The Economics of E-commerce and Technology

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)
- Unique features (e.g. Charles Schwab)
- Comprehensiveness (e.g. Mathematica)
- Annoyance (e.g. Network TV vs PBS)
- Support (e.g. McAfee)
- Online vs. Offline (e.g. newspapers)
- Fashion image (e.g. Apple)
- Reliability (e.g. Toyota)
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.
Power laws...
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 that 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 or Benefit 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.

- How to raise benefits
  - Invest in superior technology
  - Improved customer service
  - High brand equity
Other Aspects of Information Goods
1. 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.

- Data is the oil of the 21\textsuperscript{st} century.
Google Analytics

Site Usage
- 6,212 Visits (Previous: 5,112)
- 9,822 Pageviews (Previous: 7,934)
- 1.58 Pages/Visit (Previous: 1.55)

Bounce Rate
- 64.42% (Previous: 66.12%)

Average Time on Site
- 00:03:04 (Previous: 00:02:12)

% New Visits
- 68.67% (Previous: 74.04%)

Visitors Overview
- 4,707 Visitors (Previous: 2,708)

Map Overlay

[Map image of global visitors]
2. 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.
How we used to do this…The OED

- **Started 1857**
  - ‘A’ published in 1888
  - ‘Z’ published in 1928
  - 22,000 pages

- **Big data**
  - Hundreds of volunteers
  - 3.5m quotation slips
  - Scriptorium had 1,029 pigeon holes
3. 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.
4. 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).
Experimentation...
Figure 2: Brand Keyword Click Substitution

(a) MSN Test
(b) Google Test
Adaptation in AdWords Auctions

(a) 14 hours

(b) 1 week
Adaptation (gone wrong)


Available from these sellers.

1 new from $65,364,818,636.00
5. 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).
6. 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)
  - Influential reviewers (e.g. movies)
  - Free, trial version (e.g. Salon.com)
7. Attention and Search

- The internet promises to lower search costs
  - Easy to visit many stores.
  - Price comparison websites.
- Danger of 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 if useful.
- Examples
  - Yahoo vs. Google news.
  - Advertising - banner ads vs. search ads.
  - Value of website addresses (most expensive: insure for $16m)