Economics of Strategy for Online and Digital Markets

Topics in Economic Theory and Policy, 31C01000

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Lecture 7: Online markets

" Like a burnished cloak of crystals the giant
Amazon, its current gently churns overtaking
the grass on the banks and then, away off, the
clouds that the sun imbues with its dimming
remains in a flighty whim steep the celestial
sphere in scarlet. *–Manuel Pasion Zegarra* "

Outline

- Reduce frictions between buyers and sellers
- Establishing trust
- Managing information

Online marketplace: Conflicting incentives?

Low prices for buyers:

- Transparent and low prices attract buyers.
- E-commerce marketplaces or internet platforms have a need to limit search frictions and induce competition.

High prices for sellers:

- Sellers are attracted by higher prices.
- Those with cost advantage win if prices are low.
- Others may want to differentiate or make it harder for consumers to understand their pricing.

Online marketplace: Effect of market design on search

Online search design affects consumer search and seller incentives at the same time. The search can be used to:

1. Predict consumers' demand, and to guide them toward their most desired product:
   - Can be in response to a user query.
   - Or through advertising or product recommendations.
2. Help consumers to find a retailer who offers an attractive price for the product:
   - This increases the effective price elasticity faced by sellers, and increases competition.

Different online marketplaces take very different approaches:

- How many items and from how many sellers the user can see.
- The order of the items / sellers.
- Present different sequences of choices:
    - Choose exact product first, the present price alternatives.
    - Present alternative products and prices directly.

Some examples from the U.S. and Finland below.

Figure: Amazon.

Example: Search in Verkkokauppa (Finland)

Figure: Verkkokauppa.

Example: Search in eBay (U.S.)

Figure: eBay.

Example: Search in Tori.fi (Finland)

Figure: Tori.fi.
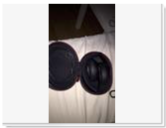
Example: Search in Huuto.net (Finland)
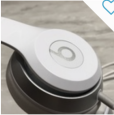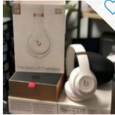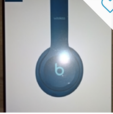
Figure: Huuto.net.

Do these things matter?

At least three channels seem evident:

- The amount of competition among the sellers is determined on the basis of how many items the user can see. This will affect which choices the customer can make.

- The order of the items / sellers will affect who gets most sales. May be based on other criteria than price, gives control to the marketplace.

- The available customer choices will start to affect the pricing (and other) decisions by the sellers.

Figure. Impact of the design change to choices people see (left) and number of clicks they need to make (right).

Experiment with eBay market design

- In May 2011, eBay introduced a new search result page:
  - Prominent "Buy Box" that displayed the lowest posted price among the sellers classified as "top rated" by eBay.
  - As a result customers could both see more choices and resort to the default choice with fewer clicks.
  - This reduced prices of trades, both because customers could more easily choose the lower price and because the prices offered by the sellers were lower.

- Apparently also quantities sold were slightly reduced. In any case, eBay reverted back to a search that was close to their original search page in 2012.

Source: Dinerstein et al. 2018.

Establishing trust

- Problem in online markets is how to trust your trading partner
    - Is the trade fulfilled at all? (fraudulent behavior)
    - What is the true quality? (remember the lemons)
- Is this problem worse online than offline?
    - Offline it can often be easier to inspect goods, and trade might be more likely to be face-to-face.
    - Online trade can happen by mail (goods) or online (e.g. coding service) delivery, be initially anonymous (Craigslist, dating sites), and often payment needs to occur before delivery.
- How to make the marketplace safe to both buyers and sellers?

Establishing trust

- Third party verification or participation:
    - Amazon will pick, pack, ship and provide customer services for non-Amazon sellers.
    - Taobao (part of Alibaba) escrow service: pay after delivery.
    - eBay/Paypal buyer money-back guarantee.
- Online reputation mechanisms:
    - Allow buyers (and sellers) to give feedback.
    - Report the feedback to subsequent participants.
    - We will return to the related issues later.
- Indirect measures also possible, e.g. use AI to follow messaging between the buyers and sellers post-trade (Milgrom and Tadelis, 2018).

- Online transactions create data for the companies.
- We'll explore the evidence on some of the (known) ways by which the companies can use these data to advance their business:
    - Dynamic pricing.
    - Product steering.
    - Price discrimination.

Dynamic pricing

- One of the fundamentals in economic theory is the the law of one price:

  The price of an identical good traded should be the same across all buyers and sellers.

- If this is not true, then some assumptions on perfect competition are not met, for example:
    - Information is not perfect.
    - Transaction costs (e.g. fixed fees, taxes) distort the outcomes.

- If a good were sold at different prices in different places, a trader could maker arbitrage profits until prices are even.

Example: Dynamic pricing
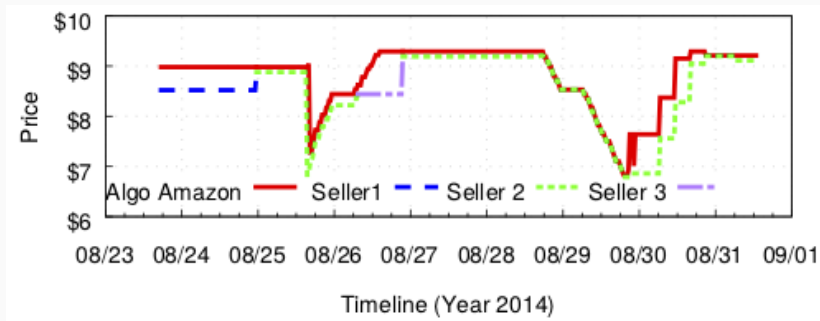
Figure. Example of Amazon matching the lowest seller.

Source: Chen et al. 2016.

Example: Dynamic pricing
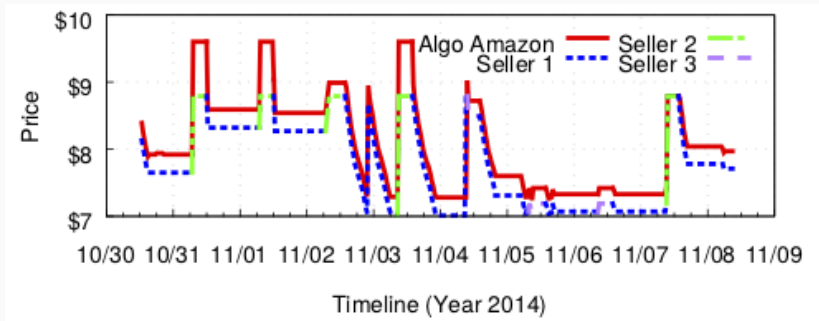
Figure. Example of Amazon keeping a premium over other sellers.

Source: Chen et al. 2016.

Dynamic pricing

- Online information on the bids of competitors makes it easy to match prices.
- If and when consumers are inattentive, Amazon has the advantage of deciding when it wants to sell the product and at what price.
- This also works the other way around: Other companies can start to match Amazon prices.
    - There is evidence that also offline retail prices start to match Amazon's online prices (e.g. Cavallo 2017).
    - As the share of online markets grow, this will start to have wider economics implications, e.g. to inflation.

Product steering
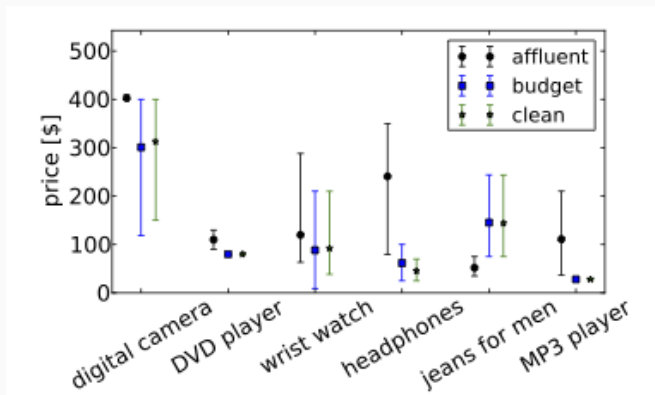
Figure. Example of the use of data to steer product selection, see e.g. the prices offered in headphones or MP3 players.

Figure: Mikians et al. 2012.

Price discrimination

Figure. Example of price discrimination. Two identical searches with different online fingerprint.

Figure: Hannak et al. 2014.

Price discrimination

- Product steering and price discrimination are ways by which the firm tries to extract the maximum amount you are willing to pay.
- If the firm has market power and is only able to offer *uniform pricing*, the price for everyone, then it will still maximize its profit but some trade will not happen.
- Remember, that in perfect competition all sellers would be willing to sell at their cost (if they would try sell at a higher price, someone else would sell at cost level).

Deadweight loss caused by monopoly pricing
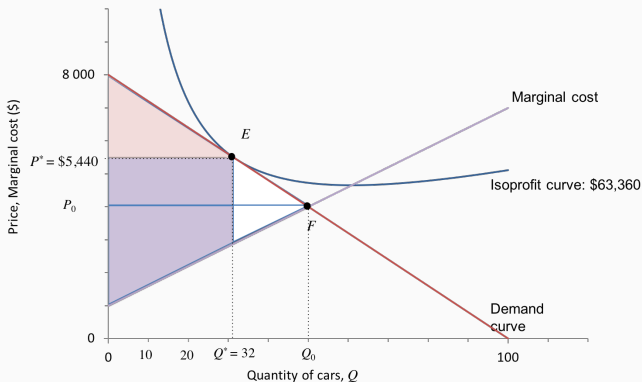
Figure. If a monopoly can charge only one price (at E here), then the allocation is not efficient.

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; this typically is seen to be problematic.

Price discrimination

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

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

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

Source: See Varian, 2012, Section 1.

Price discrimination

- Despite the potential, evidence suggests that price discrimination is not that wide-spread:
  - In 2015, the U.S. Council of Economic Advisers: price discrimination is used in a "limited and experimental fashion".
  - Geographical price discrimination rare among the top online retailers in the U.S. (Cavallo 2018).
- Arguments against price discrimination:
  - Transparency of online prices.
  - The fear of antagonizing customers.
- In 2000, Amazon was caught selling same DVD with different prices. This lead to the following statement by their CEO:
  - "We've never tested and we never will test prices based on customer demographics."

Use of data in price discrimination

In the case of duopoly competition, the following result holds:

- If firms are equally able to profile consumers or if only one firm is able to profile consumers, then profiling does not allow firms to escape from the Bertrand paradox and make positive profits.

- If both firms can profile customers and price discriminate, but there is uncertainty (did one firm recognize the consumer or did they both?), then the firms can earn positive profits.

Source: Belleflamme et al., 2017.

- Reduction of search frictions is key to how much competition there really is on a marketplace.
- Companies can collect and use data to their advantage in at least three way: dynamic pricing, price discrimination, and product steering.
- Marketplaces need to balance their design to remain viable.

Readings for this lecture

- Milgrom, P. and S. Tadelis (2018) "How artificial intelligence and machine learning can impact market design", NBER Working Paper 24282.
    - Section II., though entertaining reading and relevant for anyone interested in auctions, is not in the core of this course and can be skipped.

3. Assume that you are a social planner (i.e. trying to maximize total welfare) that is set to design an online marketplace. The market place has producers trying to sell and consumers interested in buying. Sellers submit their offerings, products and prices, to the marketplace. The marketplace is build around a search engine where buyers can try to find a product that they are interested in. If the price is lower than the willingness to pay of the user, then they will make the purchase.

   (a) First assume that you can ban all other marketplaces (you are the planner!). How would you try to organize the search to maximize welfare? (No need to worry about other frictions or distortions.)

   (b) How does the design problem change if there are alternative venues of trade for the producers to sell their products?

   (c) How and why would you collect and use data on buyers?

   Note that your job is not to present a website design or anything like that, but to describe the key economic principles that would direct how to setup the market place. I'm after a simple theory answer for (a); (b) and (c) are more open ended and will be graded on the merits of thinking (not the same things as length!).

Next time

Networks

- Networks
- Direct network effects