ECON102 NOTES

Chapter 15: Firms in Competitive Market

Competitive Market

- A market with many buyers and sellers trading identical products so that each buyer and seller is a price taker.
- Perfectly Competitive Market
- Has two characteristics
    - The market has many buyers and many sellers
    - The goods offered by the various sellers are largely the same.
    - Sometimes, firms can freely enter or exit the market

Average Revenue

- Total revenue divided by the amount of output (quantity sold)
- Average revenue is total revenue (P 3 Q) divided by quantity (Q). **Therefore, for all types of firms, average revenue equals the price of the goods.**

Marginal Revenue

- The change in total revenue from the sale of each additional unit of output.
- **Therefore, for competitive firms, marginal revenue equals the price of the good.**

Table 1
Total, Average, and Marginal Revenue for a Competitive Firm

(1) Quantity (Q)	(2) Price (P)	(3) Total Revenue (TR = P × Q)	(4) Average Revenue (AR = TR / Q)	(5) Marginal Revenue (MR = ΔTR / ΔQ)
1 gallon	$6	$6	$6	
				$6
2	6	12	6	
				6
3	6	18	6	
				6
4	6	24	6	
				6
5	6	30	6	
				6
6	6	36	6	
				6
7	6	42	6	
				6
8	6	48	6	

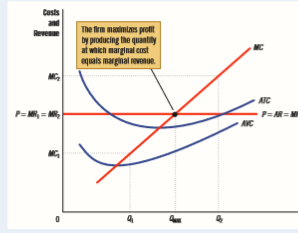
The goal of a firm is to maximize profit.

Table 2
Profit Maximization: A Numerical Example

(1) Quantity (Q)	(2) Total Revenue (TR)	(3) Total Cost (TC)	(4) Profit (TR − TC)	(5) Marginal Revenue (MR = ΔTR / ΔQ)	(6) Marginal Cost (MC = ΔTC / ΔQ)	(7) Change in Profit (MR − MC)
0 gallons	$0	$3	−$3			
				$6	$2	$4
1	6	5	1			
				6	3	3
2	12	8	4			
				6	4	2
3	18	12	6			
				6	5	1
4	24	17	7			
				6	6	0
5	30	23	7			
				6	7	−1
6	36	30	6			
				6	8	−2
7	42	38	4			
				6	9	−3
8	48	47	1			

Figure 1
Profit Maximization for a Competitive Firm

This figure shows the marginal-cost curve (*MC*), the average-total-cost curve (*ATC*), and the average-variable-cost curve (*AVC*). It also shows the market price (*P*), which for a competitive firm equals both marginal revenue (*MR*) and average revenue (*AR*). At the quantity Q_1, marginal revenue MR_1 exceeds marginal cost MC_1, so raising production increases profit. At the quantity Q_2, marginal cost MC_2 is above marginal revenue MR_2, so reducing production increases profit. The profit-maximizing quantity, Q_{MAX}, is found where the horizontal line representing the price intersects the marginal-cost curve.



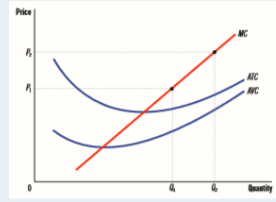
This analysis yields three rules for profit maximization:

- If marginal revenue exceeds marginal cost, the firm should increase its output.
- If marginal cost exceeds marginal revenue, the firm should decrease its output.
- At the profit-maximizing level of output, marginal revenue equals marginal cost.

Because the firm's marginal-cost curve determines the quantity of the good the firm is willing to supply at any price, the marginal-cost curve is also the competitive firm's supply curve.

Figure 2
Marginal Cost as the Competitive Firm's Supply Curve

An increase in the price from P_1 to P_2 leads to an increase in the firm's profit-maximizing quantity from Q_1 to Q_2. Because the marginal-cost curve shows the quantity supplied at any price, it is the firm's supply curve.



Firm's Temporary Shutdown vs Permanent Exit

Shutdown

- refers to a short-run decision not to produce anything during a specific period because of current market conditions.

Exit

- refers to a long-run decision to leave the market.

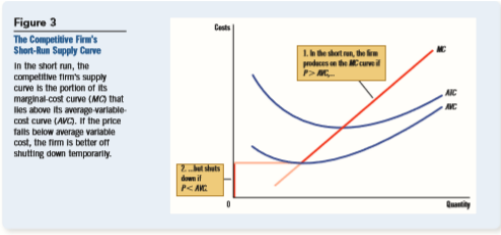
The short-run and long-run decisions differ because most firms cannot avoid their fixed costs in the short run but can do so in the long run. That is, a firm that shuts down temporarily still **must pay its fixed costs**, while a firm that exits the market **doesn't pay any costs at all, fixed or variable**.

What determines a firm's shutdown decision?

If the firm shuts down, it loses all revenue from the sale of its product. At the same time, it saves the variable costs of making the product (but must still pay the fixed costs). Therefore, the firm shuts down if the ***revenue that it would earn from producing is less than its variable costs of production.***

Shutdown if:

- **TR < VC**
- **TR/Q < VC/Q**
- **P < AVC**



The competitive firm's short-run supply curve is the portion of its marginal-cost curve that lies above the average-variable-cost curve.

Sunk Cost

- A cost that has already been committed and cannot be recovered.

The firm exits the market **if the revenue it would get from producing is less than its total cost of production.**

Exit if:

- **TR < TC**
- **TR/Q < TC/Q**
- **P < ATC**

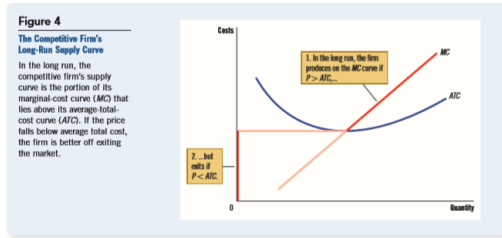
A parallel analysis applies to entrepreneurs who could establish new firms. They have an incentive to **enter** the market if doing so would be profitable, which occurs if the price exceeds average total cost.

Enter if:

- **P > ATC.**

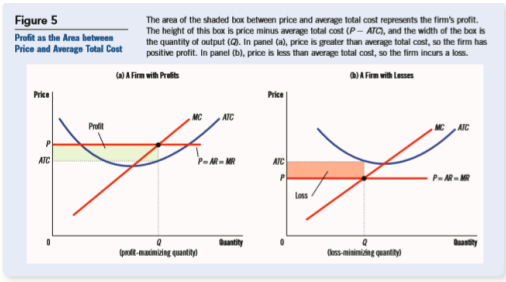
The rule for entry is exactly the opposite of the rule for exit.

We can now describe a competitive firm's long-run profit-maximizing strategy. If it produces anything, it chooses the quantity at which marginal cost equals the price of the good. Yet if the price is less than the average total cost at that quantity, the firm decides to exit (or not enter) the market. Figure 4 illustrates these results. The competitive firm's long-run supply curve is the portion of its marginal-cost curve that lies above the average-total-cost curve.



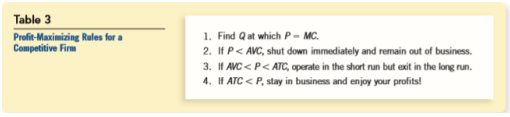
Measuring Profit in Our Graph for the Competitive Firm

- Profit = TR - TC
- Profit = (TR/Q - TC/Q) x Q
- Profit = (P - ATC) x Q



Panel (a) of Figure 5 shows a firm earning positive profit. As we have already discussed, the firm maximizes profit by producing the quantity at which price equals marginal cost. Now look at the shaded rectangle. The height of the rectangle is P 2 ATC, the difference between price and average total cost. The width of the rectangle is Q, the quantity produced. Therefore, the area of the rectangle is (P 2 ATC) 3 Q, which is the firm's profit.

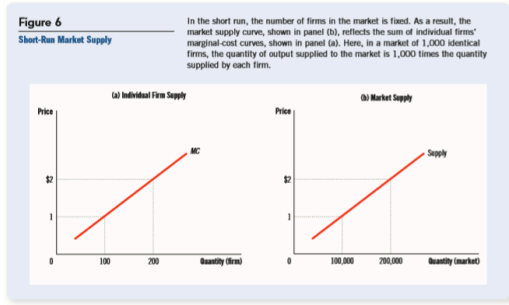
Similarly, panel (b) of this figure shows a firm with losses (negative profit). In this case, maximizing profit means minimizing losses, a task accomplished once again by producing the quantity at which price equals marginal cost. Now consider the shaded rectangle. The height of the rectangle is ATC 2 P, and the width is Q. The area is (ATC 2 P) 3 Q, which is the firm's loss. Because a firm in this situation is not making enough revenue on each unit to cover its average total cost, it would exit the market in the long run.



The supply curves for entire markets are built on the supply decisions of individual firms. There are two cases to consider:

(1) markets with a fixed number of firms and,

(2) markets in which firms can enter and exit.

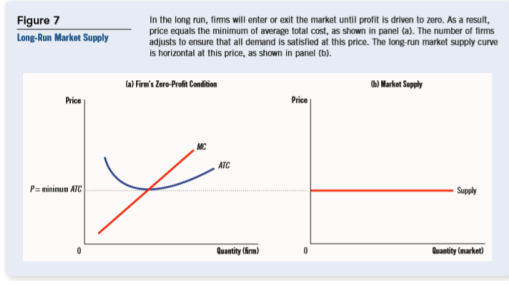


At the end of this process of entry and exit, firms that remain in the market must be making zero economic profit.

** The process of entry and exit ends only when price and average total cost are driven to equality.*

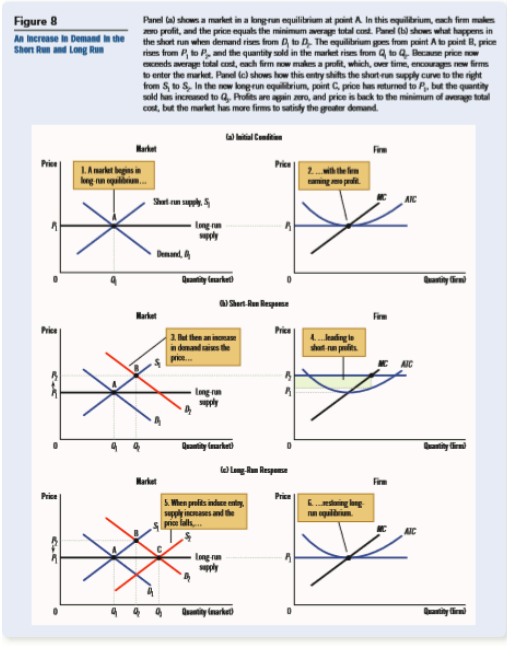
Recall from the preceding chapter that economists use the term **efficient scale** to **describe the level of production with the lowest average total cost.**

Therefore, in the long-run equilibrium of a competitive market with free entry and exit, firms operate at their efficient scale.



Panel (a) of Figure 7 shows a firm in such a long-run equilibrium. In this figure, price P equals marginal cost MC, so the firm is maximizing profit. Price also equals average total cost ATC, so profit is zero.

New firms have no incentive to enter the market, and existing firms have no incentive to leave the market. From this analysis of firm behavior, we can determine the long-run supply curve for the market. In a market with free entry and exit, there is only one price consistent with zero profit—the minimum of average total cost. As a result, the long-run market supply curve must be horizontal at this price, as illustrated by the perfectly elastic supply curve in panel (b) of Figure 7. Any price above this level would generate profits, leading to entry and an increase in the total quantity supplied. Any price below this level would generate losses, leading to exit and a decrease in the total quantity supplied. Eventually, the number of firms in the market adjusts so that price equals the minimum of average total cost, and there are enough firms to satisfy all the demand at this price.



Because firms can enter and exit more easily in the long run than in the short run, the long-run supply curve is typically more elastic than the short-run supply curve.

Chapter 16: Monopoly

*While a **competitive** firm is a **price taker**, a **monopoly** firm is a **price maker**.*

Monopoly

- A firm that is the sole seller of a product without close substitutes.
- The fundamental cause of monopoly is **barriers to entry:** A monopoly remains the only seller in its market because other firms can't enter and compete with it. Barriers to entry, in turn, have 3 main sources:
    1. **Monopoly resources:** A single firm owns a key resource required for production.
    2. **Government regulation:** The government gives a single firm the exclusive right to produce a good or service.
    3. **The production process:** A single firm can produce output at a lower cost than a larger number of firms can.

Natural Monopoly

- A type of monopoly that arises because a single firm can supply a good or service to an entire market at a lower cost than could two or more firms.
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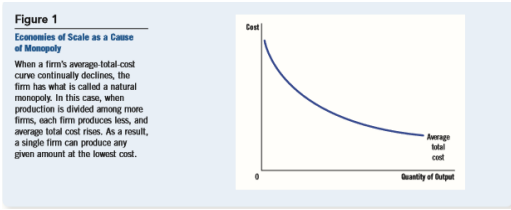
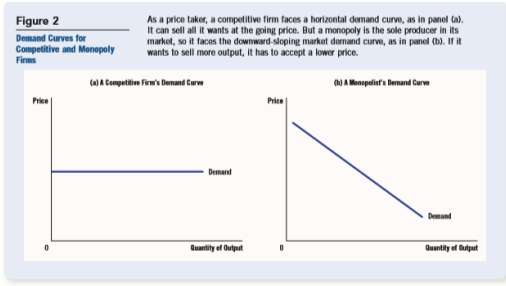
** Club goods are excludable but non-rival, meaning their use can be restricted to paying members, but one person's consumption does not prevent others from consuming them. Examples include cable television, private gyms, toll roads, and streaming services.*



Monopoly vs Competition

The key difference between a competitive firm and a monopoly is the monopoly's ability to influence the price of its output. A competitive firm is small relative to the market in which it operates and, therefore, has no power to influence the price of its output. You could also take a look at both demand curves.



A Monopoly's Revenue

Table 1
A Monopoly's Total, Average, and Marginal Revenue

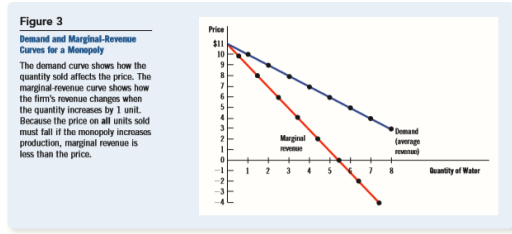
(1) Quantity of Water (Q)	(2) Price (P)	(3) Total Revenue (TR = P × Q)	(4) Average Revenue (AR = TR/Q)	(5) Marginal Revenue (MR = ΔTR/ΔQ)
0 gallons	$11	$0	—	
				$10
1	10	10	$10	
				8
2	9	18	9	
				6
3	8	24	8	
				4
4	7	28	7	
				2
5	6	30	6	
				0
6	5	30	5	
				−2
7	4	28	4	
				−4
8	3	24	3	

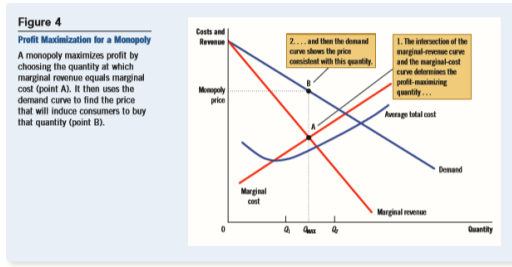
A monopolist's marginal revenue is less than the price of its goods.

Marginal revenue for monopolies is very different from marginal revenue for competitive firms. When a monopoly increases the amount it sells, there are two effects on total revenue (P x Q):

- **The output effect**: More output is sold, so Q is higher, which increases total revenue.
- **The price effect:** The price falls, so P is lower, which decreases total revenue.

Profit Maximization





The monopolist's profit-maximizing quantity of output is determined by the intersection of the marginal-revenue curve and the marginal-cost curve.

No supply curve for Monopoly

- *A supply curve tells us the quantity that firms choose to supply at any given price. This concept makes sense for competitive firms, which are price takers. But a monopoly is a price maker, not a price taker. It is not meaningful to ask what amount such a firm would produce at any given price because it does not take the price as given. Instead, when the firm chooses the quantity to supply, that decision—along with the demand curve—determines the price.*

For competitive firm

P = MR = MC

For a monopoly firm

P > MR = MC

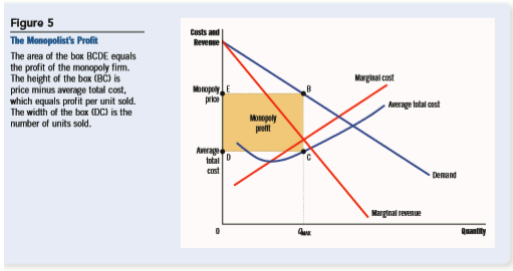
In competitive markets, price equals marginal cost. In monopolized markets, price exceeds marginal cost.

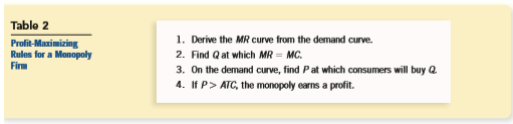
Monopoly's Profit

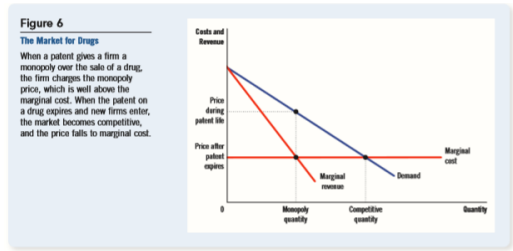
Profit = TR - TC

Profit = (TR/Q -TC/Q) x Q

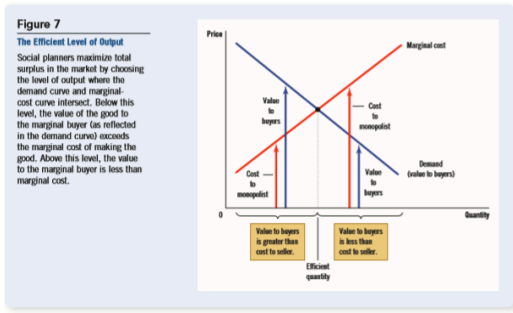
Profit = (P - ATC) x Q



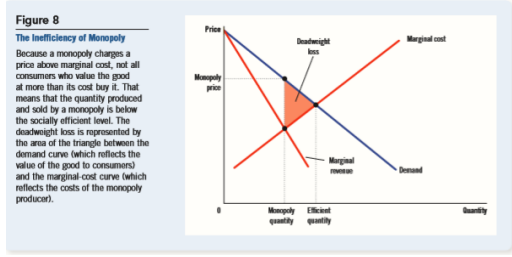




The socially efficient quantity is found where the demand curve and the marginal-cost curve intersect.



The monopolist produces less than the socially efficient quantity of output.

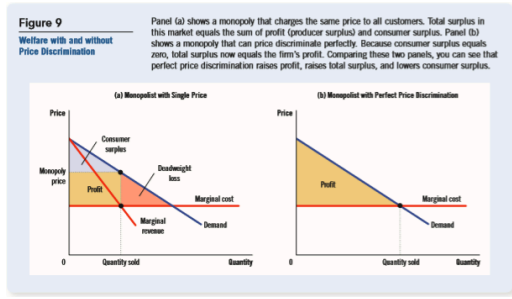


Price Discrimination

- The business practice of selling the same goods at different prices to different customers.
- Also called sometimes by marketing experts as **price customization.**

Perfect Price Discrimination

- A situation in which the monopolist knows exactly each customer's willingness to pay and can charge each customer a different price.



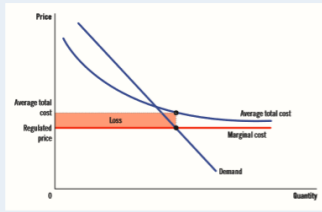
Increasing Competition with Antitrust Laws

Traditionally, the courts are especially wary of **horizontal mergers**, those between two firms in the same market, like Coca-Cola and PepsiCo. They are less likely to block **vertical mergers**, those between firms at different stages of the production process, such as a merger between a tire company and an auto company. The government derives this power over private industry from **antitrust laws**, statutes aimed at curbing monopoly power. Sometimes, companies combine to lower costs through more efficient joint production. These advantages are called **synergies.**

Figure 10

Marginal-Cost Pricing for a Natural Monopoly

Because a natural monopoly has declining average total cost, marginal cost is less than average total cost. Therefore, if regulators require a natural monopoly to charge a price equal to marginal cost, the price will be below average total cost, and the monopoly will lose money.



The third policy for dealing with monopoly is public ownership. That is, rather than regulating a natural monopoly run by a private firm, a government unit can run the monopoly itself.

Table 3

Competition versus Monopoly: A Summary Comparison

	Competition	Monopoly
Similarities		
Goal of firms	Maximize profits	Maximize profits
Rule for maximizing	$MR = MC$	$MR = MC$
Can earn economic profits in the short run?	Yes	Yes
Differences		
Number of firms	Many	One
Marginal revenue	$MR = P$	$MR < P$
Price	$P = MC$	$P > MC$
Produces welfare-maximizing level of output?	Yes	No
Entry in the long run?	Yes	No
Can earn economic profits in the long run?	No	Yes
Price discrimination possible?	No	Yes

Chapter 17: Monopolistic Competition

Imperfect Competition

- Describes market structures that are less competitive than perfect competition, where firms can influence prices, differentiate products, and face barriers to entry or exit.

Oligopoly

- A market structure in which only a few sellers offer similar or identical products.

Economists often measure a market's domination by a small number of firms with a statistic called the concentration ratio, which is the percentage of total output in the market supplied by the four largest firms.

Monopolistic Competition

- A market structure in which many firms sell products that are similar but not identical.

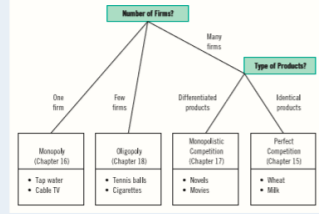
To be more precise, monopolistic competition describes a market with the following attributes:

- **Many sellers**: Numerous firms are competing for the same group of customers.
- **Product differentiation**: Each firm offers a product that is at least slightly different from those of other firms. Rather than being a price taker, each firm faces a downward-sloping demand curve.
- **Free entry and exit**: Firms can enter or exit the market without restriction. The number of firms in the market adjusts until economic profits are driven to zero.

Figure 1

The Four Types of Market Structure

Economists who study industrial organization divide markets into four types: monopoly, oligopoly, monopolistic competition, and perfect competition.



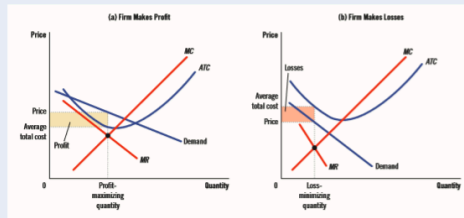
The Monopolistically Competitive Firm in the Short Run

The monopolistically competitive firm follows a monopolist's rule for profit maximization: **It produces the quantity at which marginal revenue equals marginal cost and then uses its demand curve to find the price at which it can sell that quantity.** A monopolistically competitive firm chooses its quantity and price just as a monopoly does. In the short run, these two market structures are similar.

Figure 2

Monopolistic Competitors in the Short Run

Monopolistic competitors, like monopolists, maximize profit by producing the quantity at which marginal revenue equals marginal cost. The firm in panel (a) makes a profit because, at this quantity, price is greater than average total cost. The firm in panel (b) makes losses because, at this quantity, price is less than average total cost.

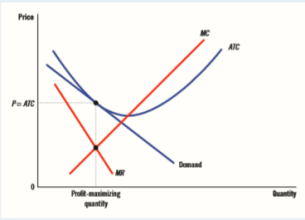


The Long-Run Equilibrium

Figure 3

A Monopolistic Competitor in the Long Run

In a monopolistically competitive market, if firms are making profits, new ones enter, causing the demand curves for the incumbent firms to shift to the left. Similarly, if firms are making losses, some of the firms in the market exit, causing the demand curves of the remaining firms to shift to the right. Because of these shifts in demand, monopolistically competitive firms eventually find themselves in the long-run equilibrium shown here. In this long-run equilibrium, price equals average total cost, and each firm earns zero profit.



To sum up, two characteristics describe the long-run equilibrium in a monopolistically competitive market:

• As in a monopoly market, price exceeds marginal cost (P > MC). This occurs because profit maximization requires marginal revenue to equal marginal cost (MR = MC) and because the downward-sloping demand curve makes marginal revenue less than the price (MR < P).

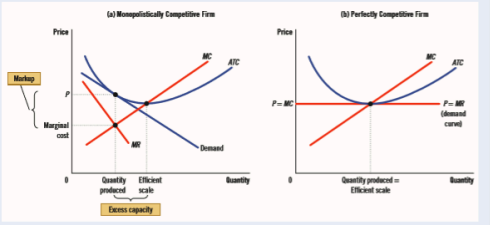
• As in a perfectly competitive market, price equals average total cost (P = ATC). This arises because free entry and exit drive economic profit to zero in the long run.

Monopolistic vs Perfect Competition

Figure 4

Monopolistic versus Perfect Competition

Panel (a) shows the long-run equilibrium in a monopolistically competitive market, and panel (b) shows the long-run equilibrium in a perfectly competitive market. Two differences are notable. (1) The perfectly competitive firm produces at the efficient scale, where average total cost is minimized. By contrast, the monopolistically competitive firm produces at less than the efficient scale. (2) Price equals marginal cost under perfect competition, but price is above marginal cost under monopolistic competition.



The quantity that minimizes average total cost is called the efficient scale of the firm. In the long run, perfectly competitive firms produce at the efficient scale, while monopolistically competitive firms produce below this level. Firms are said to have excess capacity under monopolistic competition. In other words, a monopolistically competitive firm, unlike a perfectly competitive firm, could increase the quantity it produces and lower the average total cost of production. The firm forgoes this opportunity because, to sell the additional output, it would need to cut its price for all the units it produces. It is more profitable for a monopolistic competitor to continue operating with excess capacity.

Another source of inefficiency under monopolistic competition is that the number of firms in the market may not be ideal. That is, there may be too much or too little entry. Think of the externalities associated with entry. Whenever a new firm considers entering the market with a new product, it takes into account only the profit it would make. Yet its entry would also have two effects that are external to the firm:

• **The product-variety externality**: Because consumers benefit from the introduction of a new product, the entry of a new firm confers a positive externality on consumers.

• **The business-stealing externality**: Because other firms lose customers and profits when faced with a new competitor, the entry of a new firm imposes a negative externality on existing firms.

Table 1

Monopolistic Competition: Between Perfect Competition and Monopoly

	Market Structure		
	Perfect Competition	Monopolistic Competition	Monopoly
Features that all three market structures share			
Goal of firms	Maximize profits	Maximize profits	Maximize profits
Rule for maximizing	$MR = MC$	$MR = MC$	$MR = MC$
Can earn economic profits in the short run?	Yes	Yes	Yes
Features that monopolistic competition shares with monopoly			
Price taker?	Yes	No	No
Price	$P = MC$	$P > MC$	$P > MC$
Produces welfare-maximizing level of output?	Yes	No	No
Features that monopolistic competition shares with perfect competition			
Number of firms	Many	Many	One
Entry in the long run?	Yes	Yes	No
Can earn economic profits in the long run?	No	No	Yes

Chapter 18: Oligopoly

Oligopoly

- A market structure in which only a few sellers offer similar or identical products

Game Theory

- The study of how people behave in strategic situations.By "strategic," we mean a situation in which people, when choosing a course of action, must anticipate how others might respond to their choice.

Consider the simplest type of oligopoly, one with only <u>two members</u>, called a ***duopoly.***

Collusion

- An agreement among firms in a market about quantities to produce and prices to charge.

Cartel

- A group of firms acting in unison.

Nash Equilibrium

- A situation in which economic actors interacting with one another each choose their best strategy that all the other actors have chosen.

Example: In this case, once Jill is producing 40 gallons, the best strategy for Jack is also to produce 40 gallons. Similarly, once Jack is producing 40 gallons, the best strategy for Jill is also to produce 40 gallons. At this Nash equilibrium, neither Jack nor Jill has an incentive to make a different decision.

- This example shows the tension between cooperation and self-interest that is the essence of oligopolies. Oligopolists would be better off cooperating to attain the monopoly outcome.

In summary, when firms in an oligopoly individually choose production to maximize profit, they produce a quantity greater than the level produced by a monopoly and less than the level produced under perfect competition. The oligopoly price is less than the monopoly price but greater than the competitive price (which equals marginal cost).

In making this decision, the owner weighs two effects:

• **The output effect**: Because price exceeds marginal cost, selling one more gallon of water at the going price increases profit.

• **The price effect**: Because raising production increases the total quantity sold, the price of water declines, as does the profit on all the other gallons sold.

In summary, as the number of sellers in an oligopoly grows, an oligopolistic market increasingly resembles a competitive market. The price approaches marginal cost, and the quantity produced approaches the socially efficient level.

Prisoners' Dilemma

- A particular "game" between two captured prisoners that illustrates why cooperation is difficult to maintain even when it is mutually beneficial.
- A classic game theory scenario showing that two rational individuals, acting in their own self-interest, may not achieve the best outcome for both.

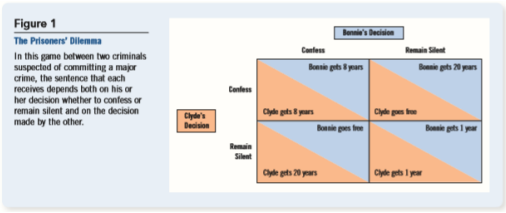
Payoff Matrix

- A table that visualizes the strategies and outcomes for two or more players in a strategic

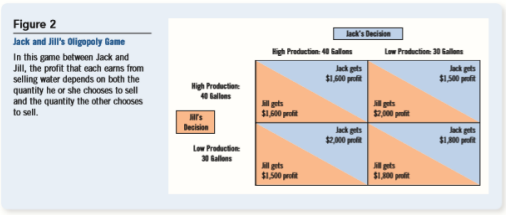
situation, such as a game or a business decision.

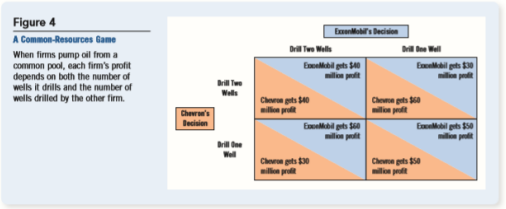
Dominant Strategy

- A strategy that is best for a player in a game regardless of the strategies chosen by the other players.



Oligopolies as a Prisoners' Dilemma





Put differently, the invisible hand guides markets to allocate resources efficiently only when markets are competitive, and markets are competitive only when firms in the market fail to cooperate with one another. Similarly, consider the case of the police questioning two suspects. Lack of cooperation between the suspects is desirable for society because it allows the police to convict more criminals. The prisoners' dilemma is a dilemma for the prisoners, but it can be a boon to everyone else.

Bundling

- a strategy where a company sells two or more distinct products or services together as a single package, often at a discounted price.