

ECON-C5100 Digital Markets

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Lecture 3: Competition

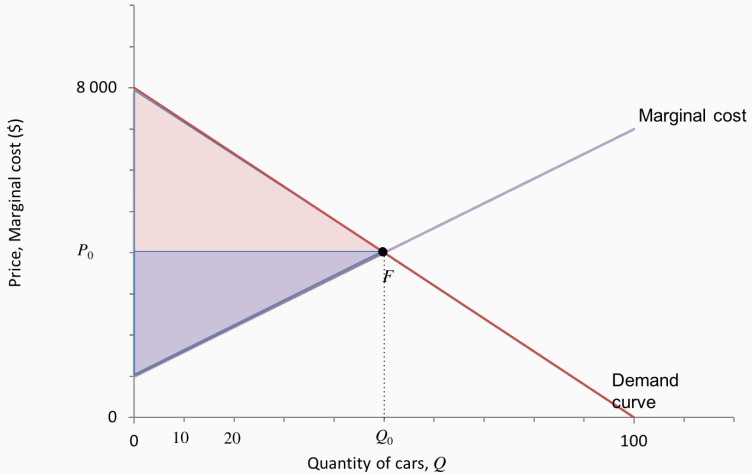
Last week

- Efficiency in the marketplaces
- Role of preferences and data online

This week

- Industry structure and competition
- Auction theory

Reminder: Competitive equilibrium



Source: CORE, The Economy.

Perfect competition

- Equilibrium allocation in the perfect competition model is Pareto efficient:
 - All buyers whose valuation is higher than the market price purchase the good. All buyers whose valuation is lower than the market price do not.
 - All sellers whose cost is lower than the market price sell the good. All sellers whose cost is higher do not.
- The allocation also maximizes welfare, i.e. the sum of
 - *Consumer surplus*: Gain to buyers who pay less than they would have been willing to.
 - *Producer surplus*: Gain to sellers who sell for a higher price than their cost.

Perfect competition

- Perfect competition rests on a set of assumptions, e.g. that property rights are well-defined and there is free trade.
- But:
 - Trade in the market may have impact on others, i.e. there may be externalities
 - Efficiency of the allocation requires also that there are no transaction costs, taxes or other distortions that prevent a trade from happening
 - In practice: frictions always present

Ignoring other frictions and distortions, the industry structure affects competition:

- Perfect competition
 - All participants act as price takers
- Monopoly
 - Only a single supplier that can set prices to maximize its profit
- Oligopoly
 - Limited number of market participants who engage in strategic behavior to maximize their profits

Impact of a monopoly setting the price in the market

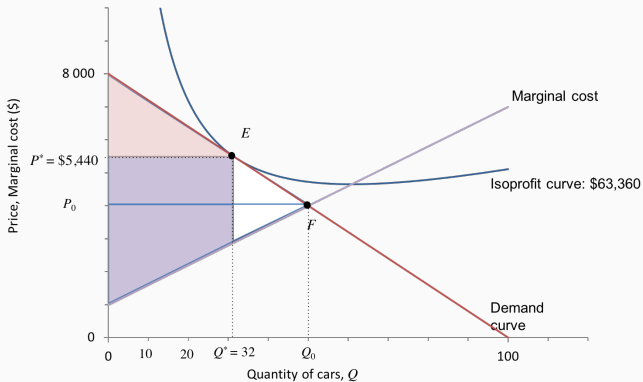


Figure. If a monopoly can charge only one price (P^* here), then the allocation is not efficient.

Source: CORE.

Monopoly

- Use of monopoly power increases the profits of the monopoly firm compared to the competitive equilibrium
- In practice, monopoly can raise its selling price or withhold supply compared to what it would do in a competitive market situation
- This leads to:
 1. Change in distribution of surplus: higher profit to the monopoly firm, higher cost to consumers
 2. Efficiency loss: the reduction of consumption and the associated surplus
- This result hold in the case if the firm is only able to offer *uniform pricing*, the same price for everyone

Price discrimination, good or bad?

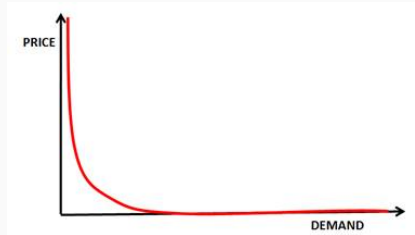
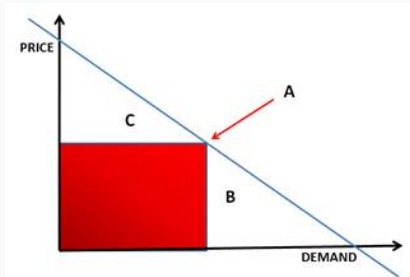


Figure. Linear demand (left). Model for demand in a free-to-play game (right).

- Setting one fixed price at A leads to buyers that could have paid more (C) and consumers that do not buy the game and thus do not pay anything (B)
- Empirically, it seems that some people are willing to pay huge sums of money within the games (like in the demand curve on the right). Free access and in-game purchases provide a way for price discrimination and monopoly rents
- High-paying customers or *whales* are similar to high-rollers in casinos

Figure: Lovell, 2011.

Price discrimination

- Consider x_i goods sold to markets $(1, \dots, n)$.
- Let c be the equal marginal cost of production.
- Compare change in welfare ΔW from situation 1 to 2:
 1. Goods are sold for a uniform price p_0 .
 2. Price discrimination: goods sold for prices (p_1, \dots, p_n) .
- The following inequalities hold:

$$(p_0 - c) \sum_{i=1}^n \Delta x_i \geq \Delta W \geq \sum_{i=1}^n (p_i - c) \Delta x_i,$$

where change in output in market i is Δx_i .

- First inequality tells that output must increase for the total welfare to increase.
- Second inequality tells that if price discrimination is profitable, total welfare must increase.

Price discrimination

- If the firm has monopoly position, can set prices freely and knows all data, then:
 - The firm will set a different price for each customer.
 - The price will be exactly set to customers valuation.
 - All customers with valuation higher than cost will get the item.
 - Consumer surplus will be zero, monopoly extracts all the rents.
- But the allocation will be efficient: total welfare increases!
 - In a monopolistic market situation price discrimination may restore market efficiency compared to uniform pricing.
 - But the all the benefits from efficiency will be pocketed by the monopoly; typically this is considered to be problematic.

Discussion: What about zero prices?

Is Google search a monopoly?

Take the poll in Presemo presemo.aalto.fi/digimar.

Real world competition

- When there is a limited number of firms, then each of these may have some market power, i.e. they can gain by bidding differently from their marginal cost
- When doing so, they must take into account the actions of the other firms
- Game theory is helpful in understanding how these non-cooperative games can play out
- Outcomes typically between perfect competition and monopolies

When there is a limited number of firms engaging in strategic behavior, several possibilities emerge:

- Bertrand competition
 - Firms can be thought to compete by setting prices.
 - Paradoxically, pure price competition reduces to sales at cost even with only two firms.
- Cournot competition
 - Firms can be thought to compete by setting quantities.
 - Effect to market equilibrium depends on the number of firms (or their market share): from monopoly to perfect competition.
- Collusion
 - Instead of competing, firms can cooperate, or collude, to achieve monopolistic control over the market.

Illustration: Online streaming

Most attention is destined to licensed content:
Demand across direct-to-consumer platforms in Mexico

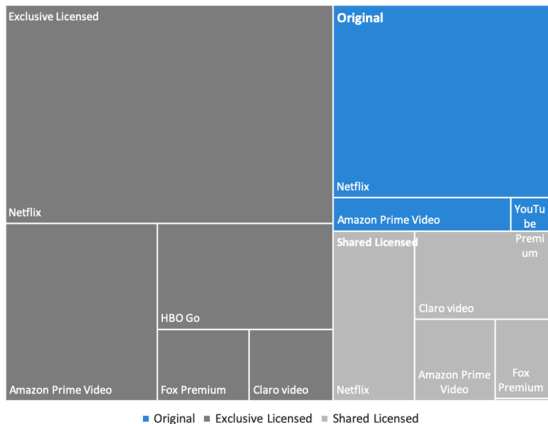


Illustration: Online streaming

- Two firms, i and j , invest to produce original content.
- Firm i has a studio with capacity K , firm j a smaller k .
- Demand is defined by an inverse demand function $p(Q)$.
- Marginal cost of production for both firms is c .
- Payoffs defined with:

$$\pi^i = \pi(K, k) = [p(K + k) - c]K$$

$$\pi^j = \pi(k, K) = [p(K + k) - c]k$$

Illustration: Online streaming

Assume that the payoffs of the firms are

(π^i, π^j)	$k = 0$	$k = 1$
$K = 2$	(45, 0)	(20, 10)
$K = 0$	(0, 0)	(0, 90)

Illustration: Online streaming – Duopoly competition

- In a *Nash equilibrium* both firms provide content:

(π^i, π^j)	$k = 0$	$k = 1$
$K = 2$	(45, 0)	(20, 10)
$K = 0$	(0, 0)	(0, 90)

- Cost for consumers is $20 + 10 = 30$.
- If the firms could coordinate their actions:
 - they would limit the production,
 - increase prices, and
 - increase their joint profits ($90 > 30$).

For continuous selection of quantities with a linear demand function, see MRU on Cournot (link in materials below). And we'll have a go as well!

Cournot competition

1. You compete in a market where prices are set by the following inverse demand function

$$p(Q) = 30 - Q$$

2. You start with a firm that consists of your team
 - The firm has unlimited production capacity
 - Production costs are 0
3. We play several rounds. In each round:
 - i Your firm makes a decision on how much goods to sell
 - ii We calculate the market prices and your payoffs
 - iii The lowest payoff firm is acquired by the highest payoff firm
 - iv In case of ties, loser and winners are randomized
4. Game continues until only one firm remains

- Reminder: Market institutions are crucial
 - Efficient marketplaces with free entry improve competition
- Protection against the misuse of market power is one of the key regulatory concerns
 - Competition law (=anti-trust in the U.S.) is covered later
- Network externalities will impact the nature of competition
 - Will be tricky, we cover as much as we can later

Takeaways from today

- Market structure matters for the equilibrium outcomes
- Lack of competition leads to lower output and higher prices
 - Lower output is a social loss, market is no longer efficient
 - High prices have distributional effects, consumer pay too much
- If competition is insufficient there is a need for regulation

Materials for this week

Online resources (for Lecture 3):

- **Perfect competition.** www.core-econ.org 8.5 and 8.8.
- **Monopolies.** Here MRU section on Monopolies mru.org: [Monopoly](#) is better suited for the course than www.core-econ.org 7.5.1.
- **Oligopolies.** MRU on Cournot mru.org: [Cournot](#).

Reading assignment 2 (for Lecture 4):

- Easley, David and Jon Kleinberg (2010), Chapter 9 from “Networks, Crowds, and Markets: Reasoning about a Highly Connected World”. Advanced material (9.7) not obligatory.
- Einav, Lina, Chiara Farronato, Jonathan Levin and Neel Sundaresan (2018) “Auctions versus Posted Prices in Online Markets”. Very selective reading expected: Introduction, with the exception of the literature review in the end, and Section II.

Auction theory

- Why auctions (price discovery, competition)
- Auction methods
- Private vs. common value auctions