

The Information Economy

The Nature of Information Goods

Information Goods

- ▶ **Take broad view of an information good**
 - ▶ Anything that can be digitized (or has a digital component)
 - ▶ Books, databases, movies, stock quotes etc.

- ▶ **What is special?**
 - ▶ Reproducibility
 - ▶ Degree of variety
 - ▶ Customizability
 - ▶ Search and attention

Reproducibility

- ▶ **Information goods are...**
 - ▶ Costly to produce but cheap to reproduce.
 - ▶ That is, high fixed costs but low (zero) marginal costs.
 - ▶ No capacity limits
- ▶ **Examples**
 - ▶ Cable companies – cost to lay lines.
 - ▶ Microsoft office – cost to design program
 - ▶ Amazon – cost to build warehouses and buy inventories
- ▶ **Platforms/networks not unique to the online economy**
 - ▶ Shopping malls are platforms
 - ▶ Postal system is a network
 - ▶ What is new is the scale: one mall for the entire world.

Example: CD Phone Books

- ▶ **CD Phone Books are digitized versions of Yellow Pages**
 - ▶ Nynex covered NYC in 1986. Charged \$10,000 per disk.
 - ▶ Pro CD covered entire USA. Charged \$hundreds in early '90s
- ▶ **Lots of entry ensued**
 - ▶ Over 20 companies by end of 1990s.
 - ▶ Cost of disk is \$20.
- ▶ **Product is commodity and no capacity constraints**
 - ▶ If firm A charges \$200.
 - ▶ Then B should charge \$190 and steal all market.
 - ▶ Then A should charge \$180 etc.
 - ▶ Prices go down to marginal costs.

Two Business Models

- ▶ There are two ways firms can make money when selling information goods
- ▶ Differentiate the product
 - ▶ Sell something different from other firms
 - ▶ Firm has some market power and can recover fixed costs
- ▶ Be a dominant firm
 - ▶ Be the only firm in the industry
 - ▶ Have the lowest costs.
 - ▶ Have the first-mover advantage.

Differentiation

Dimensions of Differentiation

- ▶ Delay (e.g. cinema vs. DVDs, Netflix vs. Blockbuster)
- ▶ User interface (e.g. Google vs. Yahoo)
- ▶ Customizability (e.g. Facebook's privacy settings)
- ▶ Resolution (e.g. different qualities of MP3s)
- ▶ Speed of operation (e.g. printers)
- ▶ Flexibility of use (e.g. protected MP3s)
- ▶ Features (e.g. Charles Schwab)
- ▶ Comprehensiveness (e.g. Mathematica)
- ▶ Annoyance (e.g. PBS)
- ▶ Support (e.g. McAfee)
- ▶ Online vs. Offline (e.g. newspapers)

Longtail

- ▶ **There is huge variety of many products**
 - ▶ Books, Songs, Movies, iPhone Apps, Games etc.
 - ▶ Both horizontally and vertically differentiated
- ▶ **Distribution of demand follows power law**
 - ▶ Frequency approximately inversely proportional to rank.
 - ▶ Seen with words in English: $Pr(r)=0.1/r$, where r is rank.
 - ▶ Distribution has fat tail, where there is lots of mass.
- ▶ **Niche products matter**
 - ▶ Typical bookstore has 130,000 titles.
 - ▶ One third of Amazon's sales come from outside top 130,000.
- ▶ **Sorting information**
 - ▶ With more information, need better organization and filtering.

Squeezing the Middle

▶ **Movie industry**

- ▶ Number of American movies growing (610 in 2009; 471 in '99)
- ▶ Blockbusters growing bigger (32 movies over \$100m; 21 in '99)

▶ **Music sales**

- ▶ Album sales declined 20% since 2004.
- ▶ Hits hold up best; Albums ranked 300-400 hold up worst.

▶ **Fragmentation**

- ▶ Due to long tail and falling costs of production and distribution.

▶ **Consolidation**

- ▶ People want to share same culture (e.g. Terminator).
- ▶ New technology helps distribution and communication.
- ▶ Increased role of brands (e.g. NY Times)

Dominant Firm

First-Mover Advantage

- ▶ First firm may deter future entry. Strategies:
- ▶ Build capacity to respond to a threat
 - ▶ Build base of loyal (locked in) customers.
 - ▶ Build network.
 - ▶ Have more capacity than you need.
- ▶ Limit-entry pricing
 - ▶ Price low in order to prevent entry.
 - ▶ Signals you are “tough” and builds customer base.
 - ▶ Example: Airlines before Southwest enters.
- ▶ After entry, play tough.
 - ▶ This may scare off first entrant.
 - ▶ Give you a reputation and prevent future entry.
 - ▶ Example: Walmart and Unions.

Cost Leadership

- ▶ **Average costs made up of**
 - ▶ Marginal costs (may be already low with information good)
 - ▶ Per-period fixed cost (e.g. cost of upgrading software)
- ▶ **How to reduce average costs**
 - ▶ Build volume to amortize fixed costs.
 - ▶ Build volume to benefit from learning-by-doing.
 - ▶ Supply chain management: reduce distribution costs.

Other Aspects of Information Goods

Product Customization

- ▶ **Online firms have lots of information on customers.**
 - ▶ Demographics: IP address, registration
 - ▶ Observation: cookies monitor clickstream (pages visited and for how long), past purchases, partnerships with other sites.
- ▶ **Use this information to customize experience**
 - ▶ Search results.
 - ▶ Product recommendations.
 - ▶ Targeted advertising.
 - ▶ Facebook friend finder.

Content Creation

- ▶ **Users also design own experience**
 - ▶ WordPress – people to create blogs.
 - ▶ Craigslist – online classified.
 - ▶ Google Wave – real time team projects.
- ▶ **Crowdsourcing**
 - ▶ Wikipedia allows users to create own encyclopedia.
 - ▶ Ushahidi provides crisis information.
 - ▶ Open source software design.
- ▶ **Business model**
 - ▶ Provide toolkit for people to build product.
 - ▶ Provide structure for interaction between people.

Reproducibility and Property Rights

- ▶ Information is a public good (i.e. it is nonrivalrous)
 - ▶ With traditional goods there is physical cost of reproduction.
- ▶ Excluding people from information
 - ▶ Reduces consumption and welfare
 - ▶ Gives rents to seller, encouraging innovation
 - ▶ May lower subsequent innovation
- ▶ How to exclude
 - ▶ Intellectual property: patents, copyright, trademarks.
 - ▶ Trades secrets.
- ▶ Hard to enforce with online economy
 - ▶ Perfectly reproduce and instantly transmit around the world.
 - ▶ Information regarding how to break protection also free.
- ▶ Are some firms too worried? Cassette player.Video recorder.

Experimentation and Adaptation

▶ Traditional industries

- ▶ Changing product is rare occurrence (e.g. car models).
- ▶ Hard to gauge reaction (surveys, focus groups).

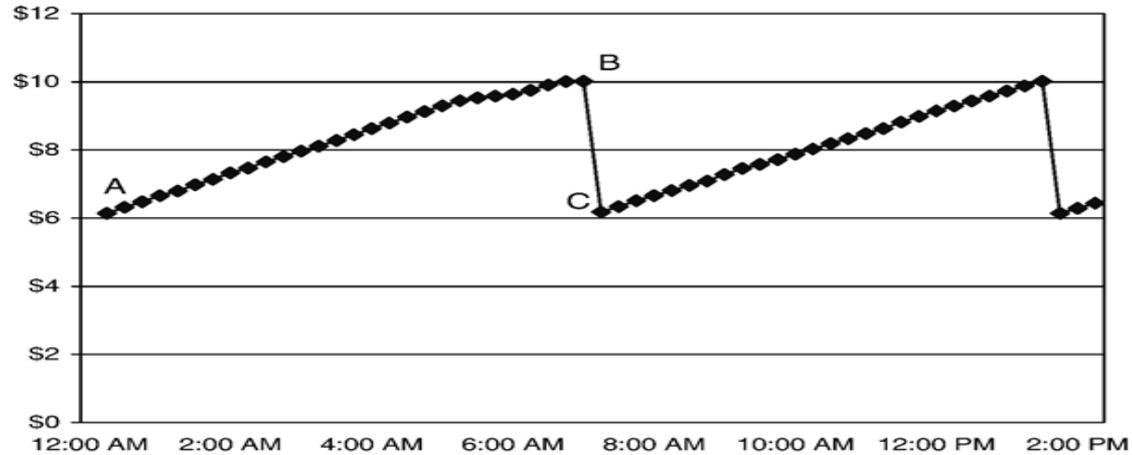
▶ Experimentation online

- ▶ Easy to run controlled experiments.
- ▶ Refine pricing, matching algorithms, recommendations etc.

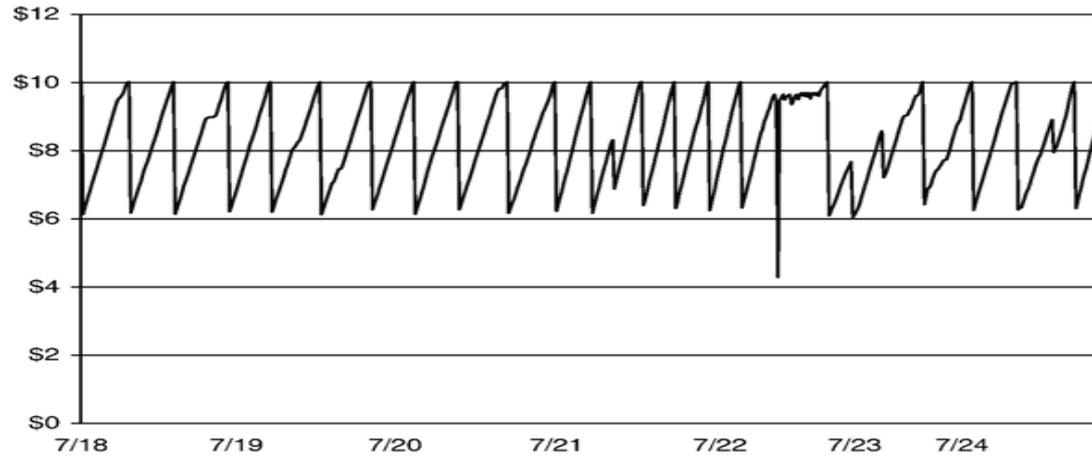
▶ Adaptation

- ▶ When the state of the world changes, firm can react quickly.
- ▶ Also react to competitors (e.g. first-price ad auctions).

Bidding on AdWords via First-Price Auction



(a) 14 hours



(b) 1 week



Platforms and Market Design

- ▶ **Platforms control many aspects of exchange**
 - ▶ Online firms have lots of information about customers.
 - ▶ They can also control what participants know about the product, the market and each others.
- ▶ **Examples**
 - ▶ Letting participant monitor each other (e.g. Yelp).
 - ▶ Reputation mechanisms (e.g. eBay).
 - ▶ Anonomizing interactions (e.g. Hotwire).
 - ▶ Market rules (e.g. Google ad auctions).
 - ▶ Structuring search (e.g. Facebook).
 - ▶ How people see prices (e.g. Bing travel).

Product trials

- ▶ **Experience good:** The quality is known after consumption.
 - ▶ What is today's NY Times worth?
 - ▶ How good is this iPhone app?
 - ▶ All information is experience good!
- ▶ **Strategies**
 - ▶ Reveal parts of information (e.g. free song, Amazon's "look inside")
 - ▶ Given temporary access to information (e.g. put on Hulu)
 - ▶ Promotional pricing (e.g. low prices for new subscribers)
 - ▶ Building a brand/reputation (e.g. NY Times)
 - ▶ Testimonials (e.g. Trip Advisor).
 - ▶ Free, trial version (e.g. Salon.com)

Attention and Search

- ▶ **The internet promises to lower search costs**
 - ▶ Easy to visit many stores.
 - ▶ Price comparison websites.
- ▶ **Danger or information overload**
 - ▶ Increase in number and types of sites.
 - ▶ Increase in products at a given site.
- ▶ **Important to “organize the world’s information”**
 - ▶ Locating, filtering and communicating what is useful.
- ▶ **Examples**
 - ▶ Yahoo vs. Google news.
 - ▶ Advertising - banner ads vs. search ads.
 - ▶ Value of website addresses (most expensive: insure for \$16m)