

# AP Microeconomics | Unit 4

IMPERFECT COMPETITION

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# Lesson 1: Monopoly

## Monopoly

A monopoly is the opposite of perfect competition. For a monopoly to exist, there can only be one seller of goods for which there are no close substitutes. While there are certain instances when monopoly power is justified, generally monopolies are viewed negatively due to the inefficiencies they produce in the market.

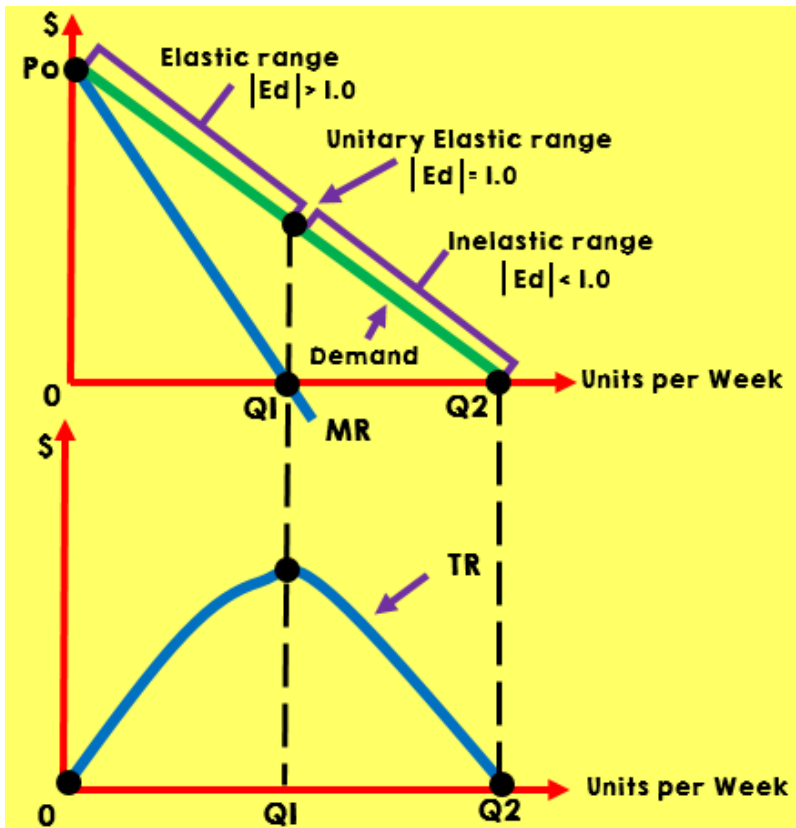
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## Characteristics of Monopolies

- Only one seller of a good
- Good produced has no close substitutes
- Market demand curve is the demand curve for the monopolist
- Monopolist is a price maker; to sell more, price must be lowered
- Barriers to entry: entry is effectively barred
- Positive long run profits are possible
- $D = \text{Price} = \text{Average Revenue}$
- $\text{Price} > \text{Marginal Revenue}$

## Why is $P > MR$ for a Monopoly?

Perfect competition is a unique market structure in that it is the only structure in which price is synonymous with marginal revenue. In all other structures (monopoly, monopolistic competition, and oligopoly), price (which will always be found on the demand curve) is greater than marginal revenue. This is because firms operating in these market structures all have some degree of price-making ability. Therefore, if they want to sell more of a good or service, the price must decrease. However, the price decrease is applied to all previous units of the good and not just the next unit a firm wants to sell.



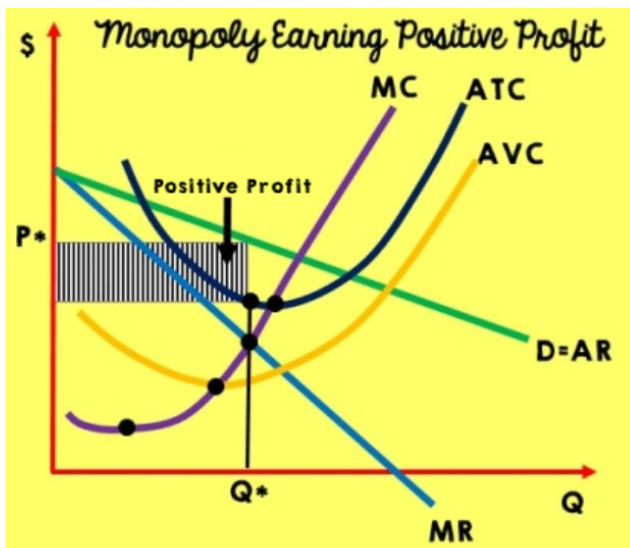
Price	Quantity	Total Revenue $P \times Q$	Average Revenue $TR/Q$	Marginal Revenue $\Delta TR/\Delta Q$
\$5.00	1	\$5.00	\$5.00	\$5.00
\$4.00	2	\$8.00	\$4.00	\$3.00
\$3.00	3	\$9.00	\$3.00	\$1.00
\$2.00	4	\$8.00	\$2.00	-\$1.00

If the monopoly wants to sell more of its good, it must lower price. As you can see, total revenue first increases and then begins to decrease. This is related back to the elasticity ranges of a linear demand curve. Demand, which is plotted using  $P$  and  $Q$ , will lie above the  $MR$  curve, which is plotted using  $MR$  and  $Q$ . A monopoly will never produce in the inelastic portion of its demand curve. In this case, the inelastic portion of the demand curve includes prices below  $\$3.00$ . We know this is the inelastic range because of the total revenue test (when price and total revenue move in the same direction, demand is inelastic). By producing quantities beyond the 3<sup>rd</sup> unit, the firm's total revenue will decrease while its costs of production increase. This has a detrimental impact on profit. As you can see, price is greater than marginal revenue as the quantity sold increases. Graphically, this results in the demand curve (which is created using price and quantity) lying above the marginal revenue curve (which is created using marginal revenue and quantity).

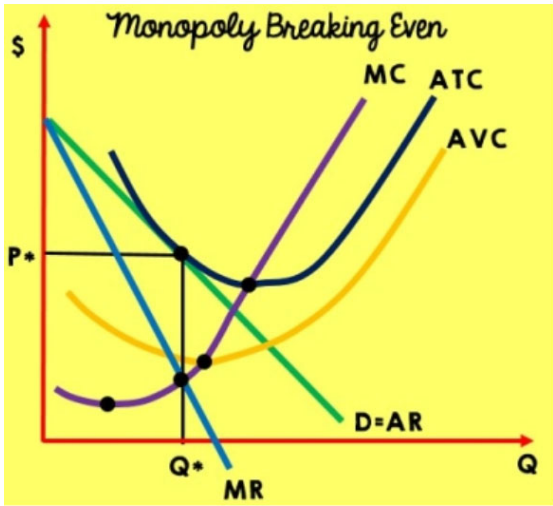
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### Graphing the Monopoly

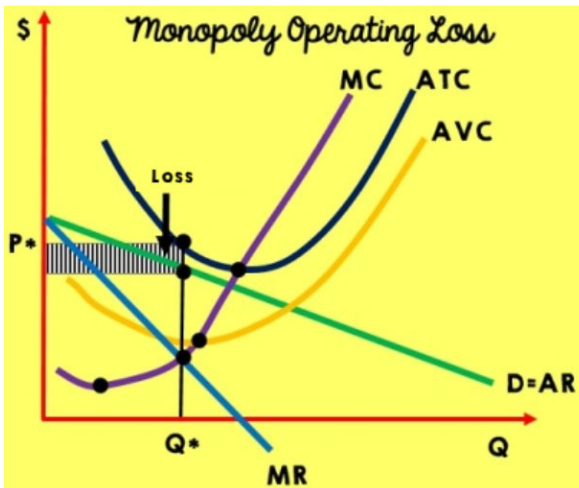
Like perfectly competitive firms, monopolies can earn positive profit, breakeven, or earn a loss. However, monopolies can sustain positive profit in the long run because entry is barred. If the monopoly is earning a loss, it must evaluate if it should operate through the loss or shutdown. Move through the activity below to learn more about the different profit graphs for a monopoly.



Profit is maximized at a quantity of  $Q^*$  (intersection of  $MR$  and  $MC$ ) and a price of  $P^*$ . In this situation, the profit rectangle exists between  $AR$  and  $ATC$  at  $Q^*$  units. Because  $AR > ATC$ , this rectangle has a positive value.



Precision is important in drawing a monopoly breaking even. The quantity at which  $MR = MC$  must correspond to a point on the demand curve that is just tangent to the ATC. The demand curve cannot intersect the ATC because it would result in a positive profit. This graph is demonstrating that the best this monopoly can do is break even. Therefore, demand (AR) can never rise above ATC. Profit is maximized at a quantity of  $Q^*$  (intersection of MR and MC) and a price of  $P^*$ . In this situation, there is no profit rectangle.  $AR = ATC$  at  $Q^*$  which means the total revenue rectangle is equal to the total cost rectangle. When the two are subtracted, the result is 0 economic profit.

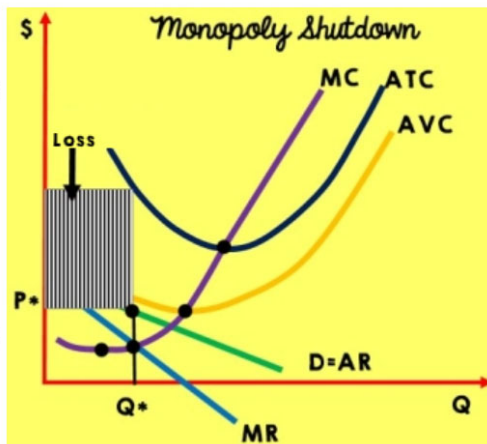


Remember, while a positive profit is desired, profit maximization does not always result in positive profit. Sometimes, the best a firm can do is lose the least amount of money possible. To show a profit maximizing monopoly operating through a loss, the demand curve must lie below the ATC at all points and AR must be greater than AVC at the profit maximizing level of output (where  $MR = MC$ ). In this graph, the profit maximizing level of output is  $Q^*$ . At  $Q^*$ , the monopolist goes up to the demand curve to find the price ( $P^*$ ) it can charge. The loss rectangle is the difference between AR and ATC (which is a negative number) multiplied by  $Q^*$  units.

Remember, while a positive profit is desired, profit maximization does not always result in positive profit.

Sometimes, the best a firm can do is lose the least amount of money possible. To show a profit maximizing monopoly which should shut down operation in the short run, the demand curve must lie below the ATC at all points (show the loss) and the demand curve (AR or P) must lie below AVC at the profit maximizing level of output (where  $MR = MC$ ).

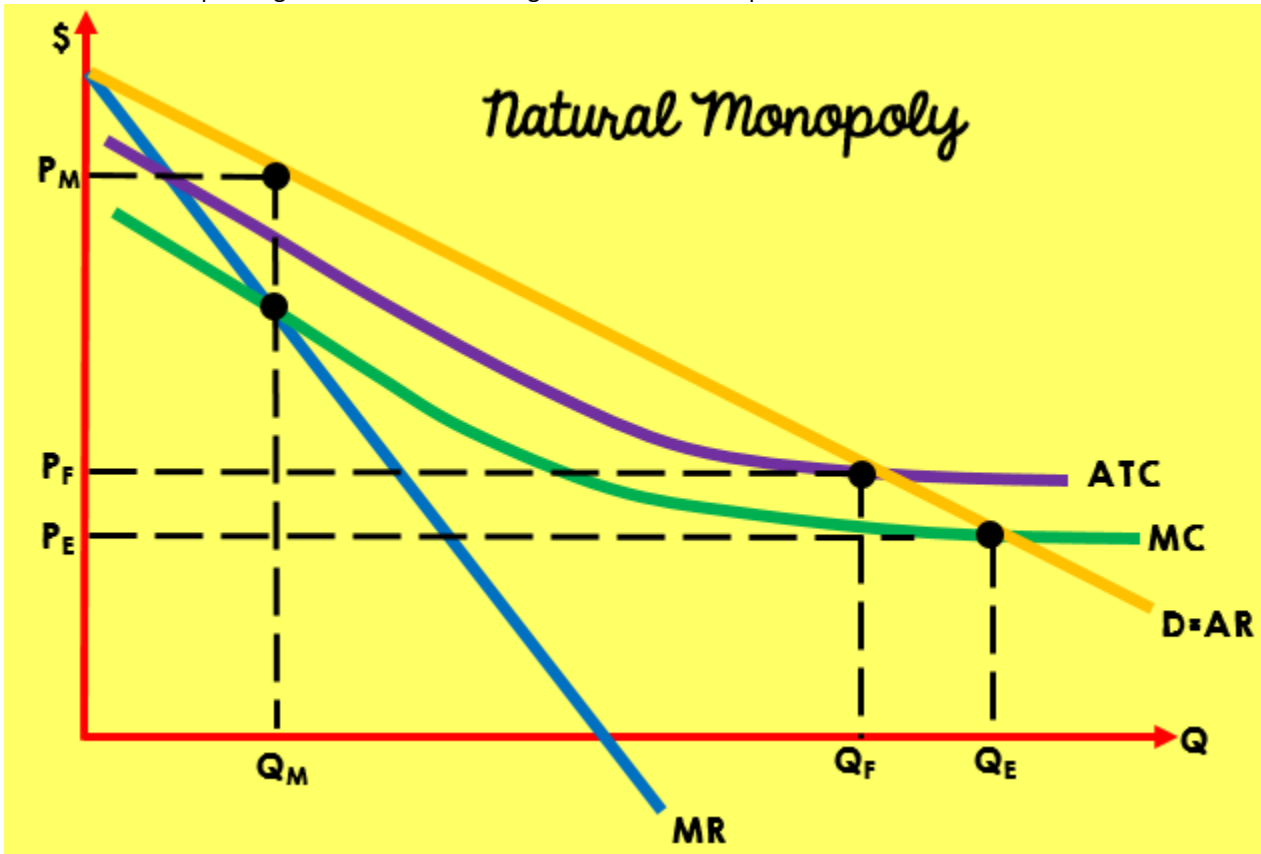
In this graph, the profit maximizing level of output is  $Q^*$ . At  $Q^*$ , the monopolist goes up to the demand curve to find the price ( $P^*$ ) it can charge. The loss rectangle is the difference between AR and ATC (which is a negative number) multiplied by  $Q^*$  units. The total revenue rectangle is  $P^* \times Q^*$ . Revenue is not great enough to cover the variable costs the firm would incur if it operated. It would be better to shut down and only lose the dollar value associated with fixed costs.



### Special Monopoly Scenario: The Natural Monopoly

A natural monopoly exists when it is more efficient for one firm to produce a good rather than multiple firms. More efficient "means the overall cost of production is lower when just one firm produces the good or service. An example of a natural monopoly might be a power company. It is more cost effective to allow a power company to supply power to given geographic areas. It would raise costs if competing power companies all tried to service a given neighborhood (each company would run its own poles and lines, etc).

Natural monopolies are allowed to exist, but the government usually regulates the pricing policies of natural monopolies to protect the consumer. Steps the government takes to regulate natural monopolies will be discussed in a future module.



### Discussion- Natural Monopoly



It is now time to complete the Natural Monopoly discussion. Please respond to the following prompt:  
Research examples of real life natural monopolies. Choose one of the examples and discuss the history of the monopoly, along with the pros and cons of allowing the natural monopoly.

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### Assignment- Perfect Competition and Monopoly



It is now time to complete the Perfect Competition and Monopoly assignment. Please follow the directions on the handout.

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### Assignment- Reading a Monopoly's Graphs



It is now time to complete the Reading a Monopoly's Graphs assignment. Please follow the directions on the handout.





**Perfect Competition and Monopoly – Fill in the blank. After reading through the sections on perfect competition and monopoly and viewing the associated videos, complete the following sentences.**

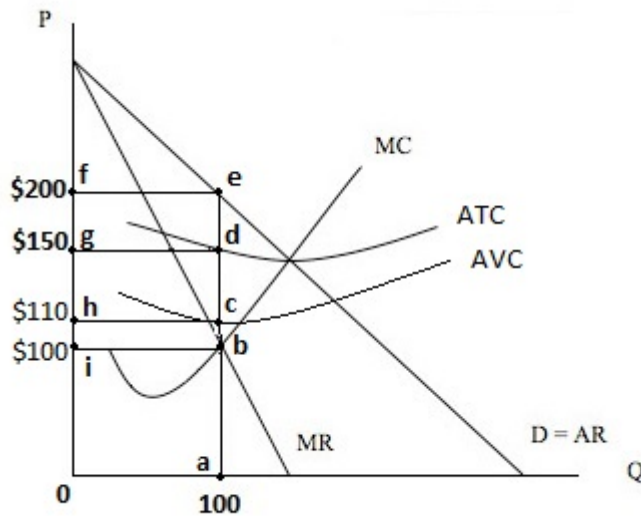
1. For a perfectly competitive firm, its demand curve is equivalent to its \_\_\_\_\_ curve, its \_\_\_\_\_ curve, and to \_\_\_\_\_ in the market.
2. A perfectly competitive firm's demand curve is horizontal because, in regard to elasticity, the firm's demand curve is \_\_\_\_\_.
3. Easy entry and exit explain why the perfectly competitive firm will earn \_\_\_\_\_ economic profit in the long run.
4. A perfectly competitive firm seeks to maximize profit where \_\_\_\_\_ equals marginal costs. This is a slightly different variation of the general profit maximizing rule for all other firms which states profit is maximized where \_\_\_\_\_ equals marginal cost. The reason for the variation is because \_\_\_\_\_ and price are equivalent to one another in perfect competition.
5. Marginal revenue is found by dividing the change in \_\_\_\_\_ by the change in \_\_\_\_\_.
6. For any market structure, the price a good will sell for is always found on the \_\_\_\_\_ curve.
7. Units of a good for which the marginal revenue is \_\_\_\_\_ than the marginal cost will add to a firm's profit. Once marginal revenue is \_\_\_\_\_ to the marginal cost, profit has been maximized. Producing units beyond this point will result in marginal revenue being less than marginal cost and profits will \_\_\_\_\_.
8. A firm will earn positive economic profit if price (or average revenue) is greater than \_\_\_\_\_ at the quantity that maximizes profits. A firm will earn a \_\_\_\_\_ if price is less than \_\_\_\_\_.
9. In the case of a loss, a firm must decide if it should continue to operate or shutdown in the short run. A firm will continue to operate if \_\_\_\_\_ is greater than \_\_\_\_\_ because the firm will earn enough \_\_\_\_\_ to cover its \_\_\_\_\_ costs and offset a portion of its fixed costs, thus minimizing its loss. A firm will shutdown if \_\_\_\_\_ is less than \_\_\_\_\_ because producing will not generate enough \_\_\_\_\_ to cover the variable costs it incurs when it chooses to produce.
10. \_\_\_\_\_ acts as incentive for firms to enter and exit the market.
11. Perfectly competitive firms can experience profits or losses when either market \_\_\_\_\_ changes or when \_\_\_\_\_ at the firm changes.
12. In perfect competition, long run equilibrium occurs where price equals \_\_\_\_\_ and it equals \_\_\_\_\_.
13. A monopoly is considered to be a price \_\_\_\_\_ due to the significant market power it has.
14. For a monopoly, price is greater than \_\_\_\_\_ because the firm must lower price to sell more.
15. A monopoly will never choose to expand production into the \_\_\_\_\_ portion of its demand curve because total revenue will decline while costs are rising.
16. Monopolies are able to earn \_\_\_\_\_ in the long run because entry into this market structure is extremely difficult.

**Perfect Competition and Monopoly – Fill in the blank. After reading through the sections on perfect competition and monopoly and viewing the associated videos, complete the following sentences.**

17. To determine the price a monopoly should charge, you first should find the quantity the monopoly will produce. This occurs at the intersection of \_\_\_\_\_ and \_\_\_\_\_. At that quantity, you would then go up to the \_\_\_\_\_ curve to determine price. To show a monopoly earning a positive economic profit, you would place the average total cost curve \_\_\_\_\_ the demand curve at the profit maximizing level of output. To show a monopoly breaking even, the average total cost curve would be \_\_\_\_\_ to the demand curve at the profit maximizing level of output. To properly demonstrate a monopoly that is earning a loss but continuing to operate, the \_\_\_\_\_ curve should be placed below the average total cost curve and above the \_\_\_\_\_ at the profit maximizing level of output. To show a monopoly that should shutdown, the demand curve should be placed below the \_\_\_\_\_.
18. A \_\_\_\_\_ exists when it is cheaper for a single firm to produce a good or service than if multiple firms produced the good.

## Reading a Monopoly's Graph

Use the graph below to answer the questions that follow.

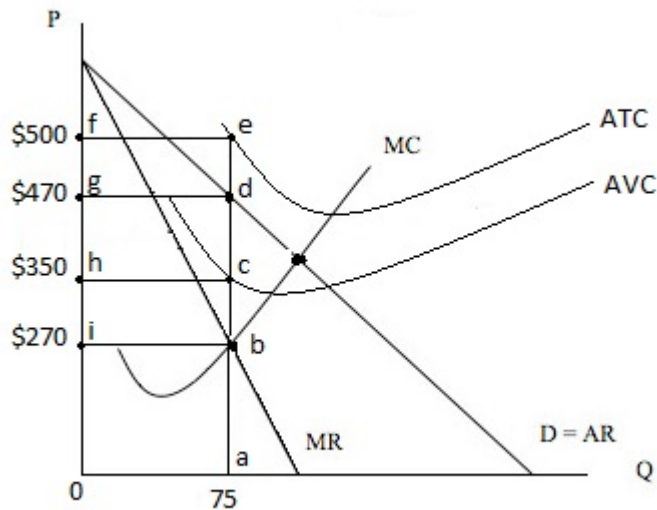


1. Is this firm's production following the profit maximizing rule?
2. At 100 units of output, what price will this monopoly charge?
3. What is the dollar value of total revenue? \$\_\_\_\_\_
4. What is the dollar value of total cost? \$\_\_\_\_\_
5. What is the firm's profit?
6. Is this firm earning a positive profit, a loss, or breaking even? How can you use AR and ATC at the 100 units of output to make this determination?
7. Use the lettering on the graph to state the area of profit for this firm. \_\_\_\_\_
8. If the firm decided to decrease production, how would total profit be impacted? (Use the concepts of MR and MC to explain.)
9. If the firm decided to increase production, how would total profit be impacted? (Use the concepts of MR and MC to explain.)

Assignment continues on next page...

## Reading a Monopoly's Graph

Use the graph below to answer the questions that follow.



10. At 75 units, what kind of profit (positive profit, loss, or zero) is this firm earning? Is it possible for this firm to improve its profit level by adjusting production? Why or Why not?
11. What is the dollar value of total revenue at 75 units? \$\_\_\_\_\_
12. What is the dollar value of total cost at 75 units? \$\_\_\_\_\_
13. Consider the price being charged by the firm. Given this price and the firm's current profit level, would this firm be better off to shut down operations? Why or why not? (Link back to TFC and TVC)

Short Answer Graphing:

14. Draw the graph for a monopoly earning a positive economic profit. Suppose the government institutes a per unit tax on the good produced by the monopoly (consider the impact it will have on the cost curves). On the graph, show how this will affect the monopoly's profit maximizing level of output and the price charged by the monopoly. What happens to the area of deadweight loss? Based on what you've previously learned about deadweight loss, why was this impact expected?

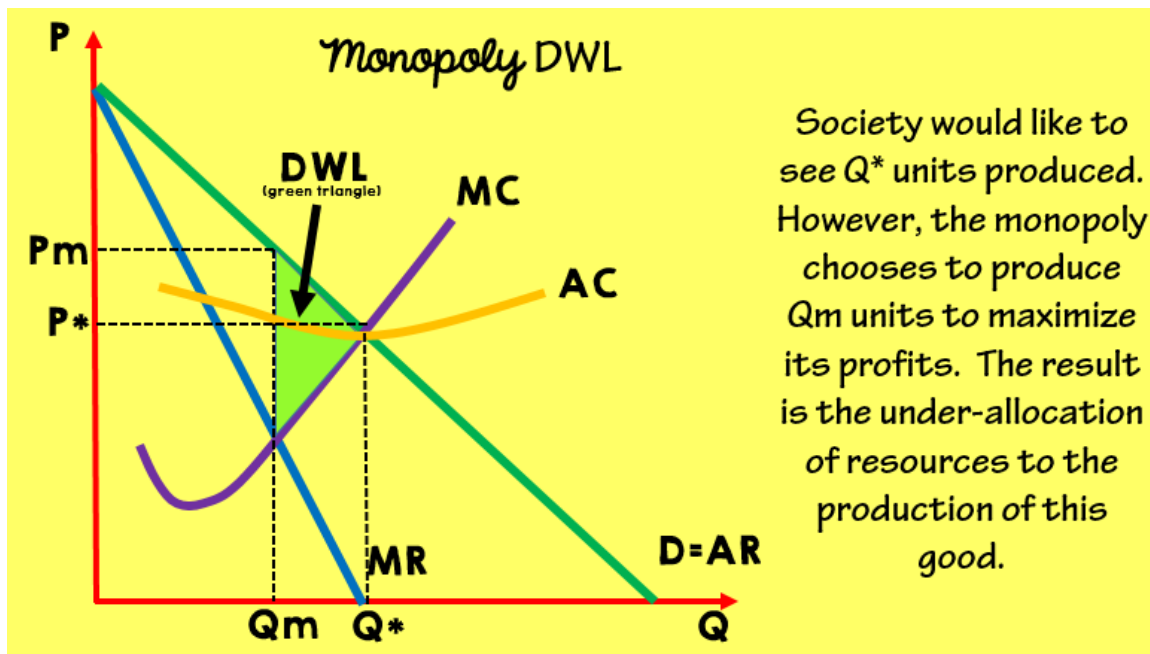
# Lesson 2: Inefficiency and Monopolies

## Inefficiency and Monopolies

Monopolies produce inefficient outcomes in a market. The inefficiency is a result of producing too little of the product while charging a price that is too high. The inefficiency of a monopoly is apparent when compared to perfect competition.

In perfect competition, a firm produces where  $P = MC$  (this is the same as saying where demand intersects  $MC$ ). The sum of consumer and producer surplus is maximized in perfect competition. No deadweight loss exists. However, what is good for society as whole is not necessarily good for a monopoly.

Monopolies choose to produce where  $MR = MC$  and  $P > MC$  to maximize profit. This means the firm is producing less than the socially desirable quantity. When  $P > MC$ , society values this good beyond its cost of production. Society would like to see more of the good produced. Unfortunately, the monopoly will not produce that amount because it will result in lower profit levels. In this situation, the deadweight loss triangle appears to the left of the socially optimal level of output (where  $P = MC$ ). Recall from an earlier module, deadweight loss appears to the left of the intersection of demand and supply when too little is produced. It is the difference between  $P$  and  $MC$  over the range of quantities  $Q_m$  to  $Q^*$  in the graph below.



Monopolies also result in inefficiency because average costs are not minimized at the profit maximizing level of output found at  $MR = MC$ .

## Price Discrimination

Price discrimination is the practice of charging different customers different prices. It takes a variety of forms. Common examples include airline pricing strategies (business class v. coach class, advanced purchase v. last minute) and age discounts at movie theaters (child pricing and "senior" pricing). To effectively price discriminate, a monopoly must:

- Have price making power
- Be able to identify and separate groups of consumers
- Be able to prevent the transfer of the good from one consumer to another

<https://youtu.be/1kSk1Hu3TVM>

Price discrimination can reduce the amount of deadweight loss a market incurs due to monopoly power. It can be eliminated entirely if perfect price discrimination is practiced because the monopoly will produce where price equals marginal cost. However, consumer surplus is lessened and even becomes zero in the instance of perfect price discrimination. This is because each consumer is paying exactly what he or she was willing to pay for the unit - there is no difference between willingness to pay and price paid.

### **Discussion- Price Discrimination**



It is now time to complete the Price Discrimination discussion. Please respond to the following prompt:  
Aside from the examples mentioned in the module, suggest another example of price discrimination. Explain how the example meets the requirements of price discrimination. Do you feel the seller of the good is able to meet the basic requirements to effectively price discriminate?

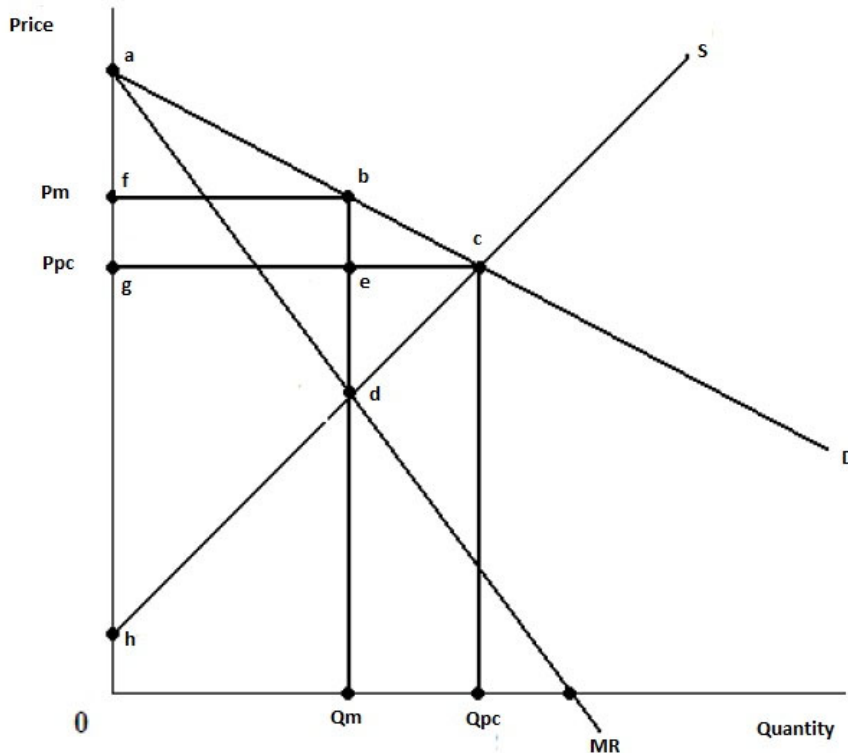
### **Assignment- Comparing Efficiency**



It is now time to complete the Comparing Efficiency assignment. Please follow the directions on the handout.

## Comparing Efficiency – Perfect Competition and Monopoly

Use the graph below to answer the questions that follow.  $P_m$  and  $Q_m$  denote the price and quantity if this market was a monopoly (and the supply curve would be the monopolist's marginal cost curve).  $P_{pc}$  and  $Q_{pc}$  denote the price and quantity if this market was perfectly competitive.



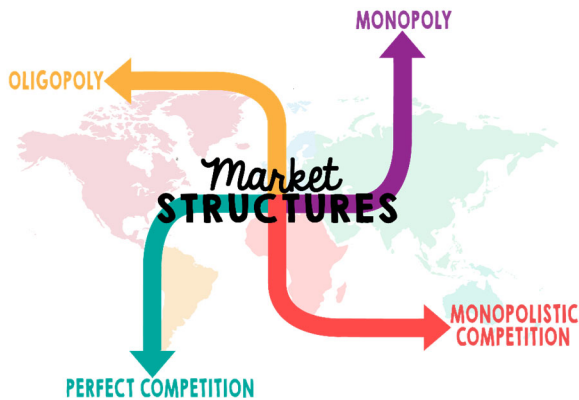
1. If this market was perfectly competitive, the coordinates of consumer surplus would be \_\_\_\_\_.
2. If this market was a monopoly, the coordinates of consumer surplus would be \_\_\_\_\_.
3. If this market was perfectly competitive, the coordinates of producer surplus would be \_\_\_\_\_.
4. If this market was monopoly, the coordinates of producer surplus would be \_\_\_\_\_.
5. If this market moved from perfect competition to monopoly, the area of consumer surplus would (increase or decrease) \_\_\_\_\_ while the area of producer surplus would (increase or decrease) \_\_\_\_\_.
6. If this market was a monopoly, society would like to see (more or less) \_\_\_\_\_ produced. We know this because price would be (greater than, equal to, or less than) \_\_\_\_\_ the marginal cost of production.
7. A perfectly competitive market has no deadweight loss. However, a monopoly will produce deadweight loss. In this case, if the market above was a monopoly, the area of deadweight loss would be triangle \_\_\_\_\_. We know a monopoly does not reach allocative efficiency because \_\_\_\_\_ does not equal \_\_\_\_\_ at the profit maximizing level of output.





# Lesson 3: Imperfect Competition, Part 2

## Introduction



In the previous module, we evaluated the characteristics and efficiency of the two extremes - perfect competition and monopoly - on the spectrum of competition. However, most goods and services are bought and sold in the two market structures that exist between these extremes. In this module, you will learn about the two variations of these extremes - monopolistic competition and oligopolistic competition. You will learn the characteristics of each, as well as their implications in terms of efficiency in the market.

## Essential Questions:

1. Why is product differentiation a necessary characteristic of monopolistic competition? How does it give a firm market power?
2. What is non-price competition?
3. What is meant by excess capacity and how does it relate to the concept of efficiency?
4. How does a monopolistic competitor act like a monopoly in the short run?
5. How does a monopolistic competitor act like a perfect competitor in the long run?
6. What are the key characteristics of oligopolies?
7. How is collusion used to gain market power?
8. What is game theory? How does it help explain interdependence among firms in an oligopolistic market?
9. What is a dominant strategy?
10. What is the significance of Nash equilibrium?

## Key Terms

- **Monopolistic Competition**
- **Non-price Competition**
- **Oligopoly**
- **Collusion**
- **Cartel**
- **Game Theory**
- **Dominant Strategy**
- **Nash Equilibrium**
- **Payoff Matrix**
- **Excess Capacity**

## What to Expect

In this module, you will be responsible for completing the following assignments:

- Benefits and Drawbacks of Monopolistic Competition Discussion
- Graphing Monopolistic Competition Assignment
- Monopolistic...Competition? Discussion
- Game Theory Discussion
- Analyzing a Payoff Matrix Assignment
- Comparing Market Structures Assignment
- Market Structures: Part Two Multiple Choice Test
- Market Structures: Part Two Free Response Test

# AP Microeconomics Key Terms

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## Market Structures- Part 2

**Monopolistic Competition** – This market structure is characterized by a many small firms producing a differentiated product with easy entry and exit into the market.

**Non-price Competition** – Non-price competition is a strategy used by firms to distinguish its product or service from competing products on the basis of the products characteristics, rather than its price.

**Oligopoly** – This market structure is characterized by a small number of interdependent, large firms who can produce either identical or differentiation products in a market with high barriers to entry.

**Collusion** – Collusion is an arrangement among oligopolists to work together to mutually improve their situation.

**Cartel** – This is a group of firms that agree to maximize their joint profits rather than compete.

**Game Theory** – This approach models the strategic interactions of firms in oligopoly markets.

**Dominant Strategy** – This is a strategy that is always the best strategy to pursue, no matter what a competitor is doing.

**Nash Equilibrium** – A Nash equilibrium is a solution concept in a non-cooperative game in which no player would deviate from unilaterally.

**Payoff Matrix** – The matrix is a table which demonstrates the payoffs associated with different decisions among players.

**Excess Capacity** – In this situation, a firm is producing at a lower scale of output than it is capable of; the difference between the long run output in monopolistic competition and the output at minimum ATC.

# Lesson 4: Monopolistic Competition

## Monopolistic Competition

Have you ever stopped to consider exactly how many different colors, styles, and brands of jeans are available for purchase? No matter your specific preferences, you are likely to be able to find the perfect pair of jeans just for you! This is due to the market structure in which jean manufacturers operate...monopolistic competition.

Monopolistic competition, as the name suggests, has characteristics similar to perfect (pure) competition and monopoly.



As you can see, monopolistic competition is similar to perfect competition in that there are a large number of buyers and sellers (though not as many as perfect competition), easy entry and exit, and long run profits are zero.

The key to monopolistic competition is product differentiation. Each firm produces a product that is similar to, yet distinctly different from, the products produced by its competitors in the market. Due to the differentiation, monopolistic competitors have some market power. That is, product differentiation is responsible for the monopoly type price making ability possessed by monopolistic competitors. This gives rise to the need for non-price competition in monopolistic competition. Advertising is an example of non-price competition. If the products are different, firms in monopolistic competition need to make consumers aware of how their products are different in order to persuade consumers to purchase their product over another firm's product.

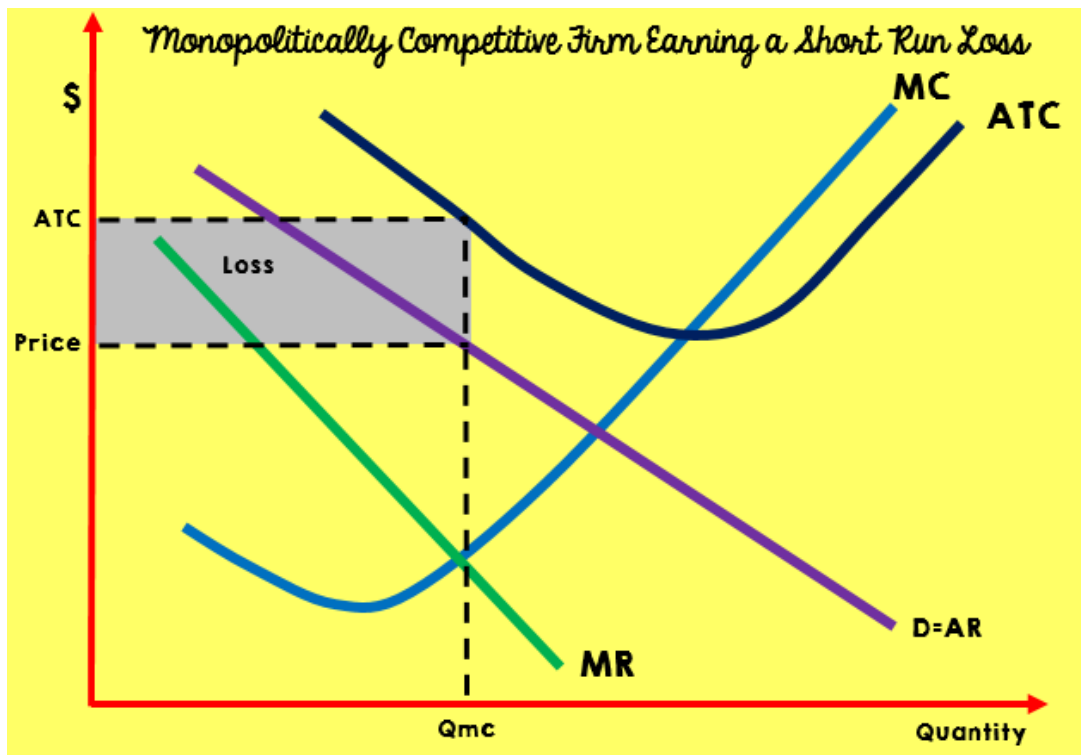
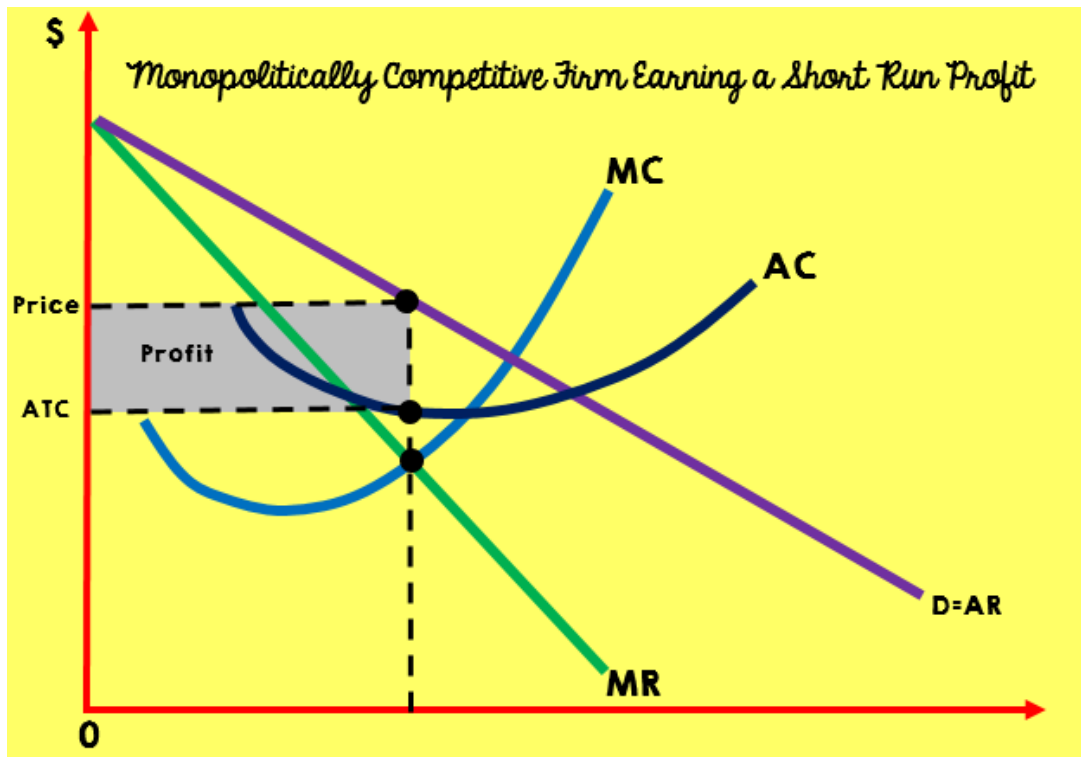
Just like a monopoly, the demand curve for a monopolistic competitor is downward sloping and marginal revenue lies below the demand curve. This indicates price must be lowered to sell more. However, the monopolistic competitor's demand curve is more elastic than a monopolist's demand curve because consumer's have options (substitutes) for the product. Profit is maximized where marginal revenue equals marginal cost. Because of this, monopolistic competition - like monopoly - will result in an inefficient level of production and some deadweight loss.

Unlike the monopoly, the monopolistic competitor's graph is drawn separately from the market graph since there are a large number of suppliers in this market structure. The elasticity of the demand curve facing a given monopolistic competitor is based on the degree of product differentiation. (Remember, the monopoly's graph was the market graph because it was the only firm for consumers to buy from - market demand was the monopolist's demand curve - and it was the only firm supplying the good - the market supply curve was the monopolist's supply curve.)

<https://youtu.be/T3F1Vt3IyNc>

### Monopolistic Competition in the Short Run

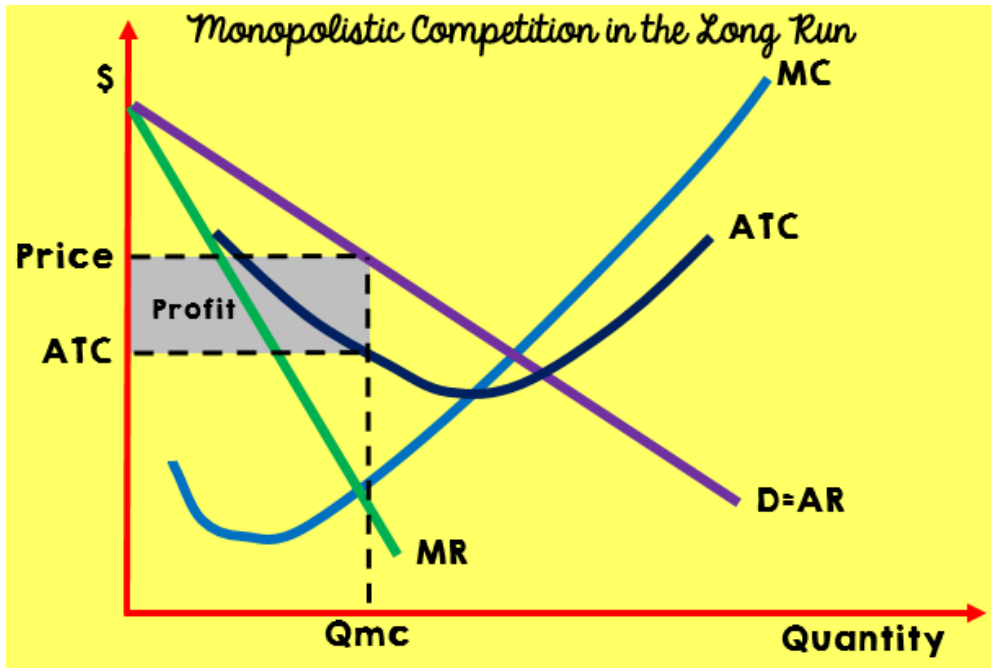
In the short run, monopolistic competition resembles a monopoly. That is, the firm will seek to produce where  $MR = MC$  and charge a price that is found on the demand curve. The short run graph for a monopolistic competitor resembles that of a monopolist.



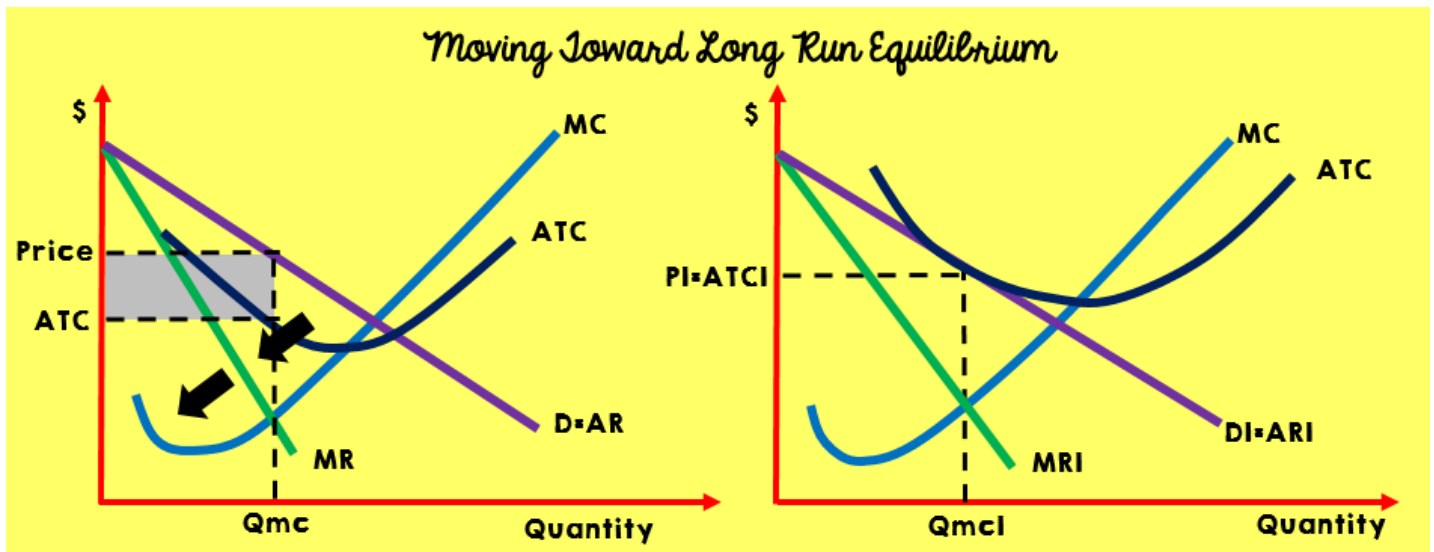
The first step for any firm is to determine the profit-maximizing level of output. For monopolistic competition, that is found where  $MR = MC$ . In each graph, the profit-maximizing level of output is designated as  $Q_{mc}$ . At  $Q_{mc}$ , the firm looks at the demand curve to establish price. To determine the type of profit (positive or negative/loss), price (AR) should be compared to ATC at the profit maximizing level of output ( $Q_{mc}$ ).

### Monopolistic Competition in the Long Run

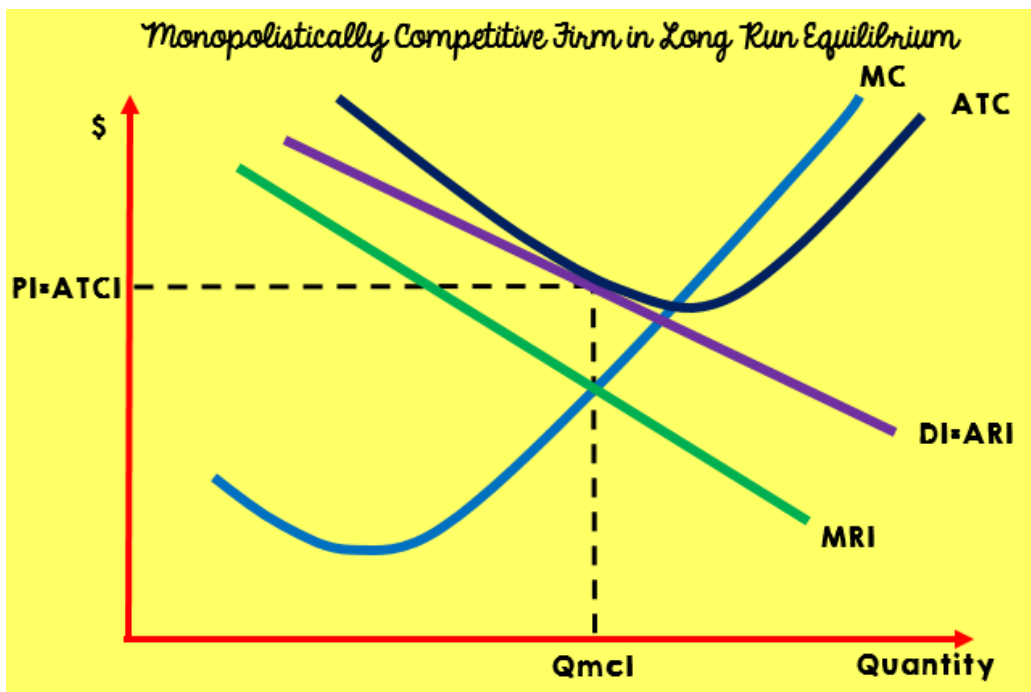
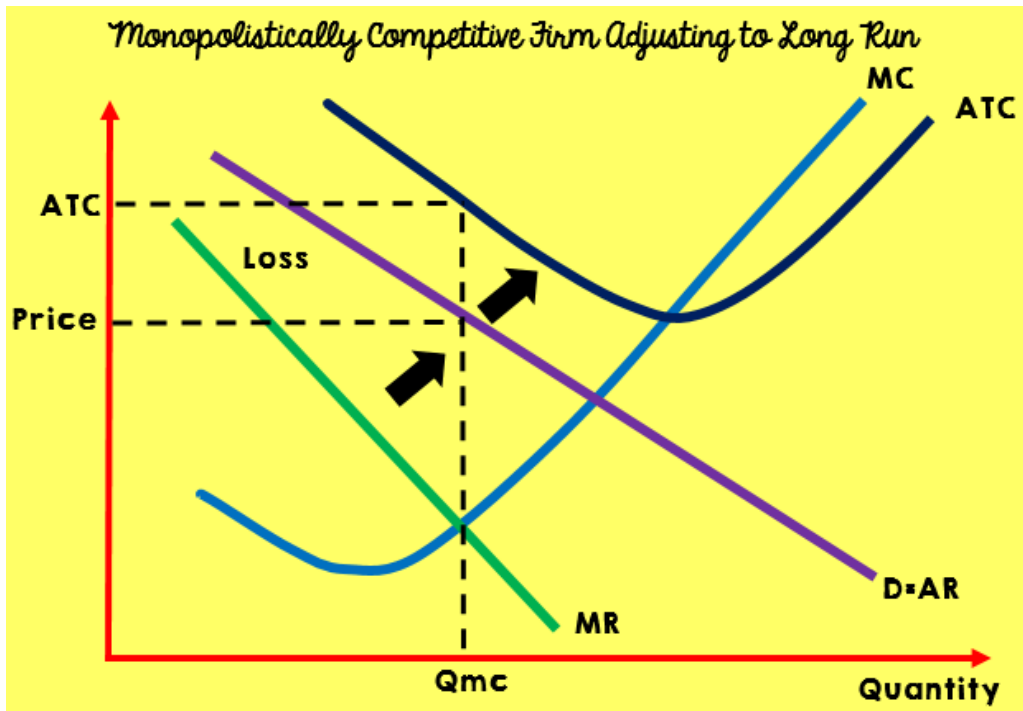
In the long run, a monopolistic competitor behaves like a perfect competitor. That is, the existence of short run profits or losses will result in entry or exit in the industry. Entry and exit result in zero long run economic profit (just like in perfect competition). In the market graph, entry or exit results in the market supply curve shifting either right or left. Entry in the market causes demand at a given monopolistic competitor to decrease until economic profit disappears. Exit from the market causes demand at the remaining monopolistic competitors to increase until economic losses disappear.



When profits exist, as they do in the image above, other firms have the incentive to enter the industry in the long run.



As firms enter the industry, demand at any given firm will decrease, or shift left. This is because some of the consumers who were purchasing at one of the existing firms may now switch their purchases to a new firm, thus reducing demand at the firms that were making a profit. As the demand curve shifts left (along with marginal revenue), the distance between price (AR) and average total cost closes (profit is decreasing). Entry will continue to occur so long as positive economic profit can be made. The entry will continue to lower demand at each firm until eventually price equals average total cost at the quantity where marginal revenue equals marginal cost. The firm's demand curve will lie just tangent to its average total cost curve at the profit maximizing level of output. So, in the long run, the profit maximizing monopolistic competitor will be producing its profit maximizing level of output where  $MR = MC$ , but economic profit will be zero because  $AR = ATC$  at that level of output. The firm is now doing the best it can and the best it can do is breakeven.



In the presence of economic losses, firms in the industry have the incentive to exit in the long run.

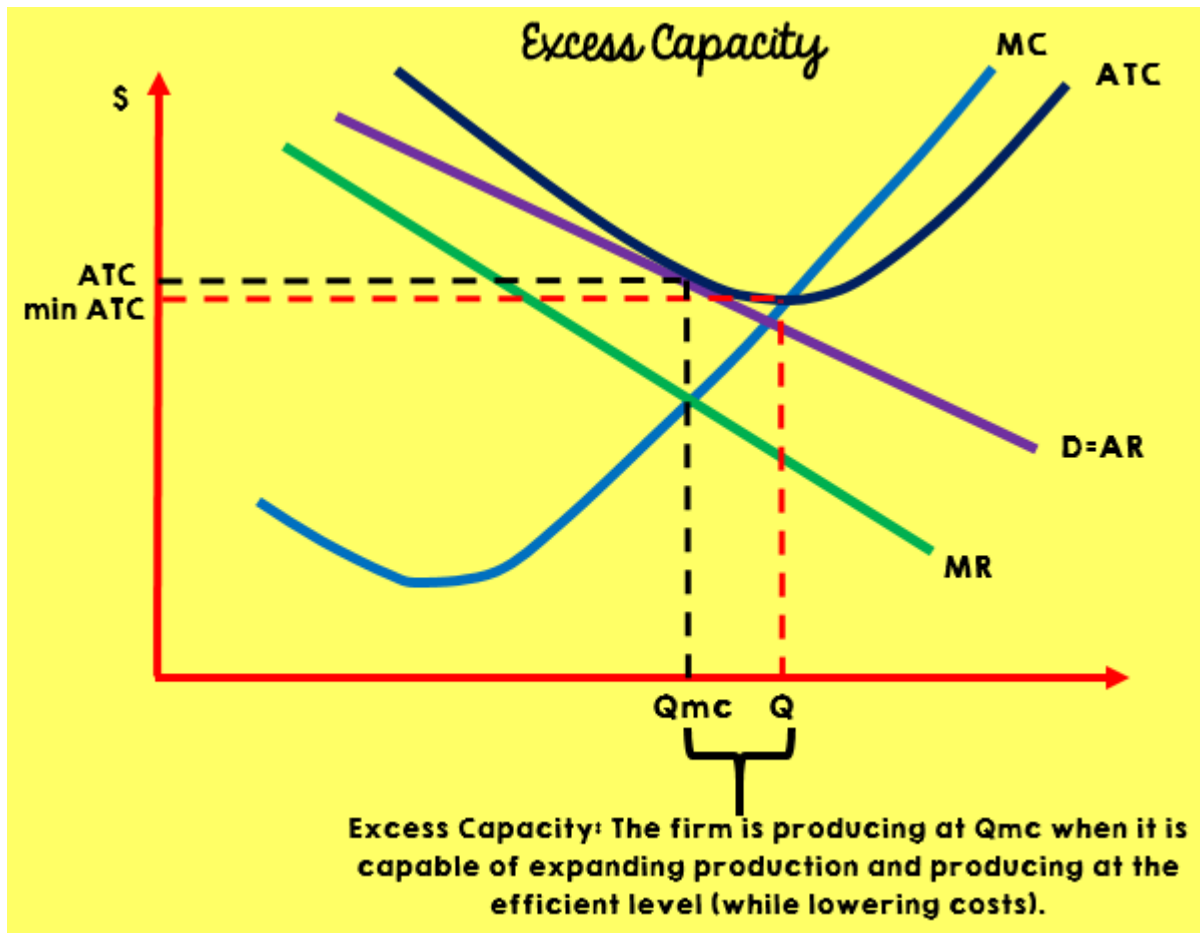
As firms exit the industry, demand at any given remaining firm will increase, or shift right. This is because the number of consumers in the market has not changed and those consumers will now move demand to the remaining firms. As the demand curve shifts right (along with marginal revenue), the area of loss begins to disappear as price and ATC come closer together. Firms will continue to exit the market until the demand curve shifts right just far enough to become tangent to ATC ( $P = ATC$ ) at the profit-maximizing level of output (again, at the quantity where  $MR = MC$ ).

<https://youtu.be/d57jftLwi4s>

### Excess Cost and Excess Capacity

For monopolistic competition, it is important to note that allocative efficiency is not reached (because  $P > MC$ ) and productive efficiency is not reached (because it is not producing at minimum ATC). The reduced levels of efficiencies result in the monopolistic competitor resembling a monopoly.

Let's consider how these two inefficiencies are related by briefly exploring the concepts of excess cost and excess capacity. In perfect competition, long run equilibrium was established where  $P = MC = \min ATC$ . This meant that allocative and productive efficiencies were attained. In the long run, this is not true of a monopolistic competitor. At the quantity that produces long run equilibrium for a monopolistic competitor, marginal cost is still less than average total cost. The firm is considered to be operating with excess cost. That is, the firm could increase production until marginal cost was equal to average total cost and average total cost would be at a minimum. Furthermore, operating with excess cost implies operating with excess capacity. That means a firm has the potential to expand production, but does not do so because it would not be profitable to the firm.



### **Discussion: Benefits and Drawbacks of Monopolistic Competition**



It is now time to complete the Benefits and Drawbacks of Monopolistic Competition Discussion. Please consider the positive and negative aspects of this market structure. Using those aspects, argue either for or against monopolistic competition.

### **Assignment: Graphing Monopolistic Competition**



It is now time to complete the Graphing Monopolistic Competition Assignment. Please follow the directions on the assignment page.

### **Discussion: Monopolistic...Competition?**



It is now time to complete the Monopolistic...Competition? Discussion. Please consider the characteristics monopolistic competition has in common with monopoly and perfect competition. Then discuss whether you believe monopolistic competition is more similar to monopoly or perfect competition. Be sure to justify your stance.



**Graphing Monopolistic Competition – Please fully answer the questions below (drawing graphs when specified) and submit your completed assignment when finished.**

1. Consider Caroline's Closet, which sells boutique clothing in a busy mall in a major city. The mall contains several other clothing boutiques.
  - a. Draw the marginal cost, average total cost, demand and marginal revenue for Caroline's Closet, assuming Caroline's current profit-maximizing price is greater than average total cost. Label the areas representing profit and deadweight loss.
  - b. Explain what would occur in the long run in this market (entry or exit). How would demand at Caroline's be impacted and why?
  
2. Suppose the government levies a lump sum tax on firms operating in a monopolistically competitive market that is currently in long run equilibrium.
  - a. What will be the short run impact of this tax at the firm? Draw the graph of a representative firm.
  - b. What will happen to the equilibrium price in the market and the number of firms in the market? Draw the graph of the market showing how it adjusts.
  
3. Suppose firms operating in the monopolistically competitive snack food market adopt a new food processing technology that decreases average total cost at the firms, while marginal cost remains unchanged.
  - a. How will the number of firms operating in the market be impacted? Why?
  - b. How will the quantity produced at a representative firm change? How will the quantity produced in the market change?
  - c. How will equilibrium price in the market change?



# Lesson 5: Oligopoly

## Oligopoly

Oligopoly is a step further away from perfect competition than monopolistic competition. The general characteristics of oligopoly include the following:

- The market is characterized by a few large producers.
- There are significant barriers to entry.
- Products can be standardized (as in perfect competition) or differentiated (as in monopolistic competition).
- The behavior of firms operating in an oligopolistic market is marked by interdependent behavior.

Examples of oligopolistic markets include soft drinks, airlines, tobacco products, and probably video games/consoles.

The key characteristic of an oligopoly is interdependent behavior. Because of the sheer size of the firms in the market, each firm must take into consideration the actions of competing firms. Game theory can be utilized to help understand the importance of interdependent behavior.

Game theory evaluates the strategic decisions of participants in anticipation of the potential response by rivals. Remember, models are best built when kept simple. Let's explore game theory by first looking at the quintessential example of the theory - the prisoner's dilemma. Bonnie and Clyde have just been picked up on their first bank heist. They have been sequestered in separate interrogation rooms for questioning and are not allowed to communicate. Although the two suspects cannot communicate, each is aware of their choices and corresponding prison terms depending on whether they confess or keep quiet.

The payoff matrix below shows the strategies available and the outcome of those strategies.

		<i>Bonnie's Choices</i>	
		<b>CONFESS</b>	<b>REMAIN SILENT</b>
<i>Clyde's Choices</i>	<b>CONFESS</b>	<b>10 years, 10 years</b>	<b>1 year, 20 years</b>
	<b>REMAIN SILENT</b>	<b>20 years, 1 year</b>	<b>5 years, 5 years</b>

Locked away in her own interrogation room, Bonnie must consider her strategy - to confess to the crime or remain silent. She isn't aware of what Clyde will do, but she does know his options and the length of jail time she will do for each possible combination of decisions she and Clyde may make. Clyde faces the same dilemma as Bonnie - trying to decide what he should do in the face of what Bonnie may do. The information in the matrix above shows the jail time Clyde will do to the left of the comma and the jail time Bonnie will do to the right of the comma in each box.

**SHOULD BONNIE CONFESS OR REMAIN SILENT IF CLYDE CONFESSES?**

Confess! She will serve only 10 years by confessing, rather than 20 years if she remains silent.

**SHOULD BONNIE CONFESS OR REMAIN SILENT IF CLYDE REMAINS SILENT?**

Confess! She will serve only 1 year only, rather than 5 years if she remains silent.

**WHAT SHOULD CLYDE DO?**

Clyde should also confess no matter what Bonnie decides to do! Confession is a dominant strategy for Clyde as well!

For Bonnie and Clyde, the "confess, confess" strategy is a Nash equilibrium, named after mathematician John Nash. That is, neither player would want to deviate unilaterally from that strategy. However, if the two crooks were able to communicate and had some level of trust established, together they would be better off to remain silent. This would be the cooperative outcome. Repeated "games", or situations like this among players, can eventually result in a cooperative outcome that would be to the benefit of both parties involved.

<https://youtu.be/qlEBGYD7LUo>

Now, let's consider a case of just two firms competing in a non-collusive manner in an oligopolistic market. A non-collusive model means that the two firms are not cooperating (colluding) with each other. They each operate in their own best interest taking into account the potential actions of their competitor. The payoff in this example will be the potential profit each firm could earn.

		Peppy Pizza	
		OFFER SPECIAL	NO SPECIAL
Pizza Amore	OFFER SPECIAL	\$220, \$170	\$420, \$270
	NO SPECIAL	\$150, \$470	\$360, \$370

Two firms, Peppy Pizza and Pizza Amore, are the only two producers of delivery pizzas on the island of Calzone. The payoff matrix below shows the different levels of profit based on pricing options (to run a special or not) for each pizza restaurant. The information to the left of the comma represents profits for Pizza Amore and information to the right of the comma represents profits for Peppy Pizza.

### DOES PIZZA AMORE HAVE A DOMINANT STRATEGY? EXPLAIN!

Yes, Pizza Amore has a dominant strategy. Pizza Amore should run a special no matter which pricing strategy Peppy Pizza chooses. Regardless of Peppy Pizza's strategy, Pizza Amore will make more profit if it runs a special.

### DOES PEPPY PIZZA HAVE A DOMINANT STRATEGY? EXPLAIN!

Peppy Pizza does not have a dominant strategy. Their best choice regarding profit is dependent on what Pizza Amore does. If Pizza Amore chooses to run a special, Peppy Pizza should not run a special (they would make \$270 instead of \$170). If Pizza Amore does not run a special, Peppy Pizza should run a special (they would make \$470 instead of \$370).

### WHAT IS THE NASH EQUILIBRIUM?

Pizza Amore should run a special and Peppy Pizza should not run a special (the box containing \$420, \$270). If either party changed position strategy without the other, profit would be less.

In the United States' economy, collusion among firms operating in an oligopolistic market is illegal. Through collusion, firms agree to charge very similar (high) prices. In essence, by forming a cartel and practicing collusion the firms act as a monopoly. The oil cartel, OPEC, is an example of collusion in an oligopolistic market. While explicit collusion is illegal in the U.S., tacit collusion is not. Tacit collusion does not involve a direct agreement between firms. Rather, through experience in the market, firms come to realize the strategies that provide the greatest benefits and act (set prices and output) accordingly. This lessens competition in the market, reduces efficiency, and generally harms the consumers. In practice, cartels, explicit collusion agreements, and tacit collusion are difficult to maintain because there is great incentive to defect. Oftentimes, by secretly breaking the terms of the collusion agreement, a firm is able to increase its profit. When a firm defects, it can lead to a price war between the members of the oligopoly. Generally, this is to the benefit of the consumers because prices are driven down. The video below gives more detail on collusion.

<https://youtu.be/BYLe3ErmFFA>

### **Discussion: Game Theory**



It is now time to complete the Game Theory Discussion. Identify an activity in your life in which the application of game theory might be useful. Explain how the theory could be applied to the situation and what you might gain from its application.

### **Assignment: Analyzing a Payoff Matrix**



It is now time to complete the Analyzing a Payoff Matrix Assignment. Please follow the directions on the assignment page in regarding to interpreting the payoff matrix.



**Analyzing a Payoff Matrix – Please submit your completed assignment when finished.**

1. Rocky Road and Two Scoops are two firms operating in an oligopolistic market. Each firm must decide how to price its ice cream. Profits will vary based on the pricing strategy a firm chooses and the strategy the competing firm chooses. The strategies and corresponding profits are displayed in the matrix below. Both firms have access to this information, but neither firm has communicated a strategy to the other. The information to the left of the comma corresponds to Two Scoops profits and the info to the right corresponds to Rocky Road’s profits.

		Rocky Road	
		Price High	Price Low
Two Scoops	Price High	\$4000, \$5000	\$500, \$300
	Price Low	\$6000, \$1500	\$1000, \$2000

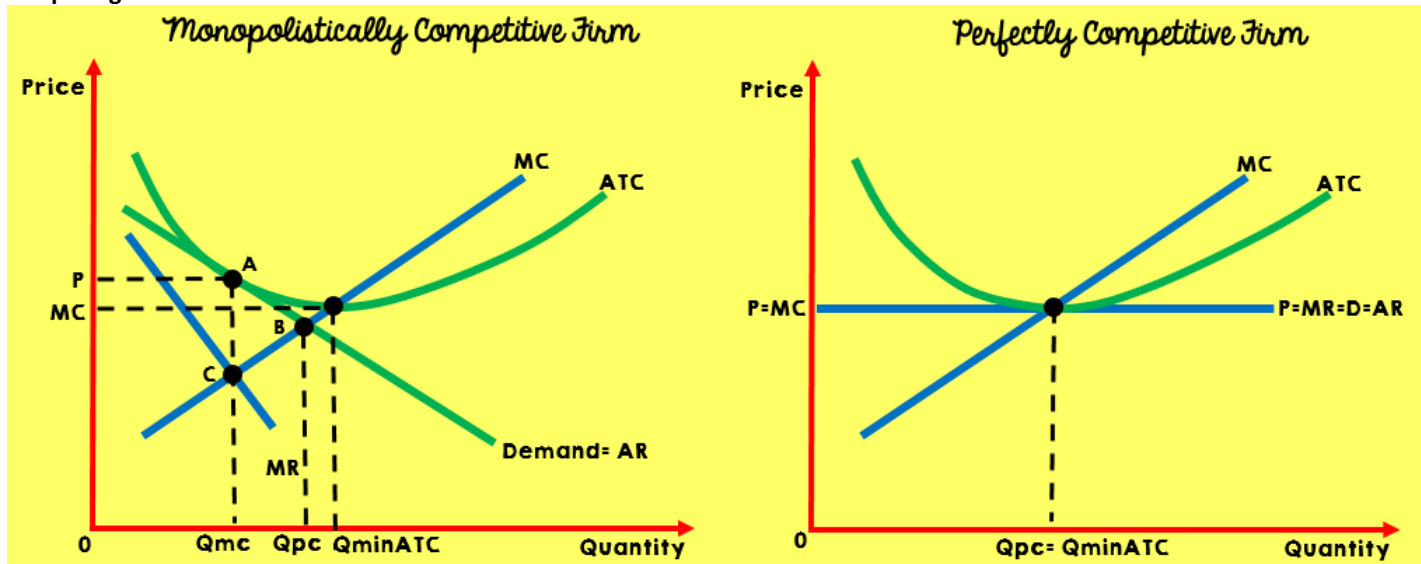
- a. Why is it necessary for firms in an oligopoly to consider the actions of rival firms?
- b. If Two Scoops chooses to Price High, what pricing strategy should Rocky Road use? Why?
- c. Do either of the firms have a dominant strategy? If not, how do you know? If so, identify the dominant strategy for the firm(s).
- d. Why is “Price Low, Price Low” considered a Nash equilibrium? Use the numbers in the chart to explain your reasoning.
- e. If the firms were able to collude, what would be the cooperative outcome? Why is this unlikely to happen? Use numbers from the matrix to explain your reasoning.
- f. What would be the harmful effects if the firms were able to successfully collude?





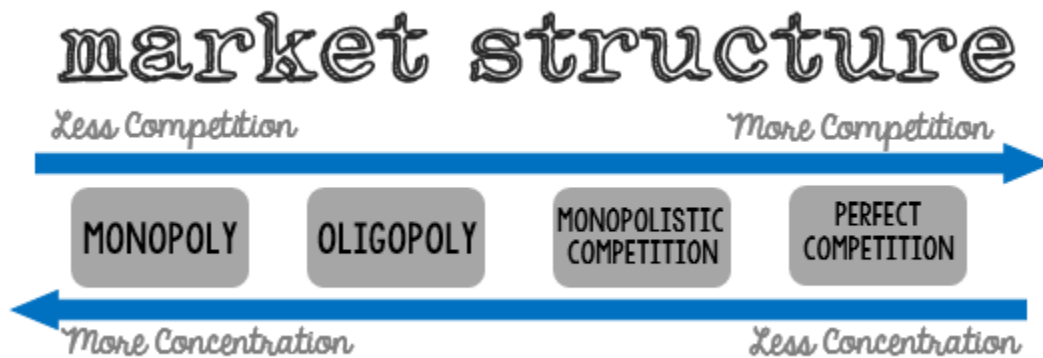
# Lesson 6: Comparing Market Structure

## Comparing Market Structure



**Monopolistic Competition:** The monopolistic competitor maximizes profit where  $MR = MC$ . Therefore, it produces at  $Q_{mc}$  and charges a price of  $P$  (found on the demand curve) and earns zero economic profit in long run equilibrium. Since  $P > MC$ , the monopolistic competitor is not producing at allocative efficiency ( $Q_{mc} < Q_{pc}$ ).  $Q_{pc}$  (this would be the quantity produced in perfect competition) represents the level of production society desires because it is where  $P = MC$ . Because  $Q_{mc} < Q_{pc}$  deadweight loss is present (equal to  $\Delta ABC$ ). Furthermore, since, at  $Q_{mc}$ ,  $ATC$  is greater than  $minATC$ , the monopolistic competitor is not producing at productive efficiency (which is represented by  $Q_{minATC}$ ).

**Perfect Competition:** The perfect competitor maximizes profit where  $P = MC$ . Therefore, it produces at  $Q_{pc}$  and charges a price of  $P$  and earns zero economic profit in the long run. Since  $P = MC$ , the perfect competitor is producing at allocative efficiency and no deadweight loss is created. Furthermore, at  $Q_{pc}$ ,  $ATC$  is at a minimum. Productive efficiency is achieved, also.



View the following video to help compare market structures.  
<https://youtu.be/q8fnKNaOf-w>

### Assignment: Comparing Market Structures



It is now time to complete the Comparing Market Structures Assignment. The assignment is divided into multiple sections. Please follow the directions on the handout for each section.



**Graphing Monopolistic Competition – Please fully answer the questions below (drawing graphs when specified) and submit your completed assignment when finished.**

1. Draw the marginal cost, average total cost, demand, and marginal revenue curves for a firm operating in a monopolistically competitive market and earning a positive economic profit.
  - a. Identify the profit maximizing level of output and the price charged by the firm. Label the level of output  $Q_{mc}$  and the price  $P_{mc}$ .
  - b. Label the areas representing profit and deadweight loss.
  - c. Explain what would occur in the long run in this market (entry or exit). How would demand at the firm be impacted and why?
  - d. In regard to allocative and productive efficiency, how is this firm demonstrating inefficiency?
  
2. Draw the graph of a monopolistically competitive firm operating in long run equilibrium. Suppose the government levies a lump sum tax on the firms operating in this industry.
  - a. What will be the short run impact of this tax at the firm? Show this impact on the graph.
  - b. In the long run, what will happen to the number of firms in the market? How will the demand at firms be impacted?
  - c. How will price and output at the firm be impacted in the long run?
  
3. Suppose firms operating in the monopolistically competitive market adopt a new technology that decreases average total cost and marginal cost at the firms.
  - a. How will the short run output level and price at the firm be impacted? What will happen to the level of profit earned by the firm?
  - b. In the long run, how will the number of firms operating in the market be impacted? Why?
  - c. In the long run, how will the quantity produced at a representative firm change? How will the quantity produced in the market change?



# Module Wrap Up

## Module Checklist



In this module, you were responsible for completing the following assignments:

- Benefits and Drawbacks of Monopolistic Competition Discussion
- Graphing Monopolistic Competition Assignment
- Monopolistic...Competition? Discussion
- Game Theory Discussion
- Analyzing a Payoff Matrix Assignment
- Comparing Market Structures Assignment

## Review

Now that you have completed the initial assessments for this module, review the lesson material with the practice activities and extra resources.

