

Econ 301: Managerial Economics

Topic 8: Market Structure

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Market Structures

- Over the next few topics we are going to look at different market structures and what it means for firm's decisions to produce output, and consumer welfare.
- **Types of Market Structures**
 1. Perfect Competition
 2. Monopoly
 3. Monopolistic Competition
 4. Oligopoly (duopoly etc)

Perfect Competition

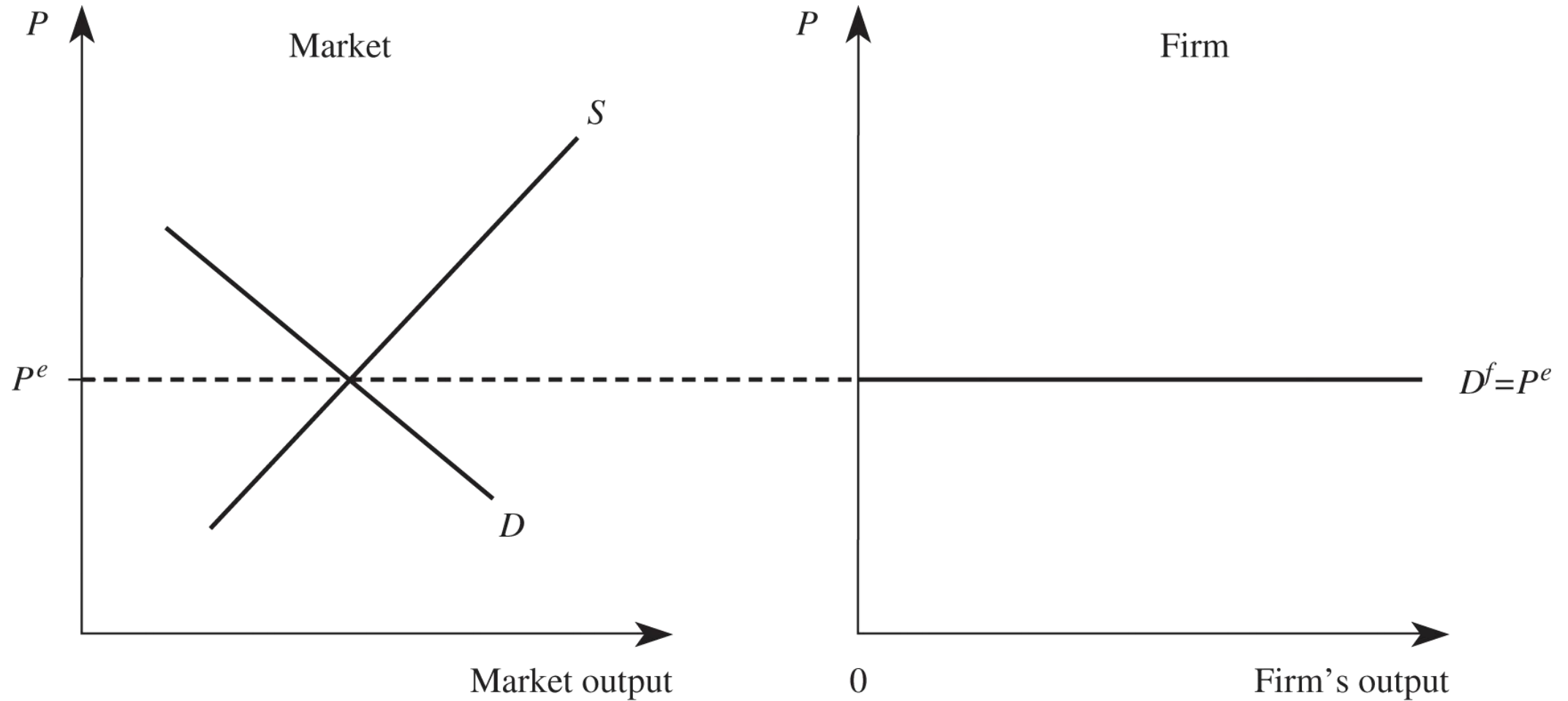
Perfectly competitive markets:

- There are many buyers and sellers that are “small” relative to the market.
- Each firm in the market produces a homogeneous (identical) product.
- Buyers and sellers have perfect information.
- No transaction costs exist.
- There is free entry into and exit from the market.

The implications of these conditions:

- A single market price is determined by the **interaction of demand and supply**.
- Firms earn **zero economic profits in the long run**.

Demand at the Market and Firm Levels under Perfect Competition



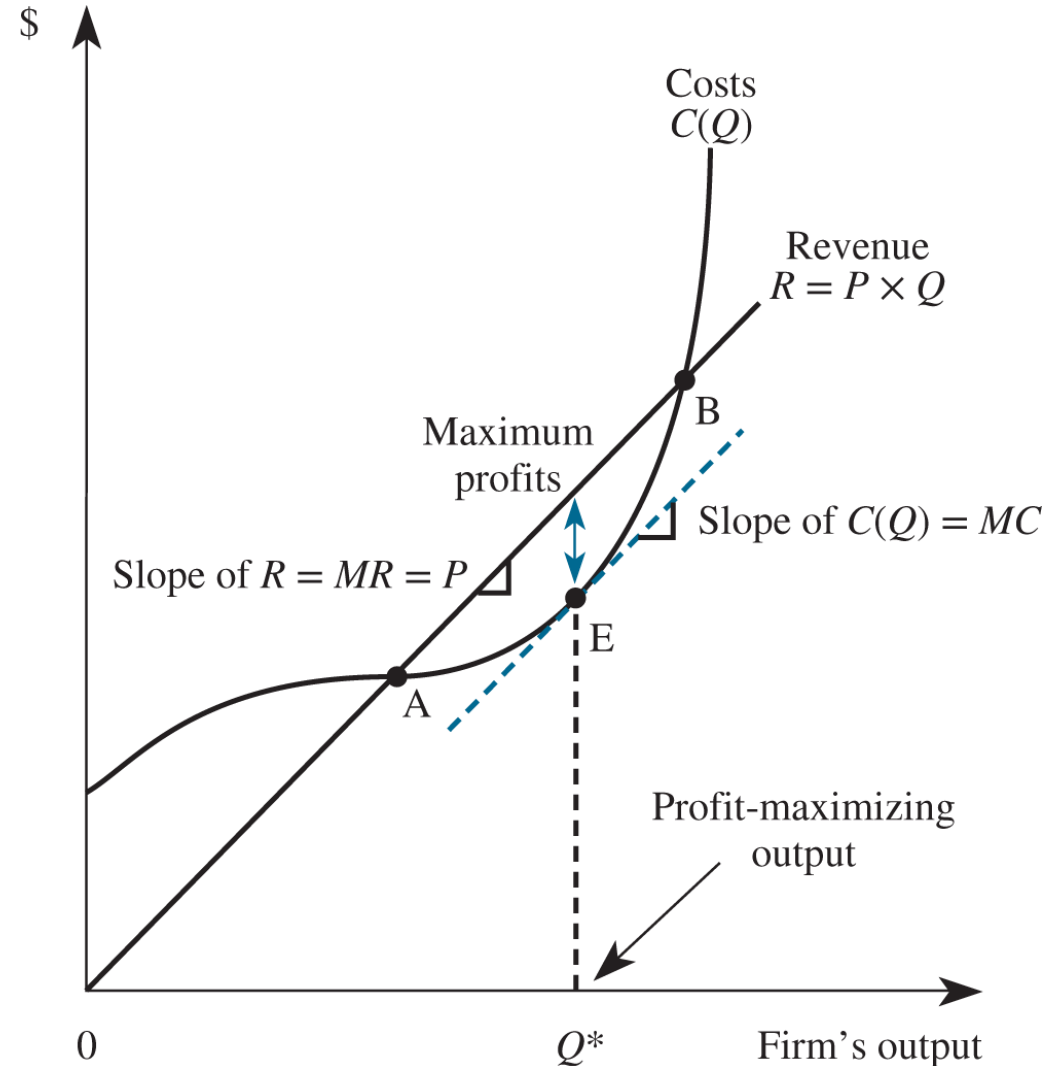
Firm's Demand Curve

- Notice that the demand curve that the firm faces is horizontal.
- This means it is **perfectly elastic**: In other words, if the firm changes the price even slightly above market price it would sell zero units.

Short-Run Output Decisions

- The short run is a period of time over which some factors of production are fixed.
- To maximize short-run profits, managers must take as given the fixed inputs (and fixed costs) and determine how much output to produce by changing the variable inputs.

Revenue, Costs, and Profits for a Perfectly Competitive Firm



Competitive Firm's Demand

The demand curve for a competitive firm's product is a horizontal line at the market price. This price is the competitive firm's marginal revenue.

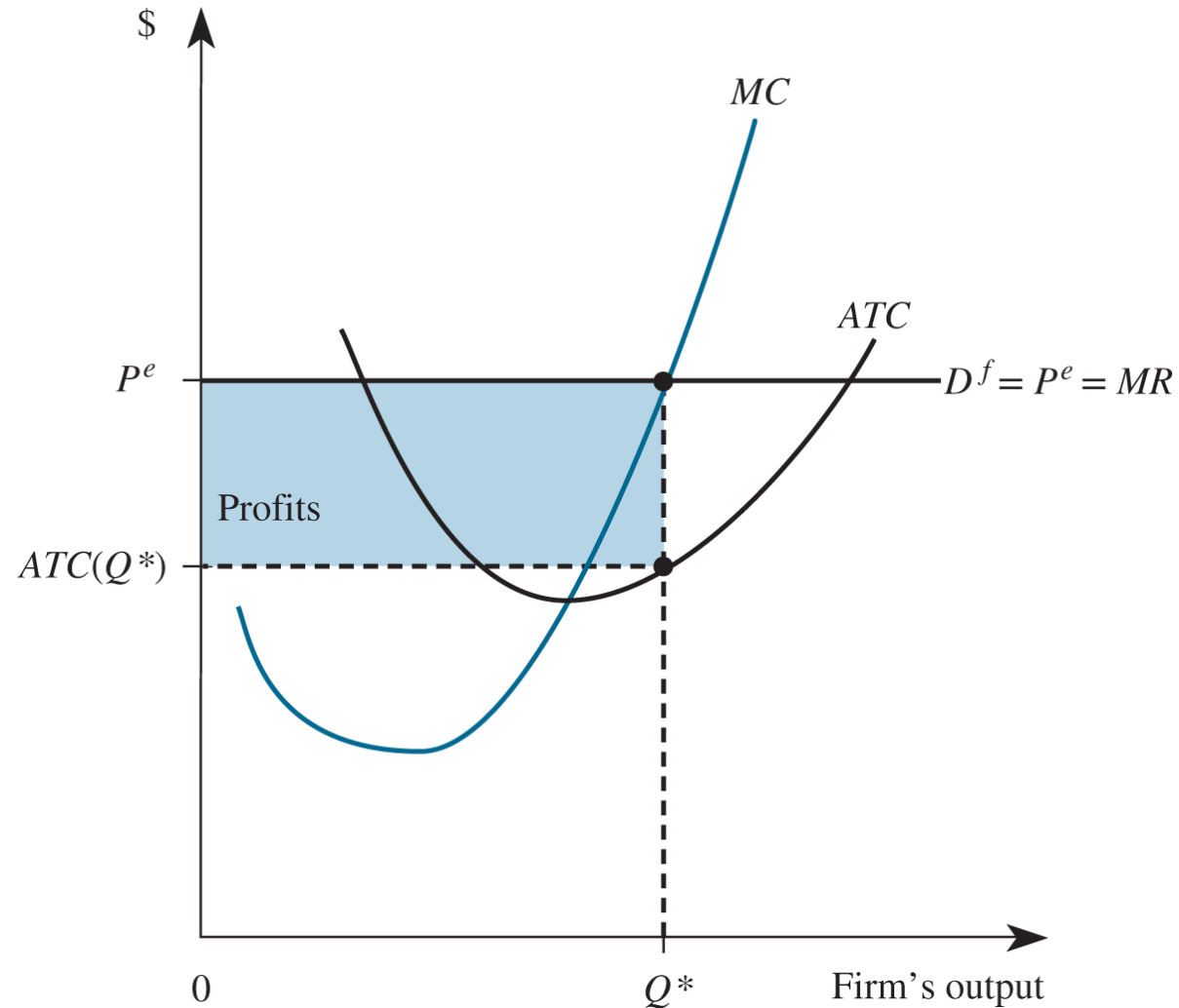
$$D^f = P = MR$$

Calculus Alternative:

Revenue = $P \cdot Q$

$$\frac{dRevenue}{dQ} = P$$

Profit Maximization under Perfect Competition



Competitive output rule for PC

- To maximize profits, a perfectly competitive firm produces the output at which price equals marginal cost in the range over which marginal cost is increasing.

$$P = MC(Q)$$

Competitive Output Rule In Action

The cost function for a firm is $C(Q) = 5 + Q^2$.

If the firm sells output in a perfectly competitive market, and other firms in the industry sell output at a price of \$20, what price should the manager of this firm charge?

What level of output should be produced to maximize profits?

How much profit will be earned?

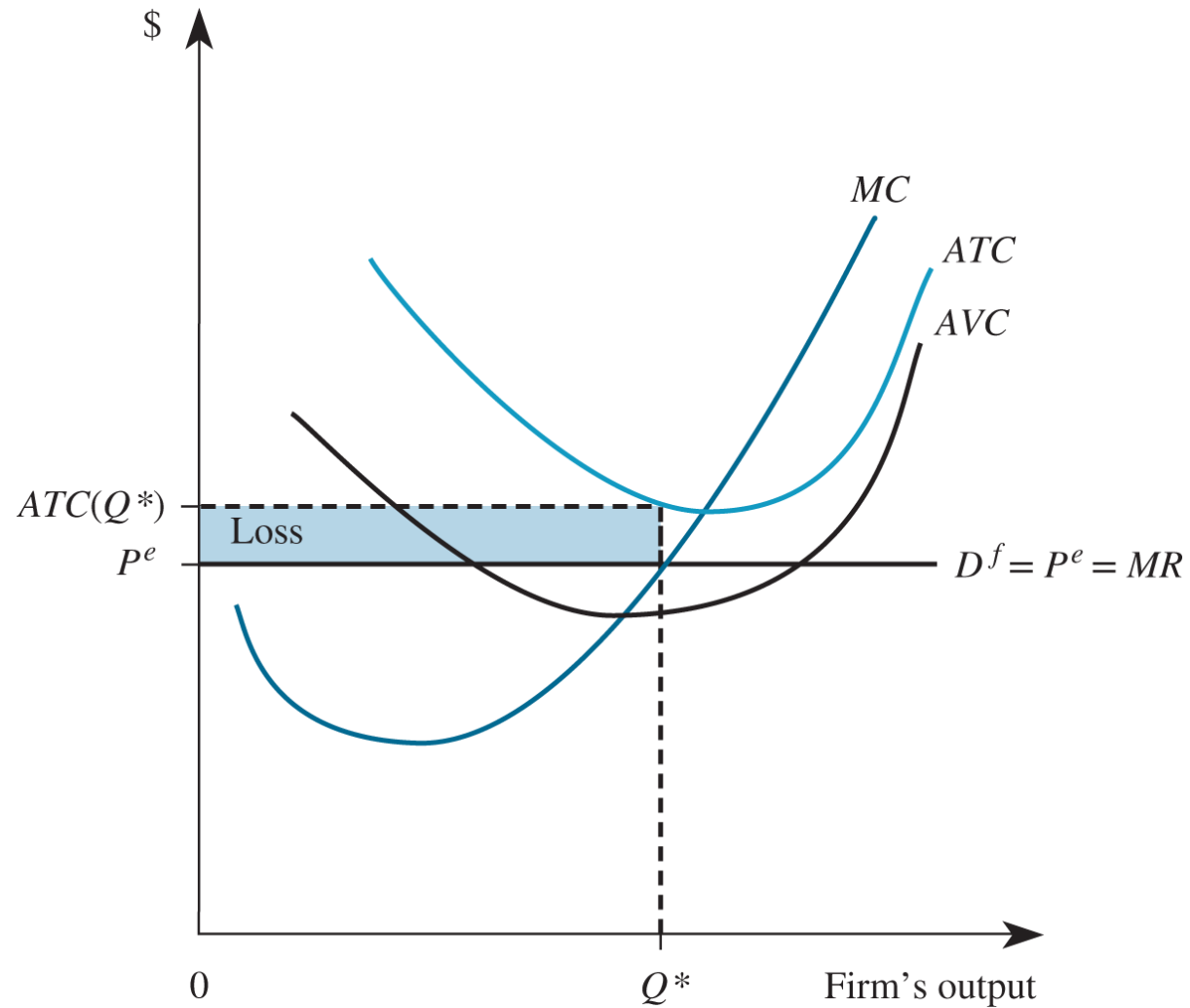
Competitive Output Rule In Action

The cost function for a firm is $C(Q) = 5 + Q^2$.

Answer:

- Charge \$20.
- Since marginal cost is $2Q$, equating price and marginal cost yields: $\$20 = 2Q \Rightarrow$
- $Q = 10$ units.
- Maximum profits are: $\pi = 20 \times 10 - (5 + 10^2) = \95 .

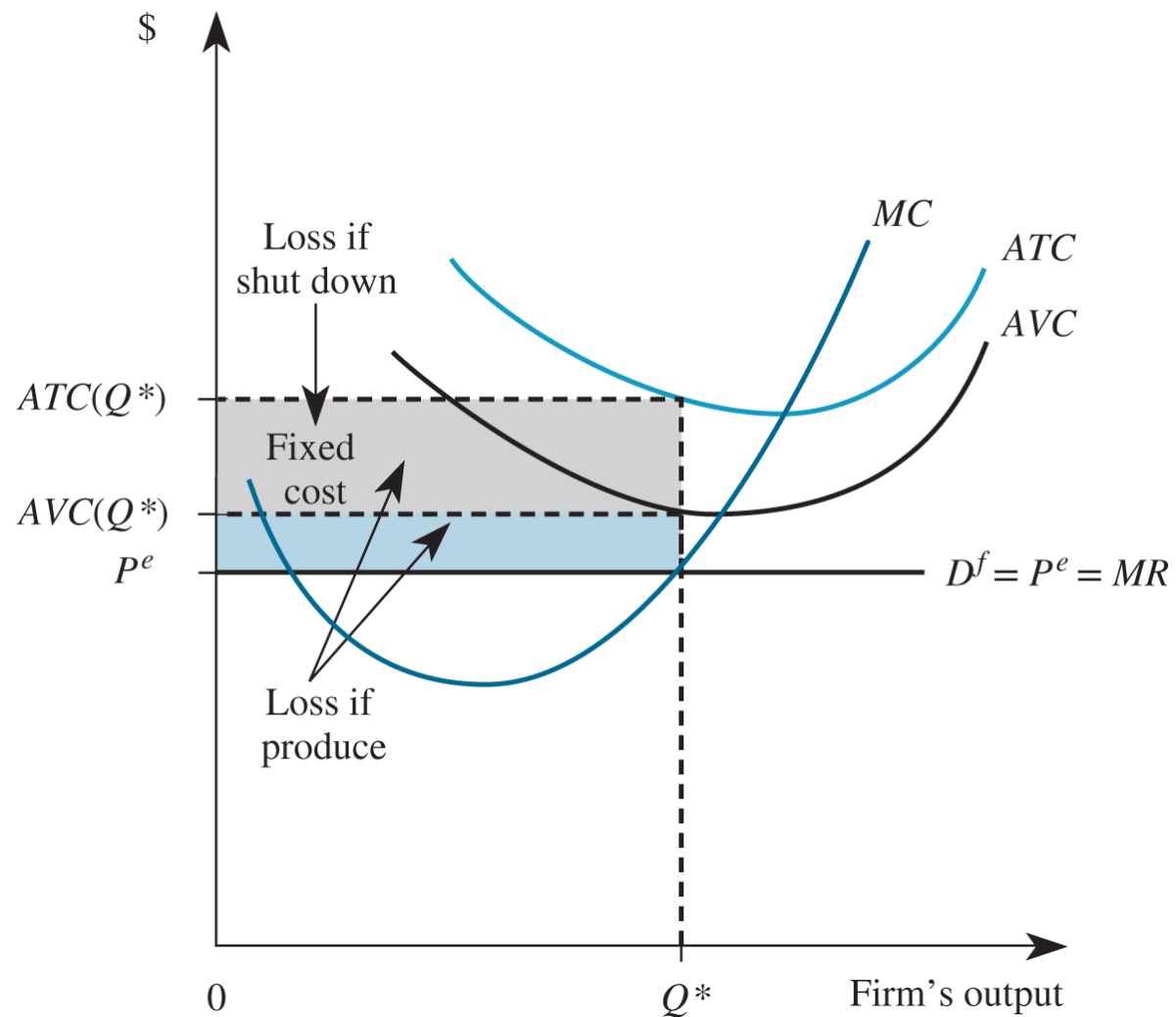
Loss Minimization



Loss Minimization

- Wait? Why is the firm still operating at a loss? Why does it just stop altogether.
- Remember, the Firm has fixed costs that they will pay regardless of if they continue production/shut down.
- Thus they ignore the Fixed costs (sunk) and compare the MB of production to the MC (Variable Costs).
- Since Price is above AVC at Q^* , it's still worth producing!

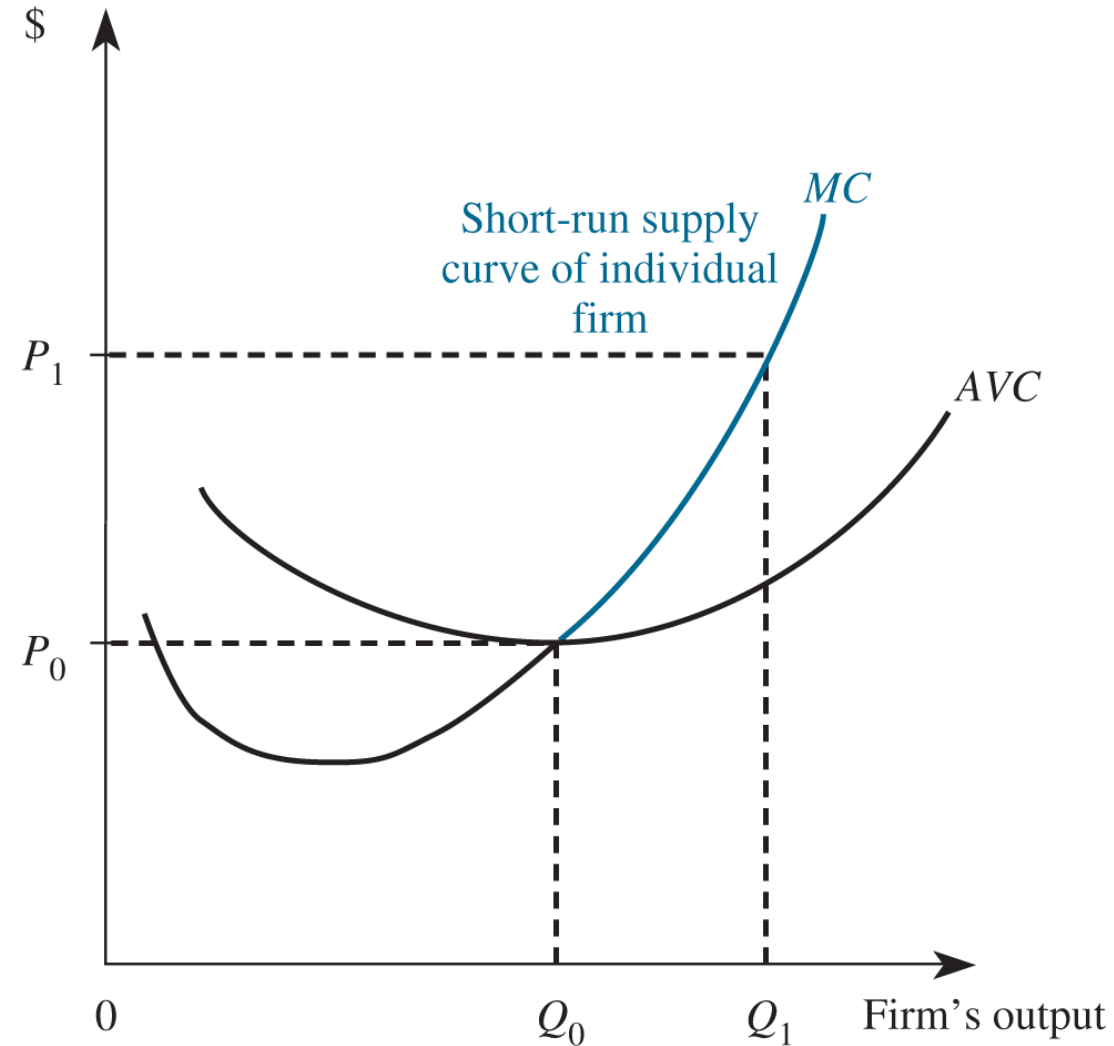
The Shut-Down Case



Short-Run Output Decision under Perfect Competition

- To maximize short-run profits, a perfectly competitive firm should produce in the range of increasing marginal cost where $P = MC$, provided that: $P \geq AVC$.
- If $P < AVC$, the firm should shut down its plant to minimize its losses.

The Short-Run Supply Curve for a Competitive

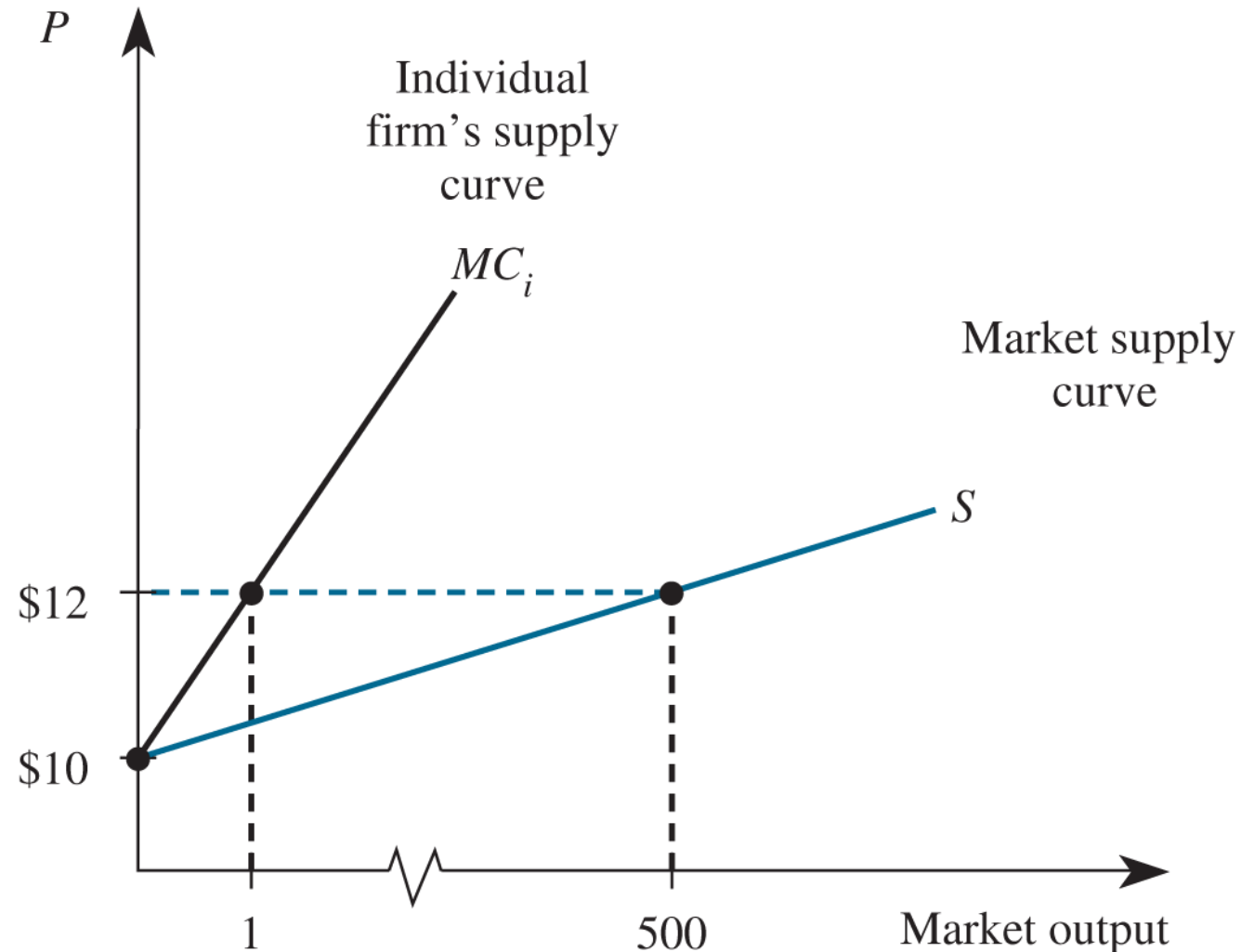


The Short-Run Firm and Industry Supply Curves

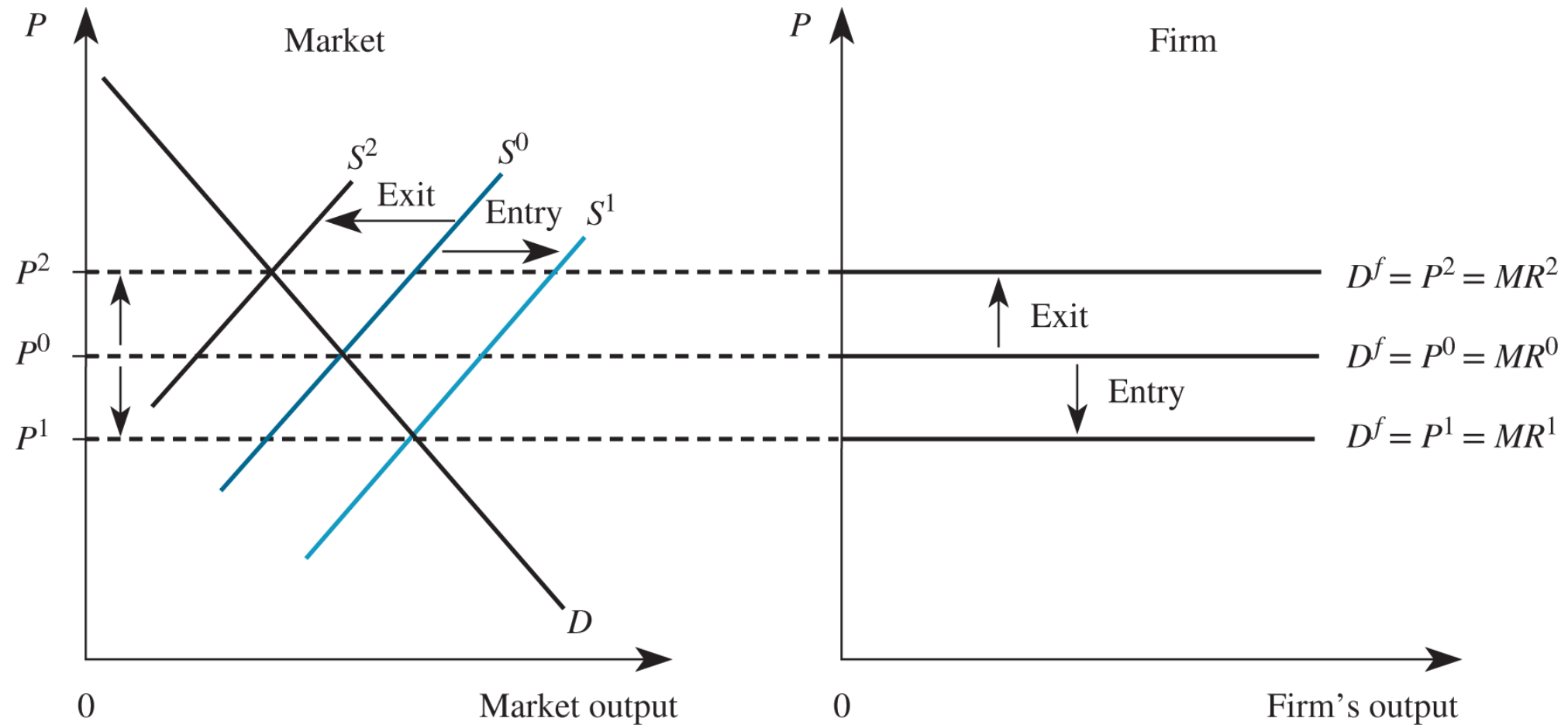
The short-run supply curve for a perfectly competitive firm is its marginal cost curve above the minimum point on the *AVC* curve.

Note: If $P < AVC$ when $MC = P$ the firm will produce 0 units in the short-run.

The Market Supply Curve (with 500 firms)



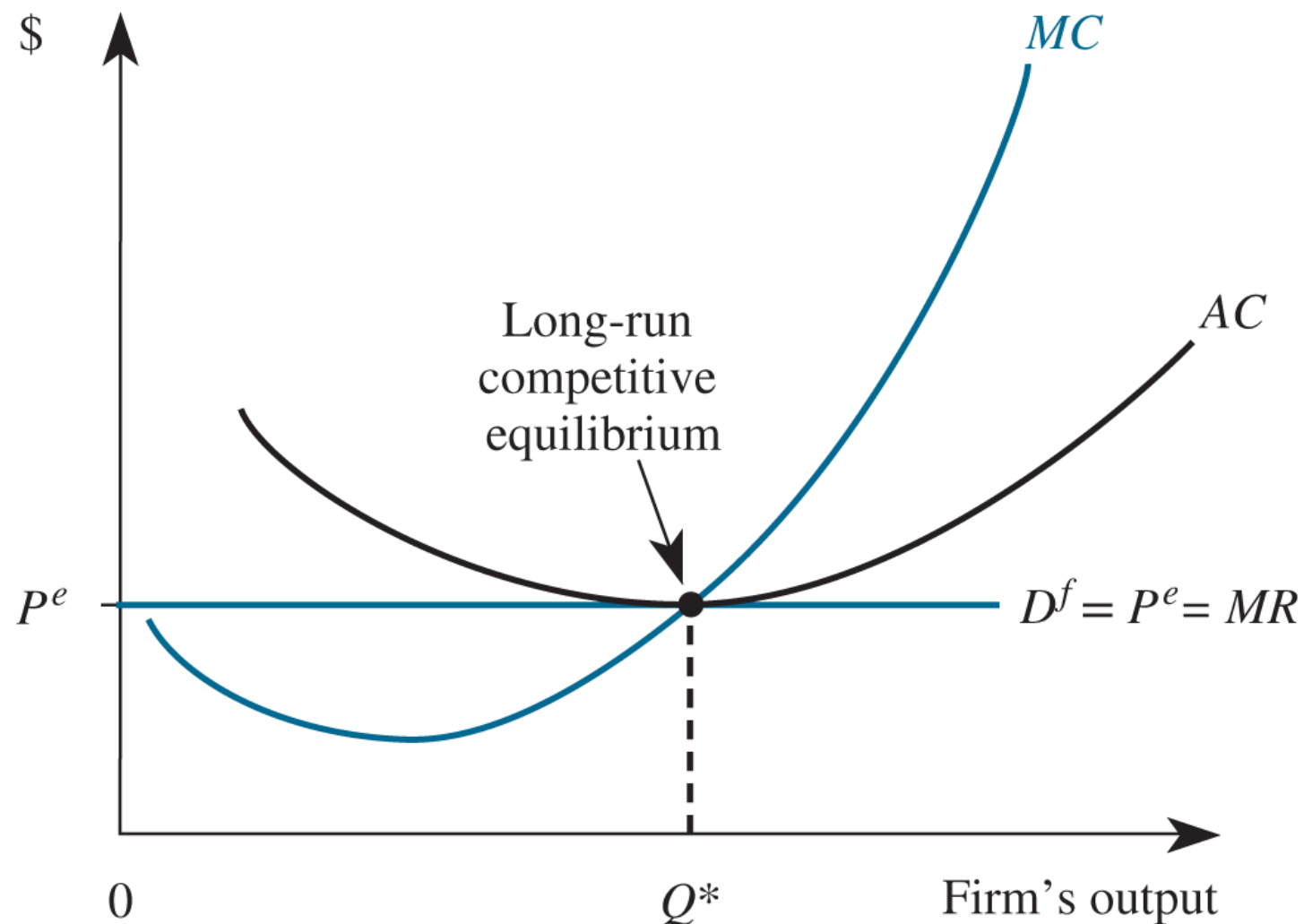
Entry and Exit: The Market and Firm's Demand



Long Run Equilibrium

- In the long run, if a firm in a competitive industry is sustaining short-run losses, they will exit the industry since they are not covering their opportunity costs. This increases the market price.
 - i.e- When they can adjust their fixed costs, they may as well use their total resources elsewhere.
- If firms are making positive economic profits in the short run, there is incentive for new companies to enter (no barriers to entry etc). This shifts supply curve down to the right, decreasing the Price and lessening economic profits per firm.
 - This continues until long run economic profits are 0.

Long-Run Competitive Equilibrium (Figure 8-9)



A Note On Zero Economic Profits

- Wait, why do firms still exist in the long run if the equilibrium case is zero-economic profits.
- Remember Zero-Economic Profits differ from Zero Accounting Profits.
- Zero Economic Profits means Positive Accounting Profits
- It just means that these accounting profits are just large enough to offset any implicit costs of production (selling hardware, using time/resources for other things).

Long-Run Competitive Equilibrium

- In the long run, perfectly competitive firms produce a level of output such that:
 1. $P = MC$
 2. $P = \text{minimum of } AC$

Monopoly and Monopoly Power

Monopoly: a market structure in which a **single firm** serves an entire market for a good that has **no close substitutes**

How should a Monopolists go about producing goods?

Monopoly Game!

- You will all be Monopolists (Single firm in an industry) and you will choose how many goods to produce per round (for 10 rounds)

•**Production Cost:** Your production decision must be between (and including) 0.00 and 13.00, and the cost associated with this production will be \$1.00 for each unit produced. So your total cost is calculated by multiplying production quantity and \$1.00.

Price: All units produced will be sold for the same price, which depends on the total amount that you produce and on a random shock. The more that is produced, the lower the price tends to be, although price is subjected to a random shock in each round. Price will be positive, unless your production is high enough to drive price down to zero.

Sales Revenue: Your total revenue is calculated by multiplying your production quantity and the price. Since you do not know the price in advance, you will not know what your total revenue from sales will be.

Monopoly Game!

- You will all be Monopolists (Single firm in an industry) and you will choose how many goods to produce per round (for 10 rounds)
- **Earnings:** Your profit is the difference between your total revenue and your production cost. If Q is the quantity you produce, then total revenue is $(Q \times \text{price})$, total cost is $(Q \times 1.00)$, so earnings = $Q \times (\text{price}) - (Q \times \$1.00)$. Obviously, earnings can be positive if price is above cost and negative if price is below cost.
- **Cumulative Earnings:** The program will keep track of your total (cumulative) earnings. Positive earnings in a round will be added, and negative earnings will be subtracted.
- Once game there will be a prize for our best monopolist!

Monopoly Game!

- Please go to Veconlab.com
- Type in blgr27 and you can go at your own pace!

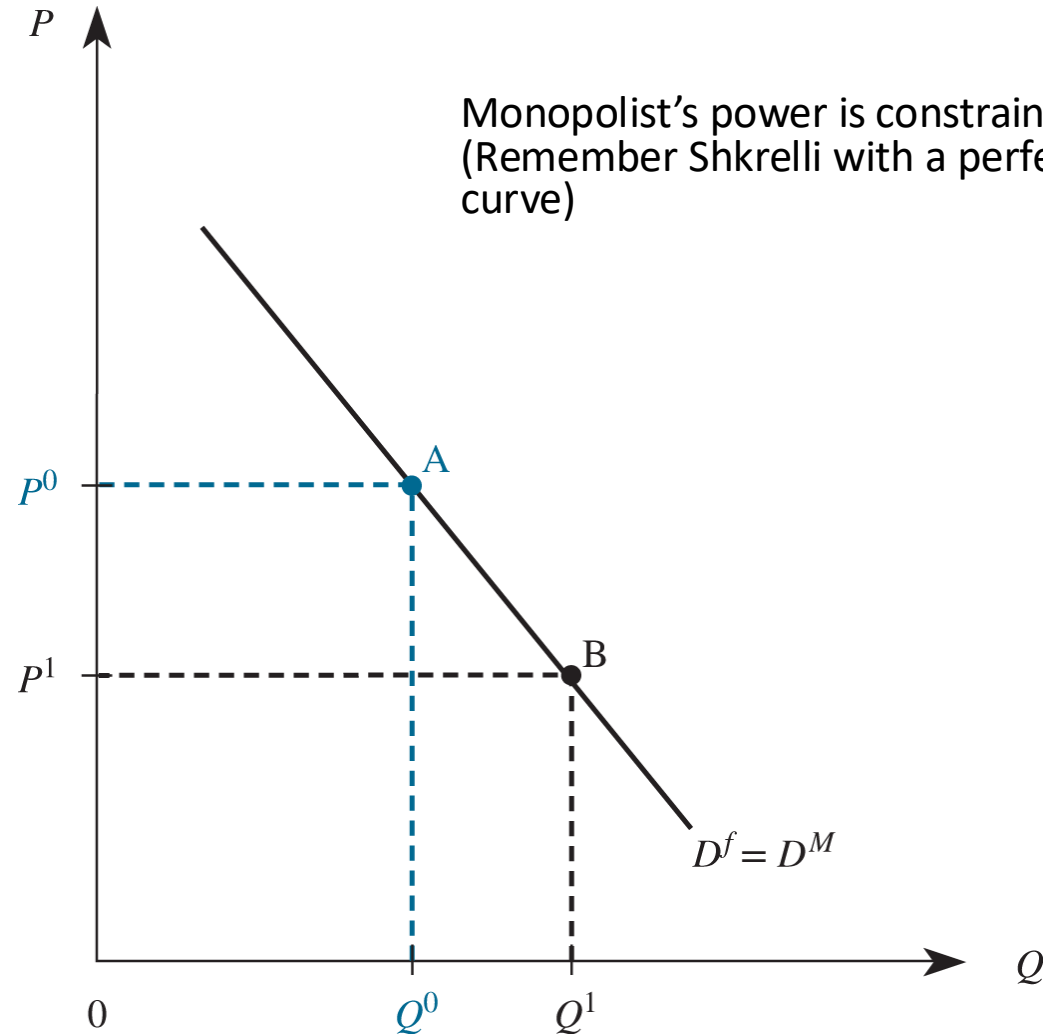
Monopoly and Monopoly Power

Monopoly: a market structure in which a **single firm** serves an entire market for a good that has no close substitutes

Being the sole seller of a good in a market gives that firm greater market power than if it competed against other firms.

- The implication is that the market demand curve is the monopolist's demand curve.
- However, a monopolist does not have unlimited market power.

The Monopolist's Demand



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Sources of Monopoly Power

A monopoly persists when barriers prevent competitors from entering the market. These barriers can be structural, legal, or strategic.

1. Economies of Scale (Natural Monopoly)
2. Control of an Essential Resource
3. Patents & Intellectual Property
4. Government Licenses & Franchises
5. Network Effects & Switching Costs
6. Strategic / Predatory Behavior

1. Economies of Scale (Natural Monopoly)

Definition

A natural monopoly arises when a single firm can supply the entire market at a lower average cost than two or more firms could. This occurs in industries with very high fixed costs and low marginal costs, so the long-run average cost curve is still declining at market-level output.

Key Insight

- ▶ Enormous fixed / sunk costs create the barrier
- ▶ Subadditive cost function: $C(Q) < C(Q_1) + C(Q_2)$
- ▶ Entry is unprofitable—entrant can't cover fixed costs at smaller scale
- ▶ Often subject to government regulation (rate-of-return, price caps)

EXAMPLE

Electric utilities: Building the grid costs billions. Once built, the marginal cost of delivering one more kWh is tiny. A second set of power lines would be wasteful duplication.

EXAMPLE

Water & sewer systems, natural gas pipelines, railroads in the 19th century—all share massive infrastructure costs that create natural monopoly conditions.

MANAGERIAL TAKEAWAY

If your industry has natural monopoly characteristics, expect regulatory scrutiny. Pricing freedom is constrained.

2. Control of an Essential Resource

Definition

A firm gains monopoly power by owning or controlling a resource that is essential for production and has no close substitutes. Competitors simply cannot obtain the input they need to compete.

Key Insight

- ▶ The resource must be scarce and non-replicable
- ▶ Ownership may be natural (geology) or acquired (buying up supply)
- ▶ Rarer in modern economies due to global sourcing & substitutes
- ▶ Antitrust law can intervene if resource control is anticompetitive

CLASSIC EXAMPLE

De Beers once controlled ~85% of the world's rough diamond supply through ownership of mines and exclusive purchasing agreements, maintaining monopoly pricing for decades.

MODERN EXAMPLE

Alcoa (early 20th c.) controlled nearly all U.S. bauxite deposits, the essential input for aluminum production. Ruled a monopoly in *United States v. Alcoa* (1945).

MANAGERIAL TAKEAWAY

Securing exclusive access to key inputs can be a powerful competitive strategy—but may attract antitrust scrutiny.

3. Patents & Intellectual Property

Definition

Governments grant patents, copyrights, and trade secrets that give inventors exclusive rights to produce and sell their innovation for a fixed period. This legal protection creates a temporary monopoly as a reward for R&D investment.

Key Insight

- ▶ Patents last 20 years (U.S.); copyrights much longer
- ▶ Deliberate policy trade-off: short-run monopoly loss vs. long-run innovation gains (incentivize innovation)
- ▶ "Patent thickets" & "evergreening" can extend monopoly power beyond original intent
- ▶ Generic entry after patent expiry shows the barrier was legal, not structural

EXAMPLE: PHARMACEUTICALS

Pfizer's patent on Lipitor (atorvastatin) generated ~\$125B in sales before generic entry in 2011. The patent—not production costs—was the barrier; generics entered at a fraction of the price.

EXAMPLE: TECH

Qualcomm holds essential patents for cellular technologies (CDMA/LTE). Any phone manufacturer must license these patents, giving Qualcomm significant market power.

MANAGERIAL TAKEAWAY

Building a patent portfolio is a strategic investment in future market power.

4. Government Licenses & Franchises

Definition

The government explicitly restricts entry by granting exclusive rights to operate in a market. This can take the form of licenses, franchises, charters, or outright legal prohibitions on competition.

Key Insight

- ▶ The barrier is purely legal—not cost- or technology-based
- ▶ Often justified by safety, quality control, or natural monopoly regulation
- ▶ Can also result from lobbying & rent-seeking behavior
- ▶ Deregulation removes these barriers (e.g., telecom, airlines in the 1970s-80s)

EXAMPLE: USPS

The U.S. Postal Service has a legal monopoly on first-class mail delivery. Private firms like FedEx and UPS are prohibited from delivering standard letters.

EXAMPLE: UTILITIES

Many cities grant exclusive franchises to a single cable TV or waste management company. The firm is the sole legal provider within that jurisdiction.

EXAMPLE: LIQUOR & CANNABIS

State-run liquor stores (e.g., in Pennsylvania, Virginia) or limited cannabis dispensary licenses create government-enforced monopolies or oligopolies.

5. Network Effects & Switching Costs

Definition

Network effects exist when the value of a product increases as more people use it. Combined with high switching costs—the expense or hassle of changing to a competitor—these effects create powerful demand-side barriers to entry that can tip a market toward monopoly.

Key Insight

- ▶ Direct network effects: value rises with users (phone network, social media)
- ▶ Indirect effects: more users attract more complements (app developers, sellers)
- ▶ "Winner-take-all" dynamics—market can tip to a single dominant platform
- ▶ Switching costs lock users in: data migration, learning curves, social graph

EXAMPLE: SOCIAL MEDIA

Tiktok/Insta dominates because your friends are already there. A new social network with better features still struggles—it lacks the user base that creates value.

EXAMPLE: OPERATING SYSTEMS

Microsoft Windows maintained dominance partly because software developers wrote for Windows first (indirect network effect), and businesses faced huge switching costs in retraining and compatibility.

EXAMPLE: PAYMENT NETWORKS

Visa/Mastercard: more cardholders attract more merchants, which attracts more cardholders. A classic two-sided network effect.

6. Strategic / Predatory Behavior

Definition

An incumbent firm may take deliberate strategic actions to deter or eliminate competitors. These actions raise rivals' costs, cut off their revenue, or signal that entry will be unprofitable—even if the actions are costly to the incumbent in the short run.

Key Insight

- ▶ Predatory pricing: pricing below cost to drive out rivals, then raising prices
- ▶ Excess capacity: building capacity to credibly threaten a price war
- ▶ Exclusive dealing contracts: locking up distributors or suppliers
- ▶ Difficult to prove under antitrust law—intent and recoupment must be shown

EXAMPLE: STANDARD OIL

Rockefeller's Standard Oil used predatory pricing, railroad rebates, and exclusive dealing to crush competitors—leading to the landmark 1911 antitrust breakup.

EXAMPLE: MICROSOFT (1990s)

Microsoft bundled Internet Explorer free with Windows and used exclusive contracts with PC makers to undercut Netscape—found to have violated antitrust law in *U.S. v. Microsoft* (2001).

EXAMPLE: AMAZON?

Critics argue Amazon has used below-cost pricing (e.g., *diapers.com* acquisition) to eliminate competitors, though this remains debated.

Summary: Sources of Monopoly Power

Source of Monopoly	Type	Mechanism	Example
Economies of Scale	Structural	High fixed costs make single-firm production most efficient	Electric utilities, water systems
Essential Resource Control	Structural	Firm owns/controls a scarce, non-substitutable input	De Beers (diamonds), Alcoa (bauxite)
Patents & IP	Legal	Government grants exclusive rights to an innovation	Pfizer (Lipitor), Qualcomm (CDMA)
Gov't Licenses	Legal	Government restricts entry by law	USPS (first-class mail), liquor stores
Network Effects	Demand-side	Value increases with user base; high switching costs	Facebook, Visa/Mastercard, Windows
Strategic Behavior	Behavioral	Incumbent actions deter or eliminate rivals	Standard Oil, Microsoft (IE bundling)

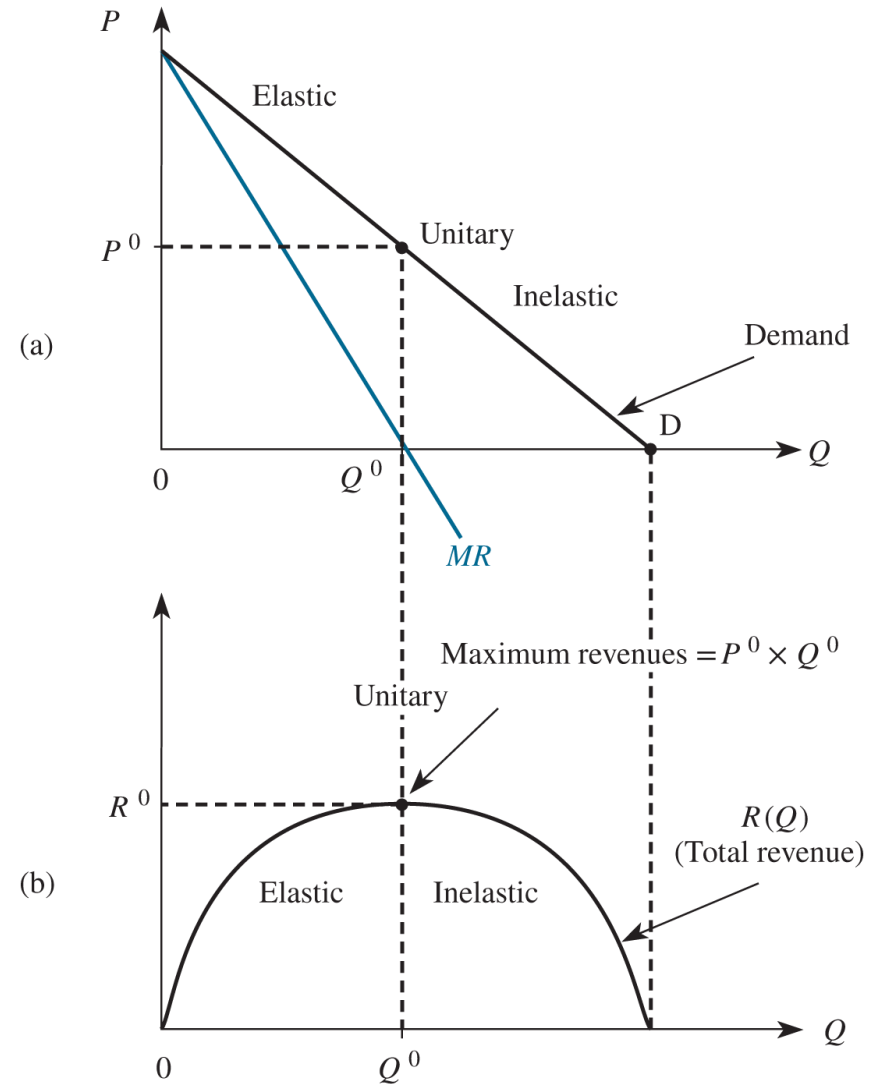
Key Takeaways

- ▶ Monopolies exist because of barriers to entry—not just because a firm is large or profitable.
- ▶ Barriers can be structural (cost advantages), legal (patents, licenses), or strategic (predatory conduct).
- ▶ Natural monopolies arise from economies of scale; they are often regulated rather than broken up.
- ▶ Legal barriers are deliberate policy choices—society trades short-run efficiency for long-run innovation or safety.
- ▶ Network effects create demand-side scale economies that can be just as powerful as supply-side ones.
- ▶ Understanding the source of monopoly power is essential for managers: it determines pricing strategy, regulatory risk, and long-run sustainability of profits.

Do Monopolists always make a profit?

- Perfectly competitive firms
 - Price **takers**, cannot affect **the price**
 - Each firm faces a **horizontal** demand
- Monopoly firm
 - Price **maker, sets** the price by choosing output level
 - Faces the **downward sloping** demand curve for the entire industry

Elasticity of Demand and Total Revenues



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Marginal Revenue and Elasticity

The monopolist's marginal revenue function is

$$MR = P \left[\frac{1 + E}{E} \right]$$

where E is the elasticity of demand for the monopolist's product and P is the price charged.

For $P > 0$.

- $MR > 0$ when $E < -1$.
- $MR = 0$ when $E = -1$.
- $MR < 0$ when $-1 < E < 0$.

How do we get that (some calculus, not necessary)

Recall,

$$TR(Q) = P(Q) * Q$$

- Use Product Rule:

$$\frac{dR}{dQ} = \frac{dP}{dQ} Q + P(Q) * 1$$

- We can simplify $P(Q)$ to P (it's still the same thing!)

$$\frac{dR}{dQ} = \frac{dP}{dQ} Q + P$$

- P is a Common Factor

$$\frac{dR}{dQ} = P \left[\frac{dP}{dQ} \frac{Q}{P} + 1 \right]$$

How do we get that (some calculus, not necessary)

$$\frac{dR}{dQ} = P \left[\frac{dP}{dQ} \frac{Q}{P} + 1 \right]$$

Note $\frac{dP}{dQ} \frac{Q}{P}$, is just $\frac{1}{E}$!

$$\frac{dR}{dQ} = P \left[\frac{1}{E} + 1 \right]$$

$$\frac{dR}{dQ} = P \left[\frac{1+E}{E} \right]$$

Marginal Revenue and Linear Demand

Given a linear inverse demand function

$$P(Q) = a + bQ$$

where $a > 0$ and $b < 0$, the associated marginal revenue is

$$MR = a + 2bQ$$

$$\text{Revenue} = Q * P(Q)$$

$$\text{Revenue} = Q * [a + bQ]$$

$$\text{Revenue} = aQ + bQ^2$$

$$\frac{dR}{dQ} = a + 2bQ$$

Marginal Revenue in Action

- Suppose the inverse demand function for a monopolist's product is given by $P = 10 - 2Q$. What is the maximum price per unit a monopolist can charge to be able to sell 3 units? What is marginal revenue when $Q = 3$?

Marginal Revenue in Action

Suppose the inverse demand function for a monopolist's product is given by $P = 10 - 2Q$. What is the maximum price per unit a monopolist can charge to be able to sell 3 units? What is marginal revenue when $Q = 3$?

Answer:

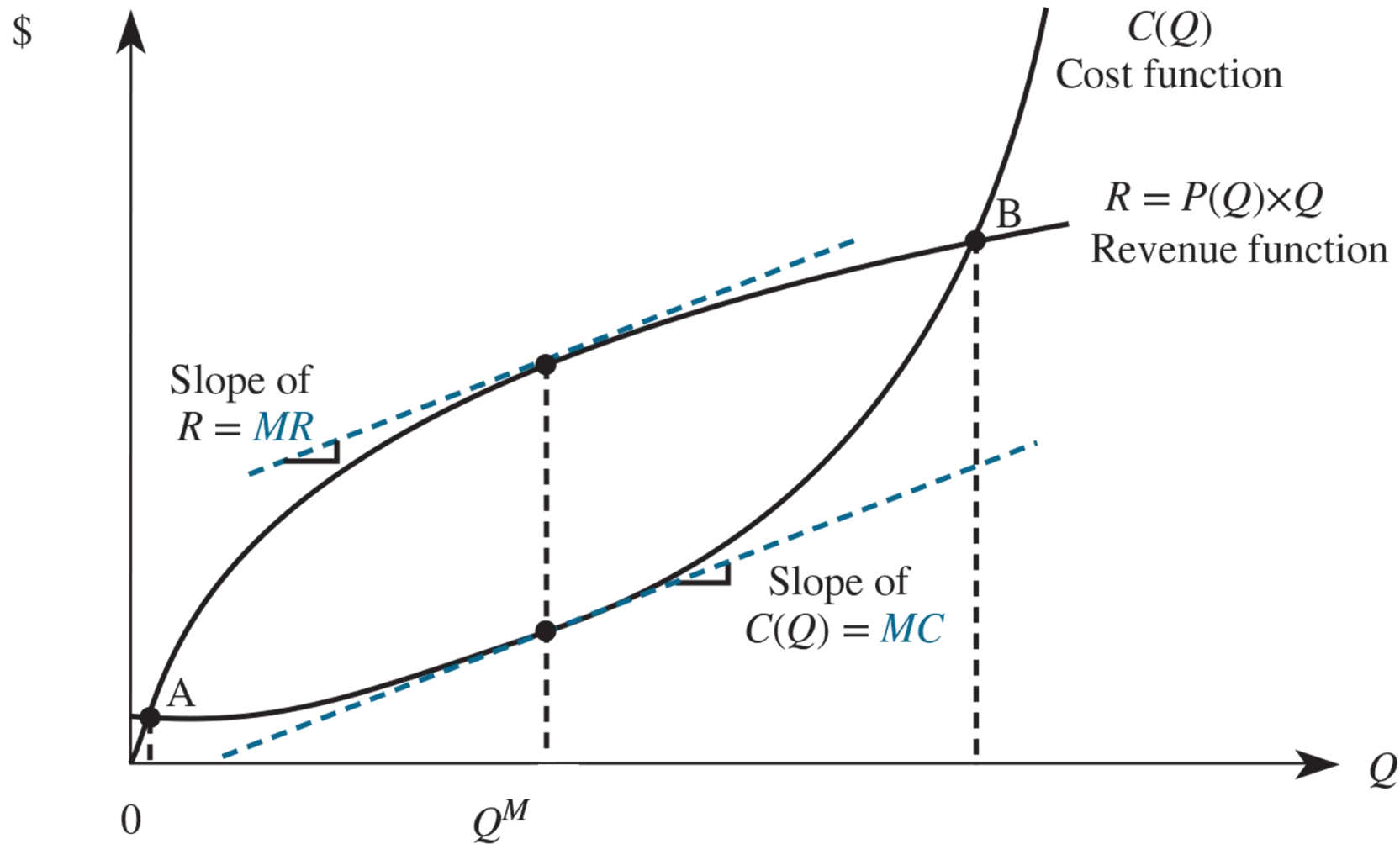
- The maximum price the monopolist can charge for 3 units is: $P = 10 - 2(3) = \$4$.
- The marginal revenue at 3 units for this inverse linear demand is: $MR = 10 - 2(2)(3) = -\$2$.

Monopoly Output Rule

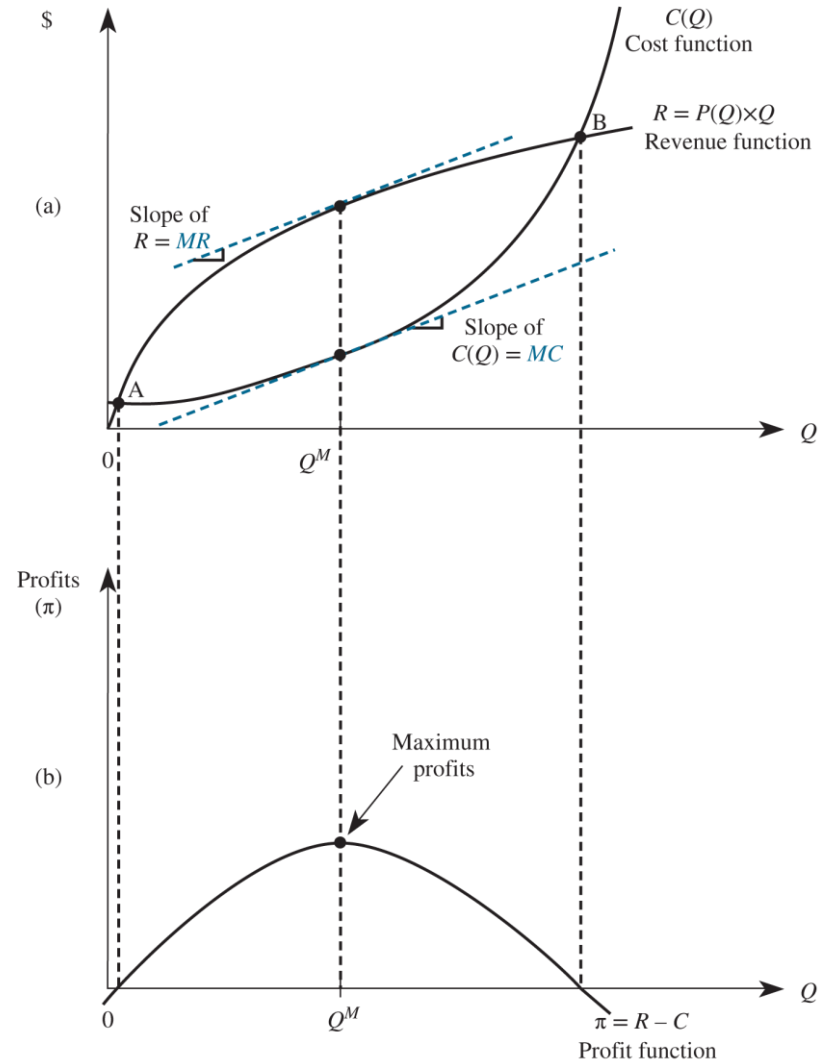
A profit-maximizing monopolist should produce the output Q^M , such that marginal revenue equals marginal cost:

$$MR(Q^M) = MC(Q^M)$$

Costs, Revenues, and Profits under Monopoly

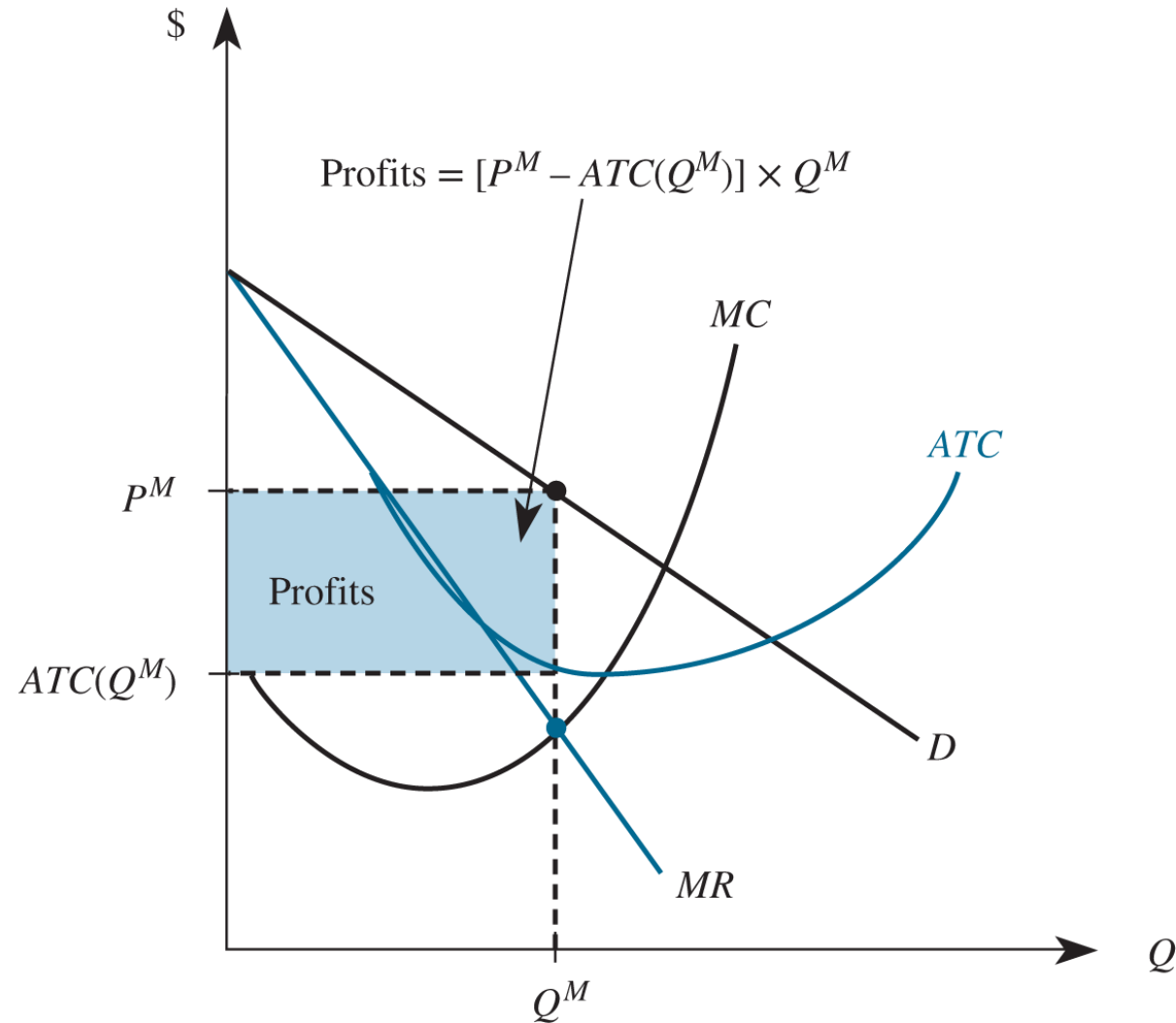


Costs, Revenues, and Profits under Monopoly (



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Profit Maximization under Monopoly



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Monopoly Pricing Rule

Given the level of output, Q^M , that maximizes profits, the monopoly price is the price on the demand curve corresponding to the Q^M units produced:

$$P^M = P(Q^M)$$

Monopoly In Action

Suppose the inverse demand function for a monopolist's product is given by $P = 100 - 2Q$ and the cost function is $C(Q) = 10 + 2Q$.

Determine the profit-maximizing price, quantity, and maximum profits.

Monopoly In Action

- Suppose the inverse demand function for a monopolist's product is given by $P = 100 - 2Q$ and the cost function is $C(Q) = 10 + 2Q$.

Determine the profit-maximizing price, quantity, and maximum profits.

$$R = P \cdot Q = Q(100 - 2Q) = 100Q - 2Q^2, \text{ therefore } MR = 100 - 4Q \quad MC = 2$$

Answer:

- Profit-maximizing output is found by solving: $100 - 4Q = 2 \Rightarrow Q^M = 24.5$.
- The profit-maximizing price is: $P^M = 100 - 2(24.5) = \$51$.
- Maximum profits are: $\pi = \$51 \times 24.5 - (10 + 2 \times 24.5) = \$1,190.50$.

The Absence of a Supply Curve

- Recall, firms operating in perfectly competitive markets determine how much output to produce based on price ($P = MC$).
- Thus, a supply curve exists in perfectly competitive markets.

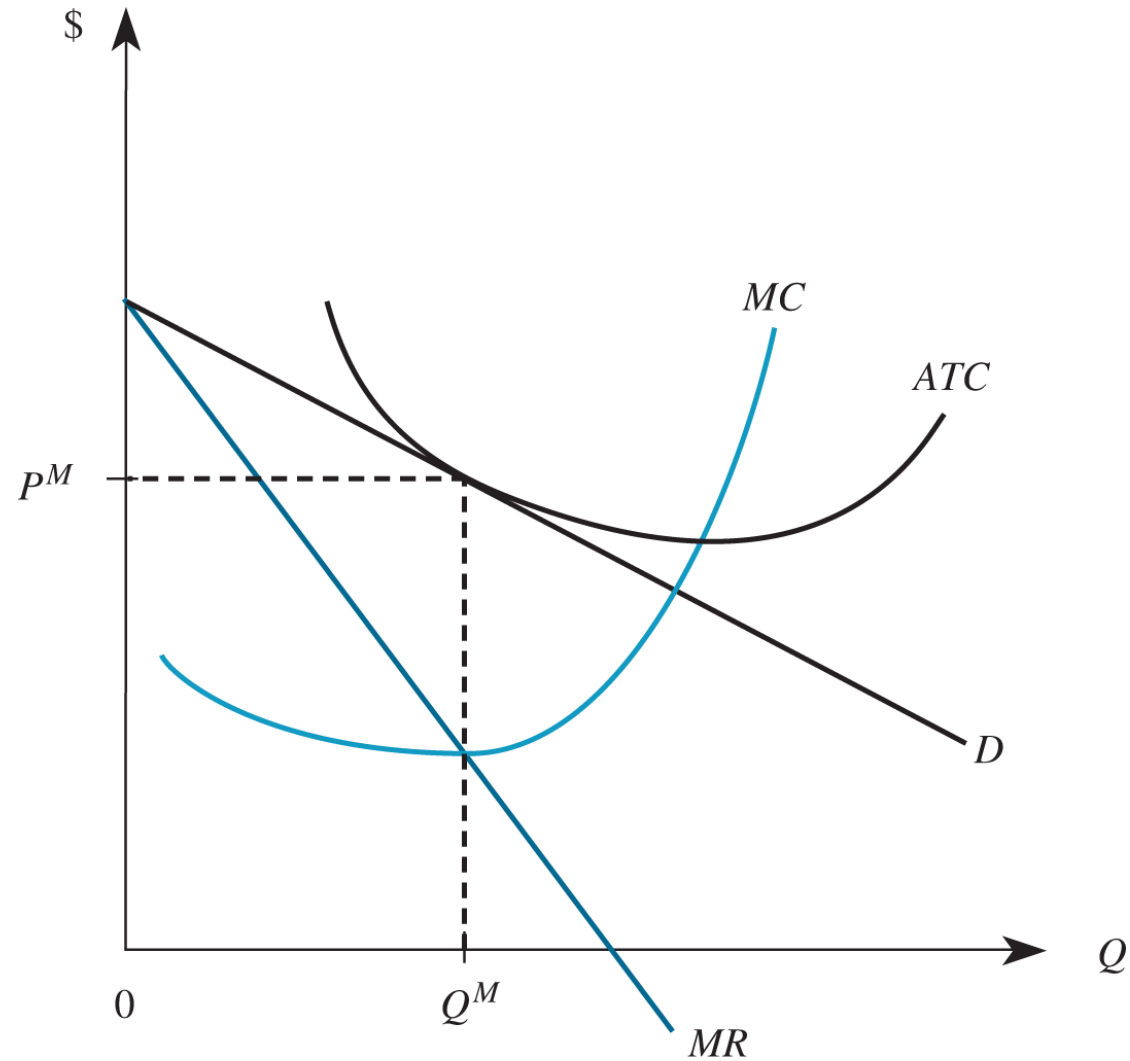
A monopolist's market power implies $P > MR = MC$.

- A monopolist determines how much to produce based on marginal revenue, which is less than price; a change in quantity will change market price.
- Thus, there is no supply curve for a monopolist or in markets served by firms with market power.

Implications of Entry Barriers

- A monopolist may earn positive economic profits, which in the presence of barriers to entry prevents other firms from entering the market to reap a portion of those profits.
- **Implication:** monopoly profits will continue over time provided the monopoly maintains its market power.
- Monopoly power, however, does not guarantee positive profits.

A Monopolist Earning Zero Profits



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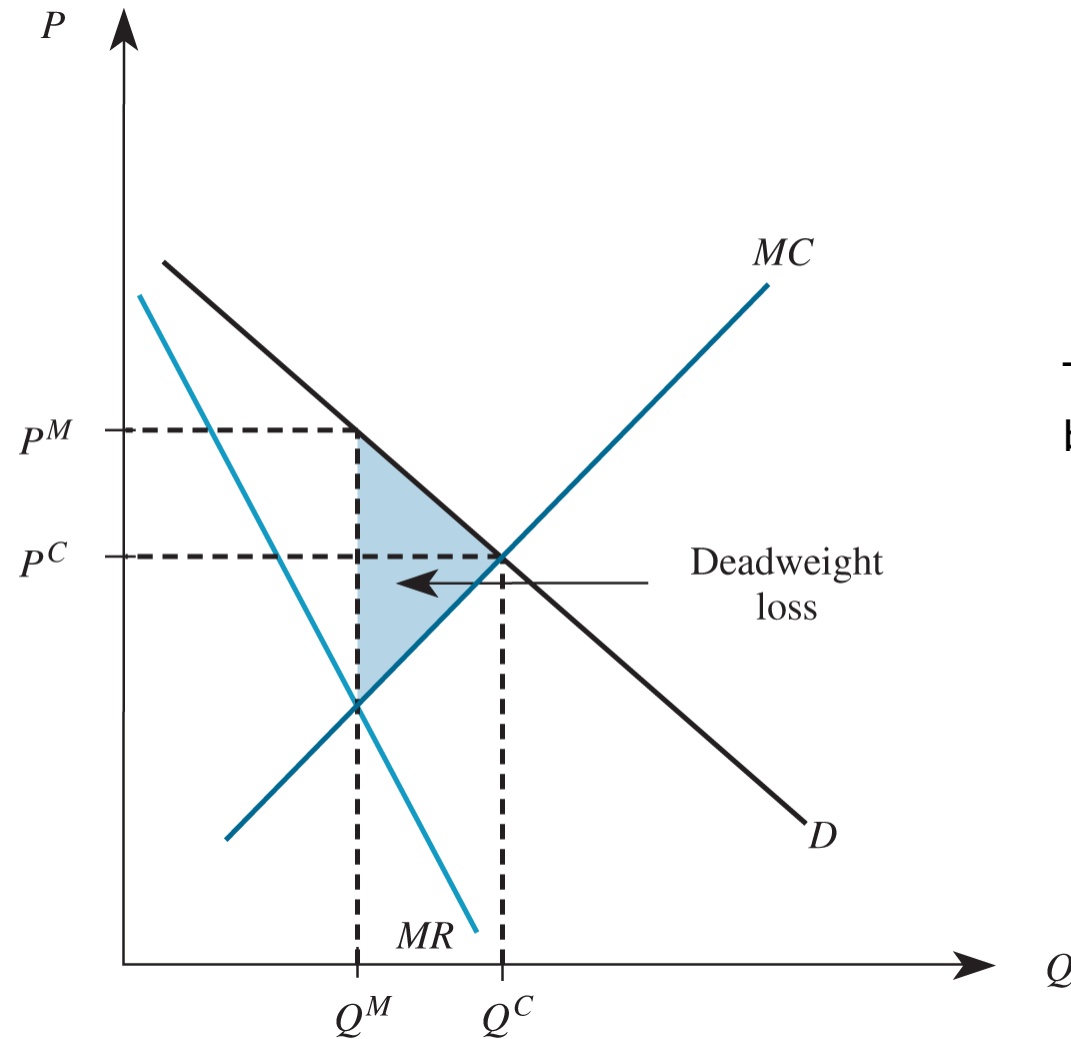
Social Cost of Monopoly

- There are 3 sources of Social Costs from Monopolies
 1. Deadweight Loss (Market Inefficiency)
 2. Loss of Choice for Consumers
 3. Wasted resources on Rent Seeking

Deadweight Loss of Monopoly

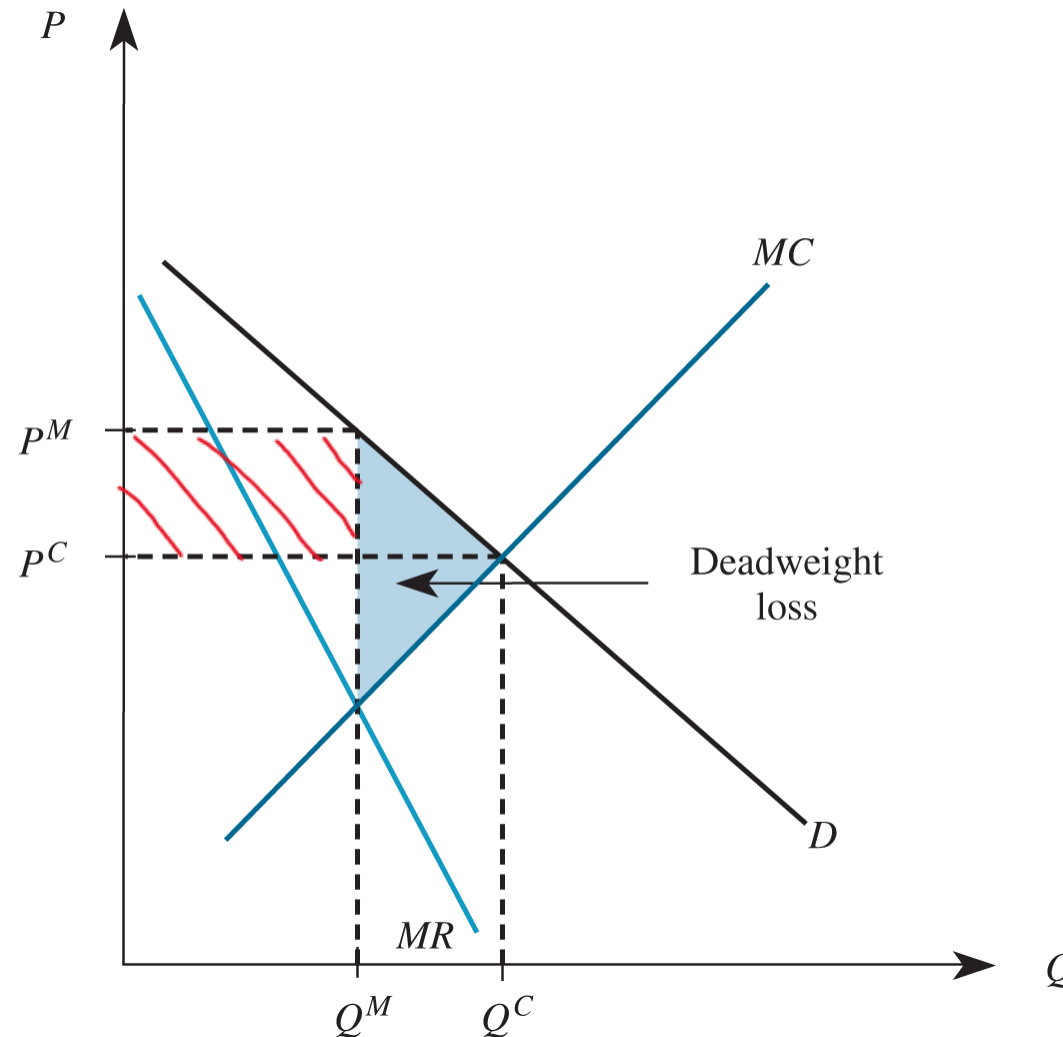
- The consumer and producer surplus that is lost due to the monopolist charging a price in excess of marginal cost
- Remember, this is one of our four Market Failures!

Deadweight Loss of Monopoly



The MR curve always occurs below the demand curve.

Deadweight Loss of Monopoly



- Red Area is Surplus transferred from the Consumer to Producer under Monopoly.
- Higher Price & Less Quantity under Monopoly
- Consumers are worse off

More Negatives: Less Choice for Consumers

- A reduction in the competitiveness of a market **limits the options available** to consumers. There is only ONE seller.

More Negatives: Rent Seeking

- Occurs when resources are used to secure monopoly rights through the political process.
- Rival firms may compete to become a **monopolist**.
- **Rent Seeking:** Resources used to monopolize rather than become a more **competitive firm**.
 - Lobbying!

Solutions to Monopoly

- 1. Break up the monopoly (Antitrust Laws)
- 2. Reduce barriers to entry, e.g. foreign competition.
- 3. Regulate the market, e.g. force the monopolist to set $P = MC$.
- 4. Do nothing

Monopsony (1 firm, many people supplying labor)

- Firms will charge a too low wage (market inefficiency)
- Minimum Wage can solve this.

Monopolistic Competition

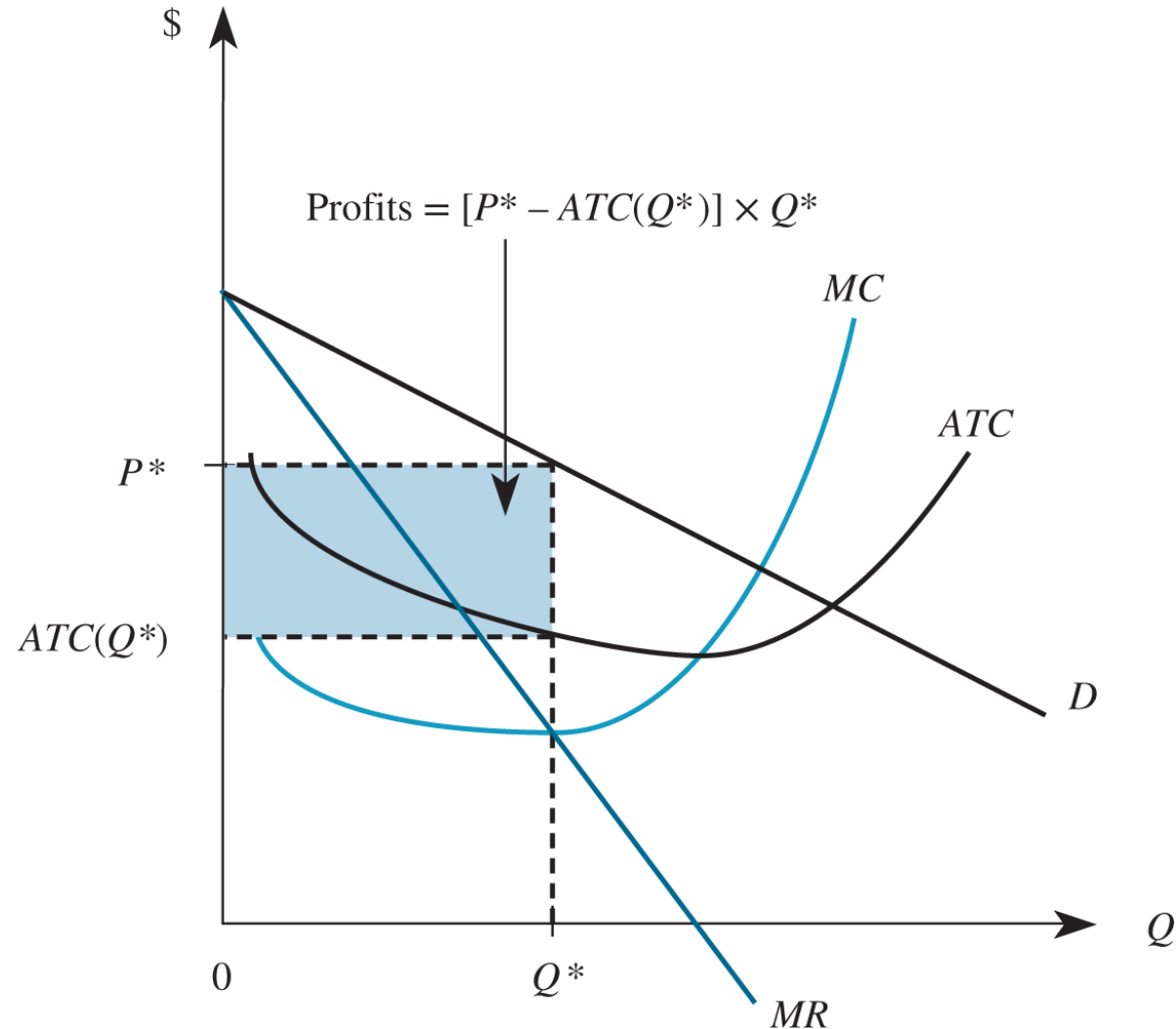
An industry is **monopolistically competitive** if:

- There are many buyers and sellers.
- Each firm in the industry produces a differentiated product.
- There is free entry into and exit from the industry.

The key difference between monopolistically competitive and perfectly competitive markets is that **each firm produces a slightly differentiated product**.

- Implication: products are close, but not perfect, substitutes; therefore, a firm's demand curve is downward sloping under monopolistic competition.

Profit-Maximization under Monopolistic Competition



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Profit-Maximization Rule for Monopolistic Competition

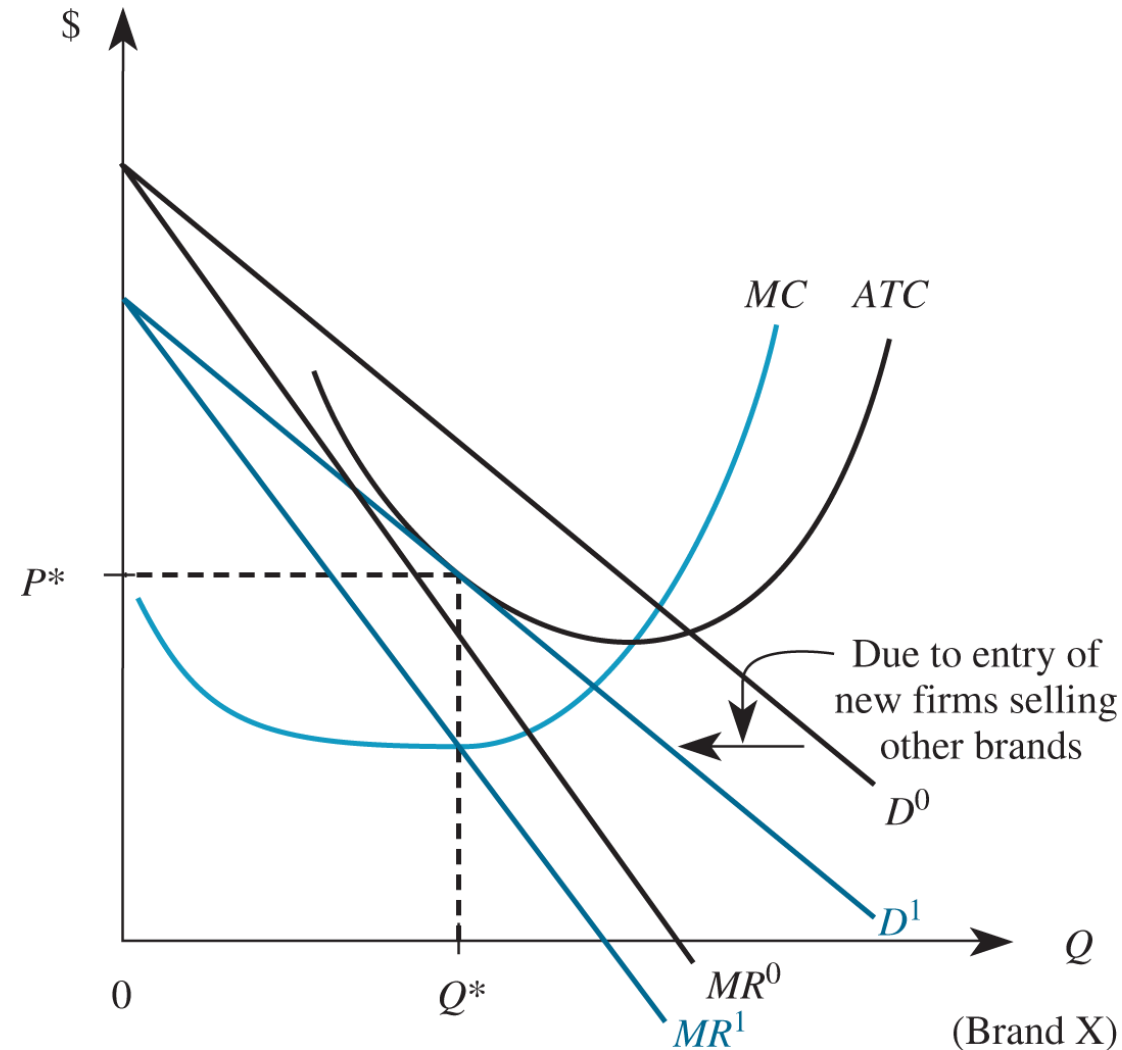
- To maximize profits, a monopolistically competitive firm produces where its marginal revenue equals marginal cost.
- The profit-maximizing price is the maximum price per unit that consumers are willing to pay for the profit-maximizing level of output.
- The profit-maximizing output, Q^* , is such that $MR(Q^*) = MC(Q^*)$ and the profit-maximizing price is $P^* = P(Q^*)$.

Long-Run Equilibrium

If firms in monopolistically competitive markets earn:

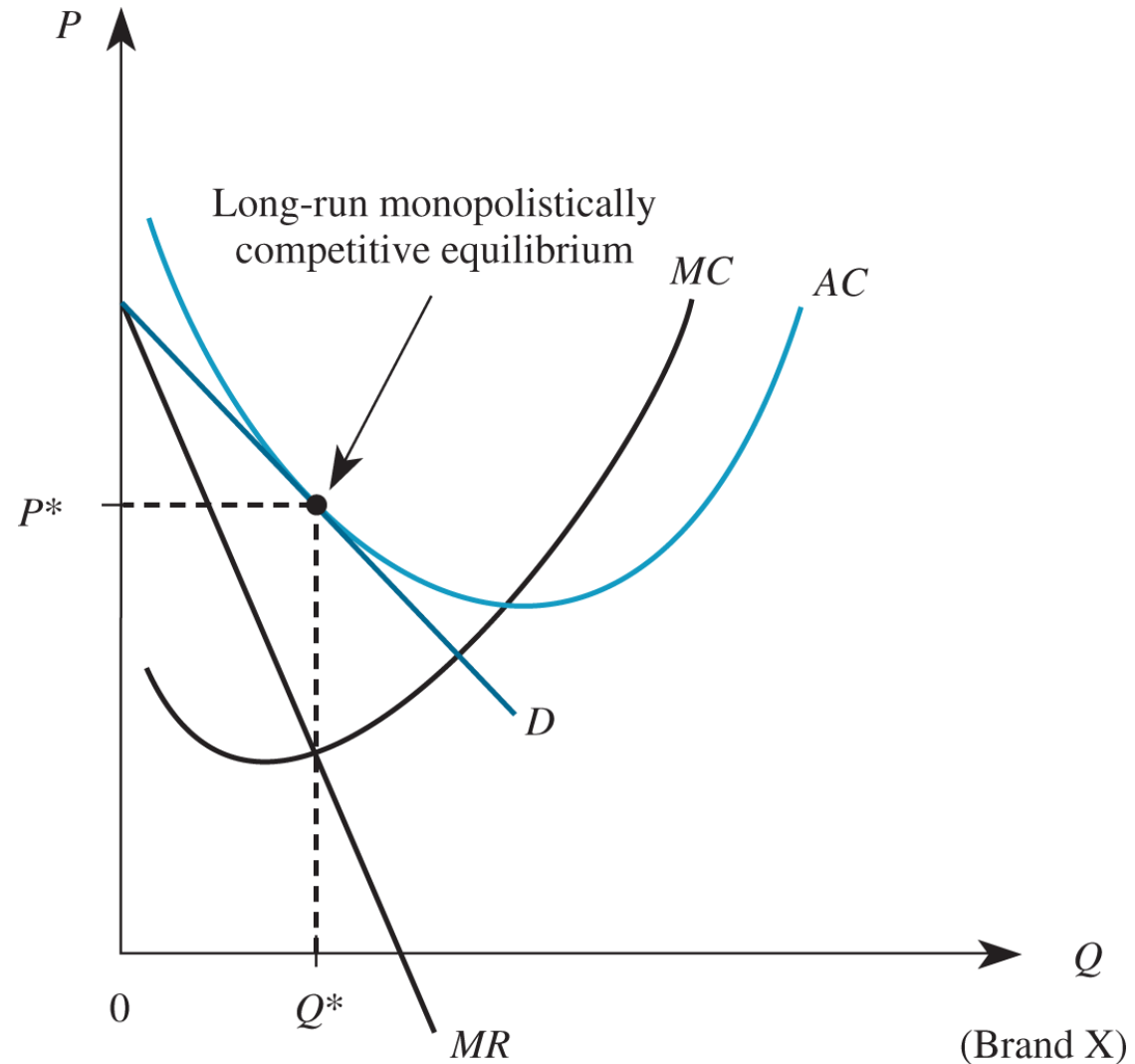
- **short-run profits**, additional firms will enter in the long run to capture some of those profits.
- **short-run losses**, some firms will exit the industry in the long run.

Effect of Entry on a Monopolistically Competitive Firm's Demand



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Long-Run Equilibrium under Monopolistic Competition



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The Long-Run and Monopolistic Competition

In the long run, monopolistically competitive firms produce a level of output such that:

1. $P > MC$
2. $P = ATC > \text{minimum of average costs}$

Implications of Product Differentiation ¹

- The differentiated nature of products in monopolistically competitive markets implies that firms in these industries must continually convince consumers that their products are better than their competitors.
- Lots of ads promoting one product over another
 - Coke vs pepsi
 - McDonalds vs Burger King
 - Apple vs Samsung Phones
 - NFL vs Basketball

Implications of Product Differentiation ₂

- Two strategies monopolistically competitive firms use to persuade consumers:

Comparative advertising: form of advertising where a firm attempts to increase the demand for its brand by differentiating its product from competing brands

- Brand equity is the additional value added to a product because of its brand.

Niche marketing: a marketing strategy where goods and services are tailored to meet the needs of a particular segment of the market

- Green marketing targets consumers who are concerned about environmental issues.

- Successful differentiation and branding strategies can make managers **brand myopic**, resting on the brand's past laurels instead of focusing on industry trends and changing consumer preferences.