SPEA-V-202

Contemporary Economic Issues in Public Affairs

Monopoly and Antitrust Regulation II

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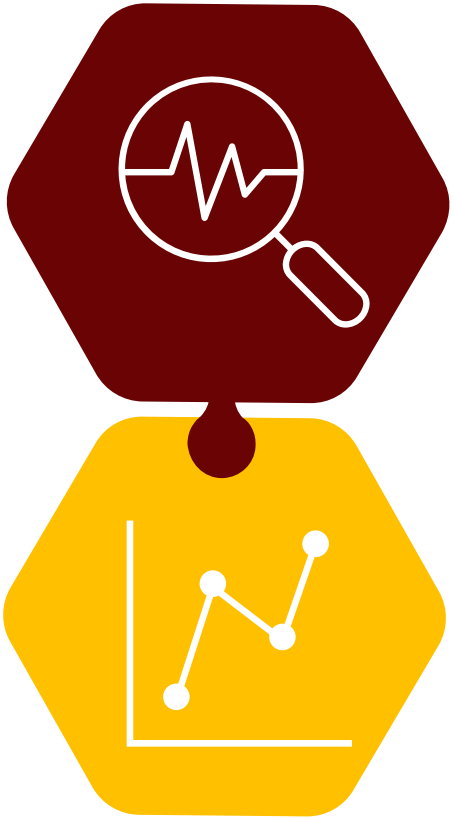
Fall 2022

INDIANA UNIVERSITY BLOOMINGTON

Outline for Today



Monopolistic Behavior and Oligopoly

- Monopolist Profits
- Price Discrimination
- Price Competition
- Collusion

Empirical Aspects and Antitrust Policy

- Market Structure
- Vertical and Horizontal Integration
- Antitrust Policy

Why Monopolies Arise?

A monopoly remains the sole seller in its market **because other firms cannot enter the market and compete with it.**

Barriers to Entry:

- Monopoly Resources: a key resource required for production is owned by a single firm.
- Government Regulation: the government gives a single firm the exclusive right to produce some good or service.
    - Example: patent and copyright laws.
- Natural Monopolies: a single firm can produce at a lower cost than a larger number of firms.
    - Arise when there are economies of scale over the relevant range of output.
    - **Example:** water provision (and most large infrastructure projects). Once all the infrastructure is built, marginal costs represent all the provision costs.

Quick Review of Cost Functions

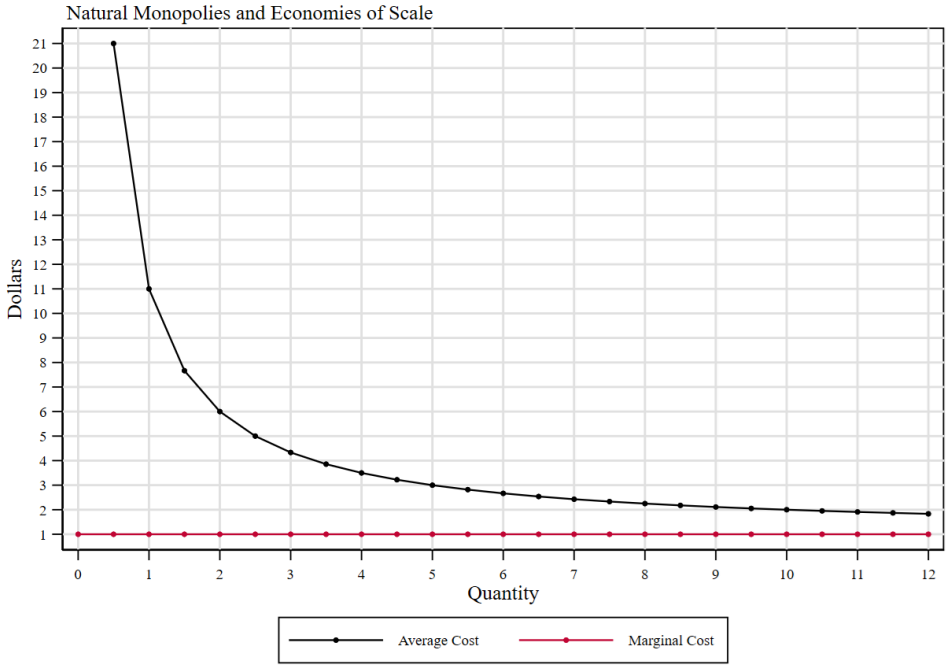
Recall the definition of a cost function. In general, it has two components:

- **Fixed costs:** need to be paid, regardless of the number of units produced
    - Big part of fixed costs are covered when entering the market (e.g. buying equipment).
- **Variable costs:** depend on the number of units produced (e.g. buns and vegetables in a burger place).
- Given these concepts, we can write the cost function as the sum of some fixed cost E plus the marginal cost MC times the number of units q produced.

$$c(q) = E + (MC \times q)$$

- **Remark:** when we say the supply is perfectly elastic (constant marginal cost) it is assumed we are doing long-run analysis. Why? Fixed costs are already covered at this point. Total costs is only given by the marginal cost.

Natural Monopolies



Suppose we have the following cost function:

$$c(q) = q + 10$$

- Note that, fixed costs $E = 10$ and $MC = 1$.

$$AC(q) = 1 + \frac{10}{q}$$

- Under economies of scale the <u>average cost function is always decreasing.</u>
- In this case, provision by one firm could be beneficial. Why? Suppose one firm enters the market. Then it needs to invest $10 to buy all the equipment. In the short run, that might increase prices to consumers.

Monopolist's Profits

- Recall the definition of the profit function $\pi(q)$:

$$\pi(q) = R(q) - C(q)$$

- Define $AC(q)$ as the average cost of production. This expression gives the cost of the typical unit sold.

$$AC(q) = \frac{C(q)}{q}$$

- Note we can rewrite profits as:

$$\pi(q) = R(q) - AC(q) \times q$$

- We know that profits are maximized when MR=MC. That leads to q^m and p^m. Monopolist's profits are:

$$\pi(q^m) = (R(q^m) - AC(q^m)) \times q^m$$

- This has a nice graphic representation.

Monopolist's Profits

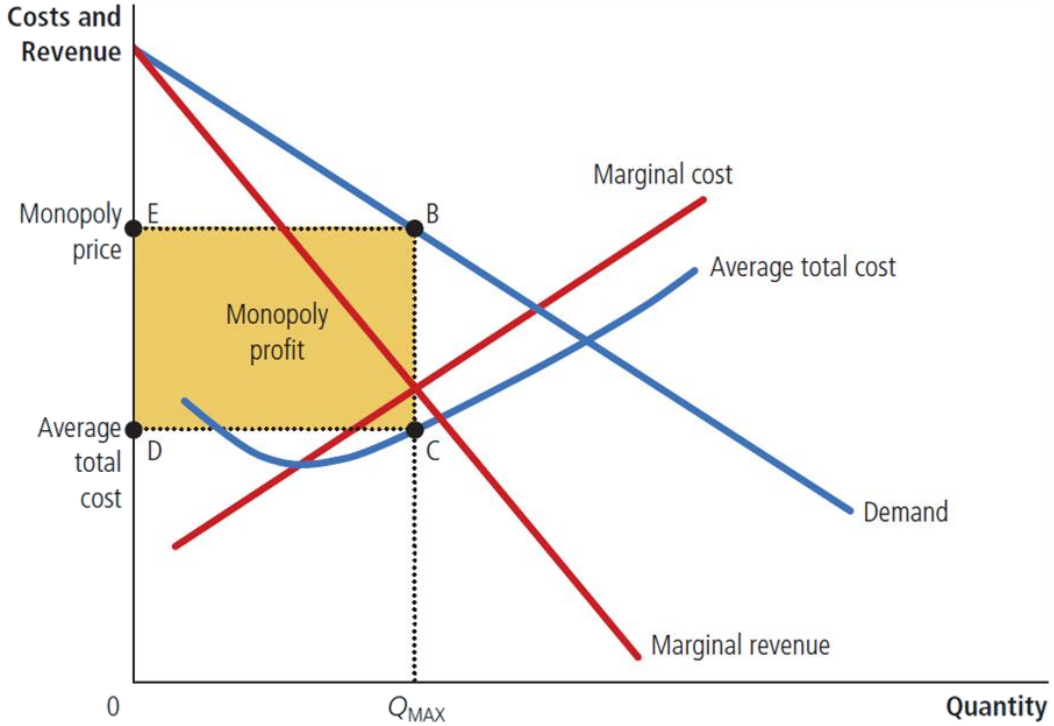


FIGURE 5

The Monopolist's Profit

The area of the box BCDE equals the profit of the monopoly firm. The height of the box (BC) is price minus average total cost, which equals profit per unit sold. The width of the box (DC) is the number of units sold.

Source: Mankiw Ch 15

Price Discrimination

Price discrimination: the practice of selling the same good at different prices to different customers.

- Examples: airplane tickets, education, movie tickets.

- Why the monopolist would price-discriminate consumers? To maximize profits! The key factor, however, is being able to separate/identify customers according to their WTP. That could be hard in some markets.

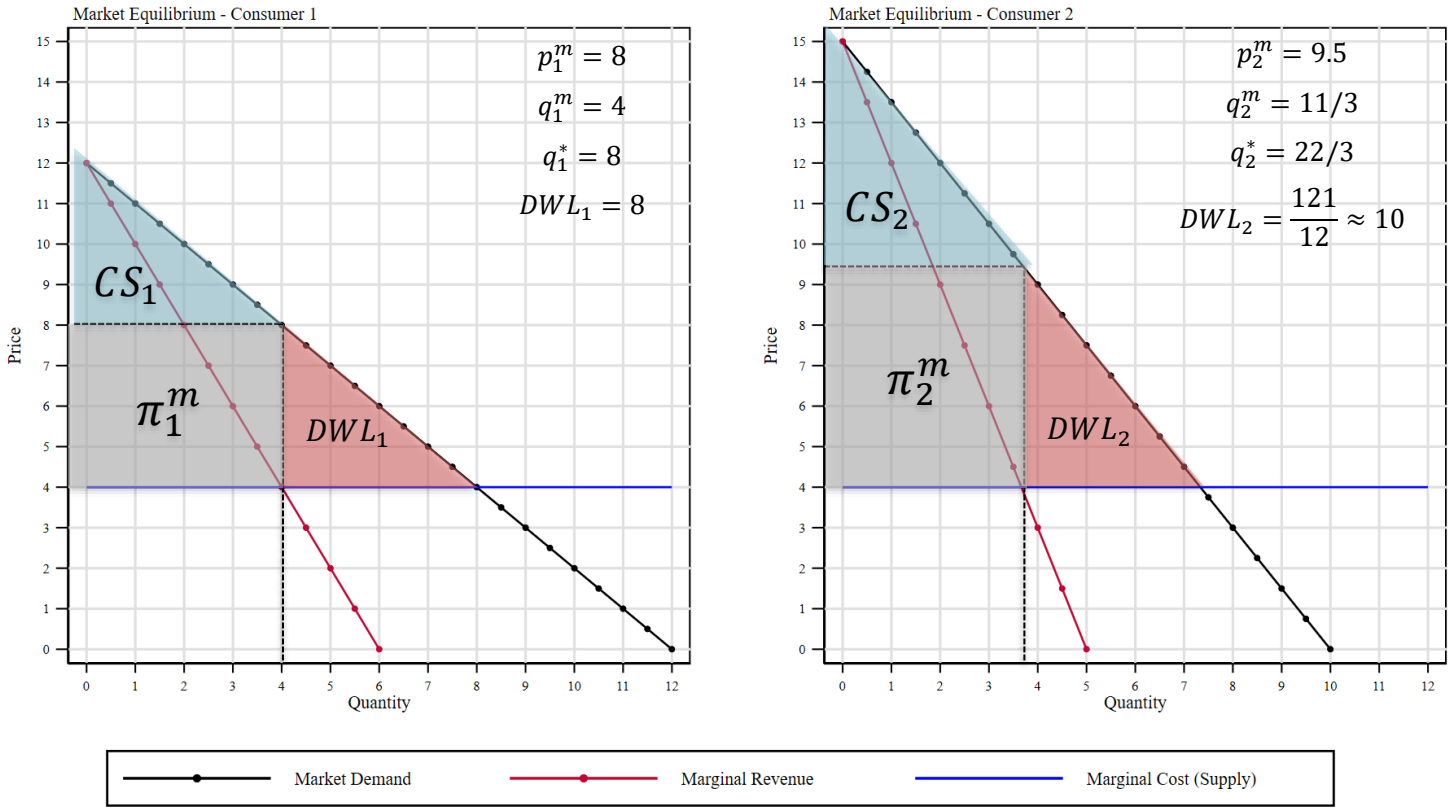
- Example: suppose we have two consumers with the following demand functions:

  - $p_1(q) = 12 - q$
  - $p_2(q) = 15 - 1.5q$

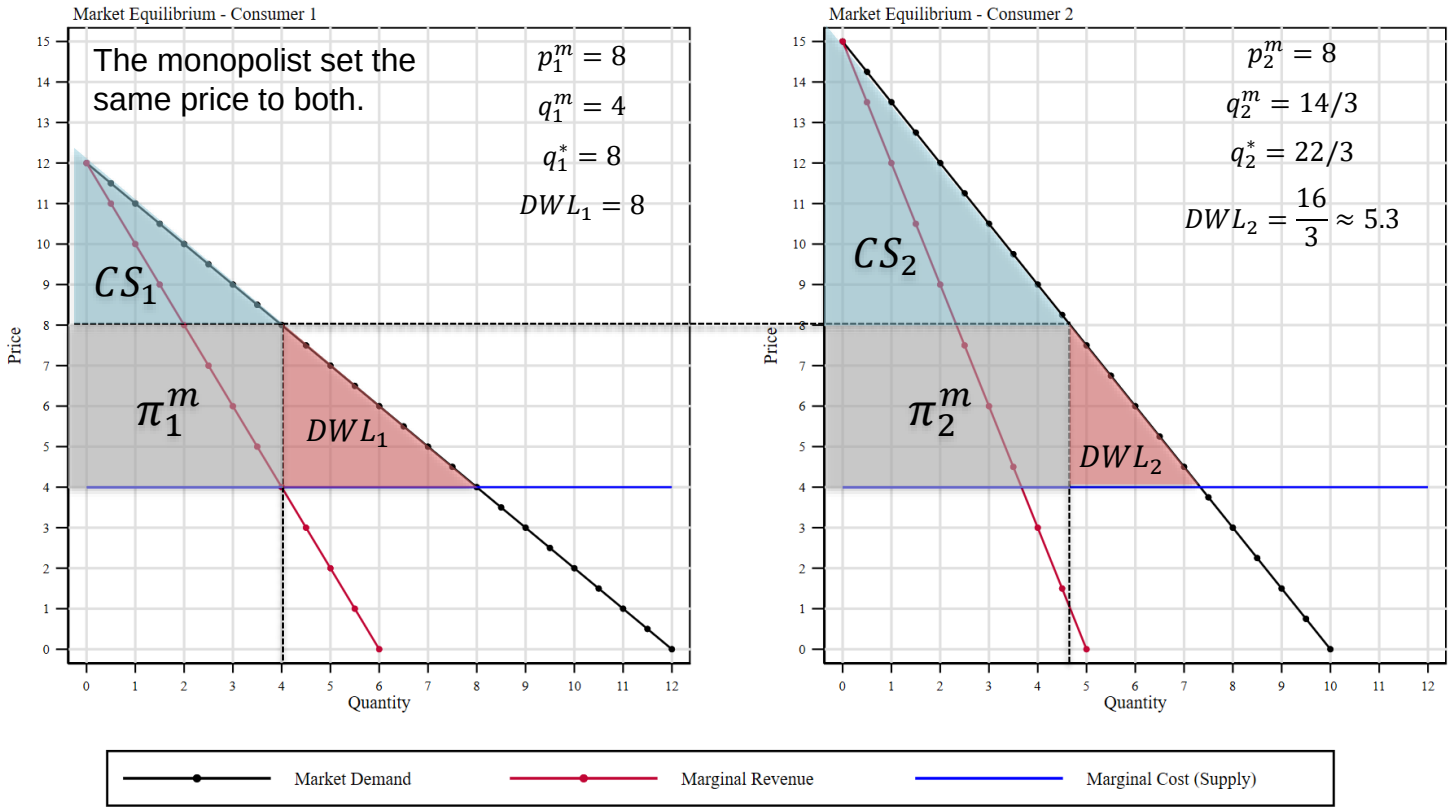
- Case 1: Equilibrium with price discrimination: monopolist knows both $p_1(q)$ and $p_2(q)$;

- Case 2: Equilibrium without price discrimination: monopolist knows $p_1(q)$ and assumes 2 has the same demand.

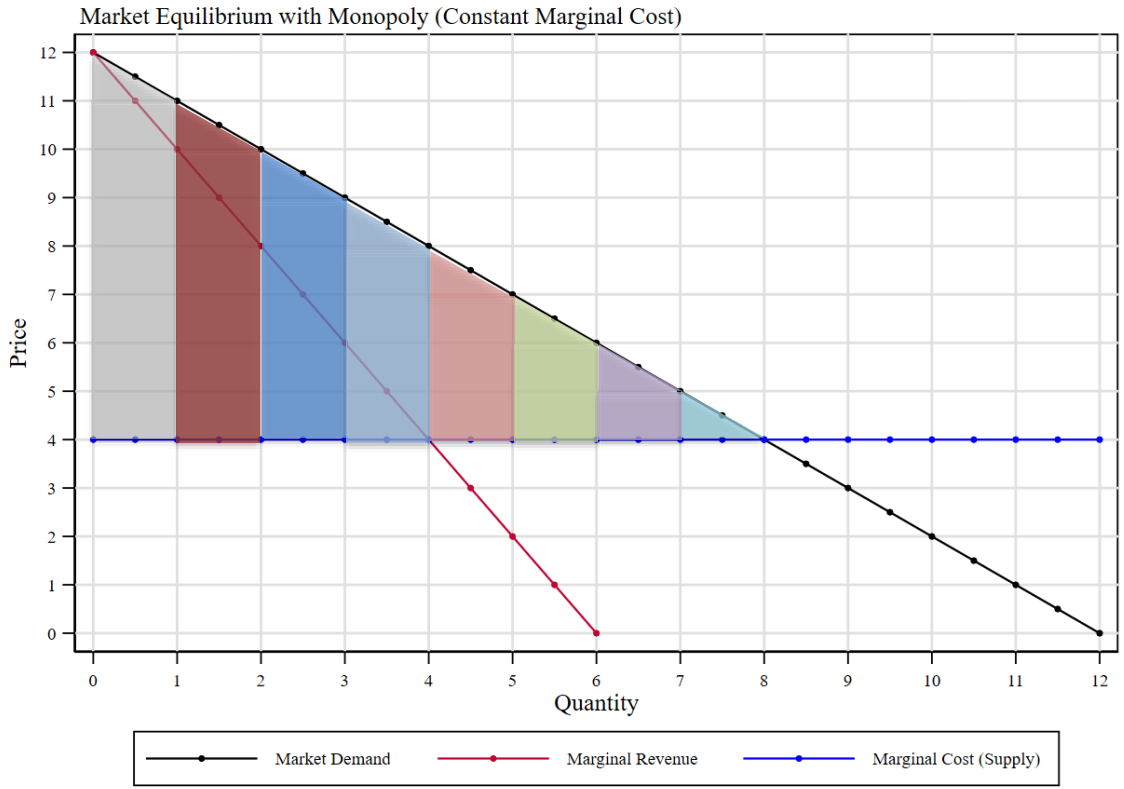
Equilibrium with Price Discrimination



Equilibrium without Price Discrimination



Perfect Price Discrimination



- Suppose the monopolist can charge a unique price to each consumer.
- Moreover, the monopolist has perfect information on the demand: knows perfectly each consumer's WTP.
- Hence, to maximize profits he sells the good at the max WTP of each individual consumer.
- All the consumer surplus is now part of the monopolist's revenues.
- **Key fact:** in this case there is DWL.
- **This result is efficient.** There are no resources left on the table. The monopoly extracts all the CS.

Competition and Economic Efficiency

The **Bertrand game/duopoly model** provides a nice example to understand the benefits of competition.

- **Setting:** Suppose two firms, A and B, are supplying the market, producing identical goods. Both firms have the same marginal cost MC. Suppose that if each firm operates alone can satisfy market demand.
- **Rules:** Each firm **chooses the price** that maximizes profits.
- **Firm's Incentives:** Set the highest price that allows capturing the largest market share.
- **The Catch:** the firm with the lowest price will capture the whole market and the other will make zero profits.
- **Example**: suppose market demand is given by $p(q) = 12 - q$ and $MC_a = MC_b = 4$.
    - Hence, we know that $p^m = 8$

Bertrand Game: Race to the Bottom Incentives

- **Intuition:** Suppose A considers setting the price at $p_a = p^m = 8$ and make monopoly profits. If B sets p_b below p_a, say $p_b = 7$, then B captures all market's demand and A makes 0 profits.
    - A realizes this and considers setting $p_a = 6$ to capture all the market. But B faces the same incentives, so chooses to set his price below A's, at $p_b = 5$ to get all the profits.
    - This cycle repeats again and $p_a = 4$. Note that in this case B cannot cut the price below 4 because $MC_b = 4$. Same with A. All prices below 4 imply losing money.
- **Race to the bottom incentives:** firms will cut prices until marginal revenue drops to zero.
- In equilibrium, both firms set prices $p_a = p_b = 4$.
- But wait, this means $p = MC$. We reached economic efficiency (no DWL) even when the market has 2 firms.

Bertrand Game

- **Takeaway:** competition created incentives that led firms to choose the price that maximizes total surplus. **Price competition derives in efficiency.**

- **Generalization:** what if MC differ across firms? Say $MC_a > MC_b$.

  - In this case, firm B can cut the prices below MC_a, but A cannot.

  - In equilibrium, the prices will be $p_a = MC_a$ and $p_b = MC_a - \epsilon$, where ϵ is a small, but positive number.

  - Note we still have that one firm sets $p_a = MC_a$, but B sells (to the whole market) at a price above its marginal cost (i.e. B charges a markup) hence leading to some DWL.

Market Collusion

Now suppose these 2 firms instead of competing, decide to cooperate/collude with each other.

Let's look at the incentives they face.

- If both firms collude, we say they formed a **cartel.** Both firms agree on setting the same price and split the market. Which price shall they choose?
- The monopolist's price p^m ! It is the one that maximizes profits in the overall market.
- If both set $p_a = p_b = p^m$, then joint profits are π^m and each firm gets $\frac{\pi^m}{2}$
- In this case, we have DWL equivalent to the case where there is a monopolist in the market.
- **Key:** for firms to collude, however, transaction costs should be low (i.e. they need to agree in the first place).
    - As the number of firms increases, collusion becomes harder.

Example: OPEC

The Organization of Petroleum Exporting Countries (OPEC) is the world's largest cartel.

- Formed by the group of 13 world's major oil-exporting nations: Iraq, Iran, Saudi Arabia, Venezuela, United Arab Emirates, and others.
- Governments part of the organization coordinate to determine the supply of oil in the economy, hence controlling the price at which it is exchanged.
    - In practice, OPEC does not have enough market power to unilaterally control the price. It competes with other oil producers like the US, Mexico, Canada, Brazil, and others.
    - Price control in the oil market is done by managing stocks.
- **Pro:** the organization was created to bring stability to oil markets.
- **Con:** by agreeing on the relevant share of the world's oil supply, they can keep oil prices artificially high.

Incentives to Enter the Market

A firm that is considering entering a monopolistic market. Under which conditions the firm enters the market?
Same setting: suppose both the monopolist and the entering firm have the same marginal cost.

- Suppose that if it enters the market, then it can collude with the monopolist, so they set the price at p^m and split the market. Each firm gets $\frac{\pi^m}{2}$.
- **Key:** entering the market requires some fixed cost (barrier of entry). Define the entry cost as E. (e.g. the cost of buying all the equipment required to produce).
- The firm will enter the market so long:

$$\frac{\pi^m}{2} - E > 0$$

Takeaway: high entry costs dissuade firms' incentives to enter the market.

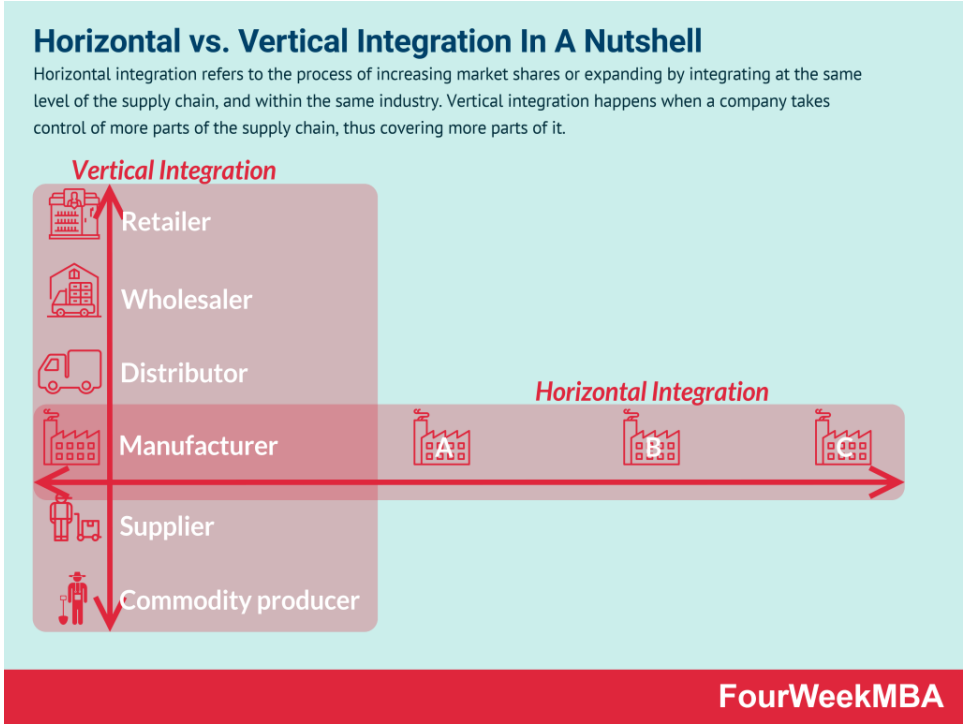
Incentives to Enter the Market

Example: suppose we have monopolist and a firm that wants to enter the market. Both firms have $MC = 4$. the inverse demand function of this market is given by: $p(q) = 12 - q$. Again, suppose that if the firm enters the market, it colludes with the monopolist, and they split the market.

- What is the maximum entry cost E the entering firm is willing to pay in order to enter this market?
  - First find the marginal revenue curve. $\mathrm{MR}(q) = 12 - 2q$
  - $\mathrm{MR}(q) = MC(q) \rightarrow 12 - 2q = 4 \rightarrow q^m = 4$
  - $p(q^m) = 12 - q^m = 12 - 4 = 8 \rightarrow p^m = 8$
  - $\pi^m = p^m \times q^m = 8 \times 4 = 32 \rightarrow \frac{\pi^m}{2} = 16$
- The firm will enter the market so long:

$$\frac{\pi^m}{2} - E > 0 \rightarrow E < 16$$

Market Structure: Horizontal vs Vertical Integration



We have discussed what happens when two firms collude with each other.

In practice, this often takes the form of **market integration:** when firms merge or acquire each other. This could take two forms:

- **Horizontal Integration:** control over the firms that provide a key step of the production process.
- **Vertical Integration:** control over (potentially all) the steps/elements in the production process.

Source: https://fourweekmba.com/horizontal-integration/

Horizontal Integration: Examples

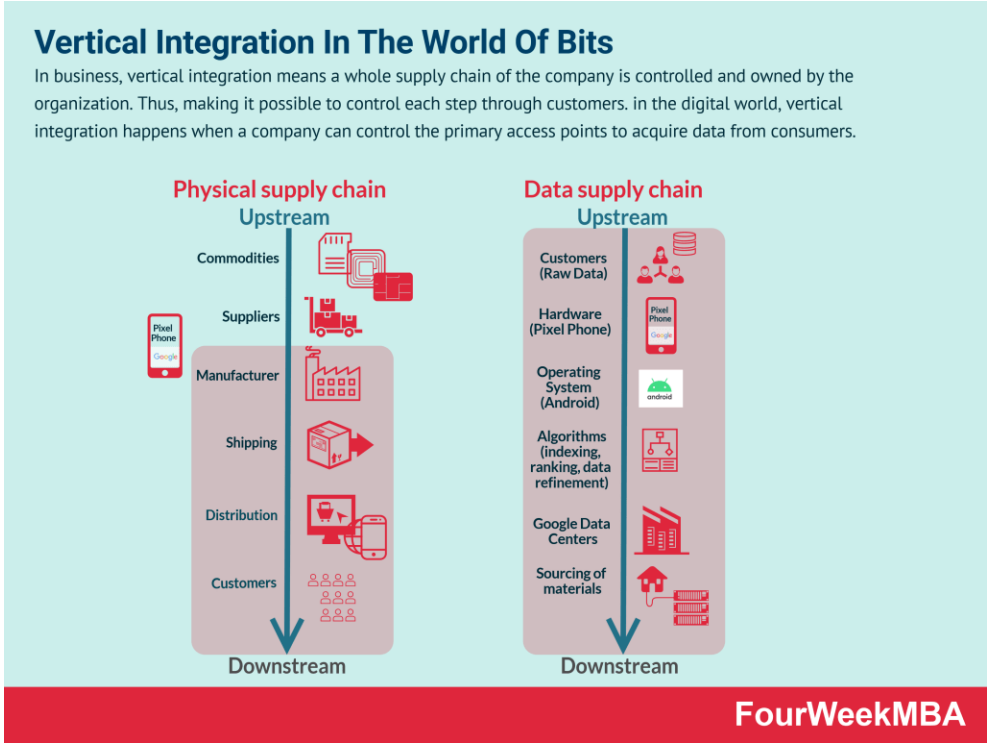
- Disney acquired Pixar Animation Studios (2006)
- United Airlines merged with Continental Airlines (2010).
- Uber Eats acquired Postmates (Nov 2020).
- GrubHub and JustEat merged (June 2020).
- Facebook acquired Instagram (2012)
- TikTok bought Music.ly to then rebranded it and integrate it to its own app. (2017)

Source: https://fourweekmba.com/horizontal-integration/

Vertical Integration: Examples

There are several firms that have control of the business model from production, to distribution and sell to final consumers. As you can see, these are big firms.

- Google
- Samsung
- Apple (particularly through the iPhone).
- Target
- Zara (clothes brand)
- Ferrero (chocolates brand)



Source: https://fourweekmba.com/vertical-integration-data-world/

Antitrust Regulation

The government responds to monopolistic behavior through 3 types of policy tools:

Increase competitiveness in monopolized industries

- DOJ needs to approve big mergers to avoid markets losing competitiveness. Example: in 2011 the DOJ blocked AT&T's purchase of T-Mobile.

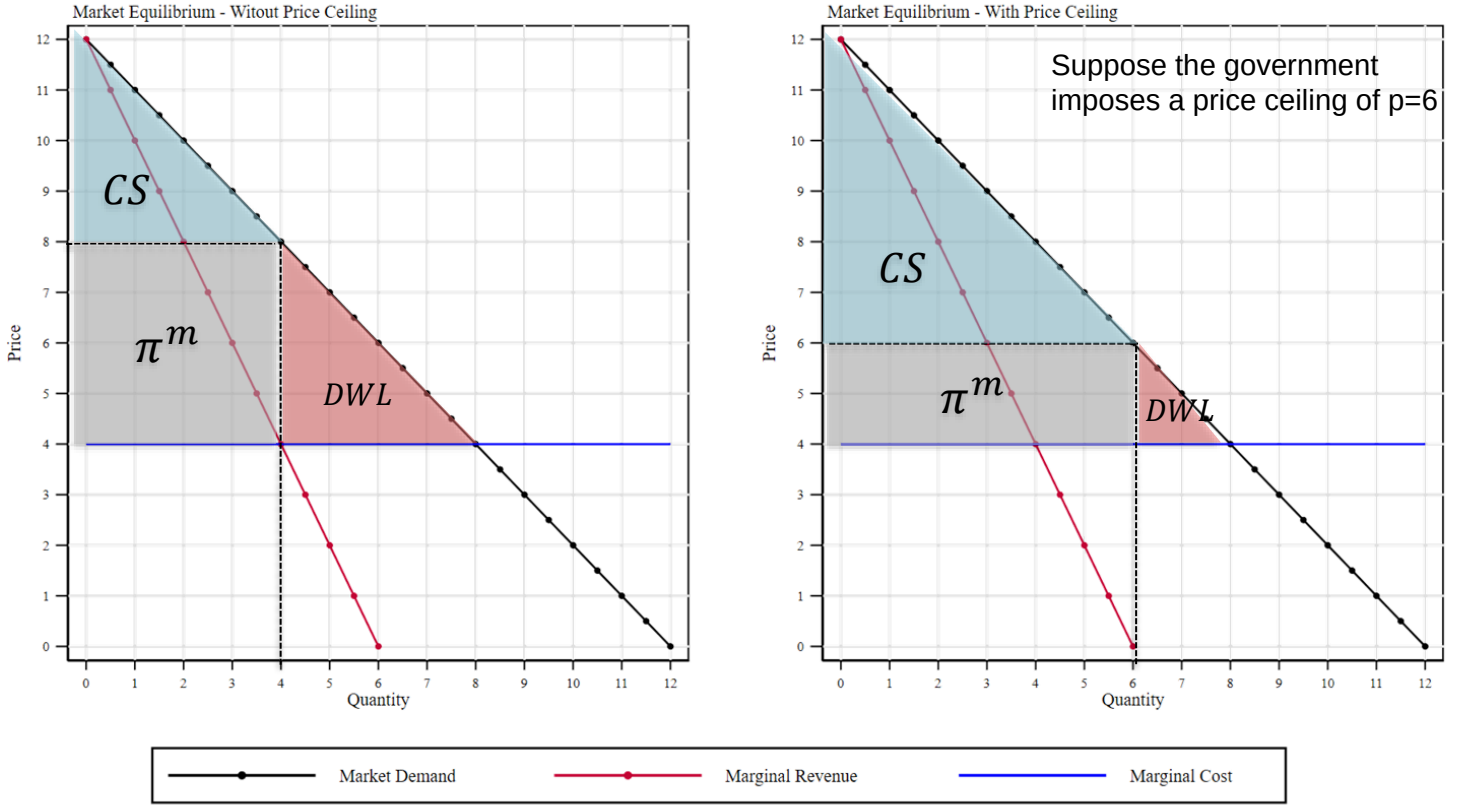
Regulating monopolies' behavior

- Usually applied to natural monopolies. Price control policies (i.e. price ceilings) or subsidies to monopolies to set the price closer to MC (i.e. government revenues take the hit instead of CS).

Public Ownership

- The government runs the monopoly. Examples: US Postal Service. Some countries operate utilities like telephone, electricity, and water through the government. State-owned oil companies.

Antitrust Regulation: Price Controls

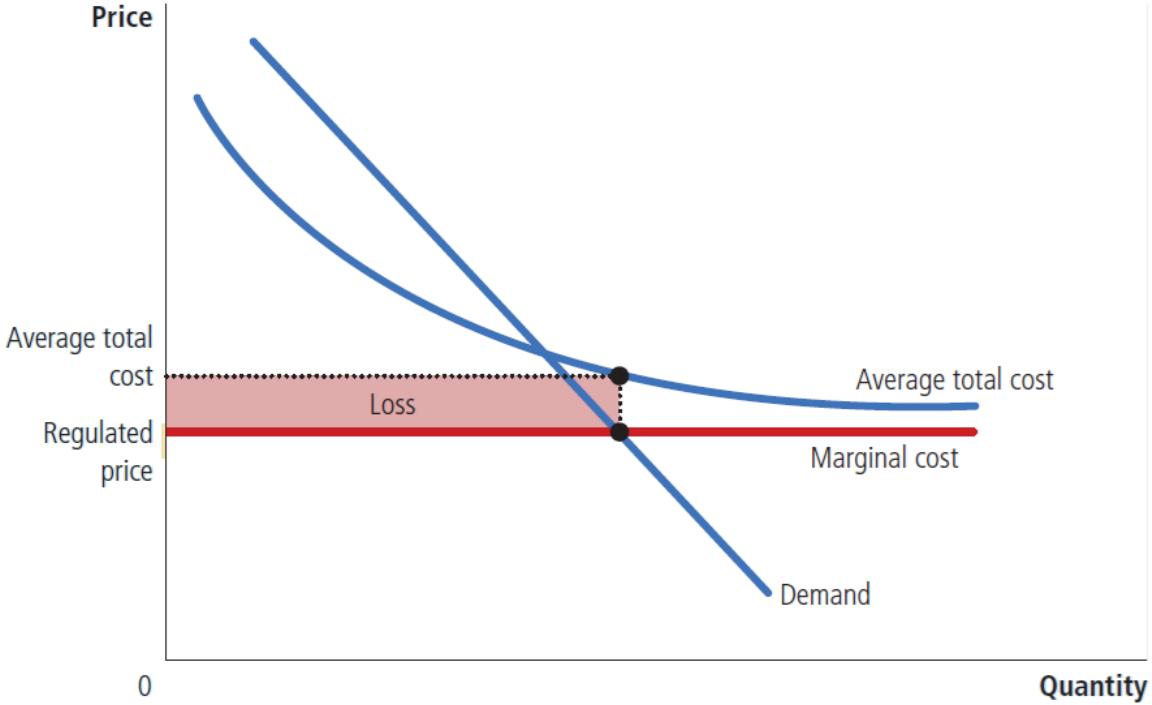


Antitrust Regulation: Public Ownership

FIGURE 10

Marginal-Cost Pricing for a Natural Monopoly

Because a natural monopoly has declining average total cost, marginal cost is less than average total cost. Therefore, if regulators require a natural monopoly to charge a price equal to marginal cost, price will be below average total cost, and the monopoly will lose money.



Source: Mankiw Ch 15.

Final Remarks

- Firms with market power have incentives to preserve it. They will do whatever they can to raise entry costs to their market.
    - This could happen through policy channels (patents) or market channels: buy your competitor when it is a small organization and close it.
- Antitrust policy aims to prevent monopolistic behavior by reducing firm's market power.
    - Big mergers need to be authorized by the DOJ.
    - Rules in place to avoid collusion.

For Next Class

- **Next class:** Trade Policy
- **Readings:** Mankiw Ch 9.
- **Assignment 5:** is out. Due next Monday (11/14)

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