

Market Equilibrium

Economic Markets

Market Demand

□ Assume that there are only two goods (x and y)

* An individual's demand for x is

$$\text{Quantity of } x \text{ demanded} = x(p_x, p_y, I)$$

* If we use i to reflect each individual in the market, then the market demand curve is

$$\text{Market demand for } X = \sum_{i=1}^n x_i(p_x, p_y, I_i)$$

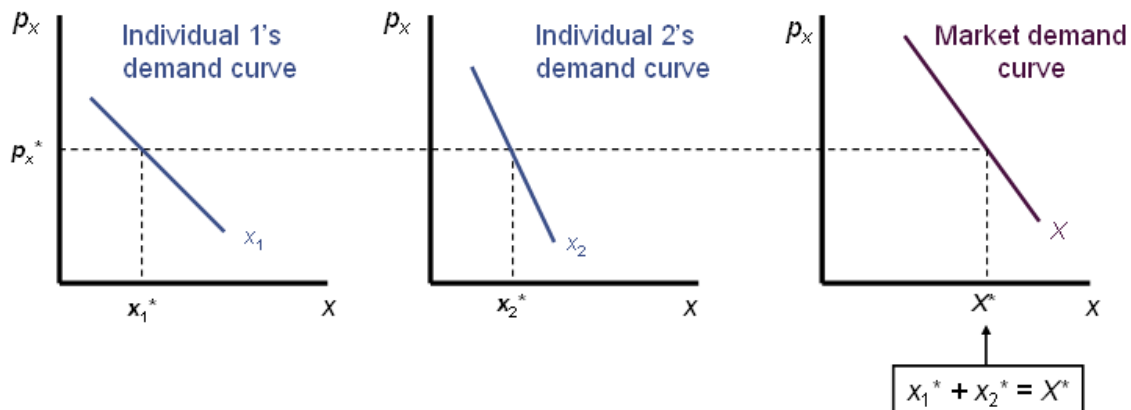
Market Demand

□ To construct the market demand curve, P_X is allowed to vary while P_Y and the income of each individual are held constant

□ If each individual's demand for x is downward sloping, the market demand curve will also be downward sloping

Market Demand

To derive the market demand curve, we sum the quantities demanded at every price



Shifts in the Market Demand Curve

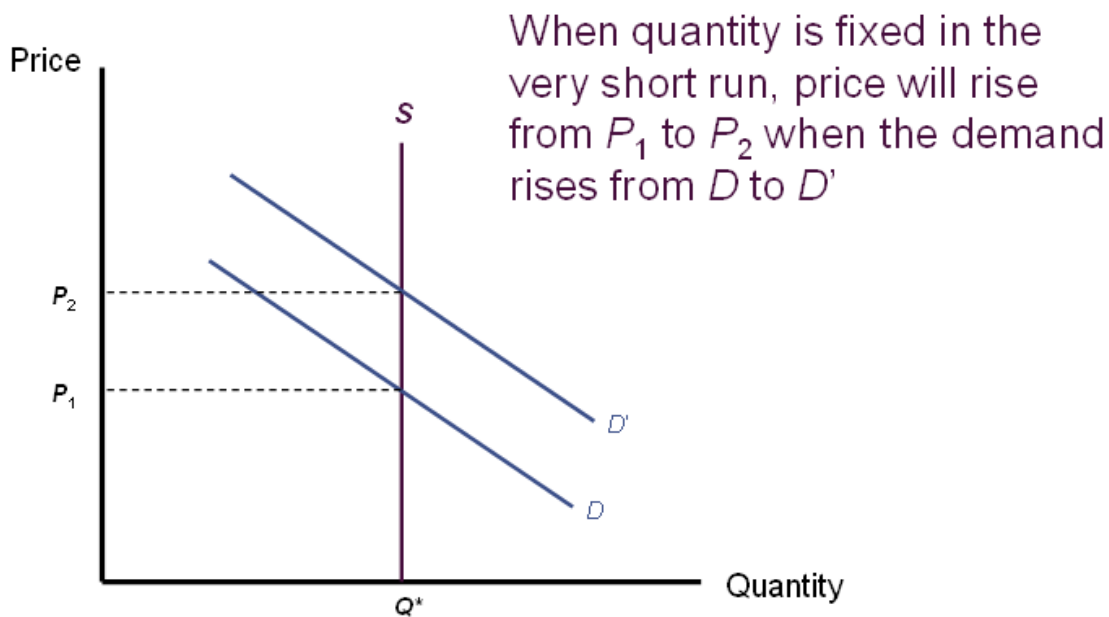
- The market demand summarizes the ceteris paribus relationship between X and p_x
 - * Changes in p_x result in movements along the curve (change in quantity demanded)
 - * Changes in other determinants of the demand for X cause the demand curve to shift to a new position (change in demand)

Timing of the Supply Response

- In the analysis of competitive pricing, the time period under consideration is important
 - * Very short run
 - No supply response (quantity supplied is fixed)
 - * Short run
 - Existing firms can alter their quantity supplied, but no new firms can enter the industry
 - * Long run
 - New firms may enter an industry

Pricing in the Very Short Run

- In the very short run (or the market period), there is no supply response to changing market conditions
 - * Price acts only as a device to ration demand
 - Price will adjust to clear the market
 - * The supply curve is a vertical line



Short-Run Price Determination

- The number of firms in an industry is fixed
- These firms are able to adjust the quantity they are producing
 - * They can do this by altering the levels of the variable inputs they employ

Perfect Competition

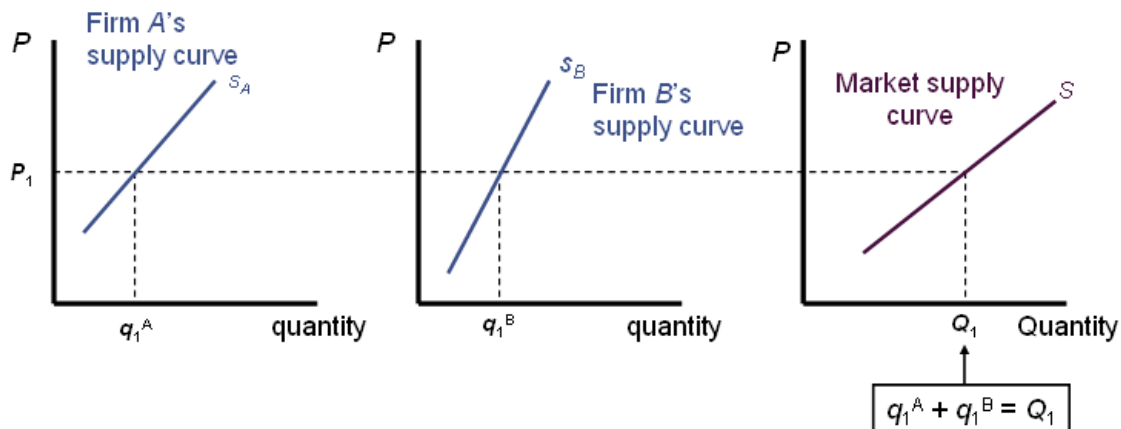
- A perfectly competitive industry is one that obeys the following assumptions:
 - * There are a large number of firms, each producing the same homogeneous product
 - * Each firm attempts to maximize profits
 - * Each firm is a price taker
 - Its actions have no effect on the market price
 - * Information is perfect
 - * Transactions are costless

Short-Run Market Supply

- The quantity of output supplied to the entire market in the short run is the sum of the quantities supplied by each firm
 - * The amount supplied by each firm depends on price
- The short-run market supply curve will be upward-sloping because each firm's short-run supply curve has a positive slope

Short-Run Market Supply Curve

To derive the market supply curve, we sum the quantities supplied at every price



Short-Run Market Supply Function

- The short-run market supply function shows total quantity supplied by each firm to a market

$$Q_s(P, v, w) = \sum_{i=1}^n q_i(P, v, w)$$

- Firms are assumed to face the same market price and the same prices for inputs

Short-Run Supply Elasticity

- The short-run supply elasticity describes the responsiveness of quantity supplied to changes in market price

$$e_{S,P} = \frac{\% \text{ change in } Q \text{ supplied}}{\% \text{ change in } P} = \frac{\partial Q_S}{\partial P} \cdot \frac{P}{Q_S}$$

- Because price and quantity supplied are positively related, $e_{S,P} > 0$

A Short-Run Supply Function

- Suppose that there are 100 identical firms each with the following short-run supply curve
- $q_i(P, v, w) = 10P/3$ ($i = 1, 2, \dots, 100$)
- This means that the market supply function is given by

$$Q_S = \sum_{i=1}^{100} q_i = \sum_{i=1}^{100} \frac{10P}{3} = \frac{1000P}{3}$$

A Short-Run Supply Function

- In this case, computation of the elasticity of supply shows that it is unit elastic

$$e_{S,P} = \frac{\partial Q_S(P, v, w)}{\partial P} \cdot \frac{P}{Q_S} = \frac{1000}{3} \cdot \frac{P}{1000P/3} = 1$$

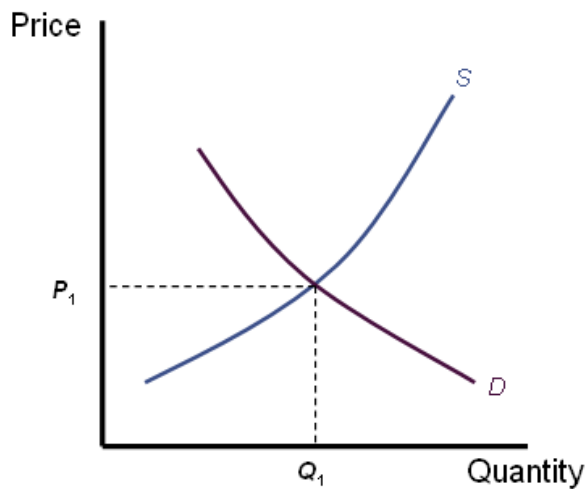
Equilibrium Price Determination

- An equilibrium price is one at which quantity demanded is equal to quantity supplied
 - * Neither suppliers nor demanders have an incentive to alter their economic decisions
- An equilibrium price (P^*) solves the equation:

$$Q_D(P^*, P', I) = Q_S(P^*, v, w)$$

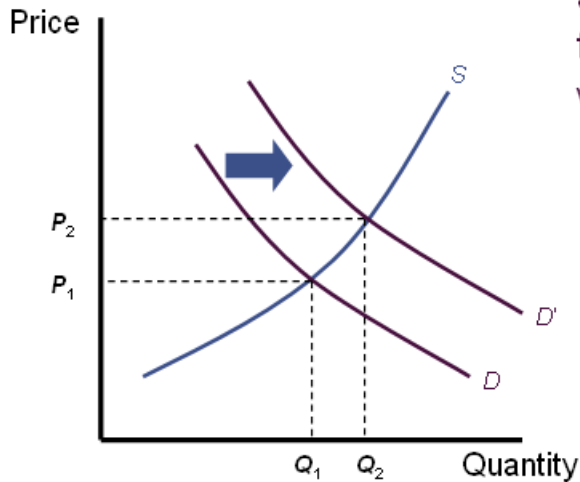
Equilibrium Price Determination

- The equilibrium price depends on many exogenous factors
 - * Changes in any of these factors will likely result in a new equilibrium price



The interaction between market demand and market supply determines the equilibrium price

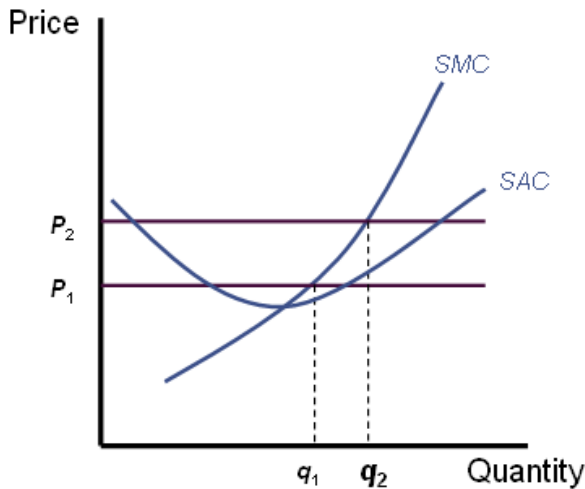
Market Reaction to a Shift in Demand



If many buyers experience an increase in their demands, the market demand curve will shift to the right

Equilibrium price and equilibrium quantity will both rise

Market Reaction to a Shift in Demand



If the market price rises, firms will increase their level of output

This is the short-run supply response to an increase in market price

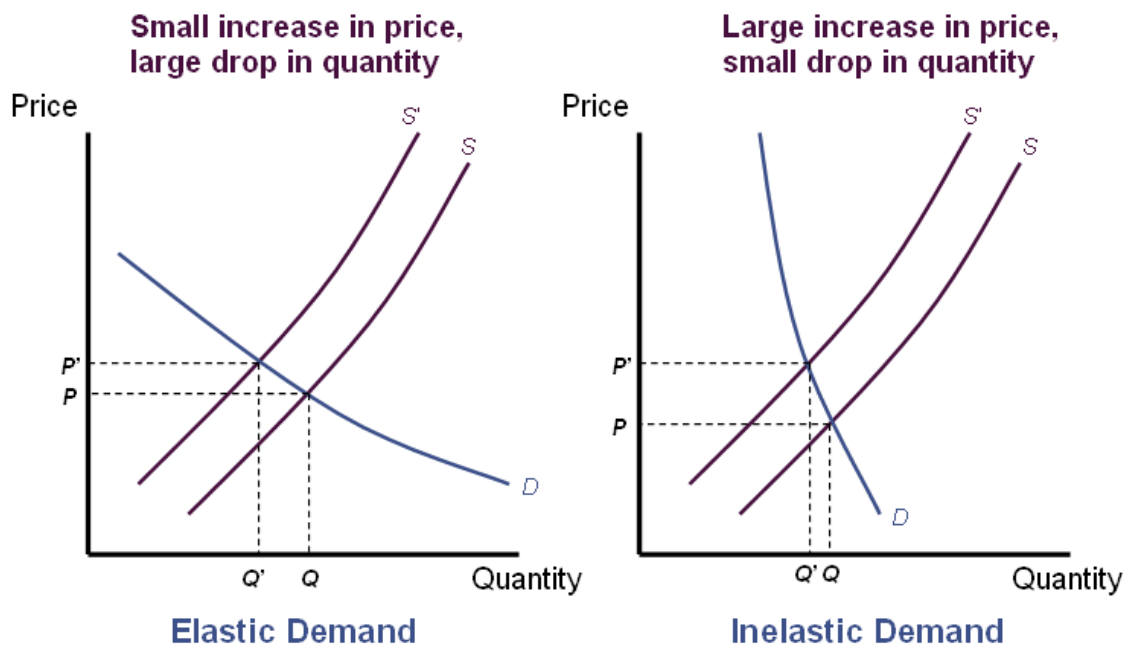
Shifts in Supply and Demand Curves

- Demand curves shift because
 - * Incomes change
 - * Prices of substitutes or complements change
 - * Preferences change
- Supply curves shift because
 - * Input prices change
 - * Technology changes
 - * Number of producers change

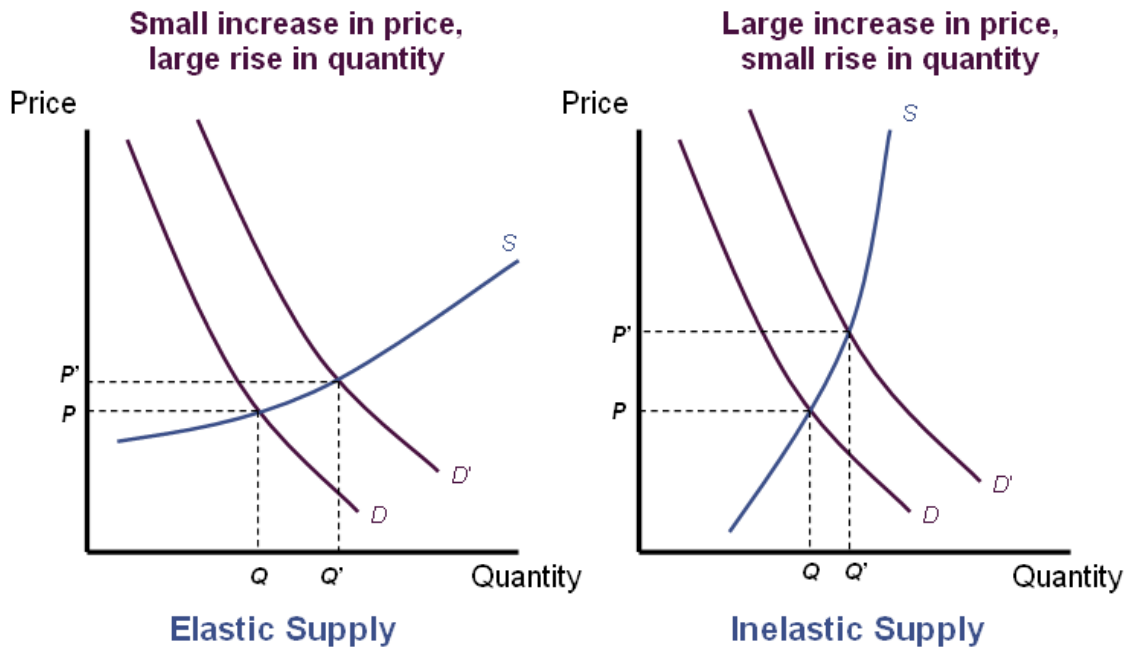
Shifts in Supply and Demand Curves

- When either a supply curve or a demand curve shift, equilibrium price and quantity will change
- The relative magnitudes of these changes depends on the shapes of the supply and demand curves

Shifts in Supply



Shifts in Demand



Mathematical Model of Supply and Demand

□ Suppose that the demand function is represented by

$$Q_D = D(P, \alpha)$$

* α is a parameter that shifts the demand curve

• $\partial D / \partial \alpha = D_\alpha$ can have any sign

$$\partial D / \partial P = D_P < 0$$

Mathematical Model of Supply and Demand

□ The supply relationship can be shown as

$$Q_S = S(P, \beta)$$

* β is a parameter that shifts the supply curve

• $\partial S / \partial \beta = S_\beta$ can have any sign

$$\partial S / \partial P = S_P > 0$$

□ Equilibrium requires that $Q_D = Q_S$

Long-Run Analysis

- In the long run, a firm may adapt all of its inputs to fit market conditions
 - * Profit-maximization for a price-taking firm implies that price is equal to long-run MC
- Firms can also enter and exit an industry in the long run
 - * Perfect competition assumes that there are no special costs of entering or exiting an industry

Long-Run Analysis

- New firms will be lured into any market for which economic profits are greater than zero
 - * Entry of firms will cause the short-run industry supply curve to shift outward
 - * Market price and profits will fall
 - * The process will continue until economic profits are zero

Long-Run Analysis

- Existing firms will leave any industry for which economic profits are negative
 - * Exit of firms will cause the short-run industry supply curve to shift inward
 - * Market price will rise and losses will fall
 - * The process will continue until economic profits are zero

Long-Run Competitive Equilibrium

- A perfectly competitive industry is in long-run equilibrium if there are no incentives for profit-maximizing firms to enter or to leave the industry
 - * This will occur when the number of firms is such that $P = MC = AC$ and each firm operates at minimum AC

Long-Run Competitive Equilibrium

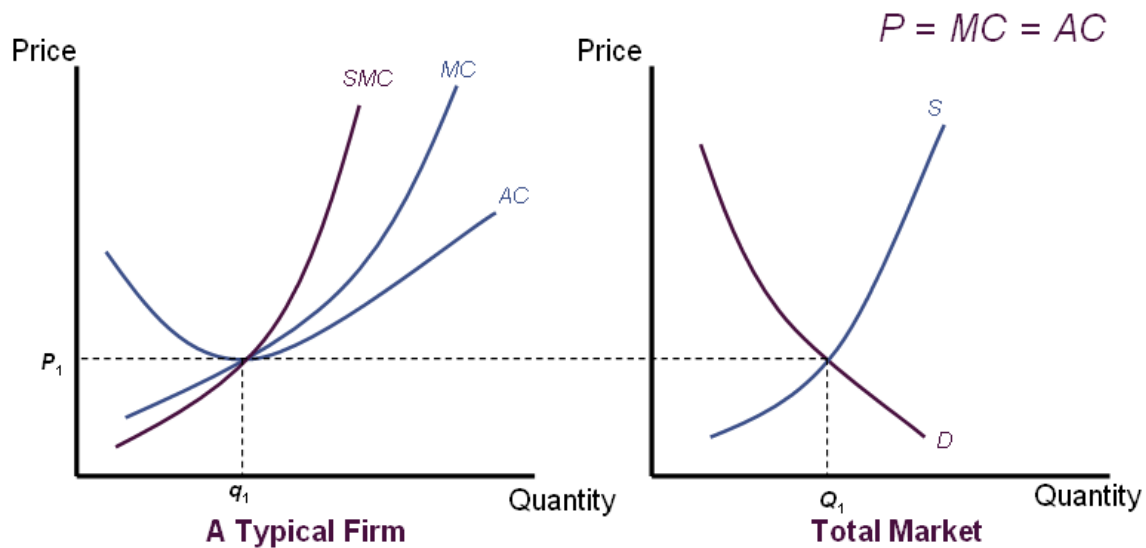
- We will assume that all firms in an industry have identical cost curves
 - * No firm controls any special resources or technology
- The equilibrium long-run position requires that each firm earn zero economic profit

Long-Run Equilibrium: Constant-Cost Case

- Assume that the entry of new firms in an industry has no effect on the cost of inputs
 - * No matter how many firms enter or leave an industry, a firm's cost curves will remain unchanged
- This is referred to as a constant-cost industry

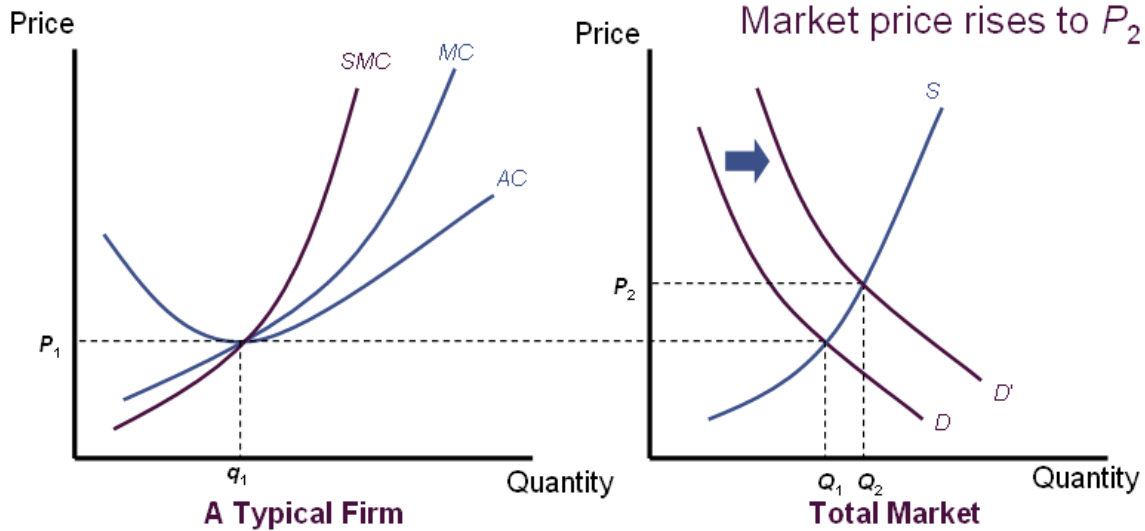
Long-Run Equilibrium: Constant-Cost Case

This is a long-run equilibrium for this industry



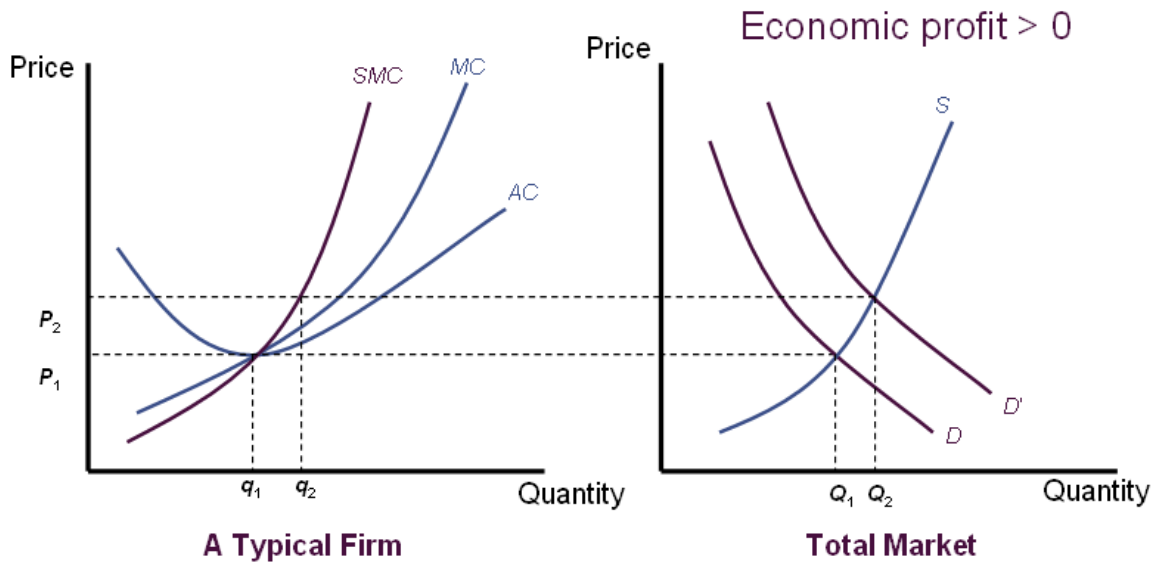
Long-Run Equilibrium: Constant-Cost Case

Suppose that market demand rises to D'



Long-Run Equilibrium: Constant-Cost Case

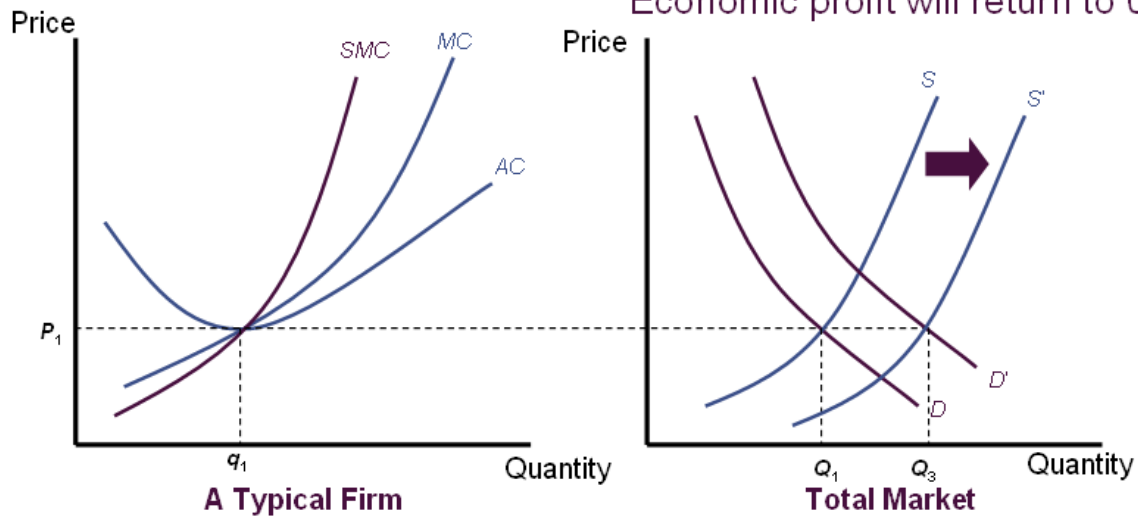
In the short run, each firm increases output to q_2



Long-Run Equilibrium: Constant-Cost Case

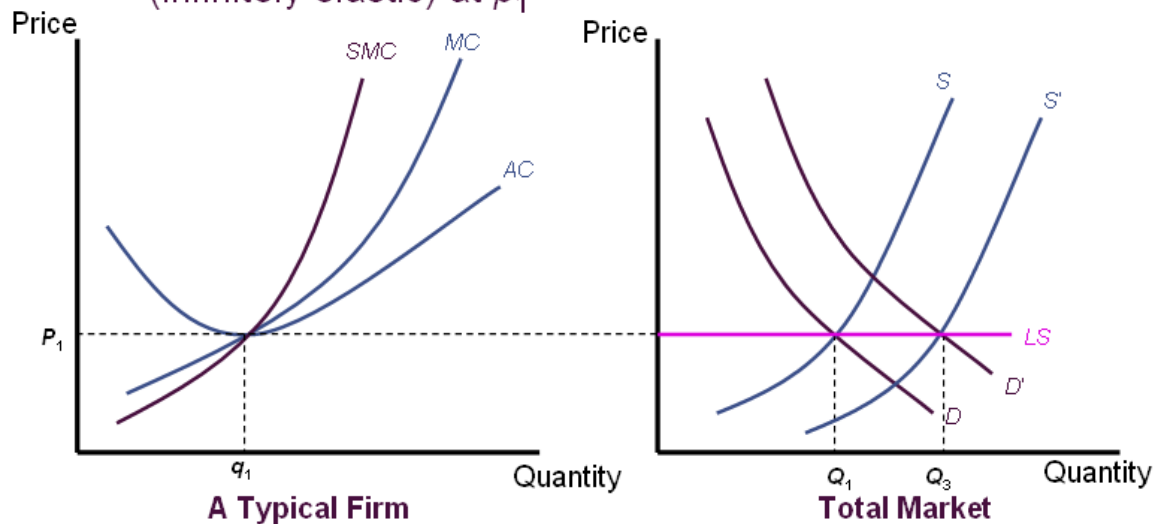
In the long run, new firms will enter the industry

Economic profit will return to 0



Long-Run Equilibrium: Constant-Cost Case

The long-run supply curve will be a horizontal line (infinitely elastic) at p_1



Shape of the Long-Run Supply Curve

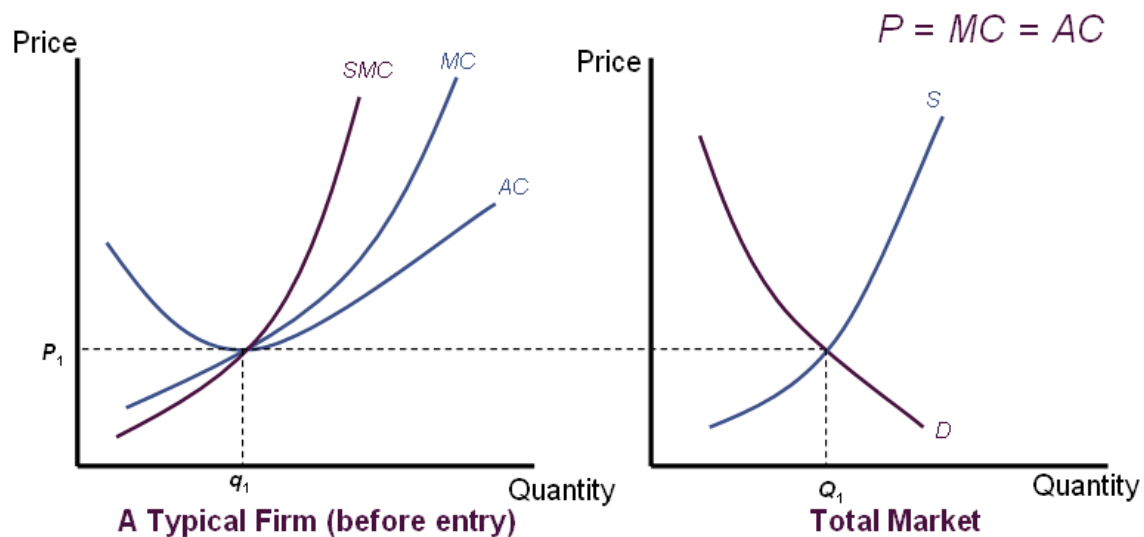
- The zero-profit condition is the factor that determines the shape of the long-run cost curve
 - * if average costs are constant as firms enter, long-run supply will be horizontal
 - * if average costs rise as firms enter, long-run supply will have an upward slope
 - * if average costs fall as firms enter, long-run supply will be negatively sloped

Long-Run Equilibrium: Increasing-Cost Industry

- The entry of new firms may cause the average costs of all firms to rise
 - * Prices of scarce inputs may rise
 - * New firms may impose “external” costs on existing firms

Long-Run Equilibrium: Increasing-Cost Industry

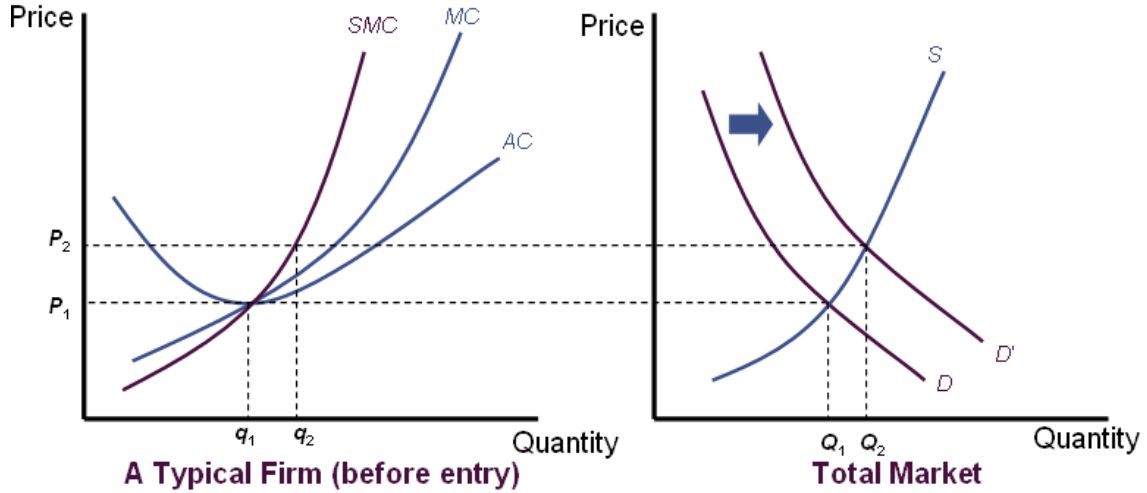
Suppose that we are in long-run equilibrium in this industry



Long-Run Equilibrium: Increasing-Cost Industry

Suppose that market demand rises to D'

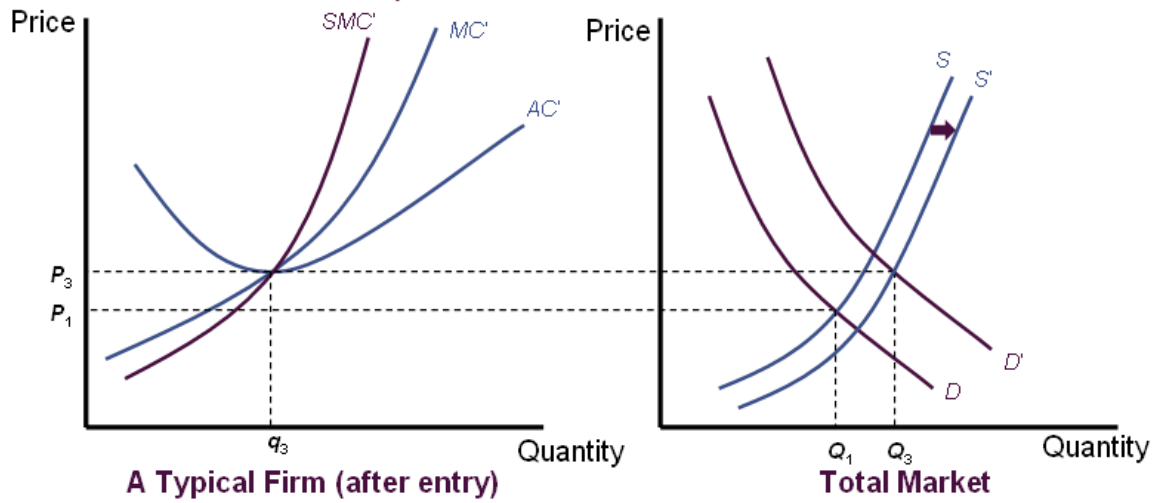
Market price rises to P_2 and firms increase output to q_2



Long-Run Equilibrium: Increasing-Cost Industry

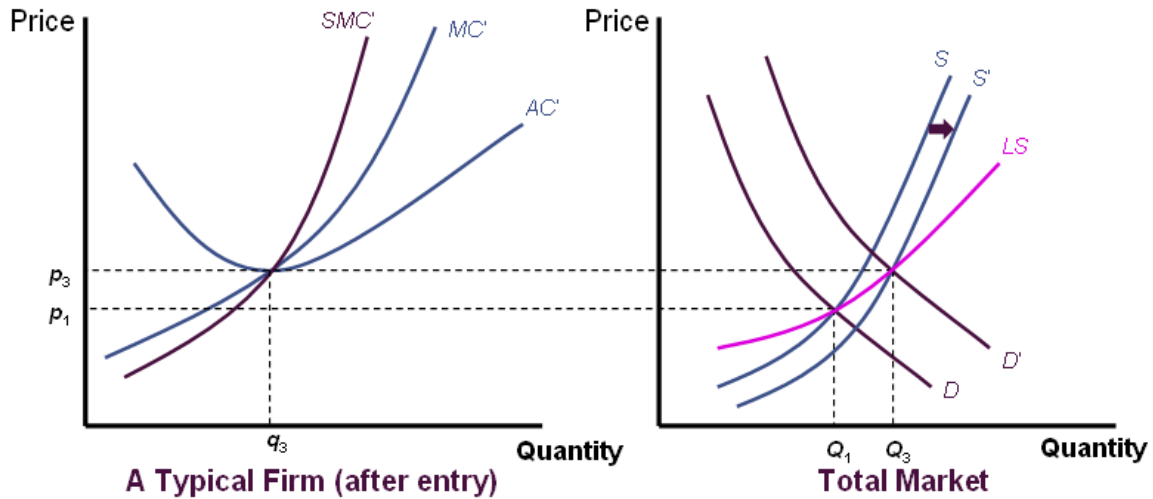
Positive profits attract new firms and supply shifts out

Entry of firms causes costs for each firm to rise



Long-Run Equilibrium: Increasing-Cost Industry

The long-run supply curve will be upward-sloping



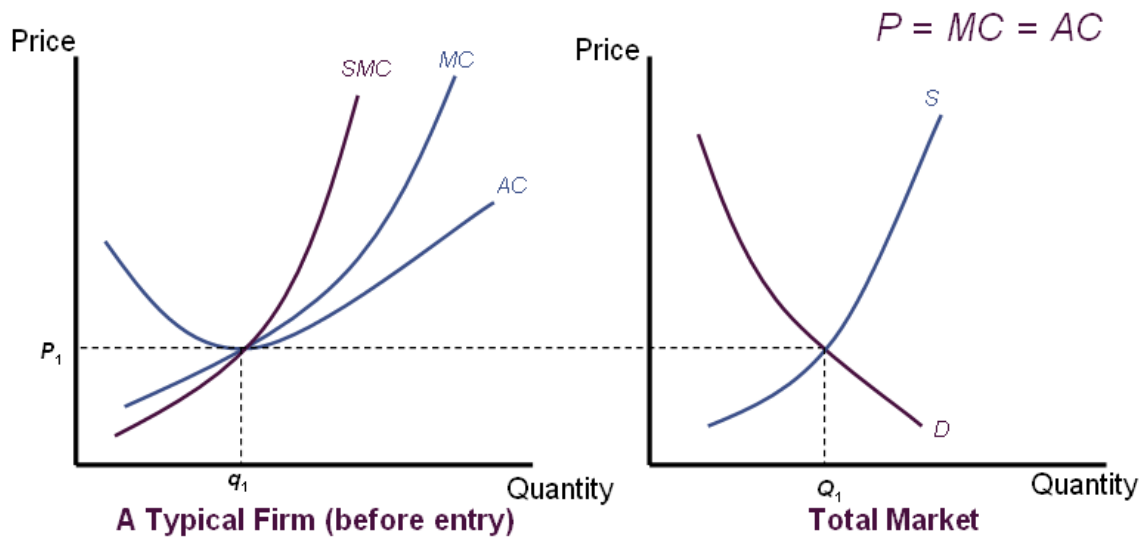
Long-Run Equilibrium: Decreasing-Cost Industry

□ The entry of new firms may cause the average costs of all firms to fall

- * New firms may attract a larger pool of trained labor
- * Entry of new firms may provide a “critical mass” of industrialization
 - Permits the development of more efficient transportation and communications networks

Long-Run Equilibrium: Decreasing-Cost Case

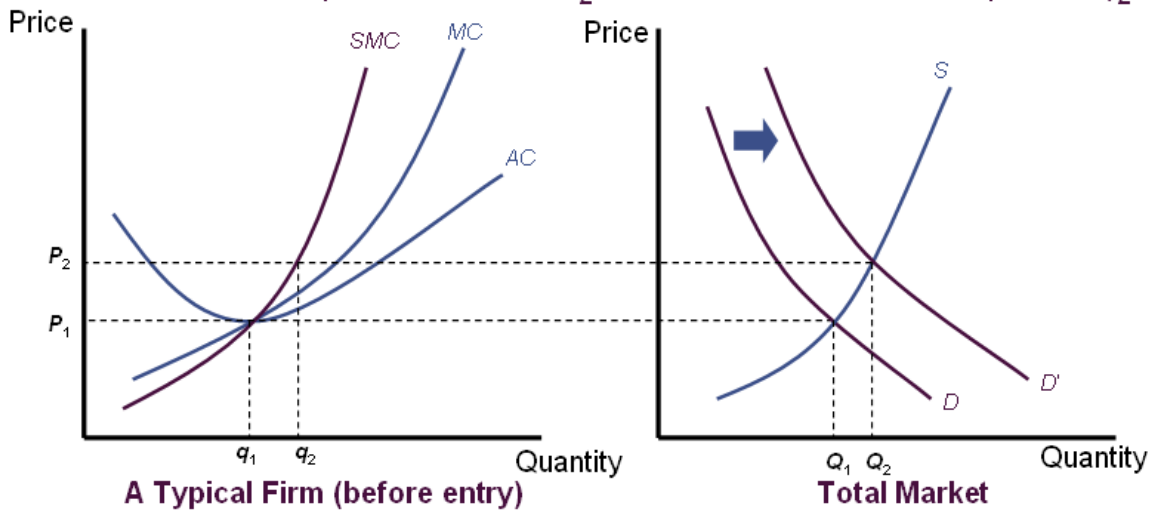
Suppose that we are in long-run equilibrium in this industry



Long-Run Equilibrium: Decreasing-Cost Industry

Suppose that market demand rises to D'

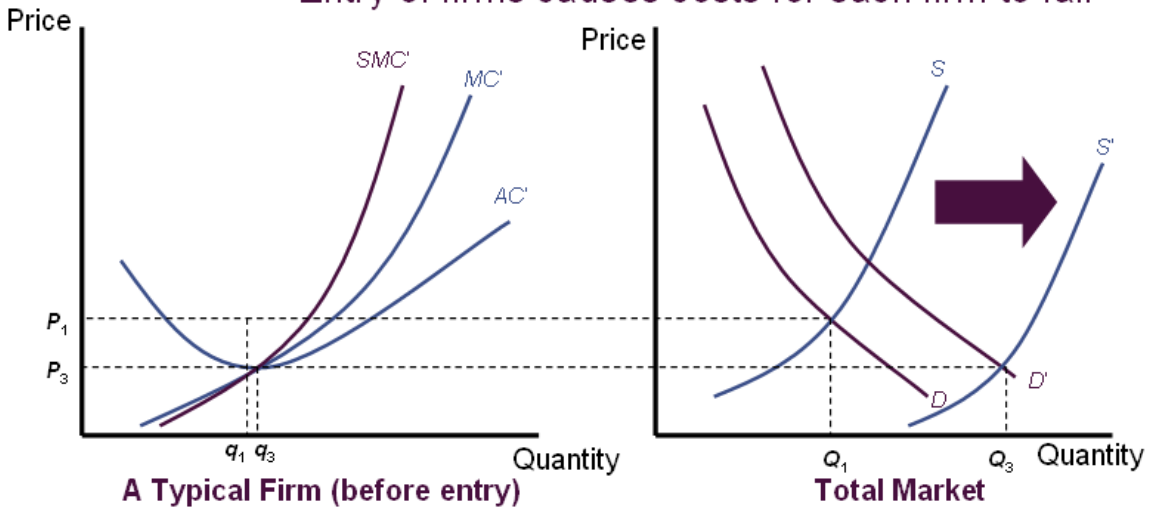
Market price rises to P_2 and firms increase output to q_2



Long-Run Equilibrium: Decreasing-Cost Industry

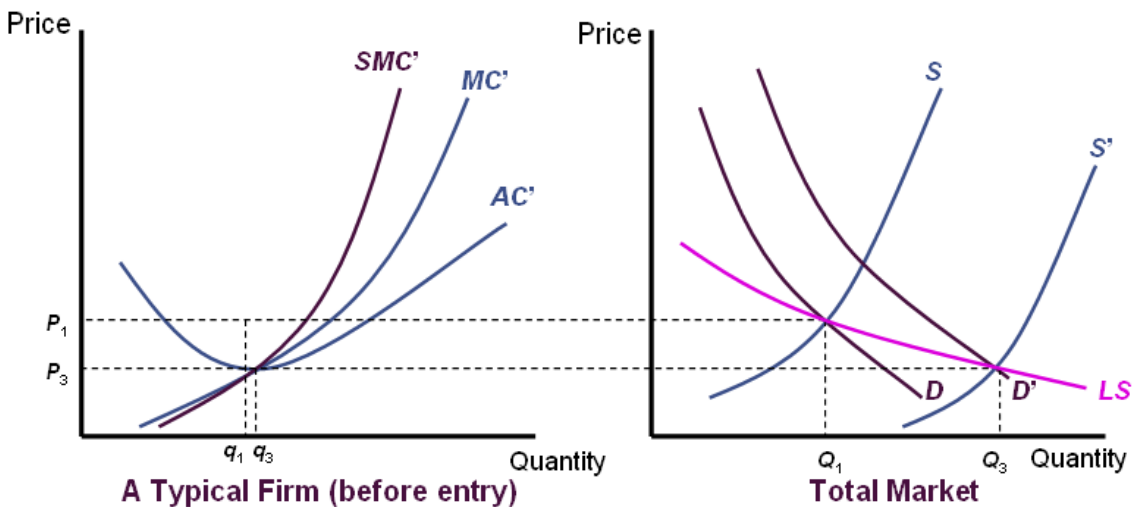
Positive profits attract new firms and supply shifts out

Entry of firms causes costs for each firm to fall



Long-Run Equilibrium: Decreasing-Cost Industry

The long-run industry supply curve will be downward-sloping



Classification of Long-Run Supply Curves

- Constant Cost
 - * Entry does not affect input costs
 - * The long-run supply curve is horizontal at the long-run equilibrium price
- Increasing Cost
 - * Entry increases inputs costs
 - * The long-run supply curve is positively sloped
- Decreasing Cost
 - * entry reduces input costs
 - * the long-run supply curve is negatively sloped