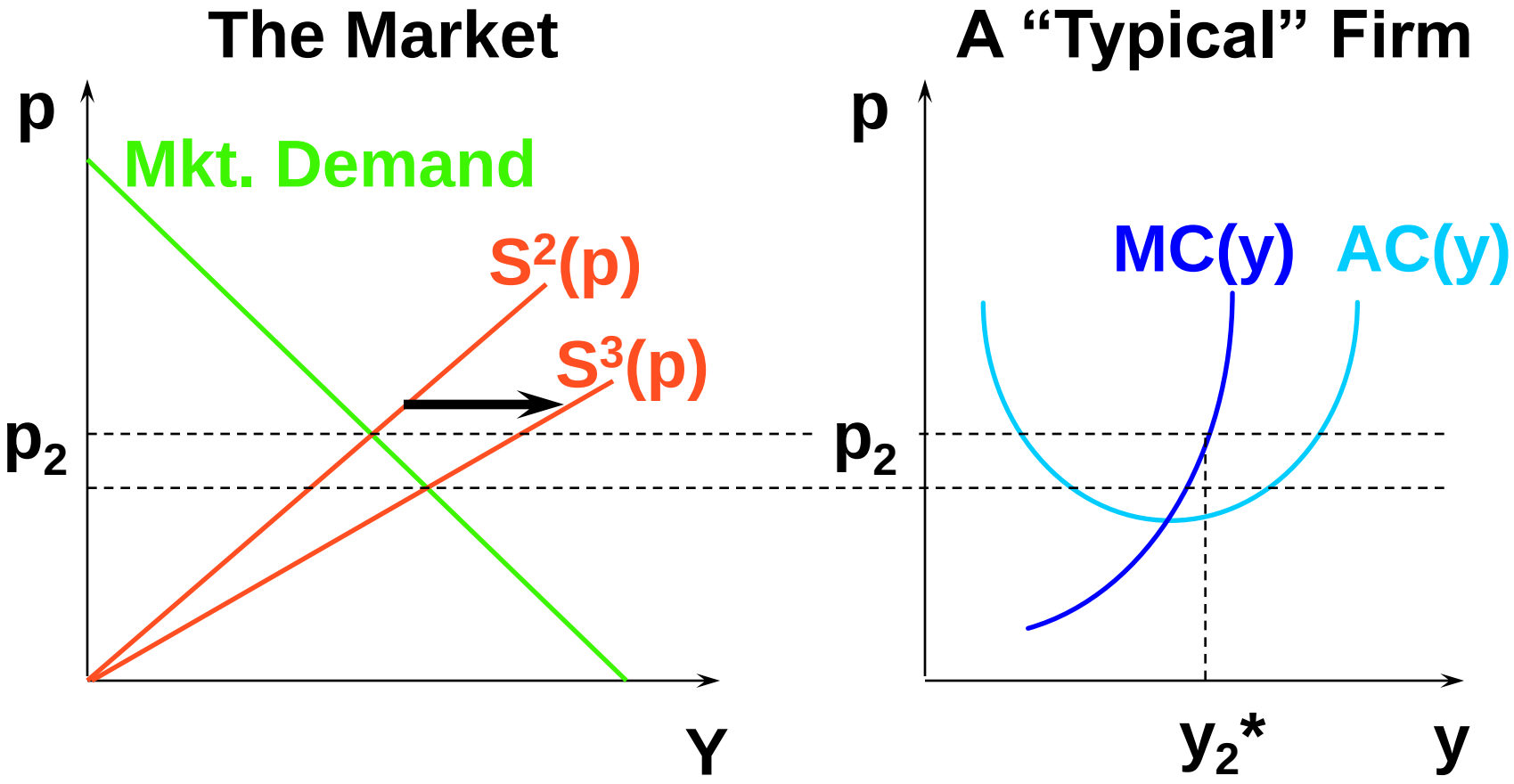
Each firm makes a positive economic profit, inducing entry by another firm.

Long-Run Industry Supply



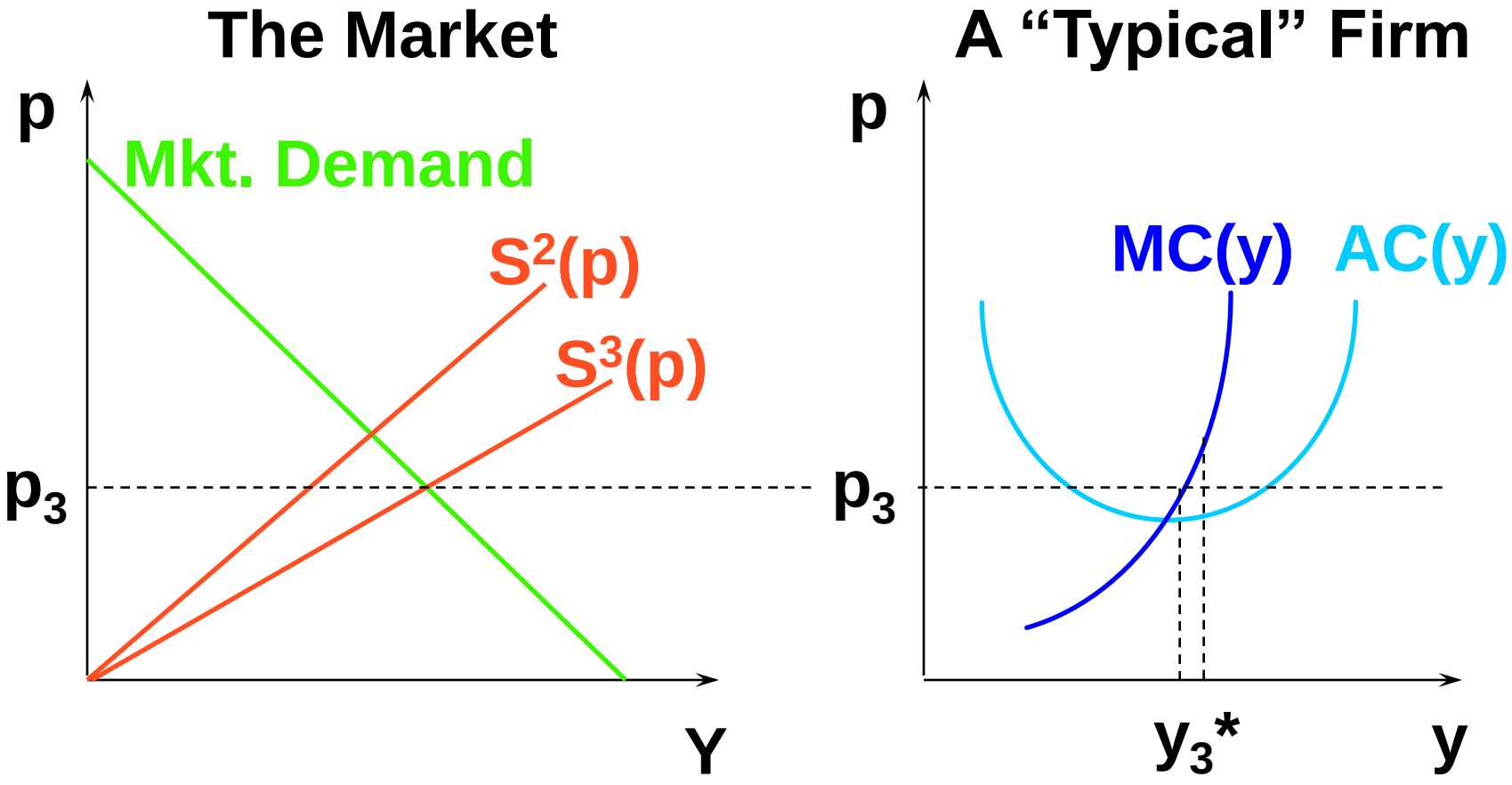
Market supply shifts outwards.

Long-Run Industry Supply



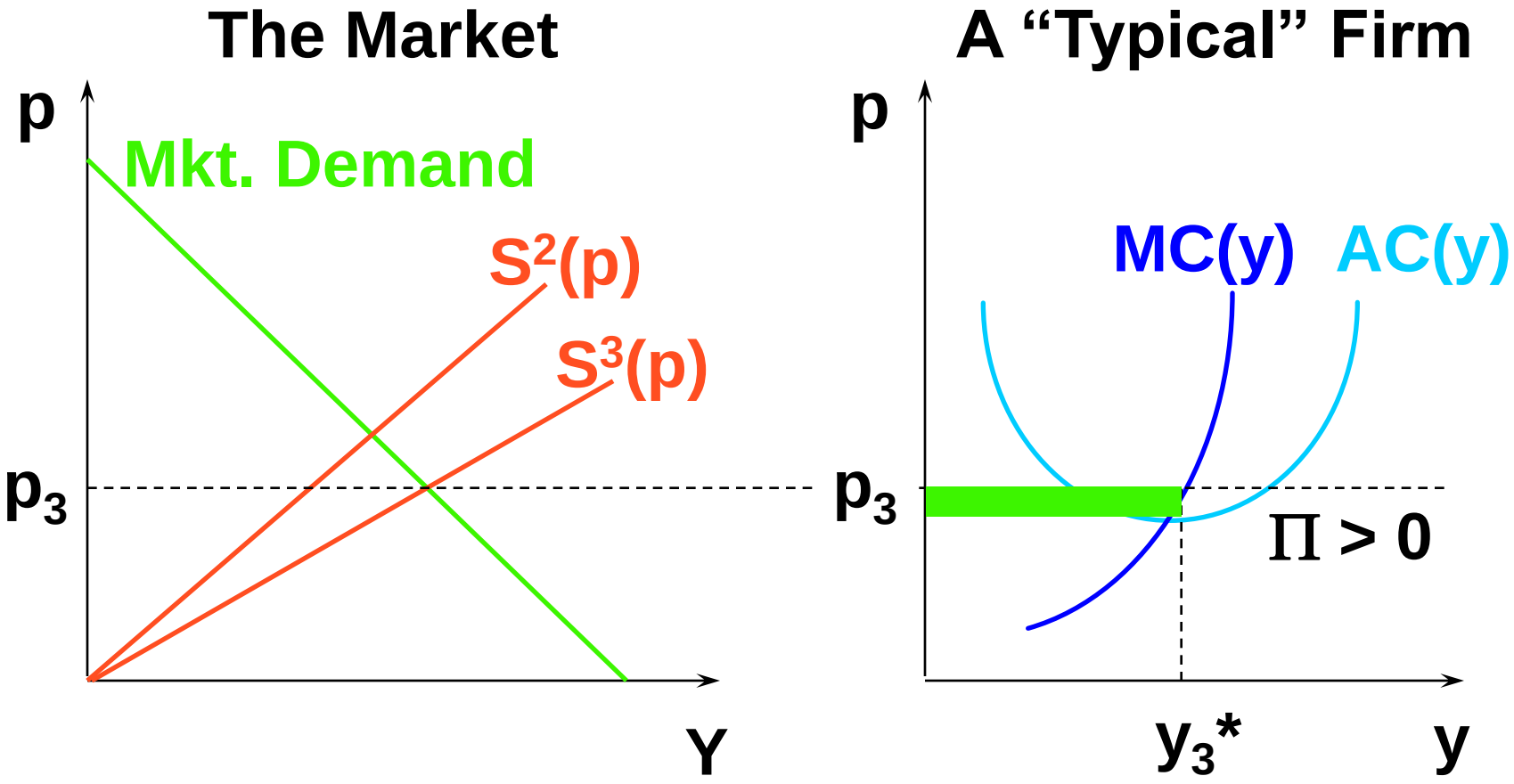
Market supply shifts outwards.
Market price falls.

Long-Run Industry Supply



Each firm produces less.

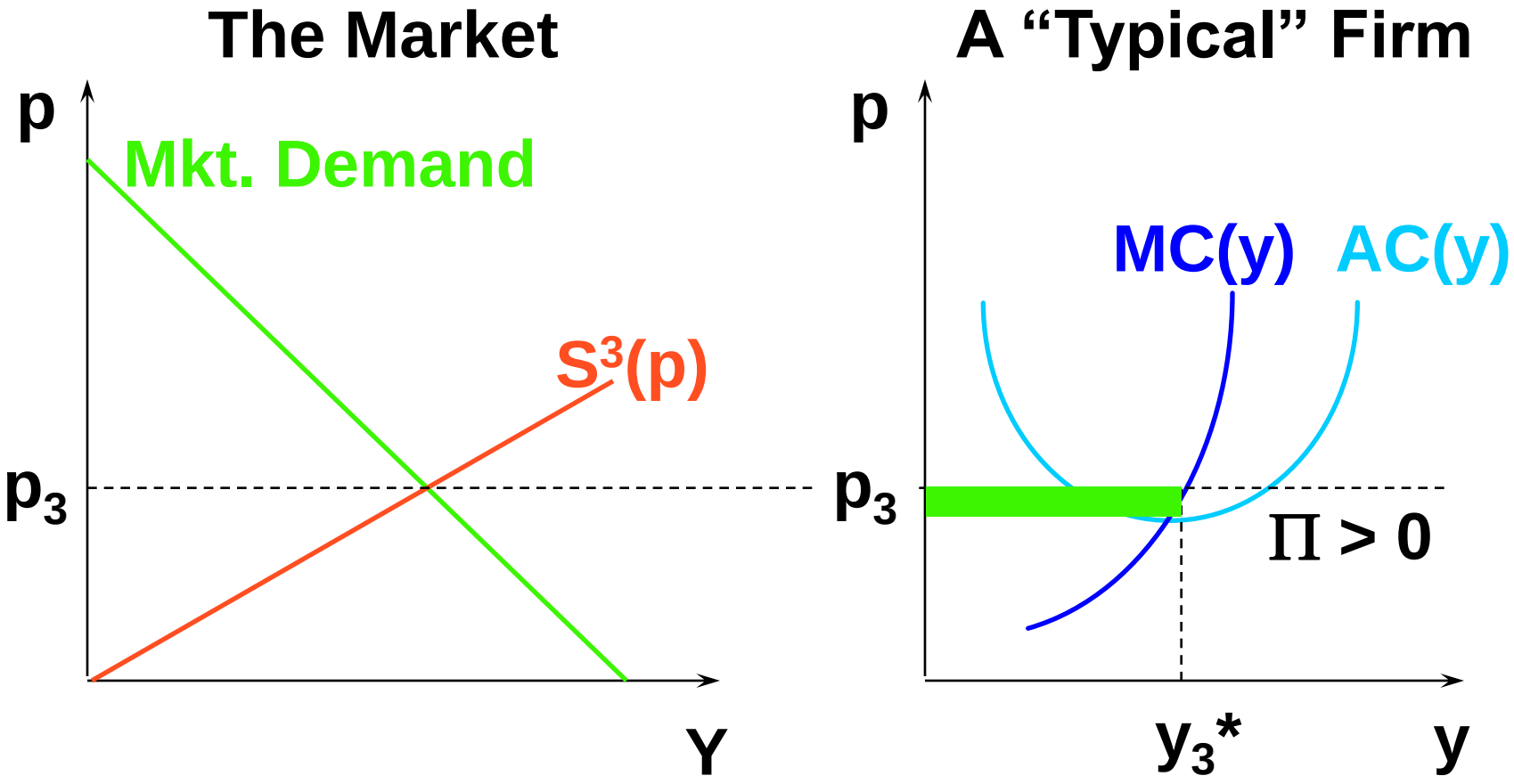
Long-Run Industry Supply



Each firm produces less.

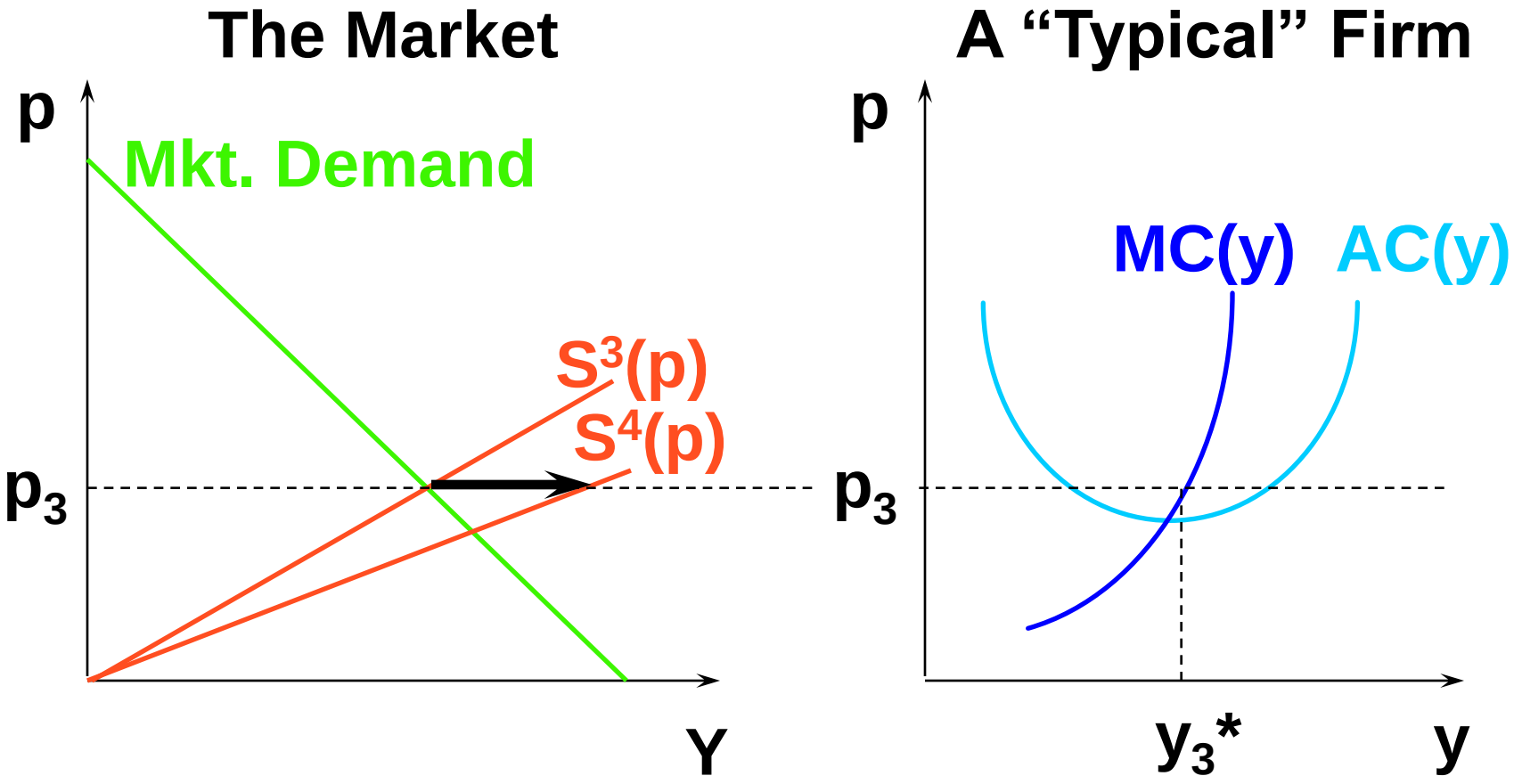
Each firm's economic profit is reduced.

Long-Run Industry Supply



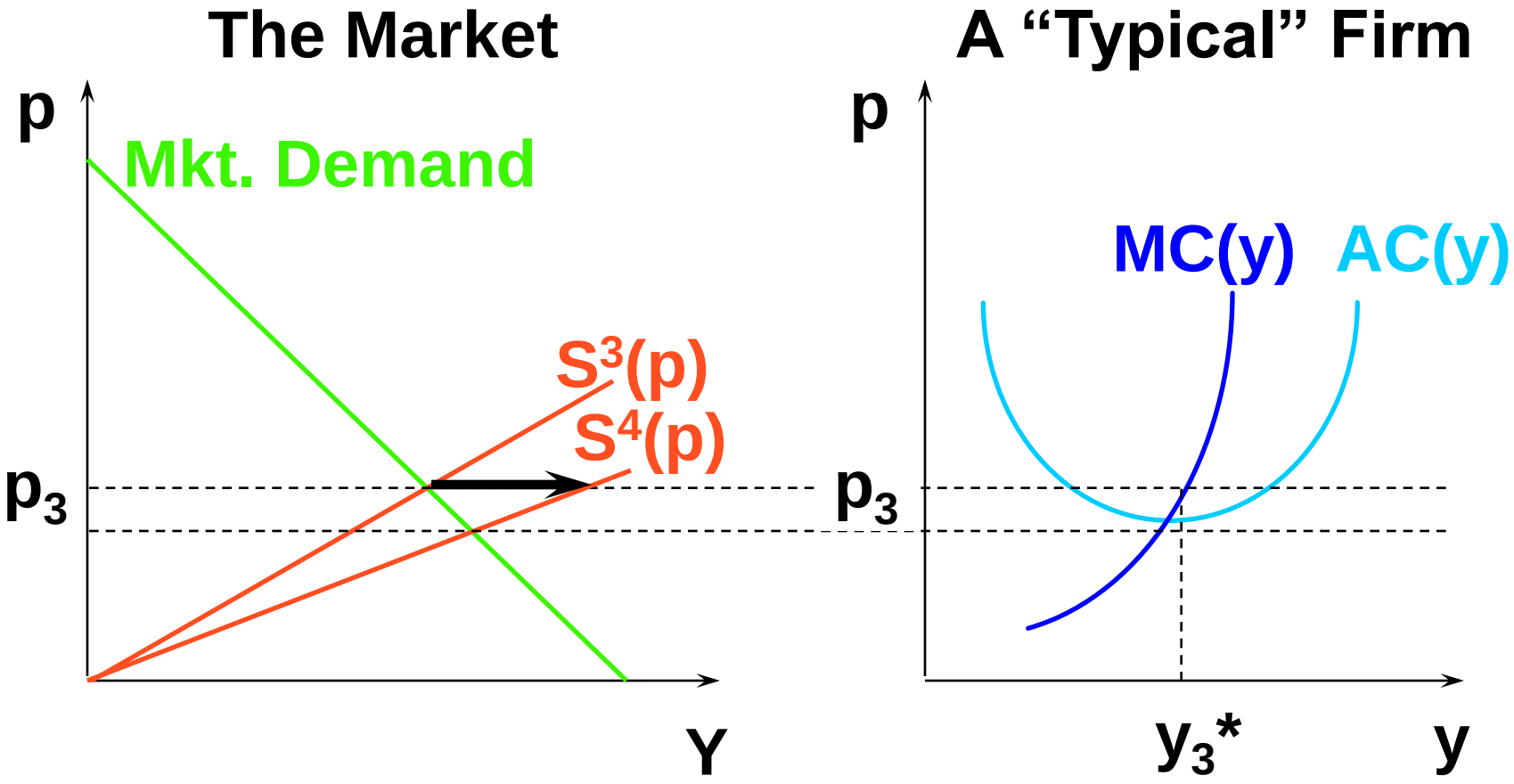
Each firm's economic profit is positive.
Will another firm enter?

Long-Run Industry Supply



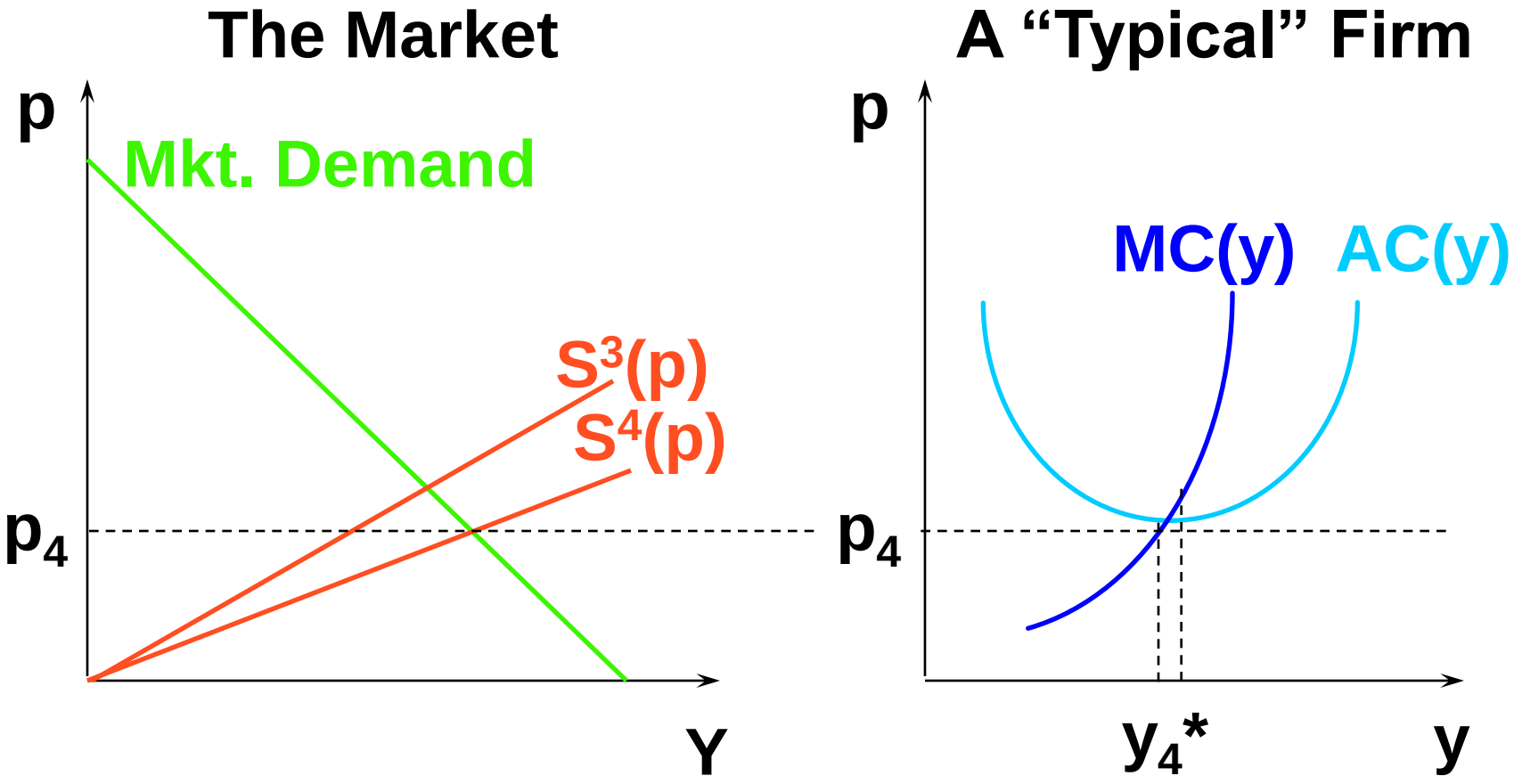
Market supply would shift outwards again.

Long-Run Industry Supply



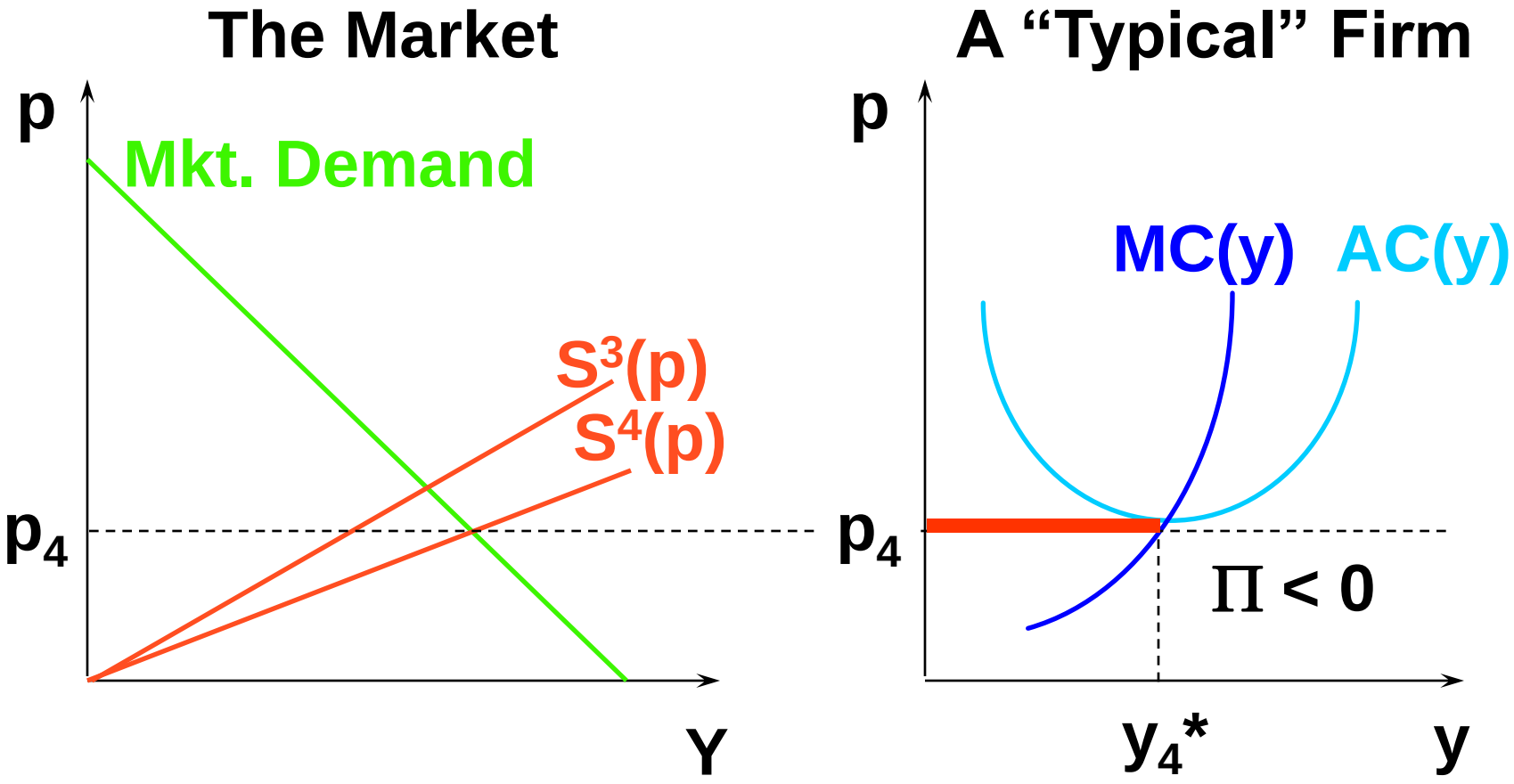
Market supply would shift outwards again.
Market price would fall again.

Long-Run Industry Supply



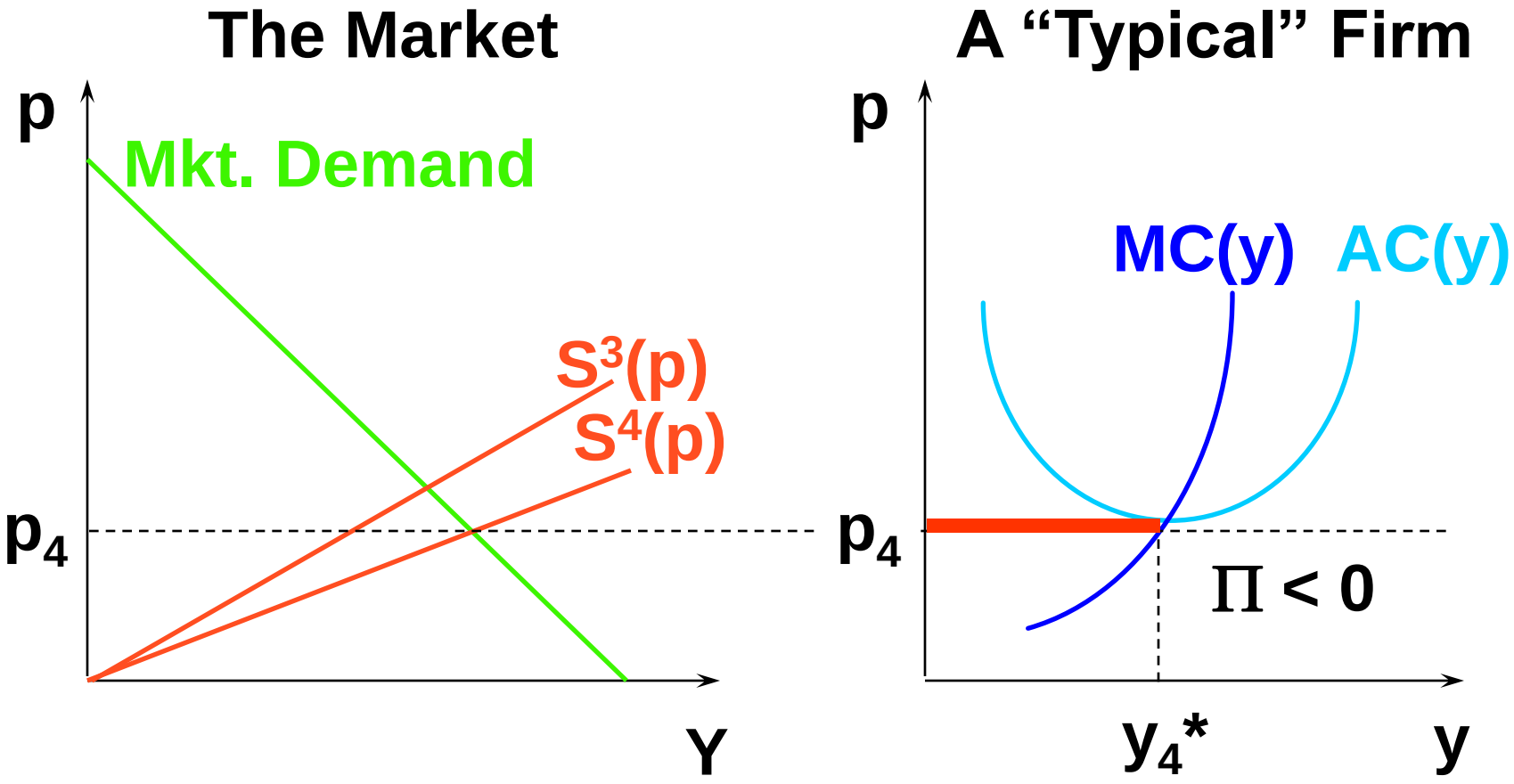
Each firm would produce less again.

Long-Run Industry Supply



Each firm would produce less again. Each firm's economic profit would be negative.

Long-Run Industry Supply



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

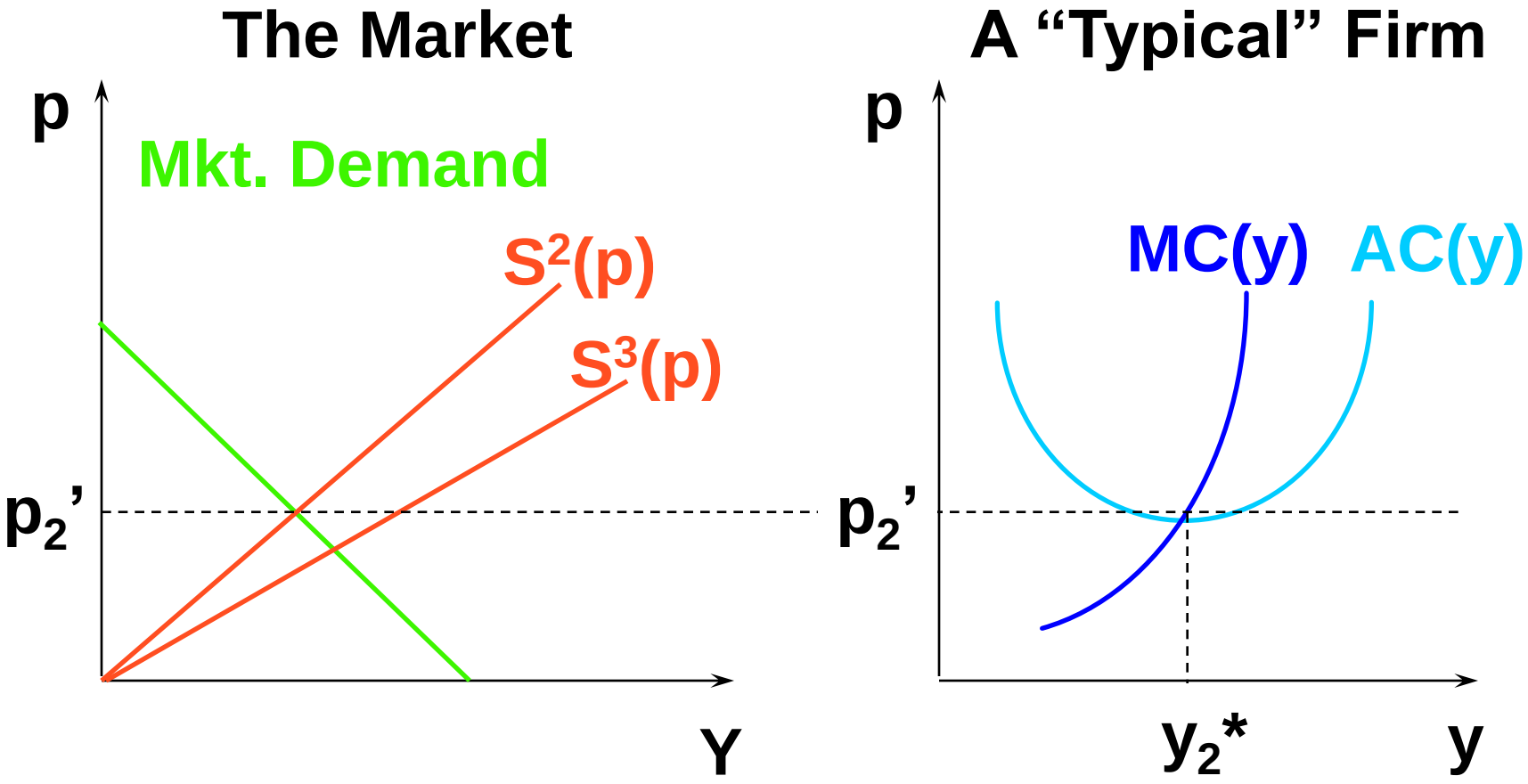
Long-Run Industry Supply

- 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(y).
- 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.

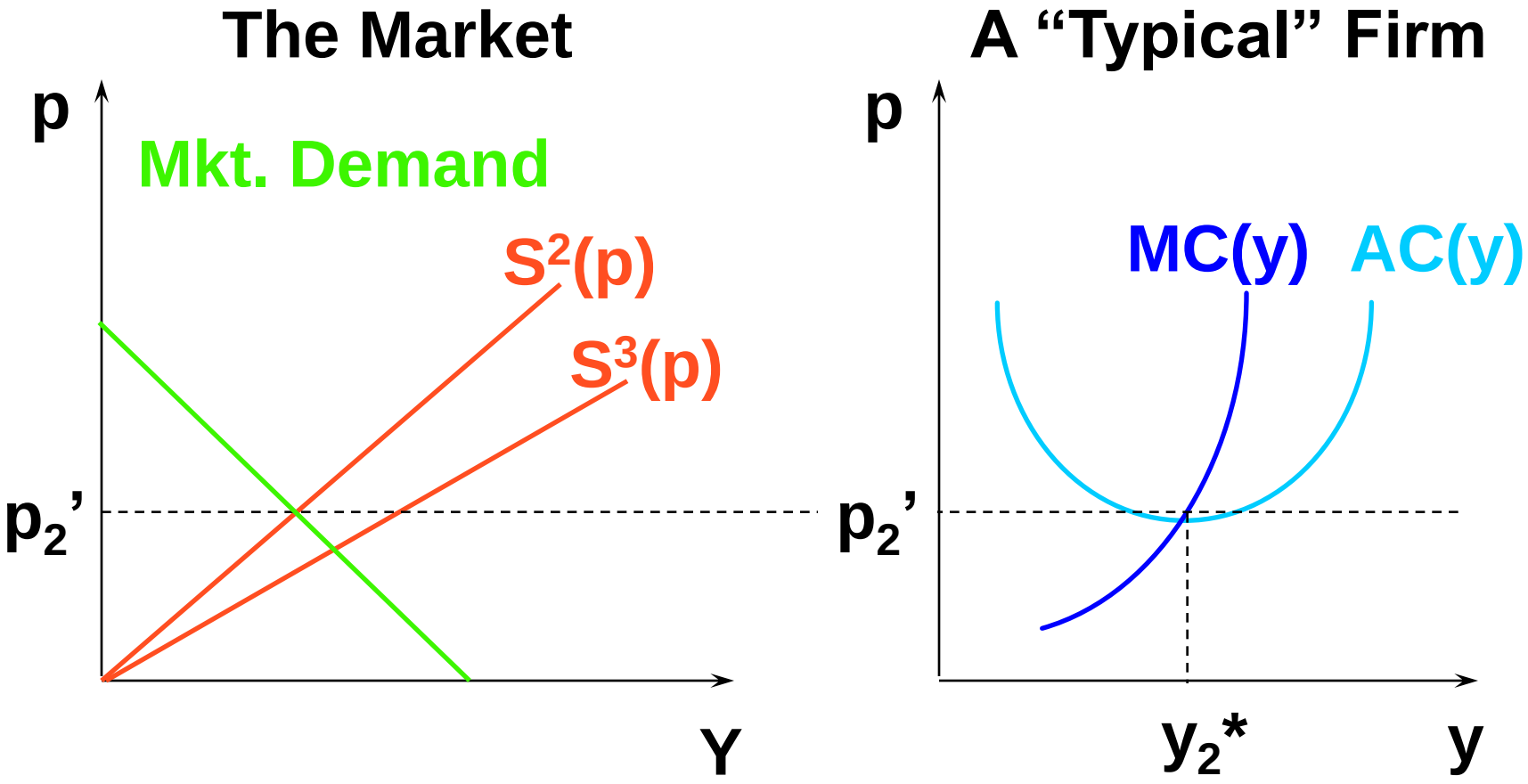
Long-Run Industry Supply



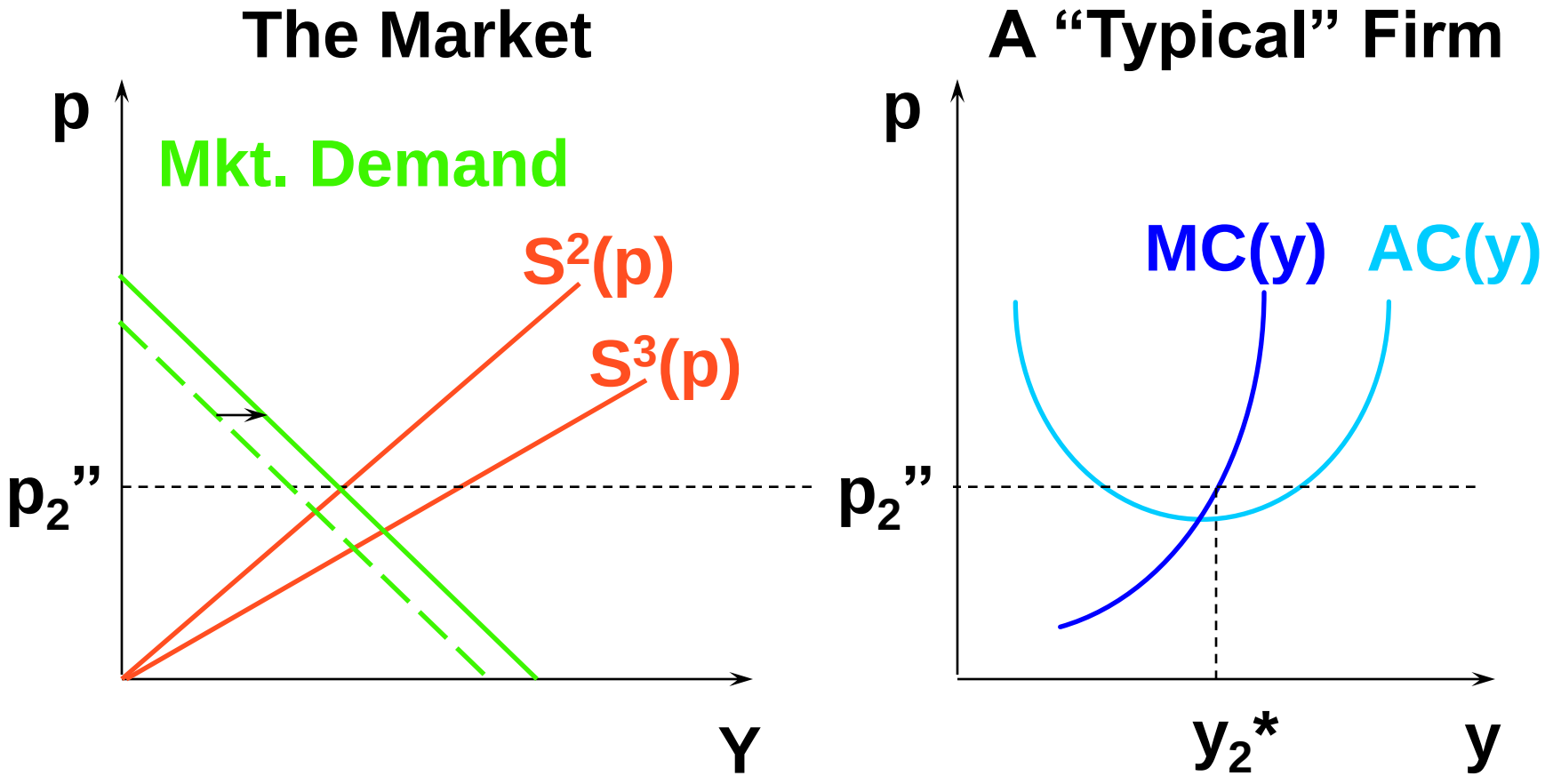
Long-Run Industry Supply

- 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.

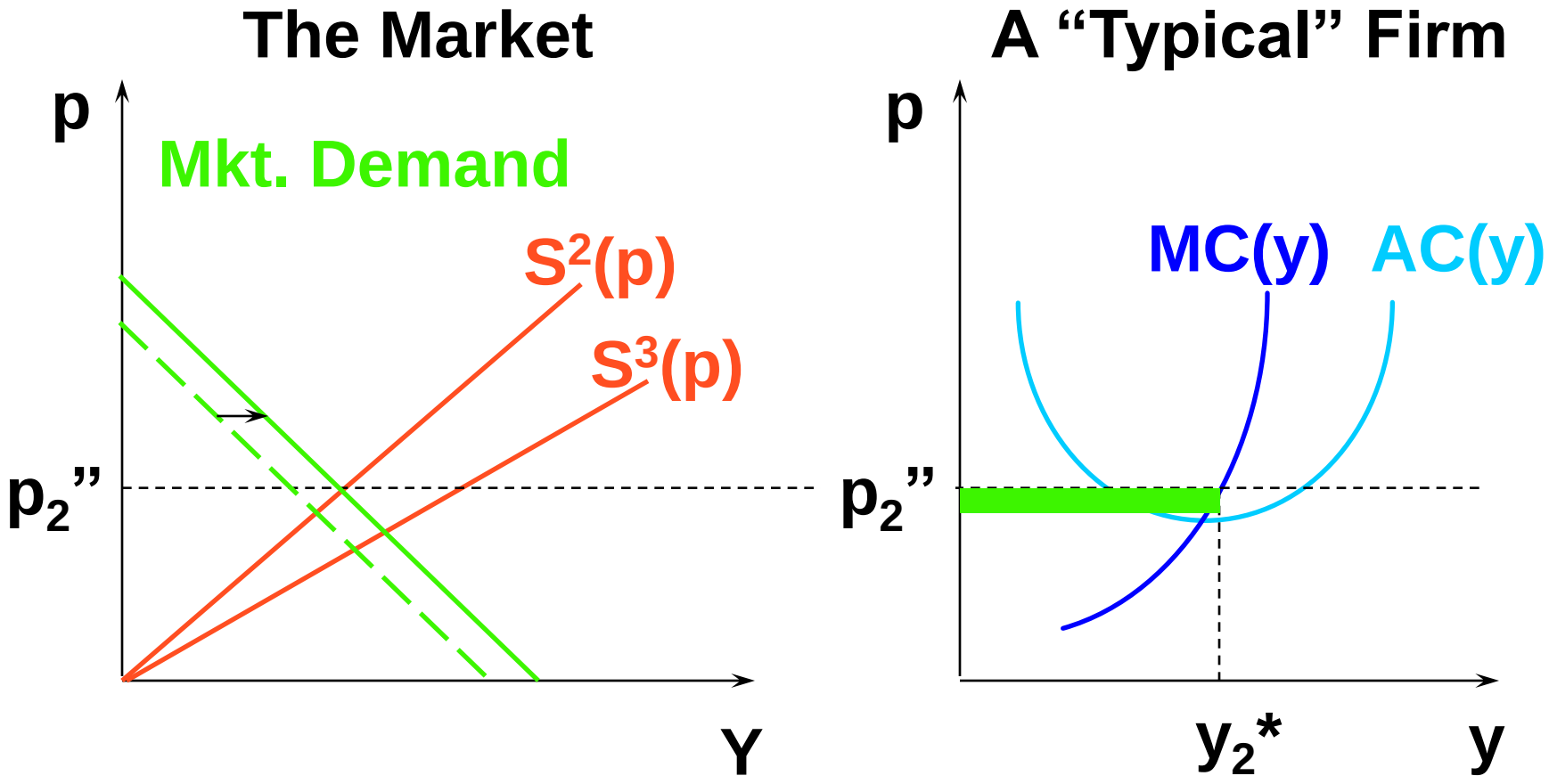
Long-Run Industry Supply



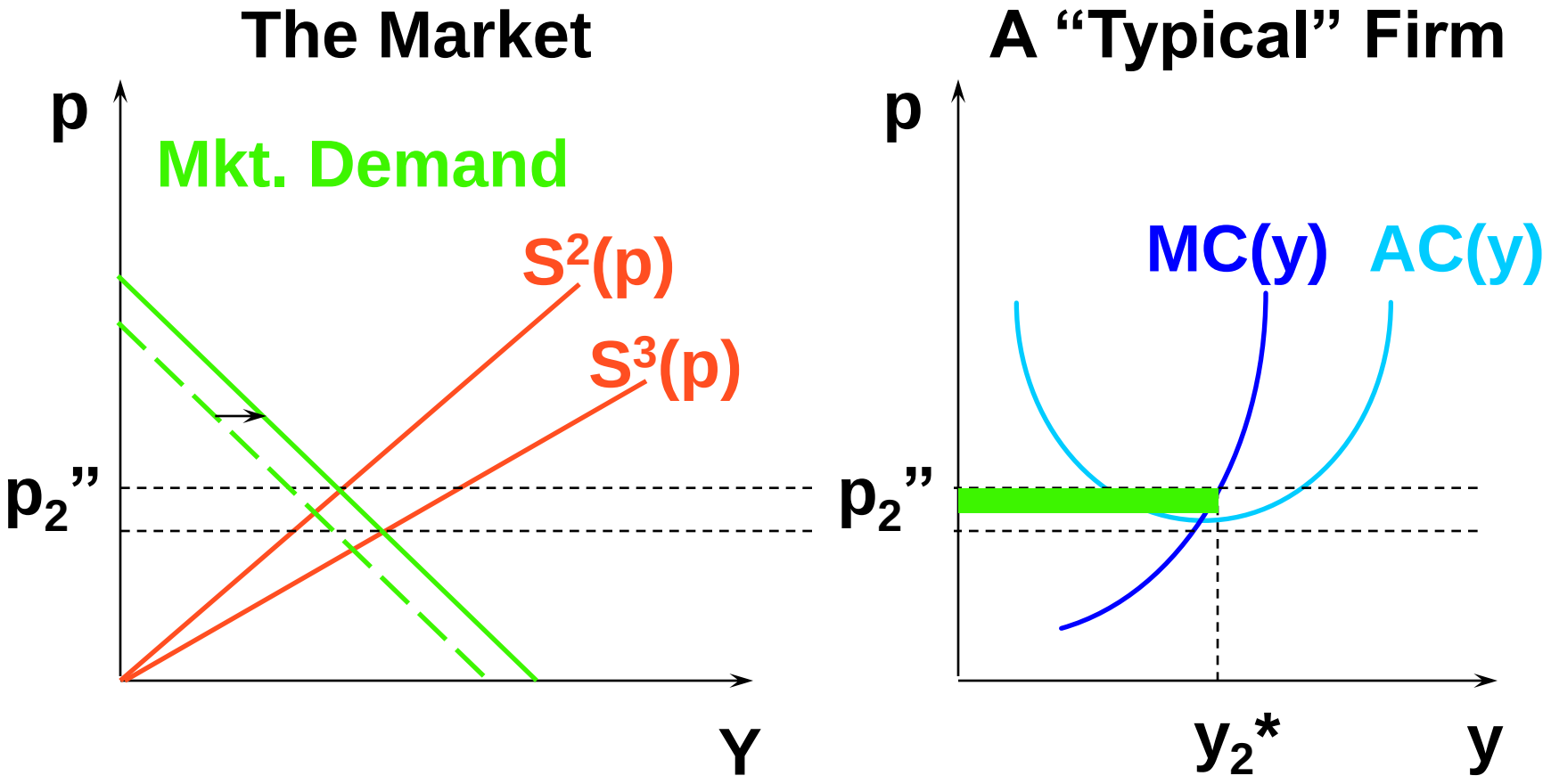
Long-Run Industry Supply



Long-Run Industry Supply



Long-Run Industry Supply

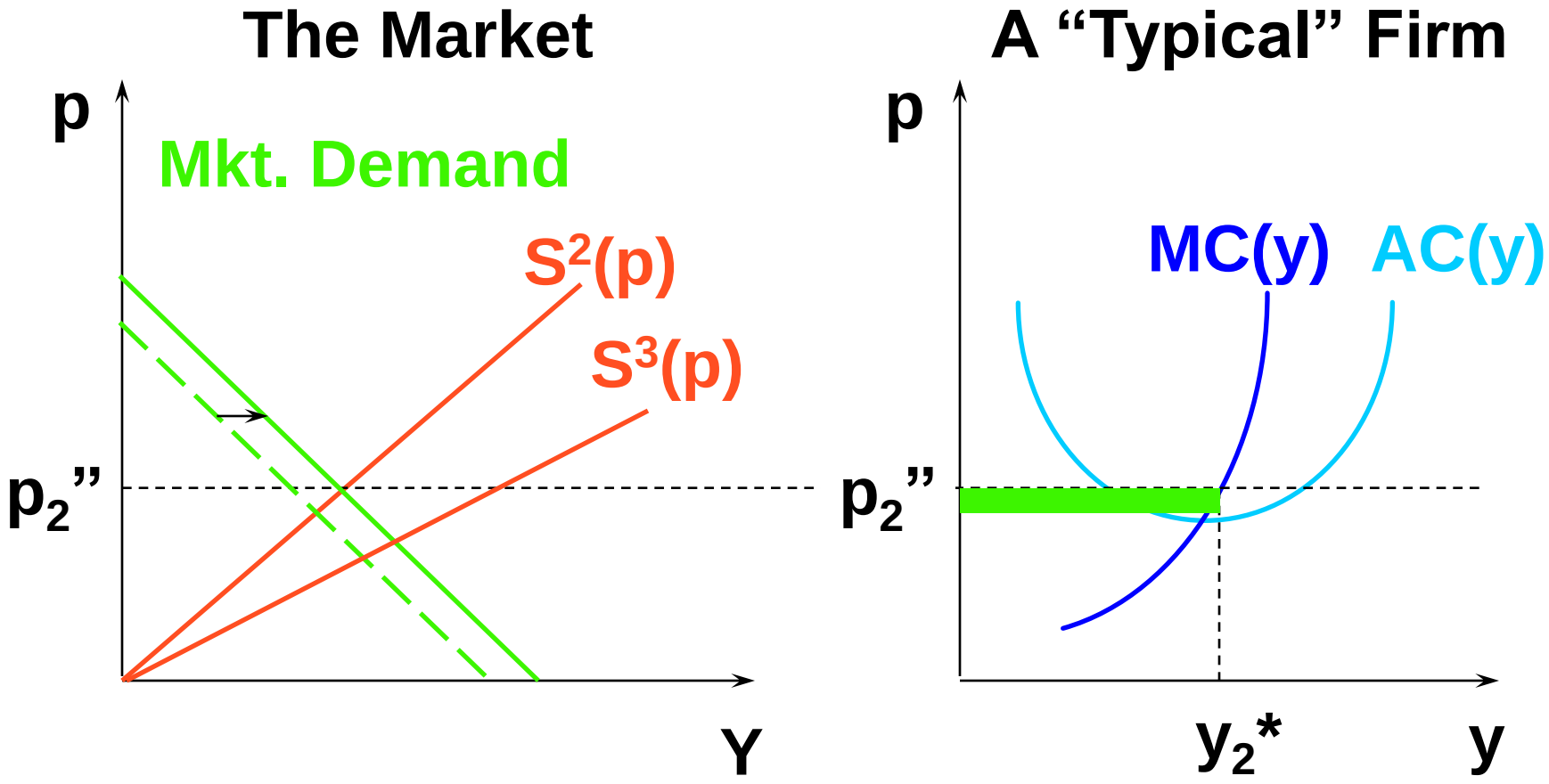


Notice that a 3rd firm will not enter since it would earn negative economic profits.

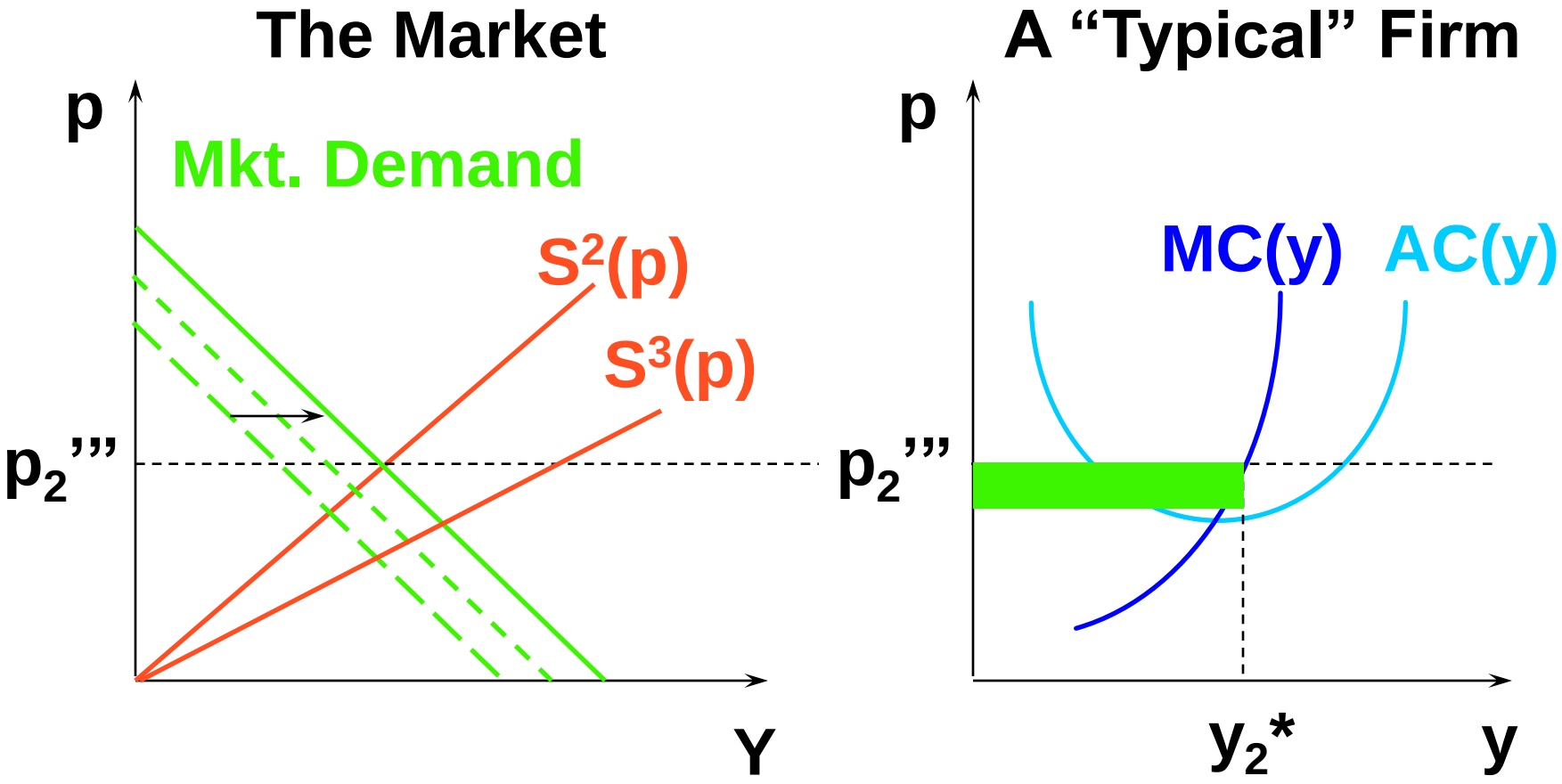
Long-Run Industry Supply

- 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.

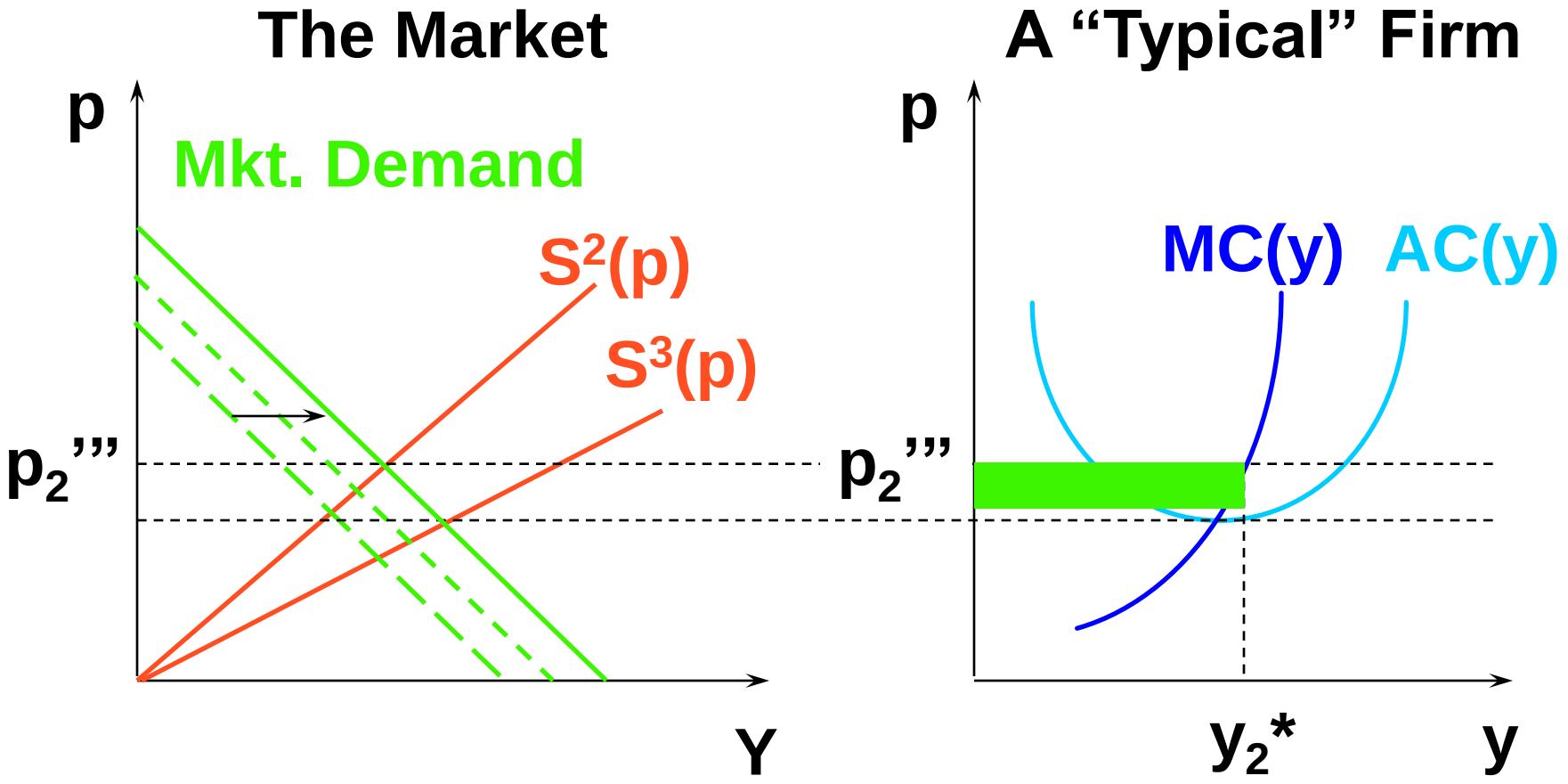
Long-Run Industry Supply



Long-Run Industry Supply



Long-Run Industry Supply

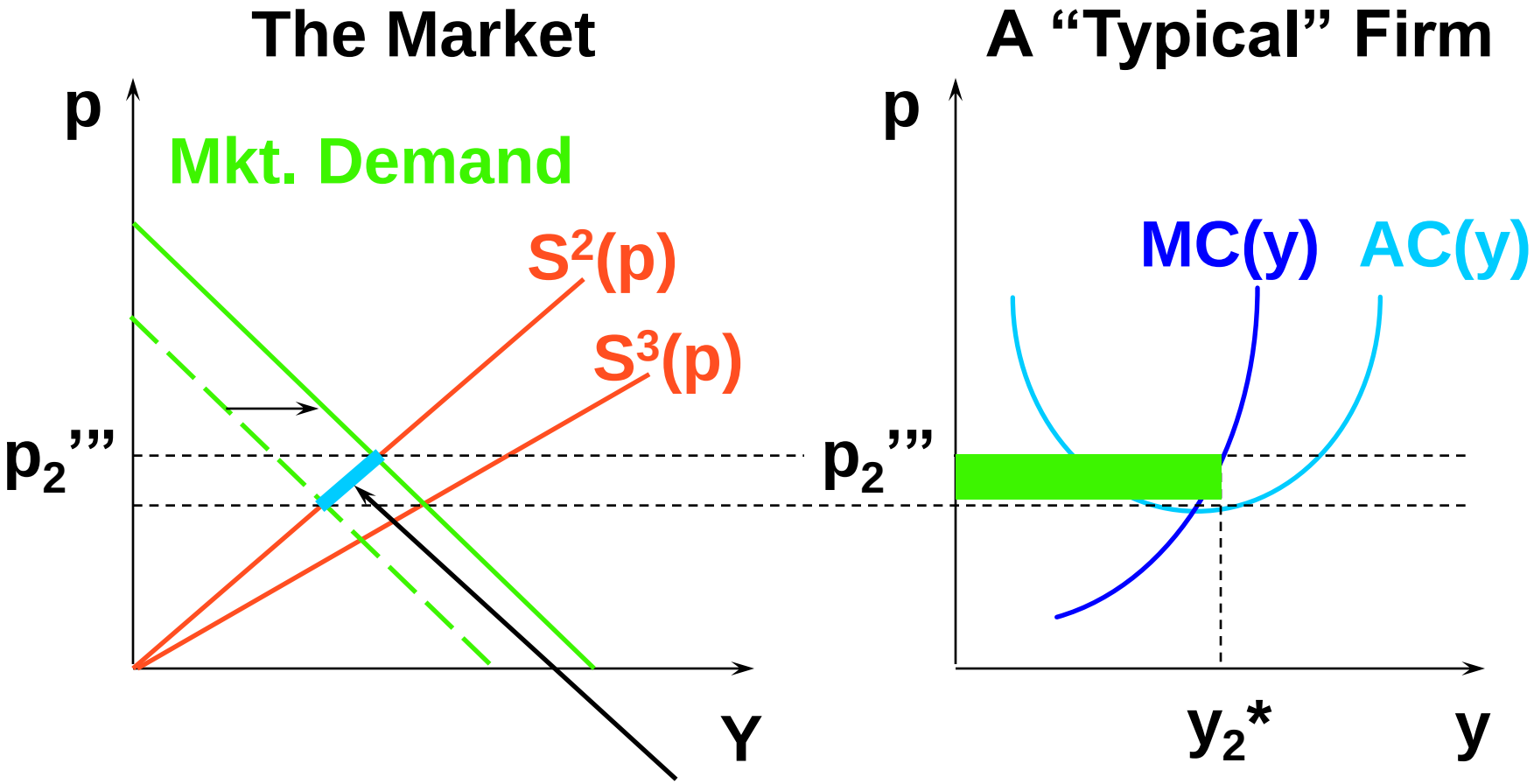


A third firm can now enter, causing all firms to earn zero economic profits.

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

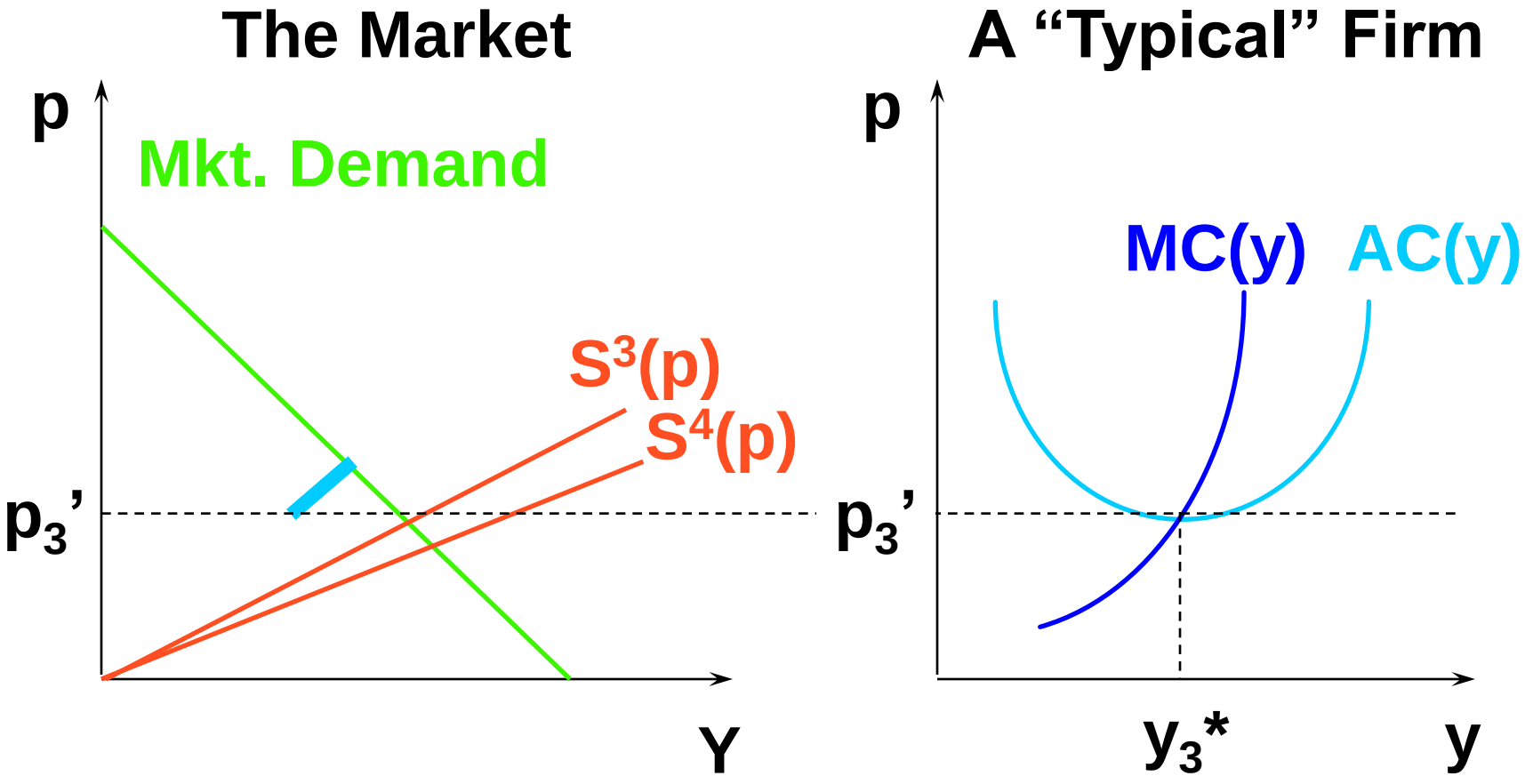


The only relevant part of the short-run supply curve for n = 2 firms in the industry.

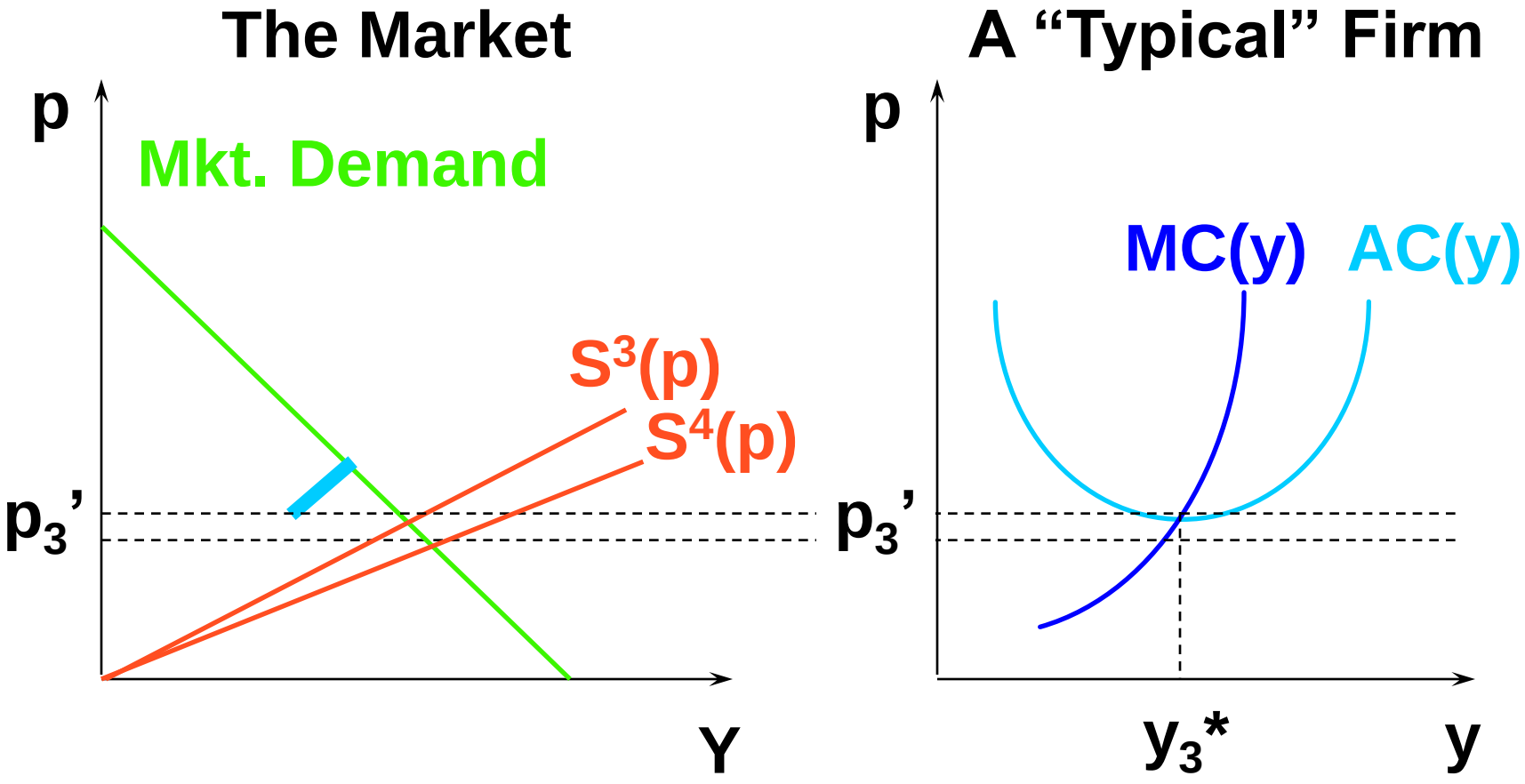
Long-Run Industry Supply

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

Long-Run Industry Supply

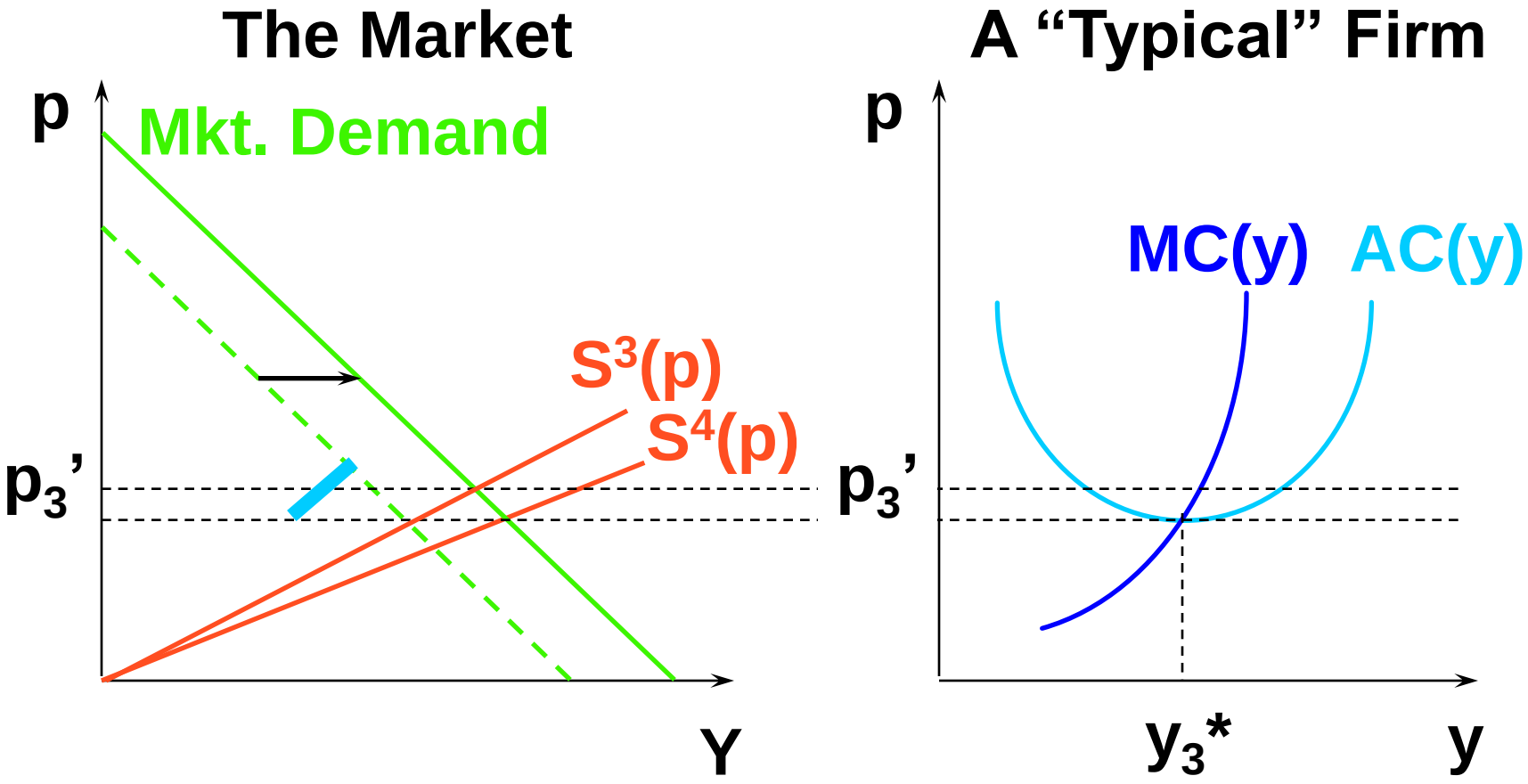


Long-Run Industry Supply



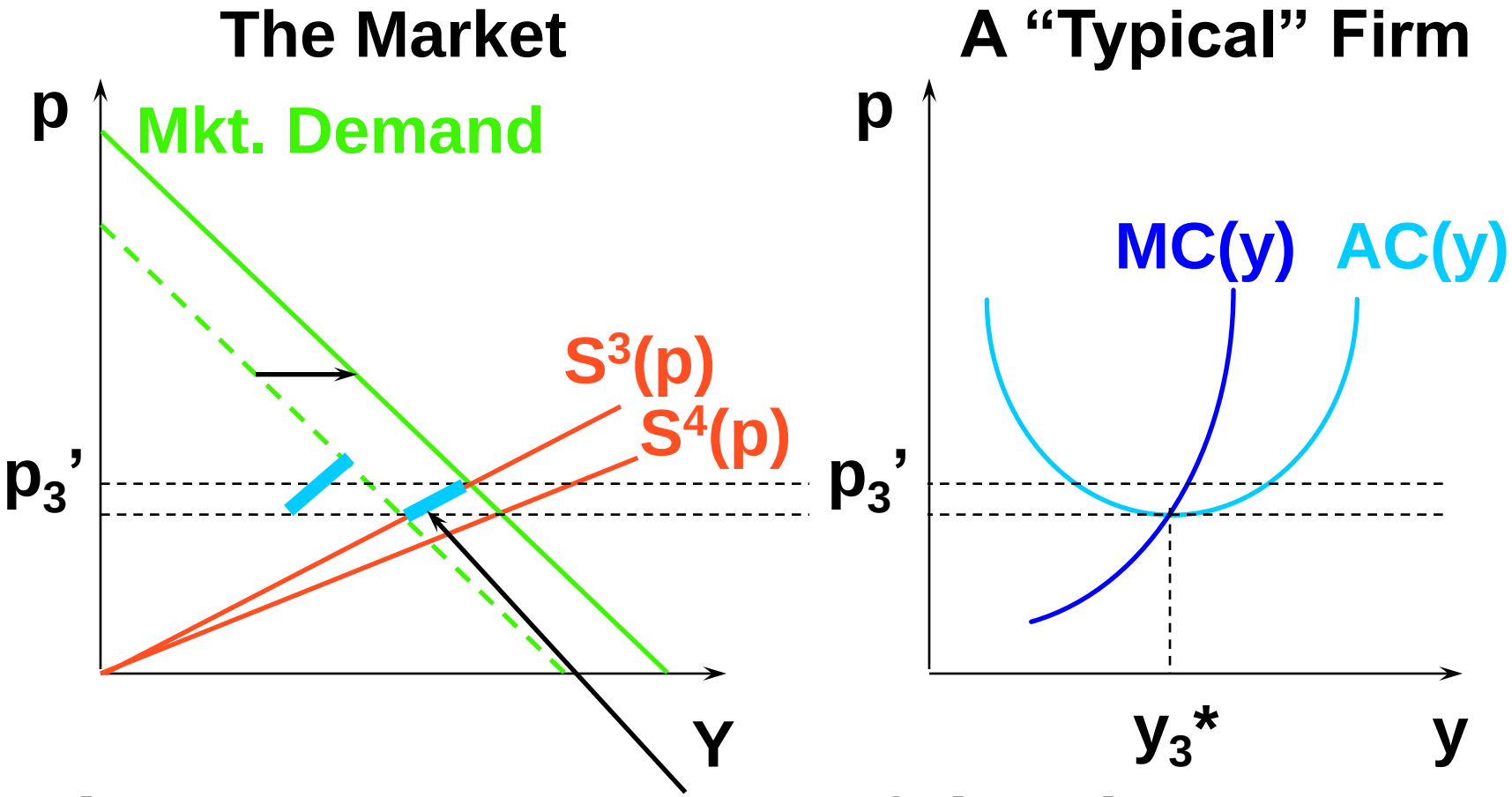
A 4th firm would now earn negative economic profits if it entered the industry.

Long-Run Industry Supply



But now a 4th firm would earn zero economic profit if it entered the industry.

Long-Run Industry Supply

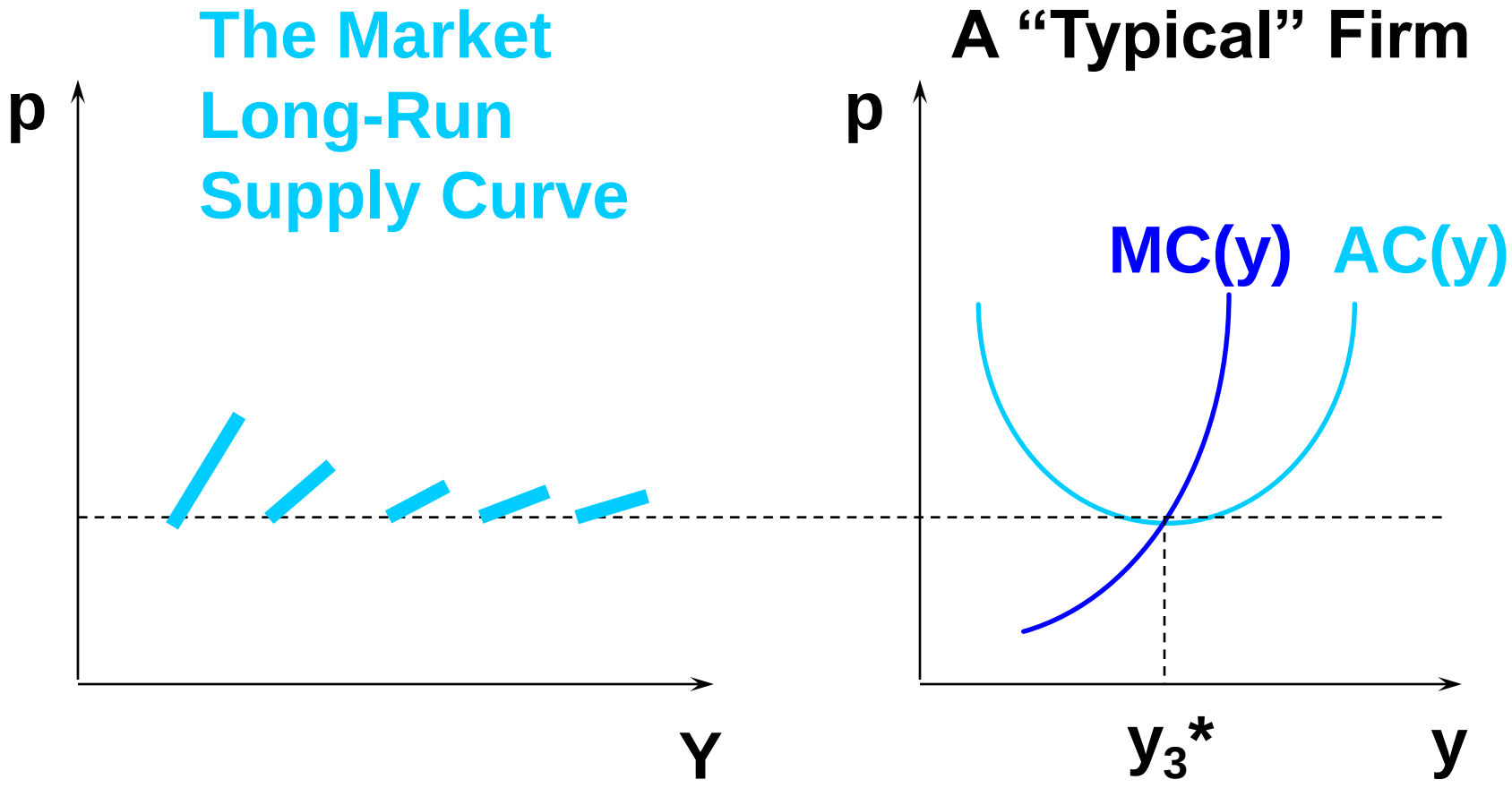


The only relevant part of the short-run supply curve for n = 3 firms in the industry.

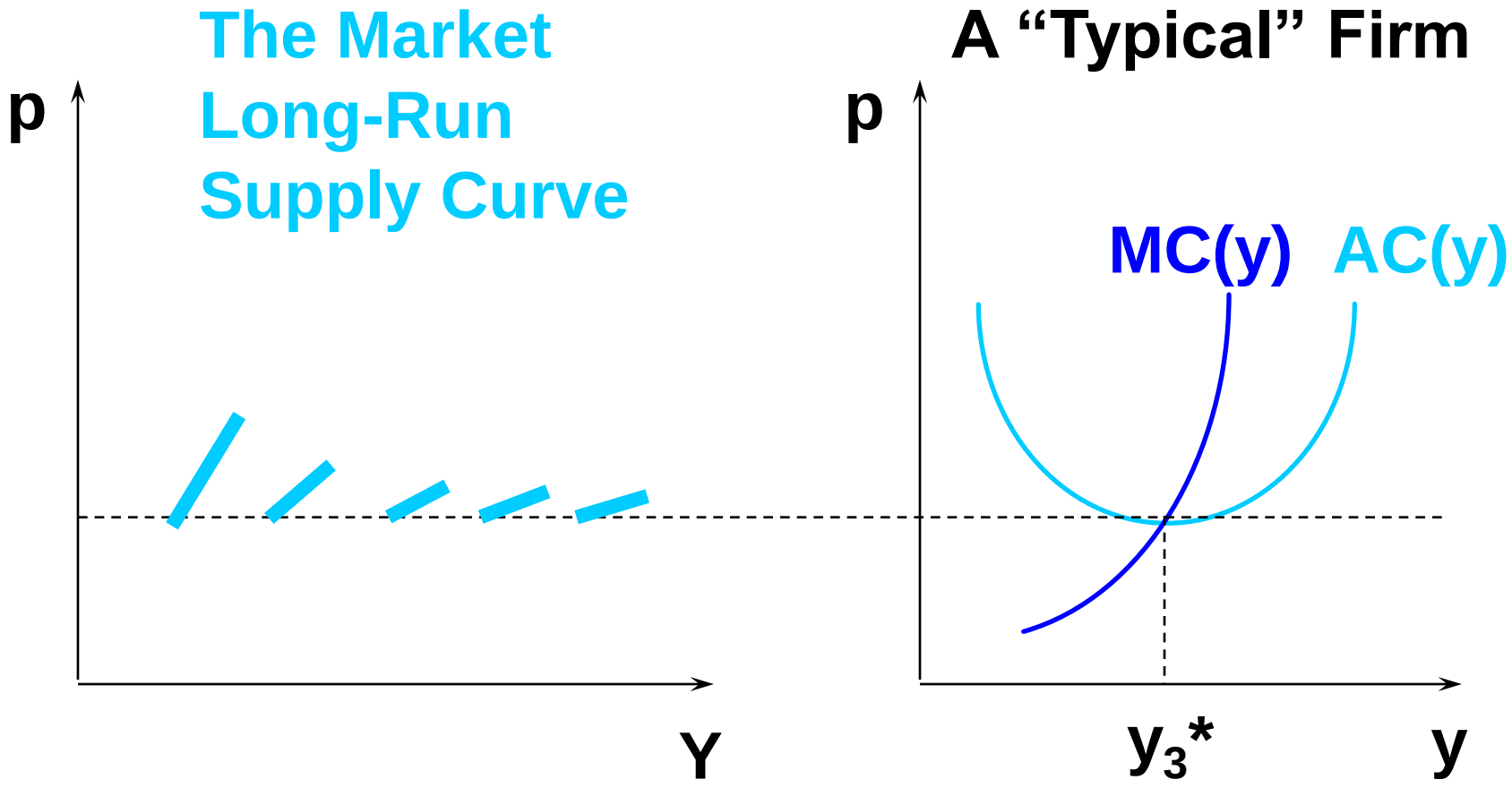
Long-Run Industry Supply

- 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



Long-Run Industry Supply

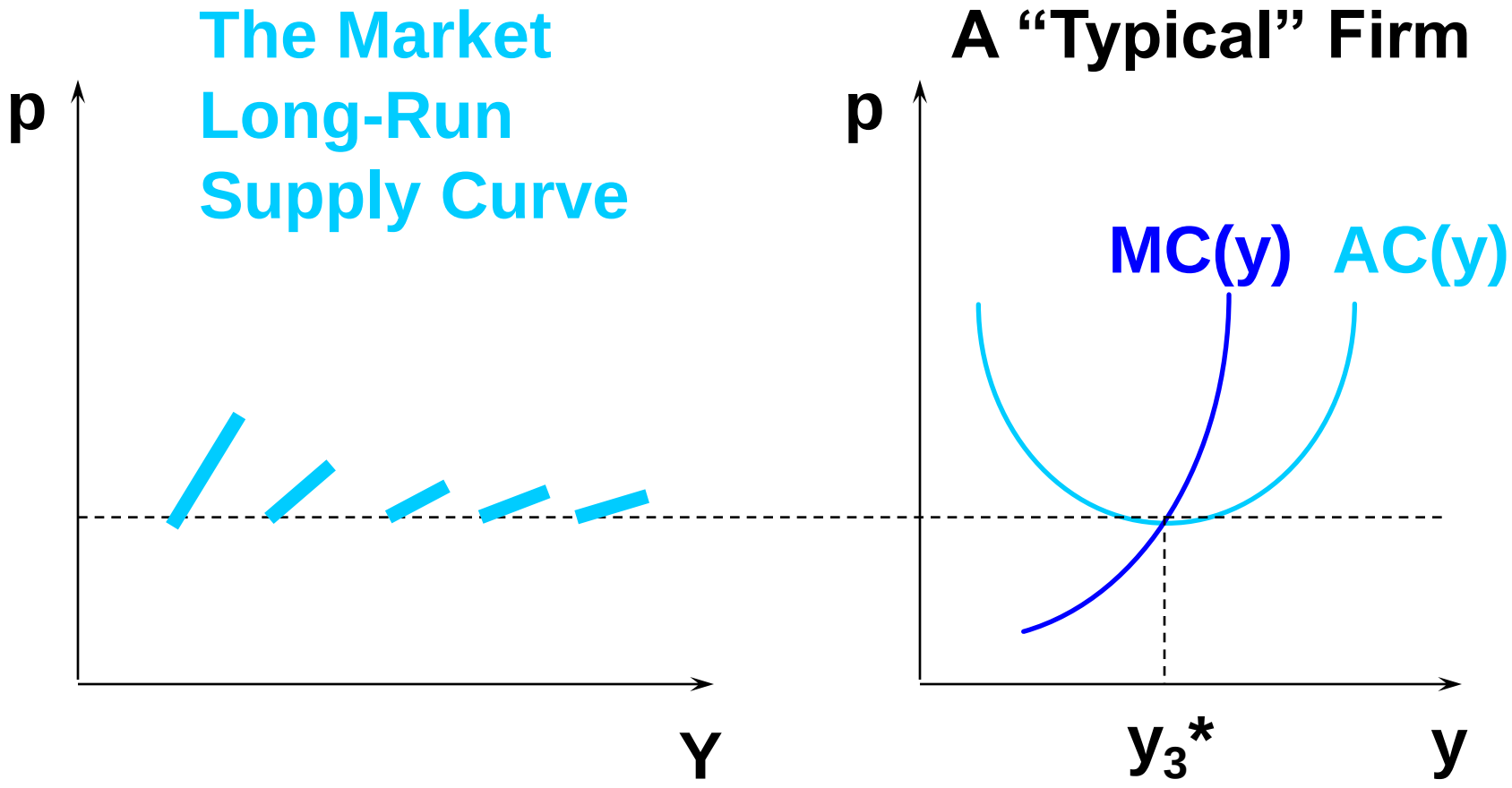


Notice that the bottom of each segment of the supply curve is min AC(y).

Long-Run Industry Supply

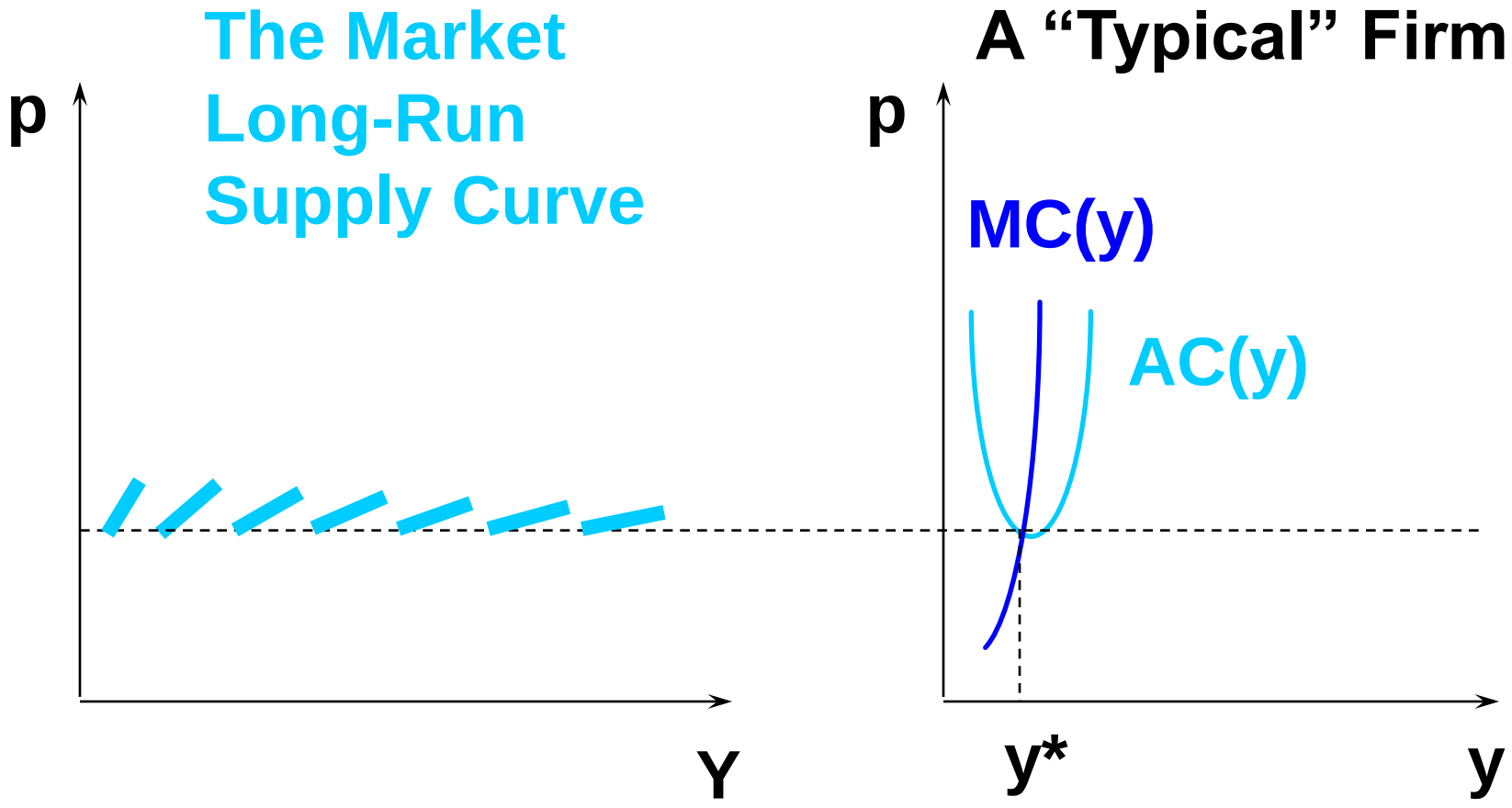
- As each firm gets “smaller” relative to the industry, the long-run industry supply curve approaches a horizontal line at the height of min AC(y).

Long-Run Industry Supply



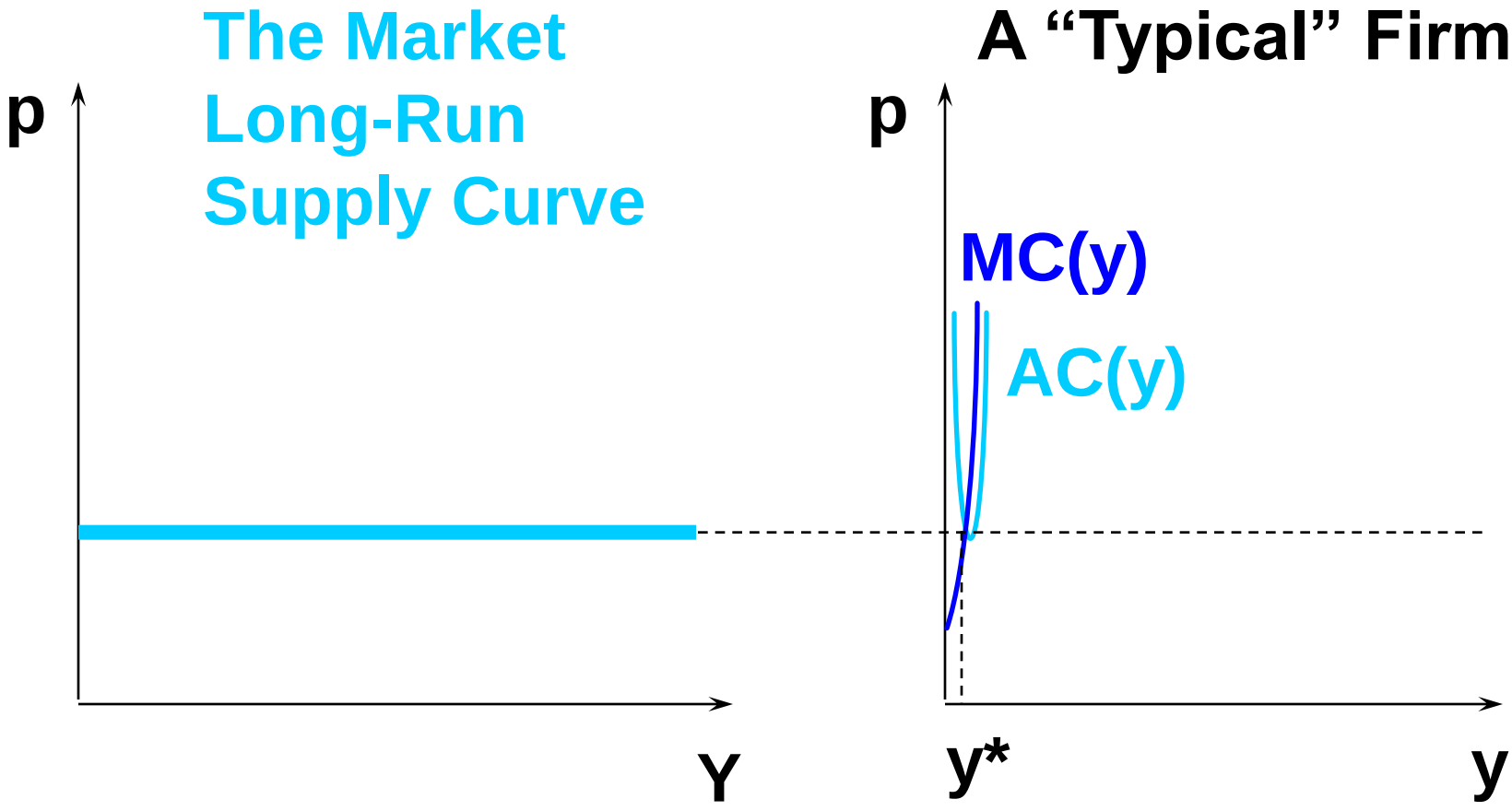
Notice that the bottom of each segment of the supply curve is min AC(y).

Long-Run Industry Supply



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

Long-Run Industry Supply



In the limit, as firms become infinitesimally small, the industry’s long-run supply curve is horizontal at min AC(y).

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.

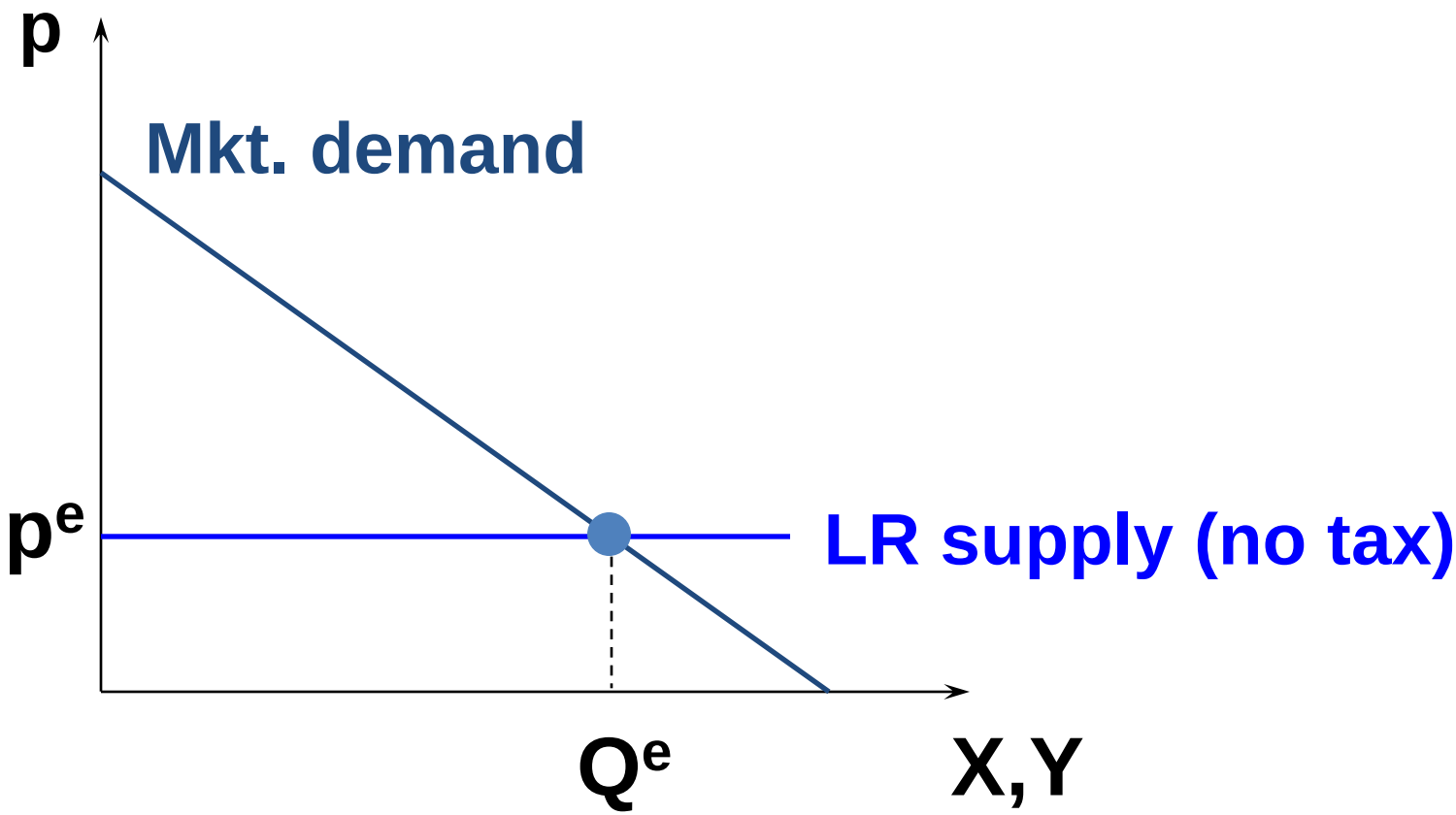
Long-run market price is

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

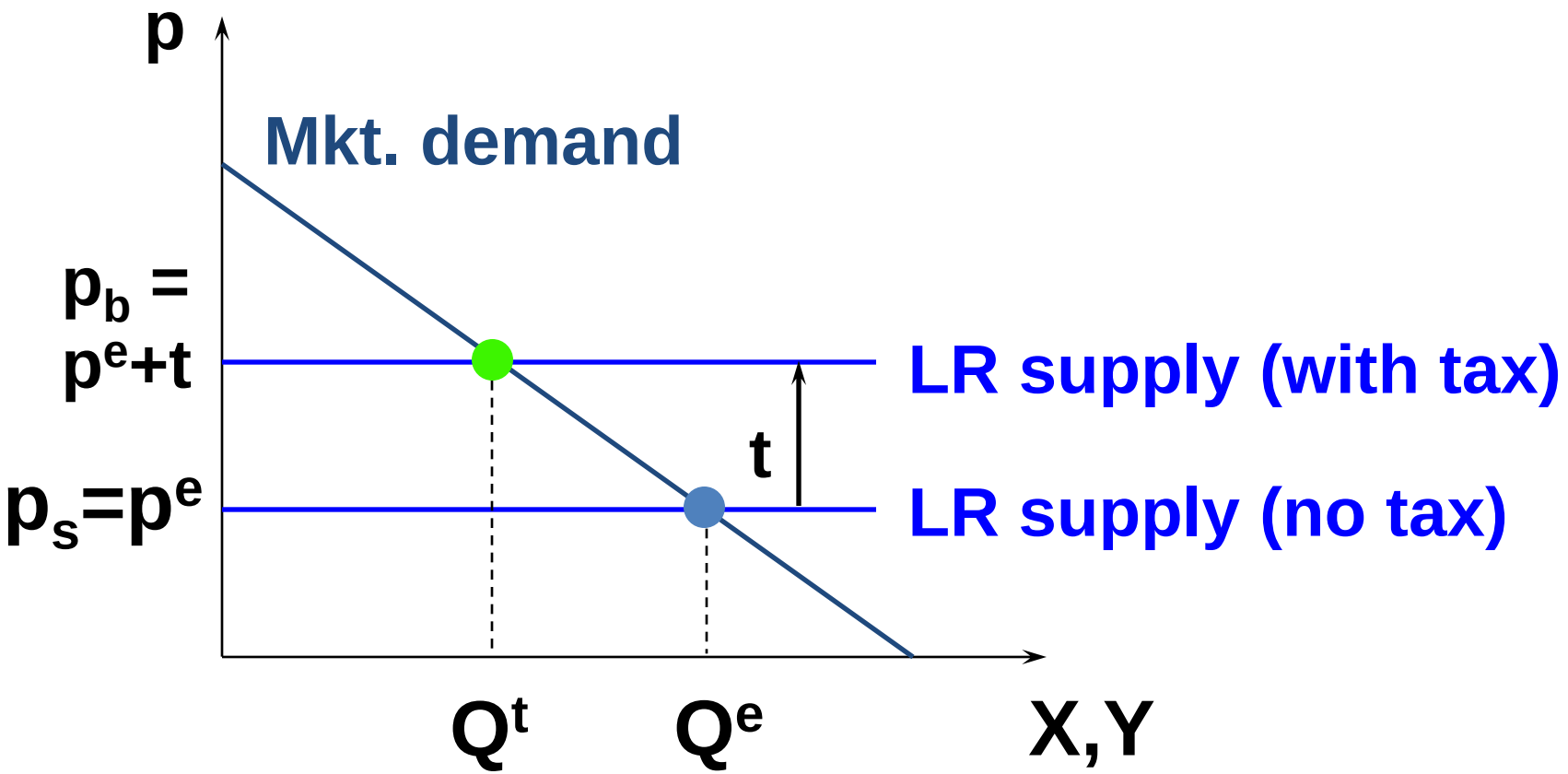
Long-Run Implications for Taxation

- 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

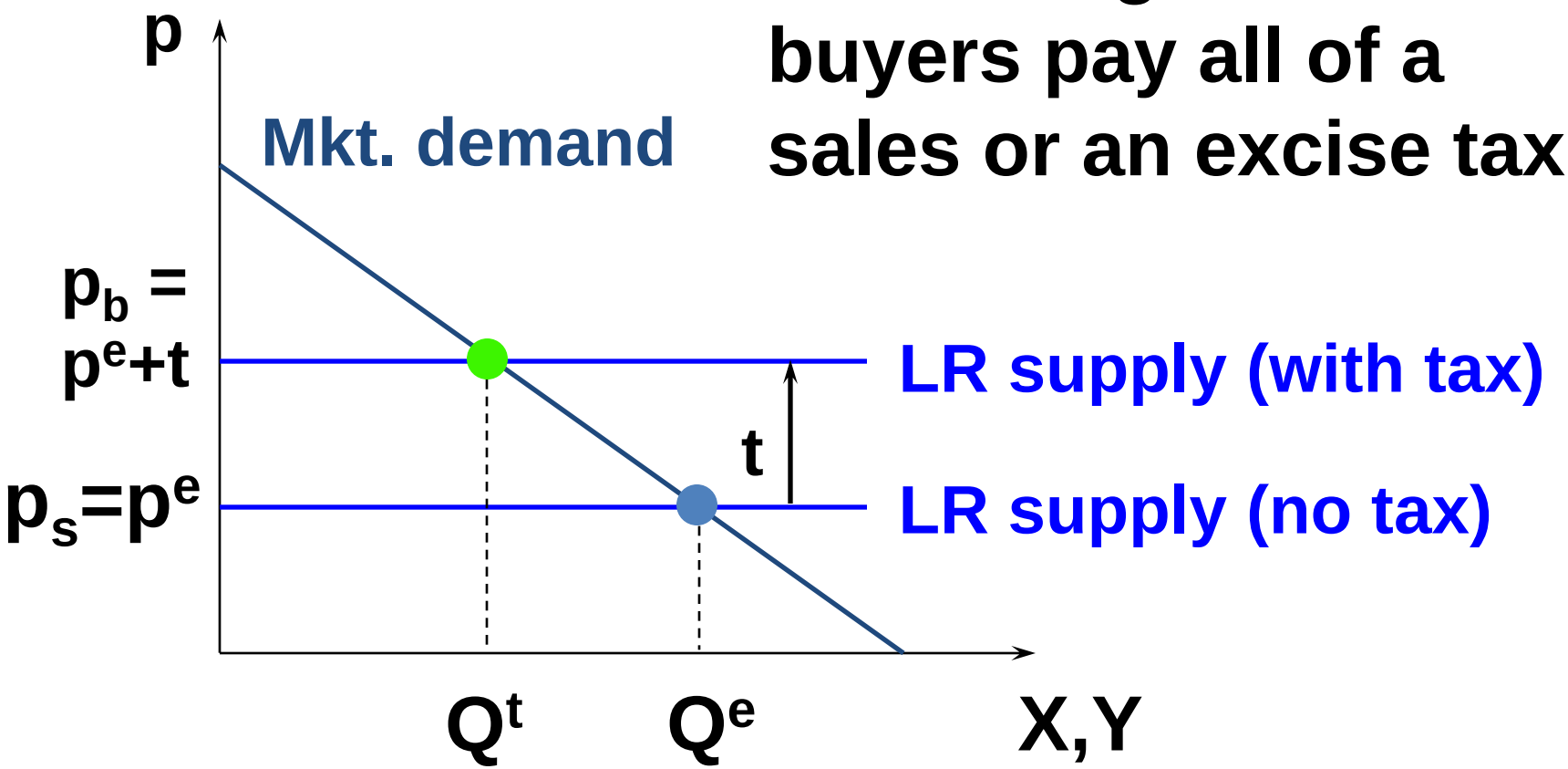


Long-Run Implications for Taxation



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, $c(y) = F + c_v(y)$.
- And long-run average total cost,

  $$AC(y) = AFC(y) + AVC(y).$$

- In the long-run equilibrium, what will be the value of F?

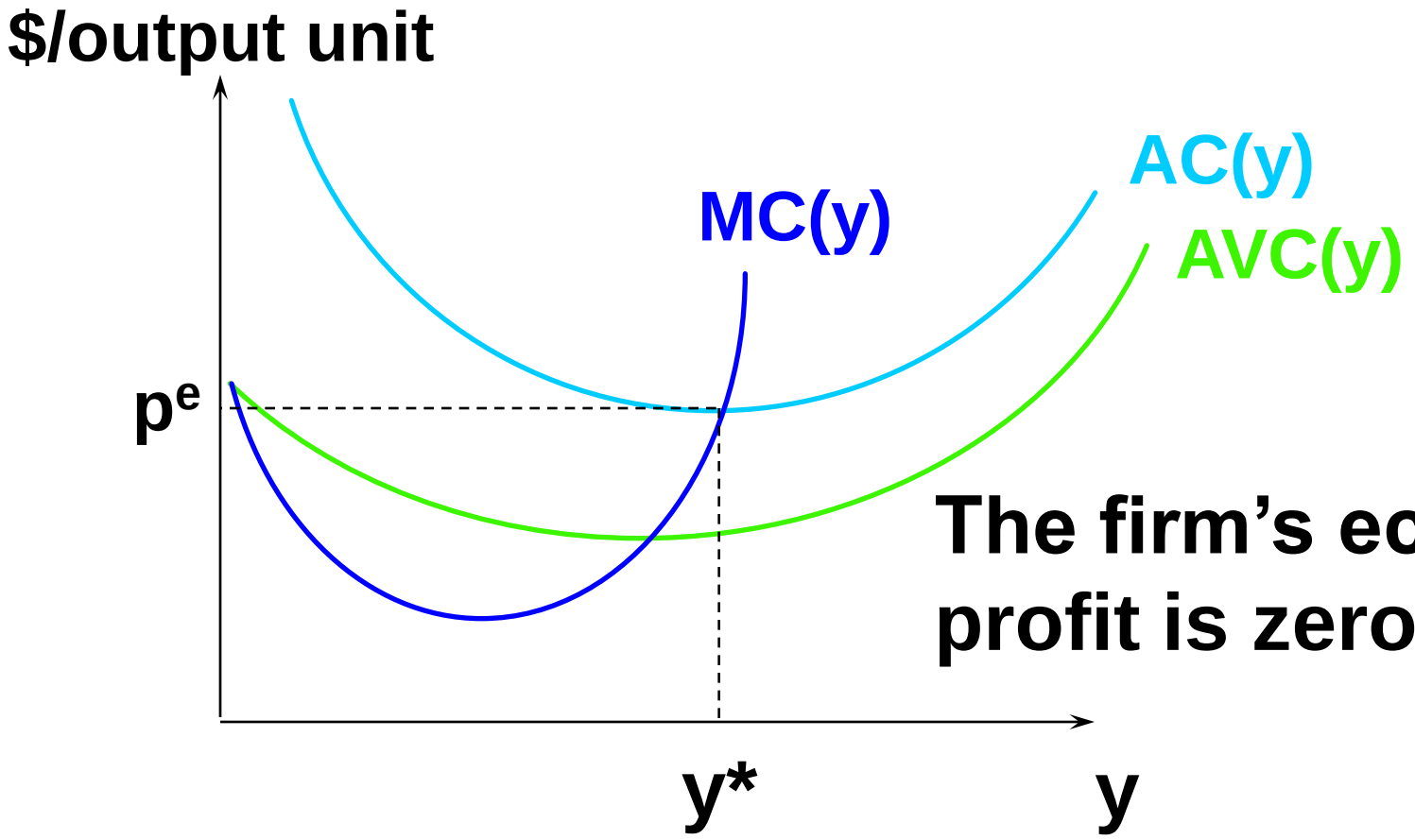
Fixed Inputs and Economic Rent

- 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

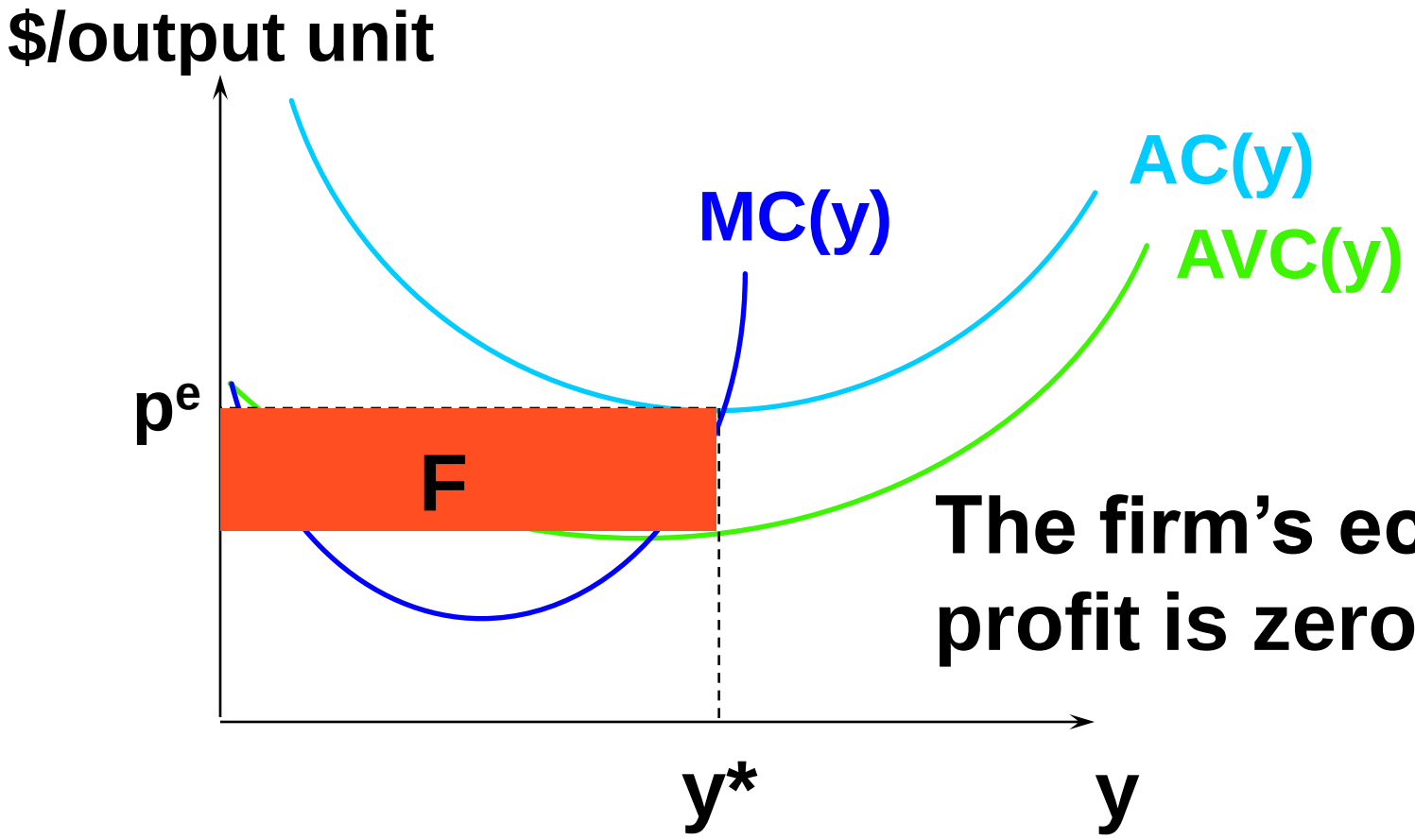
- So in the long-run equilibrium, each firm makes a zero economic profit and each firm's fixed cost is its payment for its operating license.

Fixed Inputs and Economic Rent



The firm's economic profit is zero.

Fixed Inputs and Economic Rent



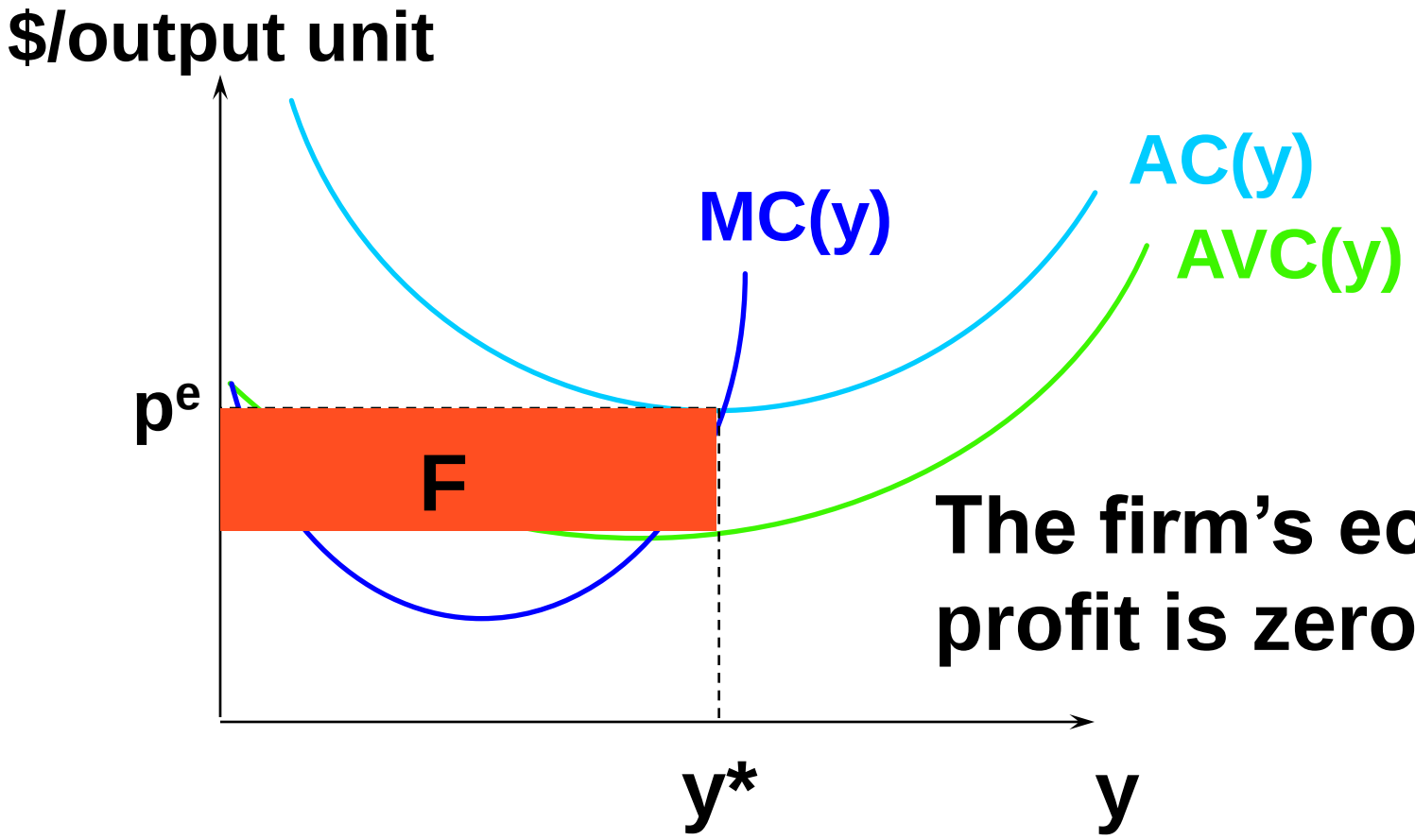
The firm's economic profit is zero.

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



The firm's economic profit is zero.

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