8TH EDITION

INTERMEDIATE MICROECONOMICS

HAL R. VARIAN

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.**

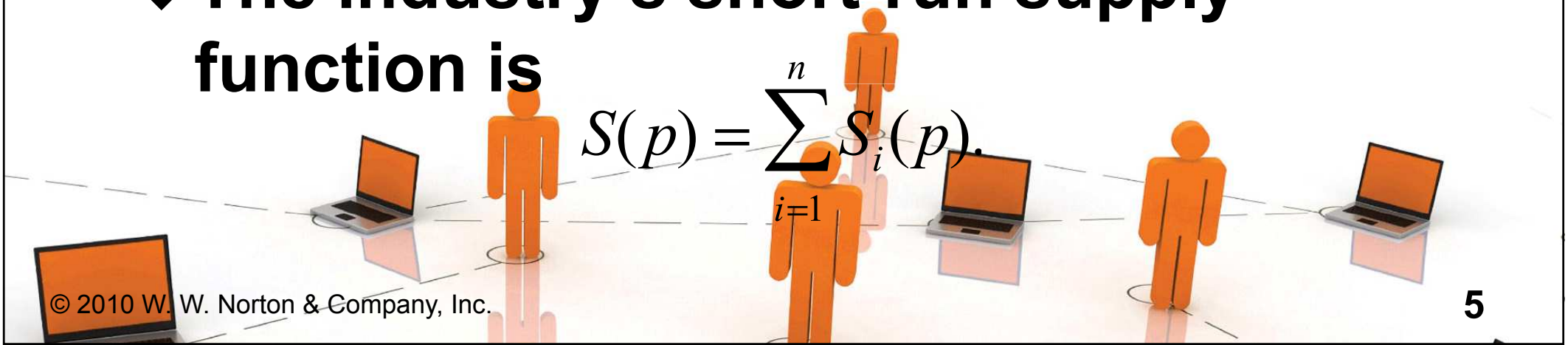
Short-Run Supply

- **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

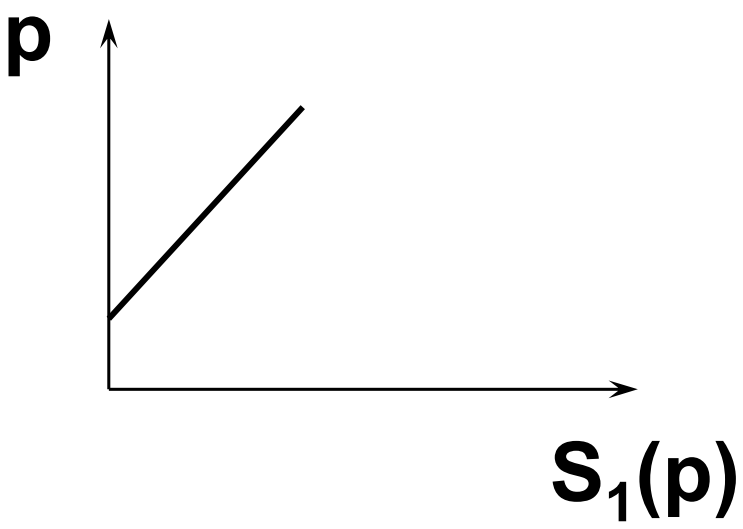
- **In a short-run the number of firms in the industry is, temporarily, fixed.**
- **Let n be the number of firms; i = 1, … ,n.**
- **$S_i(p)$ is firm i's supply function.**
- **The industry's short-run supply function is**

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

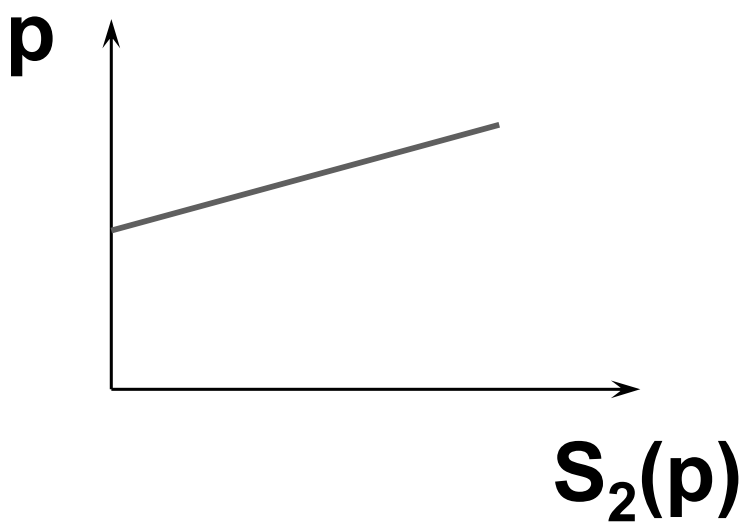


Supply From A Competitive Industry

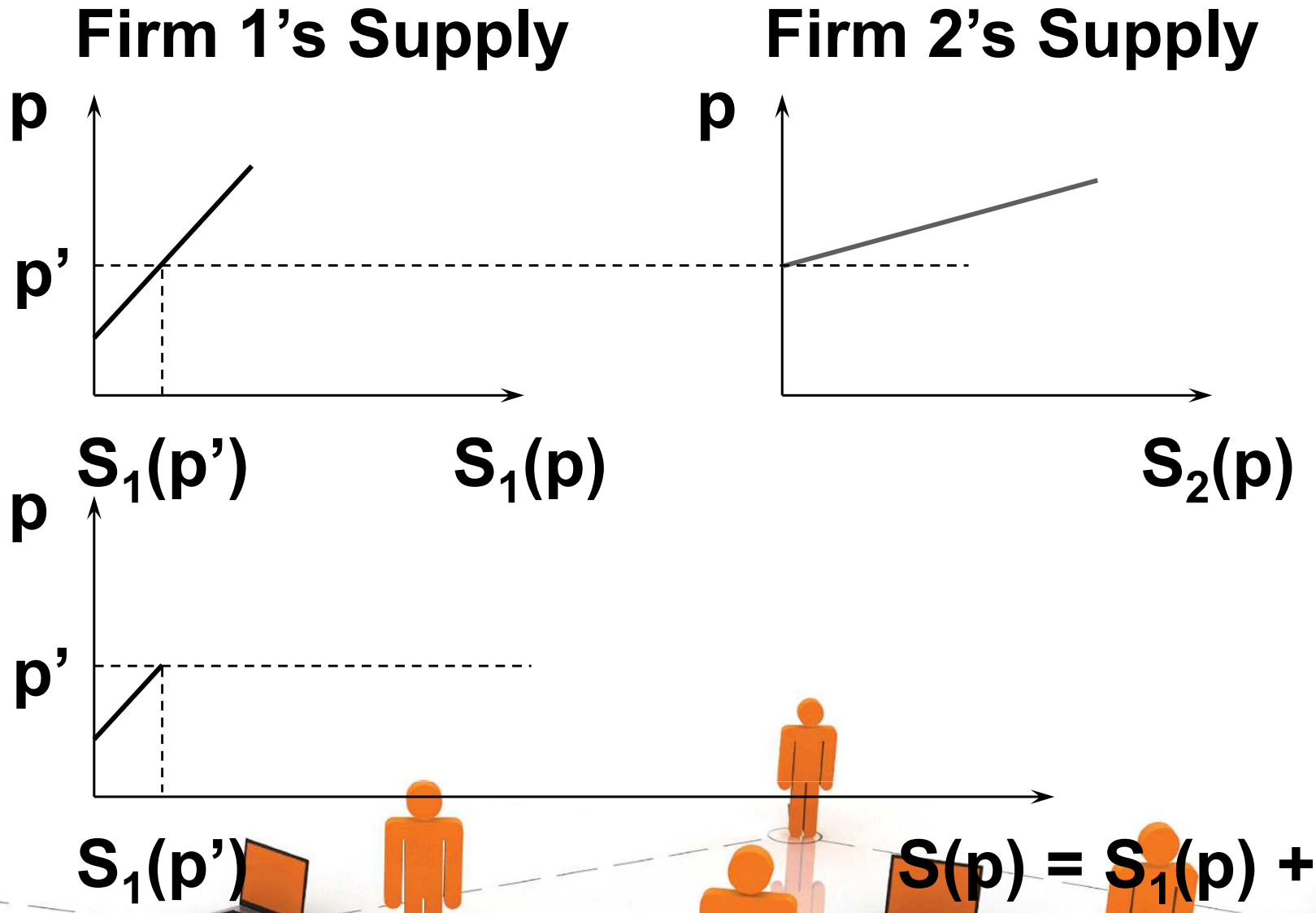
Firm 1's Supply



Firm 2's Supply

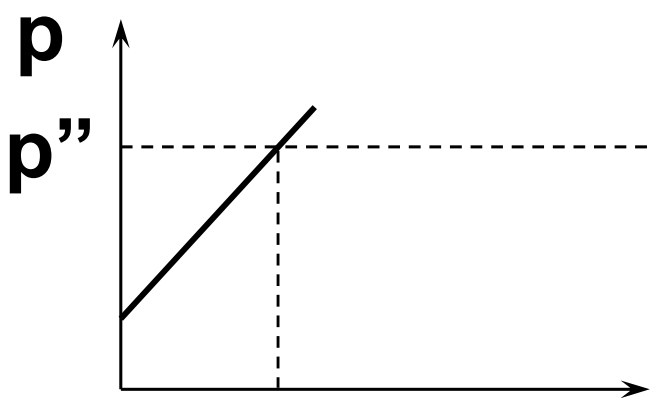


Supply From A Competitive Industry

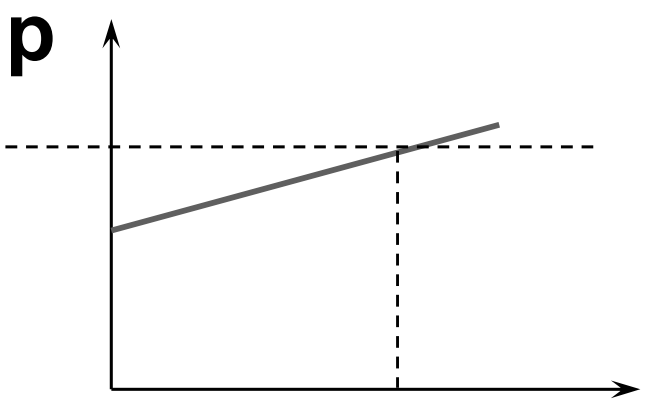


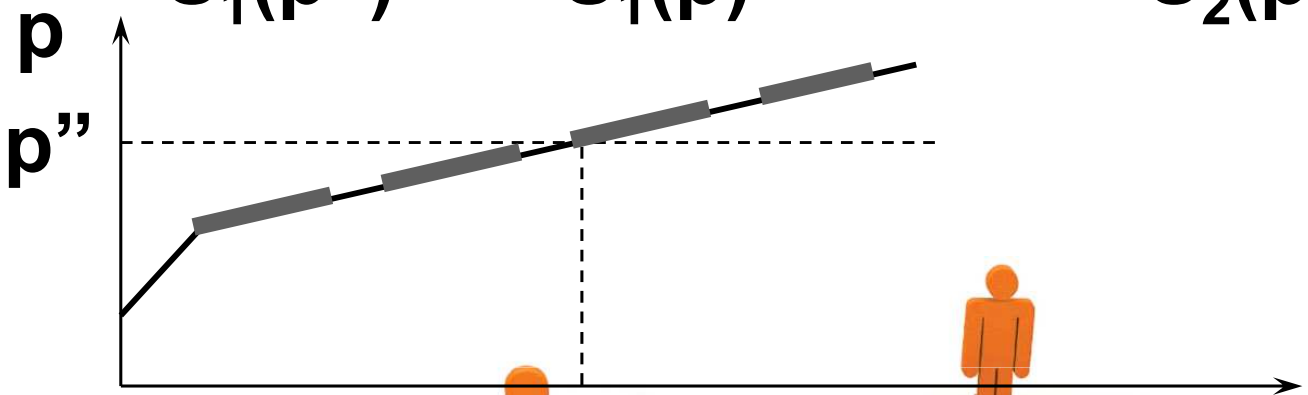
Supply From A Competitive Industry

Firm 1's Supply



Firm 2's Supply



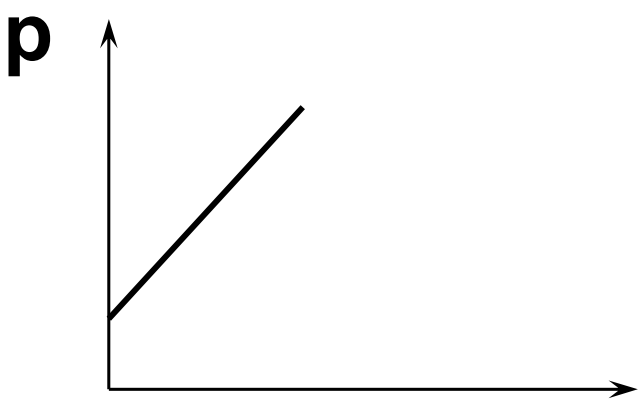


$S_1(p'') + S_2(p'')$ $S(p) = S_1(p) + S_2(p)$

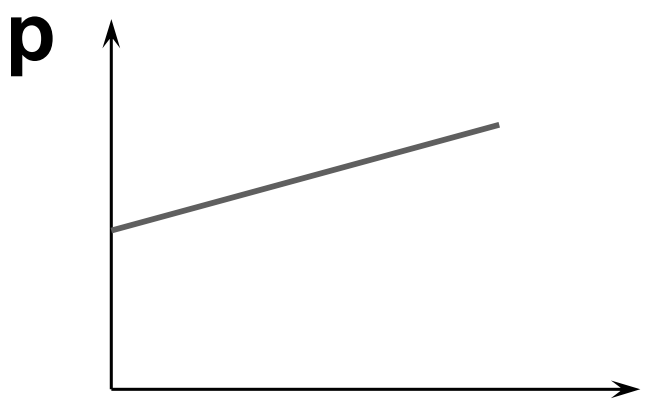
Industry's Supply

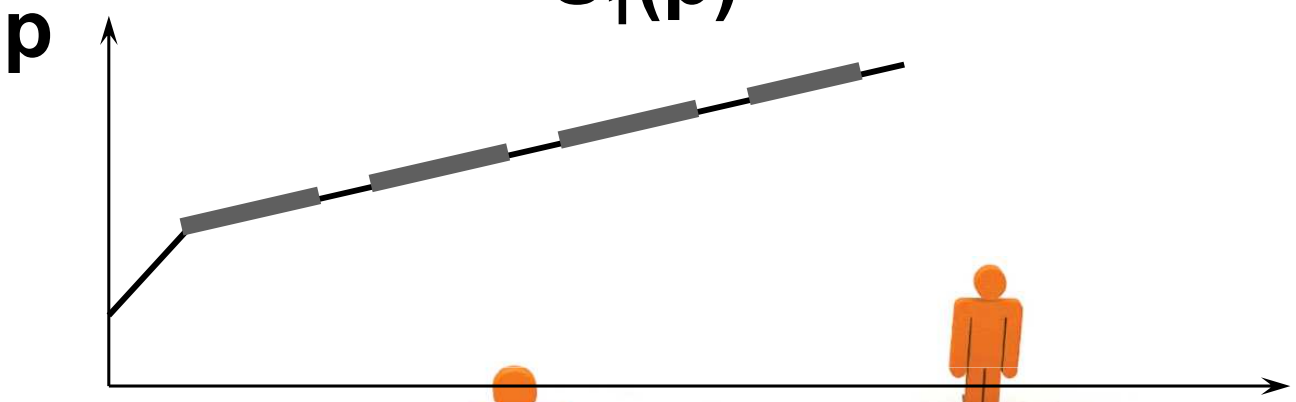
Supply From A Competitive Industry

Firm 1's Supply



Firm 2's Supply





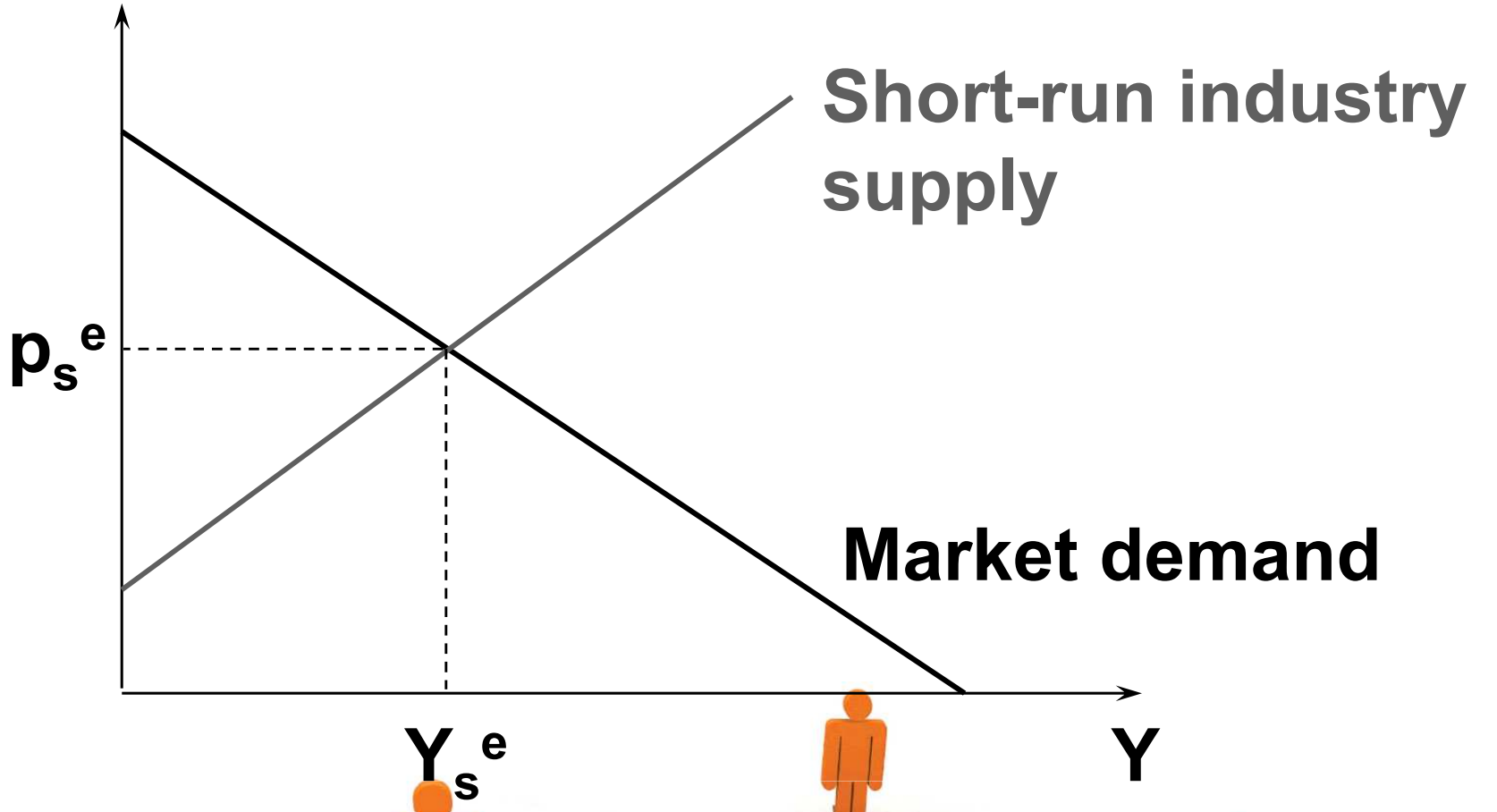
$S(p) = S_1(p) + S_2(p)$

Industry's Supply

Short-Run Industry Equilibrium

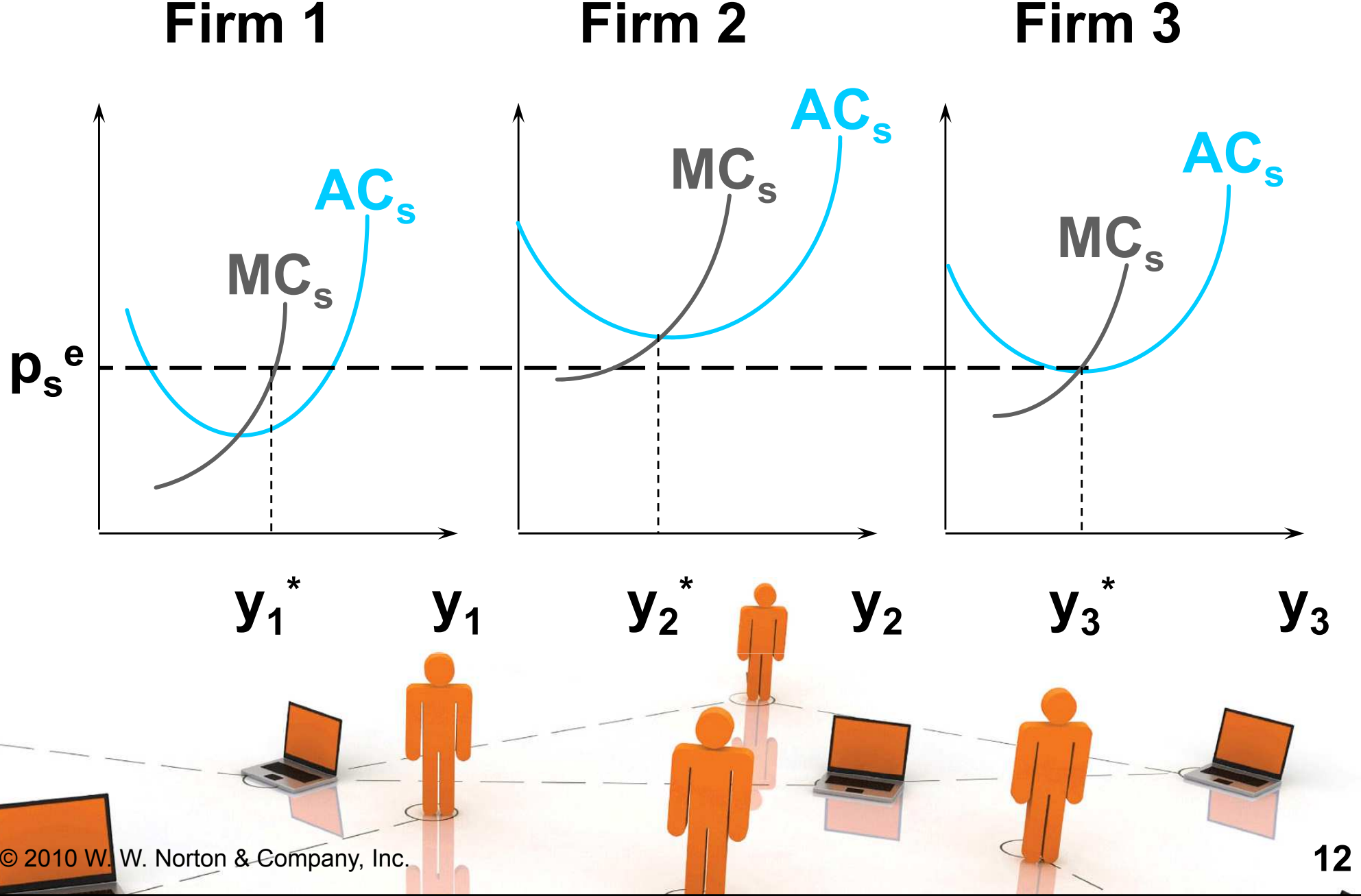
- **In a short-run, neither entry nor exit can occur.**
- **Consequently, in a short-run equilibrium, some firms may earn positive economics profits, others may suffer economic losses, and still others may earn zero economic profit.**

Short-Run Industry Equilibrium

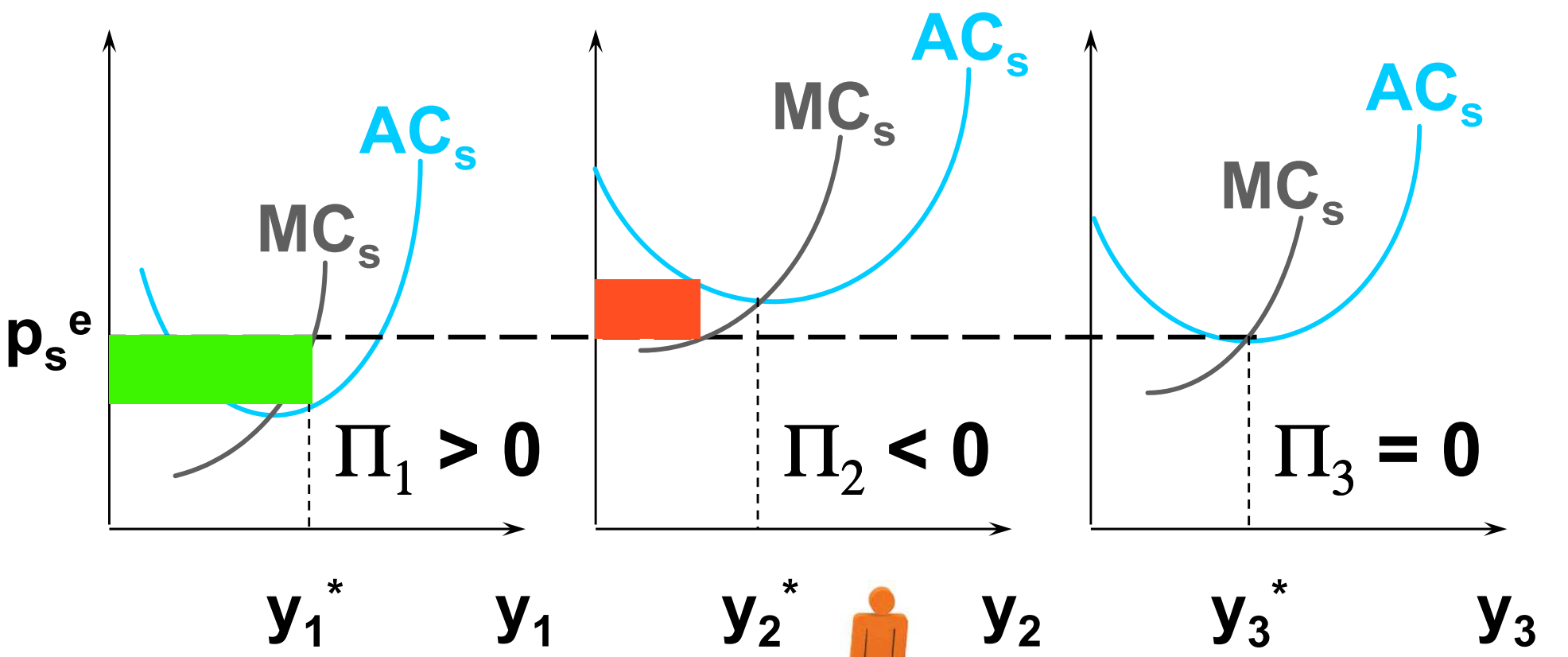


Short-run equilibrium price clears the market and is taken as given by each firm.

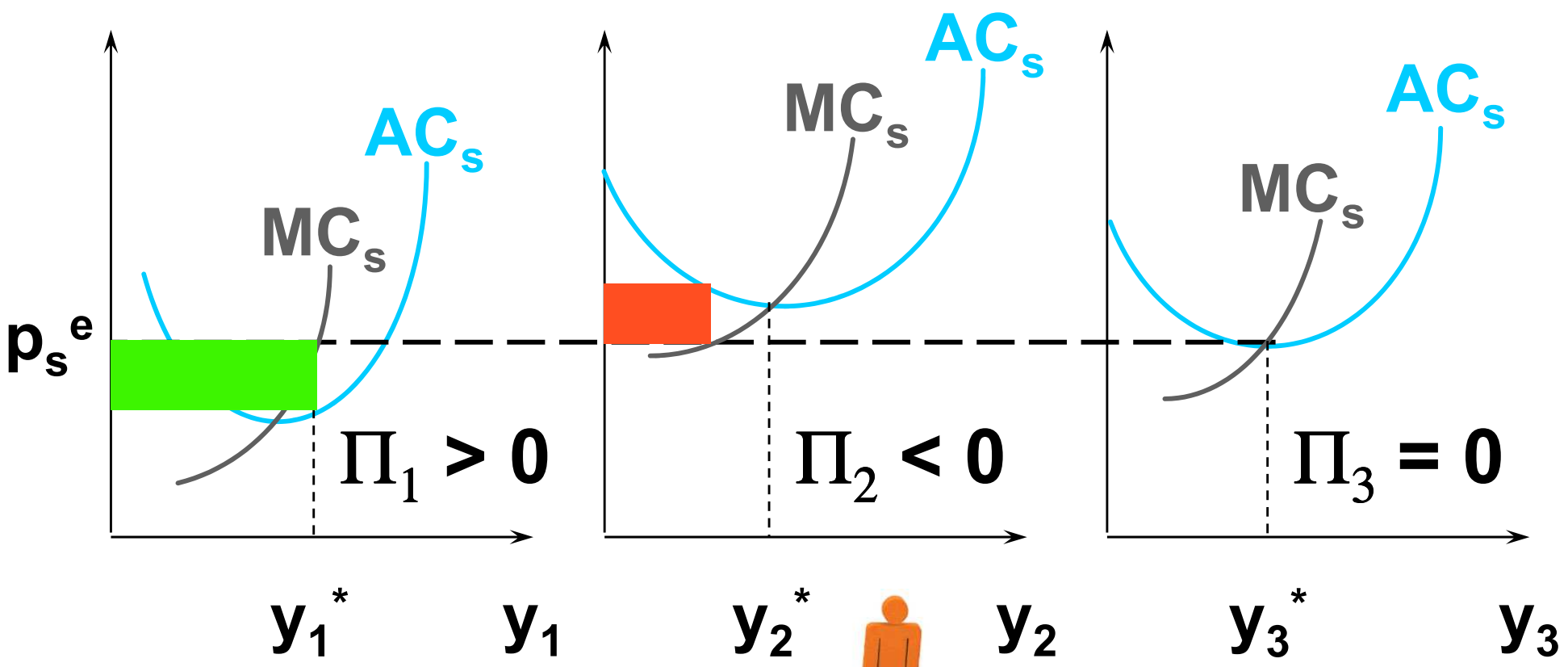
Short-Run Industry Equilibrium



Short-Run Industry Equilibrium



Short-Run Industry Equilibrium



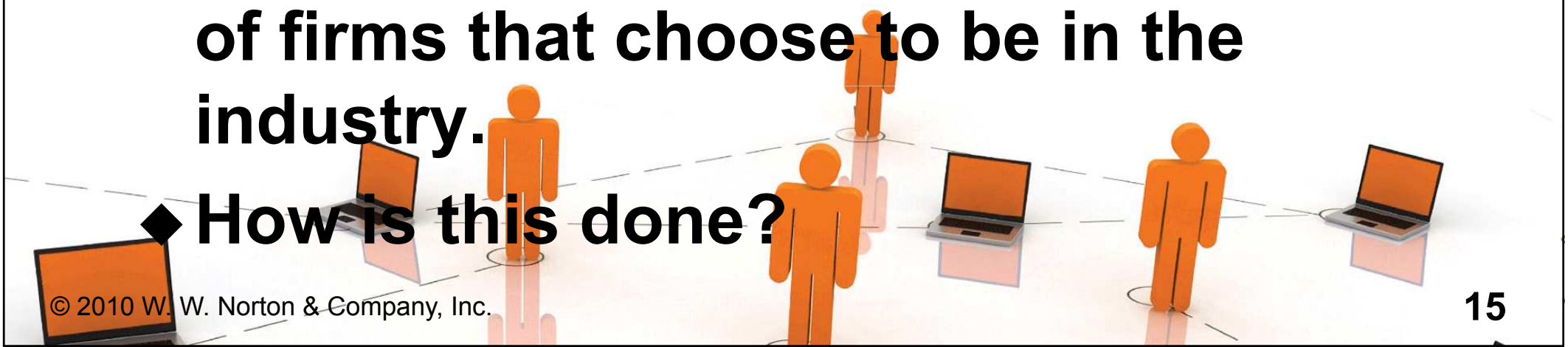
Firm 1 wishes to remain in the industry.

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?**



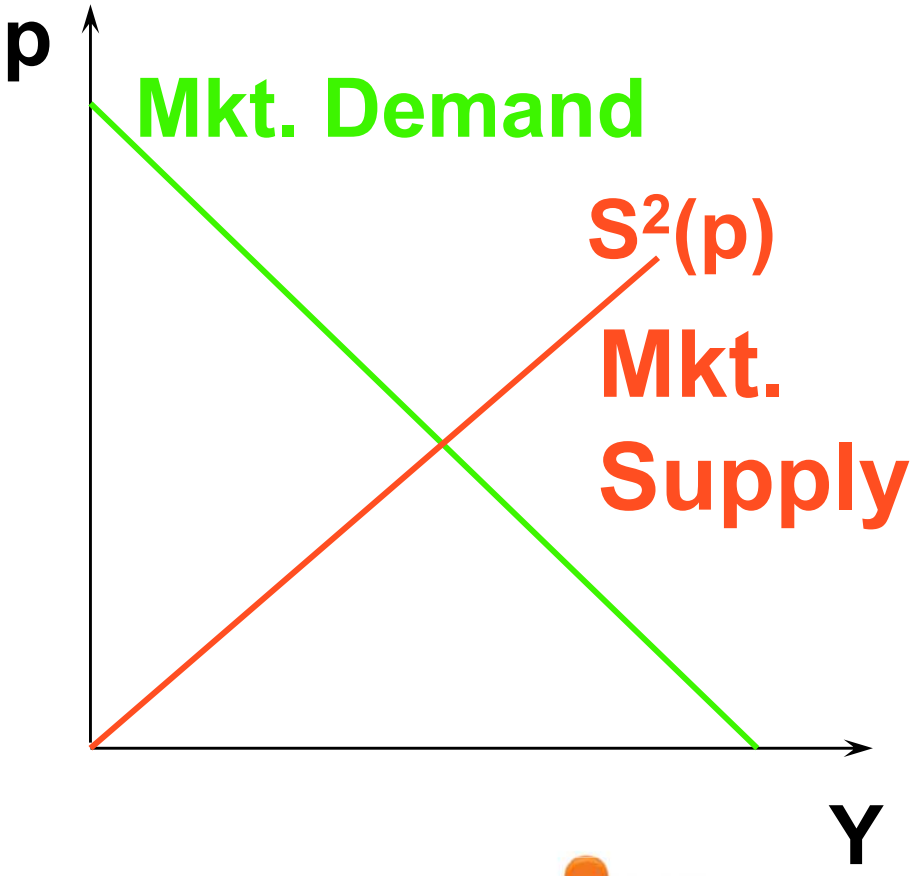
Long-Run Industry Supply

- **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;**

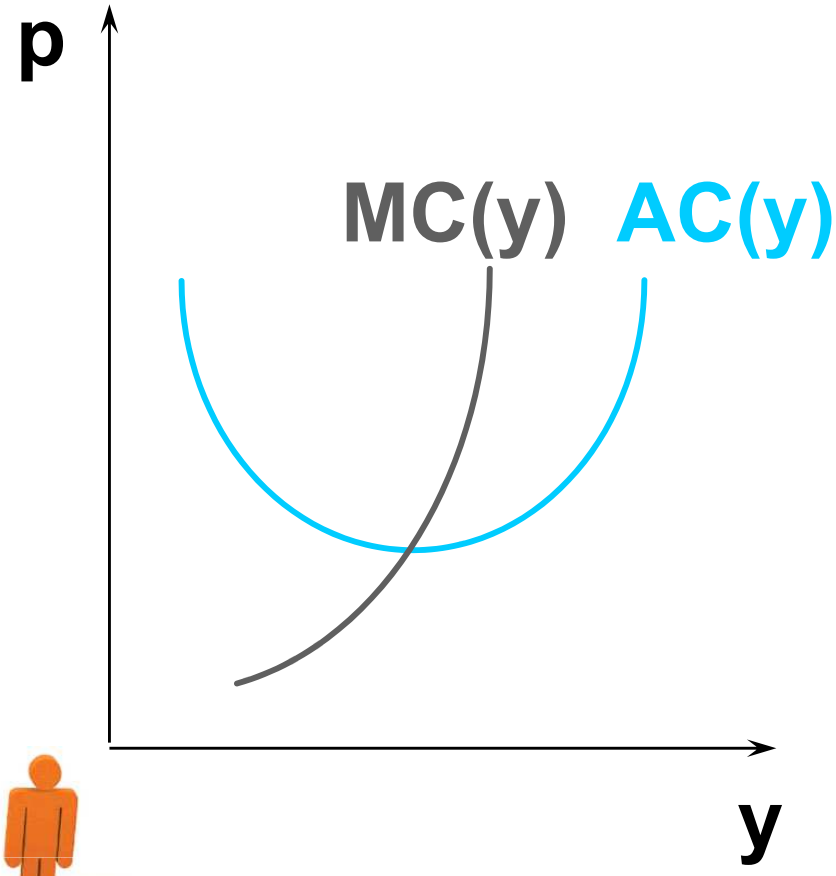
  p_s^e > min AC(y).
- **Entry increases industry supply, causing p_s^e to fall.**
- **When does entry cease?**

Long-Run Industry Supply

The Market



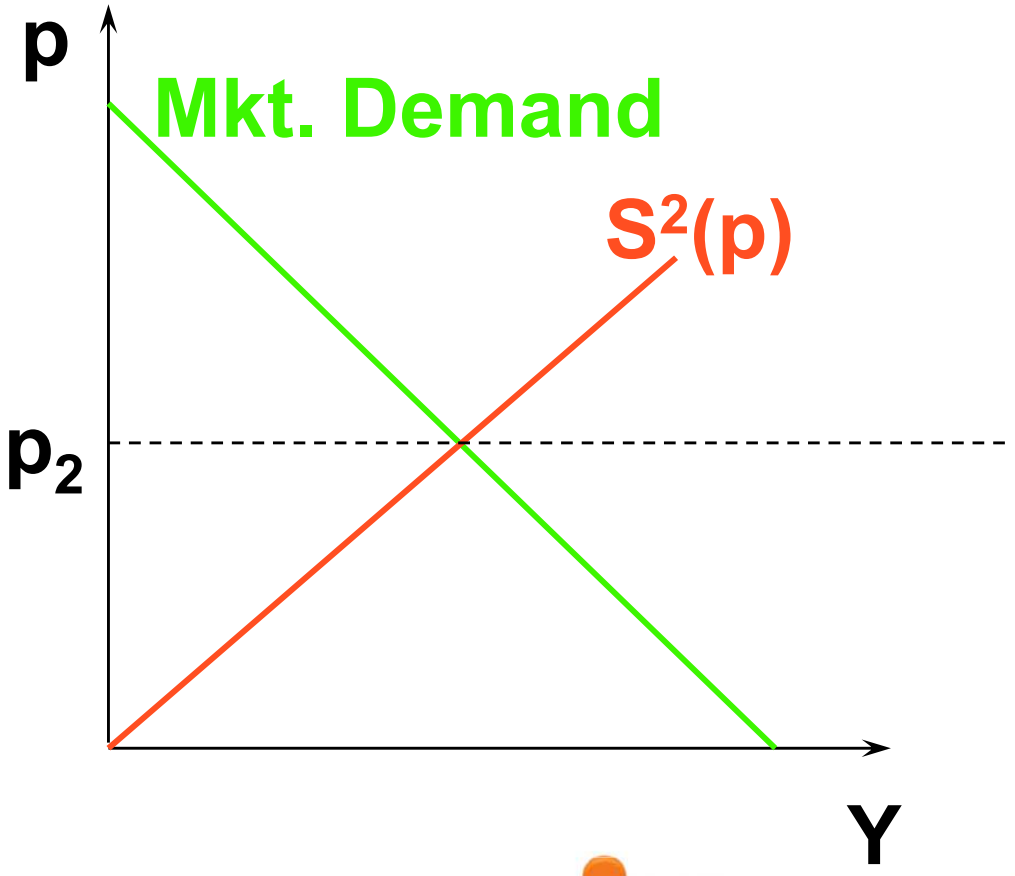
A "Typical" Firm



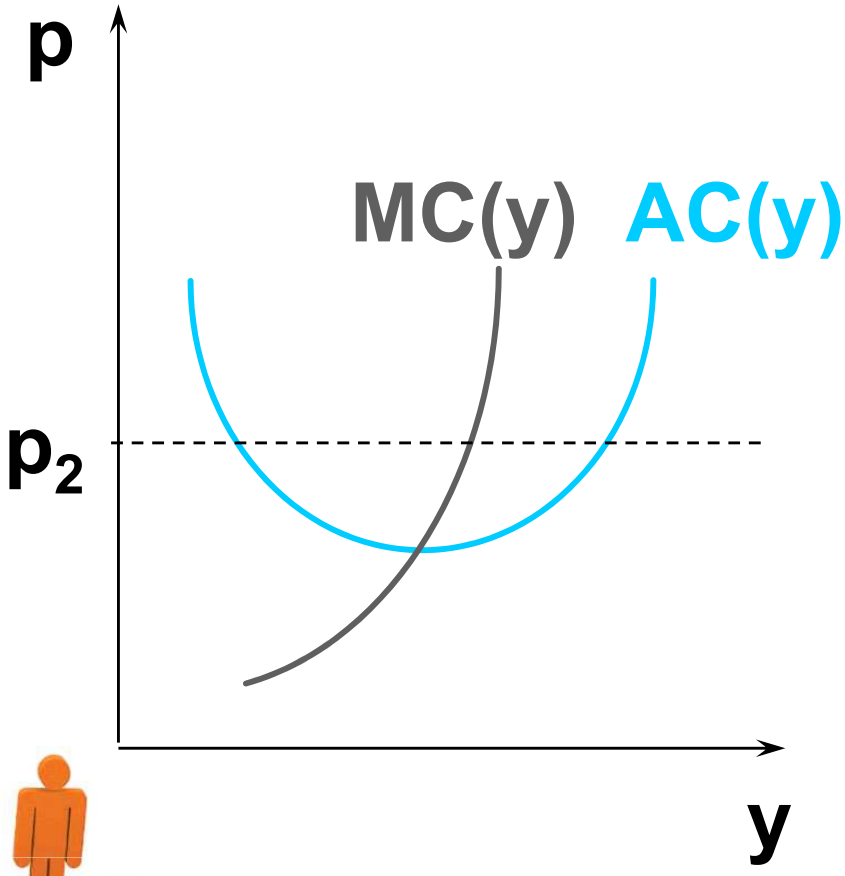
Suppose the industry initially contains only two firms.

Long-Run Industry Supply

The Market



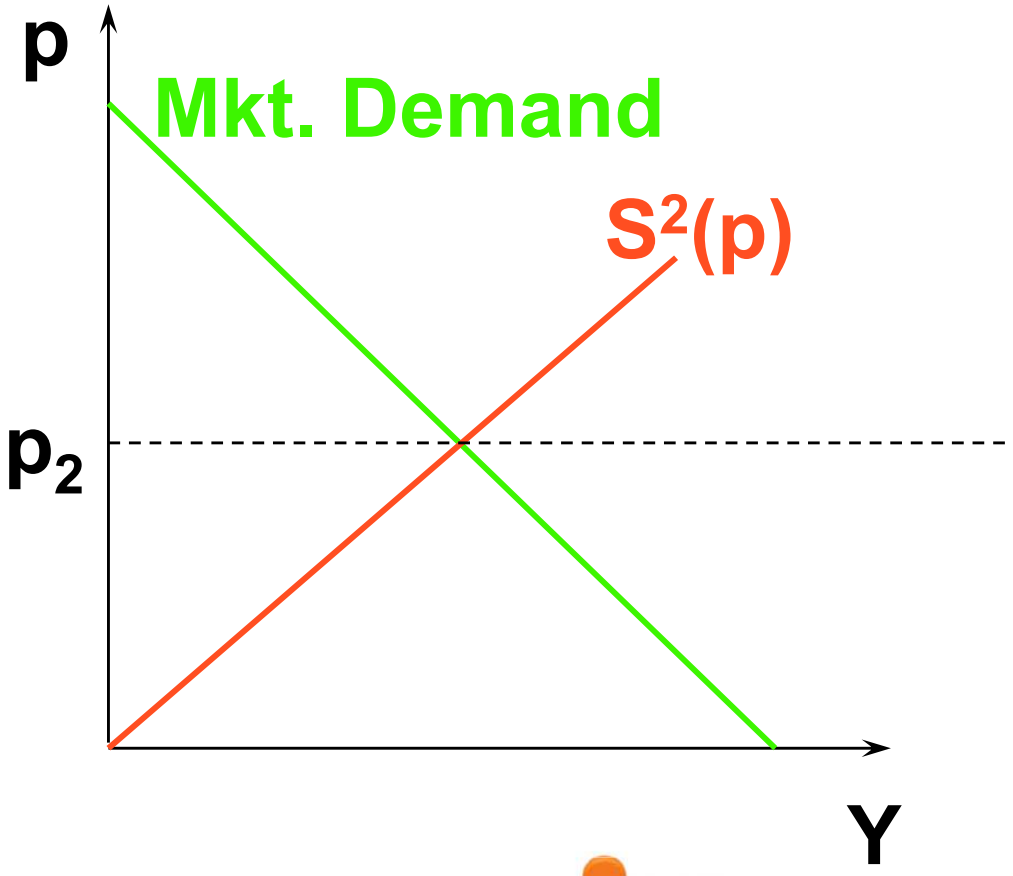
A "Typical" Firm



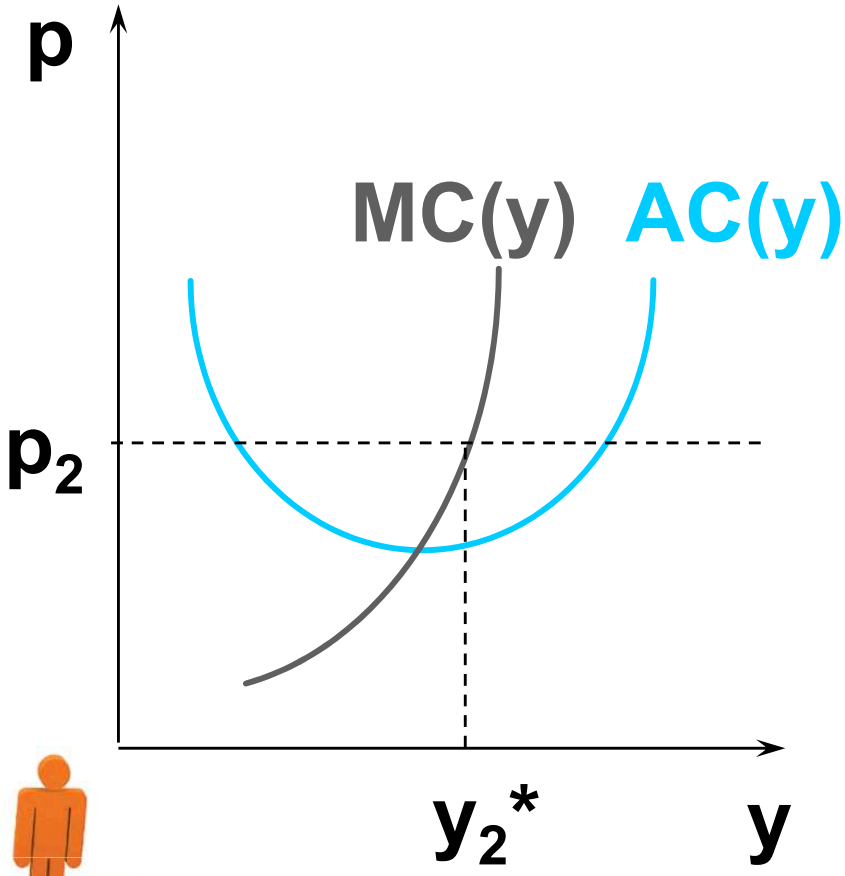
Then the market-clearing price is p_2.

Long-Run Industry Supply

The Market

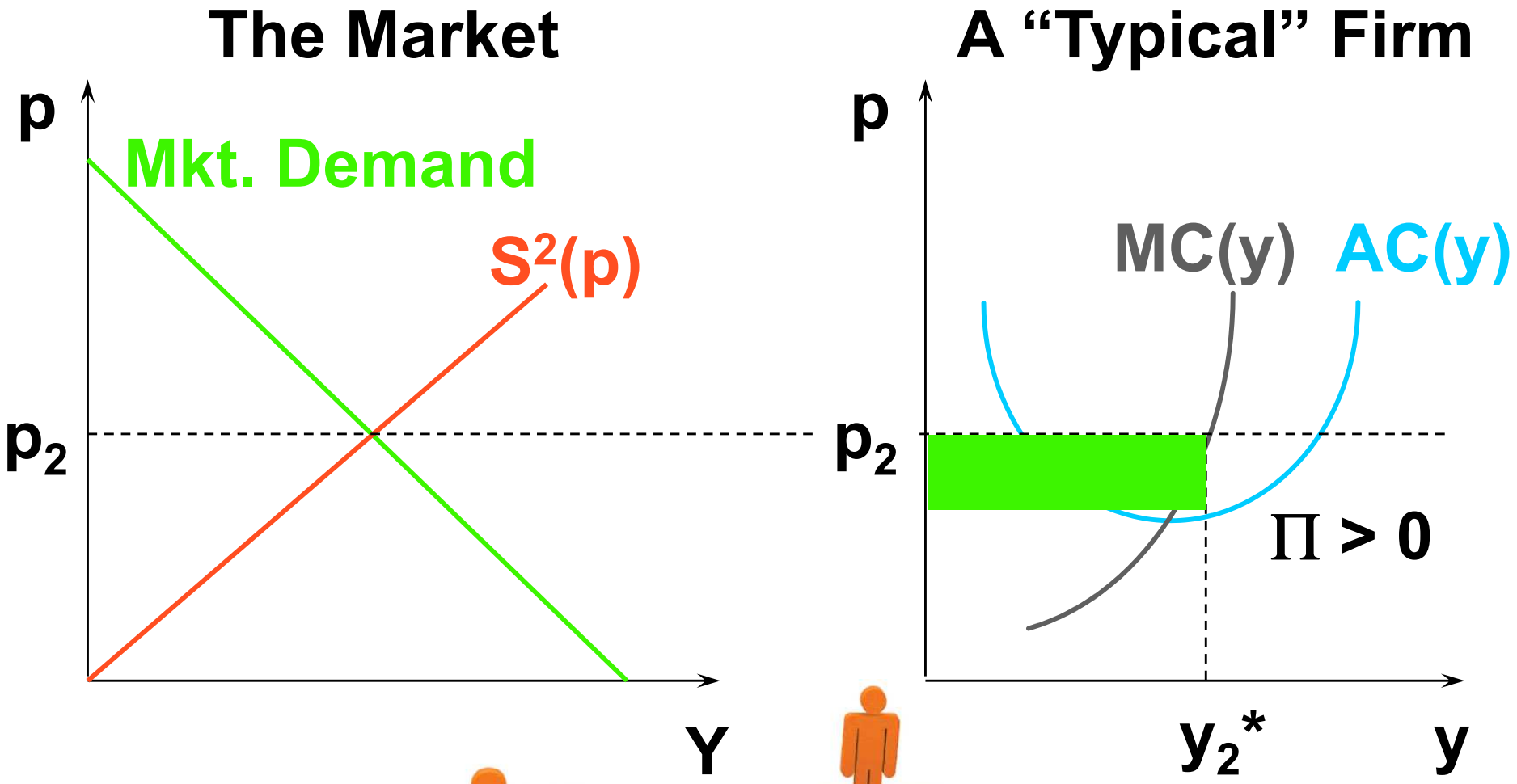


A "Typical" Firm



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

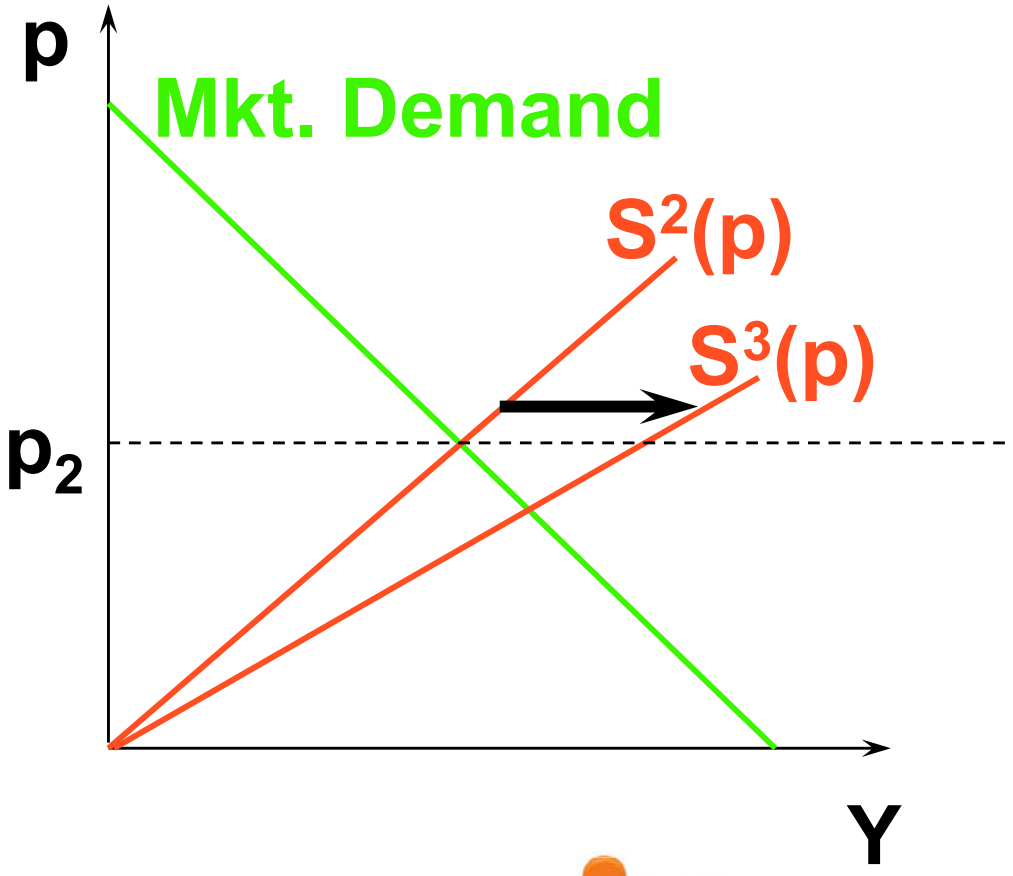
Long-Run Industry Supply



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

Long-Run Industry Supply

The Market



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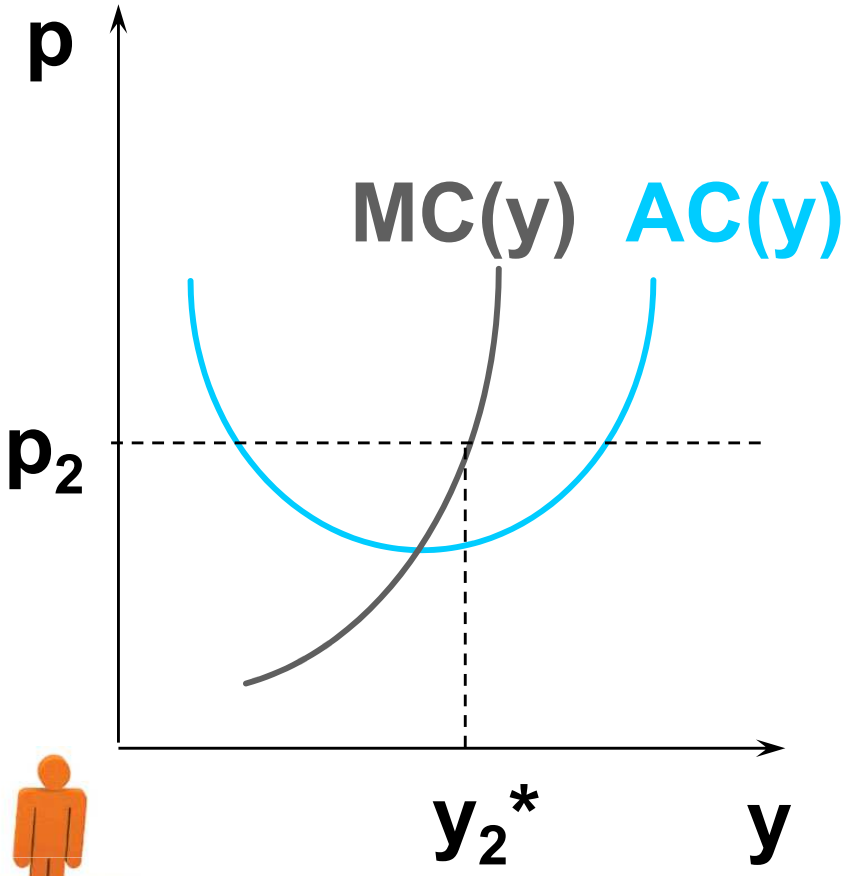
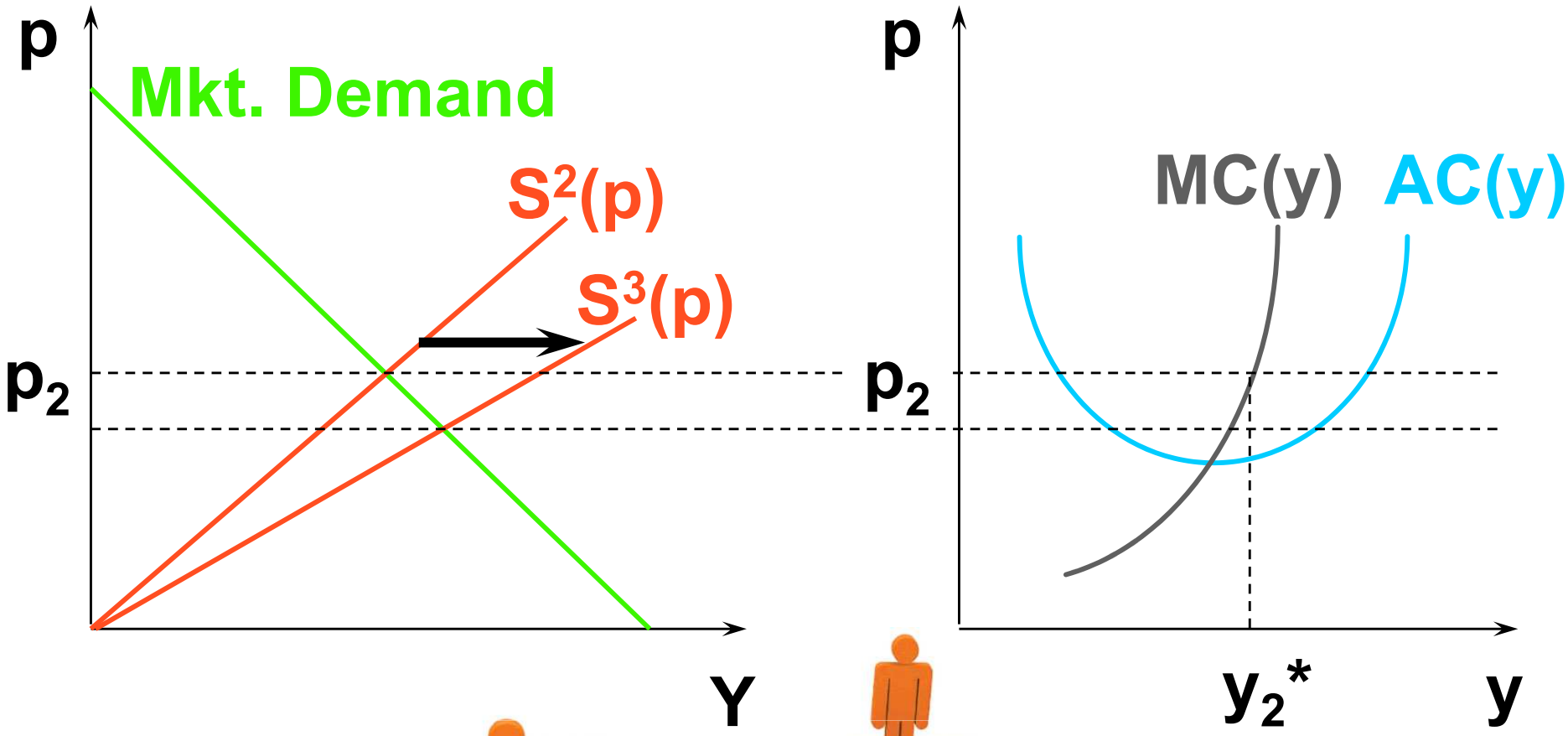


Market supply shifts outwards.

Long-Run Industry Supply

The Market

A "Typical" Firm

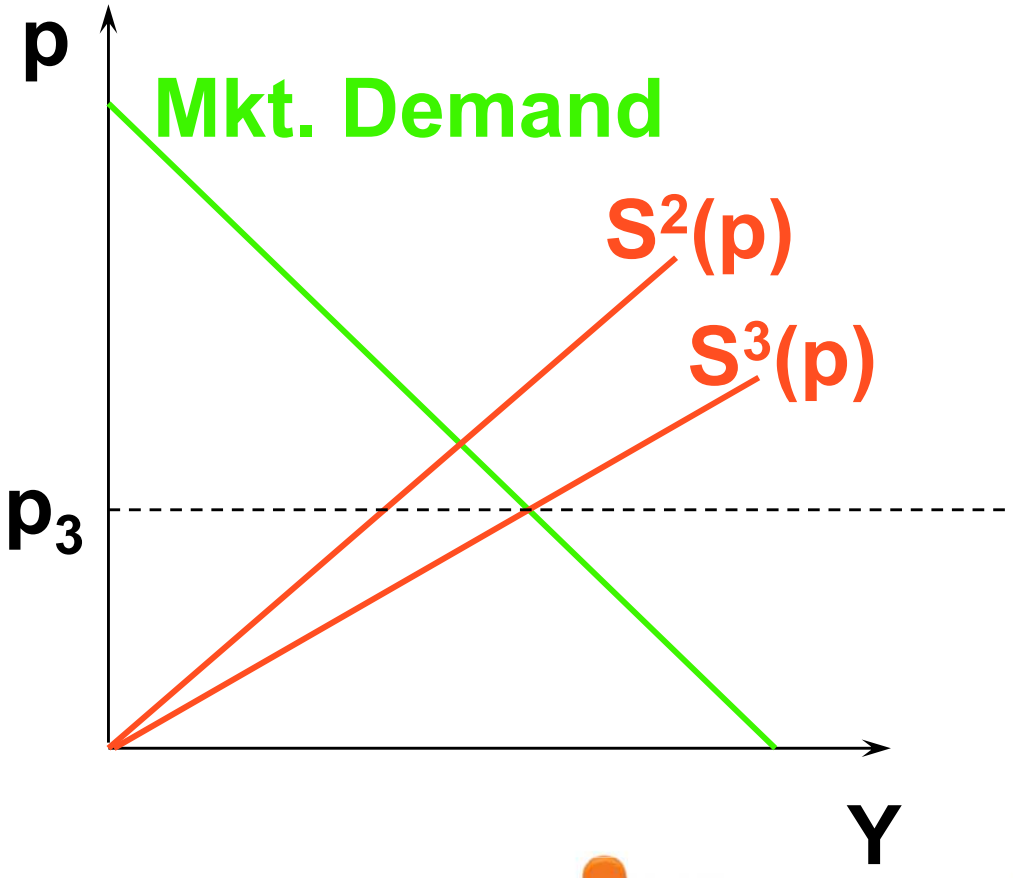


Market supply shifts outwards.

Market price falls.

Long-Run Industry Supply

The Market



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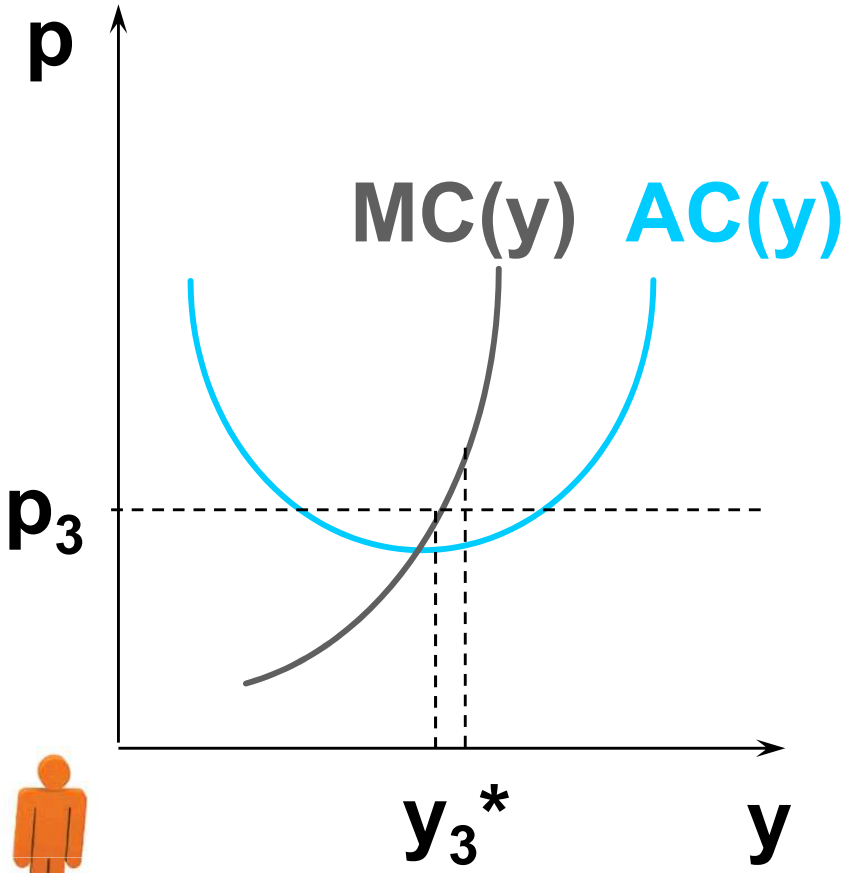
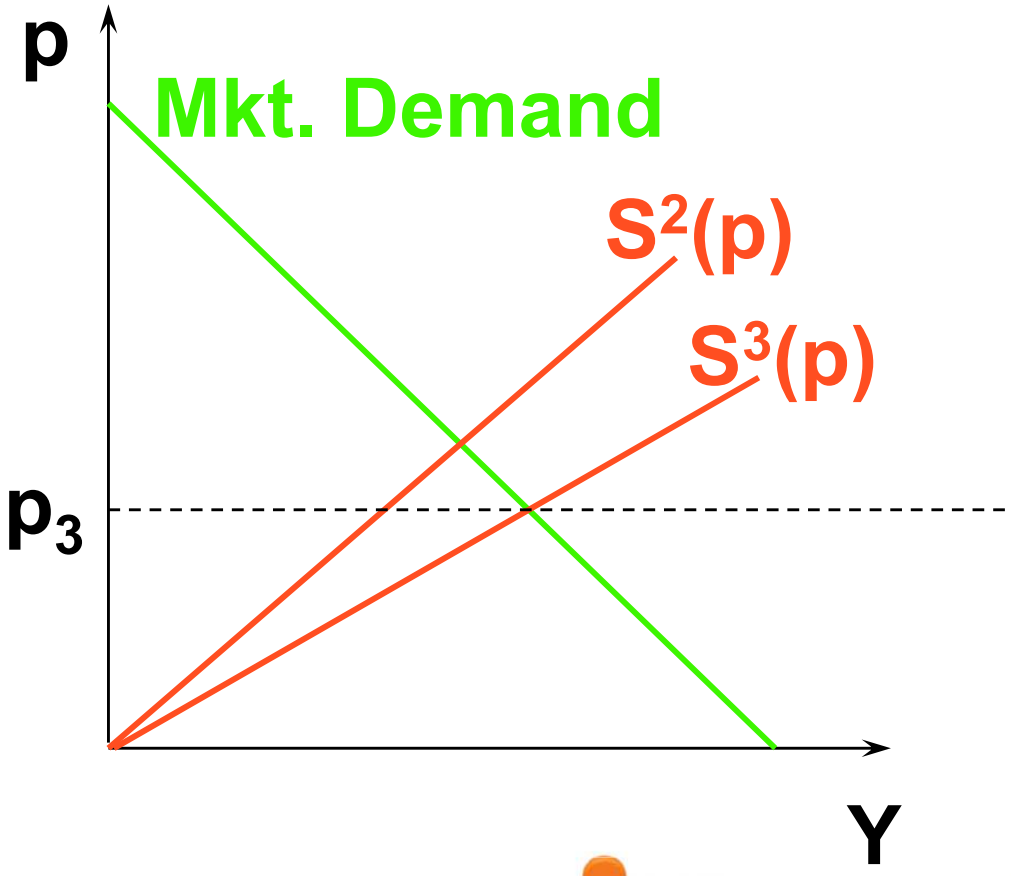


Each firm produces less.

Long-Run Industry Supply

The Market



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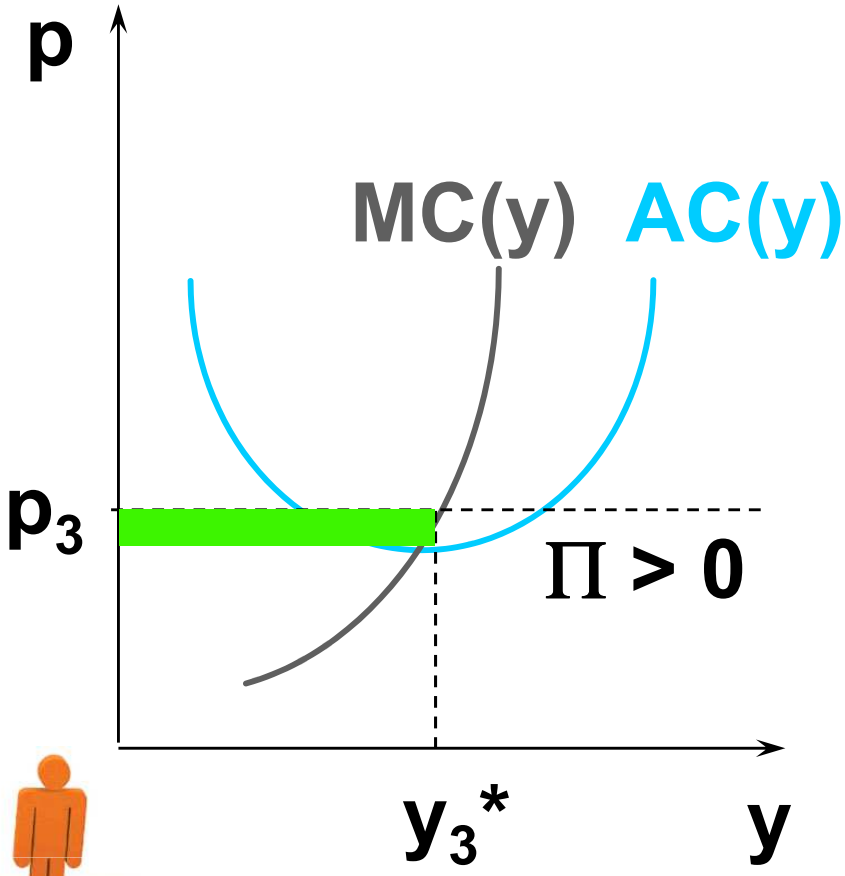
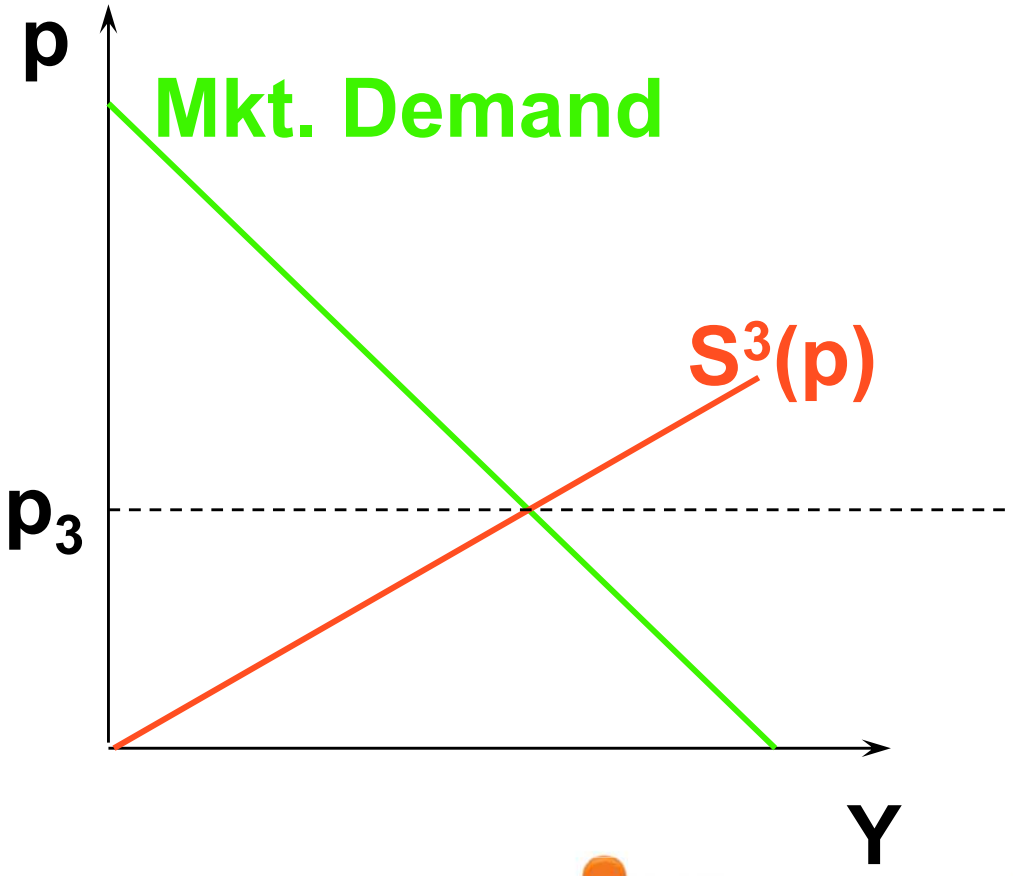


Each firm produces less.

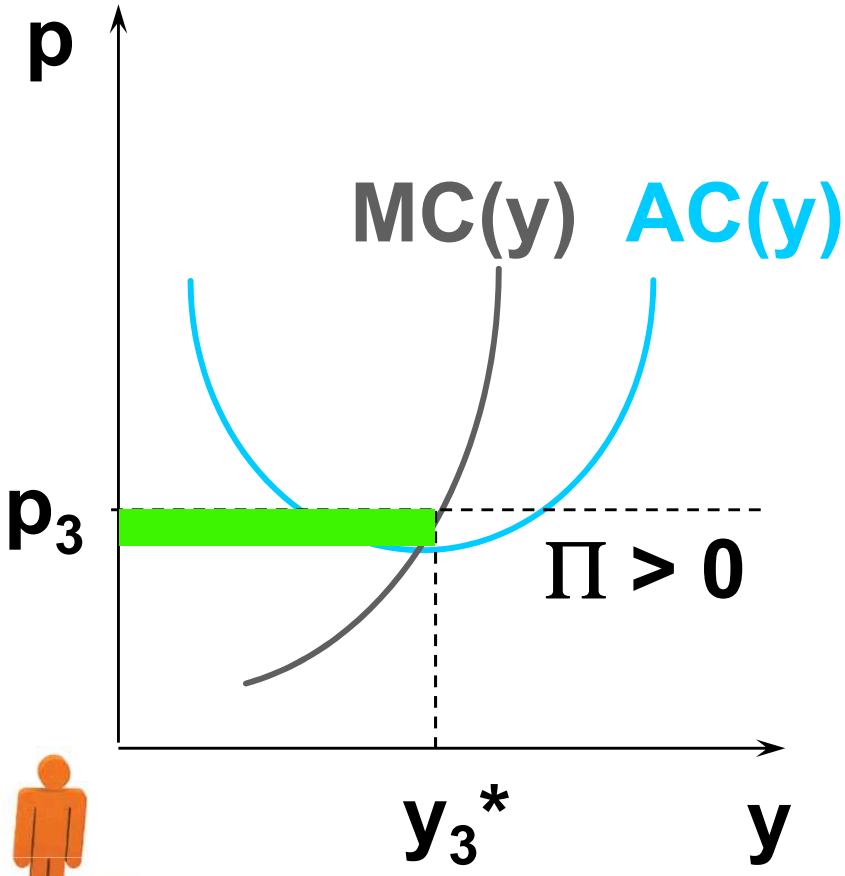
Each firm's economic profit is reduced.

Long-Run Industry Supply

The Market

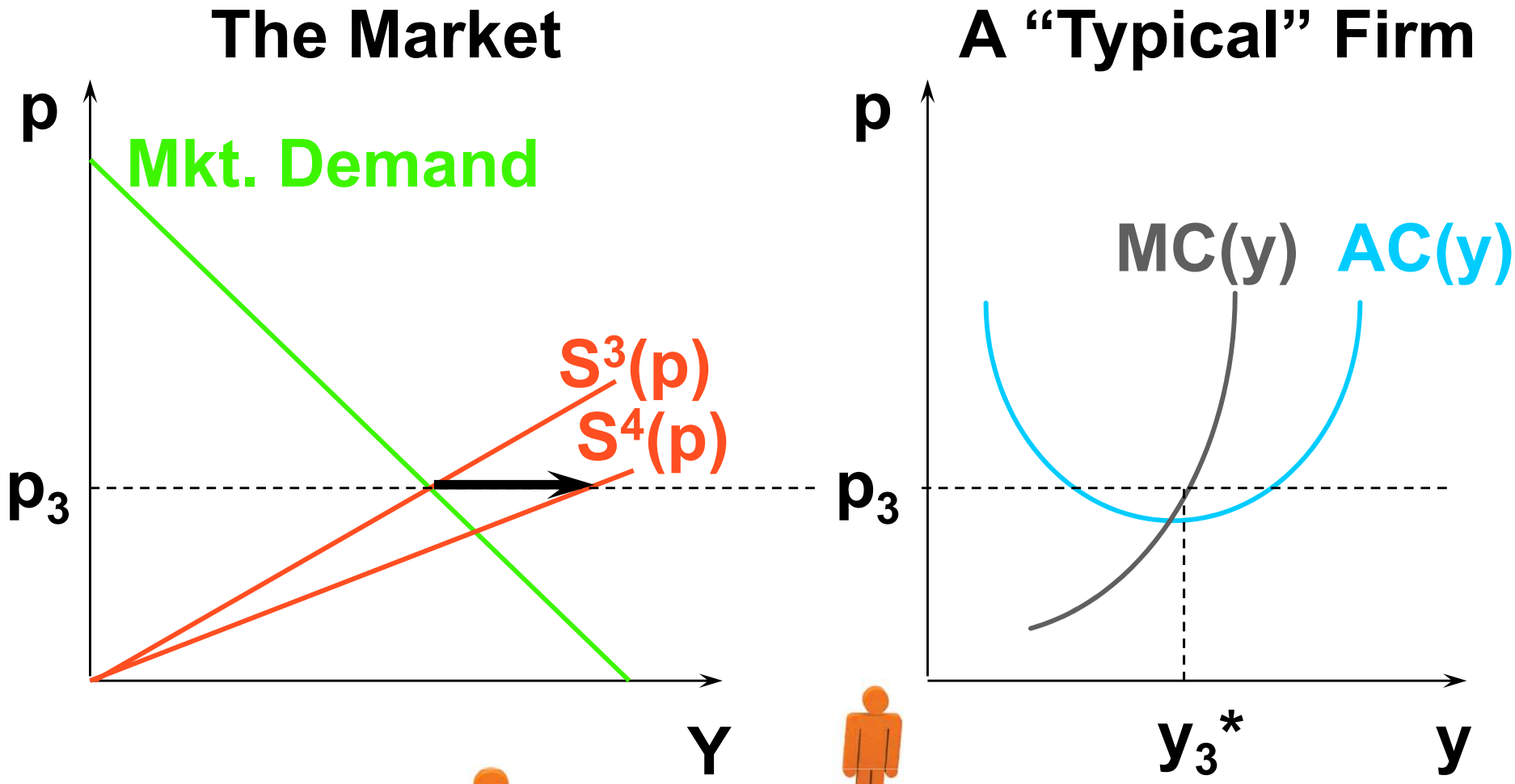


A "Typical" Firm



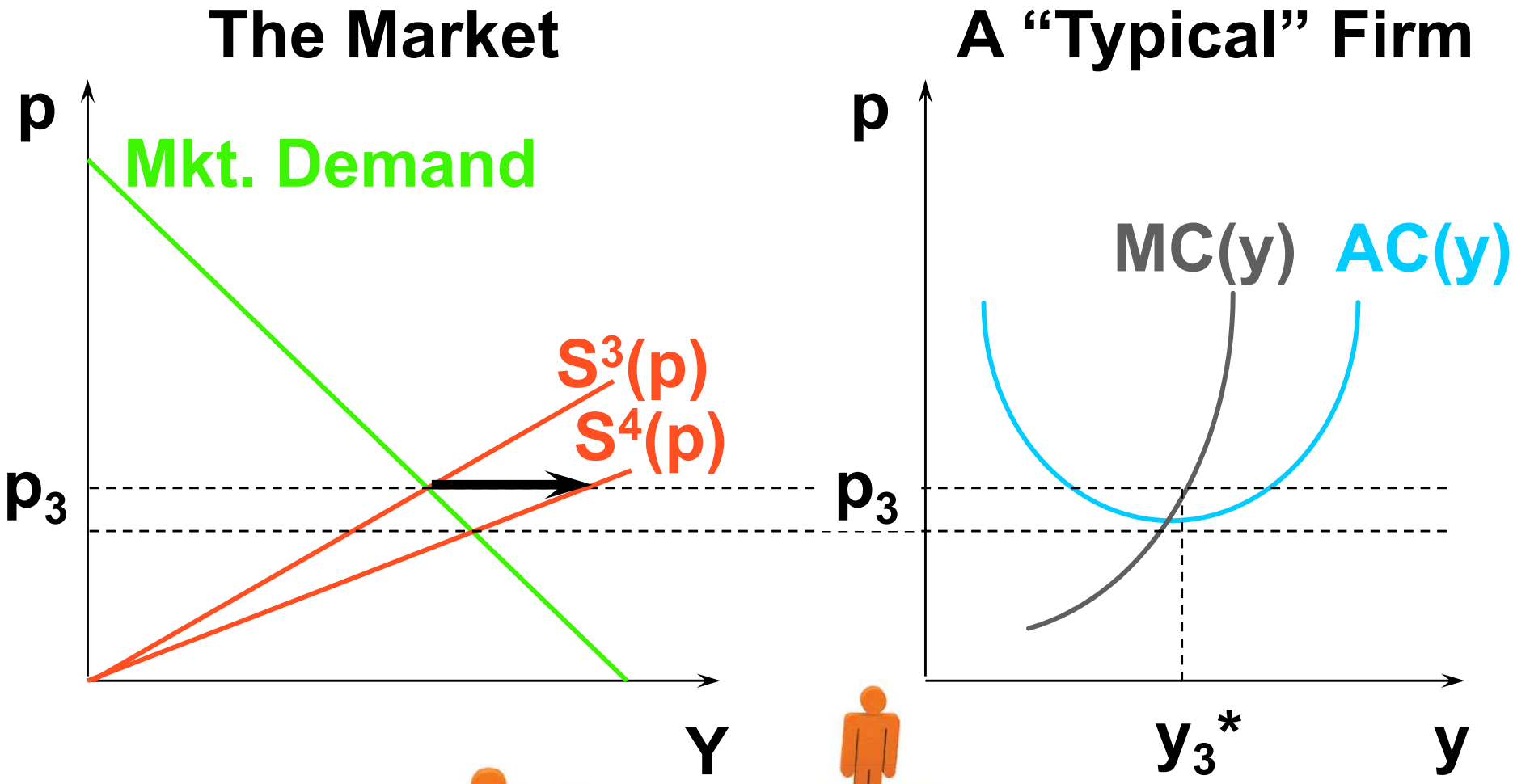
Each firm's economic profit is positive. Will another firm enter?

Long-Run Industry Supply



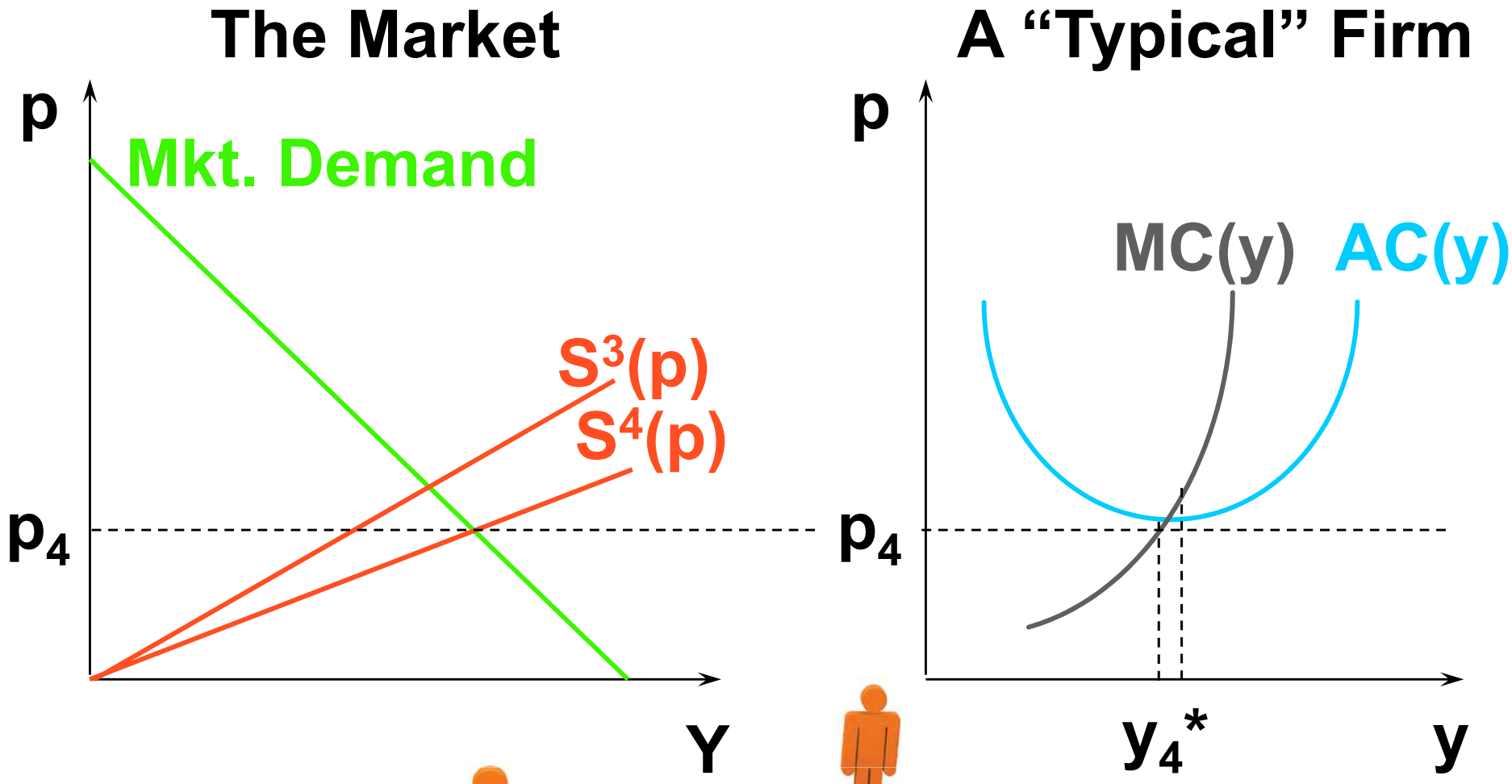
Market supply would shift outwards again.

Long-Run Industry Supply



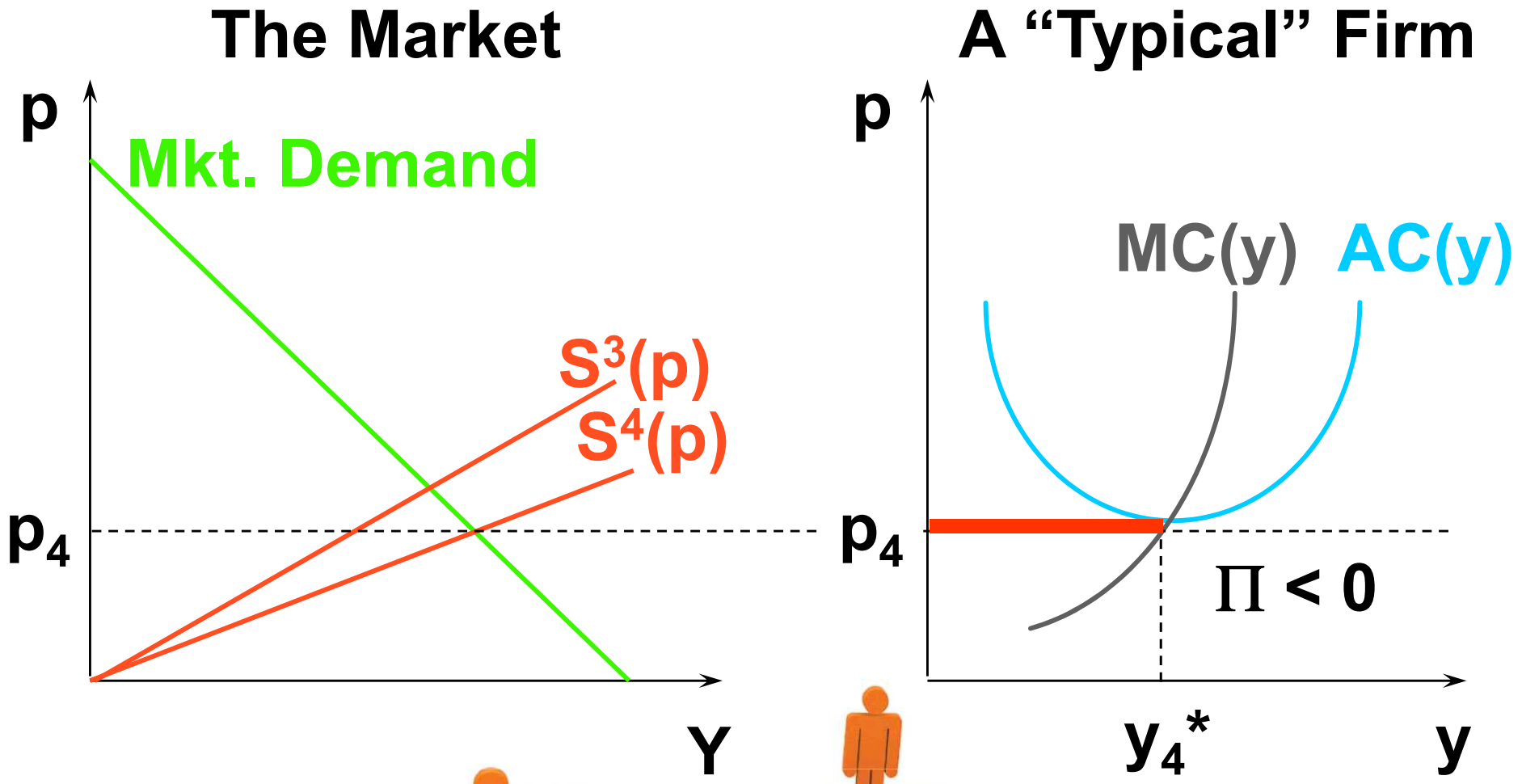
Market supply would shift outwards again.
Market price would fall again.

Long-Run Industry Supply



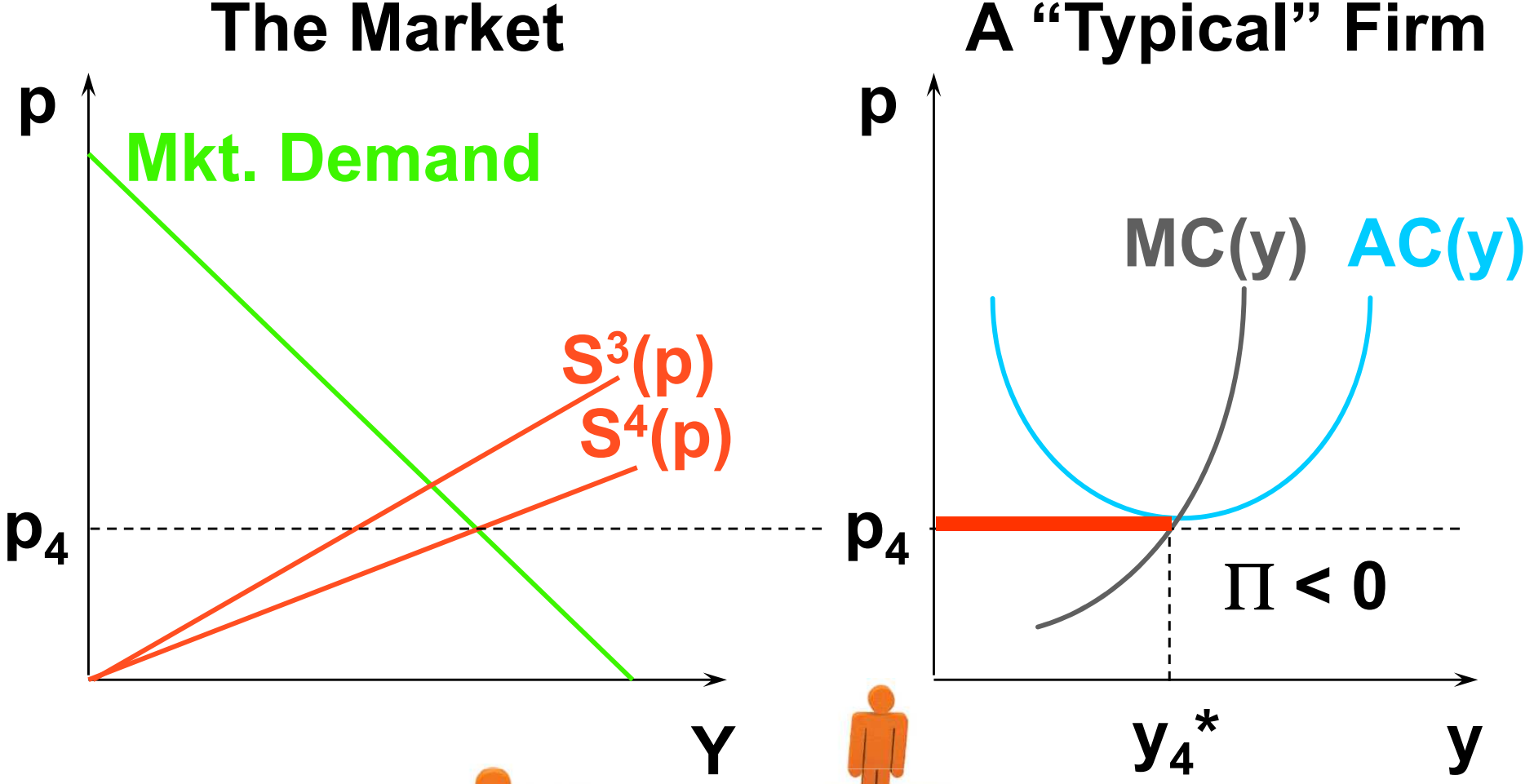
Each firm would produce less again.

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.

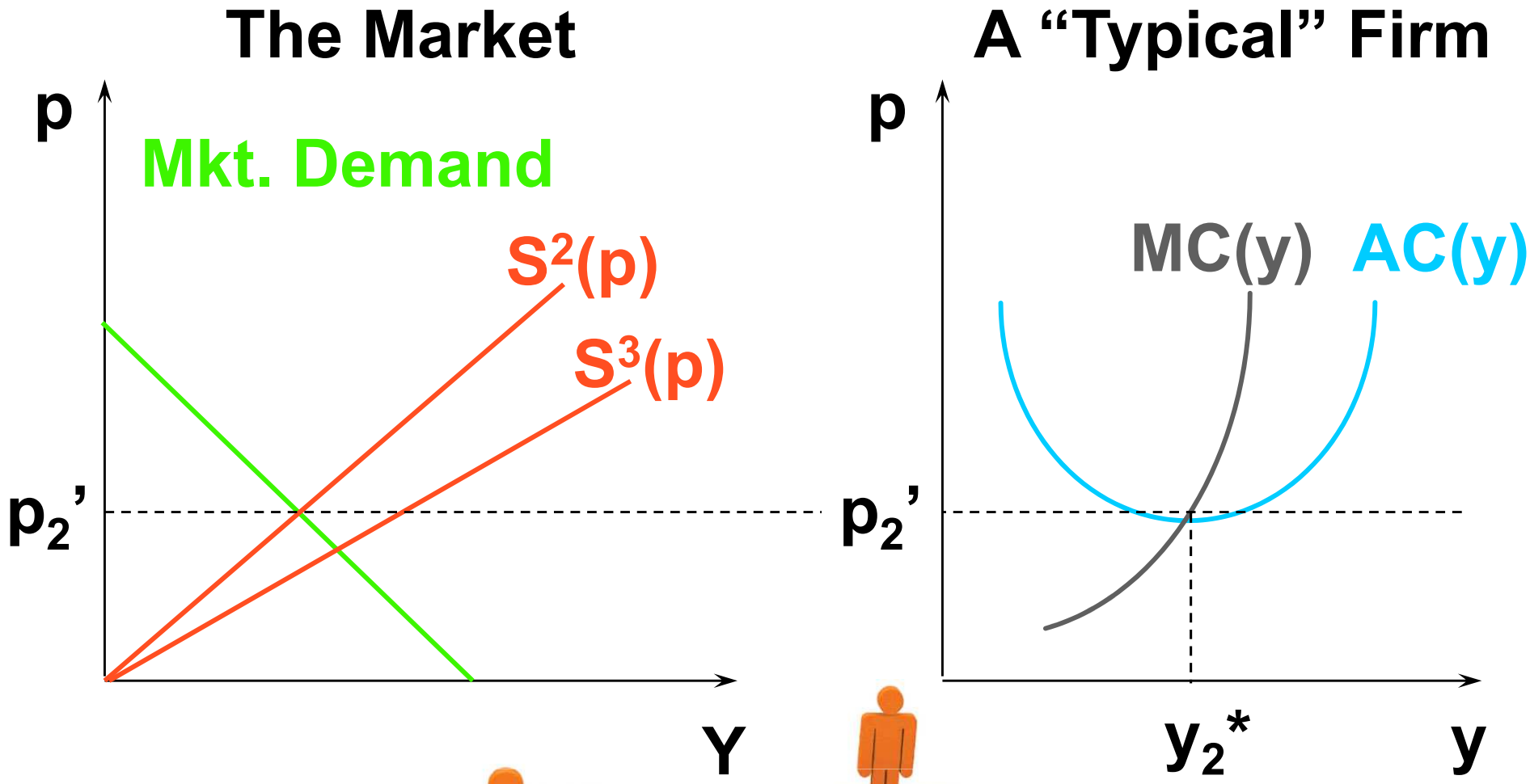
Long-Run Industry Supply

- **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.**

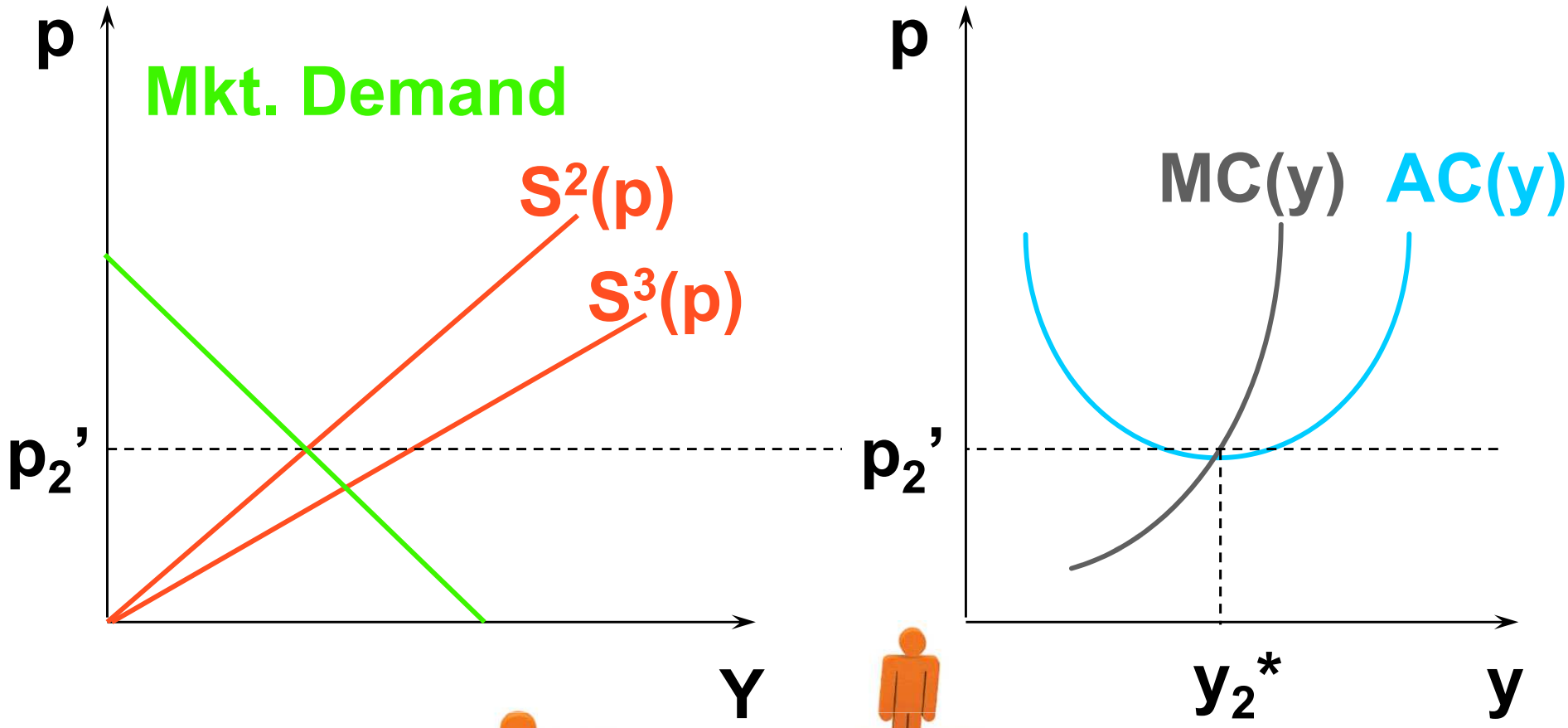
Long-Run Industry Supply



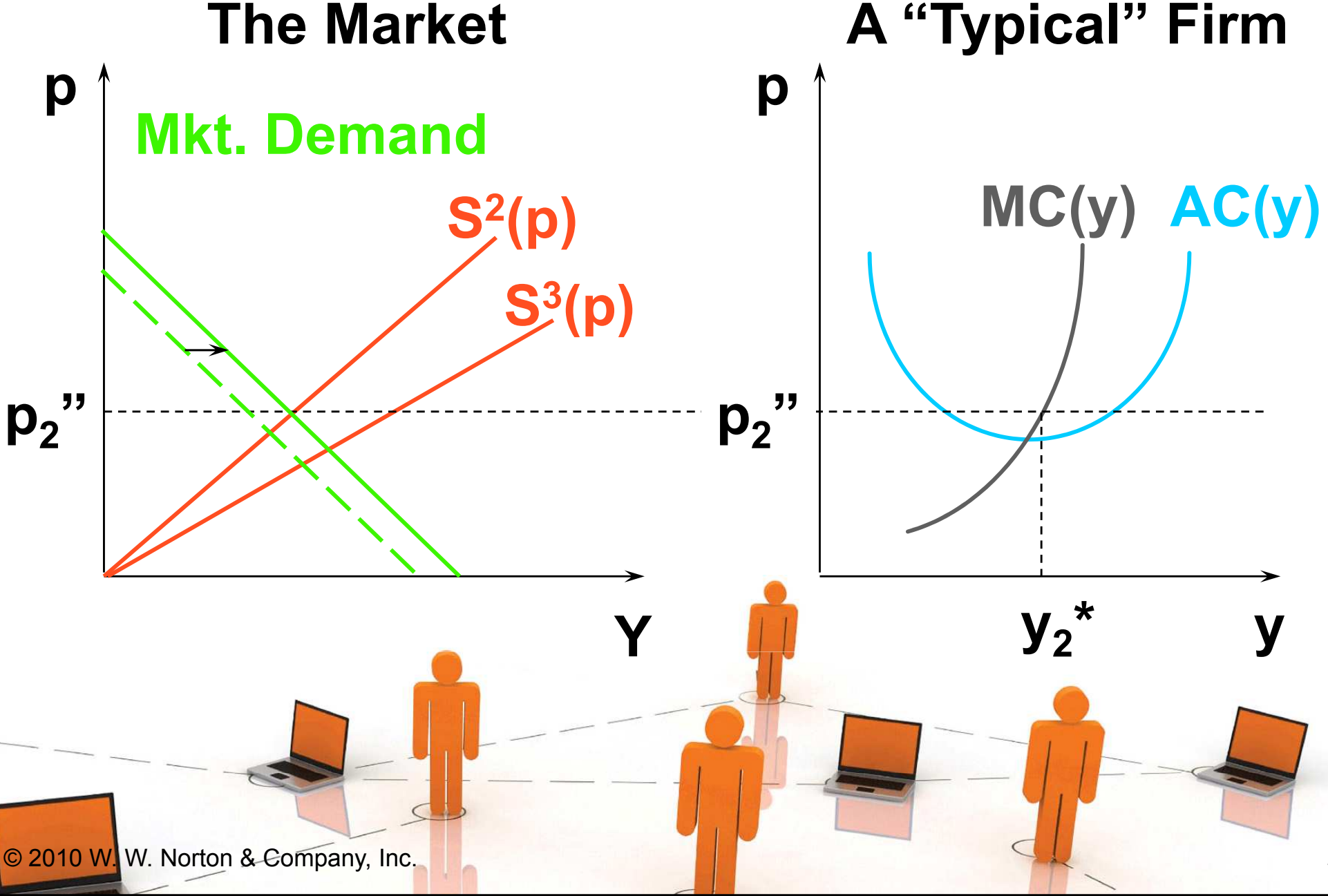
Long-Run Industry Supply

- **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.**

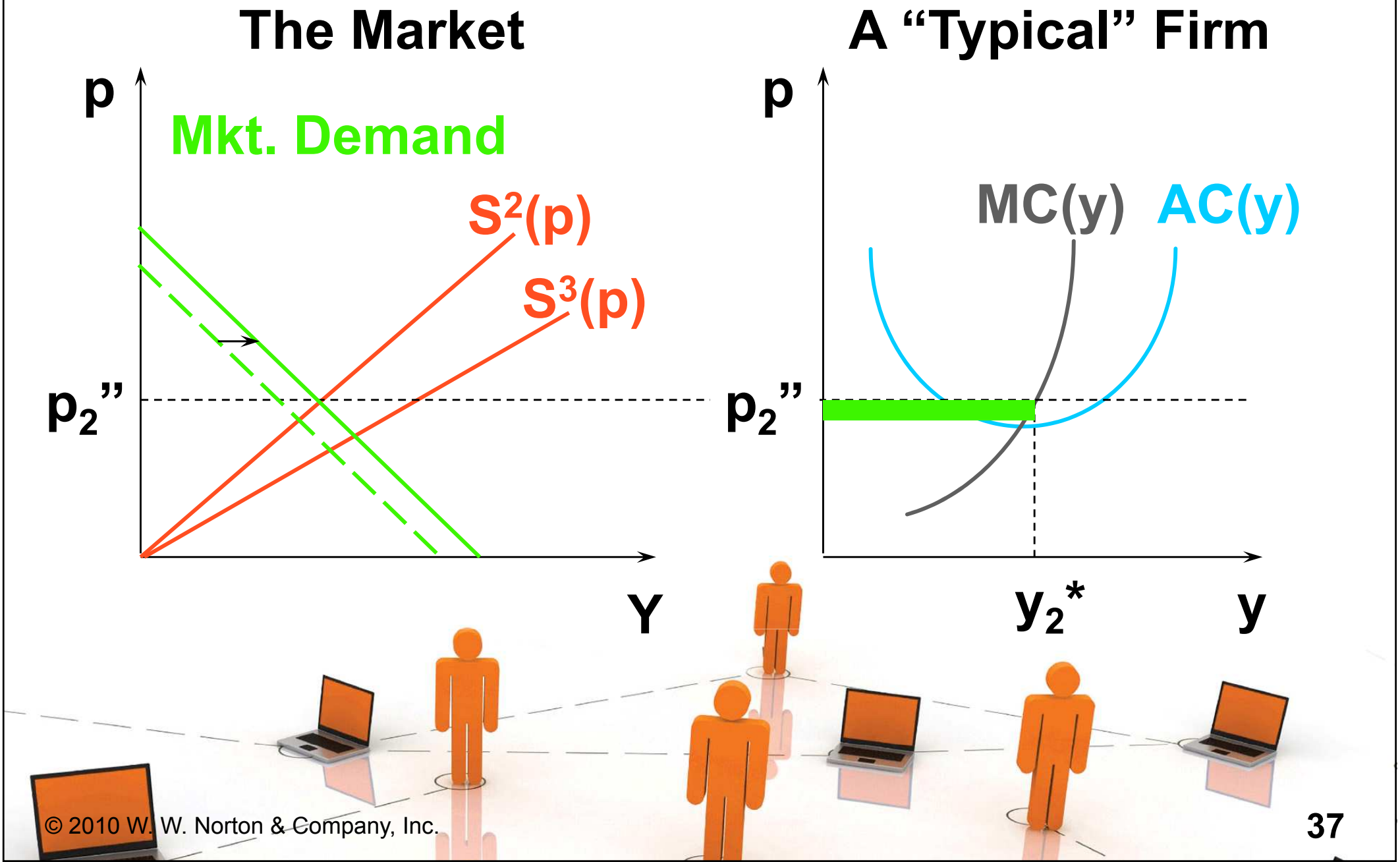
Long-Run Industry Supply



Long-Run Industry Supply

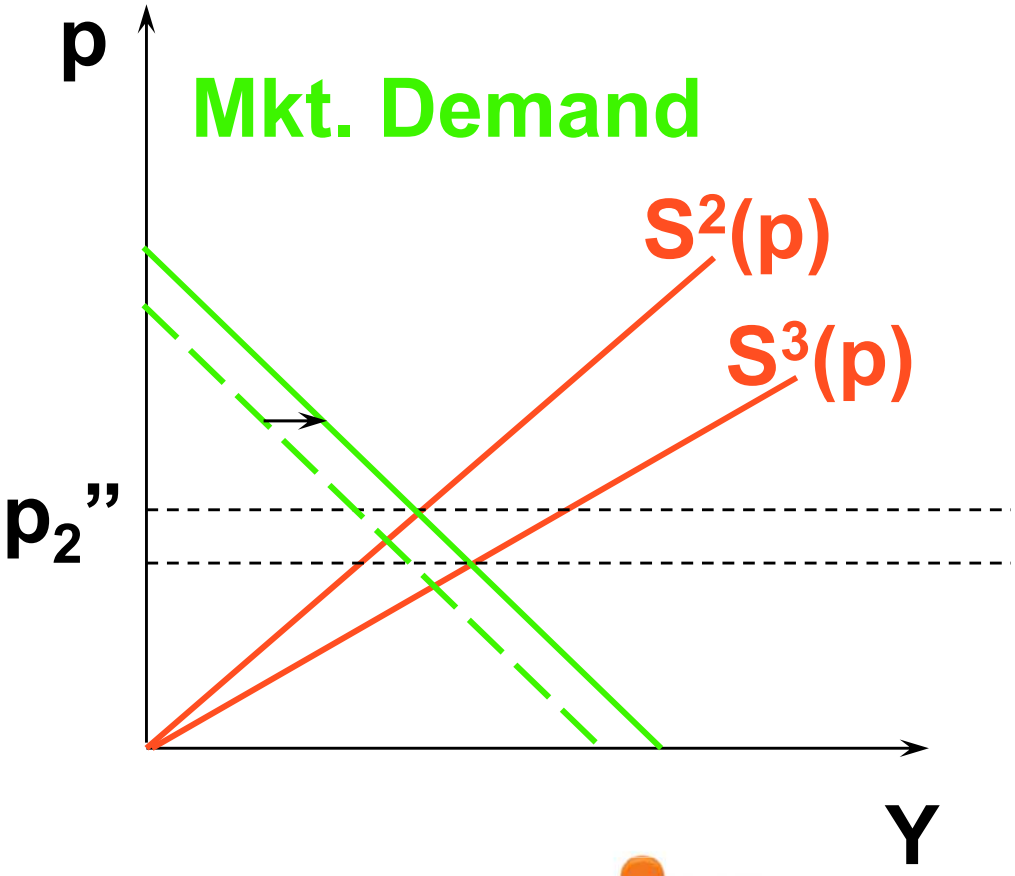


Long-Run Industry Supply

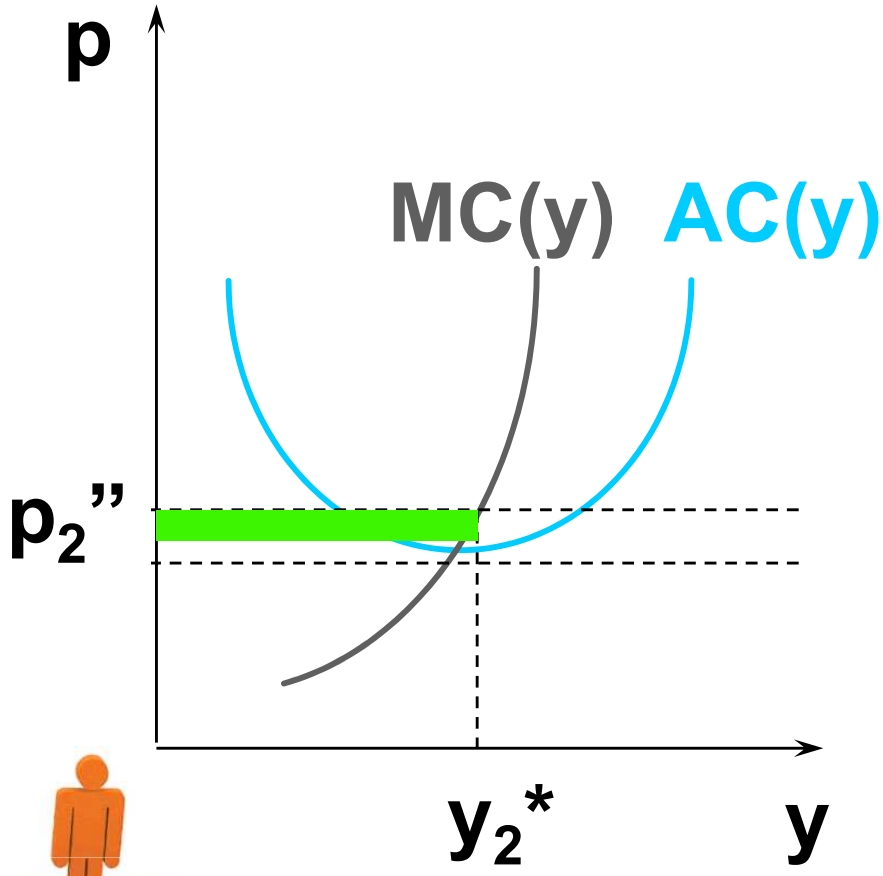


Long-Run Industry Supply

The Market



A “Typical” Firm

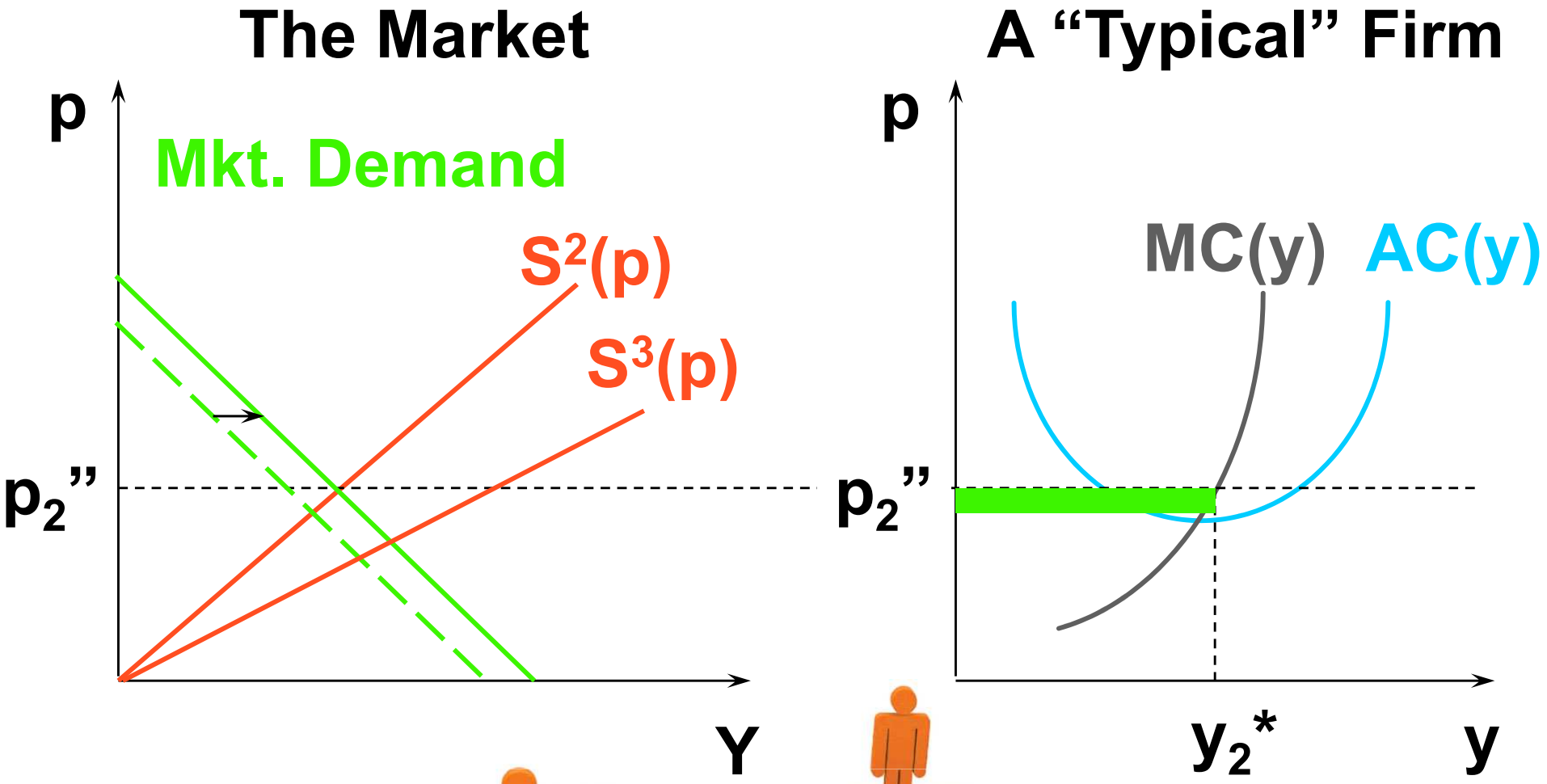


Notice that a 3rd firm will not enter since it would earn negative economic profits.

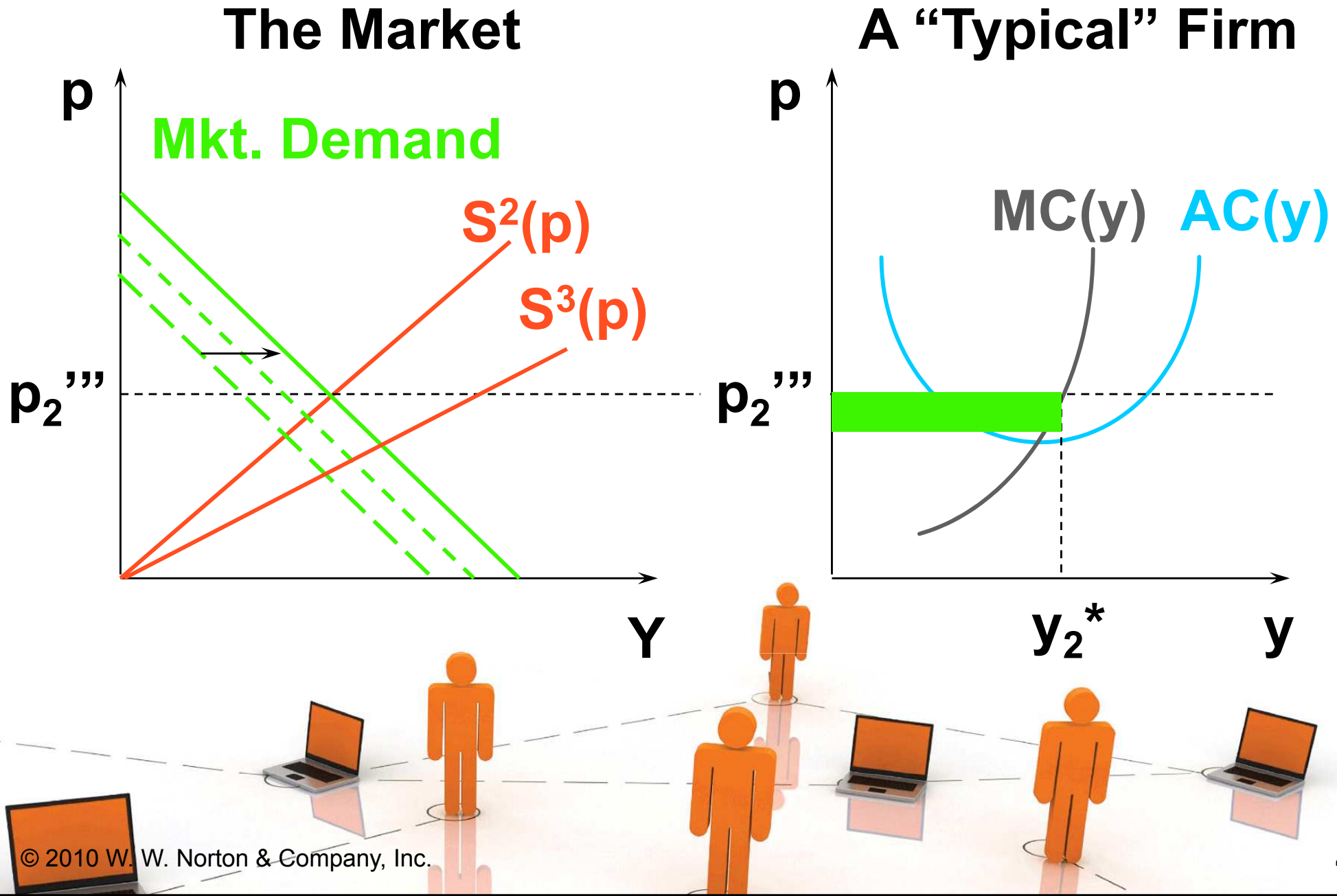
Long-Run Industry Supply

- **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.**

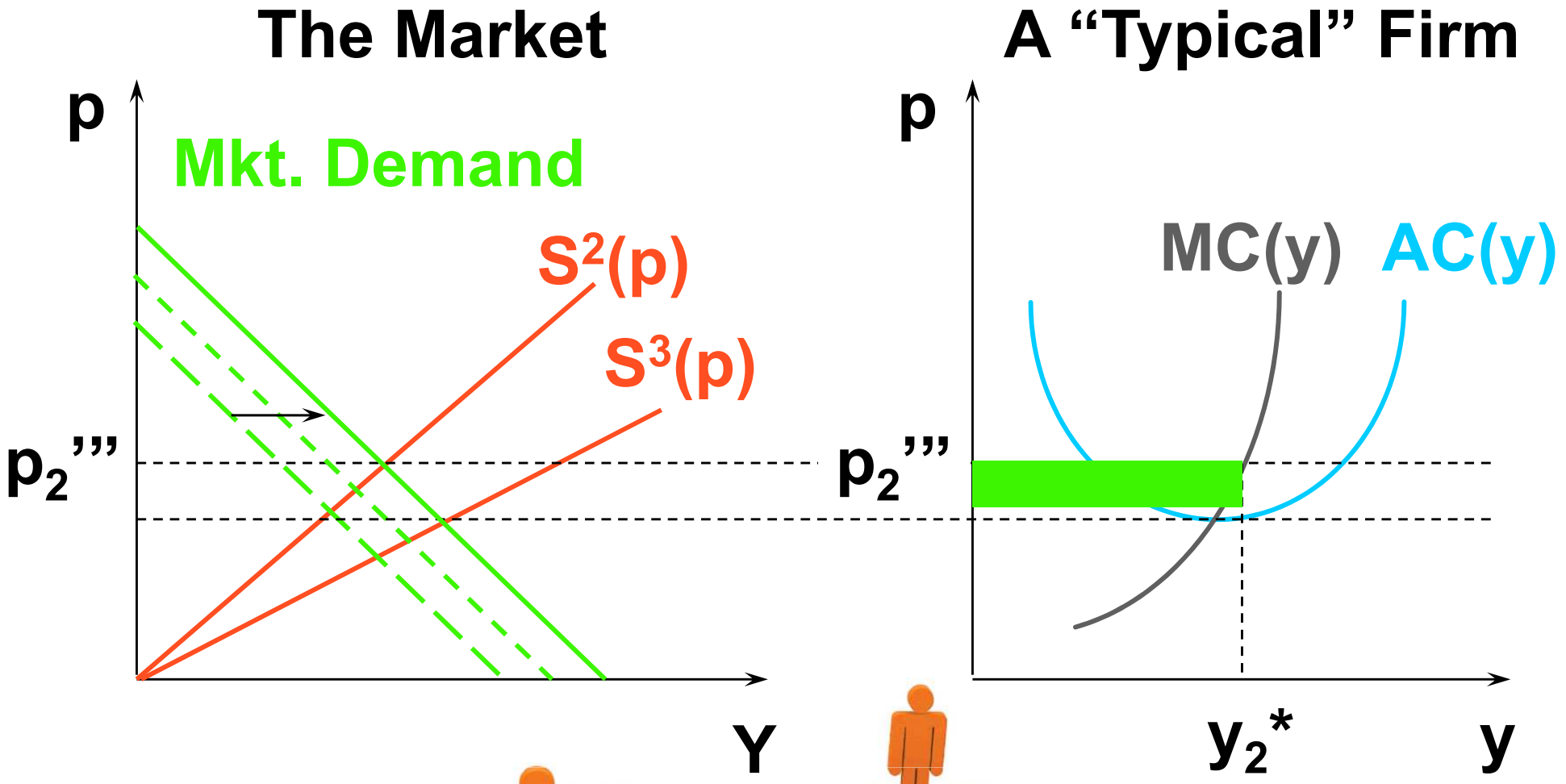
Long-Run Industry Supply



Long-Run Industry Supply



Long-Run Industry Supply

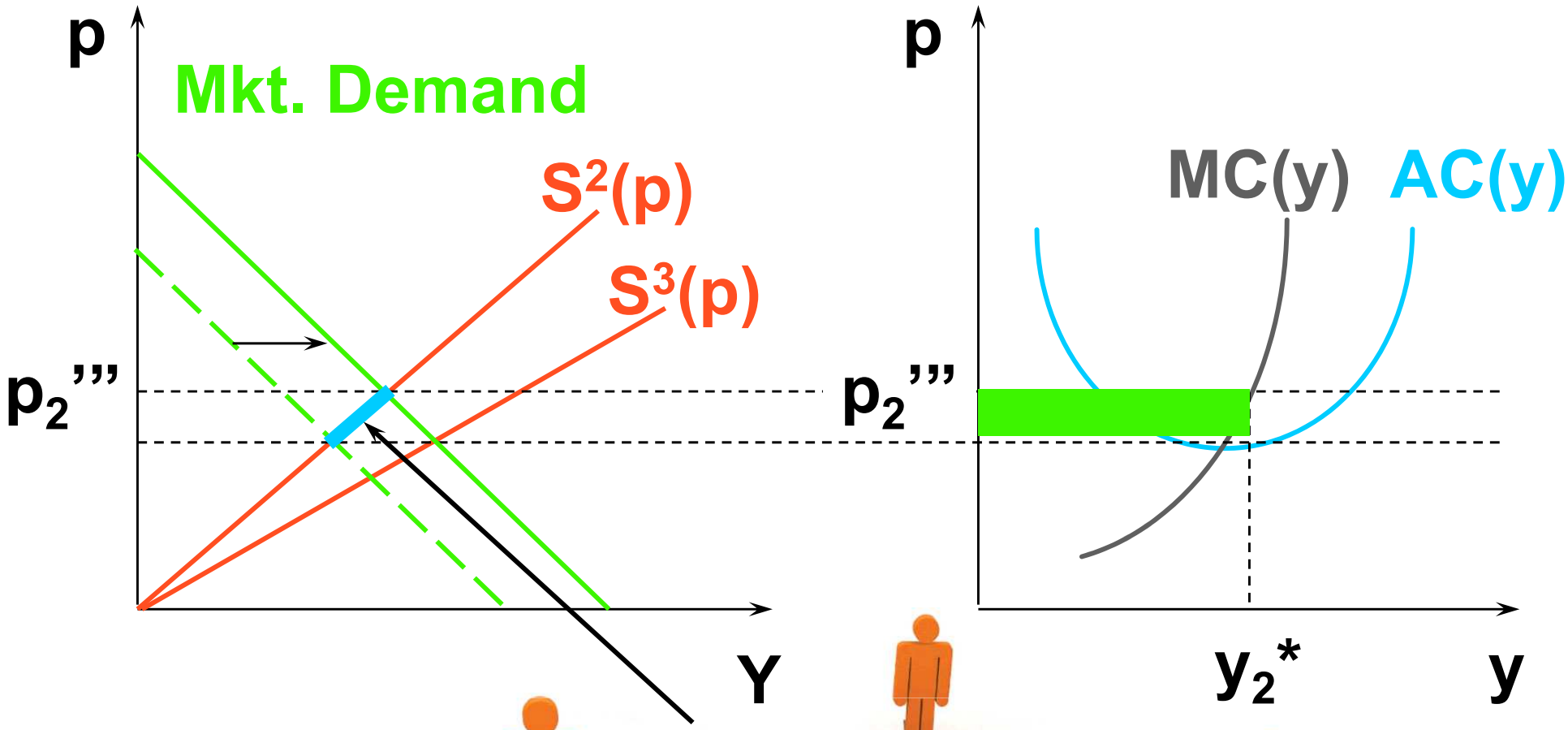


A third firm can now enter, causing all firms to earn zero economic profits.

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

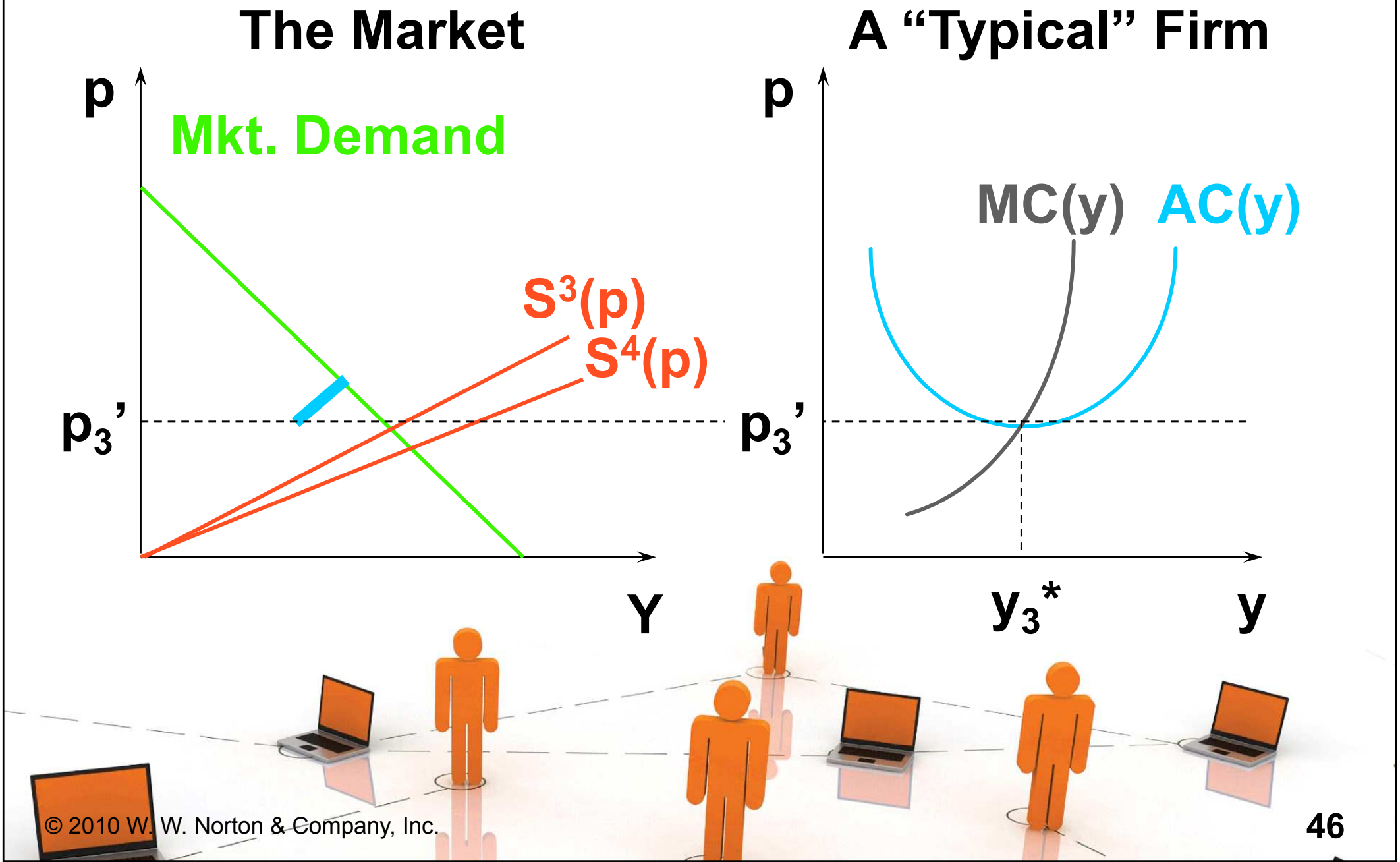


The only relevant part of the short-run supply curve for n = 2 firms in the industry.

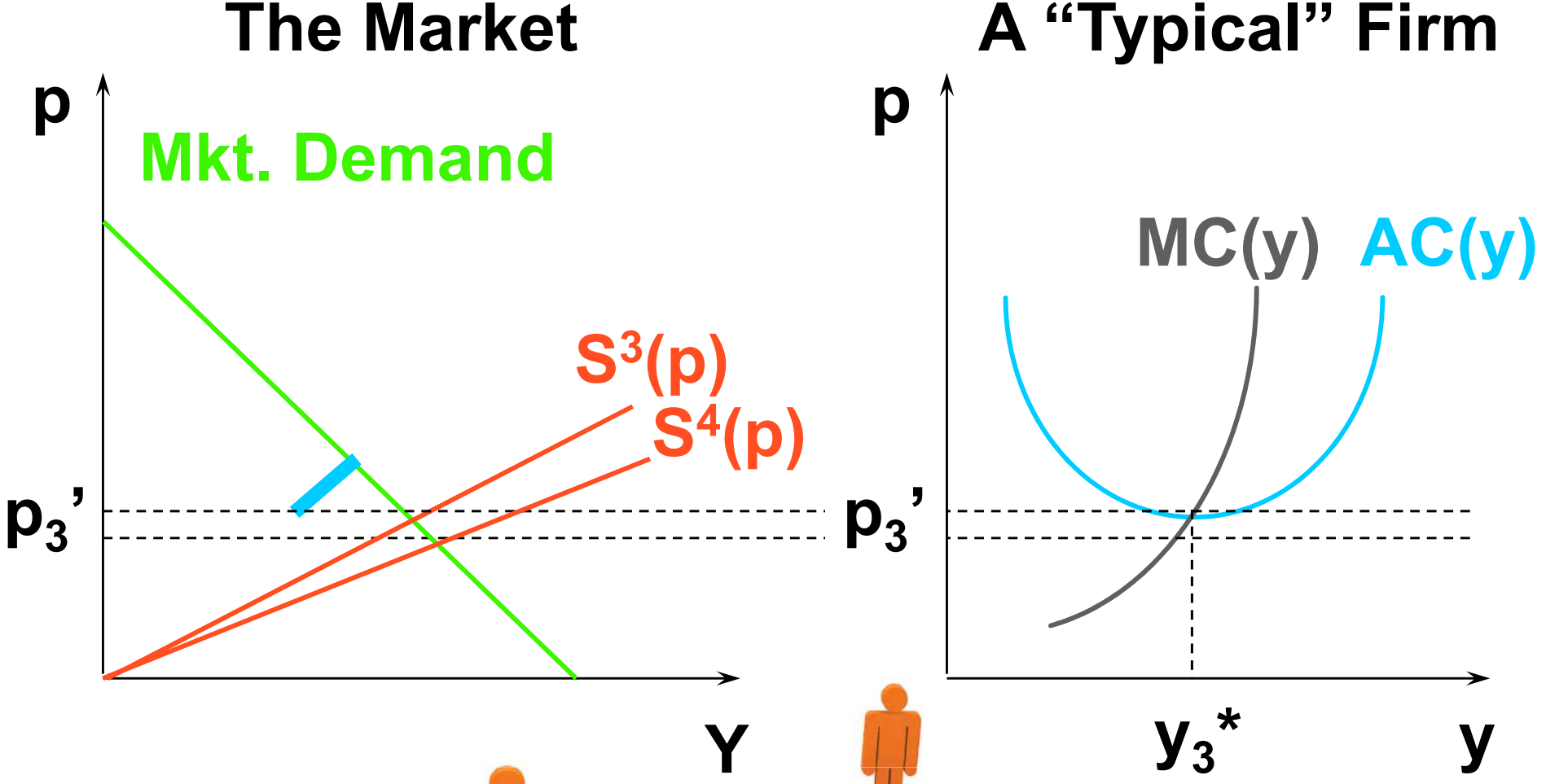
Long-Run Industry Supply

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

Long-Run Industry Supply

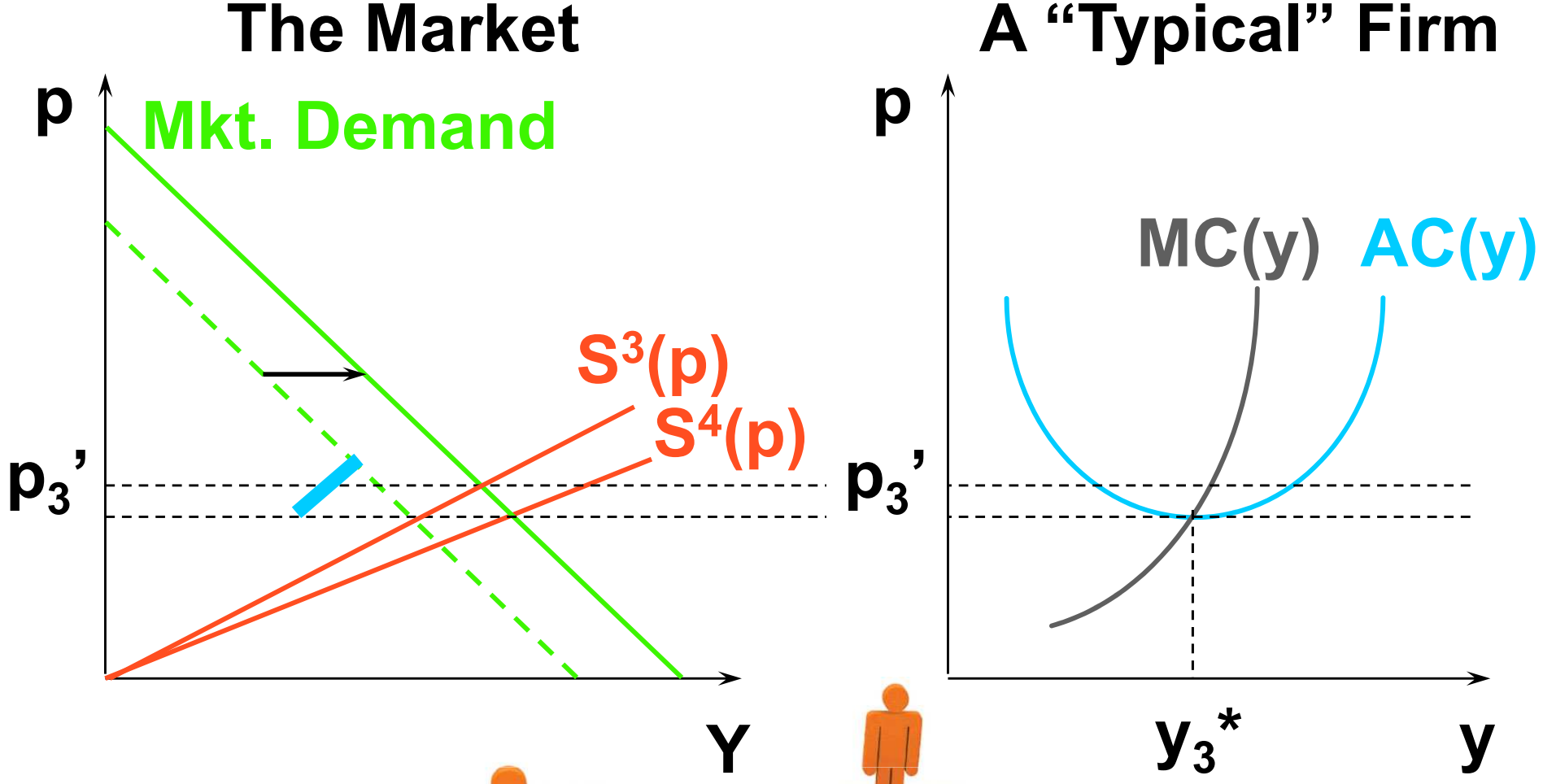


Long-Run Industry Supply



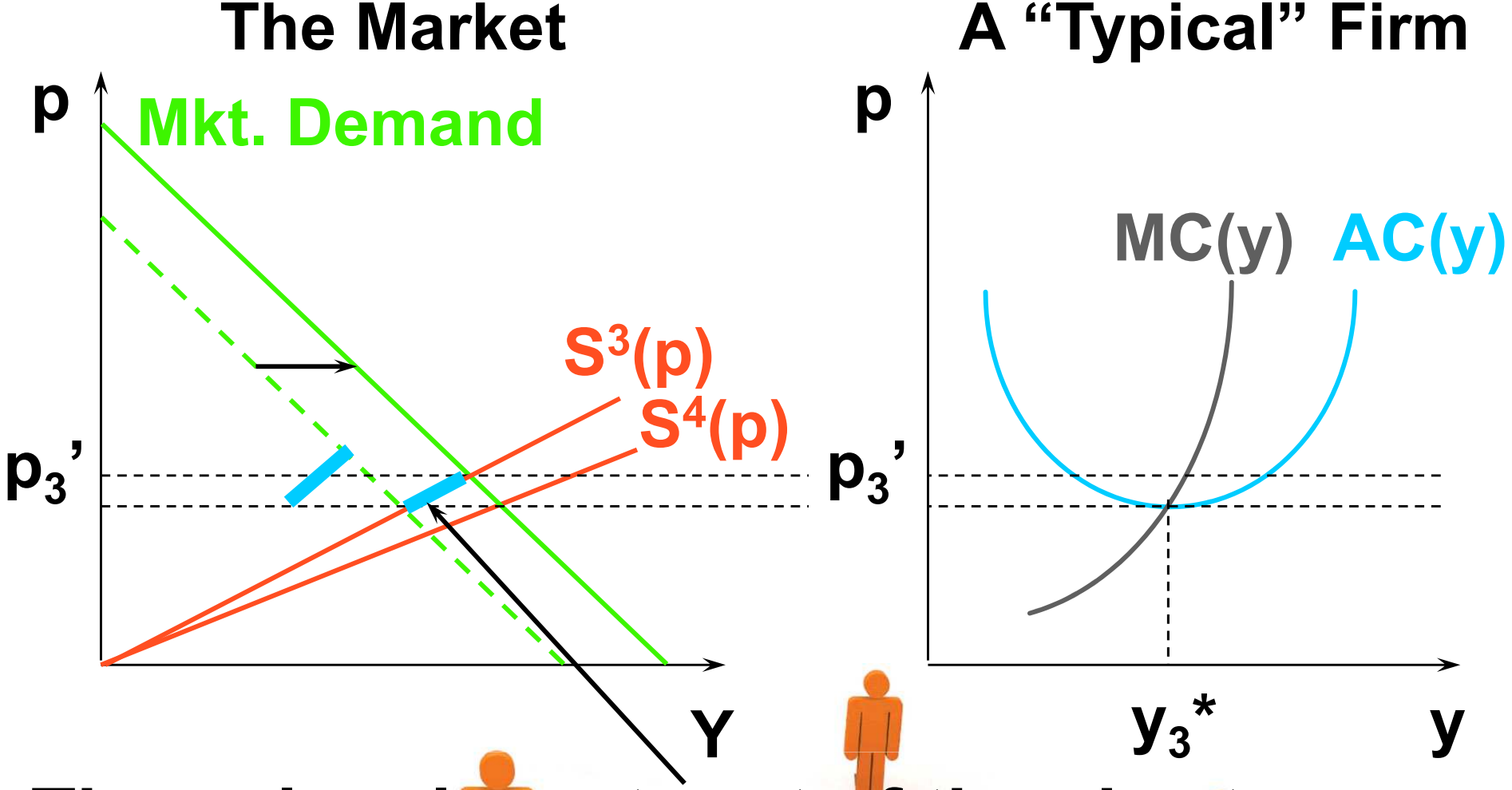
A 4th firm would now earn negative economic profits if it entered the industry.

Long-Run Industry Supply



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

Long-Run Industry Supply

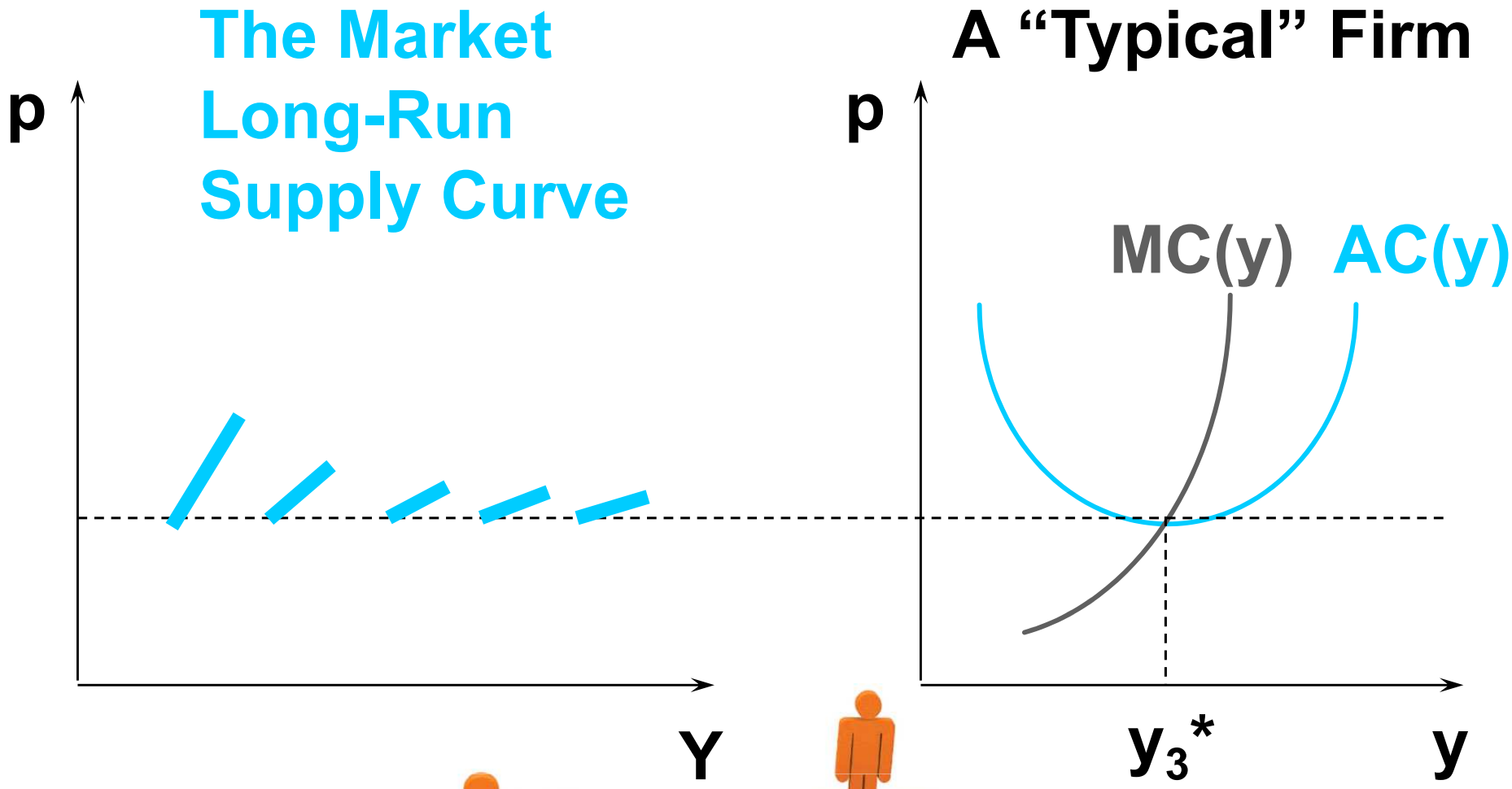


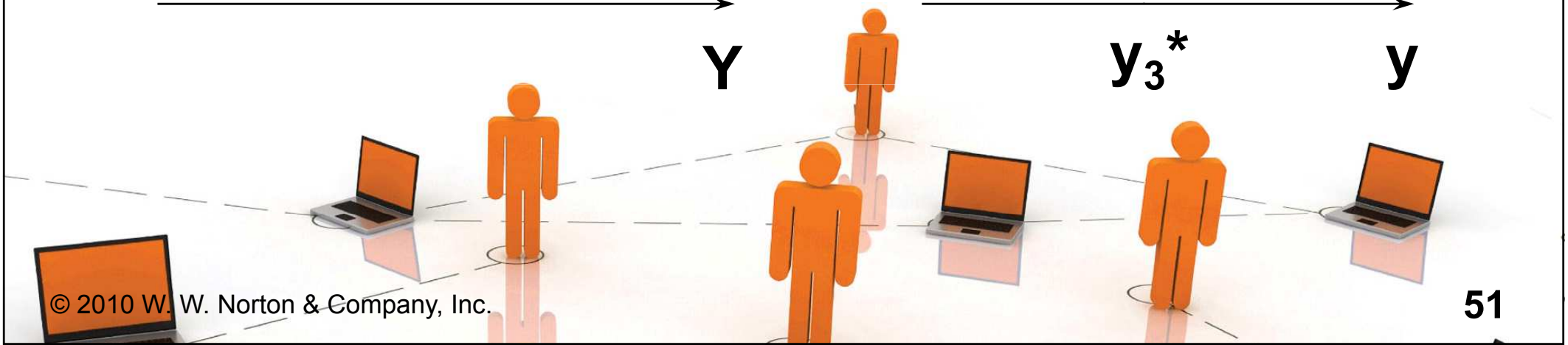
The only relevant part of the short-run supply curve for n = 3 firms in the industry.

Long-Run Industry Supply

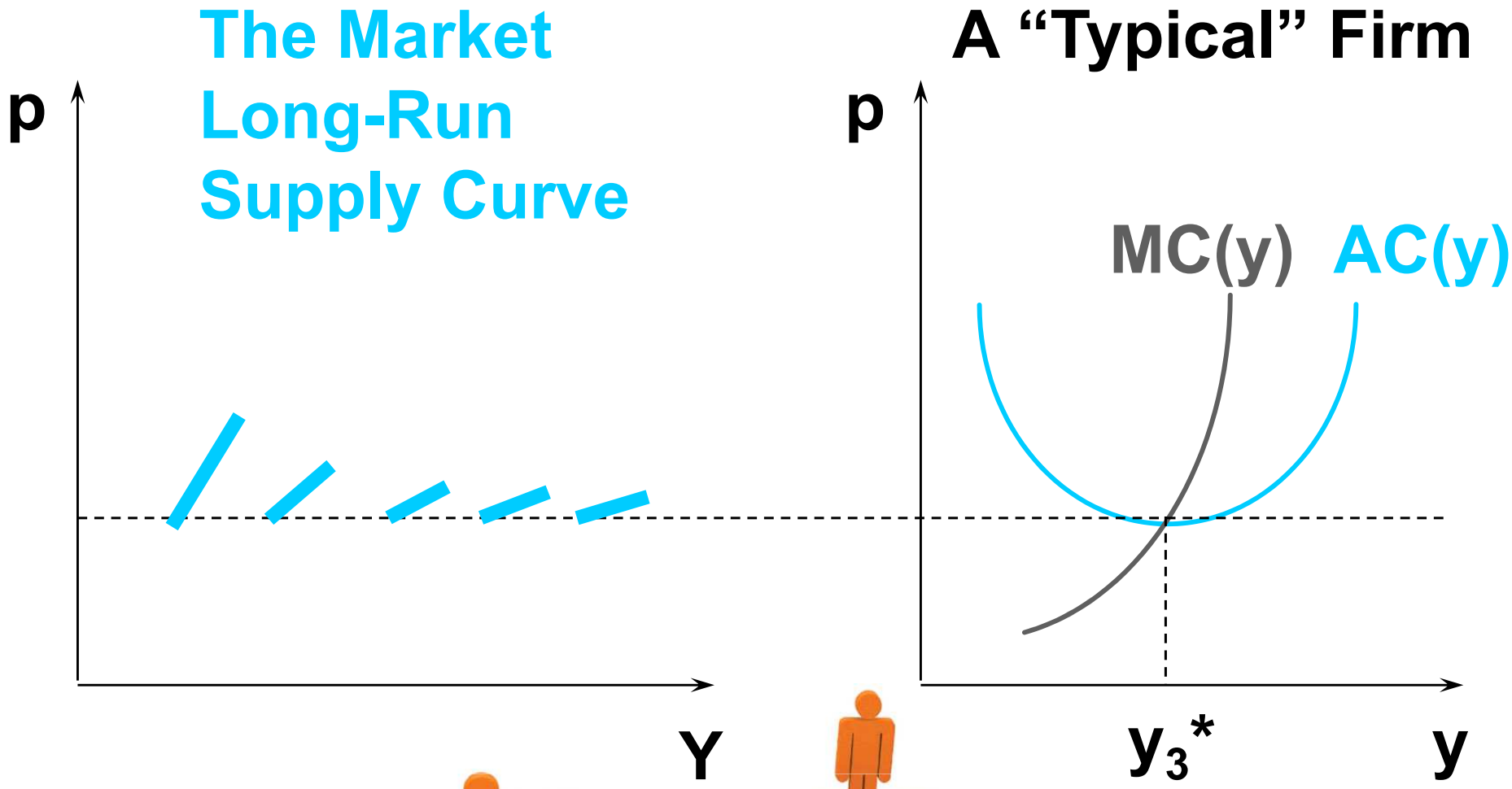
- **Continuing in this manner builds the industry's long-run supply curve, one section at-a-time from successive short-run industry supply curves.**

Long-Run Industry Supply





Long-Run Industry Supply

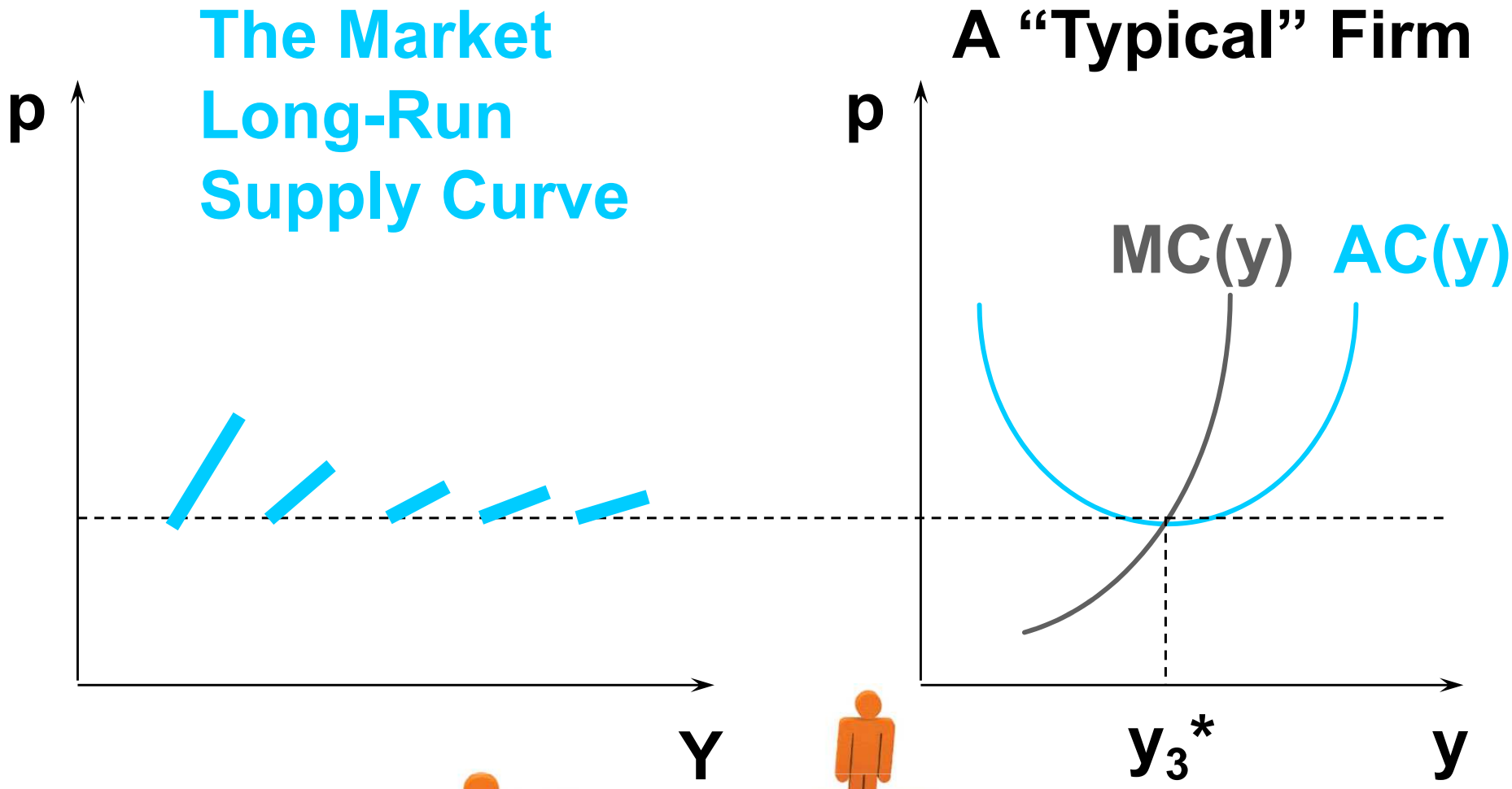


Notice that the bottom of each segment of the supply curve is min AC(y).

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



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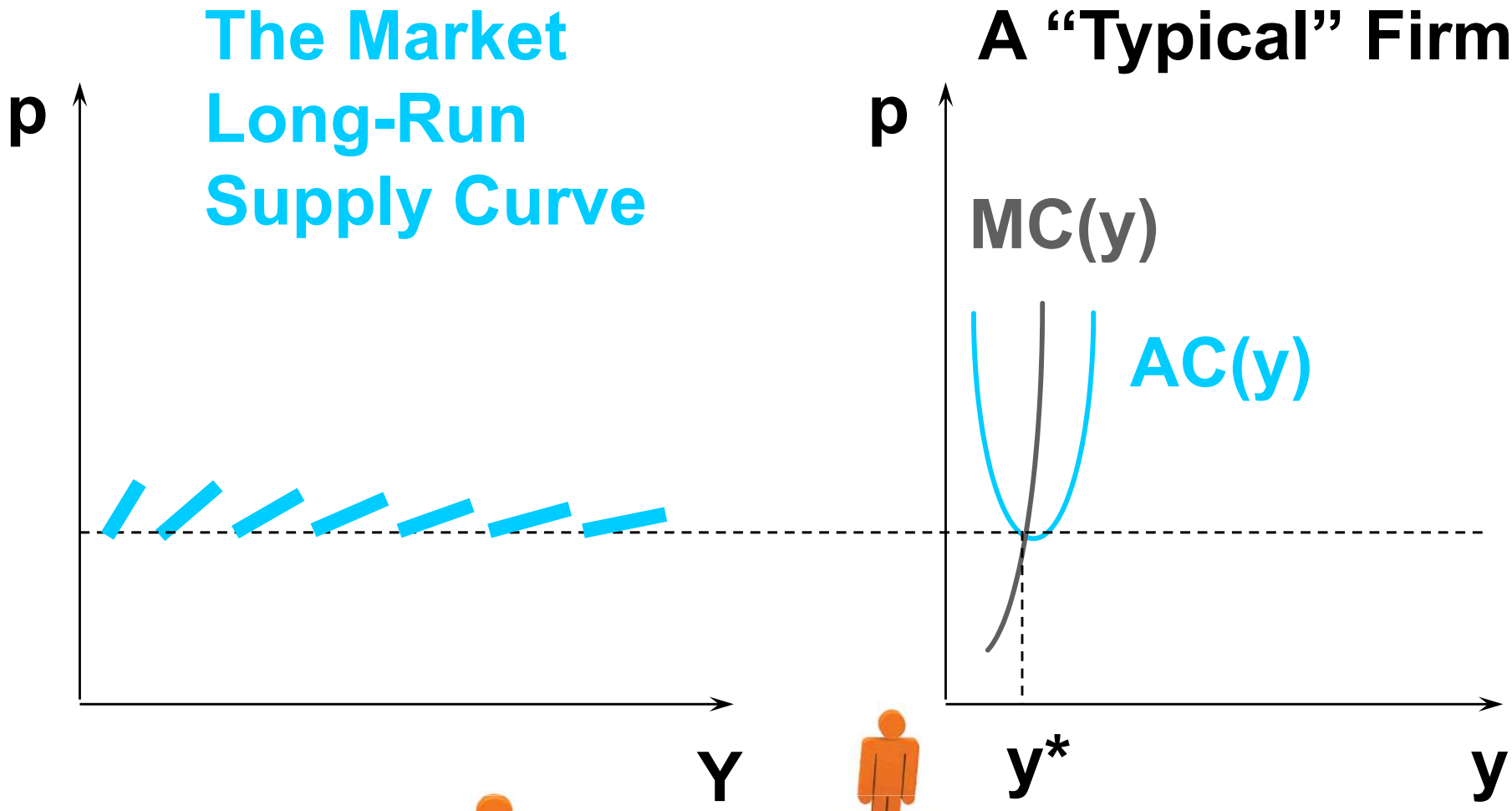
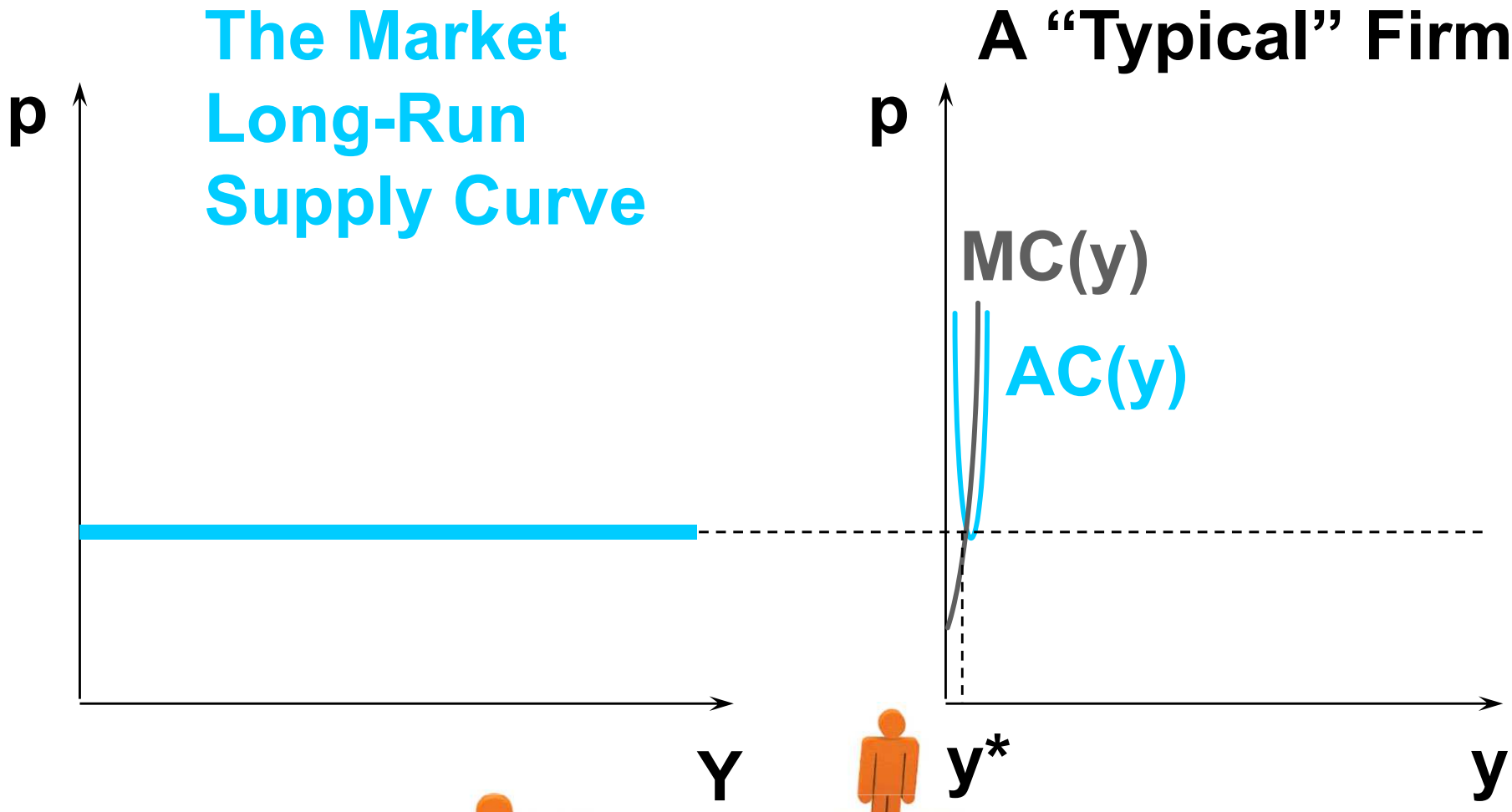
Long-Run Industry Supply



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



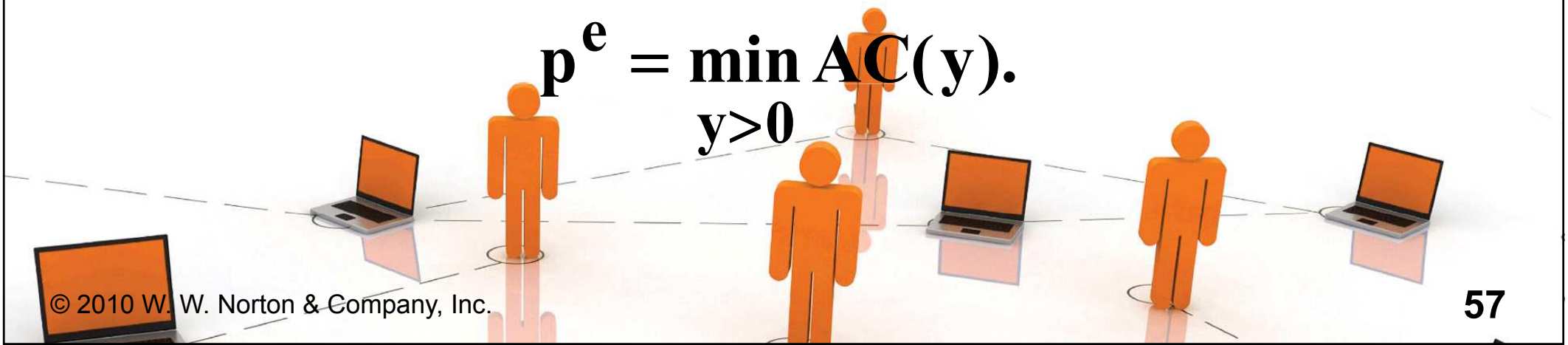
In the limit, as firms become infinitesimally small, the industry's long-run supply curve is horizontal at min AC(y).

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

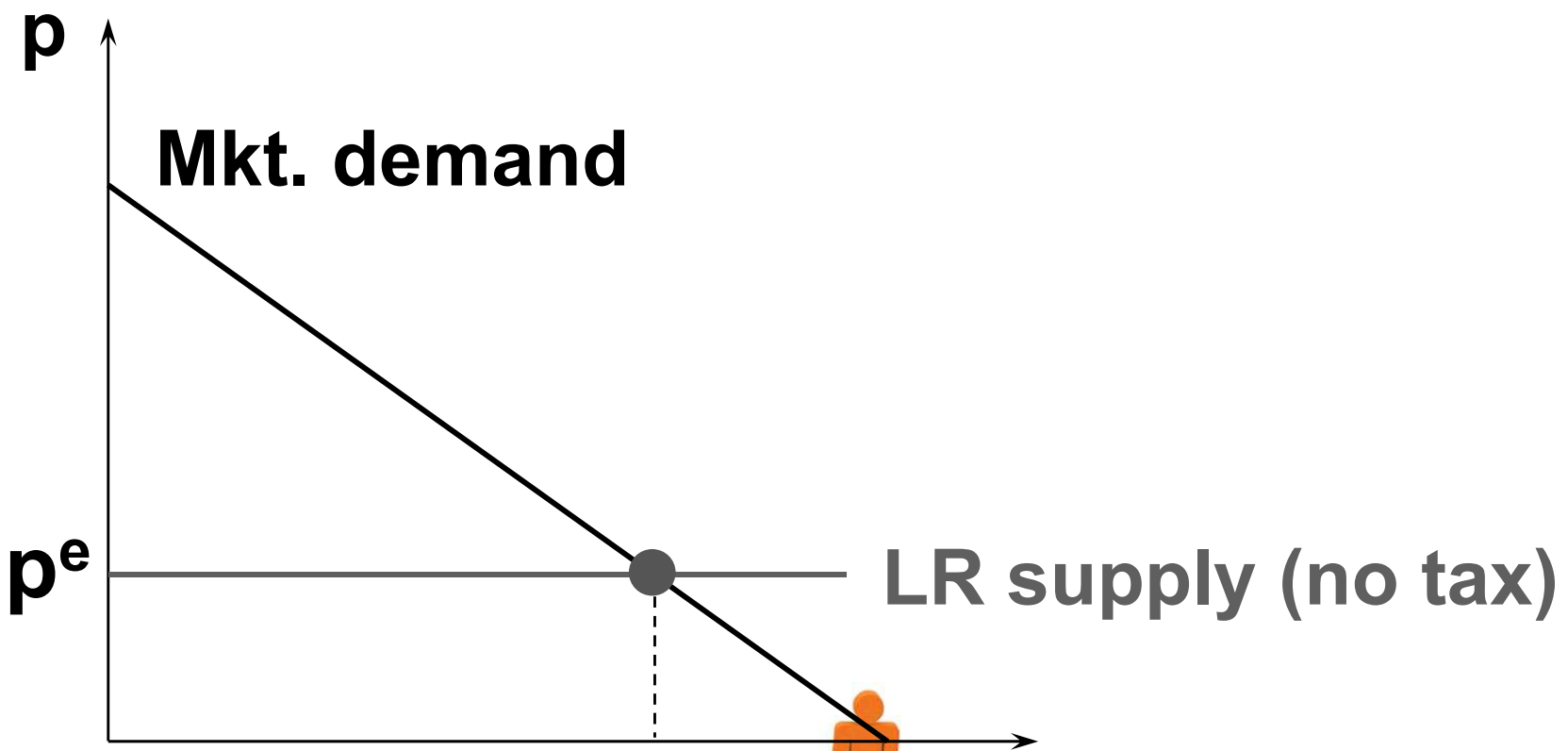
$$p^e = \min_{y>0} AC(y).$$



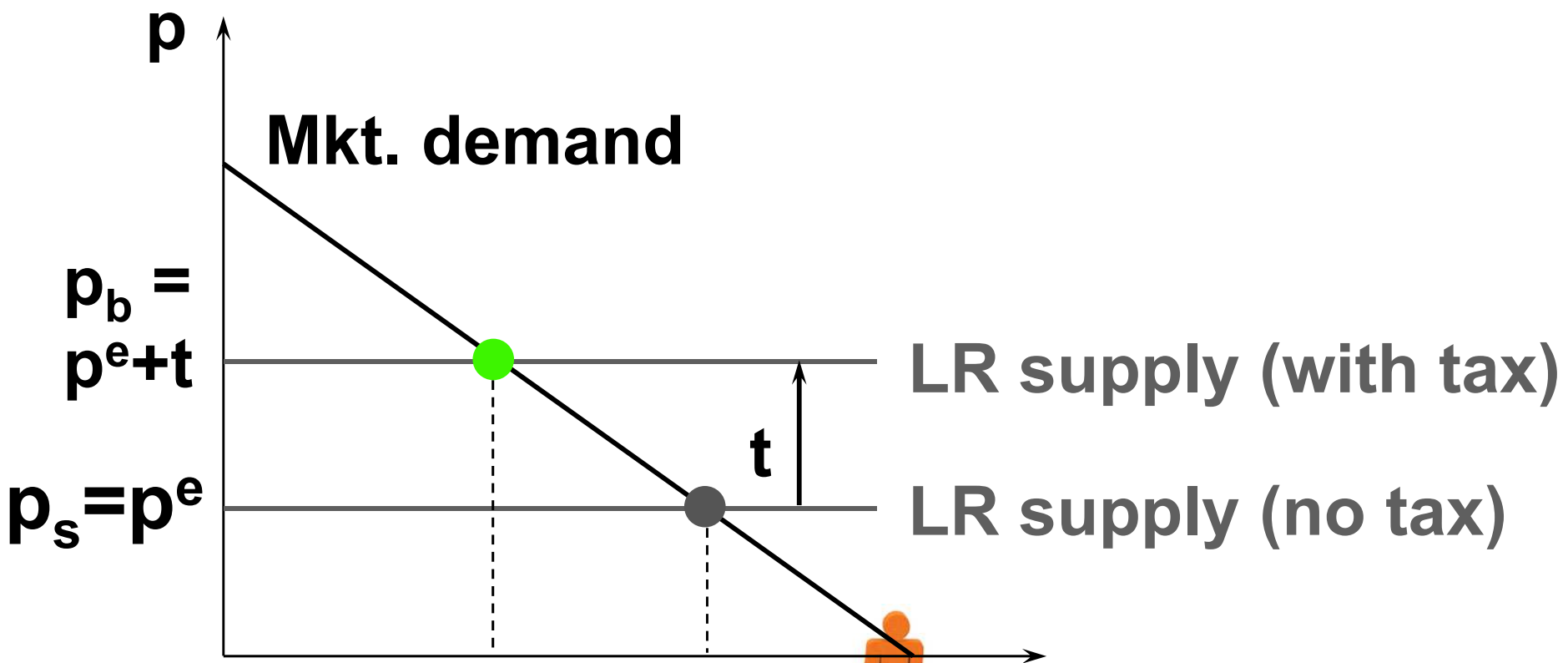
Long-Run Implications for Taxation

- **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

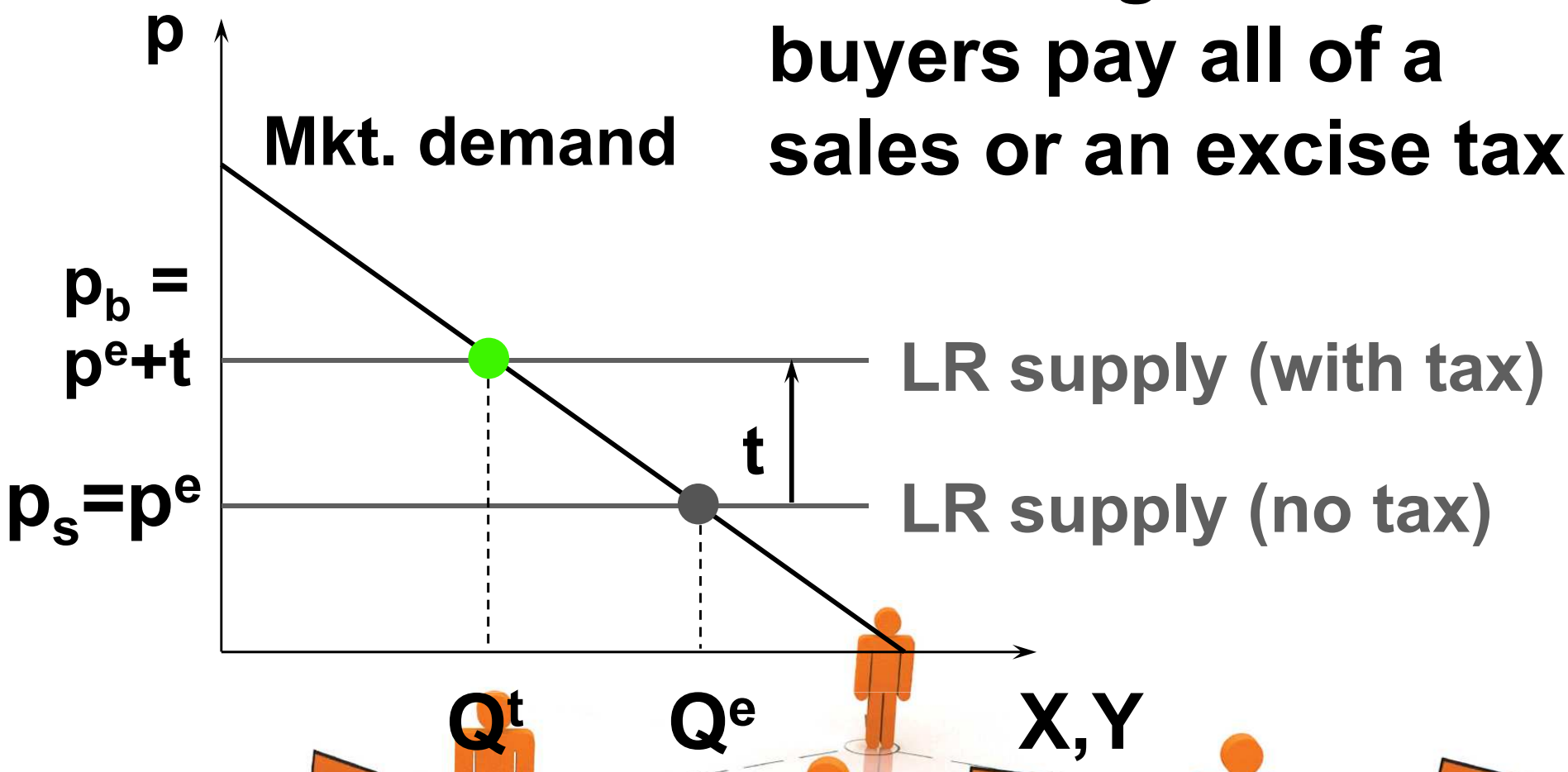


Long-Run Implications for Taxation



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?**

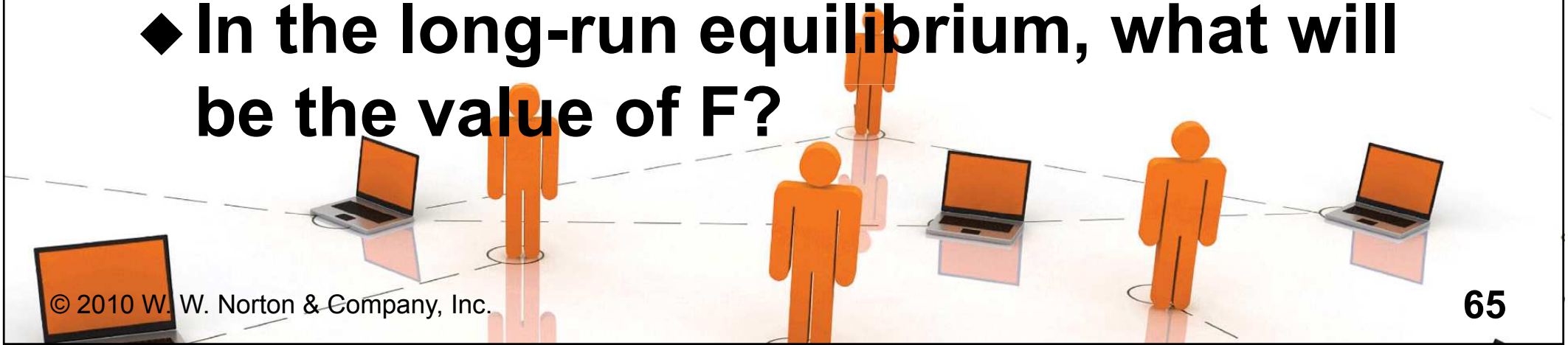
Fixed Inputs and Economic Rent

- **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?**



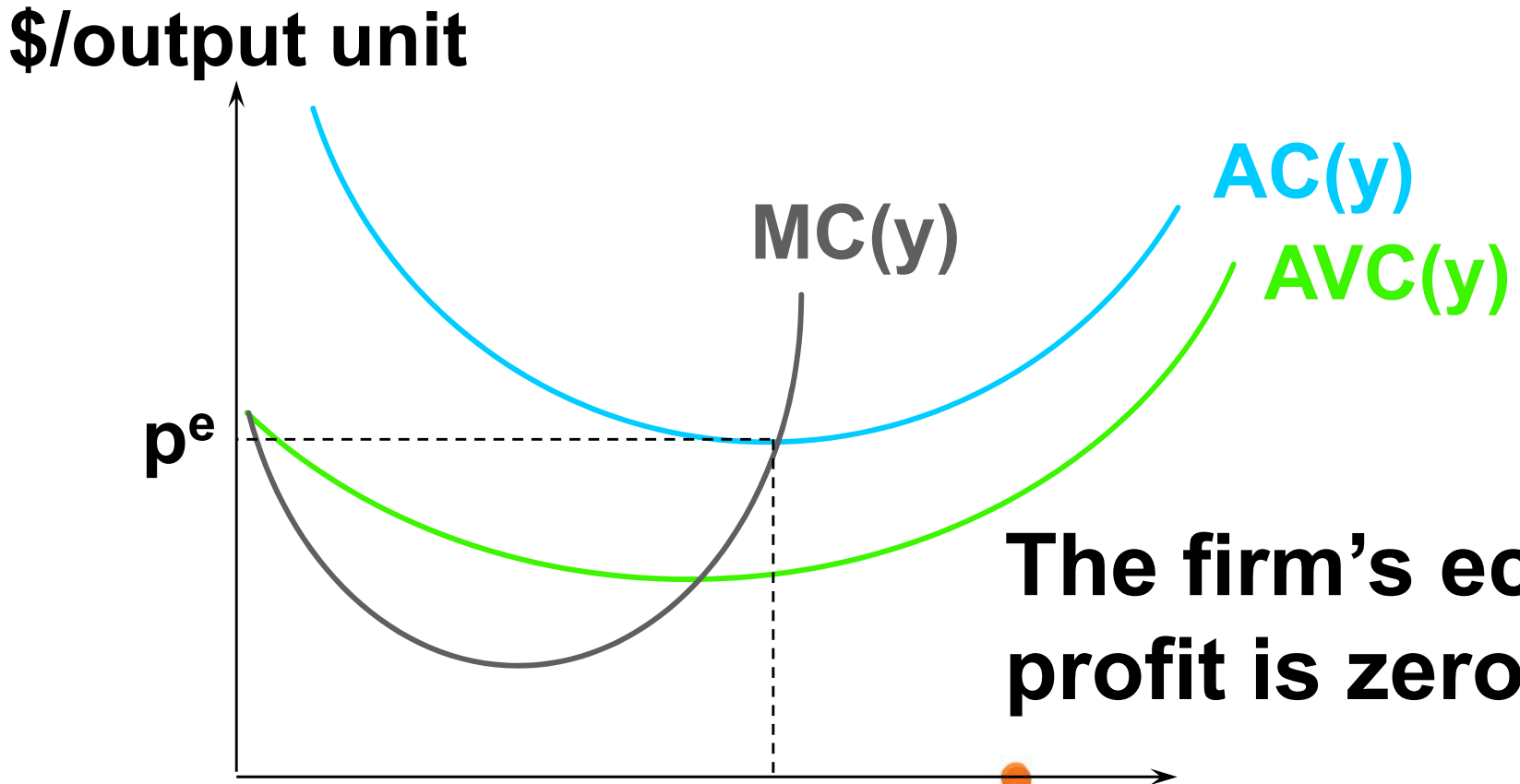
Fixed Inputs and Economic Rent

- **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.**

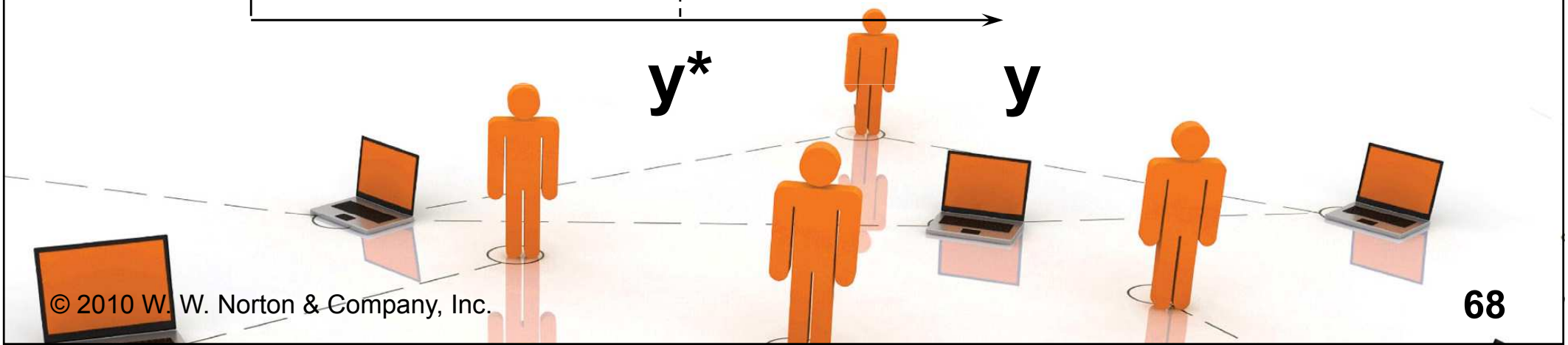
Fixed Inputs and Economic Rent

- **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.**

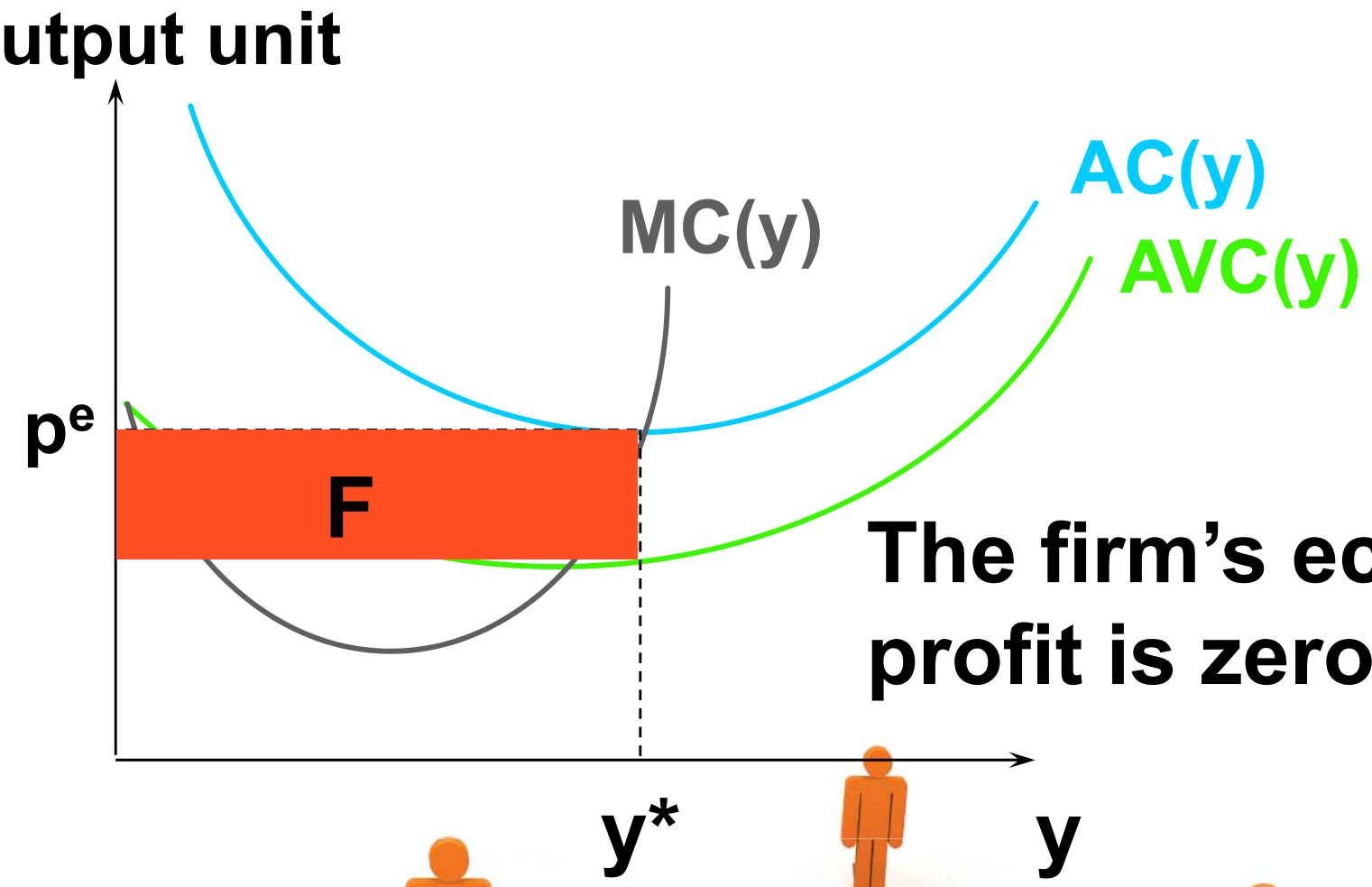
Fixed Inputs and Economic Rent



The firm's economic profit is zero.



Fixed Inputs and Economic Rent



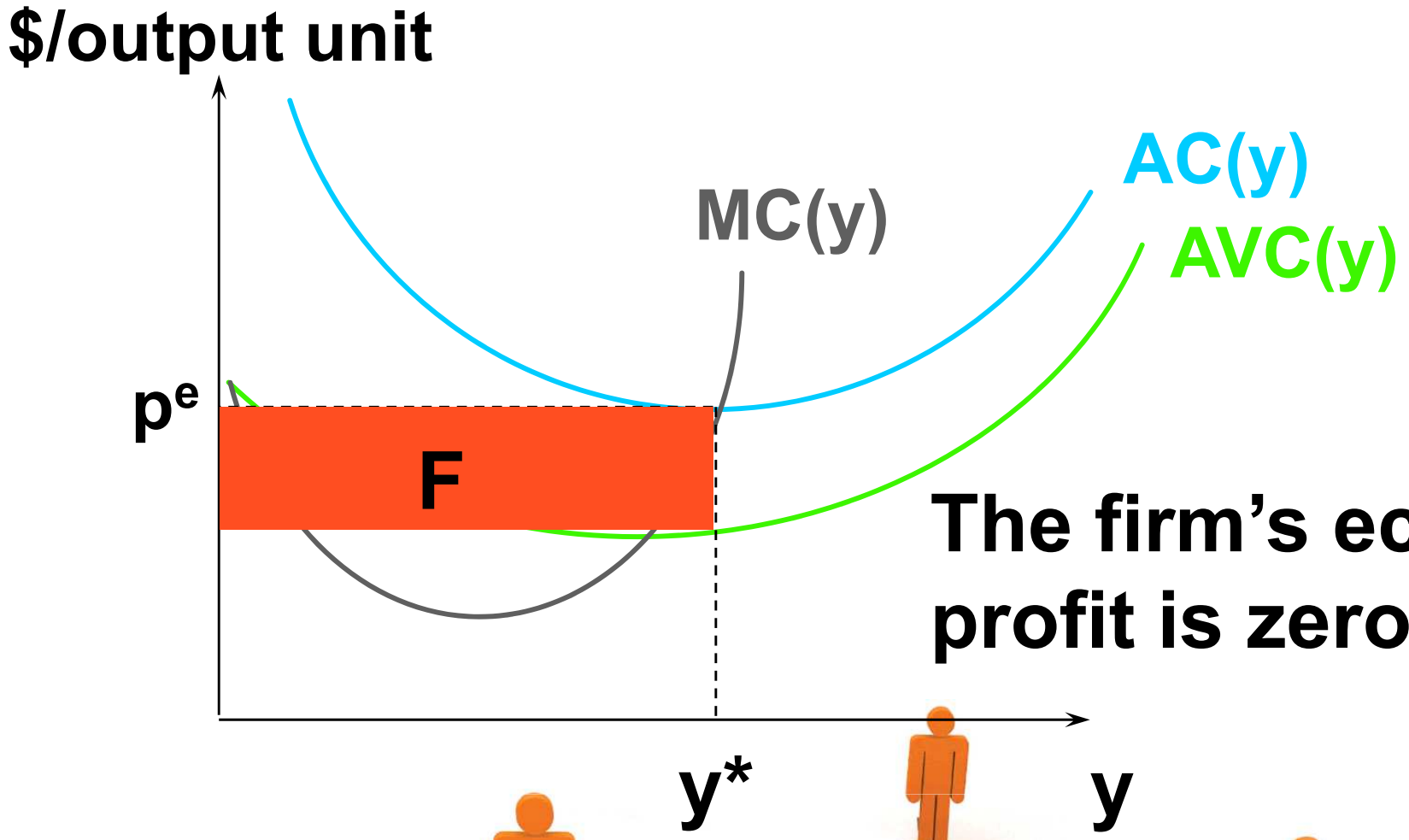
The firm's economic profit is zero.

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.