Economics of Strategy for Online and Digital Markets

Topics in Economic Theory and Policy, 31C01000

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Lecture 3: Markets

- Supply and demand
- Competitive equilibrium
- Perfect competition, monopoly, oligopoly
- Institutions

- We now turn to see in detail how markets operate.
- In a market place we have a number of buyers that set the demand and a number of sellers that set the supply.
- Buyers have some willingness to pay for a good, set e.g. by their budget constraints and preferences.
- Similarly, sellers have some reservation price set e.g. by production costs and preferences.
- Markets balance the aggregated demand and supply.

bid.id	date.time	type	Р	Q
1	2015-01-15 11:00:00	D	0.011	144.215
2	2015-01-15 11:00:00	D	0.029	79.928
3	2015-01-15 11:00:00	D	0.042	63.523
79	2015-01-15 11:00:00	D	25	0.035
80	2015-01-15 11:00:00	D	25.010	0.464
81	2015-01-15 11:00:00	D	25.145	0.881
165	2015-01-15 11:00:00	D	120.900	30
166	2015-01-15 11:00:00	D	123.203	25.400
167	2015-01-15 11:00:00	D	126.257	45

Table 2: Demand bids in the Nordic electricity market.

Aggregated demand and demand elasticity



Quantity, Q: number of consumers

Strategies to estimate demand

- Change of price leads to changes in demand.
- Online market places differ from traditional sales in the speed and reach of testing.
- A/B testing can provide an understanding on how demand changes when prices change, i.e. on the price elasticity of demand.



Source: VWO.

	Arden A (Control)	Arden B (Experiment)
Subjects	22	21
Price of Cure Light Wounds Potion	15 gold	30 gold
Potions Purchased	597	324
Potions Per Subject	27.14	15.43

Figure. Demand for Cure Light Wounds Potion with different prices.

Source: Castronova, 2008.

bid.id	date.time	type	Р	Q
1	2015-01-15 11:00:00	S	0.011	146.371
2	2015-01-15 11:00:00	S	0.029	272.917
3	2015-01-15 11:00:00	S	0.042	205.597
116	2015-01-15 11:00:00	S	20.007	4.999
117	2015-01-15 11:00:00	S	20.100	64.486
118	2015-01-15 11:00:00	S	20.200	32.611
583	2015-01-15 11:00:00	S	100.100	5.107
584	2015-01-15 11:00:00	S	108	0.569
585	2015-01-15 11:00:00	S	110	4.689

Table 3: Supply bids in the Nordic electricity market.

Example: Nordic electricity market



Video of market bid curves in the Nordic electricity market.

Competitive equilibrium



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.

- Several conditions required, including:
 - Well-defined property rights.
 - Perfect information available to all players.
 - Participants act as price takers.
- 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 main types of competition can be characterized as:

- 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.

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.
- There is a tendency to regulate monopolies to reduce harmful effects of market power.

Deadweight loss caused by monopoly pricing



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 efficient allocation 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 co-operate, collude, to achieve monopolistic control over the market.

Illustration: Exit game - Collustion

- Going back to example in Lecture 2.
- In a collusive solution the firms maximize the total profit by closing the larger plant:

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

- This leads to an additional gain of 90 (20 + 10) = 60 compared to the competitive solution.
- Division of the cake will depend on the bargaining powers of the firms.

Source: Liski & Vehviläinen, 2018.

Institutions

- Institutional arrangements set the rules for "games" in marketplaces.
- Market places can have their own rules, e.g. stock exchanges.
- Setting these rules is a question of market design, which we will return to in lectures 6 and 7.
- Even with no market specific rules, we have rules and regulation in place to set some boundary conditions
 - For example, environmental regulation, competition law, consumer protection law, copyright law, health and safety laws, labor laws etc.

- Competitive markets are an efficient tool to allocate resources.
- Monopolies may need regulation and oligopolies antitrust controls to prevent efficiency losses.
- Markets are always formed or designed within the legislative and institutional boundaries.

Following units from *The Economy* (www.core-econ.org) should be helpful:

- Institutions, supply and demand (CORE 8.1, 8.2)
- Competitive equilibrium (CORE 8.5)
- Perfect competition (CORE 8.8)

Note that these units from CORE may not necessarily be self-sufficient. If you are unfamiliar with the topics covered you may want to familiarize yourself with the earlier CORE units. Do not be overwhelmed by the amount of material: it is extensive but for the purposes of this course should make a quick read.

- Assume that firms may collect data on users' purchase behavior, but compete otherwise in a frictionless and distortion-free marketplace. Describe how competition can work in the following cases:
 - (a) If there are many firms who all know the users' purchase history fully?
 - (b) If there is a single firm who knows the users' purchase history fully and other firms know nothing of it?
- 2. Consider a market for a single homogenous good. Assume that there are n buyers with bid for buyer i given as (p_i, Q_i) and m sellers with bid for seller j given as (p_j, Q_j) . Write down (maths or verbally) the perfect competition equilibrium conditions.

 Think of a question (about economics of games) to Janne Peltola / Supercell. You get an extra point if we use the question for in-class discussion.

Submit your question through MyCourses by noon Thu 17 Jan.

Auction theory

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