

# EC 360: Industrial Organization

## Perfect Competition, Monopoly, Dominant Firm

Brett Garcia

Copyright © 2020 Brett Garcia. All rights reserved.

# What is a model?

This lecture introduces the three most essential models in industrial organization

- Perfect competition
- Monopoly
- Dominant firm

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
- 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
- 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

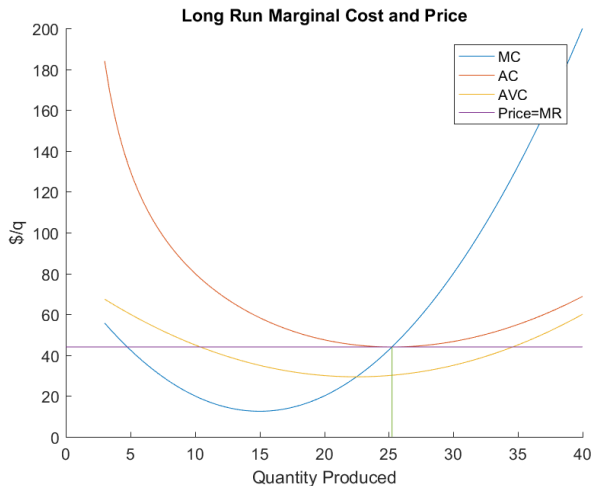
# Reaching market equilibrium: example 1

- 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
  - 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
  - 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



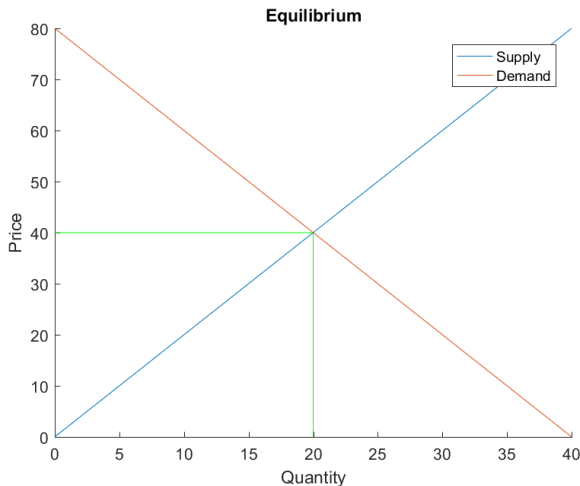
# Are perfectly competitive markets realistic?

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

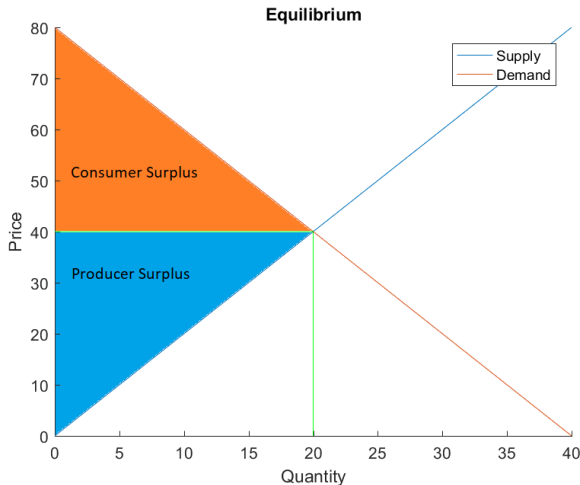
# Are perfectly competitive markets socially optimal?



Consider this market that is at a competitive equilibrium

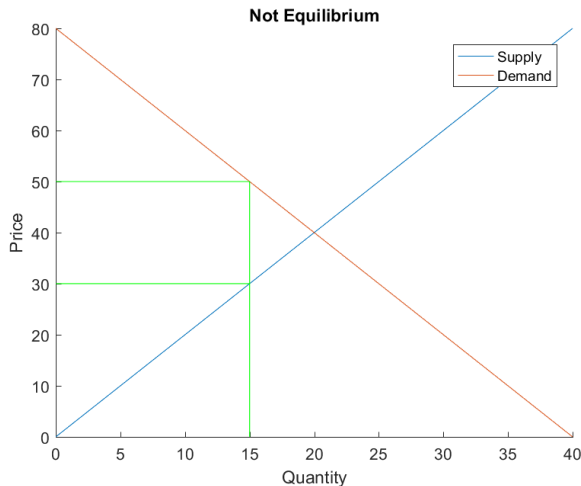
- At this price and quantity, quantity demanded equals quantity supplied
- At  $p^* = 40$ , the maximum willingness to pay for 20 units is exactly equal to the minimum willingness to accept for 20 units
- No firm has incentive to enter or exit the industry

# Are perfectly competitive markets socially optimal?



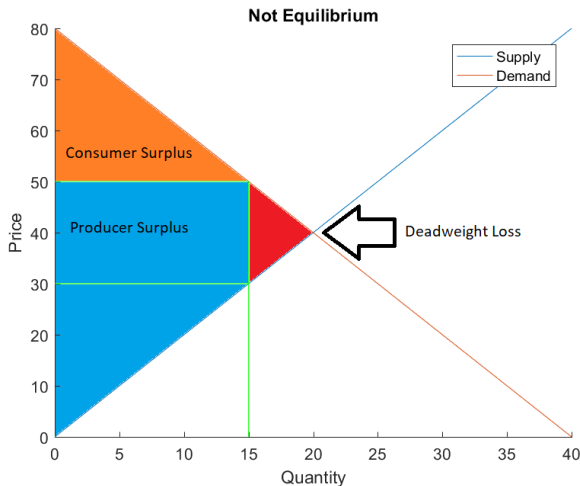
- The area below the demand curve and above price is called **consumer surplus**
- The area below the price and above the supply curve is called **producer surplus**
- These two regions completely fill the area between the supply and demand curves

# 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)
- 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**
- 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,  $TR(q) = 100q - q^2$

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

$$MC(q) = 2q$$

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

$$100 - 2q = 2q$$

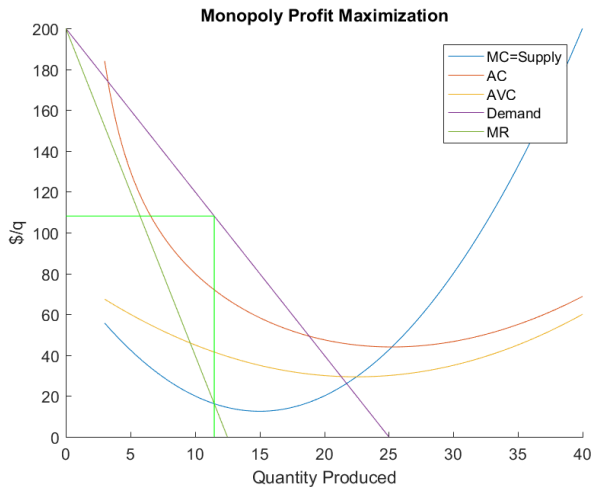
$\implies$

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

- **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

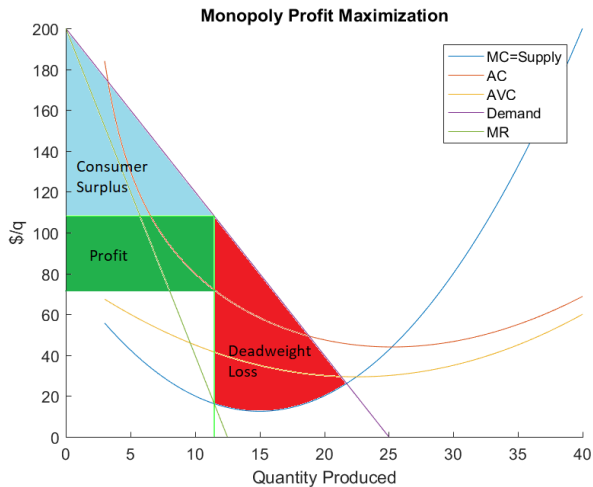


The profit maximizing level of output is the quantity that equates marginal revenue and marginal cost

- 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?
- 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
- 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

- 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
- Let's solve this model graphically and mathematically
  - Graph 2.2
  - Example 2.1