

# The Economics of Internet Markets

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Econometric Society, August 2010

- ▶ Remarkable growth of internet platforms
  - ▶ Amazon founded in 1995 - \$25 billion in annual sales.
  - ▶ Taobao founded in 2003 - 200 million active users.
  - ▶ Facebook founded in 2004 - 500 million active users.
  - ▶ Google founded in 1998 - over a billion searches a day.
  
- ▶ This talk: What is economically distinctive about these markets? What have we learned? What is missing?
  
- ▶ Organize talk, and recent research, into three parts
  - ▶ Platform competition, Marketplace design, Market behavior.

# What is distinctive about internet markets?

- ▶ Changes in *technology* reduce costs of market operation
  - ▶ Costs of communication and search, changing displays, measuring behavior, aggregating and processing data, etc.
- ▶ Technological changes enable distinctive *economic* features
  - ▶ Scalability
  - ▶ Customization
  - ▶ Innovation

# Platform Competition

- ▶ Approach in IO: think of platforms as intermediaries that bring users together to enable economic or social exchange.
- ▶ Process is characterized by network effects
- ▶ Not specific to internet, but useful for general insights.
  - ▶ How can platforms attract users and extract revenue?
  - ▶ What is the nature of competition and market structure?

# Platform Strategy and Market Structure

- ▶ Platforms set user prices; users decide whether to participate.
  - ▶ Strategy: Optimal pricing relies on *cross-subsidization*.
  - ▶ Competition: potential for concentration or *market tipping*.
- ▶ Common concern is lock-in and dynamic inefficiency
  - ▶ Users become coordinated on a platform, preventing entry.
  - ▶ Examples: payment cards, operating systems.
- ▶ Should we have the same concern in internet industries?
  - ▶ Maybe ... although switching and *multi-homing* costs can be low, enabling entry - ex. of Twitter & Facebook.

- ▶ How to create efficient, innovative marketplaces?
  - ▶ Efficiently match users with opportunities
  - ▶ Facilitate competition and safe exchange
  - ▶ Promote innovation built on underlying platform
- ▶ Technology creates new challenges (scale, heterogeneity) but also allows for new mechanisms (real-time, data intensive).
- ▶ Describe some novel solutions to the above problems.

# Sponsored Search

- ▶ Google gets over a billion search queries a day: the problem it faces is how to match results with user requests.
  - ▶ Ranking algorithm used to allocate “organic” positions
  - ▶ Auction used to allocate positions to sponsored results.
- ▶ Positions are valuable to advertisers because queries can reveal particular need at particular time.
- ▶ Market-based approach to matching users and opportunities that operates in real-time at enormous scale.

# Sponsored Search: An assignment approach

Model of Edelman, Ostrovsky, Schwarz (2007); Varian (2007)

- ▶  $M$  positions that will receive  $x_1 > \dots > x_M$  clicks
- ▶  $N$  advertisers with “per-click” values  $v_1 \geq \dots \geq v_N$
- ▶ Advertiser  $n$ 's payoff from position  $m$  is  $v_n x_m - t$

*Theorem* - appealing properties of the model.

- ▶ Efficient assignment is assortative (advertiser  $k$  in position  $k$ )
- ▶ Efficient assignment can be supported with CE prices
- ▶ CE prices must be increasing, on a per-click basis.

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# Sponsored Search: Designing a market

- ▶ Google's "generalized second price" auction
  - ▶ Bidders offer a maximum payment per click
  - ▶ Positions assigned in order of bids
  - ▶ Bidders pay minimum necessary to sustain position
  
- ▶ Design features a series of incremental innovations
  - ▶ Bids are per-click, not per-position  $\Rightarrow$  *simplification*
  - ▶ Bidders pay next highest bid, not own bid  $\Rightarrow$  *stability*
  - ▶ Bids are weighted by quality scores  $\Rightarrow$  *relevance*

*Theorem* - appealing properties of GSP.

- ▶ Pure NE exist, although bidders have no dominant strategy.
- ▶ (Refined) NE are "equivalent" to the competitive equilibria.

# Reputation Mechanisms

- ▶ Problem in internet markets: What am I buying? Can I trust the person with whom I'm trading?
  - ▶ Jin-Kato (2007) baseball card experiment: much greater misrepresentation online where cards can't be examined.
- ▶ Online reputation and evaluation mechanisms
  - ▶ Elicit and aggregate user feedback
  - ▶ Transmit the information to subsequent users

# Reputation: an eBay Case Study

- ▶ Mechanics of eBay's reputation system
  - ▶ After a transaction, buyer and seller can submit feedback - pos, neg, neutral - and short text ("AAA+++ seller").
  - ▶ About 70% of traders give feedback, so millions of feedbacks each day. *But ... almost 99% of feedbacks are positive.*
- ▶ Bolton, Greiner and Ockenfels (2008) re-design
  - ▶ Problem: fear of retaliation limits negative feedback
  - ▶ Solution: kill sequential feedback; add detailed ratings
  - ▶ In "trust game" experiments, efficiency gains of 15-25%
  - ▶ In the field, detailed scores lower and more spread out.

# Market Behavior

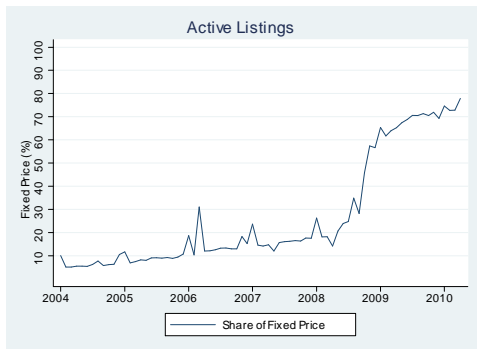
- ▶ Internet markets provide an opportunity to study competition and consumer behavior in structured, data-rich environments.
- ▶ Many interesting questions involve the effect of technology
  - ▶ reductions in search and display costs
  - ▶ new flexibility in pricing and targeting products, etc.
- ▶ One lesson is that the *equilibrium market response* to changes are not necessarily the same as “first-pass” effects.

# Search Costs and Price Competition

- ▶ Hypothesis: reduction in search costs should intensify competition and reduce price dispersion, at least in homogenous goods markets.
- ▶ Evidence (fairly rich) suggests a subtler story
  - ▶ Early studies found lower prices, although still dispersion.
  - ▶ Ellison & Ellison (2009): on price search engines, sellers compensate for increased competition with “obfuscation” strategies - add-ons, up-sells, or bait-and-switch tactics.

# Auctions and Posted Prices

- ▶ Hypothesis: reduced costs of assembling buyers would shift markets from posted prices to auctions.
- ▶ Einav-Levin et al.: here's eBay



- ▶ Internet reduces cost of running auctions, but as markets become thicker, less need for price discovery.

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# What's missing?: Empirical strategies

- ▶ Enormous amount of data  $\Rightarrow$  shift in mindset.
  - ▶ A lot of research on markets (empirical IO) over the last 25 years has focused on developing econometric methods designed to substitute or compensate for lack of data.
  - ▶ In internet markets, ability for micro-level and experimental measurement is *vastly* improved, but now there can be “too much” data - requires new thinking and approaches.

# What's missing?: Experiments and Innovation

- ▶ Central feature of the internet - rapid innovation/adaptation.
- ▶ Experimentation and incremental innovation
  - ▶ Platforms regularly engage in experiments to try out market design changes - Google ran 6,000 just last year.
  - ▶ Market participants do the same - seller experiments on eBay (Einav, Kuchler and Levin, 2010)
- ▶ Important consequences for innovation, platform competition, market design - and for economics research!



Introduction

What's New?

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**Conclusion**

# The End