

Topic Area: Economics

Reading: The Firm and Market Structures

**CFA
Level 1
Exam**



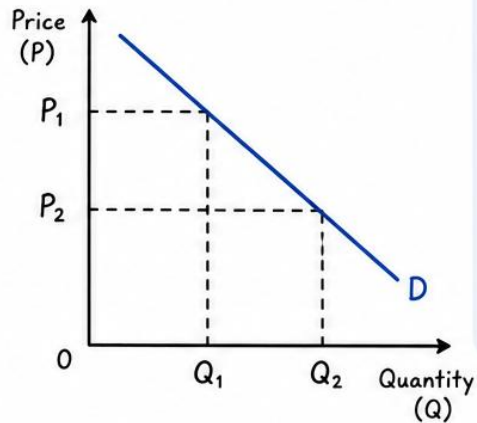
Contents

- Profit Maximization: Production Breakeven, Shutdown and Economies of Scale
- Introduction to Market Structures
- Monopolistic Competition
- Oligopoly
- Determining Market Structure

PREREQUISITE

DEMAND

Demand Curve

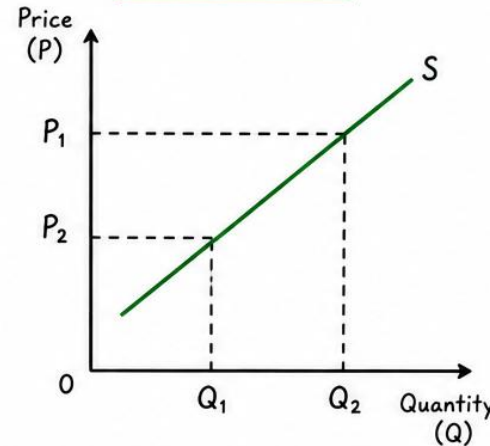


Law of Demand

Other things being equal, as price increases, quantity demanded decreases, and as price decreases, quantity demanded increases.

SUPPLY

Supply Curve



Law of Supply

Other things being equal, as price increases, quantity supplied increases, and as price decreases, quantity supplied decreases.

Factor	Effect on Demand
Income	↑ Income → ↑ Demand
Price of substitutes	↑ Substitute price → ↑ Demand
Price of complements	↑ Complement price → ↓ Demand
Consumer preferences	More favorable → ↑ Demand
Number of consumers	↑ Consumers → ↑ Demand
Expected future prices	Higher expected prices → ↑ Current demand

Factor	Effect on Supply
Input prices	↑ Costs → ↓ Supply
Technology	Improvement → ↑ Supply
Number of sellers	↑ Sellers → ↑ Supply
Taxes	↑ Taxes → ↓ Supply
Subsidies	↑ Subsidies → ↑ Supply
Expected future prices	Higher expected prices → ↓ Current supply

PREREQUISITE

Quantity (Q)	Price (P)	Total Revenue (TR)	Marginal Revenue (MR)	Fixed Cost (FC)	Variable Cost (VC)	Total Cost (TC)	Marginal Cost (MC)	Average Total Cost (ATC)	Average Variable Cost (AVC)	Economic Profit
0	20	0		20	0					
1	20	20		20	8					
2	20	40		20	14					
3	20	60		20	21					

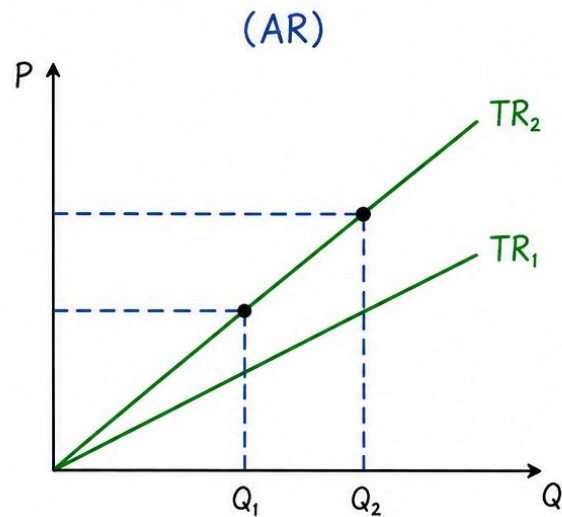
- **Fixed Costs:** Costs that remain unchanged with changes in output in the short run. Examples include rent, insurance, machinery leases, and salaries of permanent staff.
- **Variable Costs:** Costs that vary with the level of production. Examples include raw materials, hourly labor, packaging, production-related electricity, and per-unit shipping costs.
- **Marginal Cost:** Marginal cost eventually increases because of the **law of diminishing marginal returns**. Beyond a certain point, producing additional units requires proportionately more variable inputs, increasing the cost of each extra unit.
- **Accounting Profit:** $\text{Accounting Profit} = \text{Total Revenue} - \text{Explicit Costs}$
- **Economic Profit:** $\text{Economic Profit} = \text{Accounting Profit} - \text{Implicit Opportunity Costs}$
- **Normal Profit:** Occurs when economic profit equals zero; the firm earns just enough to cover all explicit and implicit costs.

PREREQUISITE

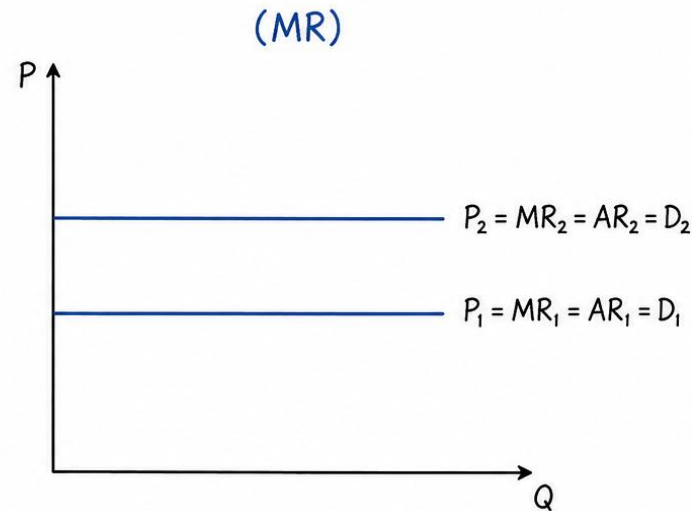
Quantity (Q)	Price (P)	Total Revenue (TR)	Marginal Revenue (MR)	Fixed Cost (FC)	Variable Cost (VC)	Total Cost (TC)	Marginal Cost (MC)	Average Total Cost (ATC)	Average Variable Cost (AVC)	Economic Profit
0	20	0	—	20	0	20	—	—	—	-20
1	20	20	20	20	8	28	8	28.0	8.0	-8
2	20	40	20	20	14	34	6	17.0	7.0	6
3	20	60	20	20	21	41	7	13.7	7.0	19

Firms are price takers; all face horizontal demand curves.

Under perfect competition: **$P = MR = AR = 20$**



Total revenue increases proportionally with quantity at a constant price.



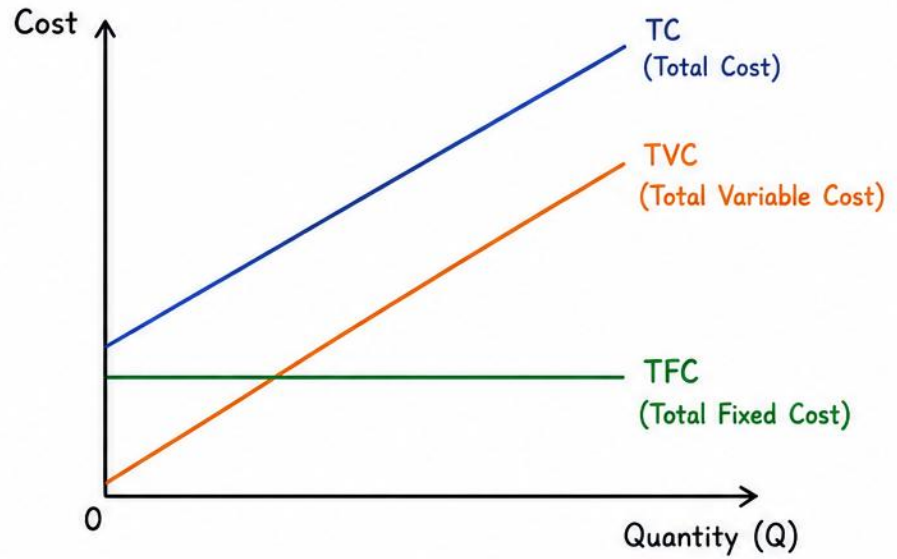
Marginal revenue, average revenue, price, and demand are all equal and horizontal.

PREREQUISITE

Quantity (Q)	Price (P)	Total Revenue (TR)	Marginal Revenue (MR)
1	20	20	20
2	18	36	16
3	16	48	12
4	14	56	8
5	12	60	4
6	10	60	0
7	8	56	-4

Price falls to sell more units. Total revenue rises while marginal revenue is positive, stops increasing when marginal revenue is zero, and falls when marginal revenue becomes negative.

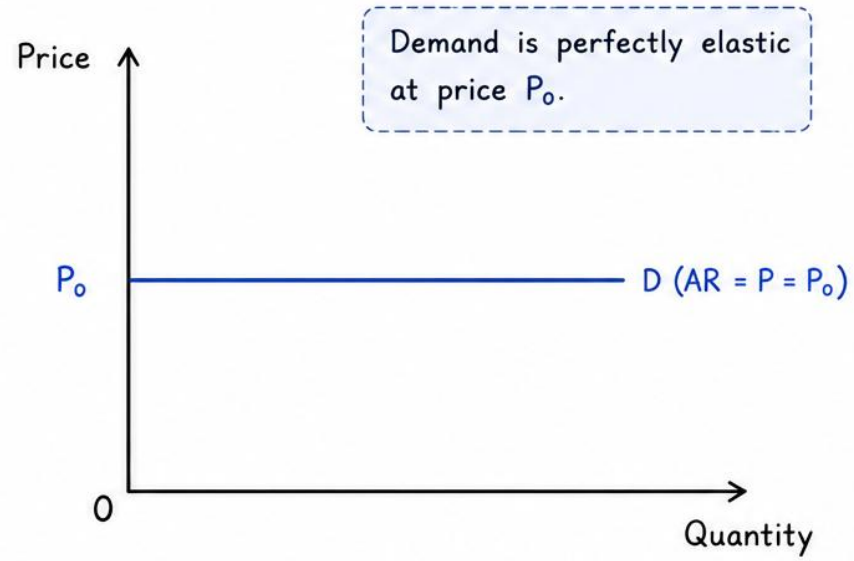
PREREQUISITE



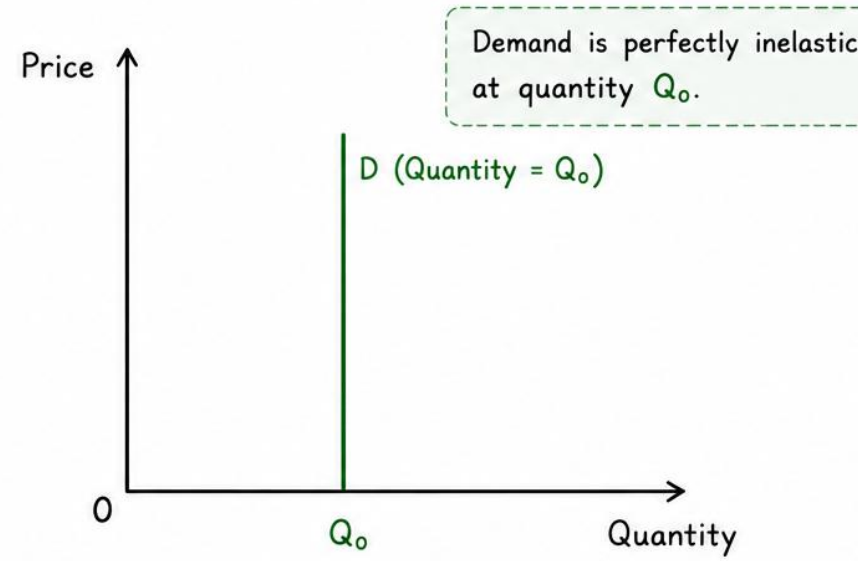
- $TC = TFC + TVC$
- TFC is constant at all levels of output.
- TVC increases as output increases.
- TC increases as output increases.

PREREQUISITE

1. Perfectly Elastic Demand



2. Perfectly Inelastic Demand



LOS: determine and interpret breakeven and shutdown points of production, as well as how economies and diseconomies of scale affect costs under perfect and imperfect competition.

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

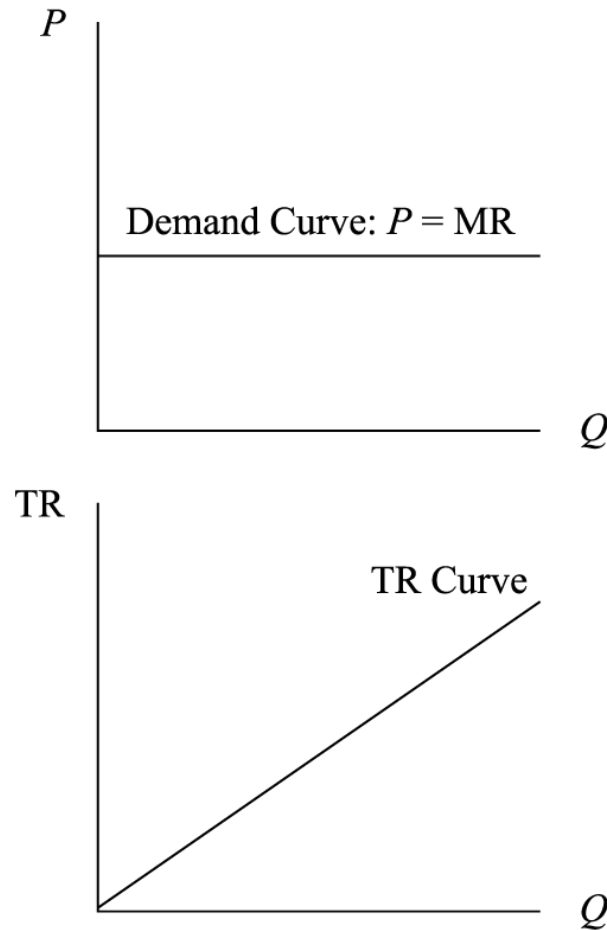
Firms operate in either **perfectly competitive** or **imperfectly competitive** markets, with the key difference being the demand curve they face.

- In perfect competition, firms are price takers and face a horizontal demand curve. As a result, **MR = AR = P**, and each additional unit sold increases total revenue by the market price. (the firm is a price taker)
- In imperfect competition, firms face a downward-sloping demand curve and must lower price to sell more output. Consequently, **MR is less than price**, and price depends on the quantity sold.

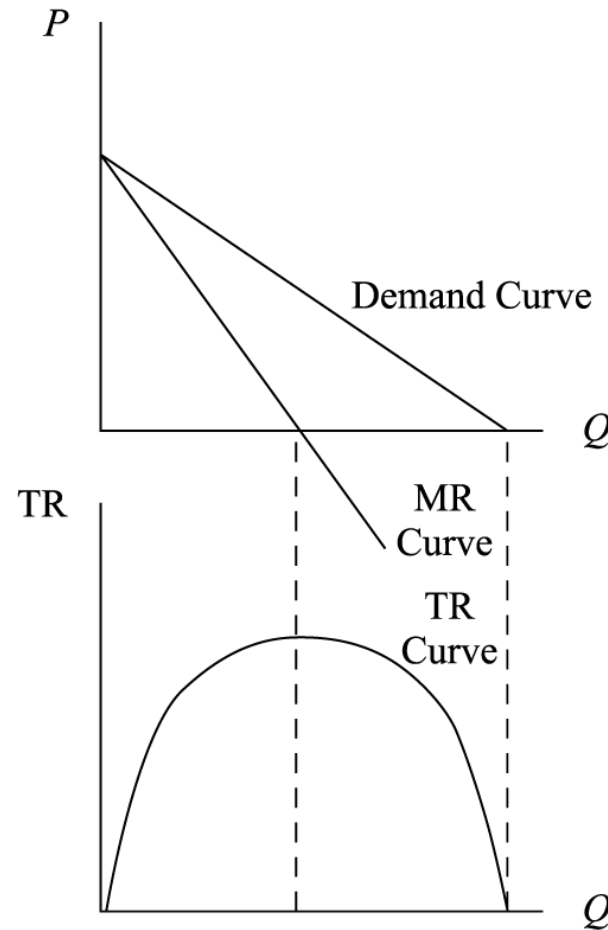
For a monopolist, reducing price initially increases total revenue because the gain from selling more units exceeds the loss from a lower price. However, beyond a certain point, further price reductions cause total revenue to decline because the decrease in price outweighs the increase in quantity sold.

PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

A. Perfectly Competitive Firm



B. Imperfectly Competitive Firm



A) Perfect competition, the demand curve is horizontal, and the total revenue curve is a straight line with a slope equal to the market price. As output increases, total revenue increases at a constant rate.

$TR = P \times Q$, and **P is constant** (market-determined).

B) Monopoly, the demand curve is downward sloping and the total revenue curve first rises and then falls. Total revenue increases when **MR is positive** and decreases when **MR is negative**.

$MR > 0$ in the rising part of TR

$MR = 0$ at the peak of TR

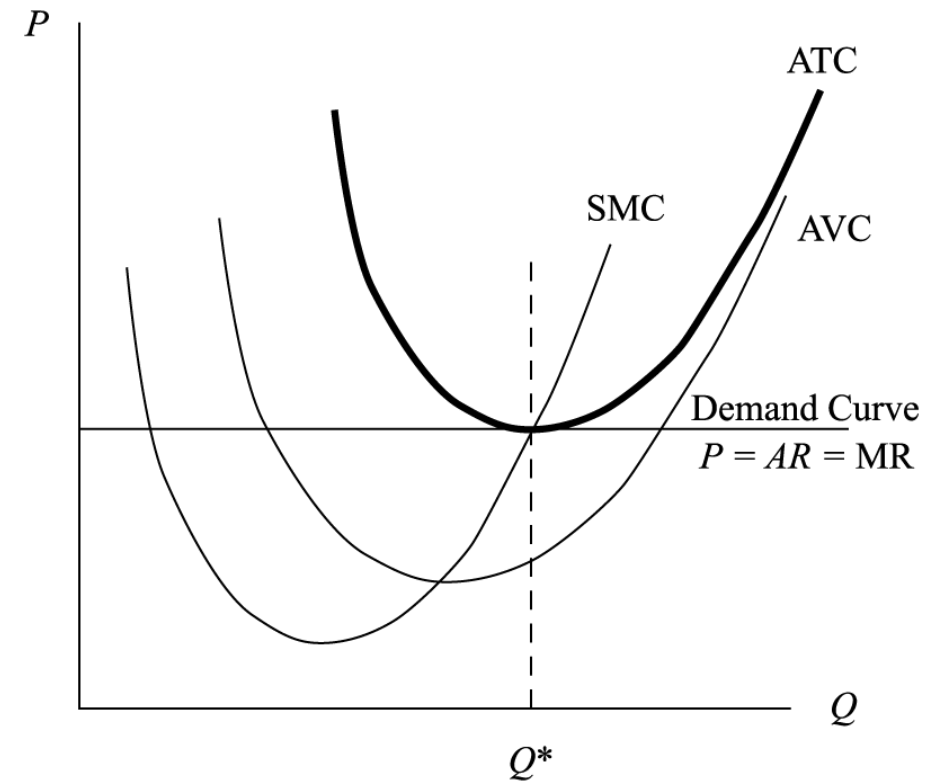
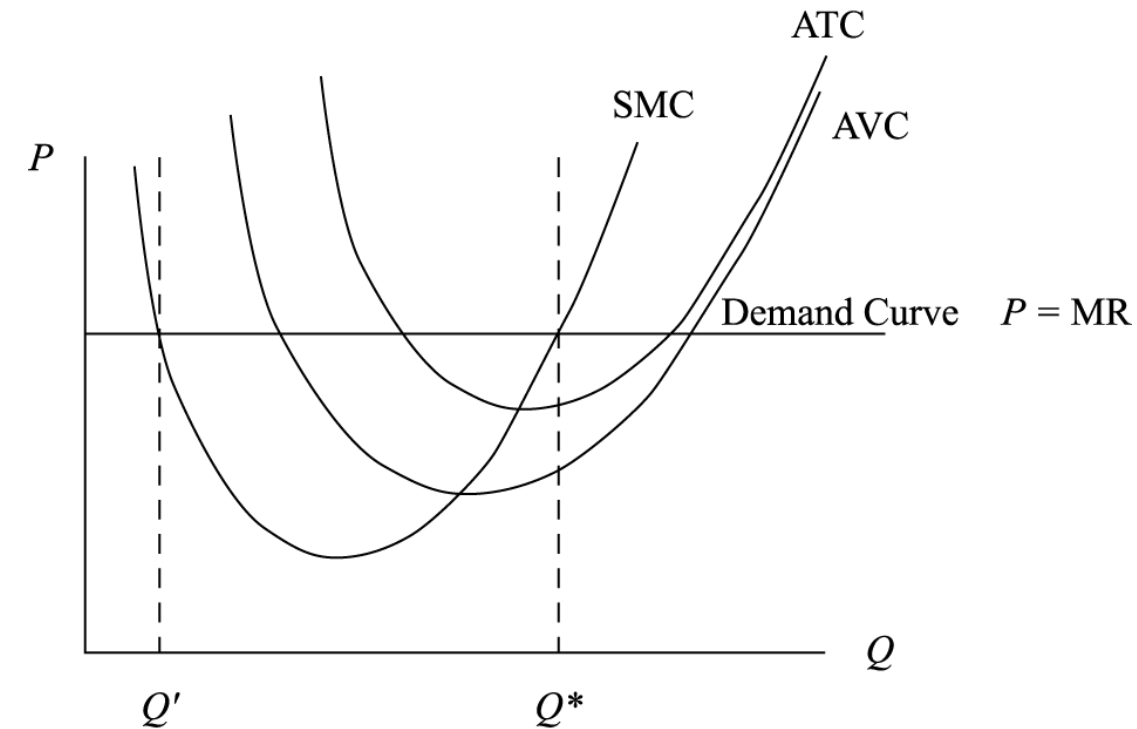
$MR < 0$ in the falling part of TR

Source: CFA Curriculum (Exhibit Reproduced)

PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Under **perfect competition**, profit is maximized at Q^* where $P = SMC = MR$ and the **SMC curve is rising**. A point where $P = SMC$ but **SMC is falling** is not profit maximizing.

If market price changes, the firm's **demand and MR curves shift**, leading to a new profit-maximizing output level. The firm earns positive economic profit when $P > ATC$, but in the long run, entry of competitors drives price down toward **ATC**.



Source: CFA Curriculum

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

Perfect competition

- **Profit-max output** choose Q where $P = SMC$ (with rising SMC).
- **Breakeven condition** economic profit is zero when: $P = ATC$ (equivalently $TR = TC$).

A firm **breaks even** when **Total Revenue (TR) = Total Cost (TC)**, or equivalently when **Price (AR) = Average Total Cost (ATC)**.

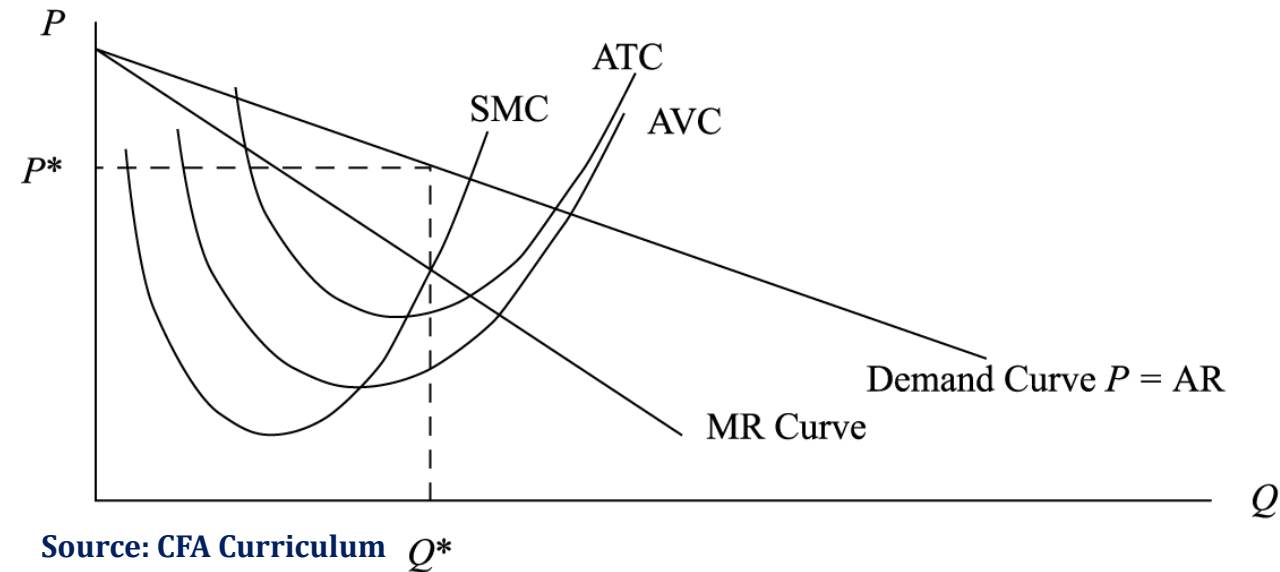
At the breakeven point, the firm earns normal profit, meaning it covers all explicit and implicit (opportunity) costs, but earns zero economic profit.

In competitive markets with no barriers to entry, positive economic profits attract new firms, increasing output and driving prices down until firms earn only normal profit in the long run.

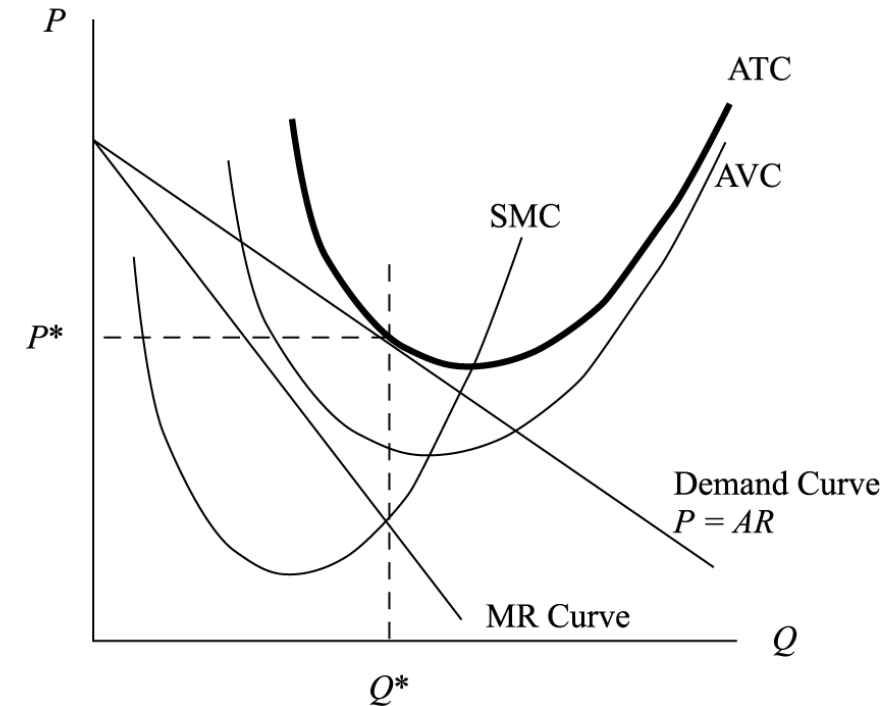
For both a perfectly competitive firm and a monopolist, the breakeven condition occurs where **MR = SMC** and **Price = ATC**, resulting in **zero economic profit**.

PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Under **monopoly**, the firm faces a downward-sloping demand curve, so **MR and demand are not identical**. Profit is maximized where **MR = SMC (Q^*)**, and the corresponding price **P^*** is determined from the demand curve. The monopolist can earn positive economic profits because barriers to entry prevent competitors from eliminating those profits.



Source: CFA Curriculum Q^*



PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Monopoly (imperfect competition): profit-max and pricing

Monopoly faces market demand, so:

- **MR curve lies below demand (AR) curve**
- Choose **Q^*** where **$MR = SMC$**
- Then charge **P^*** from the **demand curve at Q^***

Economic profit can persist if barriers prevent entry.

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

Revenue–Cost Relationship	Short-Run Decision	Long-Run Decision
$TR = TC$	Operate	Stay
$TR \geq TVC$ but $TR < TC$	Operate (minimize loss)	Exit if persistent
$TR < TVC$	Shut down (loss = TFC)	Exit

Breakeven and shutdown (short run vs. long run)

Economic costs explicit accounting costs + implicit opportunity costs.

Normal profit TR covers all economic costs (economic profit = 0).

Positive economic profit $TR >$ economic costs.

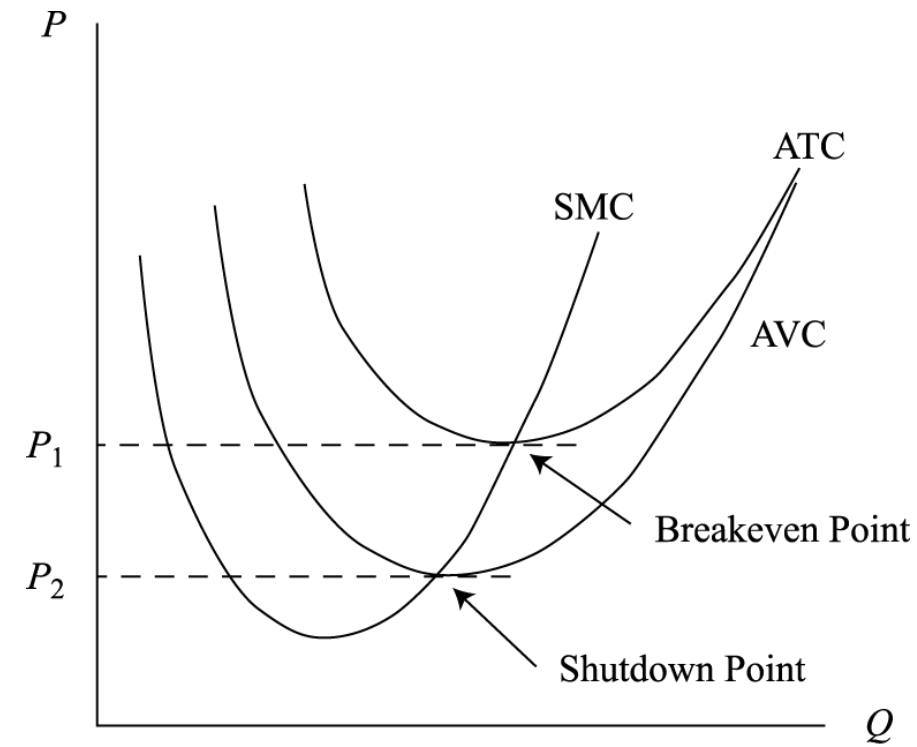
Economic loss $TR <$ economic costs.

Long run decision rule

If the firm cannot earn at least **zero economic profit** in the long run → **exit** (since all costs are avoidable long run).

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

A Perfectly Competitive Firm Shuts Down When Market Price Falls Below Minimum AVC



Source: CFA Curriculum

- If **Price > AVC (or $TR > TVC$)** → Continue operating because the firm covers all variable costs and contributes toward fixed costs.
- If **Price < AVC (or $TR < TVC$)** → Shut down because the firm cannot even cover variable costs.
- **Minimum AVC is the shutdown point.**
- **Minimum ATC is the breakeven point.**

PROFIT MAXIMIZATION: PRODUCTION BREAK EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Example: Breakeven, Profit Range, and Profit Maximization (Imperfect Competition)

Q	P	TR = P×Q	TC	Profit = TR–TC
0	12,000	0	160,000	–160,000
10	11,650	116,500	240,000	–123,500
20	11,300	226,000	310,000	–84,000
30	10,950	328,500	375,000	–46,500
40	10,600	424,000	424,000	0
50	10,250	512,500	490,000	22,500
60	9,900	594,000	560,000	34,000
70	9,550	668,500	645,000	23,500
80	9,200	736,000	736,000	0
90	8,850	796,500	840,000	–43,500
100	8,500	850,000	960,000	–110,000

PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Questions

1) How many units must the firm sell to initially break even?

Break even first occurs at $Q = 40$ ($TR = TC = 424,000$).

2) Where is the region of profitability?

Profits are positive for $40 < Q < 80$, because profit is 0 at $Q=40$ and $Q=80$ and positive in between.

3) At what point is profit maximized? Where are economic losses?

Maximum profit occurs at $Q = 60$ with **profit = 34,000.**

Economic losses occur for $Q < 40$ and for $Q > 80$.

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

Example: Shutdown analysis using fixed vs variable costs

A business has:

Revenue (TR) = GBP 3.2 million

Total cost (TC) = GBP 3.8 million

Split into **TFC = GBP 1.4 million**, **TVC = GBP 2.4 million**

A) Short-run decision

Compare TR to TVC:

TR = 3.2

TVC = 2.4

Since **TR $\geq$ TVC**, the firm should **operate in the short run**.

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

B) Long-run decision

If the revenue shortfall is expected to persist, the firm should **exit** in the long run (can't cover full economic costs over time).

C) Alternate revenue case (shutdown)

Now suppose revenue is only **GBP 2.1 million** (costs unchanged in the short run).

Compare TR to TVC:

$$TR = 2.10$$

$$TVC = 2.4$$

Since **$TVC \geq TR$** , the firm should **shutdown**.

PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

Short-run vs long-run cost curves and plant size choice

Short run: at least one factor is fixed, so the company cannot easily change it now.

Example: factory size, machines, lease, technology.

Long run: all factors are variable, so the company can change or adjust everything.

Example: expand factory, buy new machines, change technology, enter or exit the market.

The length of the long run differs by industry: it may be short for a small business, but many years for a capital-intensive firm.

PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

In the short run, **capital is fixed**, so the firm can only change output by changing **labor**.

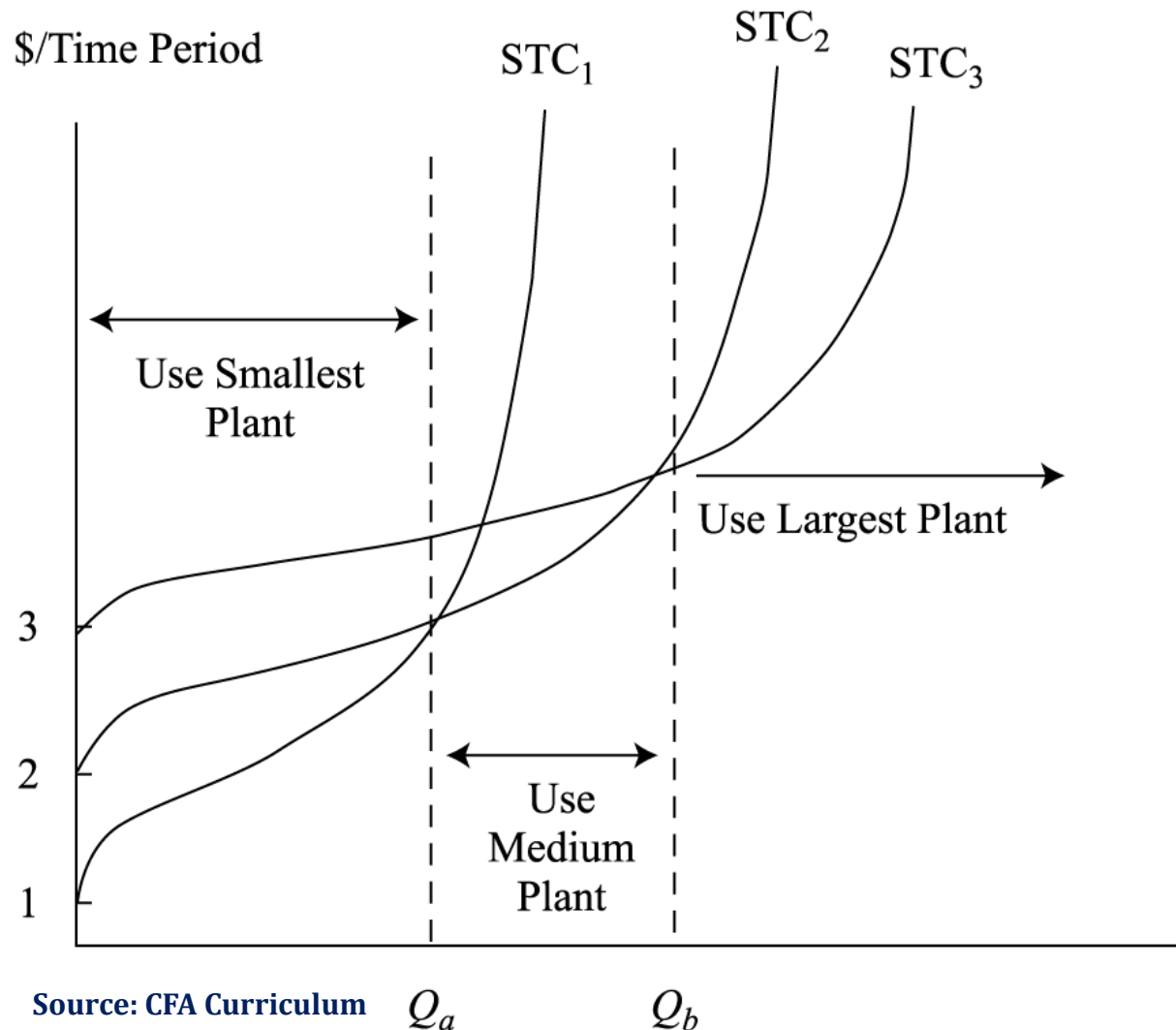
But if the firm changes capital, such as plant size or equipment, it gets a **new short-run cost curve**.

The **short-run total cost (STC)** curve rises as output increases:

- First, cost rises slowly because workers specialize and become more efficient.
- Later, cost rises faster because of diminishing marginal returns to labor.

Total fixed cost (TFC) depends on the amount of capital used. More capital means higher fixed cost, so the STC curve starts higher, but the firm also has greater production capacity.

PROFIT MAXIMIZATION: PRODUCTION BREAK EVEN, SHUTDOWN AND ECONOMIES OF SCALE



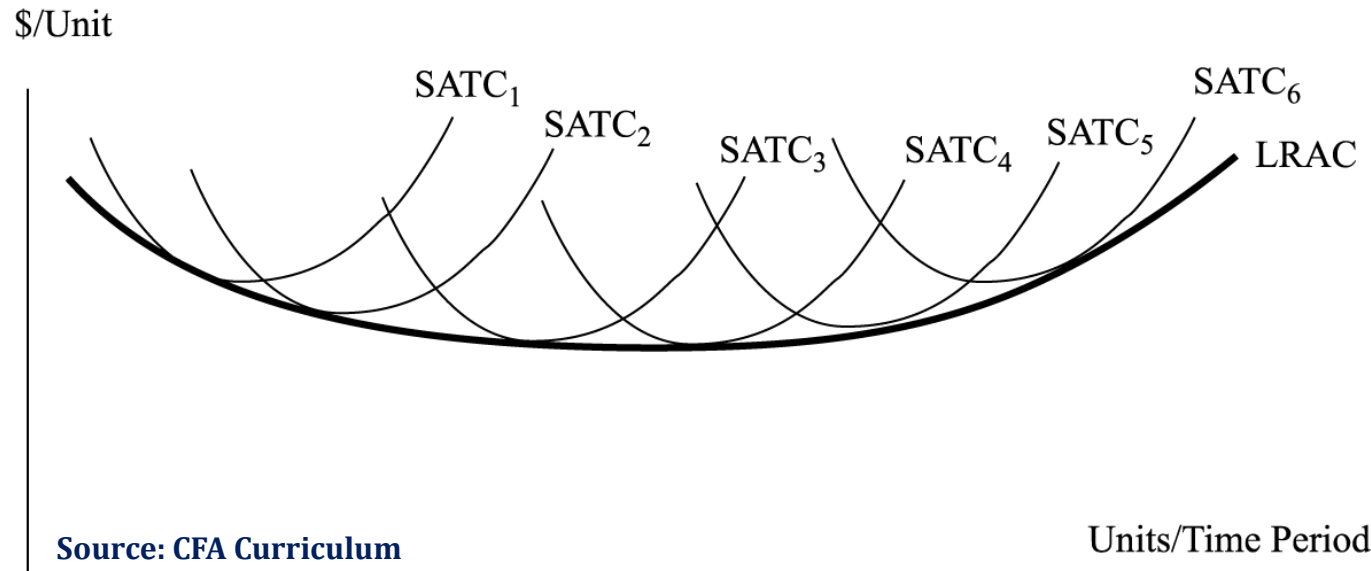
- Plant Size 1 has the **lowest fixed cost**, so it is best for low output levels, but its cost rises quickly because capacity is small.
- Plant Size 3 has the **highest fixed cost**, but it can produce larger output more efficiently, so it is best for high output levels.
- Plant Size 2 is best for the middle range of output.
- In the long run, the firm can choose the plant size with the **lowest cost** for each output level. This creates the **long-run total cost curve**, called the **envelope curve**, because it covers the lowest-cost parts of all short-run cost curves.
- Q ➤ The same idea applies to average cost: the **LRAC curve** is the envelope of all short-run average total cost curves and shows economies and diseconomies of scale.

PROFIT MAXIMIZATION: PRODUCTION BREAK EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Each **short-run total cost curve (STC)** has a related **short-run average total cost curve (SATC)**.

In the long run, the firm can choose the best plant size, so the **long-run average cost curve (LRAC)** is the envelope of all possible **SATC** curves.

- **Economies of scale** happen when the firm increases all inputs and produces more output at a **lower cost per unit**. This means the **LRAC slopes downward**.
- **Diseconomies of scale** happen when the firm increases output but **cost per unit rises**. This means the **LRAC slopes upward**.

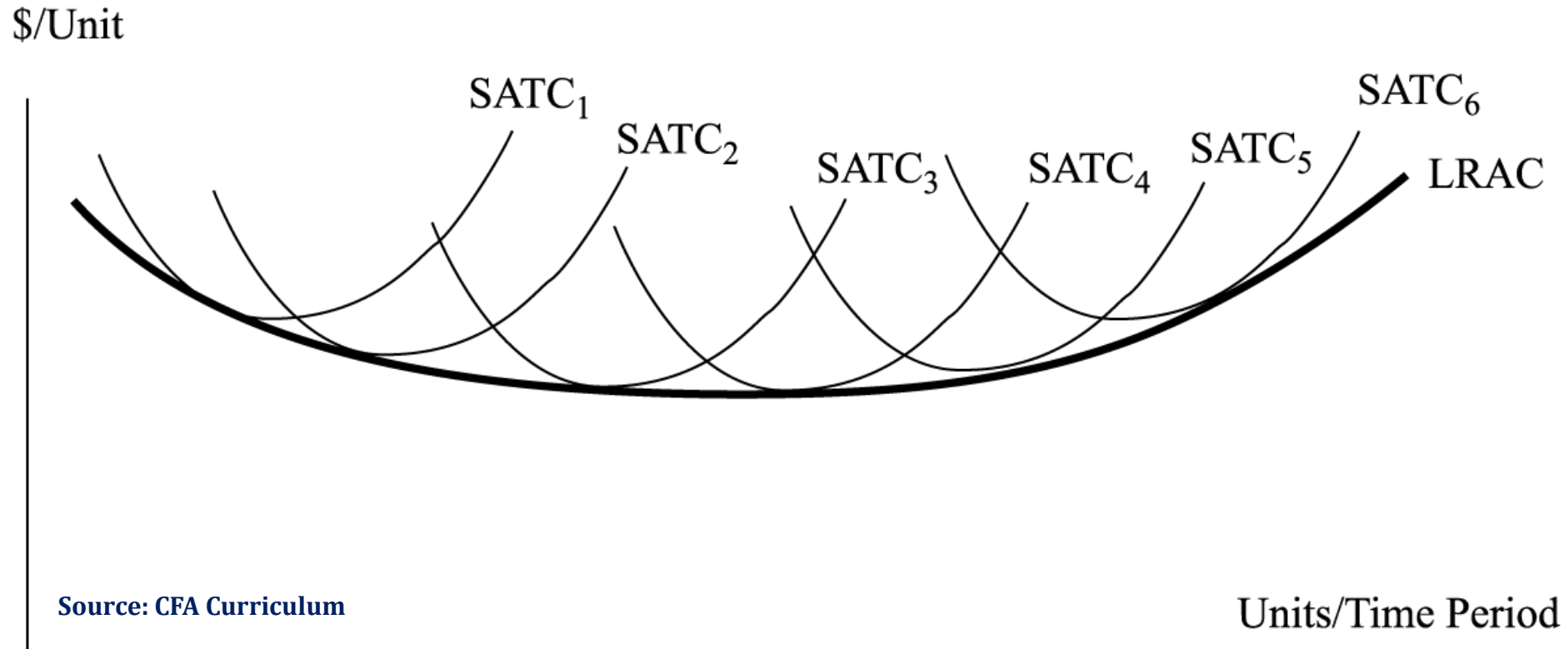


PROFIT MAXIMIZATION: PRODUCTION BREAK EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Economies and diseconomies of scale can happen in different output ranges. The effect on **LRAC** depends on which force is stronger.

- When **economies of scale dominate**, **LRAC falls** as output increases.
- When **diseconomies of scale dominate**, **LRAC rises** as output increases.
- LRAC may also be flat over a range where cost per unit stays constant.

The lowest point on the **LRAC** curve is called the **minimum efficient scale**. Under perfect competition, firms are pushed to operate at this least-cost point in the long run; otherwise, their survival may be threatened.



PROFIT MAXIMIZATION: PRODUCTION BREAK-EVEN, SHUTDOWN AND ECONOMIES OF SCALE

Economies of scale mean that as a firm grows, its **average total cost (ATC)** can fall.

This can happen because larger firms may benefit from:

- More efficient production and increasing returns to scale
- Specialization through division of labor and management
- Better and more advanced equipment or technology
- Less waste and better quality control
- Better use of market information
- Discounts from buying resources in large quantities

Diseconomies of scale mean that as a firm becomes too large, its **average total cost (ATC)** can rise.

This can happen because of:

- Decreasing returns to scale
- Difficulty managing a very large firm
- Overlapping or duplicated business functions and product lines
- Higher input prices because of supply constraints

PRACTICE

Question 1: Marginal Revenue under Imperfect Competition

A monopolistic firm faces a downward-sloping demand curve. At its profit-maximizing output, which of the following relationships must hold?

- A. Price equals marginal revenue.
- B. Marginal revenue exceeds price.
- C. Marginal revenue is less than price.

Correct Answer: C — For a firm facing a negatively sloped demand curve, price must be reduced to sell additional units. Therefore, marginal revenue lies below price at all positive output levels.

Question 2: Total Revenue in Perfect Competition

For a perfectly competitive firm, total revenue as output increases will:

- A. Increase at a decreasing rate because price falls with output.
- B. Increase at a constant rate equal to market price.
- C. First increase and then decrease as output expands.

Correct Answer: B — A perfectly competitive firm takes price as given; thus, total revenue equals price multiplied by quantity and rises linearly with output at a slope equal to price.

PRACTICE

Question 3: Profit Maximization Rule

A firm operating under either perfect or imperfect competition maximizes profit by producing the output level where:

- A. Average total cost is minimized.
- B. Price equals average total cost.
- C. Marginal revenue equals marginal cost, with marginal cost rising.

Correct Answer: C — Profit maximization requires equating marginal revenue and marginal cost, provided marginal cost is increasing at that quantity.

Question 4: Long-Run Equilibrium under Perfect Competition

In long-run equilibrium under perfect competition, firms earn:

- A. Zero accounting profit because price equals average total cost.
- B. Positive economic profit due to efficient scale production.
- C. Normal profit because price equals average total cost.

Correct Answer: C — In the long run, entry and exit drive price to the level of minimum average total cost, yielding zero economic profit (normal profit), not necessarily zero accounting profit.

PRACTICE

Question 5: Shutdown Decision in the Short Run

In the short run, a firm experiencing economic losses should continue operating if:

- A. Total revenue covers total fixed cost.
- B. Price exceeds average variable cost.
- C. Price exceeds average total cost.

Correct Answer: B — As long as price covers average variable cost, the firm contributes toward fixed costs and minimizes losses relative to shutting down.

Question 6: Breakeven Point Identification

A firm is said to break even when:

- A. Total revenue equals total cost, implying price equals average total cost.
- B. Total revenue equals total variable cost only.
- C. Marginal revenue equals marginal cost and price exceeds average total cost.

Correct Answer: A — Breakeven occurs when total revenue equals total cost; equivalently, price equals average total cost and economic profit is zero.

PRACTICE

Question 7: Long-Run Cost Curve Derivation

The long-run average total cost (LRAC) curve is best described as:

- A. The horizontal summation of all short-run average total cost curves.
- B. The envelope of short-run average total cost curves representing the lowest cost for each output level.
- C. The short-run average total cost curve corresponding to the largest plant size.

Correct Answer: B — The LRAC curve traces the minimum attainable average cost at each output level by selecting the optimal plant size, forming an envelope of short-run cost curves.

Question 8: Economies and Diseconomies of Scale

If a firm increases all inputs and experiences a proportionately larger increase in output, it is experiencing:

- A. Diseconomies of scale due to managerial inefficiency.
- B. Constant returns to scale.
- C. Economies of scale reflected in a downward-sloping LRAC.

Correct Answer: C — When output rises more than proportionately relative to inputs, average cost declines, indicating economies of scale and a negatively sloped LRAC over that range.

INTRODUCTION TO MARKET STRUCTURES

INTRODUCTION TO MARKET STRUCTURES

Market structure influences the choices available to a firm's management, including pricing, output, and profitability decisions.

A firm's long-run profitability depends on the degree of competition in its market. In highly competitive markets, competition tends to eliminate long-run economic profits, whereas less competitive markets may allow firms to earn large profits even in the long run.

Understanding market structure helps analysts evaluate a firm's short- and long-term prospects by identifying the competitive forces that affect pricing, output, and profitability.

INTRODUCTION TO MARKET STRUCTURES

Economists classify markets into four structures: **perfect competition, monopolistic competition, oligopoly, and monopoly.**

A market consists of buyers and sellers who are aware of each other and can agree on a price for goods or services.

Markets may be **global** when products or services can be digitized and delivered electronically, but some markets remain **geographically limited** because of transportation or delivery constraints.

Markets also differ in concentration:

- **Concentrated markets** are dominated by a small number of firms.
- **Fragmented markets** consist of many small firms.

New products and innovation can also lead to high market concentration and large market shares for successful firms.

INTRODUCTION TO MARKET STRUCTURES

The television broadcasting industry illustrates how **market structure can change over time because of technology and competition.**

Initially, consumers had very limited choices through free broadcast channels. New technologies such as **cable television, satellite television**, and later **internet streaming services** expanded consumer choice and increased competition.

As competition intensified, firms had to make strategic decisions regarding:

- Product offerings and packaging
- Pricing
- Advertising and marketing

Competitive pressures also led to **mergers and acquisitions**, which further changed the structure of the industry.

INTRODUCTION TO MARKET STRUCTURES

Market structures are classified into four categories: **perfect competition, monopolistic competition, oligopoly, and monopoly**, ranging from the most competitive to the least competitive environment.

1) Perfect competition is characterized by many buyers and sellers trading a homogeneous product, with no individual firm large enough to influence market price. In the long run, competition drives profits down to **normal profit**, meaning firms earn only the required return on invested capital.

2) Monopolistic competition is highly competitive but includes product differentiation. Although many firms operate in the market, firms can gain some pricing power by convincing consumers that their products are unique. Brand loyalty, such as that associated with soft drinks, fashion products, and cosmetics, is a common example.

INTRODUCTION TO MARKET STRUCTURES

Market structures are classified into four categories: **perfect competition, monopolistic competition, oligopoly, and monopoly**, ranging from the most competitive to the least competitive environment.

3) Oligopoly consists of a relatively small number of firms. Because each firm's decisions can affect competitors, pricing and output decisions must consider likely reactions from rival firms. Strategic behavior and competitive responses are therefore important features of oligopoly markets.

4) Monopoly is the least competitive market structure. A single seller provides a product or service with no close substitutes and therefore has substantial control over pricing and output decisions. Because of this market power, monopolies are often regulated by governments, with prices frequently set to allow the firm to earn a normal return on its investment.

As competition decreases from perfect competition to monopoly, firms generally gain greater influence over pricing and output decisions.

INTRODUCTION TO MARKET STRUCTURES

Five factors determine market structure:

The five factors that determine market structure are closely related to competition and pricing power.

- **Number and relative size of firms:** More firms generally increase competition and reduce pricing power. Fewer large firms can increase market power.
- **Degree of product differentiation:** Firms that successfully differentiate their products gain pricing power because consumers view their products as unique.
- **Seller's pricing power:** This ranges from none in perfect competition (price takers) to substantial in monopoly markets.
- **Barriers to entry and exit:** Strong barriers limit competition by making it difficult for new firms to enter or existing firms to leave the market. Examples include large capital requirements, patents, and high exit costs.
- **Degree of non-price competition:** Firms compete through advertising, branding, product quality, and customer service rather than price. Non-price competition is particularly important in monopolistic competition and oligopoly markets.

Together, these factors determine the level of competition and the strategic choices available to firms.

INTRODUCTION TO MARKET STRUCTURES

How Each Factor Works

Number/size

- Many small firms → intense competition.
- Few large firms → strategic interaction and potential for pricing power.
- Mix of large leaders and niche firms → leaders shape broad pricing/standards; niche firms may have power in narrow segments.

Differentiation

- Advertising/branding
- Styling/feature changes
- Bundling with complementary products

Pricing power

- Perfect competition: none (price taker).
- Monopolistic competition: some (depends on differentiation strength).
- Oligopoly: some to considerable.
- Monopoly: considerable (unless regulated).

INTRODUCTION TO MARKET STRUCTURES

Entry/exit barriers

- Large capital requirements can block entry.
- Patents can block entry.
- High exit costs (specialized, hard-to-sell assets) deter entry because entrants fear being “stuck” if conditions worsen.
- Low barriers (easy-to-replicate production) support high competition.

Non-price competition

- Dominant in monopolistic competition (differentiation is central).
- Dominant in oligopoly when firms avoid destructive price retaliation.

INTRODUCTION TO MARKET STRUCTURES

Characteristics of Market Structure

Market Structure	Number of Sellers	Degree of Product Differentiation	Barriers to Entry	Pricing Power of Firm	Non-Price Competition
 Perfect competition	Many	Homogeneous/Standardized	Very Low	None	None
 Monopolistic competition	Many	Differentiated	Low	Some	Advertising and Product Differentiation
 Oligopoly	Few	Homogeneous/Standardized	High	Some or Considerable	Advertising and Product Differentiation
 Monopoly	One	Unique Product	Very High	Considerable	Advertising

Source: CFA Curriculum (Reproduced)

INTRODUCTION TO MARKET STRUCTURES

From the firm's perspective, the most attractive market structures are those with the greatest **pricing power** because they offer the potential for higher profits. **Monopoly** provides the most control over price, followed by **oligopoly**, then **monopolistic competition**, while firms in **perfect competition** have no control over price.

From the consumer's perspective, the most attractive market structure is **perfect competition** because greater competition generally leads to lower prices and higher output.

There is a trade-off between competition and innovation. Although perfect competition produces the lowest prices and largest output, less competitive markets may encourage innovation because firms are more likely to invest in costly research and development when they expect to earn attractive returns. As a result, consumers may benefit from some degree of market power through the creation of new products and technologies.

INTRODUCTION TO MARKET STRUCTURES

A financial analyst assessing market structure and profitability should examine the number of sellers, product differentiation, pricing power, regulation, and the threat of new entrants.

This analysis is often summarized using **Porter's Five Forces**:

- **Threat of Entry:** How easily new competitors can enter the market.
- **Power of Suppliers:** The ability of suppliers to influence prices or terms.
- **Power of Buyers:** The ability of customers to influence prices or demand better terms.
- **Threat of Substitutes:** The availability of alternative products or services.
- **Rivalry among Existing Competitors:** The intensity of competition among current firms.

The first, third, fourth, and fifth forces are closely related to traditional market structure analysis. The **power of suppliers** is the additional factor emphasized by Porter because it can significantly affect profitability.

A related concept is the **economic moat**, which refers to factors that protect a firm's profitability from competitors. A strong economic moat reduces the threat of entry and may also lock in customers through high switching costs.

PRACTICE

Question 1: Long-Run Profitability and Market Structure

In analyzing a firm's long-run profitability, which statement is most accurate?

- A. Long-run profits are determined primarily by short-run demand fluctuations.
- B. In highly competitive markets, firms can sustain abnormal profits if they achieve efficient scale.
- C. In highly competitive markets, competitive forces tend to reduce long-run profits to a normal return.

Correct Answer: C — In highly competitive environments, entry and competitive pressures eliminate economic profits over time, leaving firms with only a normal return on capital.

Question 2: Economic Moat Concept

A firm described as having a wide economic moat most likely possesses:

- A. High variable production costs relative to competitors.
- B. Minimal product differentiation but efficient operations.
- C. Structural protections that limit competitive entry and customer switching.

Correct Answer: C — An economic moat refers to durable competitive advantages, such as entry barriers or switching costs, that protect long-term profitability.

PRACTICE

Question 3: Market Concentration and Strategic Implications

A market in which a small number of firms account for the majority of total sales is best described as:

- A. Fragmented and characterized by price-taking behavior.
- B. Perfectly competitive with free entry.
- C. Concentrated and likely associated with strategic interdependence.

Correct Answer: C — High concentration implies few dominant firms whose decisions influence one another, creating strategic interdependence typical of oligopolistic structures.

Question 4: Perfect Competition and Economic Profit

Under perfect competition in long-run equilibrium, firms most likely:

- A. Earn zero accounting profit.
- B. Earn a normal return on invested capital.
- C. Sustain above-normal economic profits due to efficiency.

Correct Answer: B — In long-run equilibrium, firms earn a normal profit, meaning total revenue covers all explicit and implicit costs, including the opportunity cost of capital.

PRACTICE

Question 5: Monopolistic Competition and Pricing Power

The primary source of pricing power in monopolistic competition is:

- A. Product differentiation perceived by consumers.
- B. High barriers to entry due to capital intensity.
- C. Collusive agreements among firms.

Correct Answer: A — Differentiation creates perceived uniqueness, granting firms limited discretion over pricing despite the presence of many competitors.

Question 6: Oligopoly and Strategic Behavior

Which feature most distinguishes an oligopoly from monopolistic competition?

- A. Absence of product differentiation.
- B. Mutual dependence among a small number of firms.
- C. Lack of barriers to entry.

Correct Answer: B — Because only a few firms operate in an oligopoly, each must anticipate competitors' reactions when making pricing or output decisions.

PRACTICE

Question 7: Barriers to Entry and Exit

High exit costs in an industry most directly:

- A. Encourage rapid entry by new competitors.
- B. Reduce product differentiation.
- C. Deter entry by increasing overall business risk.

Correct Answer: C — Significant exit costs increase potential losses, discouraging new entrants and strengthening barriers to entry.

Question 8: Non-Price Competition

Non-price competition is most likely to dominate in markets where firms:

- A. Are price takers selling homogeneous products.
- B. Fear retaliatory pricing and emphasize differentiation.
- C. Face no barriers to entry.

Correct Answer: B — In structures such as oligopoly and monopolistic competition, firms often rely on advertising and differentiation to avoid destructive price competition.

PRACTICE

Question 9: Desirable Market Structure Perspectives

From the consumer's perspective, the most desirable market structure is typically:

- A. Perfect competition, due to lower prices and higher output.
- B. Monopoly, because it ensures innovation.
- C. Oligopoly, because firms coordinate efficiently.

Correct Answer: A — Perfect competition maximizes output and minimizes price, benefiting consumers through competitive market outcomes.

Question 10: Innovation and Market Imperfections

Less-than-perfect competition may benefit consumers primarily because it:

- A. Eliminates the need for regulatory oversight.
- B. Provides firms with the potential returns necessary to justify innovation costs.
- C. Ensures that prices always equal marginal cost.

Correct Answer: B — Firms facing some degree of market power may expect returns sufficient to justify substantial research and development expenditures.

PRACTICE

Question 11: Porter's Five Forces—Power of Suppliers

Within Porter's framework, the bargaining power of suppliers primarily affects a firm's profitability by influencing:

- A. Input costs and value distribution within the industry.
- B. The number of buyers in the market.
- C. Government-imposed price ceilings.

Correct Answer: A — Strong supplier power can increase input costs, reducing industry profitability by capturing a larger share of economic value.

LOS: explain supply and demand relationships under monopolistic competition, including the optimal price and output for firms as well as pricing strategy.

MONOPOLISTIC COMPETITION

MONOPOLISTIC COMPETITION

Monopolistic competition is a hybrid market structure that combines strong competition with some monopoly-like characteristics. Its key feature is **product differentiation**, which gives firms some pricing power.

Characteristics of monopolistic competition:

- Many buyers and sellers participate in the market.
- Products are close substitutes, but each firm attempts to make its product appear different.
- Entry and exit costs are relatively low.
- Firms have some pricing power.
- Competition relies heavily on advertising and other non-price strategies.

Firms differentiate products through factors such as design, style, features, functionality, bundled services, branding, and advertising. Successful product differentiation creates **customer loyalty**, which increases pricing power.

However, because entry and exit barriers are relatively low, new competitors can enter the market. As a result, long-run competition tends to push prices and profits toward an equilibrium similar to perfect competition.

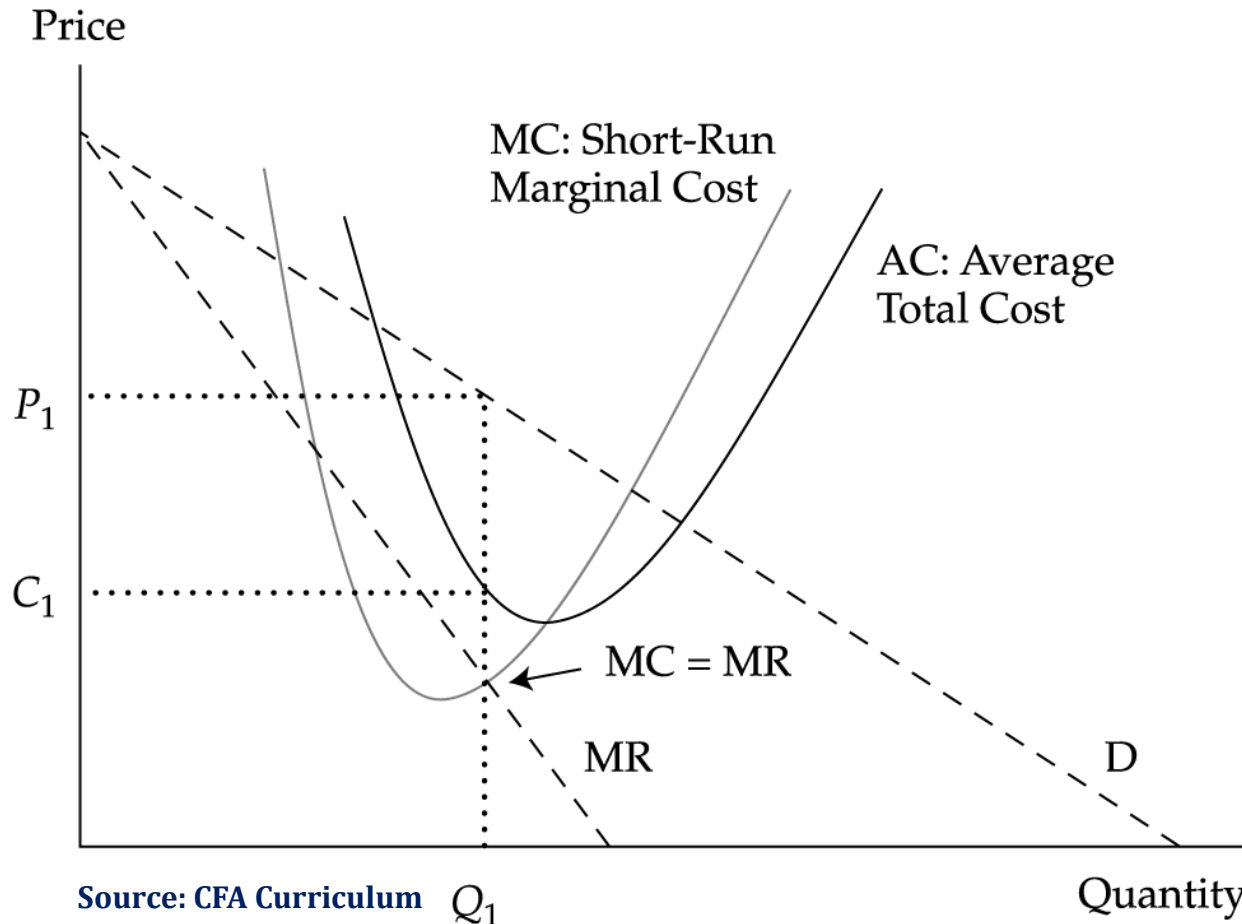
Therefore, monopolistic competition combines:

- ✓ **Competition** (many firms and low barriers to entry), and
- ✓ **Monopoly characteristics** (product differentiation and some pricing power).

MONOPOLISTIC COMPETITION

In **monopolistic competition**, product differentiation causes each firm's demand curve to be **downward sloping**, meaning price and quantity demanded are negatively related.

In the short run, the firm maximizes profit by producing the output level where **MR = MC**. Because the firm has some pricing power, it can charge the price indicated by its demand curve at that output level.



- Q_1 is the profit-maximizing output where **MR = MC**.
- P_1 is the price consumers are willing to pay for Q_1 .
- **Total Revenue** = $P_1 \times Q_1$.
- Demand may be **elastic** at higher prices and **inelastic** at lower prices.

MONOPOLISTIC COMPETITION

In **perfect competition**, the firm's supply curve is its **marginal cost (MC) curve**, because the firm takes price as given and chooses output where **$P = MC$** .

In **monopolistic competition**, there is **no clear supply curve**. The firm chooses output where **$MR = MC$** , but the price is taken from the **demand curve**, not directly from MC.

So, **MC helps determine quantity**, while **demand determines price**. Therefore, neither MC nor average cost alone shows how much the firm will supply at each price.

Optimal Price and Output (Short Run)

Step sequence (conceptual)

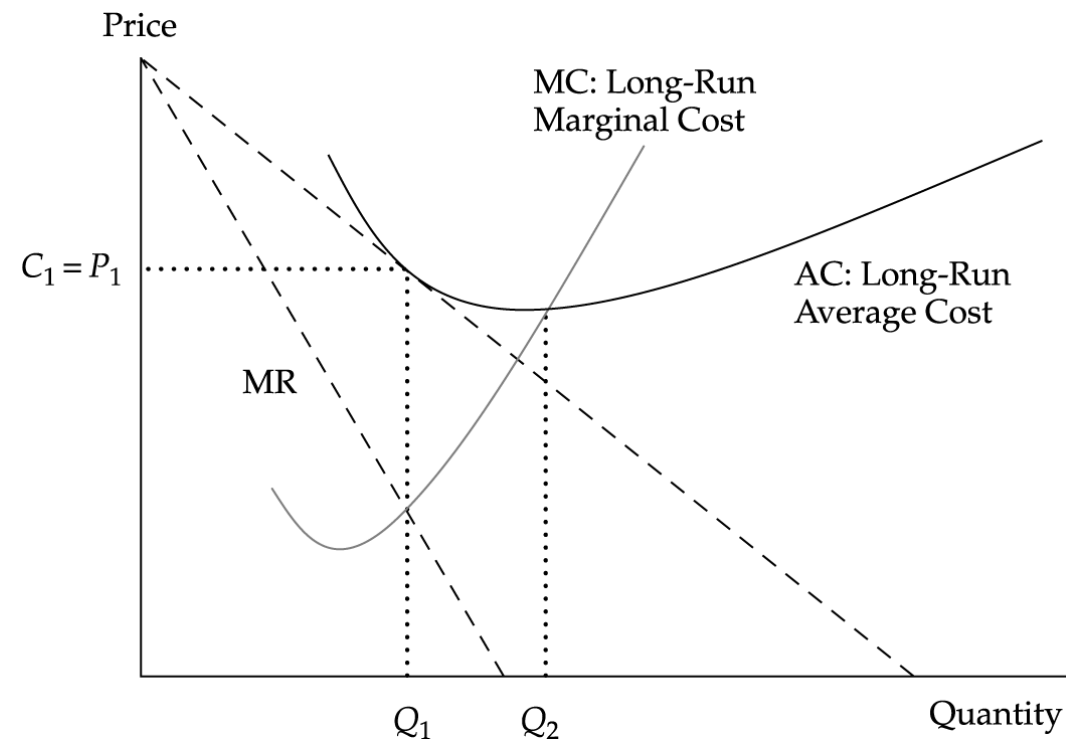
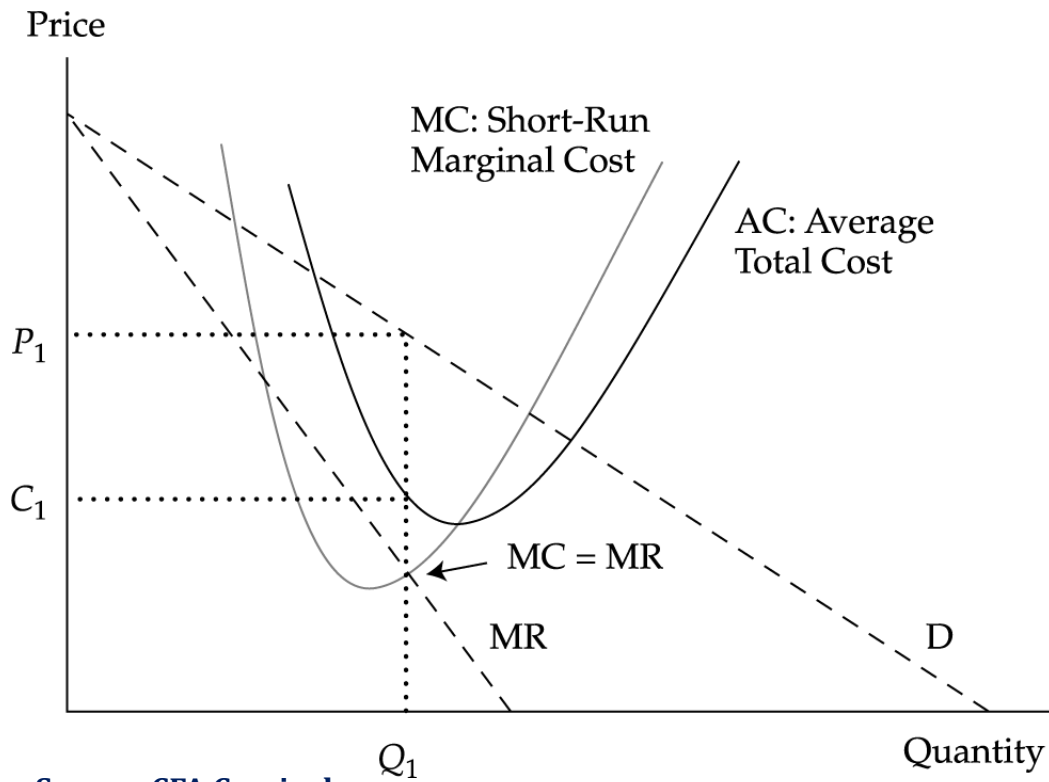
- Find Q^* where **$MR = MC$** .
- Use the **demand curve** to find the corresponding **P^*** at Q^* .
- Compute outcomes using: **$TR = P^* \times Q^*$** and **$TC = AC(Q^*) \times Q^*$**
- Economic profit: **$\pi = TR - TC$**

MONOPOLISTIC COMPETITION

In monopolistic competition, **economic profit attracts new firms** because entry costs are relatively low. New firms take some customers away, so demand for existing firms falls.

In the long run, economic profit falls to **zero**, similar to perfect competition.

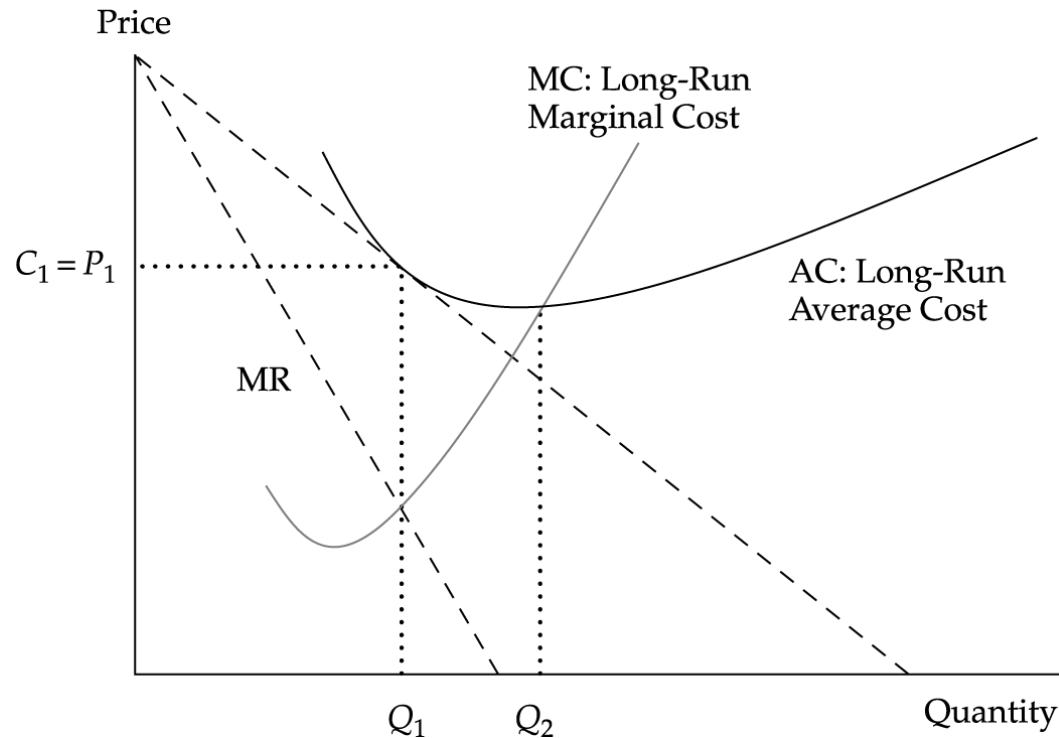
At long-run equilibrium:



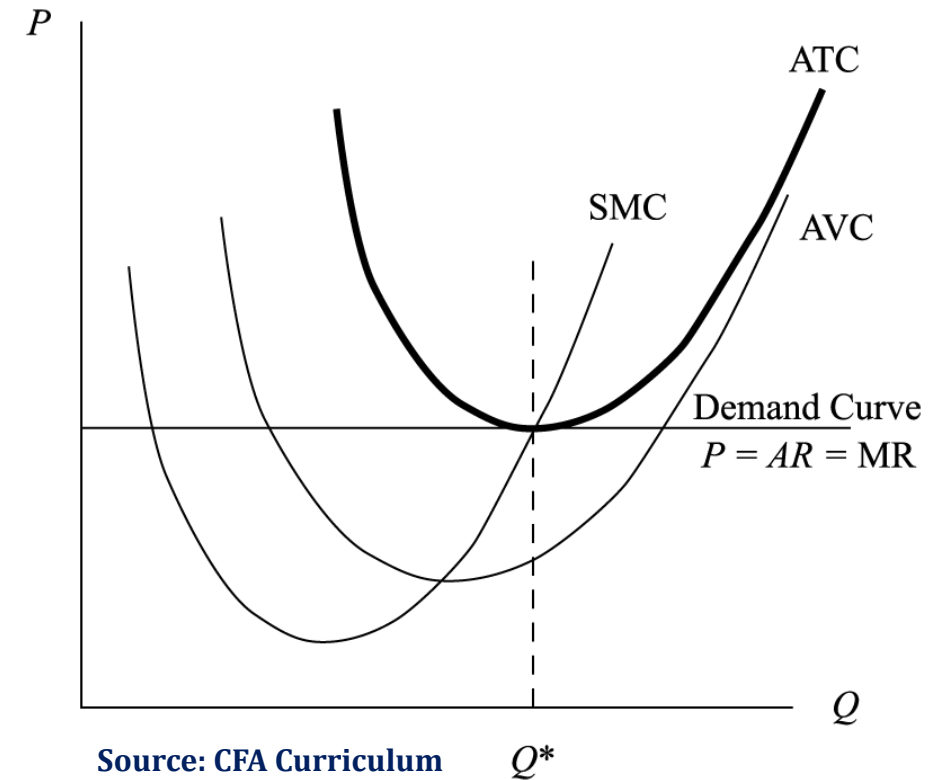
MONOPOLISTIC COMPETITION

However, monopolistic competition differs from perfect competition because the firm does **not** produce at the minimum point of average cost. Output is **Q1**, while minimum average cost occurs at **Q2**.

This means monopolistic competition has lower output and higher average cost than perfect competition, partly because firms spend on product differentiation, such as advertising and marketing. Prices may be higher, but consumers receive more variety.



Source: CFA Curriculum



Source: CFA Curriculum

PRACTICE

Question 1: Core Characteristic of Monopolistic Competition

Which feature most clearly distinguishes monopolistic competition from perfect competition?

- A. High barriers to entry
- B. Price-taking behavior
- C. Product differentiation

Correct Answer: C — Product differentiation allows firms to distinguish their offerings, giving them limited pricing power unlike perfect competitors.

Question 2: Implication of Successful Differentiation

As a firm becomes more successful in differentiating its product in a monopolistically competitive market, its market power will most likely:

- A. Decline as cross-elasticity rises.
- B. Increase as demand becomes less price sensitive.
- C. Disappear due to low entry barriers.

Correct Answer: B — Strong differentiation reduces the availability of close substitutes, making demand less elastic and increasing pricing power.

PRACTICE

Question 3: Short-Run Profit Maximization

In the short run, a monopolistically competitive firm maximizes profit by producing where:

- A. Price equals marginal cost.
- B. Marginal revenue equals marginal cost.
- C. Price equals average total cost.

Correct Answer: B — Profit maximization occurs where $MR = MC$; the price is then determined from the demand curve at that output.

Question 4: Supply Curve in Monopolistic Competition

Compared with perfect competition, a monopolistically competitive firm:

- A. Has no well-defined supply curve because price depends on demand.
- B. Uses its marginal cost curve as its supply curve.
- C. Sets output where average cost equals marginal revenue.

Correct Answer: A — Because price is determined from the downward-sloping demand curve, quantity supplied cannot be expressed independently of demand.

PRACTICE

Question 5: Long-Run Profit Outcome

In long-run equilibrium under monopolistic competition, economic profit will most likely be:

- A. Positive due to brand loyalty.
- B. Negative because of advertising costs.
- C. Zero due to entry of new firms.

Correct Answer: C — Low entry barriers allow new firms to enter, reducing demand for existing firms until economic profit is eliminated.

Question 6: Output Relative to Efficient Scale

In long-run equilibrium, a monopolistically competitive firm produces:

- A. At the minimum point of average cost.
- B. At an output below the level that minimizes average cost.
- C. Where price equals marginal cost.

Correct Answer: B — The firm operates with excess capacity; output is less than the quantity that minimizes average cost.

PRACTICE

Question 7: Economic Role of Differentiation

Which statement best explains why monopolistic competition may provide benefits despite higher prices?

- A. It eliminates all opportunity costs through entry.
- B. It ensures productive efficiency at minimum average cost.
- C. It creates incentives for innovation and product variety.

Correct Answer: C — Differentiation encourages innovation and experimentation, providing consumers with variety and potentially improving welfare.

Question 8: Demand Characteristics

The demand curve faced by a firm in monopolistic competition is downward sloping primarily because:

- A. Products are homogeneous but firms collude.
- B. Each firm's product is a close but not perfect substitute.
- C. Firms are price takers in a large market.

Correct Answer: B — Because products are differentiated, each firm faces its own downward-sloping demand curve reflecting imperfect substitutability.

LOS: explain supply and demand relationships under oligopoly, including the optimal price and output for firms as well as pricing strategy.

OLIGOPOLY

OLIGOPOLY

Oligopoly is a market structure dominated by a **small number of firms**. Products may be **differentiated** (e.g., cereals and soft drinks) or **homogeneous** (e.g., petroleum and cement), but they are generally close substitutes.

Characteristics of oligopoly:

- A small number of sellers dominate the market.
- Products may be differentiated by branding and marketing or may be homogeneous.
- Entry is difficult because of high costs and significant barriers to entry.
- Firms typically have substantial pricing power.
- Non-price competition, such as marketing and product features, is often important.

The key feature of oligopoly is **interdependence**. Because there are so few firms, each firm's pricing and output decisions depend on how competitors are expected to react.

This market structure can generate substantial profits because firms have pricing power. It also creates incentives for **collusion**, where firms cooperate to influence prices. Even without formal collusion, a dominant firm may become the market's price leader.

As a result, oligopoly markets often involve the most sophisticated pricing strategies. A well-known example of collusion is **Organization of the Petroleum Exporting Countries (OPEC)**, which seeks to influence petroleum prices through agreements among oil-producing countries.

OLIGOPOLY

In oligopoly markets, the **demand curve depends on how firms expect competitors to react to price changes**. Under collusion, firms effectively share the market demand curve. Under non-collusion, each firm faces its own demand curve.

One common pricing strategy is **pricing interdependence**, where firms expect competitors to:

- **Match price decreases**
- **Ignore price increases**

The logic is:

If a firm lowers its price, rivals also lower prices, so the firm gains little additional market share.

If a firm raises its price, rivals keep their prices unchanged, causing customers to switch away.

As a result:

- Demand is **more elastic for price increases** because customers can switch to cheaper competitors.
- Demand is **less elastic for price decreases** because competitors match the lower price.

This creates a **kinked demand curve**:

- One demand curve segment applies to price increases.
- Another demand curve segment applies to price decreases.
- The two segments meet at the current market price.

OLIGOPOLY

Oligopoly Demand Curves and Pricing Strategies

If firms collude, they behave more like a single producer and share the overall market demand among themselves.

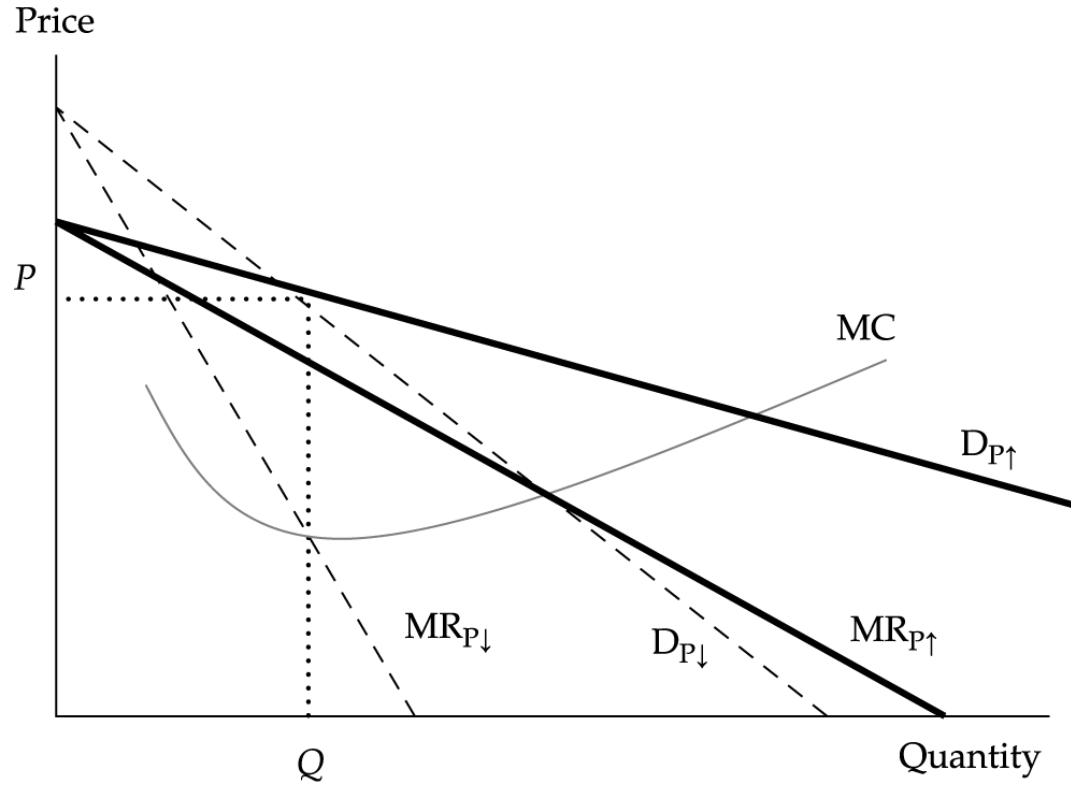
If firms do not collude, each firm faces its own demand curve, which depends on the pricing strategy followed by competitors.

The four basic pricing approaches in non-collusive oligopolies are:

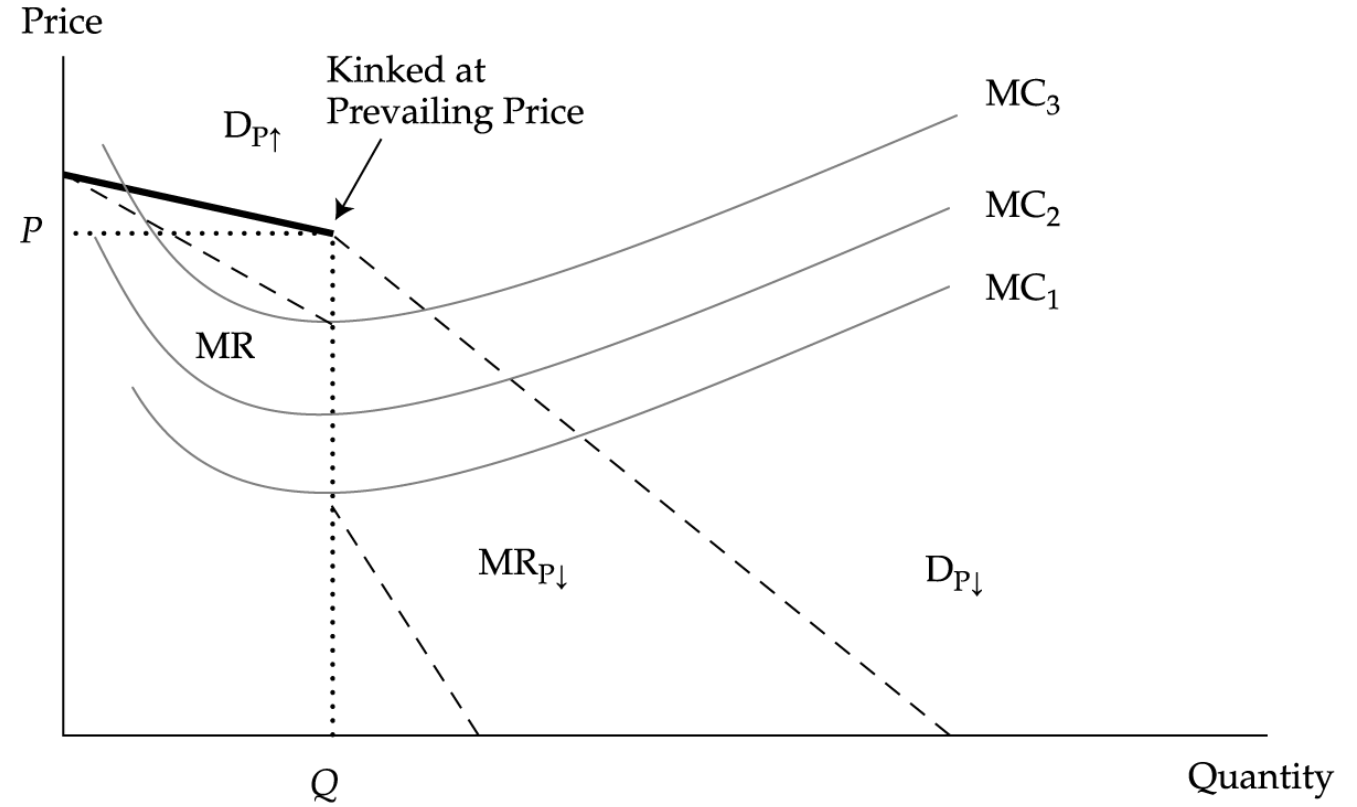
- Pricing interdependence
- Cournot assumption
- Nash equilibrium
- Stackelberg model

OLIGOPOLY

1) Pricing interdependence “Kinked Demand Curve in Oligopoly Market”



Source: CFA Curriculum



OLIGOPOLY

The kink in demand creates a **gap (discontinuity) in the MR curve**.

A key implication is that the prevailing price can remain unchanged over a wide range of costs:

If $MC = MC_1$, the firm produces where $MR = MC$.

Even if costs rise to MC_2 or MC_3 , as long as MC passes through the **MR gap**, the optimal **price and output remain unchanged**.

Therefore, the kinked demand curve helps explain why **prices in oligopoly markets tend to be stable (price rigidity)** despite moderate changes in costs.

Main criticism: The model explains why an existing price may remain stable, but it **does not explain how the original prevailing price was determined in the first place**.

OLIGOPOLY

2) The Cournot Assumption

The **Cournot model**, developed by **Augustin Cournot (1838)**, assumes that each firm chooses its profit-maximizing level of output while assuming that competitors **will not change their output**.

This assumption simplifies decision-making because firms do not need to predict or react to competitors' responses.

In a **duopoly** (two-firm oligopoly):

- Each firm selects its output to maximize profit.
- Each firm assumes the other firm will continue producing the same quantity.
- Neither firm has an incentive to change its output once equilibrium is reached.

Cournot Equilibrium

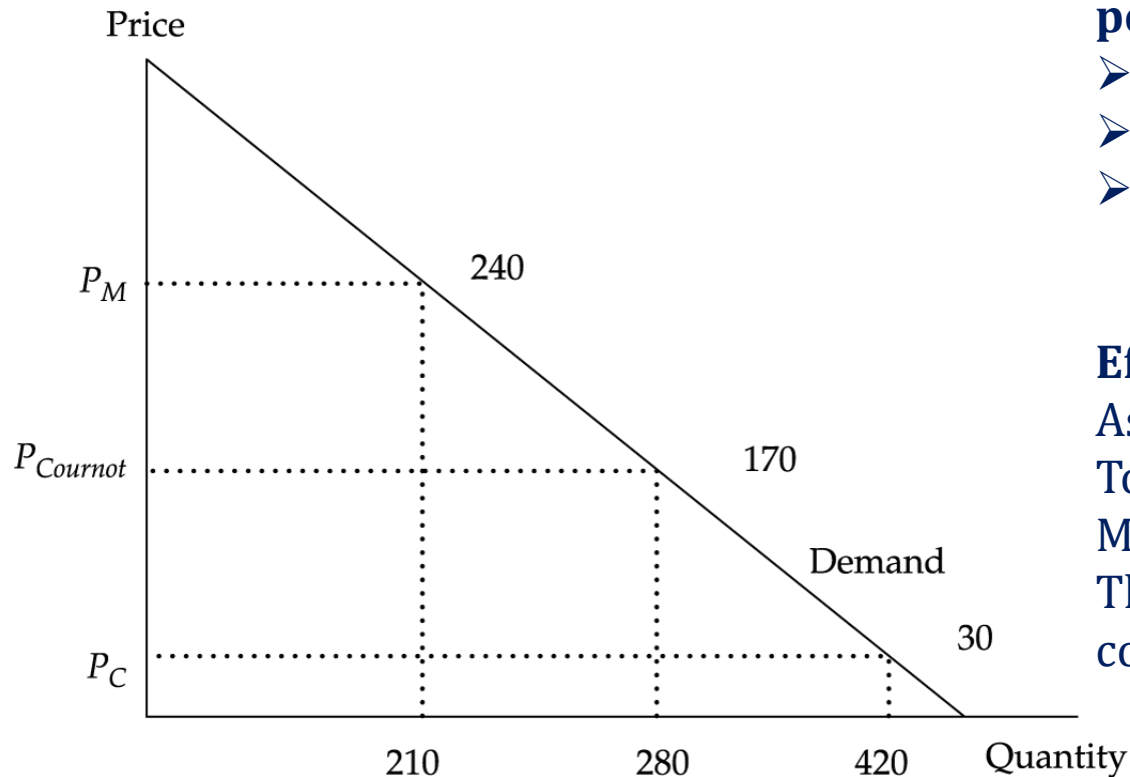
The adjustment process continues until a **long-run equilibrium** is reached, where:

- Output levels are stable.
- Market price is stable.
- Neither firm can increase profit by changing its own output, given the other firm's output.

Thus, the Cournot equilibrium occurs when **both firms are simultaneously maximizing profit and have no incentive to alter production**.

OLIGOPOLY

Market structure	Price	Quantity
Monopoly	240	210
Cournot duopoly	170	280
Perfect competition	30	420



Source: CFA Curriculum

The **Cournot equilibrium** lies between monopoly and perfect competition:

- Monopoly → highest price, lowest output.
- Perfect competition → lowest price, highest output.
- Cournot oligopoly → intermediate price and output.

Effect of Increasing the Number of Firms

As more firms enter the market:

Total output increases.

Market price decreases.

The market outcome moves closer to the perfectly competitive equilibrium.

OLIGOPOLY

3) Nash Equilibrium

The third pricing strategy is the **Nash equilibrium**, developed by **John Nash**. It is based on the idea that firms make decisions after considering the likely reactions of their competitors.

In game theory, a Nash equilibrium exists when two or more firms in a **non-cooperative** setting have no incentive to change their strategies after considering the rational choices of their rivals. Each firm chooses the strategy that maximizes its own profit, given the strategies chosen by competitors.

In an oligopoly, firms have **interdependent actions**, meaning the decisions of one firm affect the outcomes of the others. Each firm assumes that competitors will respond optimally to any change in market conditions. Therefore, every firm chooses the best strategy available under the expected reactions of its rivals.

The firms do not cooperate or collude to maximize joint profits. Instead, each firm independently seeks to maximize its own profit. Equilibrium is reached when all firms are doing the best they can given the actions of their competitors, and no firm can increase its profit by unilaterally changing its pricing strategy. At that point, no firm has an incentive to deviate from its chosen strategy.

OLIGOPOLY

ArcCo – Low Price 50 BatCo – Low Price 70	ArcCo – Low Price 80 BatCo – High Price 0
ArcCo – High Price 300 BatCo – Low Price 350	ArcCo – High Price 500 BatCo – High Price 300

Source: CFA Curriculum

OLIGOPOLY

ArcCo – Low Price 50 70 BatCo – Low Price	ArcCo – Low Price 80 0 BatCo – High Price
ArcCo – High Price 300 350 BatCo – Low Price	ArcCo – High Price 500 300 BatCo – High Price

Source: CFA Curriculum

Joint profit – Add the two firms’ profits in a cell.

- Low-Low: $50 + 70 = 120$
- Low-High: $80 + 0 = 80$
- High-Low: $300 + 350 = 650$
- High-High: $500 + 300 = 800$

Joint-profit maximum – **High-High** gives the largest combined payoff: **800**.

But Nash logic can differ – Even if **High-High** is best together, each firm asks: “Given what the other does, what’s best for me?”

Here, BatCo prefers **Low** when ArcCo is High because $350 > 300$, so the “best together” outcome is not stable without cooperation.

This is the outcome when firms do not collude. Each firm acts in its own best interest rather than maximizing joint profits, leading to the Nash equilibrium instead of the maximum joint-profit outcome.

OLIGOPOLY

Collusion and Cartels

The Nash equilibrium outcome may encourage firms to **collude** because collusion can generate higher profits than non-cooperative behavior. If firms can agree to share the gains from cooperation, they may prefer collusion. Although collusion is illegal in most countries, firms may still be tempted by the prospect of higher profits, lower cash flow uncertainty, and stronger barriers to entry.

When firms openly and formally agree to cooperate, they form a **cartel**. Collusion is sometimes successful, but competitive pressures often make it difficult to maintain.

The likelihood of successful collusion depends on several factors:

- 1) **Number and size of firms:** Collusion is more likely when there are few firms or when one firm dominates the market. It becomes more difficult as the number of firms increases or market shares become more equal.
- 2) **Product similarity:** Collusion is easier when products are homogeneous and more difficult when products are differentiated.
- 3) **Cost structure:** Firms with similar cost structures are more likely to maintain collusion.
- 4) **Order size and frequency:** Frequent, regular, and relatively small orders make collusion more sustainable because they reduce the benefits of cheating.
- 5) **Retaliation:** Strong and credible retaliation discourages firms from breaking collusive agreements.
- 6) **External competition:** Higher profits from collusion can attract new competitors, making collusion harder to sustain over time.

OLIGOPOLY

4) Stackelberg

Another oligopoly strategy is the **Stackelberg model**, which is based on game theory and strategic decision making

The key difference between the **Cournot** and **Stackelberg** models is the timing of decisions:

Cournot: Firms choose output simultaneously.

Stackelberg: Firms choose output sequentially.

In the Stackelberg model, the **leader firm** chooses its output first. The **follower firm** then observes the leader's decision and chooses its own output accordingly.

This creates a **first-mover advantage** for the leader. By committing to a higher output level first, the leader can force the follower to reduce production. In some cases, the leader may overproduce aggressively to weaken, punish, or even drive out the follower. This strategy is sometimes called the "**top dog**" strategy.

OLIGOPOLY

Dominant Firm Price Leadership

Like monopolistic competition, an oligopoly does **not have a well-defined supply curve** because output and pricing decisions depend on both market demand and competitors' strategies. However, firms still follow the profit-maximizing rule: $MR = MC$

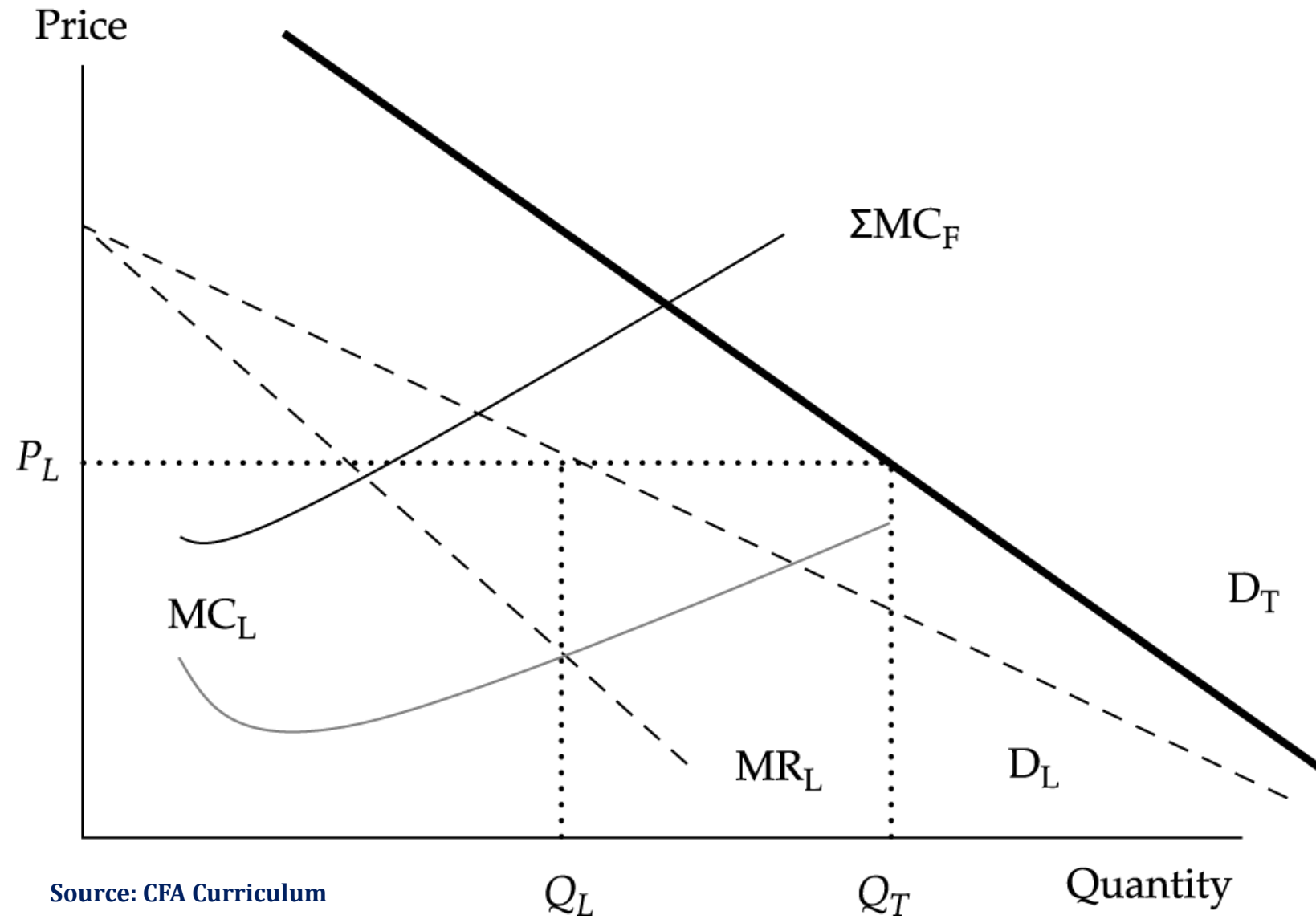
The profit-maximizing output is determined where **marginal revenue equals marginal cost**, while the price is determined from the demand curve based on what consumers are willing to pay for that quantity.

In some oligopoly markets, one firm becomes the **dominant firm** and acts as the **price leader**. A dominant firm typically has a market share of **40% or more** and may achieve this position because of: Greater production capacity, lower costs, first-mover advantage, strong customer loyalty.

When there is **no collusion**, the dominant firm acts as the price maker and behaves similarly to a monopoly within its portion of the market. The remaining firms become **price followers** and generally adopt the pricing decisions of the dominant firm.

Followers usually do not undercut the dominant firm's price because the dominant firm often has lower production costs. Attempting to start a price war against a lower-cost producer could threaten their profitability or survival. As a result, followers typically accept the dominant firm's pricing leadership.

OLIGOPOLY



Source: CFA Curriculum

OLIGOPOLY

There is **no single optimal pricing model** for all oligopoly markets because firms are interdependent and must consider competitors' actions.

- **Kinked Demand Curve:** The optimal price is the prevailing price at the kink, but the model does not explain how that price was originally established.
- **Dominant Firm Model:** The dominant firm chooses output where **MR = MC** and sets the market price. Follower firms generally accept the leader's price.
- **Cournot Model:** Each firm assumes competitors will not change their output and selects its profit-maximizing output where **MR = MC**.
- **Nash Equilibrium:** Each firm chooses the best strategy given competitors' expected reactions. Adjustments continue until prices and output become stable.

In all oligopoly models, **price and output depend on competitors' behavior**, making the individual firm's equilibrium price and output uncertain.

OLIGOPOLY

Firms in oligopoly markets can earn **long-run economic profits**, but these profits tend to attract new competitors.

As new firms enter the market, they become more efficient over time, causing their marginal costs to decline. Increased competition reduces the dominant firm's market share.

In the long run, firms must consider the likely reactions of competitors when developing pricing strategies. **Price wars should generally be avoided** because any increase in market share is usually temporary, while lower prices reduce total revenue for all firms in the market.

Innovation may help a firm maintain market leadership, although it can sometimes be costly and uneconomical.

PRACTICE

Question 1: Kinked Demand and Marginal Revenue Discontinuity

In a non-collusive oligopoly where firms match price decreases but ignore price increases, which statement best explains why the prevailing price may remain stable despite moderate changes in marginal cost?

- A. The demand curve is perfectly elastic at the prevailing price.
- B. The marginal revenue curve is continuous and upward sloping around the prevailing price.
- C. The marginal revenue curve is discontinuous at the kink, allowing marginal cost to vary within a range without changing optimal price.

Correct Answer: C — The kinked demand curve produces a vertical gap in marginal revenue. As long as marginal cost shifts within this discontinuity, the profit-maximizing condition ($MR = MC$) yields the same price and output, explaining price rigidity.

Question 2: Limitation of the Kinked Demand Model

Which of the following is the primary criticism of the kinked demand curve model?

- A. It fails to incorporate interdependence among firms.
- B. It does not determine how the prevailing price is initially established.
- C. It assumes homogeneous products only.

Correct Answer: B — The model explains price stability once a prevailing price exists but does not provide a mechanism for determining how that price was originally set, making it incomplete.

PRACTICE

Question 3: Cournot Duopoly Equilibrium

In a two-firm Cournot model with linear demand and identical constant marginal costs, which outcome characterizes the equilibrium relative to perfect competition?

- A. Higher price and lower total output than perfect competition.
- B. Lower price and higher total output than perfect competition.
- C. Identical price and output to perfect competition.

Correct Answer: A — The Cournot equilibrium yields a price above marginal cost and a total output below the competitive level because firms restrict quantity while assuming rivals' output remains fixed.

Question 4: Cournot versus Monopoly and Competition

As the number of firms increases in a Cournot framework, equilibrium price and output will:

- A. Converge toward the monopoly outcome.
- B. Remain unchanged regardless of the number of firms.
- C. Move toward the competitive equilibrium.

Correct Answer: C — With more firms, individual market power declines, increasing total output and reducing price toward the competitive level where price equals marginal cost.

PRACTICE

Question 5: Nash Equilibrium in Oligopoly

In a non-cooperative oligopoly, a Nash equilibrium occurs when:

- A. Firms maximize joint profits through coordinated pricing.
- B. Each firm chooses its best strategy given rivals' strategies, with no incentive for unilateral deviation.
- C. Firms produce where price equals average cost and earn zero economic profit.

Correct Answer: B — A Nash equilibrium exists when each firm optimizes given the actions of competitors and no firm can increase profit by changing its strategy alone.

Question 6: Incentive to Deviate from Collusion

Why is a jointly profit-maximizing high-price outcome often unstable in a duopoly without enforceable agreements?

- A. Each firm can increase its own profit by undercutting while rivals maintain high prices.
- B. Consumers prefer low prices regardless of market structure.
- C. Marginal cost always exceeds marginal revenue at high prices.

Correct Answer: A — In non-cooperative settings, a firm can gain by lowering price while others maintain high prices, creating an incentive to deviate from collusive arrangements.

PRACTICE

Question 7: Determinants of Successful Collusion

Collusion is more likely to succeed when:

- A. Products are highly differentiated and firms have dissimilar cost structures.
- B. Orders are infrequent and large, increasing short-term gains from cheating.
- C. The number of firms is small and cost structures are similar.

Correct Answer: C — A small number of firms with similar costs and homogeneous products reduces incentives and opportunities to cheat, supporting stable collusion.

Question 8: Stackelberg versus Cournot Competition

Compared with the simultaneous-move Cournot model, the Stackelberg model predicts that the leader firm will:

- A. Earn lower profits because it commits first.
- B. Earn higher profits due to its first-mover advantage.
- C. Produce less output than in the Cournot equilibrium.

Correct Answer: B — By committing first, the leader influences the follower's output decision and secures a larger profit than under simultaneous Cournot competition.

PRACTICE

Question 9: Dominant Firm Price Leadership

In a dominant firm oligopoly without collusion, the price leader determines output by:

- A. Equating marginal revenue from its residual demand with its marginal cost.
- B. Equating industry demand with industry marginal cost.
- C. Setting price equal to the marginal cost of follower firms.

Correct Answer: A — The dominant firm faces residual demand (total demand minus follower supply) and maximizes profit where its marginal revenue equals its marginal cost.

Question 10: Long-Run Dynamics in Oligopoly

In the long run, economic profits earned by a dominant oligopolist tend to decline primarily because:

- A. Marginal cost necessarily rises over time.
- B. Government regulation eliminates pricing power.
- C. Entry and technological adaptation reduce market share and shrink residual demand.

Correct Answer: C — Profits attract entry, and rivals adopt improved technologies, reducing the dominant firm's demand and marginal revenue, which diminishes long-run profitability.

LOS: identify the type of market structure within which a firm operates and describe the use and limitations of concentration measures.

DETERMINING MARKET STRUCTURE

DETERMINING MARKET STRUCTURE

Monopolies and firms with significant pricing power can be inefficient because they restrict output and charge higher prices, reducing consumption. For this reason, many countries use **competition (antitrust) laws** to preserve competition.

In practice, determining whether a firm has excessive market power is often difficult. Regulators must assess whether firms are behaving like monopolies or whether actions such as mergers could create excessive market concentration.

DETERMINING MARKET STRUCTURE

Examples of competition law enforcement include:

- Punishing firms for **price-fixing** and collusion.
- Breaking up monopolies to increase competition and lower prices.
- Blocking mergers that may create excessive market concentration.

A key challenge for regulators is measuring market power and predicting the competitive effects of future events, such as mergers.

For financial analysts, proposed mergers should always be evaluated from a competition-law perspective because regulators may block transactions that threaten market competition.

DETERMINING MARKET STRUCTURE

Market power can be measured by estimating the **elasticity of demand and supply**. A highly elastic demand suggests a market close to perfect competition, whereas inelastic demand may indicate market power.

A challenge is that observed prices and quantities are **equilibrium values**, jointly determined by supply and demand. This creates the problem of **endogeneity**, meaning demand and supply cannot be estimated separately from observed market outcomes alone.

DETERMINING MARKET STRUCTURE

To estimate elasticity properly, economists use:

- A **demand equation** (price, income, and other factors).
- A **supply equation** (price, production costs, and other factors).

Regression analysis is commonly used to estimate these relationships.

Two common approaches are:

- **Time-series analysis:** Uses market data over many years. A limitation is that market structure may change over time, making historical estimates less relevant to current conditions.
- **Cross-sectional analysis:** Uses data from different firms, buyers, or transactions at a single point in time. This approach requires extensive data collection and results can vary depending on the variables chosen.

The estimated demand and supply relationships can then be used to calculate elasticity and assess market power.

DETERMINING MARKET STRUCTURE

Measuring Market Concentration / Market Power

The two measures are:

- **Concentration Ratio (CR_n):** adds the market shares of the largest firms.
- **Herfindahl-Hirschman Index HHI:** squares each firm's market share and then adds them.

Both are used to assess how concentrated a market is and whether firms may have pricing power.

The concentration ratio adds the market shares of the largest **N firms** in the market. For example, the market share of the largest 10 firms is added and divided by total market sales.

The ratio ranges from:

- **0** → close to perfect competition
- **100%** → monopoly

Its main advantage is that it is easy to calculate.

However, it has limitations. A high concentration ratio does not always mean strong market power, because if entry barriers are low, potential competitors may force the incumbent firm to price competitively.

Another limitation is that the concentration ratio may not clearly show the effect of mergers among leading firms. If the two largest firms merge, pricing power may increase, but the concentration ratio may not change much.

DETERMINING MARKET STRUCTURE

The **Herfindahl–Hirschman Index (HHI)** measures market concentration by **squaring each firm's market share and then summing the squared shares**.

- **HHI = 1** for a monopoly (one firm controls 100% of the market).
- If **M firms have equal market shares**, then: $HHI = \frac{1}{M}$

Because market shares are squared, **larger firms receive more weight**, making HHI more sensitive to market concentration than concentration ratios.

Interpretation:

An **HHI of 0.20** is equivalent to a market shared equally by **5 firms** ($1/5 = 0.20$).

DETERMINING MARKET STRUCTURE

Example: Objective: Measure market concentration before and after a merger to assess whether market power has increased. Assume that **Firm A and Firm B merge into a single company**.

Market shares (before merger)

Firm	Share (%)	Share (decimal)
A	34	0.34
B	22	0.22
C	16	0.16
D	11	0.11
E	6	0.06
F	4	0.04
G	3	0.03
H	2	0.02
I	2	0.02
Total	100	1.00

Concentration Ratios (Before Merger)

CR₃ (Top 3 Firms) $CR_3 = 34\% + 22\% + 16\% = 72\%$

CR₄ (Top 4 Firms) $CR_4 = 34\% + 22\% + 16\% + 11\% = 83\%$

Concentration Ratios (After Merger)

CR₃ (Top 3 Firms) $CR_3 = 56\% + 16\% + 11\% = 83\%$

CR₄ (Top 4 Firms) $CR_4 = 56\% + 16\% + 11\% + 6\% = 89\%$

Note: After the merger, the largest firm's market share increases from **34% to 56%**, while **CR₃ increases from 72% to 83%** and **CR₄ increases from 83% to 89%**.

DETERMINING MARKET STRUCTURE

HHI calculation (shows why it can react more strongly)

HHI for top three firms (before merger)

Firm	Share (%)	Share (decimal)
A	34	0.34
B	22	0.22
C	16	0.16
D	11	0.11
E	6	0.06
F	4	0.04
G	3	0.03
H	2	0.02
I	2	0.02
Total	100	1.00

HHI for Top Three Firms (Before Merger)

Use decimal shares and square each:

➤ $0.34^2 = 0.1156$

➤ $0.22^2 = 0.0484$

➤ $0.16^2 = 0.0256$

Add them: $HHI_{top3,before} = 0.1156 + 0.0484 + 0.0256 = 0.1896$

HHI for Top Three Firms (After Merger)

Top three firms are **AB, C, and D**:

➤ $0.56^2 = 0.3136$

➤ $0.16^2 = 0.0256$

➤ $0.11^2 = 0.0121$

Add them: $HHI_{top3,after} = 0.3136 + 0.0256 + 0.0121 = 0.3513$

Observation: HHI increases substantially after the merger because squaring places much greater weight on large market shares.

DETERMINING MARKET STRUCTURE

Measure	Main Advantage	Main Disadvantage
Concentration Ratio (CR_n)	Simple and easy to compute.	Does not directly measure market power and may not reflect the impact of mergers well.
Herfindahl–Hirschman Index (HHI)	Gives more weight to large firms, so it better captures market concentration and merger effects.	Does not account for potential entry or demand elasticity.

DETERMINING MARKET STRUCTURE

Suppose a market has **3 suppliers** with market shares of **50 percent, 35 percent, and 15 percent**.

- 1) Calculate the **concentration ratio of the top two firms**.
- 2) Calculate the **HHI for the entire market**.
- 3) Interpret the HHI in terms of an equivalent number of equally sized firms.

Calculate the **concentration ratio of the top two firms**.

$$CR_2 = 50\% + 35\% = 85\%$$

Calculate the **HHI for the entire market**.

$$HHI = 0.50^2 + 0.35^2 + 0.15^2 = 0.25 + 0.1225 + 0.0225 = 0.395$$

Interpret the HHI in terms of an equivalent number of equally sized firms.

$$\text{Equivalent equal firms} = 1 / 0.395 \approx 2.53 \text{ equally sized firms.}$$

PRACTICE

Question 1: Limitations of the HHI for Analysts

Although widely used by regulators, the HHI has limited usefulness for forecasting firm profitability because it does not directly account for:

- A. Squared market shares
- B. Potential entry and demand elasticity
- C. Industry revenue growth

Correct Answer: B — Like the concentration ratio, the HHI omits consideration of entry conditions and demand responsiveness, both critical for assessing sustainable market power.

Question 2: Concentration Ratio and Mergers

When two leading firms merge, the concentration ratio may understate the increase in market power because it:

- A. Remains capped at 50 percent
- B. Excludes smaller firms from calculation
- C. May change only modestly despite a significant shift in dominance

Correct Answer: C — The concentration ratio aggregates shares but does not fully capture the increased dominance of a merged leading firm.

PRACTICE

Question 3: Merger Analysis and Financial Implications

When evaluating a proposed merger, a financial analyst should be most concerned that competition authorities may block the deal if it:

- A. Increases economies of scale
- B. Results in excessive market concentration
- C. Improves operating margins

Correct Answer: B — Regulators focus on whether a merger substantially reduces competition or creates dominance that could harm market efficiency.

Question 4: Measuring Market Power through Elasticity

A market characterized by highly elastic demand is most consistent with:

- A. Significant pricing power
- B. A market close to perfect competition
- C. High barriers to entry

Correct Answer: B — Highly elastic demand implies firms cannot raise prices without losing substantial sales, indicating limited market power.

PRACTICE

Question 5: Endogeneity in Estimating Demand

Observed market price and quantity cannot directly identify the demand curve because:

- A. Demand is independent of supply
- B. Prices are administratively determined
- C. Price and quantity are jointly determined by supply and demand

Correct Answer: C — Equilibrium price and quantity reflect simultaneous interaction of supply and demand, creating an endogeneity problem in single-equation estimation.

Question 6: Two-Equation Econometric Model

To consistently estimate demand elasticity in the presence of endogeneity, an analyst should:

- A. Specify separate equations for demand and supply
- B. Regress quantity solely on price
- C. Use average historical price data

Correct Answer: A — A system of equations distinguishing demand and supply allows proper identification of structural parameters.

PRACTICE

Question 7: Time-Series Estimation Limitation

Using long-term historical sales data to estimate demand elasticity may be misleading if:

- A. Data frequency is quarterly
- B. Market structure changes over time
- C. Production costs remain constant

Correct Answer: B — Structural shifts such as mergers or regulatory changes may render past elasticity estimates irrelevant for the current market.

Question 8: Cross-Sectional Regression Challenges

A cross-sectional approach to estimating demand elasticity is complicated primarily because it:

- A. Requires extensive data collection and careful variable specification
- B. Eliminates endogeneity concerns entirely
- C. Uses only aggregate national income data

Correct Answer: A — Cross-sectional estimation demands detailed firm- or transaction-level data and results may vary significantly with model specification.

PRACTICE

Question 9: Interpretation of the Concentration Ratio

A high concentration ratio does not necessarily imply strong pricing power because it:

- A. Measures squared market shares
- B. Ignores potential entry and competitive threats
- C. Always declines after mergers

Correct Answer: B — Even a highly concentrated market may behave competitively if barriers to entry are low and potential entrants constrain pricing.