Media Markets as Two-Sided Markets: Consumer Behavior and Search Engines

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The Pros and Cons of Antitrust in Two-Sided Markets
Stockholm, Swedish Competition Authority

November 28, 2014
Media Markets

- Media markets are often two-sided markets
- Platforms (newspapers, radio stations, broadcasters, websites) need to bring two sides on board: consumers (readers, listeners, viewers, users) and advertisers
- Indirect externalities: Advertisers benefit from consumers; consumers often dislike advertising
- Advertising revenue in the US in 2012: 175 billion US$ (around 41% from TV and 21% from Internet media)
Media Markets

- Consider Internet media here
- Advertising revenues were steadily increasing in the last years (increase by 500% since 2003)
- Several interesting features of the Internet, e.g., consumers often receive content for free
- Focus on two aspects:
  
  a) Consumers choosing multiple outlets (website is "just one click away")
  b) Search engines and search bias

⇒ Based on overview article jointly written with Martin Peitz "The Economics of Internet Media"
- In traditional audiovisual media, consumers often stick to one media outlet for the relevant time period (single-home)
- Advertisers are active on many outlets (multi-home)
→ Model is one of competitive bottlenecks
- In the Internet, consumers also multi-home
- Distinguishing feature of online consumption: Users spread their attention across a wide array of outlets
- Example from December 2012: Google Ad Network reaches 93.9% of users, AOL Advertising 84.2% and AT&T AdWorks 83.9%.
- Competitive-bottleneck model:
  - Outlets fight for the exclusive turf of users
  - Outlets have monopoly power of delivering users’ attention to advertisers

→ Competition is driven by business-stealing considerations on the user side

- If advertising is a nuisance to users, competition leads to reduced advertising (advertising is a shadow price to users)
- Multi-homing users:
  
  advertisers can reach a user on multiple outlets
  outlets do no longer have monopoly power

- Advertisers are willing to pay less for 'shared' users than for 'exclusive' users

→ This gives rise to new competitive effects
- Findings based on Ambrus, Calvano and Reisinger (2014)

- Suppose a new outlet enters:

→ **Duplication effect:**
  
  Shared user is exposed to the ad multiple times
  
  → advertising is less valuable

  Reduces advertising intensity

→ **Business-sharing effect:**

  After entry, some (formerly exclusive) users are shared with entrant

  Losing shared users is less detrimental than losing exclusive users

  Increases advertising intensity

- **Composition** of user demand becomes important
- Implication:
  Fiercer competition can lead to increased advertising
- This is consistent with findings in the US cable television industry ("FOX News puzzle")
→ Recommendations for competition policy can change drastically when users multi-home
- Anderson, Foros and Kind (2014) provide a related analysis
Search Engines

- Users often access websites via a search engine
- Search engine provides organic and sponsored links
- Organic link reflect relevance of listings according to an algorithm
- Sponsored links are paid for by advertisers:
  - Advertisers pay per click and bid in a second-price auction:
    - Higher per-click-price secures rank closer to top
    - Click-through-rate is also important
    - Google uses a quality score to determine the rank
Search Bias

Does search engine list results in the best interest of consumers?

**Different forms of biases**

(i) Bias coming from the tension between organic and sponsored links

(ii) Bias within the sponsored links

(iii) Bias within the organic links

- Example: search engine integration
  - Google owns many media platforms (Youtube, Google maps, Zagat)
  - Organic results may favor these websites
  - European Commission in 2012 lists this as a potential abuse of dominant position
  - FTC found that Google changed its algorithm to privilege its own content
Bias due to Organic versus Sponsored Links

Formulation based on Taylor (2013)

- Two search engines, $i \in [g; y]$
- After a query, each search engine displays an organic link (O-link) and an advertised link (A-link)
- A-link has an exogenous match probability $q$ and gives the search engine a benefit $b > 0$ if a user clicks on it
- Match probability $p_i$ of the O-link is chosen by search engine $i$, with $p_i \in [0, p^{\text{max}}]$
- Increasing $p_i$ is costless for each search engine
- Users face search costs $S > 0$ when visiting a search engine and costs $s > 0$ when clicking a link
Bias due to Organic versus Sponsored Links

- Welfare maximizing outcome: Both search engines set $p_i = p_{max}$
- But: If $q$ is large enough, there is an equilibrium in which $p_g = p_y = q < p_{max}$
  Search-quality degradation!
- Trade-off of the search engines:
  Higher quality attracts more users
  Higher quality prevents users from clicking on the advertised link
  $\rightarrow$ Self-cannibalization
- White (2013) provides a related analysis
Bias due to Competition between Advertisers

Only advertised links

Formulation based on Eliaz and Spiegler (2011)

- Single search engine sets a per-click-price to advertisers
- Continuum of advertisers competing in the product market
- Advertisers are characterized by their probability with which the product has a positive value for consumers (matching probability)
- Advertisers are heterogeneous with high and low matching probabilities
- Consumers are heterogeneous with respect to their valuation, conditional on a match being formed
Bias due to Competition between Advertisers

In equilibrium, search engine sets a per-click-price to attract relatively many low-relevance advertisers

- Trade-off of the search engine:
  Setting a per-click-price such that high-relevance advertisers are attracted increases user demand
  Attracting mainly high-relevant consumers leads to fierce competition between advertisers and lower profits
  Search-quality degradation!

- See Chen and He (2011) for related results
Bias due to Vertical Integration

Formulation based on de Cornière and Taylor (2014)

- Single search engine and two media outlets
- Users are distributed on a line of length 1; media outlets are located at the endpoints of the line
- Users are not aware of their location \( x \) before using the search engine (users do not know which media outlet they are most interested in without the search engine)
- Search engine and outlet make profits via advertising
- Advertising on a media outlet and on the search engine are substitutes
  \[ \rightarrow \] Profit of the search engine falls in the advertising levels of the outlets
Search engine works as follows:

(i) User enters a query
(ii) Search engine maps the query into a latent location and directs the user to an outlet

Cutoff rule such that users with \( x \leq \bar{x} \) are directed to outlet 1 and users with \( x > \bar{x} \) are directed to outlet 2

**Definition of a bias:**
If the search engine sets a different \( \bar{x} \) than users would have set it is biased.

- Call \( x^U \) the optimal cutoff rule for users. Then, the search engine is biased in favor of outlet 1 if and only if \( x^U > \bar{x} \).
Bias due to Vertical Integration

- Trade-off of the search engine:
  Setting \( \bar{x} \) close to \( x^U \) ensures high user participation
  If advertising on outlet \( i \) is a particularly close substitute to advertising on the search engine, the search engine prefers to bias results against platform \( i \)

→ Even without integration, a bias can occur (as long as platforms are not symmetric)
Bias due to Vertical Integration

- Search engine is integrated with platform $i$

→ Effects on the bias:
  
  Search engine benefits from revenues on platform $i$ and so biases in favor of platform $i$
  Search engine cares more about participation and implements higher quality (less-biased results)

→ Integration can increase or decrease the level of the bias!

- Burguet, Caminal and Ellman (2014) provide a related analysis
The goals of the advertising business model do not always correspond to providing quality search to users. [...] we expect that advertising funded search engines will be inherently biased towards the advertisers and away from the needs of the consumers.
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Sergey Brin and Larry Page, founders of Google, before Google was advertising financed.