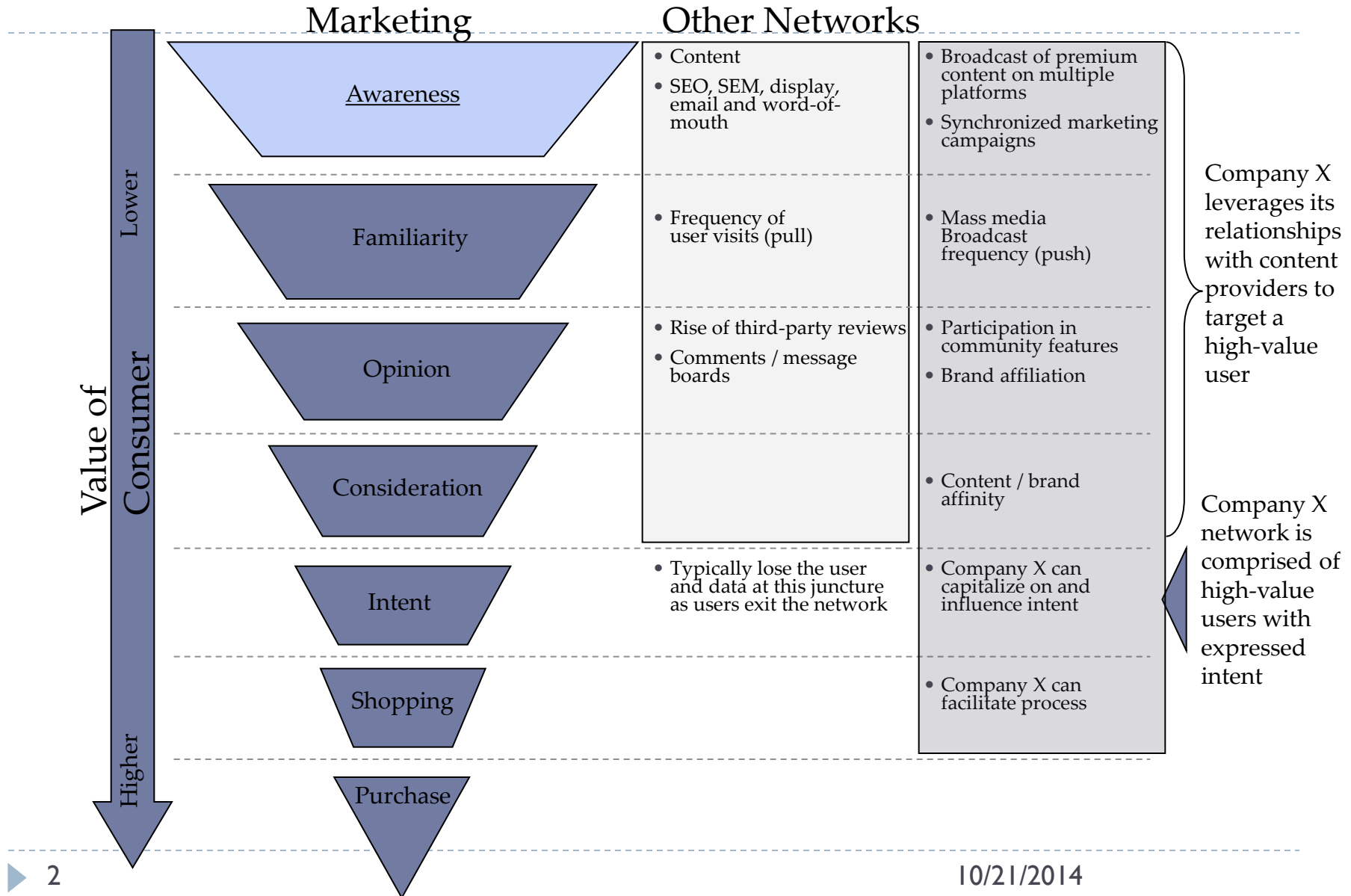


The Economics of E-commerce and Technology

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

$$\frac{p_1 - c_1}{p_1} = \frac{1}{e_{11}} - \frac{(p_2 - c_2)q_2}{p_1 q_1 e_{11}} e_{12} \quad \text{where} \quad e_{12} = -\frac{p_1}{q_2} \frac{dq_2}{dp_1}$$

- ▶ **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.
- ▶ Example: Elsevier and Universities

Third-Degree Price Discrimination

- ▶ Firm can observe customer characteristics
 - ▶ Country (e.g. book prices)
 - ▶ Student status (e.g. airline tickets)
- ▶ 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

A Modern Example

The screenshot displays the GetGoing website interface. At the top left is the 'GETGOING' logo. On the top right, there are links for 'Get a \$50 Travel Credit!', 'Support', 'Your Bookings', and a user profile for 'Simon'. Below the navigation bar are three tabs: 'Flights', 'Pick Two, Get One™', and 'Hotels'. The 'Pick Two, Get One™' tab is active, showing a search form with the following fields: 'Flying from' (Los Angeles, CA (LAX)), 'Flying to' (Europe), 'Departing' (mm/dd/yyyy), 'Returning' (mm/dd/yyyy), and 'Travelers' (1 Person). A green 'Find Flights' button is positioned below the form. To the right of the button is the text: 'The most exciting way to save up to 40% on flights'. On the right side of the page, there is a large blue banner with the text 'Smarter Travel Search Better Travel Deals' and 'Search for places or experiences, discover more affordable destinations, save up to 40% off your next trip'. At the bottom of the banner is a video player thumbnail with the text 'GET GOING Pick Two, Get One™ PARIS' and a play button icon. To the right of the video player is the text 'See how GetGoing can save you big on your next trip'.

How to Price Discriminate

- ▶ Theory beautiful but intricate.
 - ▶ See notes on website.
- ▶ How to approach problem in general
 - ▶ Suppose utility is $u=vx-p$, with $v \in \{v_L, v_H\}$
 - ▶ Consider selling bundles to each type, (x_L, T_L) and (x_H, T_H)
 - ▶ Agents must choose their own bundle (incentive compatibility)
- ▶ In optimum
 - ▶ High type will be indifferent between high- and low-bundle.
 - ▶ Low type will be indifferent between low-bundle and no bundle.
 - ▶ High quality is efficient; low quality is degraded.

Naïve Price Discrimination

- ▶ What if we just ignored other goods?
 - ▶ Example: Utility $u=vx-p$, $v\sim U[0, 1]$ and $x\in\{x_L, x_H\}$.
 - ▶ Naïve pricing: $p_L=1/2(x_L+c_L)$ and $p_H=1/2(x_H+c_H)$
- ▶ What are optimal prices?
 - ▶ Demand for each good:

$$q_H = 1 - \frac{p_H - p_L}{x_H - x_L} \quad \text{and} \quad q_L = \frac{p_H - p_L}{x_H - x_L} - \frac{p_L}{x_L}$$

- ▶ Firm's profits: $\pi=q_L(p_L-c_L)+q_H(p_H-c_H)$.
- ▶ Differentiating w.r.t. (p_L, p_H) , the naïve prices are optimal!
- ▶ Generally, need hazard rate of demand to be affine.

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

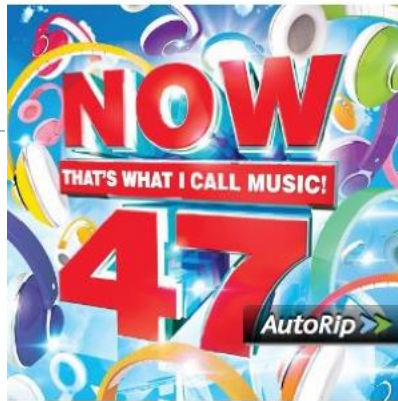
- ▶ **Bundling is very common**
 - ▶ Bundling of functions (e.g. Excel)
 - ▶ Bundling of programs (e.g. MS Office)
 - ▶ Bundling of people (e.g. MS Office site licenses)
- ▶ **Pure and Mixed Bundling**
 - ▶ Pure: only sell bundle.
 - ▶ Mixed: see bundle and components separately.

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.



Roll over image to zoom in



[Share your own customer images](#)

[Listen to samples](#)

Now 47: That's What I Call Music

[Now That's What I Call Music](#) (Artist) | Format: Audio CD

★★★★☆ (31 customer reviews)

Price: **\$11.88** & **FREE Shipping** on orders over \$25. [Details](#)

AutoRip >> : Includes **FREE** MP3 version of this album. Provided by Amazon Digital Services, Inc. [Terms and Conditions](#). Does not apply to orders.

In Stock.

Ships from and sold by **Amazon.com**. Gift-wrap available.

Want it Monday, Sept. 23? Order within **20 hrs 27 mins** and choose **One-Day Shipping** [Details](#)

Complete your purchase to save the MP3 version to Cloud Player.

35 new from \$8.58 **2 used** from \$11.16

Share [Email](#) [Facebook](#) [Twitter](#) [Pinterest](#)

Formats	Amazon Price	New from	Used from
MP3 Music, 20 Songs, 2013	\$9.49	\$9.49	—
Audio CD, 2013	\$11.88	\$8.58	\$11.16

Listen to Samples and Buy MP3s

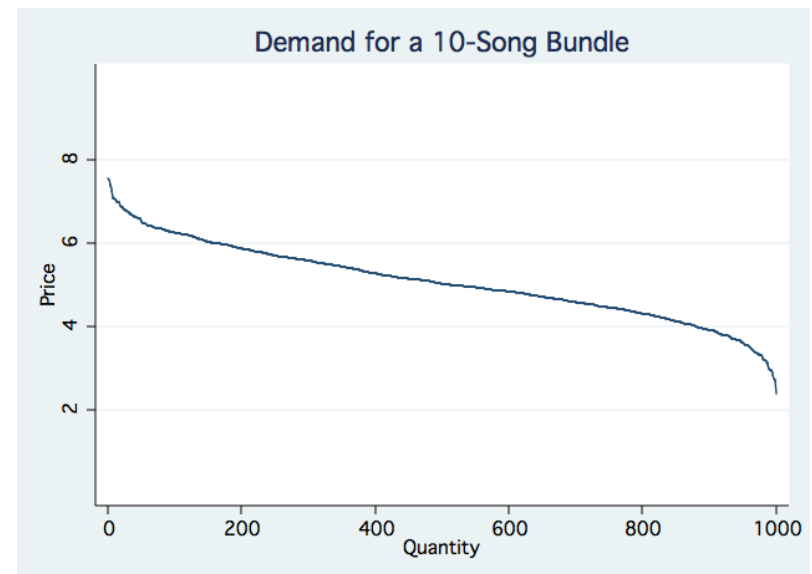
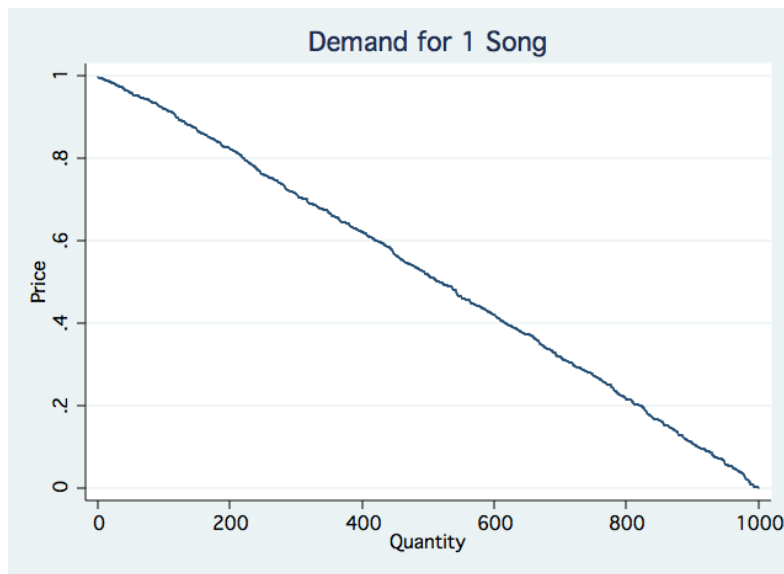
[View the MP3 Album.](#)

[Listen to all](#) Try our music sampler to hear song samples from this album.

Samples		Preview all songs
	Song Title	Artist
	1. I Love It [feat. Charli XCX]	Icona Pop
	2. Mirrors	Justin Timberlake
	3. #Beautiful [feat. Miguel]	Mariah Carey
	4. Come & Get It	Selena Gomez
	5. Radioactive	Imagine Dragons
	6. When I Was Your Man	Bruno Mars
	7. Beneath Your Beautiful [feat. Emeli Sandé]	Labrinth
	8. Clarity [feat. Foxes]	Zedd
	9. I Need Your Love [feat. Ellie Goulding]	Calvin Harris

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 customer's 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

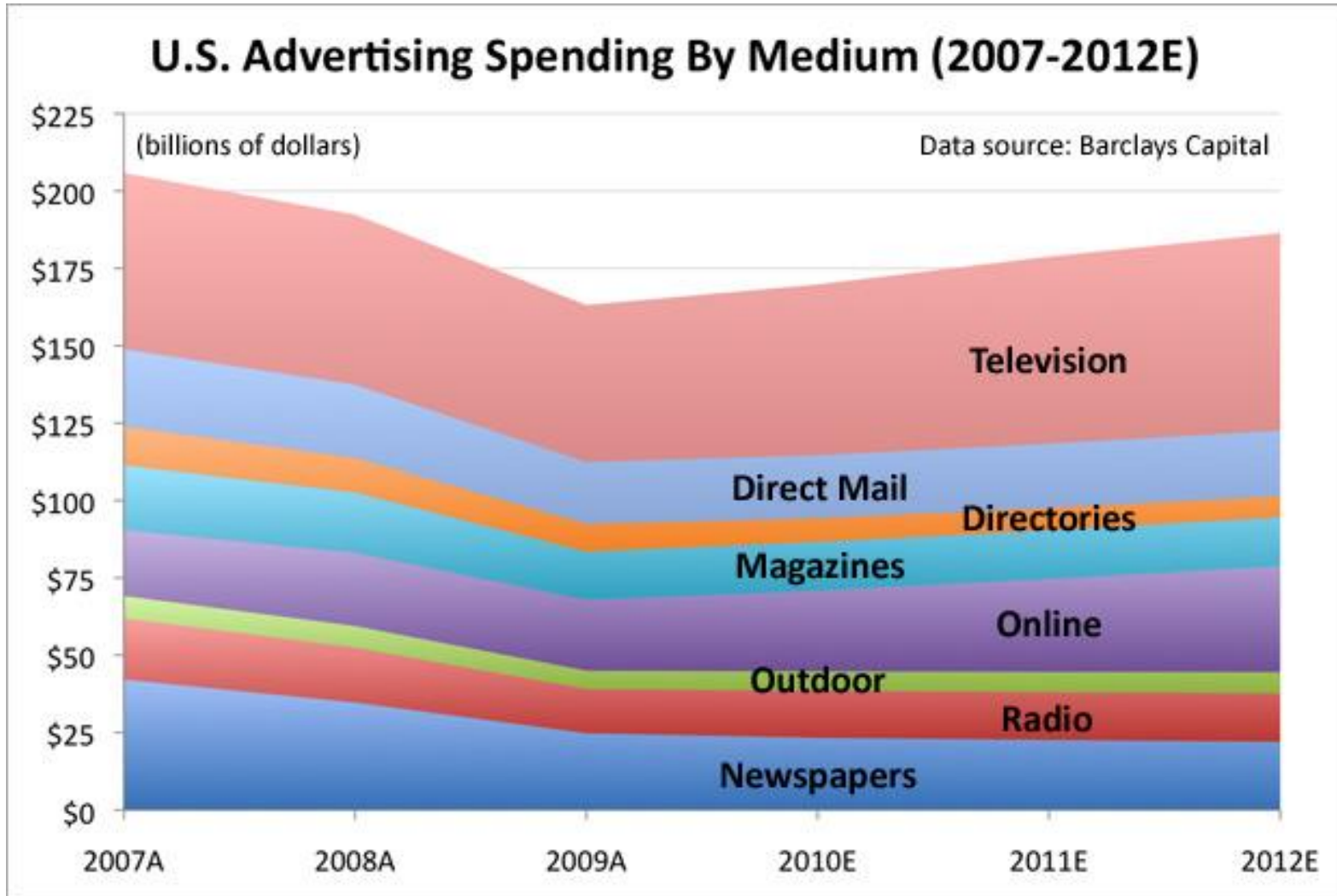
- ▶ **Customers stick with default options (endowment effect)**
 - ▶ Put object “in hands” of customer.
- ▶ **Don't overwhelm consumers (choice overload)**
 - ▶ People more likely to buy nothing.
- ▶ **Product positioning (reference effects, anchoring)**
 - ▶ Choose middle option
 - ▶ Choose second cheapest (or second most expensive) wine
 - ▶ Choices affected by dominated alternatives
- ▶ **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)**
 - ▶ Avoid customers thinking about whether to use product.
 - ▶ No transactions costs (billing, usernames, passwords)
 - ▶ Create environment of experimentation
 - ▶ Maintain privacy
- ▶ **Problems**
 - ▶ Overconsumption if $MC \neq 0$ (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.

▶ Existing Data (“Secondary Research”)

- ▶ Investor reports: annual report data, financial info, etc.
- ▶ Scan data, databases, set top boxes, subscriber lists, public company data

▶ Analytics (Behavioral data)

- ▶ Internal databases
- ▶ Digital behaviors
- ▶ Trend data
- ▶ Behavioral patterns

▶ New Data (“Primary Research”)

- ▶ Quantitative – surveys, social monitoring
- ▶ Qualitative – Focus groups, online chats, in-home interviews
- ▶ Measurement – real behaviors, not self reported



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
- ▶ **Earned media/Publicity**
 - ▶ Celebrity endorsements, press releases
- ▶ **Social media**
 - ▶ Online word of mouth

Share of advertising coming from this format

<i>Advertising format</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>
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

