

Chapter 4 - Imperfect Competition

Introduction to Imperfectly Competitive Markets

A market is **imperfectly competitive** if there are relatively few firms competing with one another either to sell products to consumers or to hire workers in a labor market. Common characteristics of imperfectly competitive markets include:

- Individual firms are **price-makers**: This means that they have the ability to raise or lower their product prices. In contrast, a perfectly competitive firm is a price-taker: it must sell its output for whatever the market price is.
- There are **barriers to entry and exit**: This means that in the existence of profits or losses firms will not immediately and effortlessly enter or exit the market. Firms may enjoy profits due to entry barriers or sustain losses for longer due to exit barriers.
- Price will be higher than the firms' marginal costs: Because entry barriers exist, firms are able to charge prices higher than their marginal costs. This also means that imperfectly competitive markets are allocatively inefficient: Market output will be at a level below the socially optimal level of output.
- Firms are **productively inefficient**: Because they are protected by entry barriers, firms will produce at an average cost that is higher than their minimum average total cost, meaning the firms are not using their resources to their maximum efficiency.

Not all imperfectly competitive markets are the same, of course. There is a range of imperfect competition from markets that are highly competitive with a large number of firms, to pure monopolies, in which a single firm produces all the output in the market.

- **Monopolistic competition**: A market with a large number of firms that sell similar (but not identical) differentiated products is monopolistically competitive. Firms have price-making power, but there are relatively low entry and exit barriers. In the long run, economic profits will attract new competitors and individual firms will only break even, unless they continue to differentiate and promote their products.
- **Oligopoly**: A market with a few dominant firms, each with a significant percentage of the total market share, is oligopolistic. There are high entry barriers protecting firms' economic profits, even in the long run. Because of the small number of firms, each firm tends to be interdependent on the actions of its competitors. For this reason, the price, output, and other decisions made by oligopolies must be made strategically, always considering what the competition will do in response to a particular decision.
- **Pure monopoly**: A market with a single firm producing nearly all or all of the market output is a monopoly. Such firms have total price making power: they can charge whatever price they choose as there are no substitutes to which consumers can switch. Entry to the market is virtually blocked, guaranteeing the monopolist's dominance. Some monopoly industries must be regulated by government, particularly those that produce essential goods or services such as energy utilities or transport networks.
- **Monopsony**: A firm that is a dominant or the sole employer of a particular resource, such as labor, is a monopsony, which means "single buyer." In labor markets, monopsonies have much control over the market wage rate, often paying a lower wage to its workers than

would be paid in a more competitive labor market.

Monopoly

Monopolistic markets differ from perfectly competitive markets in nearly all characteristics. Study the table below to compare the two market structures.

Characteristic	Pure (or Perfect) Competition	Pure Monopoly
Number of Firms	VERY large number of firms	Only ONE firm. The firm IS the industry
Price making abilities of individual firms	Each firm is so small that changes in its own output do not affect market price, i.e. firms are price takers	Changes in the firm's output cause changes in the price, i.e. the firm is a price-maker!
Type of product	Firms all produce identical products, with no differentiation	Unique product, no other firm makes anything like it.
Entry barriers	Completely free entry and exit from the industry, i.e. NO barriers to entry.	Significant barriers to entry exist, preventing new firms from entering and competing with the monopolist
Efficiency	Will achieve both allocative and productive efficiency in the long-run	Will achieve neither allocative or productive efficiency in the long-run

Pure monopoly is a market structure in which there is only ONE dominant firm that sells a unique product, has price-making power and in which there are significant barriers to entry.

Monopoly in the real world: Monopolistic markets are, in fact, more common than perfectly competitive markets. Quite a few of the goods and services we consume are provided by pure monopolies or at least NEAR monopolies:

- Microsoft: has a near monopoly in the market for PC operating systems, in which its Windows software runs on nearly every PC computer in the world.
- Local utilities: Most of us have only one option from where we buy our electricity, water, garbage collection, and gas. Most public utilities are provided by monopolists
- State liquor stores: In many US states liquor is sold in purely monopolistic state-run (or regulated) stores
- Cable and phone providers: Until the last decade or two, most people had only one option from where to buy their cable TV or their phone service. The adoption of cellular phone technology has made the phone service industry more competitive recently.
- Rail transportation: In the US, Switzerland, and many other countries, there is a purely monopolistic provider of train service in the country. If you want to travel by train across the US, you will travel on Amtrak.

Barriers to entry in monopolistic markets

One characteristic all monopolies share is that there are significant barriers to entry, which keep competition out of the market. It is these entry barriers that protect a monopolist's power. Without high entry barriers, new firms would enter the market and reduce the price-making and profit-making power of the monopolist.

Examples of entry barriers:

- Legal barriers: Monopolists may have exclusive rights granted by the government to provide a certain good or service. Other legal barriers may include patents or copyrights held by the firm that prevent competition from producing a similar product.
- Economies of Scale: The “advantages of being big”. Some firms have achieved such a great size that they can simply produce their good more efficiently, and thus sell it for a lower price, than any other firm could hope to do, keeping competition out of the market.
- Ownership of resources: If a firm has exclusive access to the resources needed to make its good, then no other competitor can hope to begin producing the good. An example of this is the global diamond giant De Beers, which has exclusive access to over 80% of the known diamond mines in the world.
- Strategic pricing: A monopolist may be able to block entry to the market by temporarily selling its output at a price below its per-unit costs (and earning short-run losses). This deters competitors from entering
- Brand loyalty: If a firm has a brand that is well known and popular among consumers, then other firms will find it hard to get a foothold in the market, allowing the monopolist to maintain market share.

Demand and Marginal Revenue a monopoly market

Demand, average revenue and marginal revenue as seen by the monopolist are quite different as that seen by the perfectly competitive firm.

- Recall that in perfect competition, demand, MR, and AR as seen by the firm is a horizontal line equal to the equilibrium price determined in the market.
- In monopoly, the demand seen by the firm is the market demand, and MR falls faster than demand, AR and price.

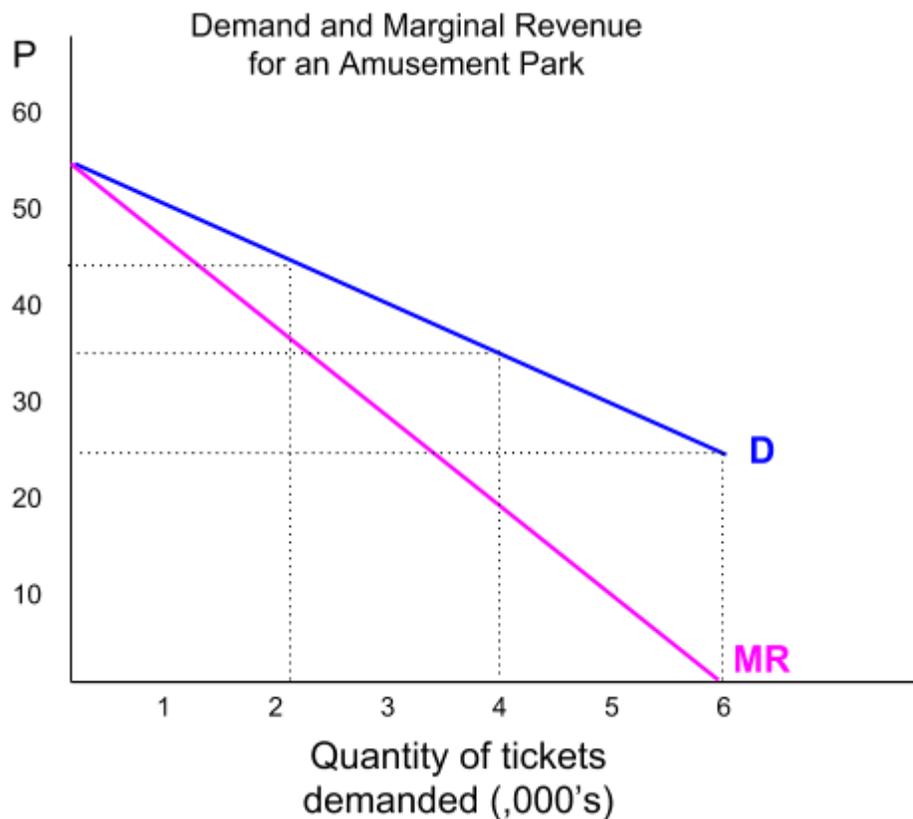
The table below represents the demand schedule, the total revenue, and the marginal revenue of an amusement park (the only amusement park in a region: in other words, a monopolist).

Q (thousands)	P (AR)	TR (P×Q) thousands	MR (ΔTR/ΔQ) thousands
0	55	0	-
1	50	50	50
2	45	90	40
3	40	120	30

4	35	140	20
5	30	150	10
6	25	150	0

Observe the following about the monopolist's demand and revenues:

- At \$55, no tickets will be sold. At \$50, 1,000 will be sold. In order to sell more tickets, the park must lower prices. The park is a price-maker!
- The park's revenues rise until it has sold 5,000 tickets, where it peaks at \$150,000.
- MR falls as output increases, but it falls twice as rapidly as the price.
- Graphically, the MR will be below the demand curve.



Observe from the graph:

Because the monopolist must lower its price to sell additional units, its marginal revenue of a particular unit will always be lower than the price that unit sells for (except at an output of 1).

Points about the monopolist's demand:

- Demand for the firm's output IS the market demand
- Demand is relatively inelastic compared to a perfectly competitive firm, since there are no close substitutes for a monopolist's product.
- When MR is positive, lowering the price and increasing output will cause the firm's total

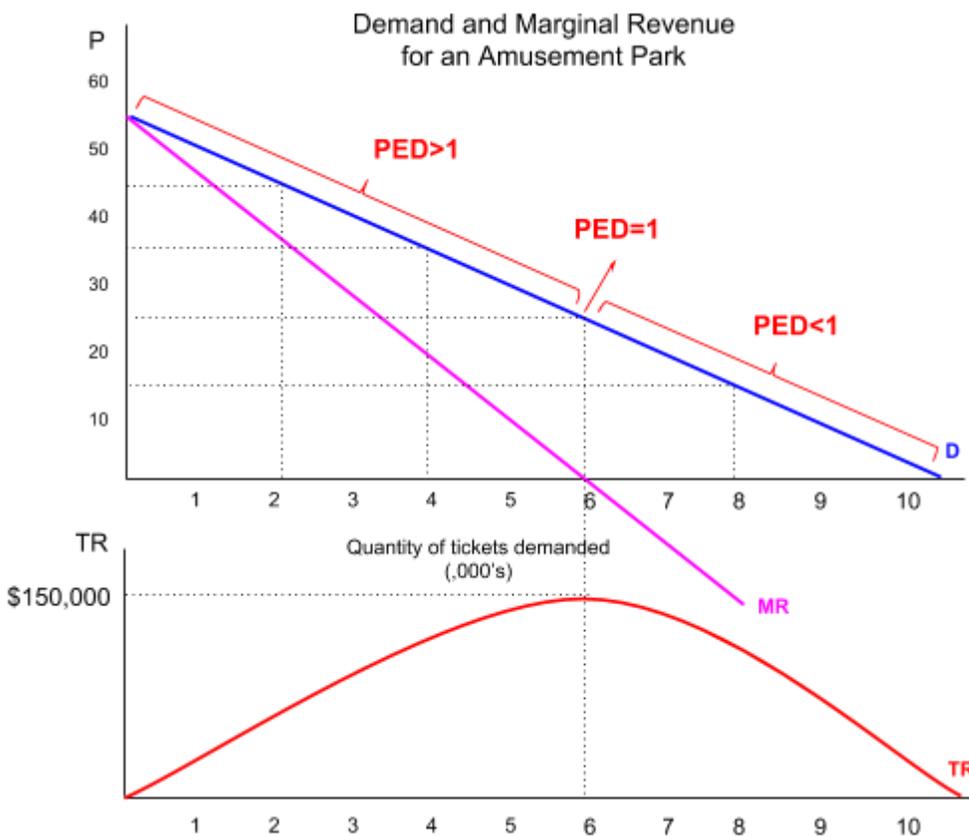
revenues to rise.

- When MR is negative (beyond 6 units on this graph), further price decreases and quantity increases will cause the firm's total revenues to fall.

PED and the monopolist's demand

In a competitive market in which hundreds of firms producing identical products compete with one another, demand for each firm's output is perfectly elastic, meaning no firm is able to raise its price as buyers will switch to another seller. A monopolist, on the other hand, is a price-maker. The firm has the freedom to raise or lower its price (and change its level of output) at will, since it is the sole producer of the good.

Compared to a perfectly competitive seller, demand for a monopolist's product is relatively inelastic. However, as a price-making firm lowers its price, the PED for its good decreases, while at higher prices PED increases. To understand why, consider the graph below.



Observe from the graph:

- As this firm increase its output from 0 to 6,000 units, it must lower its price from \$55 to \$25 in order to sell more output.
- As it does so, its total revenues ($TR=P \times Q$) increase from \$0 to \$150,000.
- At a quantity of 6,000 and a price of \$25, the firm's TR is maximized.
- In order to sell more output, the firm must lower the price, but since consumers are relatively unresponsive to further price cuts the firm's revenues fall beyond 6,000 units.

You will recall from the unit on elasticities that if a decrease in price causes sellers' revenues to increase, demand is elastic, and when a decrease in price causes sellers' revenues to decrease, demand is inelastic. The monopolist's (or any price-making firm), demand can therefore be observed to have:

- An elastic range where MR is positive. Consumers are relatively responsive to lower prices, so the percentage increase in Qd is greater than the percentage decrease in price.
- An inelastic range where MR is negative. Consumers are relatively unresponsive to lower prices, so the percentage increase in Qd is lower than the percentage decrease in price.
- A price and quantity combination at which demand is unit elastic where $MR=0$. If a change in price causes no change in total revenue (in other words, TR is maximized), then the percentage increase in Qd is equal to the percentage decrease in price.

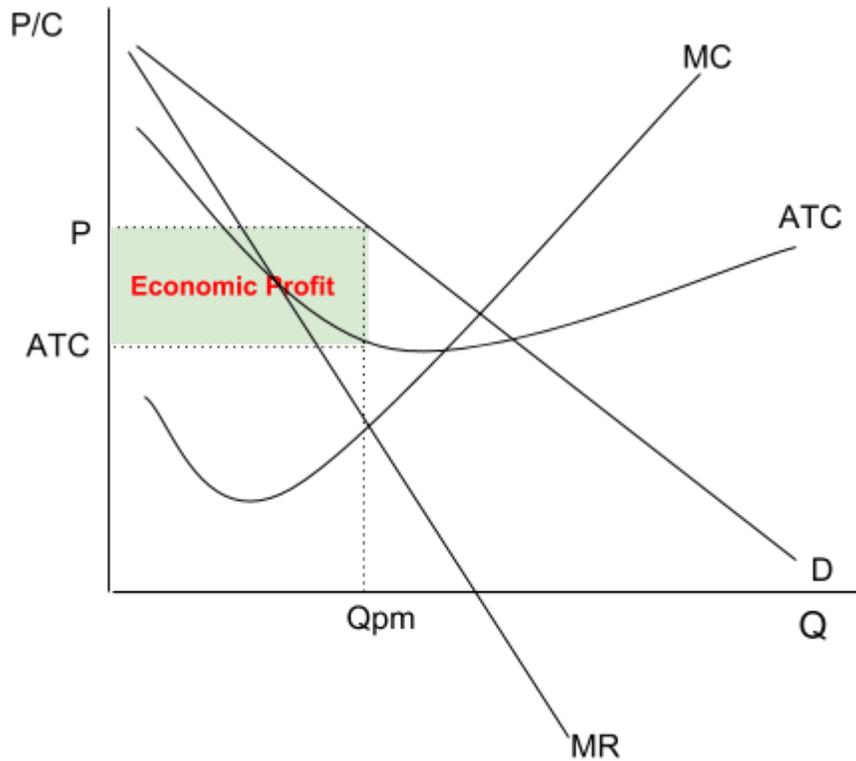
A price-making firm will NEVER produce in the inelastic range of its demand! Because if a monopolist were to sell beyond the point where $MR=0$, it would always do better by decreasing its output until MR were positive once again.

- Total costs would decrease as the firm reduces its output
- Total revenue would increase, therefore...
- Reducing output to a point below the revenue maximizing quantity (where $MR=0$) would definitely increase the firm's profits (remember, economic profits = $TR-TC$)

The profit maximizing monopolist

Just like a firm in perfect competition, a monopolist wishing to maximize its profits wants to produce at the quantity at which Marginal Revenue (MR) = Marginal Cost (MC).

To determine a monopolist's profit maximizing level of output, therefore, we must consider both its revenues and its costs. The graph below shows a monopolistic firm producing at its profit maximizing price and quantity, where $MR=MC$.



Notice in the graph:

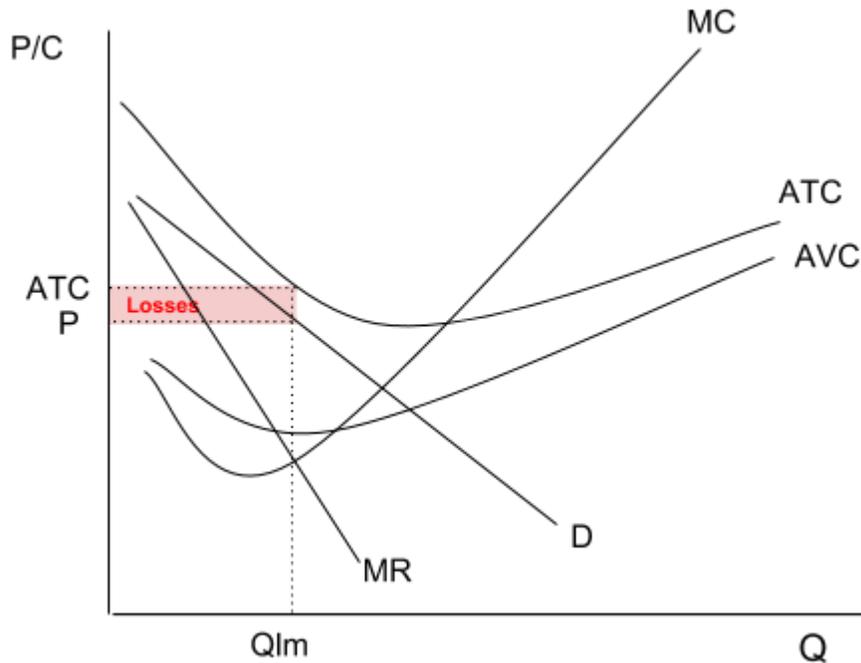
- The monopolist's MC and ATC demonstrate the same relationships as a firm in perfect competition.
- The firm will produce at the quantity at which $MC=MR$ to maximize profits.
- Subtracting the firm's ATC at Q_{pm} from the price it can sell Q_{pm} units of output for, and multiplying by the quantity produced find the area of economic profit. Economic profits = $(P-ATC) \times Q$.
- Because of the entry barriers in this market, the firm's profits are sustainable in the long-run

The loss minimizing monopolist

Having monopoly power does not guarantee that a firm will earn economic profits.

- If demand for a monopolist's output falls, or
- If the monopolist's costs of production rise, then...
- The firm can go from earning economic profits to earning losses.

To minimize losses, a monopolist should produce at its $MR=MC$ level of output.

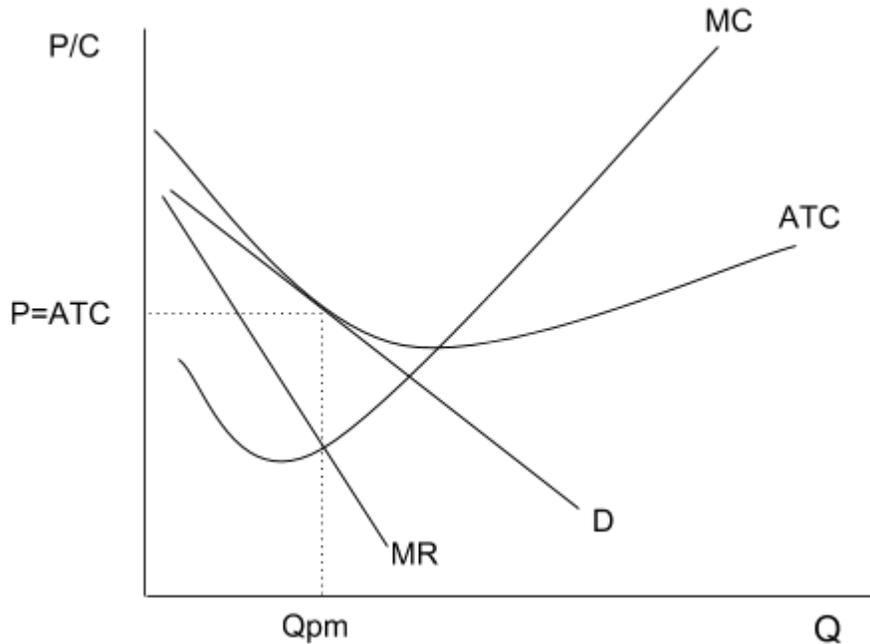


Notice in the graph:

- The firm is producing at its $MR=MC$ level of output, but at this point the firm's ATC is greater than the price it can sell for.
- The firm is earning economic losses represented by the triangle.
- Despite its losses, this firm should **NOT SHUT DOWN**, because the price still covers the average variable cost; this firm can continue to operate in the short-run.
- Only if total losses were larger than the total fixed costs should the firm shut down.
- To reduce or eliminate its losses, the firm must try and increase demand or reduce its costs.

The breaking-even monopolist

Of course, it is also conceivable that a monopolist will be selling its product at a price that is exactly equal to its ATC. This would mean that the monopolist is breaking even.



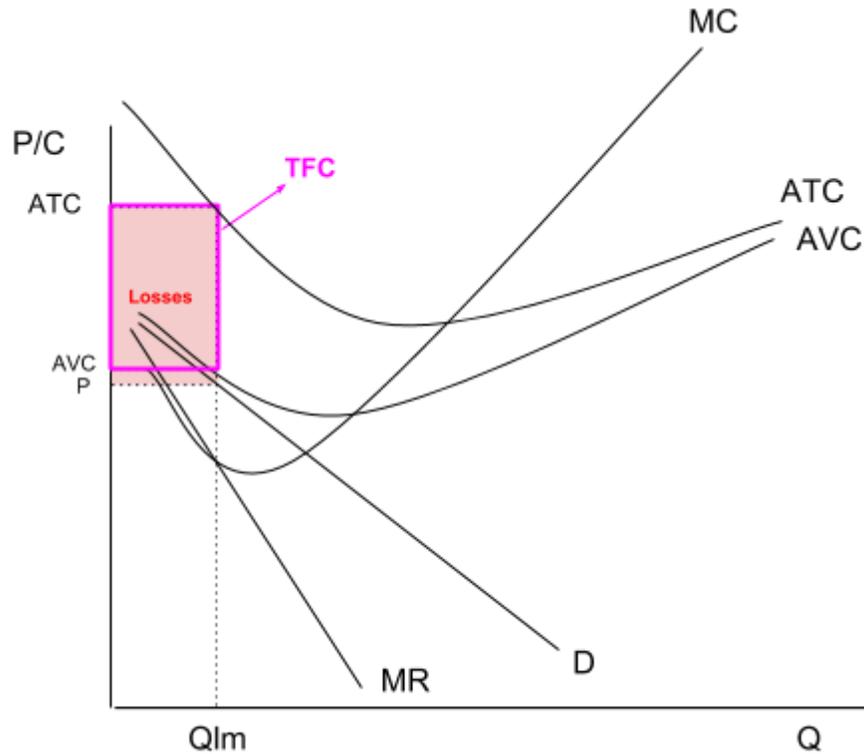
Notice in the graph:

- The firm is producing at its $MR=MC$ level of output. At this point the firm's ATC is exactly equal to its price.
- The firm's total revenues are exactly equal to its total costs.
- The firm is covering all of its explicit and implicit costs, meaning it's earning a normal profit, but it is not earning any economic profit.
- If the firm wishes to earn economic profits, it will have to improve or advertise its product to increase demand or increase the efficiency with which it uses resources to reduce its costs.

When a monopolist should shut down

Firms should follow a simple rule when deciding whether or not to shut down and leave a market:

- If the price it can sell for is lower than the firm's average variable cost, or...
- If total losses are greater than the firm's total fixed costs.



Notice in the graph:

- The firm is producing at its $MR=MC$ level of output, but at this point the price the firm can sell its output for is lower than the firm's average variable cost.
- This firm cannot even afford to pay its workers for each unit they produce (the per-unit labor costs are higher than the price)
- The gray rectangle represents the firm's losses $(ATC-P) \times Q$. The firm's total fixed costs, $(ATC-AVC) \times Q$, are smaller than the total losses. This means that if the firm shuts down it will minimize its losses

Long-run equilibrium in a monopolistic market

In our study of perfect competition we learned the following:

In perfectly competitive markets

- If firms are earning economic profits in the short-run, new firms will enter the market, increasing the supply, reducing the price and eliminating profits.
- If firms are earning economic losses in the short-run, some firms will exit the market, reducing the supply, increasing the price and eliminating losses for the firms that remain.
- In the long-run, firms in perfectly competitive markets will only break even.

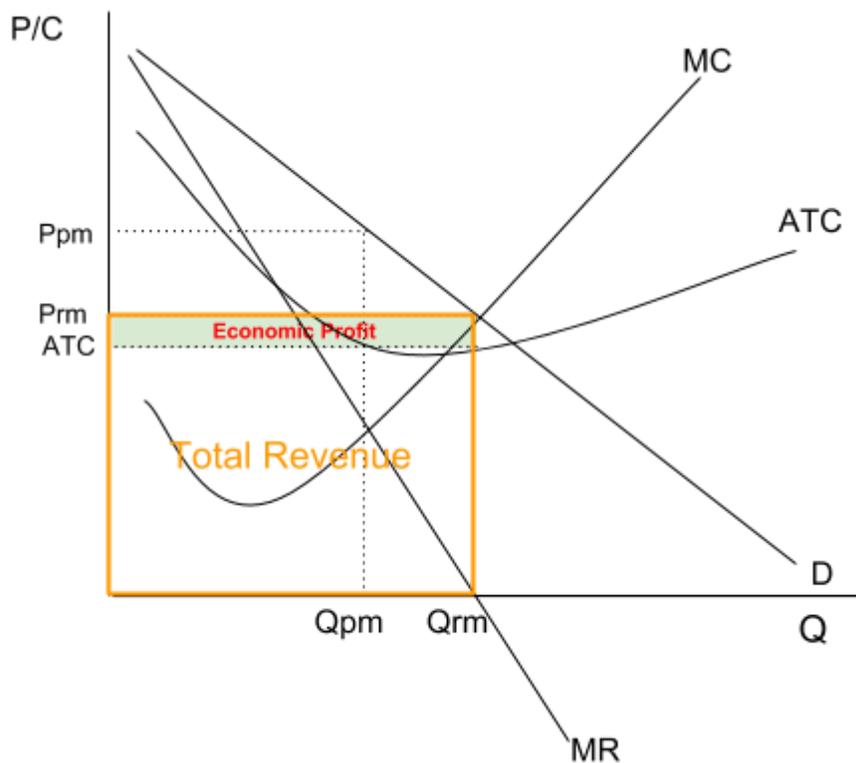
However, in monopolistic markets:

- If the firm is earning economic profits in the short-run, those profits will be maintained as long as the firm can keep demand for its goods high and its costs low, because entry to a monopolistic market is blocked!
- If the firm is earning economic losses in the short-run, those losses will be maintained as

long as the firm cannot increase the demand for its product or reduce its price. Exit from a monopoly market is difficult because of the large economies of scale that often characterize large, single sellers.

The revenue-maximizing monopolist

A price-making firm may not always aim to maximize profits, rather to sacrifice profits for market share and higher revenue. The firm below is earning smaller profits at Q_{rm} and P_{rm} (**revenue maximizing** quantity and price) than it would at Q_{pm} and P_{pm} (where $MC=MR$ and profits are maximized), however, it sells more output and may therefore have more market share than it would at the higher price.



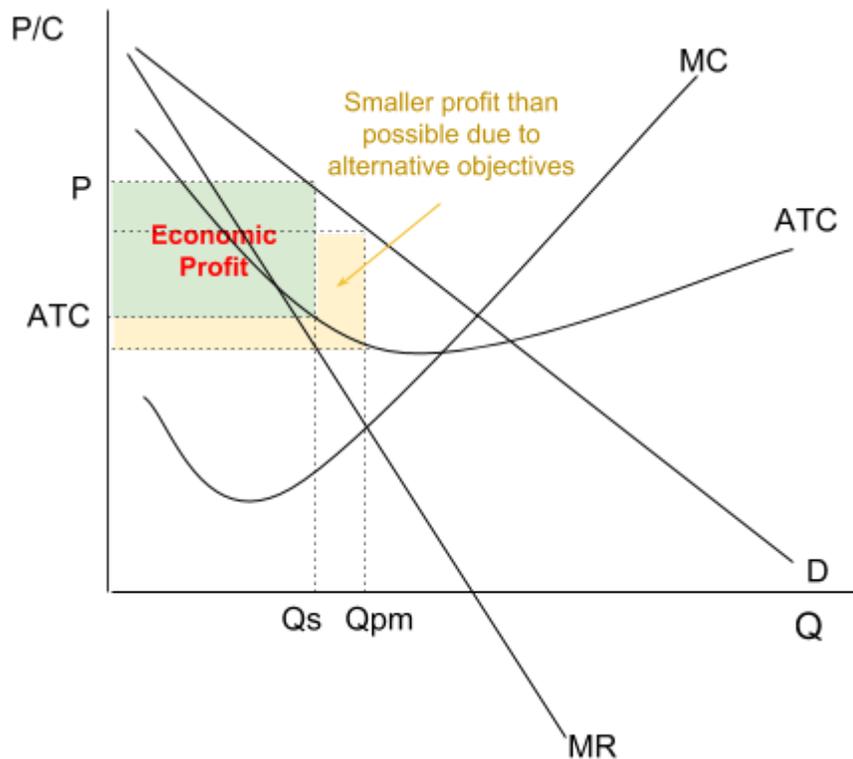
The revenue maximizing firm:

- Produces where the last unit sold earned the firm no additional revenue (where $MR=0$)
- At every level of output up to this point increases in output caused revenues to rise ($MR>0$)
- At every level of output beyond this point increases in output caused revenues to decrease ($MR<0$)
- Total revenues are maximized where $MR=0$, but the level of economic profit is smaller than it would be at a lower quantity and higher price.

The “satisficing” monopolist

As we just learned, profit maximization is not always the main objective firms pursue. Sometimes firms may sacrifice economic profit for alternative objectives, such as corporate social responsibility, environmental sustainability and public service ends.

When a firm aims to earn a profit but not necessarily maximize its profit due to its promotion of alternative objectives, the term used is **“satisficing behavior”**. While there is no single “satisficing rule”, a firm intentionally earning, but not maximizing profits, could be said to be satisficing.



Observe from the graph:

- This firm is producing a smaller quantity and charging a price than if it were to produce at its profit-maximizing level
- The firm is still earning a profit, just not *maximizing its profit*.
- The firm may be *satisficing*, e.g. earning enough to keep its owners (or shareholders) satisfied while pursuing other objectives
- The firm may be investing in renewable production methods (which limits output and increase cost), donating a share of its revenues to charities, sourcing its raw materials from fair trade or certified organic suppliers, etc...
- Any of these alternative objectives would result in a lower level of output, higher ATC and higher price, but may be considered *satisficing* behavior, since the firm is still earning a profit, just not the maximum amount possible.

Natural Monopoly

Not all industries that are monopolies necessarily need to be monopolies. In other words, sometimes firms have monopoly power for legal or technical reasons:

- If a firm has an exclusive permit from the government to provide a particular good
- If a firm has “cornered the market” for a particular resource needed to produce the good
- If a firm has priced competitors out of the market using predatory pricing strategies...
- Any of these sources of monopoly power could be considered economically inefficient and

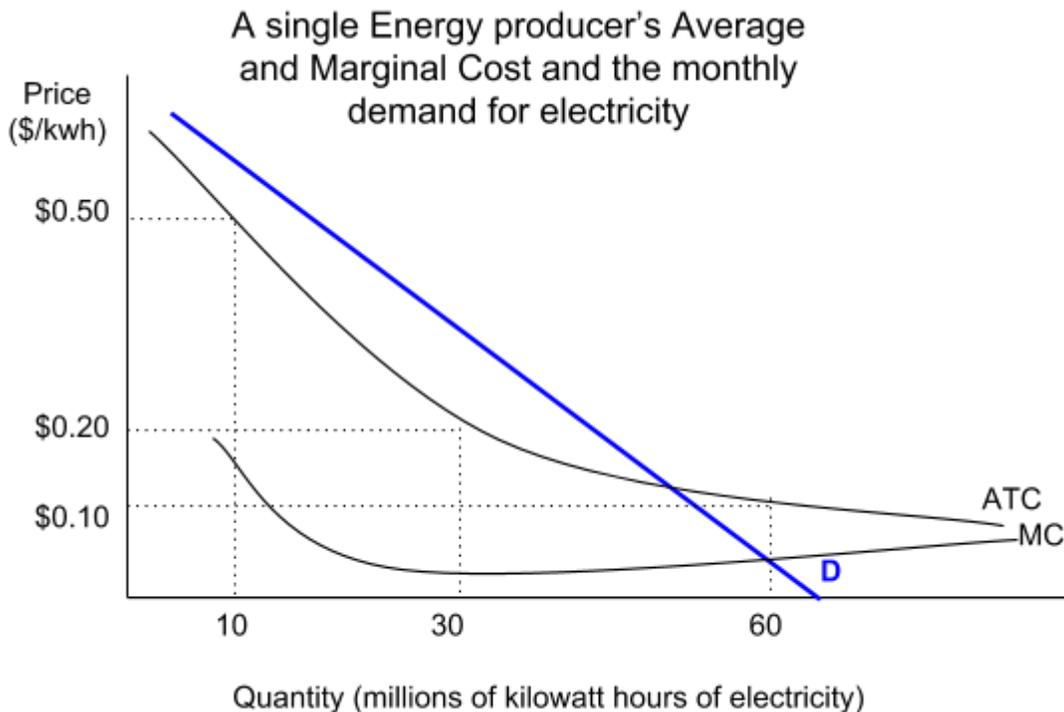
therefore undesirable to some extent.

However, there is a type of monopolistic industry in which the dominance of a single firm is economically justifiable and actually beneficial for society! It is called a **natural monopoly**.

When a single producer can do the production of a good more efficiently than could possibly be accomplished by multiple producers, an industry is a natural monopoly.

- This typically occurs in industries in which there are significant economies of scale.
- If the total demand for a good intersects the firm's ATC while the firm is still achieving increasing returns to scale, then having multiple firms produce the good cannot be more efficient than having a single producer and seller.

Natural monopolies typically occur in industries with huge economies of scale, such as utility industries or those for good that require significant capital investments to produce, and for which there is a relatively small demand in total.



The graph above shows the market demand, the average cost and the marginal cost of electricity in a city of 60,000 people.

- If a single firm produces all 60 million kwh of electricity, it can do so at a cost of \$0.10 per kilowatt hour, for a total cost of \$6 million per month (60 million \times \$0.10)
- If two firms were to compete in the market, each firm would split the market and produce 30 million kwhs each at an average cost of \$0.20 per kwh and a total cost of \$12 million per month between them (60 million \times \$0.20)
- However, if six firms were to split the market evenly and produce 10 million kwh of

electricity each, each firm would face an average cost of \$0.50 per kwh and the total cost across the six firms would be 60 million \times \$0.50 = \$30 million.

The market above is a natural monopoly because the high fixed costs associated with providing electricity to a medium size city make it more efficient for a single seller to provide the service than would be possible if multiple sellers were to compete for the limited demand.

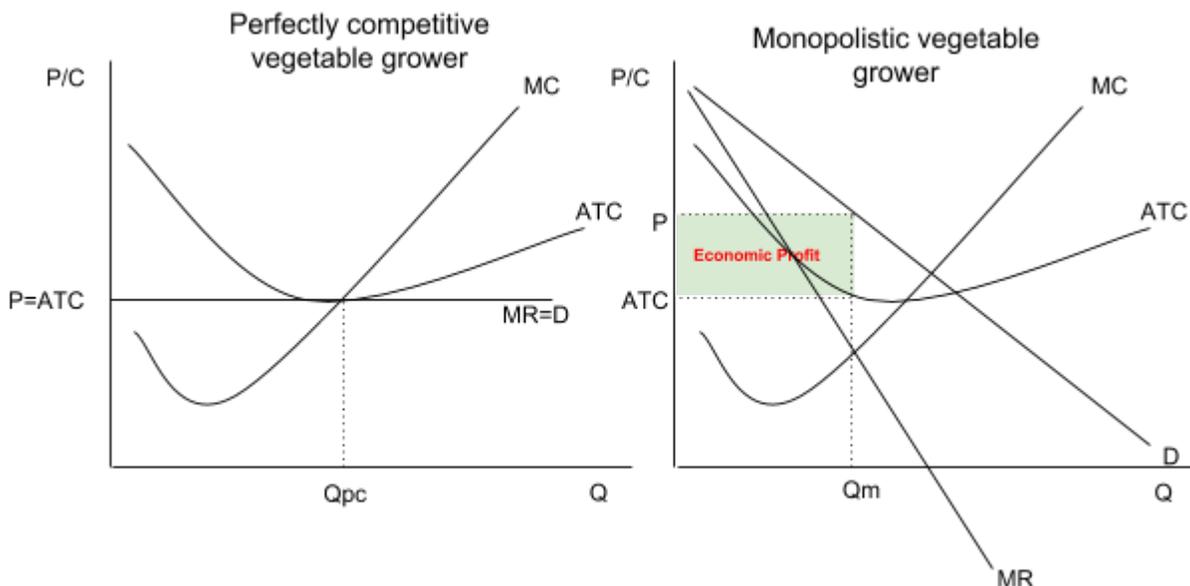
In this case, a single firm can produce the 60 million kwh of electricity demanded by the city's 60,000 households at a total cost of just \$6 million per month while six firms would have combined total costs \$30 million per month.

The least-cost way to provide electricity is to allow a single firm to provide it to the whole city. The firm will be better able to achieve economies of scale and thereby provide electricity at a lower average cost than if six or even two competing firms were to split the market.

Monopolies are productively inefficient

Under perfect competition, firms are forced to be productively efficient, meaning they produce their products at the lowest possible average total cost. Without competition, however, monopolists are NOT productively efficient.

Consider the two firms:



Observe from the graph:

- The vegetable grower producing in the competitive market is forced to produce at its minimum average total cost, at which the grower breaks even. At any other level of output the perfect competitor would earn losses. Competition forces producers to use resources in their most efficient way, maximizing productive efficiency.
- The monopolist, which faces no competition, produces at a quantity lower than where its ATC is minimized and charges a price higher than its minimum ATC. The lack of

competition allows the monopolist to use resources less efficiently and focus on maximizing its profits by restricting output and charging a higher price.

Monopoly compared to perfect competition

Compared to perfect competition, monopolistic markets have several observable effects

Effects of monopoly on price, output and efficiency
Higher price
Lower output
$P > \min. ATC$: Productive inefficiency
$P > MC$: Allocative inefficiency <i>(resources are under-allocated towards the product)</i>
Efficiency Loss (Welfare loss) occurs
There is a loss of Consumer surplus in exchange for higher firm profit. Welfare loss results
Income transfer: consumers pay a higher price, shareholders of the monopoly enjoy higher profits.

Some other effects of an industry becoming a monopoly include:

- Economies of scale: Some monopolized industries have only one firm because economies of scale exist over such a wide range of output. It is possible that one or two large firms can achieve a lower ATC than many smaller firms. This is called a natural monopoly.
- Simultaneous consumption: One product can satisfy a large number of consumers at the same time. Example: Microsoft Windows. Marginal Cost for Microsoft is essentially nothing, so ATC_{LR} declines over the entire range of output.
- Network effect: describes the phenomenon of a product's value increasing the more users it has. Examples: cell phones, the internet, email, Facebook! Tends to move markets towards monopoly as more and more consumers flock to a product because of the "network" that develops around it.
- Income Transfer: Consumer surplus is lost because of higher price. Firm profits are higher b/c of market power. Compared to PC industries, monopolies represent a transfer of income from consumers to shareholders in the monopolistic firm.

Price Discrimination

In our study of price-making monopolists we have so far assumed that the firm charges a single price to all consumers for the product in question. However, all consumers do not always pay the same price for a particular good.

When firms charge different prices to different consumers for the same product they are practicing what is known as **price discrimination**.

In order for a firm to be able to price discriminate, the following conditions must be met:

1. The firm must have some monopoly power: A perfect competitor could not possibly charge

different prices to different consumers, because there are hundreds of other firms selling the same good for the low market price.

2. **Market Segregation:** In order to price discriminate, the seller must be able to determine who is willing to pay what. The firm must segregate the market by age, gender, race, nationality, income level, or some other method that distinguishes between consumers willing to pay more for a good and those willing to pay less
3. **No Resale:** If a buyer who paid a low price is able to sell the product to someone who the seller wants to charge a high price to, the seller's monopoly power is undermined and it becomes difficult to price discriminate. So it must be difficult or impossible for buyers to resell the product to one another.

Price discrimination comes in many forms, and we distinguish between different degrees of price discrimination.

- **First degree price discrimination** – by individual consumer: This is the most difficult type of price discrimination for firms to practice. It requires the firm to determine exactly what each consumer is willing and able to pay for the product, and charges each consumer that price. This type leads to the greatest profits for the firm, but leaves consumers with no consumer surplus. Sometimes referred to as perfect price discrimination.
- **Second degree price discrimination** - by quantity: A more common form of price discrimination in which the firm charges lower per-unit price to consumers who “buy in bulk”. Consider a pack of toilet paper rolls with four rolls in it compared to a package with 24 rolls in it. Usually, if you buy the larger package, you will pay considerably less per roll. This is a form of price discrimination which charges higher prices to people who are not willing to buy in bulk.
- **Third degree price discrimination** – by consumer group: Another common form of price discrimination; consumers may pay more or less for a good depending on their age, their gender, when they buy, the passport they carry, etc... Consider movie theater tickets (age), airline tickets (when you buy), haircuts (gender) and admission to museums or national parks in some countries (nationality).

There are countless examples of firms price discriminating. Here are a few:

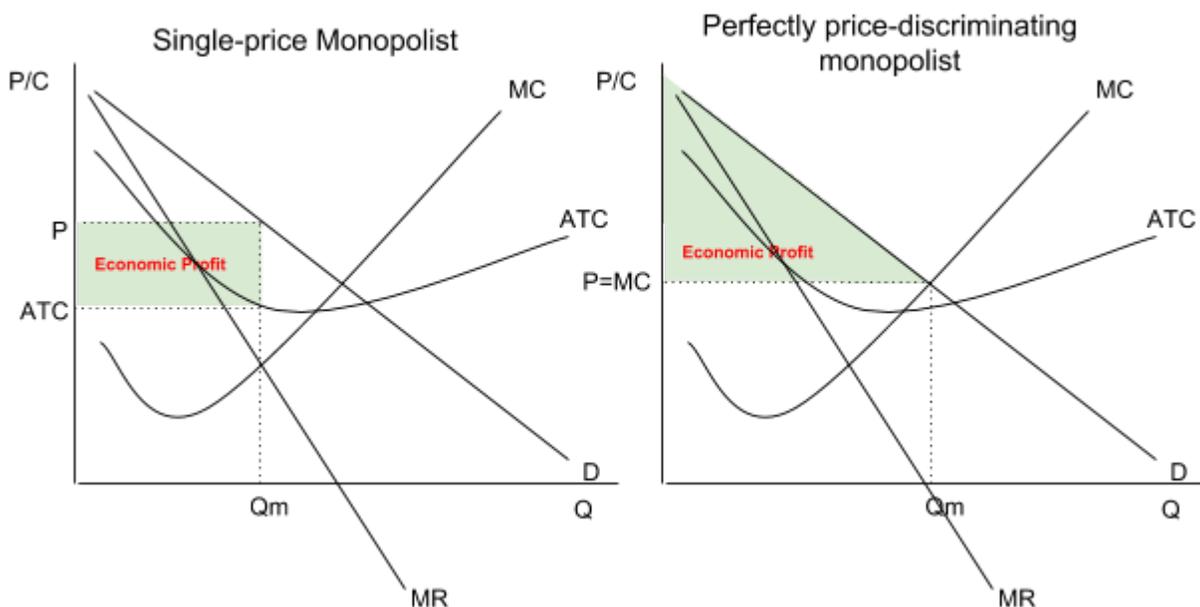
- **Movie theaters:** Charge different prices based on age. Seniors and youth pay less since they tend to be more price sensitive.
- **Gas stations:** Gas stations will charge different prices in different neighborhoods based on relative demand and location.
- **Grocery stores:** Offer coupons to price sensitive consumers (people whose demand is inelastic won't bother to cut coupons, thus will pay more for the same products as price sensitive consumers who take the time to collect coupons).
- **Quantity discounts:** Grocery stores give discounts for bulk purchases by customers who are price sensitive (think “buy one gallon of milk, get a second gallon free”... the family of six is price sensitive and is likely to pay less per gallon than the dual income couple with no kids who would never buy two gallons of milk).
- **Dell Computers:** Dell price discriminates based on customer answers to questions during the online shopping process. Dell charges higher prices to large business and government agencies than to households and small businesses for the exact same product!

- Hotel room rates: Some hotels will charge less for customers who bother to ask about special room rates than to those who don't even bother to ask.
- Telephone plans: Some customers who ask their provider for special rates will find it incredibly easy to get better calling rates than if they don't bother to ask.
- Damaged goods discounts: When a company creates and sells two products that are essentially identical except one has fewer features and costs significantly less to capture more price-sensitive consumers.
- Book publishers: Some paperbacks cost more to manufacture but sell to consumers for significantly less than hard covers. Price sensitive consumers will buy the paperback while those with inelastic demand will pay more for the hard cover.
- Airline ticket prices: Weekend stopover discounts for leisure travelers mean business people, whose demand for flights is highly inelastic, but who will rarely stay over a weekend, pay far more for a round-trip ticket that departs and returns during the week.

The effects of price discrimination can be shown graphically, which allows us to determine whom benefits, which suffers, and whether it increases or decreases overall welfare and efficiency.

First degree price discrimination

The graphs below compare a single price monopolist and a perfectly price discriminating firm.



Examining the graphs above, we can make the following observations about price discrimination:

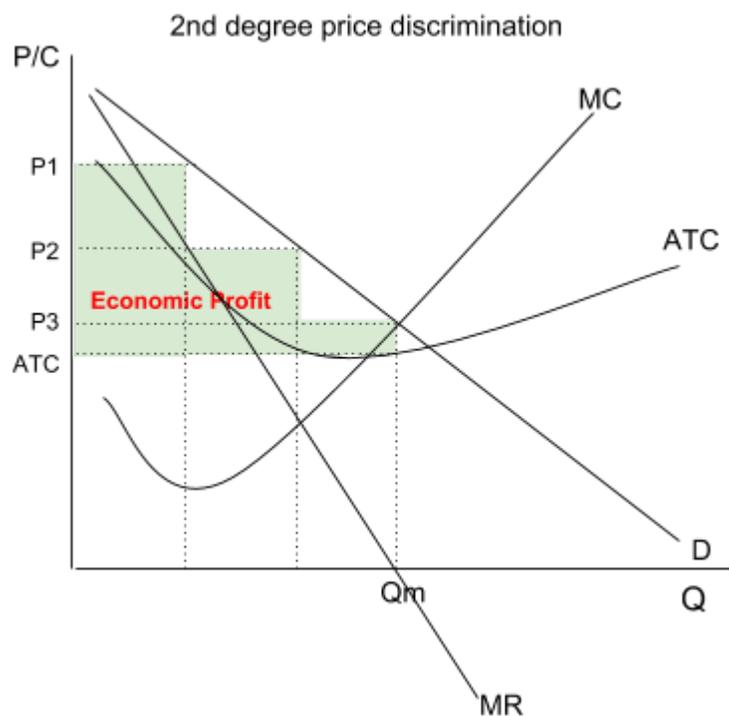
- The price discriminating firm earns a greater level of economic profits than the single-price firm. The shaded triangle on the right is bigger than the shaded rectangle on the left
- More output is produced and sold due to price discrimination: Q_{pd} is greater than Q_m
- Consumer surplus is reduced (or eliminated in the case of perfect price discrimination). When every consumer pays exactly what she is willing to pay, no one has any “extra” happiness when buying the product.
- Allocative efficiency is improved! The higher level of output will be closer to (or equal to in

the case of perfect price discrimination) the $P=MC$ level. The firm will continue to sell right up to the point the last price it charged is equal to the firm's marginal cost.

- More efficient allocation of resources: Despite the fall in consumer surplus, overall welfare is actually improved by price discrimination. More people can afford the product than under a single price seller.

Second degree price discrimination

In 2nd degree price discrimination firms do not know much about the characteristics of different consumers and thus are unable to segregate the market based on consumer incomes or other factors. Rather, firms charge different prices based on the quantity consumers buy. Examine the graph below.



Observe from the graph:

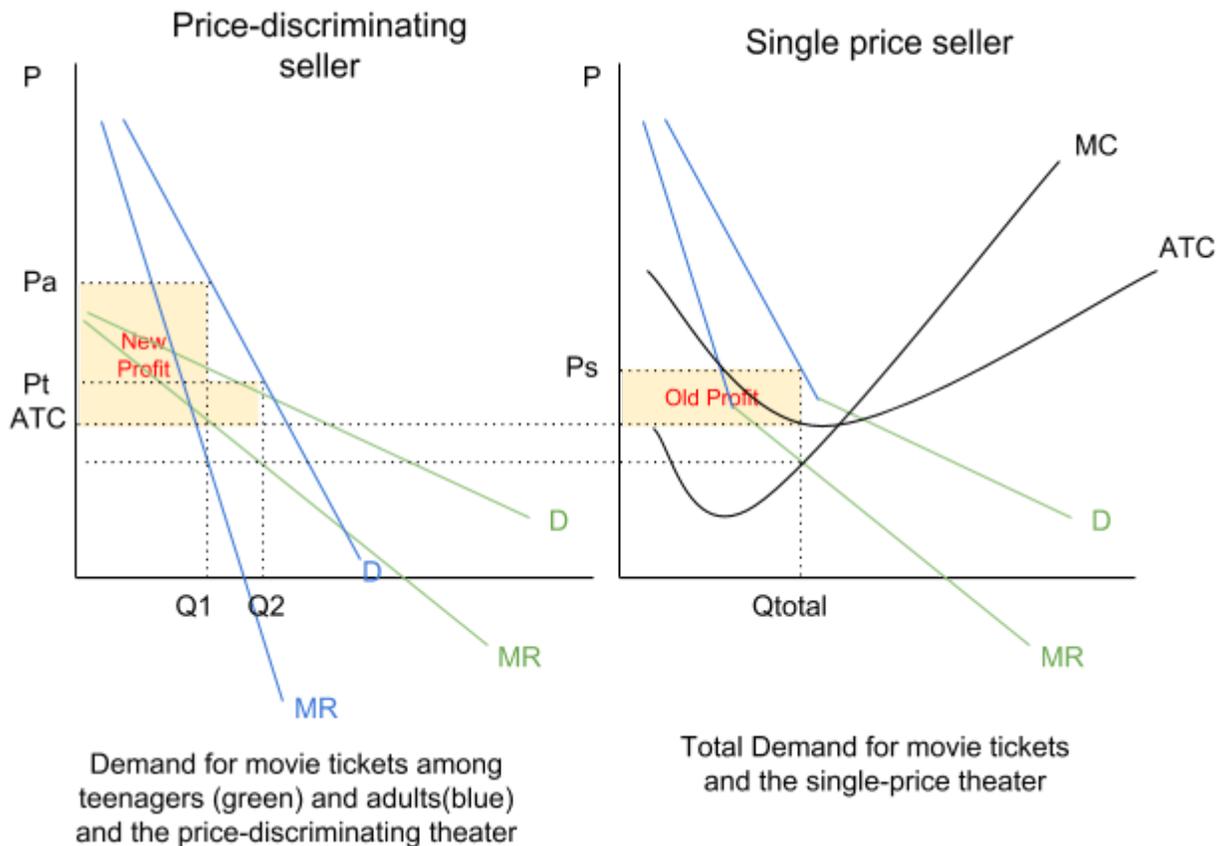
- Consumers who buy in lower quantities pay higher price of P_1 , while consumers who buy in bulk pay lower prices of P_2 and P_3 .
- By charging different prices the firm is able to extract more consumer surplus and earn more economic profit.
- Total output is higher under 2nd degree price discrimination than under a single-price seller, and total welfare is thus greater.
- Consumers who would have been unable to buy the good under the single price can now afford the good.

Bulk discounts are commonly used by consumer goods retailers: consider large packages of toilet paper versus smaller packages, volume discounts on cleaning or cooking supplies, and other deals offered by “big box” retailers like Walmart, Costco, Tesco, Carrefour and others.

Third degree price discrimination

Firms that are able to segregate their consumers based on characteristics such as income level, gender, nationality, age, etc... may employ 3rd degree price discrimination. The idea is to charge consumers whose demand is greater and less elastic higher prices while charging consumers whose demand is lower and more elastic lower prices.

The graphs below show the demand and marginal revenues for movie theater tickets on a Friday night among teenagers (in green) and adults (in blue) and the total demand of both groups in the graph on the right.



Observe from the graphs:

- Teenagers' demand (in green) is more elastic than demand from adults (in blue).
- If the movie theater had to set a single price (P_s) for movie tickets it would base it on the combined demands of the two subgroups and earn an area of profit like that shown in the graph on the right.
- By carrying over the firm's MC from the graph on the right to the graph with both groups' demand on the left, the firm can set prices above where $MC=MR$ for teenagers (P_t) and a higher price above where $MC=MR$ for adults (P_a)
- By charging higher prices to adults and lower prices to teenagers, however, the theater is able to extract more consumer surplus and convert it to economic profit (as in the graph on the

left).

Charging higher prices to consumers with relatively inelastic demand (adults who buy movie tickets) and lower prices to consumers with relatively elastic demand (teenagers), sellers are able to both earn more profits and sell to more consumers than they would if only a single price were set.

Other examples of third degree price discrimination include: airplane tickets, museum admission, cell phone plans, hair salons, night clubs (ladies night), and so on.

Monopolistic Competition

The third market structure we will study gets its name from sharing some characteristics with pure monopoly and some with perfect competition. Below are some of the key characteristics of the **monopolistically competitive** market:

Characteristic	Monopolistic Competition
Number of Firms	Fairly large number of firms, each with a relatively small amount of market share
Price making abilities of individual firms	Firms are small relative to the industry, meaning changes in one firm's output have only a slight impact on market price. While they are price-makers, demand will be relatively elastic compared to a pure monopolist
Type of product	Products are slightly differentiated. Firms will advertise to try and further differentiate product. Branding and advertising are used to attempt to increase demand for the firm's product over competitors.
Entry barriers	Entry to and exit from the market is relatively easy. If profits exist, new firms will enter, if losses are earned, it can be expected that some firms will exit.
Efficiency	Because of their price-making power, firms will produce at a price that is higher than their marginal cost and higher than their minimum ATC, meaning the industry is not economically efficient.

Examples of monopolistically competitive markets

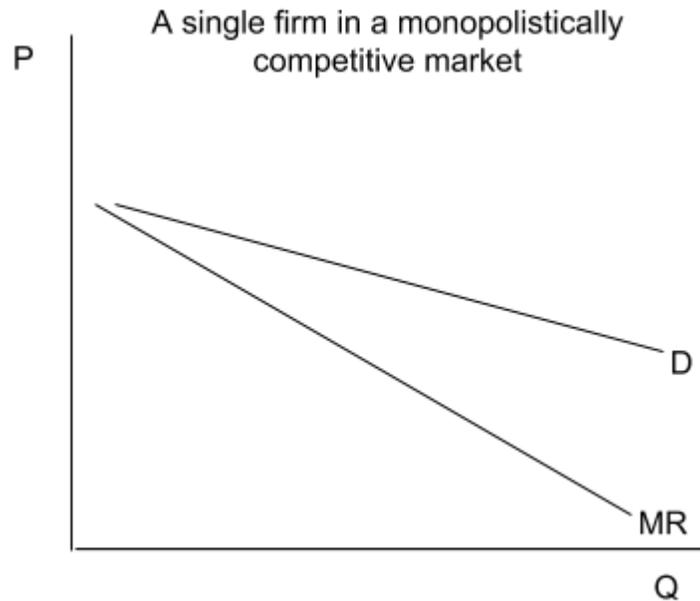
Monopolist competition is probably the most common market structure in most market economies. The characteristics apply to a wide range of industries in which many sellers compete for the business of buyers. Examples include:

- Restaurants in a major city: There are hundreds of restaurants in a city of any reasonable size. They all sell a similar product (food), which is differentiated from one seller to the other (Chinese, Mexican, French, Barbecue, etc...) Each restaurant can set its own prices, but only to an extent (have you ever seen a \$100 hamburger?)
- Apparel: The market for clothing is highly competitive, and like restaurants, the hundreds (or thousands) of clothing manufacturers are competing for our business by differentiating their products from the competition. Again, firms have some price-making power, but consumers can always switch brands if prices rise too much, so demand is relatively elastic.

- Automobiles: Even the car market shows some characteristics of monopolistic competition, although due to the relatively substantial economies of scale, it could be considered oligopolistic in some markets. Each car is a close substitute for all other cars, but is differentiated to try to make demand for it less elastic.

Revenue curves for the monopolistic competitor

Because each firm in a monopolistically competitive market makes a product that is differentiated from its competitors, it is able to control the price for its output, but only to a certain extent.

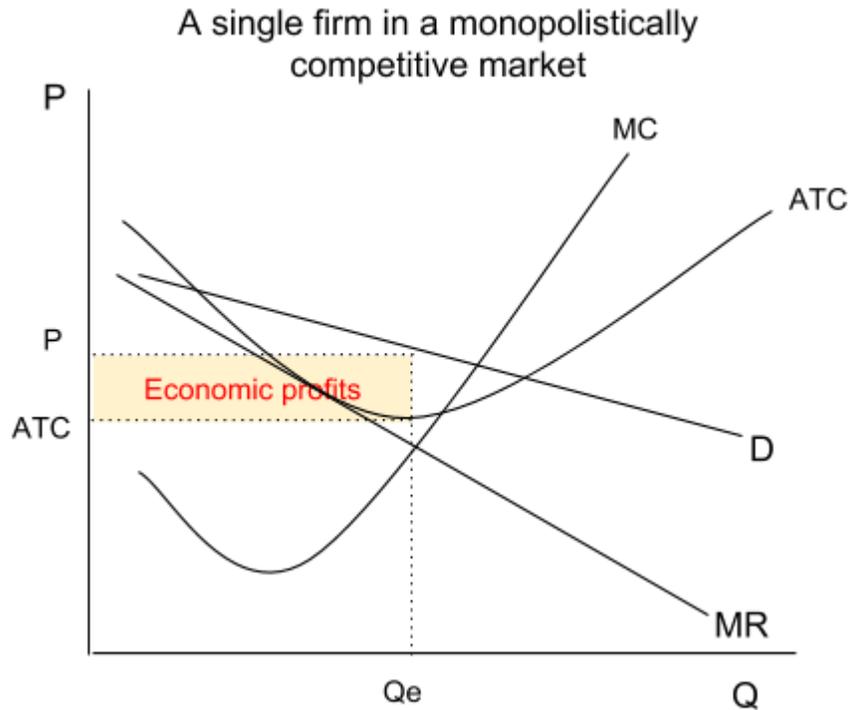


Observations of the monopolistic competitor's demand and MR curves:

- With many other firms making similar products, each firm faces a relatively, but not perfectly, elastic demand curve. A price increase will lead to a large loss of buyers, but a price decrease will lead to a large increase in buyers.
- In order to sell additional units of its product, a firm must lower the price of all its output. For this reason, the firm's marginal revenue will fall faster than its price (see a mathematical explanation for this in the chapter on Monopoly).

Profit maximization in the short run

As with firms competing in the other market structures, a monopolistic competitor will maximize its total profits when it produces at the quantity of output at which $MR=MC$

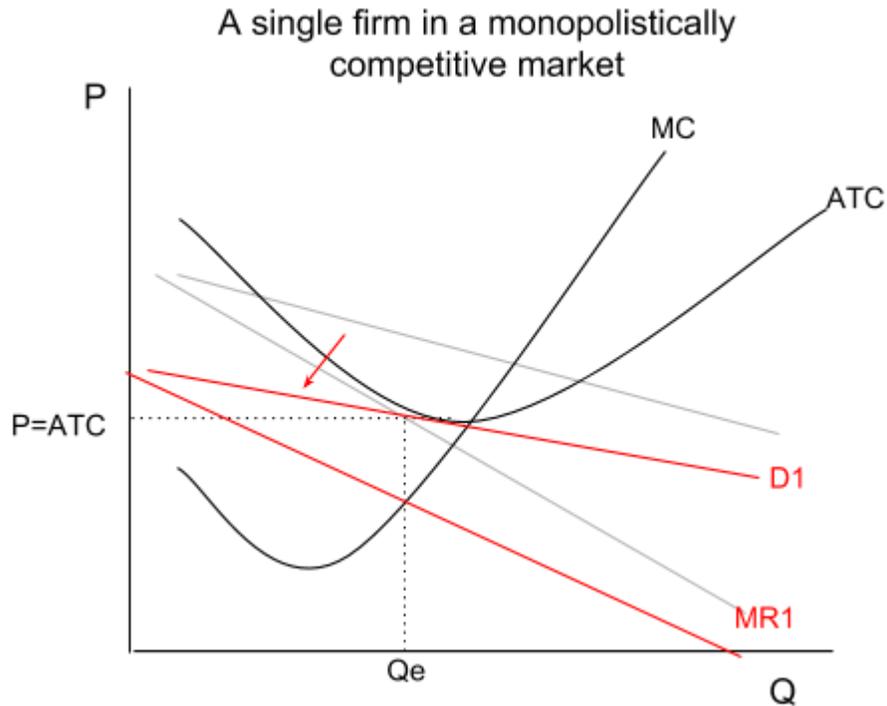


Observe from the graph:

- The firm is producing at its profit maximizing quantity (Q_f) and charging the price consumers are willing to pay for that quantity (P_f)
- At this point, price is greater than ATC, so the firm is earning an economic profit.
- Given the existence of profits in this market (assuming this firm is a typical firm) new firms will be attracted to the industry.
- Since entry barriers are low, these short-run economic profits are likely to be eliminated in the long-run as new firms enter the market.

Profit maximization in the long run – entry eliminates profits

One of the key characteristics of monopolistic competition is the *low entry barriers*. Getting into such a market is relatively cheap and easy, and entrepreneurs will therefore be attracted to any economic profits that are earned.



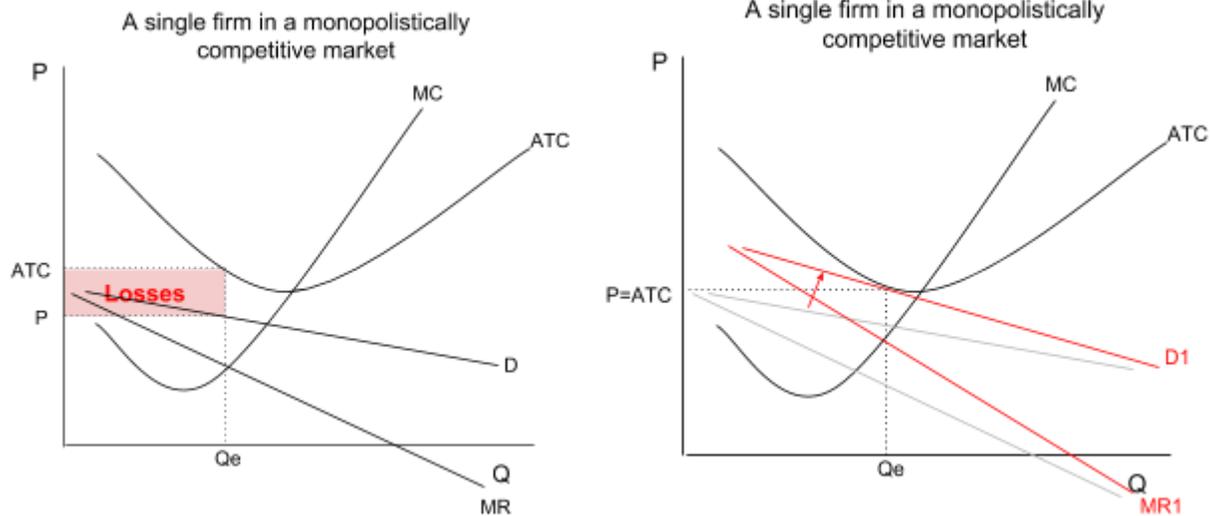
From short-run to long run in monopolistic competition:

- Economic profits attract new firms to the market, increasing the amount of competition and the number of substitutes for this firm's product
- More competition reduces demand for this firm's product, and makes it more elastic (flatter). Demand decreases until the firm is only breaking even

Notice that the demand curve is tangent to the ATC curve when the market is in long-run equilibrium. This means that at the $MC=MR$ point, the firm is only breaking even. The monopolistically competitive firm cannot do better in the long-run than break even, since any profits will be eliminated as new firms enter the market.

Profit maximization in the long run – exit eliminates losses

Just as it is relatively easy to enter a monopolistically competitive market, it is also easy to leave. This means that if the firms in such a market are earning losses, some will exit the market, increasing the demand for those that remain until they are breaking even.



In the graphs above:

- Due to weak demand or an increase in costs, firms are earning losses.
- Losses will lead some firms to exit the market, increasing market share for the remaining firms.
- In the second graph, demand has increased for a firm that has remained in the market. Due to fewer substitutes, demand also becomes more inelastic.
- Exit eliminates the losses and the remaining firms are once again breaking even.

Monopolistic competition in long-run equilibrium

Because of the low entry and exit barriers, firms in monopolistically competitive markets will only break even in the long-run (just like in perfect competition).

Non-price competition: Because firms face so much competition for their output, they will find it difficult to compete on price. In order to break even (or earn profits), a firm must compete through other, non-price means, including:

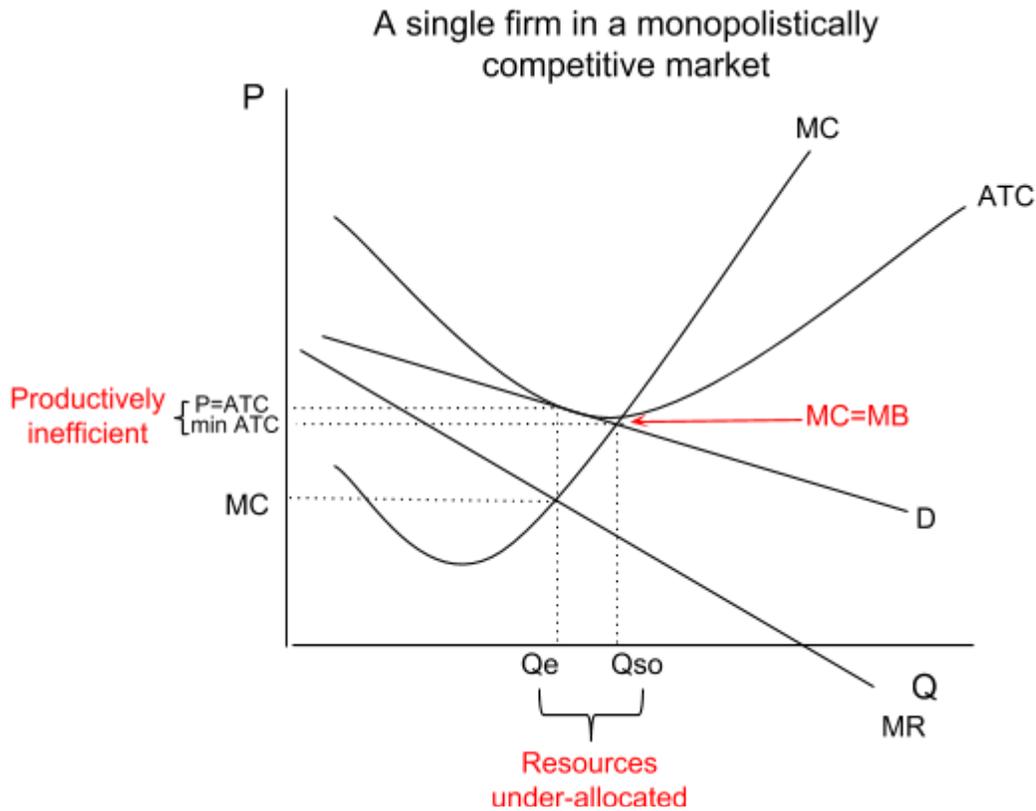
- Branding: By developing a recognizable brand image, firms attempt to build consumer loyalty, giving the firm more price-making power
- Product development: Continuously improving its product through research and development will keep demand high.
- Customer service: Offering good customer service and support may increase demand
- Location: Good access to large numbers of consumers allows a firm to charge higher prices
- Advertising: Making buyers aware of product features through advertising increases demand, giving the firm a greater chance of earning economic profits in the long-run

Efficiency in monopolistically competitive markets

To determine whether monopolistically competitive firms are economically efficient, we must determine whether:

- $P = MC$: This is an indicator of allocative efficiency, since price represents the marginal benefits of consumers and MC the marginal cost to producers

- $P = \text{minimum ATC}$: This tells us whether firms are productively efficient, since if the price equals the lowest ATC, then firms are forced to use their resources in the least-cost manner.



Efficiency is not achieved! As we can see in the graph, a monopolistic competitor in long-run equilibrium will achieve neither productive nor allocative efficiency. The lack of competition allows firms to produce at a cost higher than their minimum ATC and produce a quantity lower than what is socially optimal.

Monopolistic competition compared to perfect competition

It may appear that, since they do not achieve economic efficiency, monopolistically competitive markets are less desirable than perfectly competitive markets. However, there are also several benefits of monopolistic competition over perfect competition.

Characteristic	Perfect Competition	Monopolistic Competition
Price and Quantity	Price is low and quantity is high. Allocative and productive efficiency are achieved and consumer surplus is maximized as a result.	Price is higher and quantity lower than in perfect competition, neither type of efficiency is achieved and consumer surplus will be less.
Product Variety	Every firm sells an identical product. There is no variety for consumers to choose from.	Every firm differentiates its product, at least slightly, from every other seller, giving consumers a wide variety to choose from.
Profits	Firms will always break even in the long-run, and due to the high level of competition there is nothing an individual firm can do to earn profits, only an increase in market demand can lead to short-run profits	Firms have more ability to make profits through successful non-price competition and product differentiation, which if done well can earn a firm profits, even over time.

Oligopoly and Game Theory

The final market structure we will study lies between monopolistic competition and pure monopoly on the competitive spectrum. An **oligopoly** is an industry with a few large sellers, each with a substantial share of the total market demand.

Characteristic	Oligopoly
Number of Firms	A few large firms dominate the industry, each with a substantial share of total demand. There are few enough firms that in some cases, collusion is possible (when firm coordinate price and output decisions). Collusion can be: <ul style="list-style-type: none"> • Open / formal • Tacit / informal
Price making abilities of individual firms	A change in one firm's output has significant impact on the market price, firms are price-makers.
Type of product	Products can be identical (such as oil) or differentiated (such as Apple computers and PCs) Firms will likely use advertising to try and differentiate their products from competitors'
Entry barriers	There are significant barriers to entry, such as economies of scale, legal barriers, ownership of resources, etc...

Examples of oligopolistic markets

Oligopoly is a relatively common form of market structure. Many of the consumer goods and

services we demand are provided by oligopolistic firms, including:

- Cell phone service providers: In most countries, consumers will have only a few choices for whom to buy their cell plan from. The providers all differentiate through options such as text messaging, data plans, call time, etc...
- Airplane manufacturers: Boeing and Airbus are the two dominant firms in the market for jumbo-jets. The firms differentiate through fuel efficiency of their craft, number of seats, and so on.
- Movie studios: Only six big Hollywood studios make over 90% of the movies that make it to the big screen.
- Beer in the United States: Despite the fact that there are thousands of independent breweries in the US, only two large corporations produce 80% of the total beer supply. Both firms offer dozens, perhaps hundreds of varieties to try to differentiate their product from the competition
- Petrol for cars: Automobile fuel is a product often sold by a handful (a dozen or so) of large firms. Fuels, unlike the other products above, are a homogeneous product, so firms differentiate through location, primarily.

Collusion in oligopolistic markets – the game theory model

Because there are only a few large firms in oligopolistic markets, they often have a strong incentive to cooperate, rather than compete, with one another on output and pricing decisions.

To understand why collusion is so attractive to oligopolistic firms, it is useful to think of competition between them as a sort of game. For this, we will use a model of oligopoly behavior known as game theory.

Game Theory is the study of strategic decision making through the use of games

Consider the following example. Two cellular service companies, Firm A and Firm B, provide cell phone service in a country. These firm are trying to decide on the following:

- Whether to offer unlimited data to their customers (we will refer to this option as FREE), or
- Whether to charge customers based on data usage (we will refer to this option as PAY)

The profit of each firm depends not only on whether it offers free data, but also on whether its competitor offers free data. In this regard, the firms are highly interdependent on one another

The possible levels of profit Firms A and B can earn depending on their decision regarding data plans AND based on the competition's decision can be plotted in a table called a payoff matrix.

Study the payoff matrix below:

Payoff Matrix		Firm B	
		PAY	FREE
Firm A	PAY	10 , 10	5 , 20
	FREE	20 , 5	7 , 7

In this “game”:

- Each firm can either choose “PAY” or “FREE”
- The number on the left in each box is the possible level of economic profit (in millions of dollars) enjoyed by Firm A.
- The number on the right in each box is the possible profit earned by Firm B.
- Notice that each firm’s profit depends largely on what the competition chooses to do.

Determining the likely outcome of the game

Assume the firms do not collude. What will each firm most likely do? To determine the most likely outcome in the game below, consider the possible payoffs the firms face.

If Firm A chooses “PAY”

- And Firm B also chooses PAY, A will earn profits of \$10 million
- But if Firm A chooses FREE, B’s profits will fall to \$5 million

If Firm B chooses “FREE”

- And Firm A chooses PAY, Firm B will earn profits of \$20 million
- But if Firm A also chooses FREE, Firm B’s profits will be \$7 million.

Determining a dominant strategy:

A strategy is dominant if it results in a higher payoff regardless of what strategy the opponent chooses.

- In this game, both firms have a dominant strategy of choosing FREE.
- If Firm A chooses PAY, Firm B can do better by choosing FREE.
- If Firm A chooses FREE, Firm B can do better by choosing FREE.

Payoff Matrix		Firm B	
		PAY	FREE
Firm A	PAY	10 , 10	5 , 20
	FREE	20 , 5	7 , 7

Both firms can always do better by choosing to offer FREE data!

This game is known as the Prisoner's Dilemma. The firms in the game face a dilemma because:

- Both firms want to maximize their own profits, but...
- The rational thing to do is to offer FREE data, because the potential profits are so great!
 - \$20 million if the competitor chooses PAY, and
 - \$7 million if the competitor chooses FREE,
 - For a total possible payoff of \$27 million
- The possible payoffs for offering PAY are lower
 - \$10 million if the competitor offer PAY, and
 - \$5 million if the competitor offers FREE,
 - For a total possible payoff of \$15 million

When they act in their own rational self-interest, both firms end up earning less profits than if they had instead acted irrationally.

The dilemma is that, ultimately, the firms are likely to earn LESS total profits between them by offering FREE data than they would have earned if they had only chosen PAY data. This is because collusion was not possible.

Game theory teaches us that in oligopolistic markets:

- Firms are highly interdependent on one another and that...
- There is a good reason for firms to collude with one another, because
- Through collusion, firms can choose a strategy that maximizes total profits between them, however...
- Such an outcome (both firms choosing PAY in our game) is highly *unstable*, because both firms have a strong incentive to cheat.

Payoff Matrix		Firm B	
		PAY	FREE
Firm A	PAY	10 , 10	5 , 20
	FREE	20 , 5	7 , 7

Game theory in the real world

This model of oligopoly behavior can be used to analyze the behavior of firms in oligopolistic markets on several levels, including:

- Whether to set a high price or a low price,
- Whether to advertise or not,
- Whether to offer free customer service
- Whether to offer a 1 year warranty or a three year warranty,
- Whether to open a store in a certain location or not... and so on...

In each of these scenarios, the decision one oligopolist makes will impact not only its own level of profits, but also those of its close competitors.

Collusion in oligopolistic markets – forms of collusion

Collusion is defined as the open or tacit cooperation between firms in an oligopolistic to set prices or agree on other strategies that often benefit the firms at the expense of consumers.

In order to formally collude, the firms in a particular industry may form an official organization through which price and output decisions are agreed upon. This is called a *CARTEL*

- Cartels are illegal in most industries in most countries, due to their anti-competitive nature
- The firms in a cartel will choose an output and price that a monopolist would choose
- The price consumers pay will be higher, the output lower (consumer surplus lower)
- Cartels tend to stifle innovation among firms and reduce both productive and allocative efficiency.
- Due to the *prisoner's dilemma* explained earlier (there is always an incentive to cheat in a collusive oligopoly), cartel arrangements are often unstable and difficult to maintain. Once the majority of firms have agreed to a high price and reduced output, each individual firm has a strong incentive to increase its output to take advantage of the higher price in the market. If all firms do this, the market price will fall and the cartel will fail

Examples of cartels: OPEC (Organization of Petroleum Exporting Countries), International sugar producers, international coffee growers, drug cartels of Latin America.

Since formal collusion is illegal in many countries, oligopolistic firms have devised way to collude informally (also called tacit collusion). The most common form of tacit collusion is Price Leadership:

- Price leadership: This is when the biggest firm in an industry sets a price and the smaller firms follow suit. If the price leader raises its price, the competitors will too. If it lowers price, smaller firms will follow.
- Usually a "dominant firm" (typically the largest in the industry) establishes the price and smaller firms follow.
- Prices tend to be "sticky" upwards, since firms are hesitant to raise prices and lose market share to rivals.
- However, prices are "slippery" downwards, which means if one firm lowers its prices, others will follow suit so they don't lose all their business.

Price wars

When tacit agreements break down, firms may engage in price wars, in which they continually lower their prices and increase output in order to try and attract more customers than their rivals.

- This can cause sudden increases in output and decreases in price, temporarily approaching an efficient level.
- Once firms realize low prices hurt everyone, price leadership is usually restored, and prices rise once more.