

EC 360: Industrial Organization

Lecture 2 - perfect competition, monopoly, dominant firm

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What is a model?

This lecture introduces the three most essential models in industrial organization

- Perfect competition
- Monopoly
- Dominant firm

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A model is a **collection of assumptions**

- The results of the model depend on these assumptions being true
- Although (some of) these assumptions may seem unrealistic, we will use these models to help us understand how consumers and firms interact to influence market outcomes
- “All models are wrong, but some are useful” George E.P. Box

Perfect competition

- What do we mean by perfect competition?
 - Firms are **atomic**: all firms are small enough that one firm's actions have no effect on other firms and very little effect on the total supply and total demand
 - The product is **homogeneous**: all firms sell the exact same product
 - Firms and consumers have **perfect information**: both firms and consumers know the price in the market
 - Firms have **equal access**: all firms have access to the same technology
 - Firms have **free entry**: firms can enter or exit the market at any time without incurring any cost

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 - Firms have **free entry**: firms can enter or exit the market at any time without incurring any cost
- These are very strong assumptions!

Perfect competition

These assumptions imply that all profit maximizing firms are price-takers in the market

- Thought experiment 1: suppose a firm sets their price above the market price
 - Equal access, atomicity, and homogeneous results in many other firms in the market who can sell the exact same product at the market price

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- Thought experiment 1: suppose a firm sets their price above the market price
 - Equal access, atomicity, and homogeneous results in many other firms in the market who can sell the exact same product at the market price
- Thought experiment 2: suppose a firm sets their price below the market price
 - Then firms will be making less money than if they had priced at the market price, violating profit maximization

The long run

- In the long run, firms in competitive markets make **zero economic profit**
 - This requires that the market price is the minimum of the average cost curve
 - Let's consider two examples

Reaching market equilibrium: example 1

- Suppose the current market price is **high** enough such that all firms in the industry are making a positive profit. This means the market price is above the lowest average cost
 - Free entry allows any firm to enter the market
 - Atomicity and equal access allow any single firm to make a positive profit with very little affect to the market price

Reaching market equilibrium: example 1

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 - Free entry allows any firm to enter the market
 - Atomicity and equal access allow any single firm to make a positive profit with very little affect to the market price
 - Eventually, so many firms enter the market that this competition drives the market price down until all firms earn zero profit
 - When the market price creates zero profit, no new firm has incentive to enter and all active firms are indifferent between staying and leaving the market

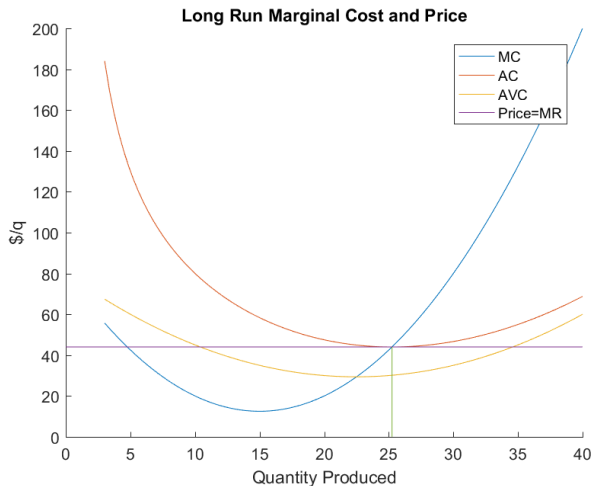
Reaching market equilibrium: example 2

- Suppose the current market price is **low** enough such that all firms in the industry are making a negative profit. This means the market price is below the lowest average cost
 - Free entry allows any firm to exit the market
 - Atomicity and equal access allow any single firm to make a negative profit and their exit will affect the market price very little

Reaching market equilibrium: example 2

- Suppose the current market price is low enough such that all firms in the industry are making a negative profit. This means the market price is below the lowest average cost
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 - Atomicity and equal access allow any single firm to make a negative profit and their exit will affect the market price very little
 - Eventually, so many firms exit the market that this lack of competition drives up the market price until all firms earn zero profit
 - When the market price creates zero profit, no new firm has incentive to enter and all active firms are indifferent between staying and leaving the market

Market equilibrium



- In a perfectly competitive market, the marginal revenue curve (market price) is tangent to the average cost curve at the lowest point
- More on this later today

Are perfectly competitive markets realistic?

- Not very often
 - Atomicity fails when there are only a few firms
 - Products are not always homogeneous (i.e. smart phones, cannabis, snowboards)
 - Free entry is often violated by startup costs or exit costs (i.e. railroads, ski resorts)

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 - The market for minimum wage jobs (workers are very similar and have no pricing power)
 - The agricultural market (products are homogeneous, costs are similar)

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- Sometimes a subset of these assumptions will hold
 - The market for minimum wage jobs (workers are very similar and have no pricing power)
 - The agricultural market (products are homogeneous, costs are similar)
- If these assumptions aren't usually satisfied, then why do we care about this model?
 - Perfectly competitive markets provide a useful benchmark

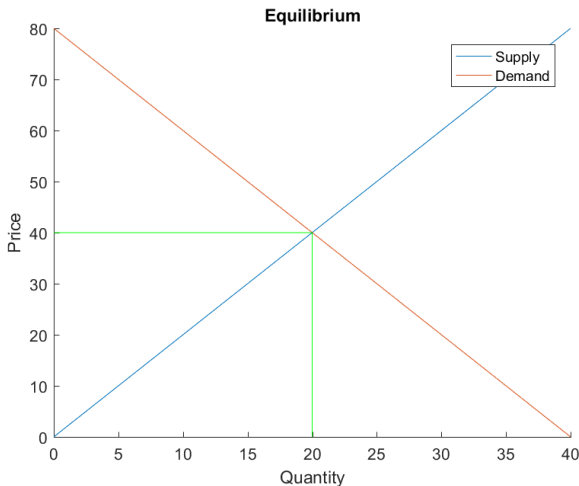
Are perfectly competitive markets socially optimal?

- From the perspective of an economist, yes
 - Perfectly competitive markets (theoretically) eliminate **deadweight loss**
 - Deadweight loss is welfare that could be collected by society, but is not collected
 - This is a market inefficiency

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- In order to formalize a measure of deadweight loss, we need to first discuss consumer surplus and producer surplus

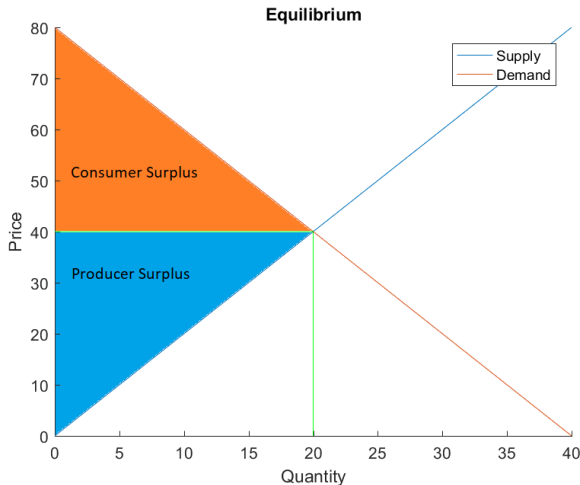
Are perfectly competitive markets socially optimal?



Consider this market that is at a competitive equilibrium

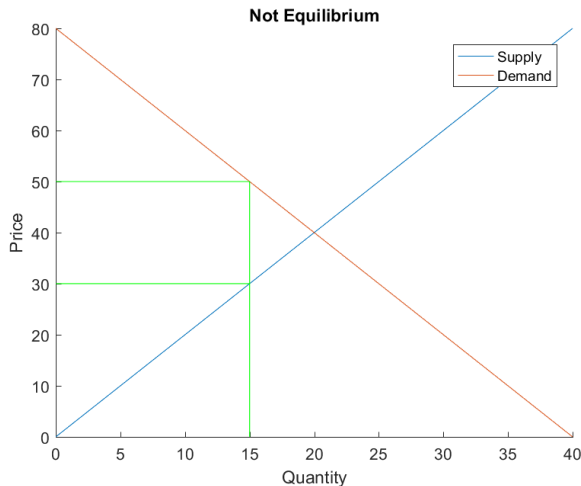
- At this price and quantity, quantity demanded equals quantity supplied
- At $p^* = 40$, the maximum willingness to pay for 20 units is exactly equal to the minimum willingness to accept for 20 units
- No firm has incentive to enter or exit the industry

Are perfectly competitive markets socially optimal?



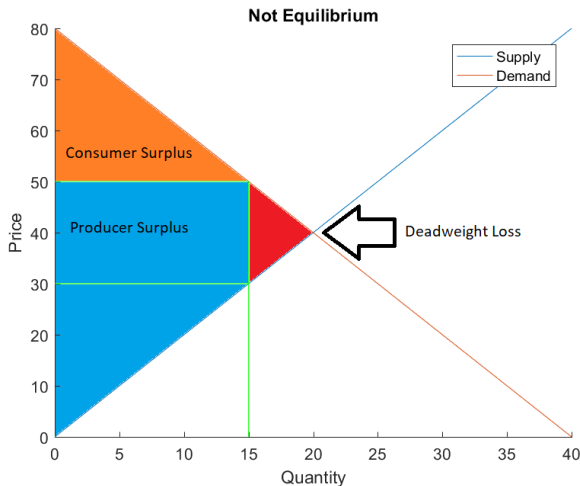
- The area below the demand curve and above price is called **consumer surplus**
- The area below the price and above the supply curve is called **producer surplus**
- These two regions completely fill the area between the supply and demand curves

Are perfectly competitive markets socially optimal?



- Now consider a market that is **NOT** at a competitive equilibrium
- At this price ($p = 50$), the price is higher than the competitive equilibrium ($p^* = 40$) and the quantity ($q = 15$) is less than the competitive quantity ($q^* = 20$)

Are perfectly competitive markets socially optimal?



- Let's break this graph into three separate regions
 - Consumer surplus
 - Producer surplus
 - Deadweight loss
- Deadweight loss is everything between the demand and supply curves that is not surplus

Are perfectly competitive markets socially optimal?

- The perfectly competitive outcome is socially optimal, as there is no deadweight loss
- In this class, we will discuss court cases and their impact on society
- We will use economic models to analyze these cases in terms of deadweight loss and its impact on various economic agents (i.e. consumers, other firms, society)

Time horizon: short run and long run

- The previous analysis occurred assuming that entry or exit could not occur
 - In economics, we call this the **short run**
- In order for our model to (better) reflect reality, we want to allow firms to enter or exit the market
 - Graphically, a **long run** competitive equilibrium is a horizontal supply curve, whose height is the minimum of firms' average total cost curve
 - This ensures our zero profit condition is met (i.e. no firm has incentive to enter or exit the market)

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- Let's graph the transition of a firm earning positive profit in the short run to a long run competitive market equilibrium
 - Graph 2.1

Time horizon: short run and long run

Perfectly competitive firms
when P falls below MC



We can also look at this in the opposite direction

- Start by assuming that in a short run competitive market, firms have a negative margin (i.e. $p < MC$)
- How do firms respond?
- How does this impact the market in the long run?

Monopolies

What is a monopoly?

- A **monopoly** is a well-defined market with one supplier
 - Monopolies have a lot of pricing power
 - Monopolies often control something incredibly valuable
 - Monopolies are a nice benchmark model on the other end of the spectrum from perfect competition

Are monopolies realistic?

- A true monopoly is rare
 - Defining a market is incredibly difficult
 - Markets with only a single supplier are rare
- Here are a few examples of monopolies
 - AT&T was the only long-distance telecommunications service prior to 1984
 - Cycloserine is the only drug on the market to treat drug-resistant tuberculosis
 - EWEB is the only electricity provider in Eugene
 - Many cities only have a single cable provider

How do monopolies happen?

- A **regulation** (or law) that prevent additional entrants from entering the market
 - Common in anything that requires a patent (i.e. pharmaceuticals)
 - Also occur in markets that require lengthy certification processes
- **Patents**, copyrights, and trademarks
 - A new patented technology receives exclusive rights to be the only producer of the technology for up to 20 years

How do monopolies happen?

- Sometimes, it is most efficient to only have a single supplier in the market
 - These are called **natural monopolies**
 - They generally occur when the monopolist sells an essential facility in the production process (i.e. tap water, city utilities, airports)
- Natural monopolies generally have a few things in common
 - They have very high startup and fixed costs
 - They have very high economies of scale
 - The good is often viewed as a necessity

How do monopolies happen?



- **Government franchises**
 - This allows the government to explicitly control who can enter into an industry (i.e. transportation services)

How do monopolies maximize profit?

- The defining feature of a monopoly is that they are the only supplier in the market
 - This implies they are a **price-setter**
- Thus, the marginal revenue function (and total revenue function) for a monopolist is different than that of a perfectly competitive firm

$$TR(q) = p(q) \cdot q$$

- where $p(q)$ is the maximum price the market will pay if q units were put up for sale
- $p(q)$ is called the **inverse demand function**

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- where $p(q)$ is the maximum price the market will pay if q units were put up for sale
- $p(q)$ is called the **inverse demand function**
- Hence, the marginal revenue function is then

$$MR(q) = p'(q) \cdot q + p(q)$$

How do monopolies maximize profit?

numerical example with linear demand

- Suppose $p(q) = 100 - q$ and $TC(q) = 100 + q^2$
 - Then, $TR(q) = 100q - q^2$

$$MR(q) = 100 - 2q$$

$$MC(q) = 2q$$

$$MR(q) = MC(q)$$

$$100 - 2q = 2q$$

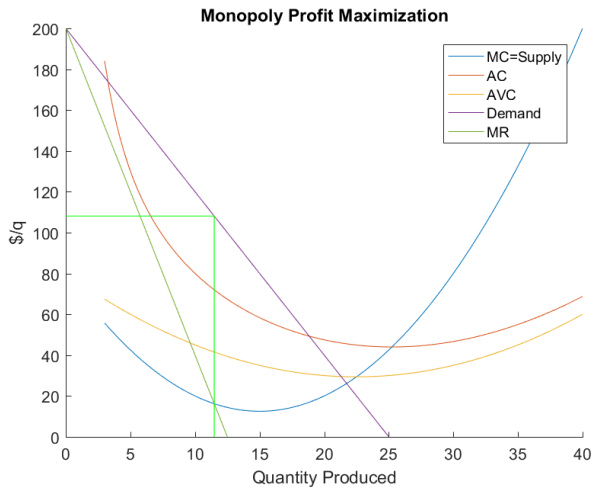
\implies

$$q^* = 25 \quad p^* = 75$$

- **Important trick:** with linear demand, $MR(q)$ always has the same intercept as demand with twice the slope

How do monopolies maximize profit?

graphical example

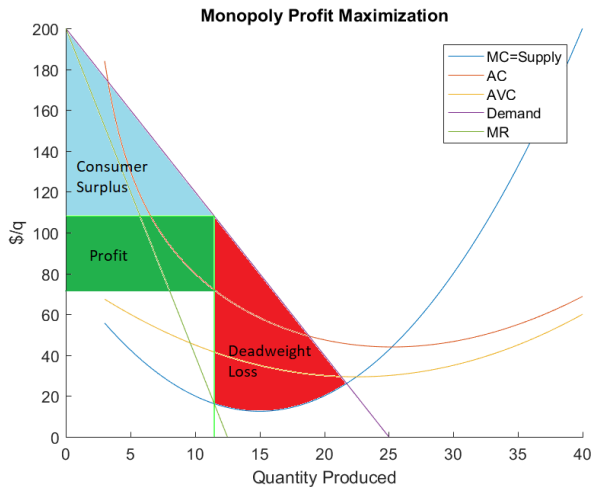


The profit maximizing level of output is the quantity that equates marginal revenue and marginal cost

- Firms then exploit their market power by pricing according to the consumers' maximum willingness to pay
- Graphically, at the profit maximizing quantity, firms move up to the demand curve to set the price

How do monopolies maximize profit?

graphical example



- This creates a lot of deadweight loss!
- From a social welfare perspective, this result is economically inefficient

How to eliminate deadweight loss

- **Regulation** can (theoretically) eliminate deadweight loss from monopoly
- There exist several different forms of regulation
 - Mandating that the market price equals the firm's marginal cost
 - Forcing the market price to equal the firm's average cost
 - Imposing a price cap
 - Imposing a per-unit subsidy, thus lowering the firm's marginal cost curve
 - Forcing the monopoly to dissolve (i.e. divest some of its' assets)
 - Encouraging new firms to enter the market

Problems with regulation

- **Regulatory capture**

- A monopolist invests in influencing regulation in ways that are favorable to the firm (i.e. Facebook, oil and gas drilling)

- **Regulatory lag**

- The time between when a regulation is agreed upon and when it actually goes into effect often varies
- This is not always a bad thing, as it can incentive firms to undergo cost-cutting measures

Innovations and monopolies

- Determining a monopoly's behavior with respect to innovation is often very difficult
 - Do they have cost-cutting incentives?
 - Will those cost-cutting incentives lead to entry in the market?
 - Is it better to cut costs using a patented technology or license off the technology and collect royalties?

Innovations and monopolies

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 - Do they have cost-cutting incentives?
 - Will those cost-cutting incentives lead to entry in the market?
 - Is it better to cut costs using a patented technology or license off the technology and collect royalties?
- Analyzing which market structures give rise to innovation is extremely difficult
 - Theories tend to disagree
 - Measuring innovation is difficult
- Lots of research on this topic with very little consensus

Dominant firm

Dominant firm

- A **dominant firm** model is a blend of our baseline models of perfect competition and monopoly
 - The dominant firm model gives us a more realistic representation of markets

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- A **dominant firm** model is a blend of our baseline models of perfect competition and monopoly
 - The dominant firm model gives us a more realistic representation of markets
- The dominant firm has power to set a price that maximizes its own profits
 - The market contains many firms, but most of them are very small and act as perfect competitors (price-takers), referred to as the **competitive fringe**
 - The dominant firm must take into account the competitive fringe firms when making its price and output decision

Dominant firm

- Assumptions

- The dominant firm has lower production costs than the other firms in the competitive fringe
- The dominant firm knows the market demand and how much output the competitive fringe will produce
- All firms in the competitive fringe are price-takers
- All firms produce homogeneous products

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- All firms in the competitive fringe are price-takers
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- Result

- Relative to monopoly, the presence of fringe firms lower profits of the dominant firm and benefit consumers

Dominant firm: examples

- Examples of markets where a dominant firm fringe model is appropriate
 - AT&T (1982): controlled the telecommunication industry through government regulations, vertical integration, and aggressive competitive practices
 - Microsoft (2002): tied its Internet Explorer browser with Windows and restricted the market for competing browsers
 - OPEC: a cartel that acts like a dominant firm
 - Hotels and Airbnb: hotels set prices and Airbnb hosts act as price-takers

Dominant firm: graphical and numerical examples

- Let S_{cf} be the fringe supply curve and D be market demand
 - The dominant firm must account for the competitive fringe, and calculates the **residual demand** curve $d = D - S_{cf}$
 - Once the dominant firm accounts for the presence of fringe firms, the dominant firm acts the same as a monopolist

Dominant firm: graphical and numerical examples

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 - The dominant firm must account for the competitive fringe, and calculates the **residual demand** curve $d = D - S_{cf}$
 - Once the dominant firm accounts for the presence of fringe firms, the dominant firm acts the same as a monopolist
- Let's solve this model graphically and mathematically
 - Graph 2.2
 - Example 2.1