

Online Display Advertising: Practice → Theory → Practice

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based on joint work with Jon Levin

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Is Every Ad Impression Unique?

- Google, Yahoo, and many ad networks conduct separate auctions for each ad opportunity.
 - But for many other goods, minimizing distinctions has been critical for creating thick, successful markets.
- Background
 - Arrow-Debreu distinguishes goods by physical attributes, place and date:
 - “Number 5 red winter wheat in Chicago.”
 - Taken to extremes, this means every item is a unique good.
 - Organized markets exploit standards and conflation

Lessons from Other Markets?

- What principles govern standards and conflation?
 - From *The Book of Wheat* by Peter Dondlinger, 1908:
“...for each transaction they would analyze a sample to determine its value. The measurement costs were very high.”
 - Online search advertising supposedly prices each impression separately, but...
 - Price per click is independent of position (Overture → Google)
 - Traditionally, no search targeting based on demographics, etc
 - Exact match, phrase match, broad match

Uncut Diamonds & Radio Spectrum

- BHP Billiton conducts a uniform price auction for uncut diamonds, selling “slices” from several categories.
 - Slices assigned randomly to buyers.
 - Seller determines relative quality of slices and adjusts the auction price accordingly.
- UK spectrum auctions, 2.6GHz bands
 - Initially, some number of MHz are assigned to each bidder in ways that satisfy certain constraints.
 - If there are multiple feasible assignments, an extra bidding phase decides among them.

From Overture to Google

- Some recent academic papers have emphasized move from first-price to generalized second-price rules
 - Edelman-Ostrovsky-Schwartz (2007), Varian (2007)
 - Analyses are conducted as if ...
 - pricing were on a per-impression basis
 - advertisers value clicks directly
- But the move from price-per-impression to price-per-click may be even more important.
 - CPC complements simplification/conflation

Simplification and Equilibrium

- Auctioning ad positions on search page (Milgrom, 2009)
- Option #1 (based loosely on Overture)
 - Each bidder bids a price for showing in a particular one among N ad positions
 - Second price auction
 - Full information pure equilibrium + small positive bid cost → equilibrium revenue is zero
- Option #2 (based loosely on Google)
 - Generalized second price auction with ONE bid per bidder
 - Full information pure ... → ... positive

FaceBook's "Success Story"

- Producer with excess inventory of Chicago Cubs pants, usually sold at the ballpark.
- Producer targeted advertising to Chicago residents who were part of a Cubs interest group.
- Success! Pants sold quickly.
- *Success??* Facebook earned almost zero in ad revenues.

A Three-Way Trade-off

- Matching
 - Match ads to opportunities
 - Use appropriate targeting
- Safety
 - Reduce measurement costs & adverse selection
 - McDonald's "Happy Contract" to place ads when the sun is shining and the Dow is up.
 - Use appropriate conflation, classification, adjustments
 - (Protect publishers and brands from devaluation)
- Market thickness
 - Ensure competition for ad opportunities
 - Use appropriate bundling

Two Easy Theory Models

- Measurement/ Adverse selection and conflation
 - Each ad opportunity has two value-determining characteristics: consumer interest and consumer value
 - Observed: imperfect indicator of interests + “demographics”
 - Theory question: should demographic targeting be allowed?
- Thin markets and bundling
 - Two categories: Cubs fans and baseball fans.
 - Should targeting Cubs fans be allowed?
 - What is the optimal pricing-and-targeting policy with unknown demand?

End
