

NU Econ 101 Lecture 12: Monopoly

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Where are we now?

- 1 Introduction to monopoly
- 2 Marginal revenue
- 3 Welfare analysis
- 4 Government policy and monopolies
- 5 Price discrimination
- 6 Problems

Introduction to monopoly

Monopoly

An environment in which one firm is the only seller of a particular product/commodity.

- *Mono*: Greek for “alone” or “single.”
- *poly*: From the Greek word to sell.

Monopoly violates the assumptions of perfect competition:

- PC: An industry structure in which there are many firms, each small relative to the industry, producing identical products and in which no firm is large enough to have any control over prices. Firms may enter and exit the industry freely.

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Marginal revenue (1)

Recall our discussions on **maximizing profits**:

$$\text{Profits} = \text{Revenue} - \text{Costs}$$

So we try to **maximize revenues minus costs**:

$$\max_q (\text{Revenue}(q) - \text{Costs}(q))$$

Taking a derivative and setting it equal to zero (for a **FOC**):

$$\text{Marginal Revenue}(q^*) - \text{Marginal Cost}(q^*) = 0$$

So our **optimality condition** was that q^* solves:

$$MR(q^*) = MC(q^*)$$

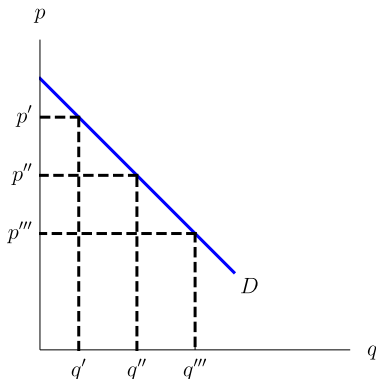
Marginal revenue (2)

With perfect competition, firms are price-takers – the price they sell at is unaffected by their quantity choice – so $MR(q) = p$.

$$\frac{d}{dq} (\text{Revenue}(q)) = \frac{d}{dq} (p \cdot q) = p$$

With a monopoly, the price the monopoly faces $p(q)$ is the **market inverse demand curve**.

Marginal revenue (3)



As the monopolist increases quantity, the price it can sell at is reduced.

The price the monopolist faces is the inverse demand curve $p(q)$.

Marginal revenue (3)

Suppose **inverse market demand** is:

$$p(q) = 70 - q.$$

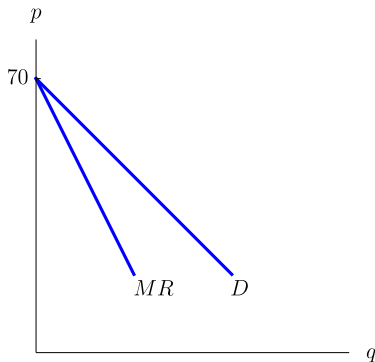
What is the monopolist's **revenue**?

$$\begin{aligned}\text{Revenue} &= \text{Price} \cdot \text{Quantity} \\ &= (70 - q) \cdot q \\ &= 70q - q^2\end{aligned}$$

Then the **marginal revenue** is:

$$MR(q) = \frac{d}{dq} (70q - q^2) = 70 - 2q.$$

Marginal revenue (4)



Inverse demand:

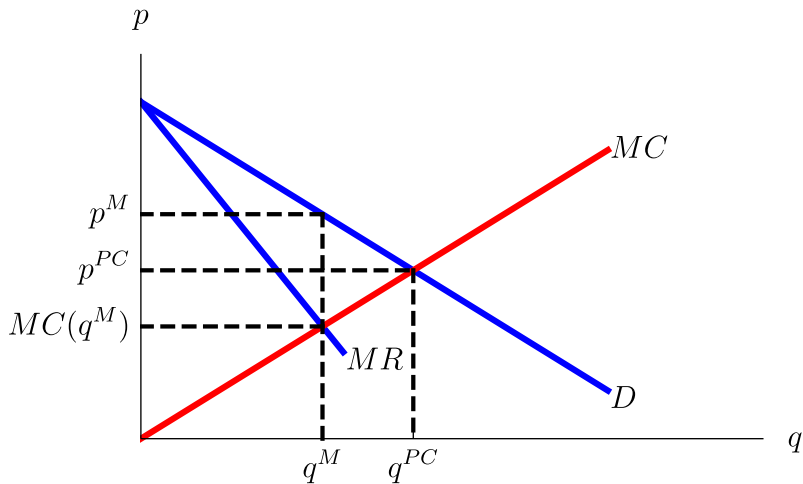
- $p(q) = 70 - q$

Marginal revenue:

- $MR(q) = 70 - 2q$

Setting $MR(q) = MC(q)$ leads to lower output and higher prices than with perfect competition...

Marginal revenue (5)



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Welfare analysis

We just saw that monopoly results in higher prices and lower quantities supplied than perfect competition.

What are the welfare consequences?

- **Let's work it out with an example:**

- Market inverse demand: $p(q) = 100 - q$.

- Firm's variable costs: $TVC(q) = \frac{q^2}{2}$.

- **Consider 2 scenarios:**

- Socially optimal outcome ($MSB = MSC$).

- Monopoly: Just one firm, as described above.

Scenario 1: Social optimum ($MSB = MSC$) (1)

First, recall that $MC(q) = \frac{d}{dq} (TVC(q)) = q$.

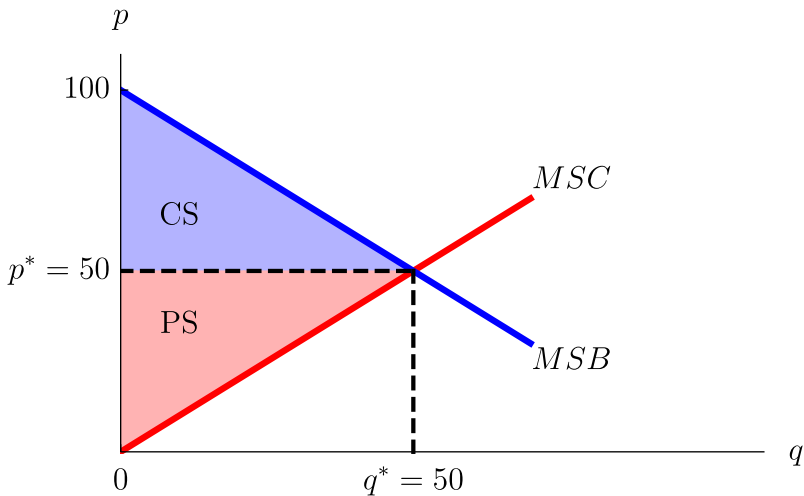
It is socially optimal to produce units whose marginal social cost is below the marginal social benefit.

- $MSC(q)$ is just the firm's marginal cost.
- $MSB(q)$ is the inverse demand curve.

Therefore, q^* solves $MSC(q^*) = MSB(q^*)$.

- Would result *if* the monopolist acted like a price-taking firm.

Scenario 1: Social optimum ($MSB = MSC$) (2)



Consumer surplus = Producer surplus = $\frac{50 \cdot 50}{2} = 1250$. TS = 2500.

Scenario 2: Monopoly ($MR = MSC$) (1)

The firm's **marginal cost** is $MC(q) = q$.

The firm's **revenue** is:

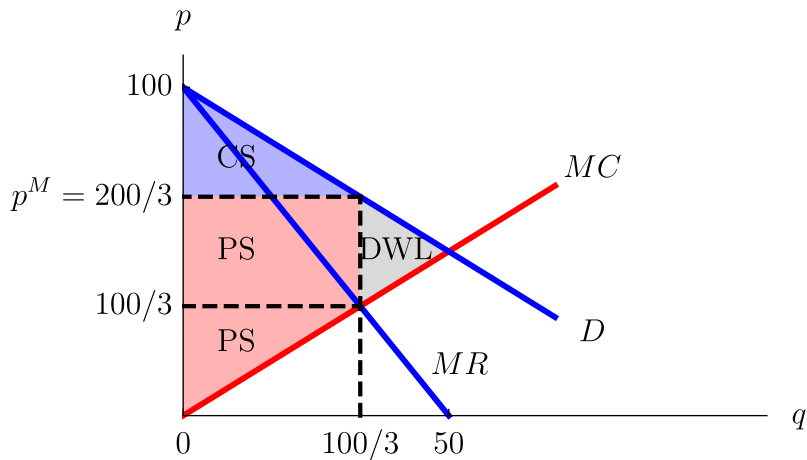
$$\text{Revenue}(q) = p(q) \cdot q = (100 - q)q = 100q - q^2$$

Then the firm's **marginal revenue** is:

$$\text{Marginal revenue}(q) = \frac{d}{dq}(\text{Revenue}) = 100 - 2q$$

So **the firm solves** $100 - 2q^M = q^M$, i.e., $q^M = \frac{100}{3}$.

Scenario 2: Monopoly ($MR = MC$) (2)



Scenario 2: Monopoly ($MR = MC$) (3)

Surplus:

- Consumer surplus = $\frac{\frac{100}{3} \cdot \frac{100}{3}}{2} = \frac{5000}{9} \approx 556.$
 - This is less than $CS^* = 1250.$
- Producer surplus = $\frac{\frac{100}{3} \cdot \frac{100}{3}}{2} + \frac{100}{3} \cdot \frac{100}{3} = \frac{5000}{3} \approx 1667.$
 - This is greater than $PS^* = 1250.$
- Total surplus = $\frac{5000}{9} + \frac{5000}{3} = \frac{20000}{9} \approx 2222.$
 - This is less than $TS^* = 2500.$

No monopolist supply curve

Q: What is the monopolist's supply curve?

A: Monopolists don't have supply curves!

- A supply curve shows a firm's supply for any price.
- Monopolists are not price-takers.
- They choose q^M based upon the demand curve and MC .

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Natural monopolies (1)

Natural monopoly

A natural monopoly is a firm in which the most efficient scale is very large.

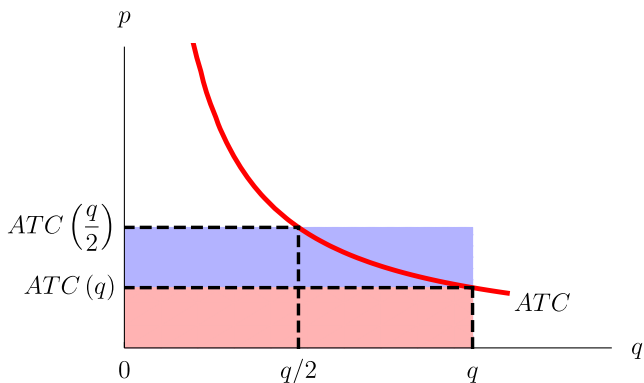
Having one big firm is more efficient than many small firms.

- Usually because fixed costs are large.
- If fixed costs are large, better to have only one firm pay them.

Examples:

- Utilities (water, electricity, gas, telephone, cable television, internet), railways, etc.

Natural monopolies (2)



Red area = Total costs of producing q with one firm.

Red area + **Blue area** = Total costs of producing q with two firms.

Network effects

Sometimes industry do not have huge fixed costs but instead have significant **network effects**.

Consider Facebook as an example:

- The fixed costs of setting up a social network are not huge.
- BUT, it's hard to convince people to sign up to a social network when very few people are already on it.
- The value of being on FB is all of the other people on FB.

Network effects can promote monopolies.

Control over a scarce factor of production

Another aspect that can support monopolies is **control over a scarce factor of production**.

Some products require the use of a scarce input:

- Diamond jewelry requires diamonds.
- Aluminum requires bauxite.

If you control the supply of the input, you control the supply of the output.

- DeBeers Company of South Africa (diamonds)
- Aluminum Company of America (bauxite)

Antitrust policy (1)

The Sherman Act of 1890

... Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade of commerce among the several States, or with foreign nations, shall be deemed guilty of a misdemeanor ...

Rule of reason: The criterion to determine whether a particular action was illegal (“unreasonable”) or legal (“reasonable”) within the terms of the Sherman Act.

Federal Trade Commission: A federal regulatory group created by Congress in 1914 to investigate potential violations of the Sherman Act.

Antitrust policy (2)

Successful uses of the Sherman Act:

- Dissolution of Standard Oil and American Tobacco.
- Restrictions on Microsoft.

Failed antitrust cases:

- Eastman Kodak, International Harvester, United Shoe Machinery, United States Steel.
 - Ruled that none had exhibited *unreasonable conduct*.

Patents

The government actually creates monopolies, also:

Patent

A barrier to entry that grants exclusive use of the patented product or process to the inventor for a fixed time period.

Pros and cons of patents:

- **Cons:** Inefficiency in supply as monopolist produces less than socially optimal quantity (and sells at high price).
- **Pros:** The profits that an inventor can make from being a monopolist incentivize innovation and R&D.

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First degree price discrimination (1)

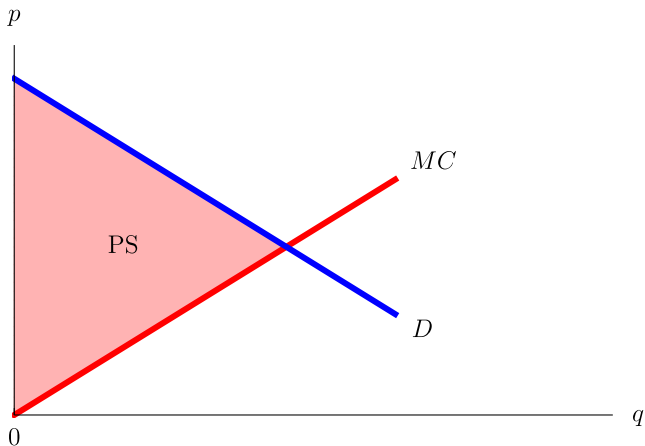
A firm might not set a uniform price for a product.

- Instead, the firm might try to work out each consumer's willingness to pay (WTP) and charge each consumer that.

Imagine each consumer walks into a store with his WTP written on his forehead and is charged his WTP.

- Then the firm/storekeeper gets all of the surplus.
- But, outcome *is* efficient, even if the firm is a monopolist.

First degree price discrimination (2)



Each consumer pays his willingness-to-pay. Bad for consumers.
Great for producers. Efficient (i.e. no DWL).

Second (and third) degree price discrimination (1)

In second and third degree price discrimination, a firm does not observe each consumer's WTP.

Instead, **the firm knows it has different types of consumers and tries to serve each type separately.**

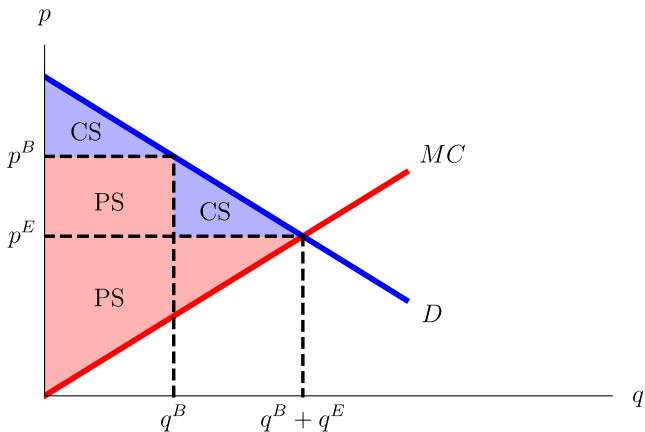
Examples:

- Bulk discounts, student/senior discounts, business class, weekend/weekday, peak v. off-peak, product versions, coupons.

A note:

- Some people call bulk discounts second-degree and everything else third degree, but they're really the same.

Second (and third) degree price discrimination (2)



An airline with business and economy customers that can be incentivized to differentiate themselves.

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Useful problems

Useful problems:

- Chapter 13: 5, 6, 7, 8, 13