### The Economics of E-commerce and Technology

Platform Markets

## Platform markets

- A platform brings together groups of users.
- Examples:
  - Real world: Credit cards, HMOs, Shopping malls
  - Technology: operating systems, video games, DVDs
  - Online:Web search, Amazon marketplace, iTunes.
- Same-side network effects
  - Negative: An Xbox developer prefers less competition.
  - Positive: An Xbox user prefers more users.
- Cross-side network effects
  - An Xbox user prefers more developers.

## Platform markets

#### Platforms differ from traditional retailers

- > Pays for goods up-front, eliminating coordination problem.
- Assume platform has all bargaining power (but Intel, EA)

#### Three-sided network

- YouTube: consumers, advertisers, content providers.
- Platforms may be
  - competitive (DVD standard)
  - proprietary (XBox)
  - open (WiFi standard)
- Platforms may be compatible (Dell, Compaq) or incompatible (Windows, Mac).

# Monopoly Pricing

## Pricing

- There are 2 groups of agents, k=1,2
- Let  $n_k$  be population size,  $n_k^e$  be expected population size
  - Demand curve for group k is  $p_k(n_k; n_1^e, n_2^e)$ .
  - Fulfilled expectations demand is  $p_k(n_k; n_1, n_2)$ , where  $n_k = n_k^e$ .
  - Cost c(n<sub>1</sub>,n<sub>2</sub>)
- Firm chooses  $(n_1, n_2)$  to maximize profits,

 $\pi = n_1 p_1(n_1; n_1, n_2) + n_2 p_2(n_2; n_1, n_2) - c(n_1, n_2)$ 

- Ignoring problem of multiple equilibria
- First order condition for n<sub>1</sub>:

$$p_1(n_1;n_1,n_2) + n_1 \frac{\partial p_1(n_1;n_1,n_2)}{\partial n_1} + n_1 \frac{\partial p_1(n_1;n_1,n_2)}{\partial n_1^e} + n_2 \frac{\partial p_2(n_2;n_1,n_2)}{\partial n_1^e} = \frac{\partial c(n_1,n_2)}{\partial n_1}$$

# Pricing

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- Marginal benefit consists of four terms:
- First and second same as standard MR curve
  - Marginal and inframarginal effects of increasing quantity.
- Third same side network effects
  - ▶ How increasing n<sub>1</sub> raises value of marginal type-1 agent.
- Fourth cross side network effects
  - ▶ How increasing n<sub>1</sub> raises value of marginal type-2 agent.

# Pricing: Lessons

#### Subsidize those who create value for others

- > Search engines subsidize users with free search and email.
- Typically platform have "money side" and "subsidy side".
  - Example: Adobe gives pdf readers away free.
- Same side vs. cross side network effects
  - Ladies night on Thursday but not Friday.
- Other considerations
  - Attract marquee users (Macy's pays lowest rents in mall)
  - Adverse selection (Westside rentals, TheLadders, eHarmony)
  - Long run effect of prices (Mac vs.Windows)
  - Mobilization (Charge zero to select equilibrium).

## Details of fee structure

#### The details of the fee structure varies across websites:

- Subscription fees (Westside rentals)
- Fee per posting (Craigslist)
- Fee per click (Price shopper)
- Sales commission (eBay)
- Which one depends on fine details. For example:
  - What can platform observe?
  - How much heterogeneity is there?
  - Can system be gamed? Is there adverse selection?
- Example: Overture and the simplicity of pay-per-click
  - First position = 100 clicks, second = 25. Value click at \$1.
  - Pay-per-view:WTP is \$100 if think first, \$25 is think second.
  - Pay-per-click:WTP is \$1. Simplifies strategic interaction.

# Competing

# Competing

### Will there be unique winner?

- Multi-homing cost
- Strength of network effects
- Desire for variety of platform

### Could you win a battle?

- First-mover advantage
- High expectations
- Technology or cost advantage

### Should you share?

- Network size bigger
- Compete within market rather than for market.

# Threat of envelopment

- Biggest threat may come from business vanishing
  - Rival offers new functionality (e.g. gmail vs hotmail)
  - Convergence of technology (e.g. iPhone vs iPod)
- Change business model
  - Real lost server business to Windows
  - Formed Rhapsody, charging customers for songs
- Form partnerships with other firms
  - Become part of bigger bundle of services
- Sue
  - Real sued Windows for \$760m

# Mobilizing a Platform Market

## Barriers to Mobilization

- Standing risk (e.g. Zune)
  - Users may not make platform specific investments
- Holdup risk (e.g. Intel)
  - Concern platform increases prices after specific investments
- Integration risk (e.g. Nintendo)
  - Suppliers worries platform will start producing complements.
- Favoritism risk (e.g. Covisint)
  - Users worry platform will skew competition
- Relationship risk (e.g. Autobytel)
  - Suppliers don't want to lose control of customer relationship
- Competitive risk (e.g. B2B exchanges)
  - Suppliers don't want more intense competition

## Penguin Problem

#### Same strategies as with one-sided networks

- Product announcements
- Introductory discounts
- Start with small networks
- Obtain marquee users (exclusively?)
- Permanently subsidize one side
  - > The subsidy side then turns up with high probability.
  - Examples: Westside Rentals; Monster.
  - Subsidy needs to overcome homing cost.

Start as vendor or merchant and transition into platform

## Transition: Vendor to Platform

- Firm starts as traditional vendor
  - Makes and sells some product
  - Shanda (online games), CNET (reviews)
- "More of the same" strategy (e.g. Schwab, mutual funds)
  - Vendor supplements own product with 3<sup>rd</sup> parties
- "Something different" strategy (e.g. Google, AdSense)
  - Add new functionality for second side of market
- Which side to start with?
  - Start with side with weaker need for other side
  - LinkedIn found employees before employers.
  - YouTube (customers) vs. Brightcove (website support)

## Transition: Merchant to Platform

#### Firm starts as merchant

- Devolves control of inventory, pricing and merchandising
- Amazon (marketplace), iTunes
- Merchants have advantages over platform
  - Overcome penguin problem
  - Scale means that have lower costs
  - Combine complements to increase values
  - Sustain reputation for quality
- But platform offers greater variety