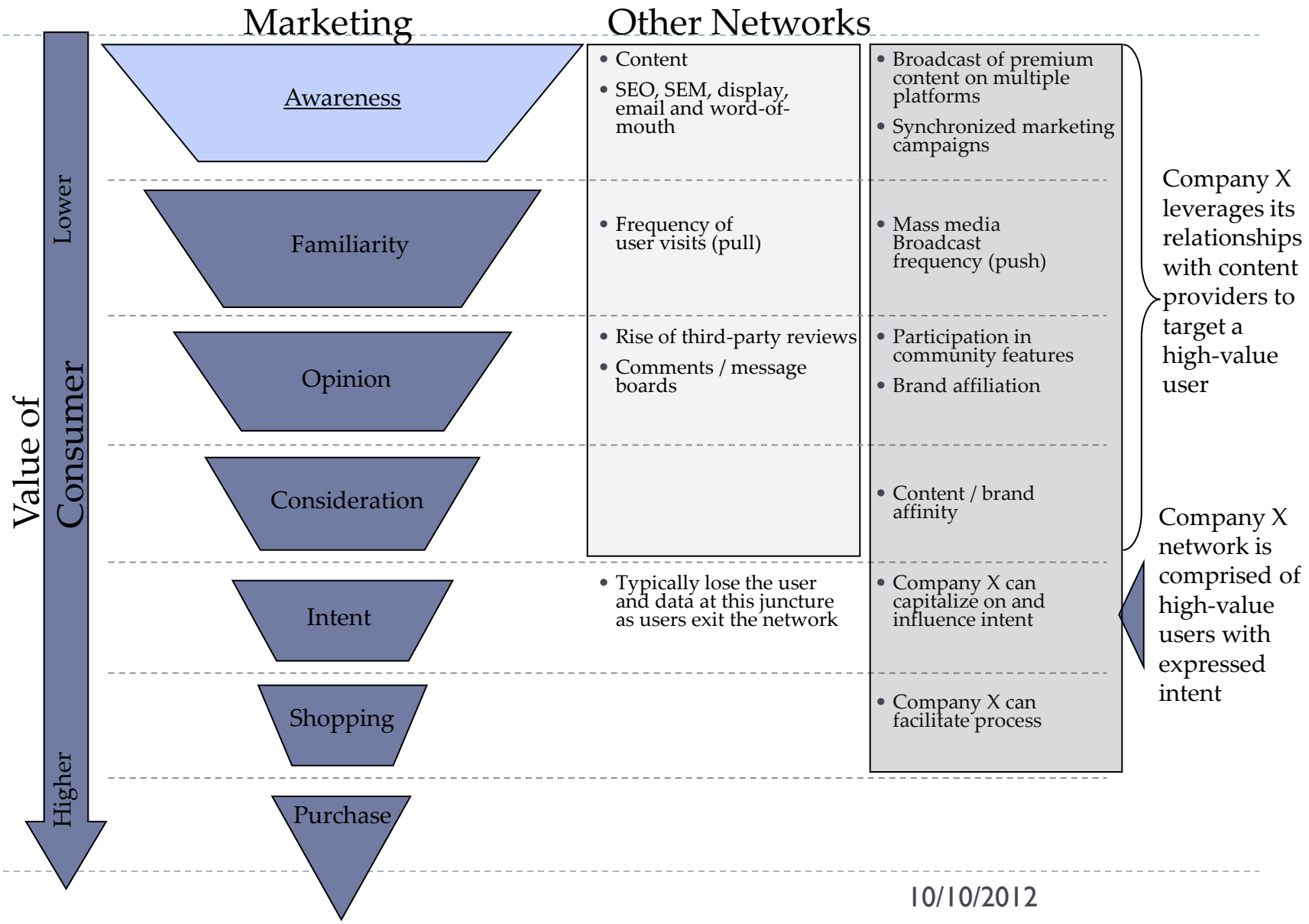
The Information Economy

Monetization: Prices and Advertising

The Stages of Buying (The Marketing Funnel)



Basic Monopoly Pricing

Monopoly Pricing: Recap

- Constant marginal cost, c.
- Firm chooses quantity to maximize profits

$$\Pi(q) = q(p(q) - c)$$

- First-order condition

$$MR(q) = c$$

- Inverse elasticity rule

$$\frac{p-c}{p} = \frac{1}{e} \quad \text{where} \quad e = -\frac{p}{q}\frac{dq}{dp}$$

Multi-product monopolist

- Microsoft sells XBox and Halo
  - If sell separately optimal prices p_X=300, p_H=50.
  - But they sell both: how should they price them?
- Walmart sells Xbox and PS3
  - If sell separately optimal prices p_X=300, p_{PS}=400.
  - But they sell both: how should they price?
- Economist sells print and online editions
  - How should they price?

Multi-product monopolist

- Firm chooses (q_1,q_2) to maximize

$$\Pi(q_1,q_2)=q_1(p_1(q_1,q_2)-c_1)+q_2(p_2(q_1,q_2)-c_2)$$

- Inverse elasticity rule for p_1

$$\frac{p_1-c_1}{p_1}=\frac{1}{e_{11}}-\frac{(p_2-c_2)q_2}{p_1q_1e_{11}}e_{12} \quad \text{where} \quad e_{12}=-\frac{p_1}{q_2}\frac{dq_2}{dp_1}$$

- Substitutes: $e_{12}<0$
  - Negative externality so increase p_1.
- Complements: $e_{12}>0$
  - Positive externality so reduce p_1.

New Products and Cannibalization

- When launching new product, do cost-benefit analysis.
- But products are often complements/substitutes for old:
  - Netflix launches Video on Demand
  - Apple launches iPad
  - Amazon launches Kindle
- Relation matters:
  - If compliment then introduce product earlier
  - If substitute then delay because of cannibalization
- This relates to last slide:
  - Having a product unavailable is like price being infinity.
  - Need to take externalities into account when launching.

Price Discrimination

Three types of price discrimination

1. First-degree
   - Perfect price discrimination. Theoretical ideal.
2. Third-degree (group pricing)
   - Price as function of observables.
   - Examples: Student status, zip code, assets.
3. Second-degree (indirect price discrimination)
   - Offer menu of options and let people self-select.
   - Examples: Versioning, quantity discounts.

- Pricing often has elements of both second- and third-degree price discrimination.

First-Degree Price Discrimination

- Suppose know customer's demand curve, p(q).
- Firm can extract all consumer surplus
  - Let welfare maximizing quantity be q^*, so that $p(q^*)=c$.
- Three ways to extract
  1. Block pricing: sell q^* units at $W(q^*)=\int_0^{q^*} p(q)dq$
  2. Two-part tariff: price $p=c$ and fee $CS(q^*)= W(q^*)=\int_0^{q^*}[p(q)-c]dq$
  3. Nonlinear prices: Sell q^{th} unit for price $p(q)$.
- Big assumptions
  - Know customers demand.
  - Able to charge different prices to different customers.

Third-Degree Price Discrimination

- Firm can observe customer characteristics
  - Country (e.g. book prices)
  - Student status (e.g. airline tickets)
  - Individual pricing (e.g. Lexis-Nexis and Universities)
- Optimal pricing: Use inverse elasticity rule for each group.
  - Lower price to most sensitive groups.
- Assumptions
  - No resale (e.g. international editions of textbooks)
  - No cost to setting different prices
  - Cannot change characteristics (e.g. hide student card)
  - No ethical issues (e.g. racial discrimination in car sales)
  - Consumer demand and observable characteristics are correlated
- Has internet made easier or harder?

Second-Degree Price Discrimination

- Offer menu of products and see which consumers choose
  - High and low quality products (vertical differentiation).
  - Indian and American textbook (horizontal differentiation).
  - Quantity discounts.
- Big idea
  - Choose options so different types of customers self-select.
  - Want to separate groups that have different WTP.
  - Need customers with different WTP to value features differently
- Classic example: Coupons (or Groupons)
  - Put coupons in the newspaper.
  - Annoying to cut out and bring to store.
  - How does this raise profits? Why not just lower price?

A Classic Example

It is not because of the few thousand francs which would have to be spent to put a roof over the third-class carriages or to upholster the third-class seats that some company or other has open carriages with wooden benches. […] What the company is trying to do is to prevent the passengers who can pay the second-class fare from traveling third class; it hits the poor, not because it wants to hurt them, but to frighten the rich.

Jules Dupuit, 1849

How to Price Discriminate

- Theory beautiful but intricate.
  - See notes on website.
- Suppose two types of customers: high and low demand.

1. Set standard monopoly price p^*: agents choose q_H, q_L.
   - Consider selling as bundles of q_H and q_L units.
2. Get more money out of high type agent.
   - Raise price of high bundle until high type indifferent between high and low bundle.
3. Degrade lower bundle
   - Lower q_L to make the low bundle unattractive to high type.
   - Self-selection: lowering q_L is worse for high type than low.

Practical Issues of Versioning

- How many versions?
  - Want to cleanly separate consumers (e.g. business vs. leisure)
  - Cost to maintaining different product lines (e.g. airlines)
  - Customer confusion from too many options (e.g. cinemas)
  - Different options may reduce network effects. (e.g. wordpad)
- Degraded versions
  - Need to ensure customers cannot undo (e.g. unlock software).
  - Use degraded version to promote regular one (e.g. mathematica)
- Framing
  - People like "middle" option.

Other Topics

Bundling

- Bundling is very common
  - Bundling of functions (e.g. Excel)
  - Bundling of programs (e.g. MS Office)
  - Bundling of people (e.g. MS Office site licenses)
- Pure and Mixed Bundling
  - Pure: only sell bundle.
  - Mixed: see bundle and components separately.

Bundling and Price Discrimination

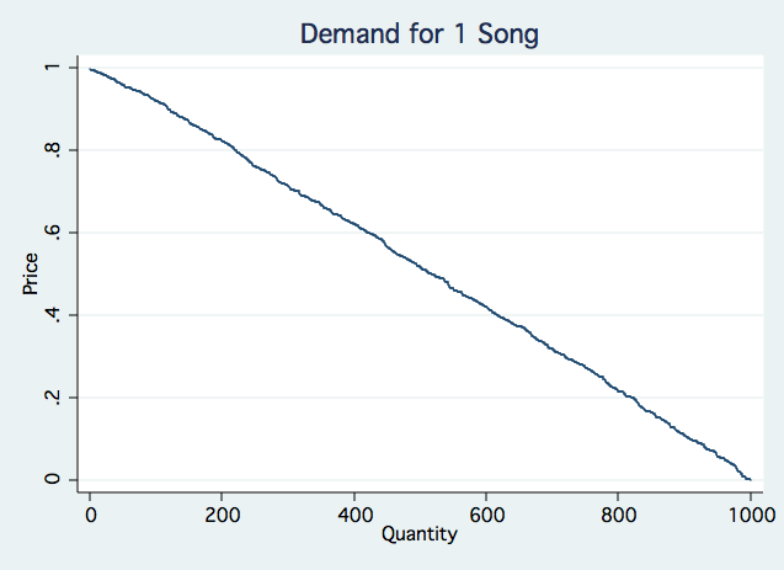
- Bundling can reduce the dispersion of consumers' WTP.
- Ann and Bob have values for Excel and Word

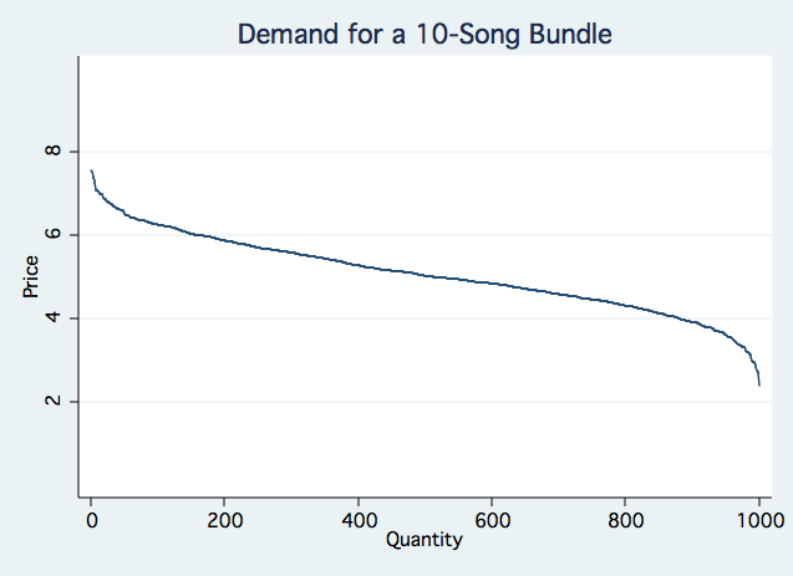
	Excel	Word
Ann (accountant)	100	60
Bob (bureaucrat)	60	100

- If sell separately
  - Prices: $60 for Word, $60 for Excel.
  - Profits $240.
- If sell as bundle
  - Prices: $160 for bundle.
  - Profits: $320.

Bundling and Price Discrimination

- Bundling can reduce the dispersion of consumers' WTP.
- This is easy to see when there are many goods
  - 1000 customers and 10 songs.
  - Each customers' value per song is uniformly distributed on [0,1]





Other Reasons to Bundle

- Complimentary consumption (e.g. shoes)
- Complimentary production (e.g. CDs)
- Reduce the number of payments (e.g. newspaper articles)
- Blocking entry (e.g. Microsoft)

Price Complexity

- Airline Pricing
  - Airline prices used to be very complex: price depends on whether single/return, on how match flights etc.
  - Increasingly sell single tickets (e.g. Virgin America)
- Complex prices
  - May be optimal form of price discrimination
  - Makes price comparison hard, and softens competition
- But…
  - Confuses customers
  - People may think differential pricing is unfair

Framing

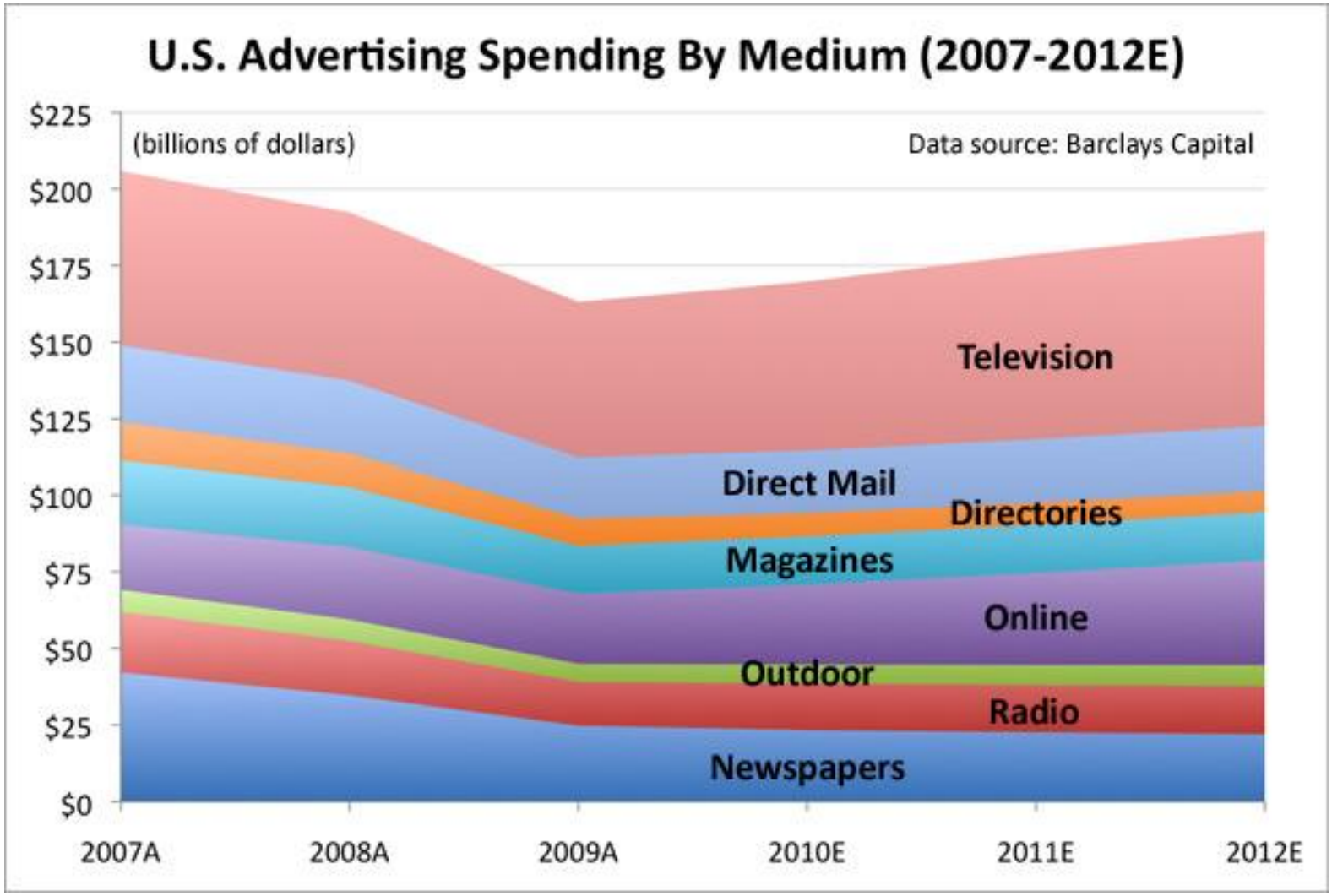
- Customers stick with default options (endowment effect)
  - Put object "in hands" of customer.
- Don't overwhelm consumers (choice overload)
  - People more likely to buy nothing.
- Product positioning (reference effects, anchoring)
  - Choose middle option
  - Choose second cheapest (or second most expensive) wine
  - Search by brand then price (affects how recommend)
- Mental accounting
  - People subdivide expenditures (e.g. insurance on computer).

Beyond Prices

Zero Prices

- Zero prices are commonplace (but not universal)
  - Email accounts, Internet hotspots, Online newspapers
- How earn money?
  - Advertising (e.g. gmail)
  - Selling complementary goods (e.g. support with Sun's MySQL)
- Advantages of zero price (over small prices)
  - No transactions costs (billing, usernames, passwords)
  - Create environment of experimentation
  - Maintain privacy
- Problems
  - Overconsumption if MC≠0 (e.g. data plans, email spam)
  - Hoarding (e.g. IP addresses)

Online Advertising



Motives for Advertising

- Informative (e.g. restaurants)
  - Inform customers of products existence
  - Advertise specific features or price
  - Signal quality through commitment to product
- Persuasive (e.g. branded drugs)
  - Change customer's view of product
  - Jam their memory, so first think of your product.
- Importance of advertising depends on type of good
  - Search good – inform of existence, jam memory of customer
  - Experience good – persuade customer quality will be high

Intensity of Advertising

- The intensity of advertising varies a lot across industries
  - Breakfast cereals - advertising is 10% of revenue
  - Salt - advertising is essentially 0% of revenue
- Amount of advertising depends on
  - The sensitivity of demand to advertising
  - The markup
  - The efficiency of advertising
  - Whether advertising helps your firm, or helps all firm.
- The sensitivity depends on
  - The amount of product differentiation
  - Search vs. experience good
  - Market concentration

Advertising Strategy

- Single firm
  - Suppose advertising shifts the demand curve.
  - Care about the WTP of the marginal customer.
  - Analogous to vertical differentiation.
  - Like quality, advertising is also investment in brand equity.
- What if there are many firms?
- Advertising about features can soften price competition
  - Consumers realize products differentiated.
  - Spurious product differentiation (e.g. Nutrasweet vs. generics)
- Advertising about prices can increase price competition
  - If prices known, firms can cut price to get more customers.

Online Advertising

- Advantages of online advertising
  - Highly targeted (IP, time, registration info, previous pages, GPS)
  - Low fixed cost
- Major types of ad
  - Display ads - visual appeal, branding
  - Search ads – very contextually specific
  - Text ads – specific, unobtrusive
  - Mobile ads – time and location sensitive
- Methods of payment
  - Pay per view
  - Pay per click

	Share of advertising coming from this format								
Advertising format	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Display related	**78%**	**72%**	**60%**	**42%**	**39%**	**34%**	**32%**	**34%**	**33%**
Banners	48%	36%	29%	21%	19%	20%	22%	21%	21%
Sponsorships	28%	26%	18%	10%	8%	5%	3%	3%	2%
Rich media	2%	2%	5%	8%	10%	8%	7%	8%	7%
Slotting fees	0%	8%	8%	3%	2%	1%	0%	0%	0%
Digital video	0%	0%	0%	0%	0%	0%	0%	2%	3%
Search	**1%**	**4%**	**15%**	**35%**	**40%**	**41%**	**40%**	**41%**	**45%**
Classifieds	**7%**	**16%**	**15%**	**17%**	**18%**	**17%**	**18%**	**16%**	**14%**
Lead generation	**4%**	**2%**	**1%**	**1%**	**2%**	**6%**	**8%**	**7%**	**7%**
E-mail	**3%**	**3%**	**4%**	**3%**	**1%**	**2%**	**2%**	**2%**	**2%**
Interstitials	**4%**	**3%**	**5%**	**2%**	**0%**	**0%**	**0%**	**0%**	**0%**
Other	**3%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Total (million $)	8,087	7,134	6,010	7,267	9,626	12,542	16,879	21,206	23,400

Ad Formats Definitions: Display ads on websites look like those in newspapers and magazines. A **banner** is a space (usually rectangular) on a web page that shows the advertiser's message; this category includes all display ads except for the other specialized categories listed below it. **Sponsorships** represent custom content and/or experiences created for an advertiser that may or may not include ad elements (for example, reskinning a section of a website with the advertiser's branding). **Rich media** refers to advertisements that incorporate animation, sound, and/or interactivity in any format. **Slotting fees** are the fee charged for premium ad placement and/or exclusivity. **Digital video format** includes commercials that appear in live, archived, and downloadable streaming content. **Search** refers to paying Internet companies to present an advertisement linked to a specific search word or phrase. It includes paid listings (text links appear at the top or side of search results for specific keywords); contextual search (text links appear in an article based on the context of the content rather than on the basis of a user-submitted keyword); and paid inclusion (guarantees that a marketer's URL is indexed by a search engine). Although this data source includes "contextual advertisements" in the search category, these ads are targeted display ads that are not based on the use of a search engine and are treated as part of display ads in the remainder of this paper. Contextual advertisements accounted for about 8 percent advertising revenue in 2008. "**Classifieds"** refer to the posting of a product or service in an online listing for a fee. "**Lead generation**" indicates referrals to qualified purchase inquiries. **E-mail ads** include banner ads, links, or advertiser sponsorships that appear in commercial e-mail communication. **Interstitials** are ads displayed during a transition from one Web page to the next.

Industry Structure

- Advertising on search site
  - Second price auction for adwords
  - Bids ranked, and slots allocated with highest first
  - Pay per click
  - Price depends on word ($99 for mesothelioma; typically $0.4)
- Advertising on other websites
  - Pay per view for display
  - Media site: $12 per 1000 impressions
  - Social networks historically lower: $0.5 per 1000 impressions
  - Large firms find own advertisers for display.
  - Otherwise use advertising network (e.g. Doubleclick)

Market Structure