

Electronic Commerce

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Economics

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Abstract

Today we discuss the nature of the technology of e-commerce, and how the technology affects the environment of firms, markets, and industries.

e-Commerce Technology and Homework

- So far nearly a dozen students have had homework returned with a request to correct and resubmit.
- Interestingly, at least one student had mail bounce.
- The others failed to write the “Subject” correctly, and did not get filtered into the “homework mailbox”.
- What do we learn about e-Commerce from this experience?

e-Commerce Technology and Homework: Discussion

- So far nearly a dozen students have had homework returned with a request to correct and resubmit.
- Interestingly, at least one student had mail bounce.
- The others failed to write the “Subject” correctly, and did not get filtered into the “homework mailbox”.
- What do we learn about e-Commerce from this experience?
 - “Customers” get frustrated
 - Are they more or less *angry* to be rejected by a computer than by a human?
 - The software could be more flexible, but how flexible?

- Getting the software right is constrained by the tools available (Google filter) and skill of engineers

The technology of e-commerce

Much e-commerce is implemented using

- the *World Wide Web* (usually WWW, but sometime W3 – W-cubed, especially in “World Wide Web Consortium” or W3C) – a collection of methods for transferring files of data
- other general-purpose *Internet* technologies, such as *electronic mail* (e-mail), based on file transfer
- special-purpose *Internet* technologies such as *streaming audio and video*, and *WebDAV*

The World Wide Web

Following a *link* in the *World Wide Web* (usually WWW, but sometime W3 – W-cubed, especially in “World Wide Web Consortium” or W3C) appears to be a single simple “get this information” action to the user, but may hide a lot of complexity.

- Following a link may involve several requests by the browser, because resources may move, and the server will issue a *redirect*.
- Following a link may involve *content negotiation* between the server and the client (*e.g.*, to determine the language to be used).
- The document retrieved typically is incomplete, requiring further requests for resources such as *style sheets* and images in order to render the display.
- All of this is mediated by the *Internet*

The cost of the WWW

- The critical component of the WWW is the Internet
 - Pervasize, diffused through at least the middle class
 - For most e-commerce, cost of the Internet appears nearly fixed and moderate
 - * Bandwidth required is constant or proportional to number of customers, not to quantity of goods delivered
 - Exception is where delivery is via Internet
- Internal to the firm are web servers ...
 - Approximately constant returns to scale
- ... and software
 - Cost is proportional to quality of service and relatively large

The Internet

- Backbone providers
 - Analogous to long distance telephone companies
 - Quantity of traffic is generally larger than a single link can handle
 - Typically provided as part of generic telecommunication service
- Internet service providers
 - Analogous to local telephone companies
 - Can be provided by telephone company, cable company, even electric or gas company
 - Typically bundled with other telecommunication services

Book errata

The book makes several false or confusing claims about the WWW.

- The function of searching for a host on the network is a fundamental feature of the Internet itself (not the web)
 - Physical routes are found using the *Internet protocol* (IP), based on numerical *IP addresses* like `128.114.124.1`. The computers that automatically search for routes are called *routers* (d'oh). (Routers have nothing to do with converting from optical signals to electronic signals, although such interfaces are normally installed in routers because routers live at the boundaries between networks.)
 - Mnemonic names (like `people.ucsc.edu`) are translated to IP addresses via the *domain name service* (DNS)

- However, accessing a resource typically requires a file name or some such on the host, and possibly other parameters. The WWW defined *uniform resource locators* (URLs, later redefined as *uniform resource identifiers*, URIs) which allow specifying those parameters in a common format.
 - Important because it allows “pointing at” a resource automatically, rather than having the user log in and request the resource – a typical feature of e-commerce, letting computers do the boring stuff
 - Critical innovation for the WWW

Cost of the Internet: Local loop

- Very similar to traditional regulated telecommunications utility
- Local network very expensive
 - wires/fibers/cell towers to each subscriber
 - capacity high compared to subscriber usage
 - interconnect is necessary and expensive
 - natural monopoly?
 - but multiple adaptable *existing* networks (telephone, cable, cellphone, power lines, even gas pipes!)

Cost of the Internet: Backbone

- Again, very similar to traditional, now deregulated, telecommunications utility
- Trunk lines, or “long-distance” service
- choose routes to minimize cost for capacity carried
- follow existing socio-economic networks (transport, telecommunications) with required capacity a multiple of single-link capacity
- almost constant returns

New Types of Firms and Industries

For fee services:

- Internet service provider (Earthlink)
- Portal (AOL)
- Web hosting
- Co-location hosts (rent space for your own computer)
- “Scaling” (Akamai)
- Web site design
- Technology substitution (*e.g.* IP telephone)
- Spamming (collecting addresses, sending email or posting to wikis and blogs)

Content on demand

- Traditional broadcast/cable technology provides all viewables simultaneously (if you have cable, you can watch as many programs as you have TVs, right?)
- But must watch on provider's schedule; on demand must solve
 - Switching problem for provider
 - Ordering problem for user
- Implementations
 - Internet radio, etc: “broadcast” over the Internet
 - Podcasts
 - e-books

Advertising-supported communications

- Traditionally advertising is associated with broadcast media
 - Advertisers don't know who might buy, so target everyone
 - Broadcast media reach many users for one price ...
 - ... and typically provide high bandwidth services, there is a “place” to put advertisements (pages and margins in the newspaper, “TV timeouts” in TV and radio)
- Person-to-person media (letters, telephone) would require a deal with each person, and can't “display” ads anyway
- But if person-to-person is mediated by a personal computer, and the communication is provided by a large service provider, there are margins in which to place ads.
- Examples: “free” email, Skype, Facebook

Advertising-supported no-charge services

- Similar rationale to advertising-supported communication
- Traditional news/magazine content (including blogs) on media websites
- Reference services: Wikipedia, web dictionaries
- Service hosting (blogs, wikis, mailing lists, web forum)

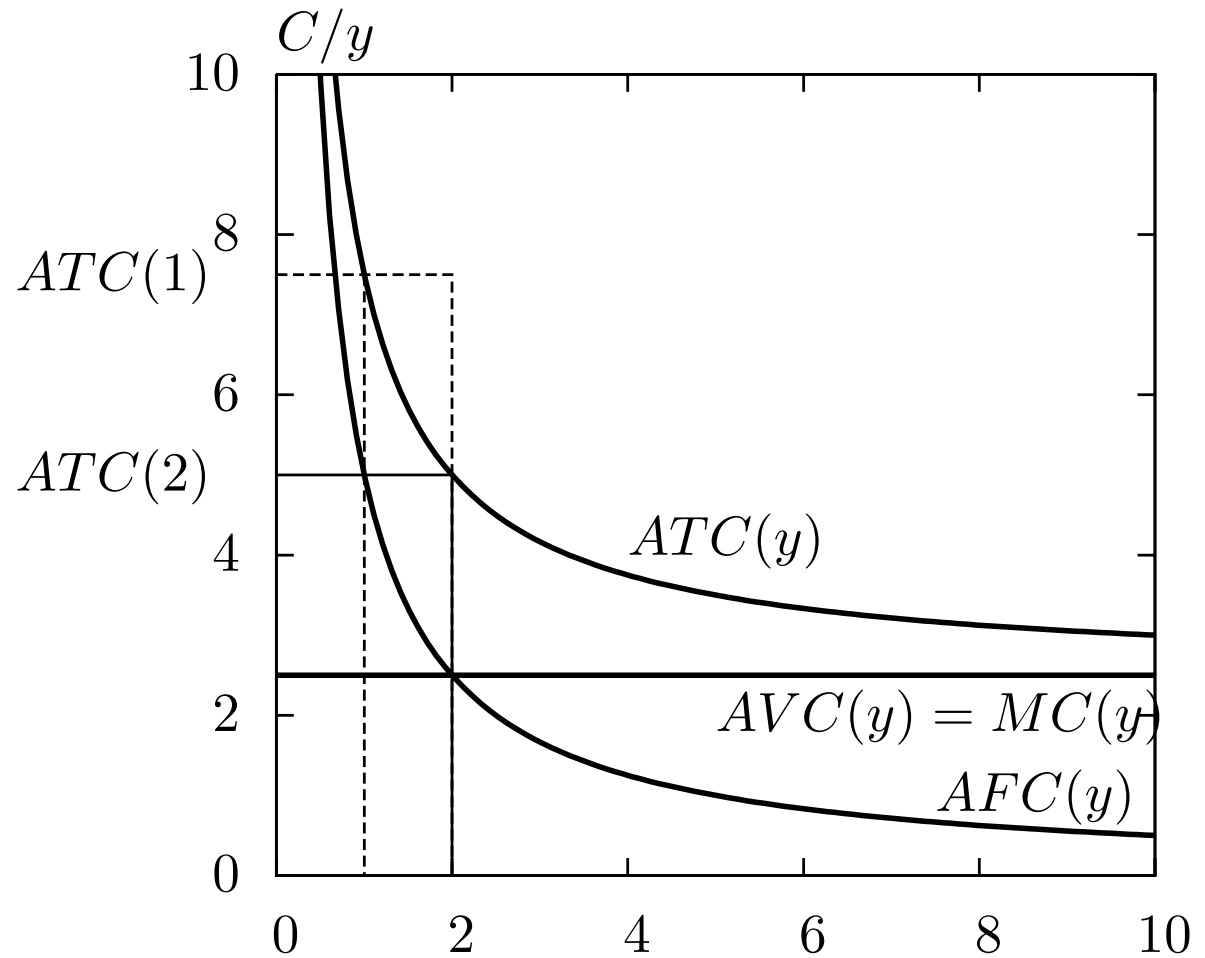
Changing Nature of Firms and Markets

Internet and web technology also changes the way existing firms do business. Not all of the following count as e-commerce according to Deak's definition.

- Use of the new advertising and marketing channels
- Use of corporate web sites to provide resources to existing and potential customers (manuals, troubleshooting, contact directories)
- High-content channels make decentralization possible (*supply chain management* and “virtual firms”)
- Present traditional activities to a much broader audience, *e.g.* auctions (eBay) and day trading

Natural Monopoly

With decreasing average cost, the total cost of producing $y = 2$ spread over two firms each producing $y = 1$ is much higher than if a single firm does so.



Rivalry in consumption

“*Microeconomics* is the social science that studies the interaction of decisions about allocating scarce resources to competing ends.”

- If goals do not compete, there's no need for economizing!
- Competition for a physical object: only one person can type on a keyboard at a time
 - Time-sharing
- Competition for bandwidth
- Competition for attention
 - “Investment of attention”, *i.e.* R&D

Rivalry in electronic communications

- Wired media have a bandwidth constraint, but can be shared flexibly
 - Exception is the local loop
- Broadcast media have very “chunky” constraint (small number of TV channels)
- Switching stations become congested
- Peak-load issues
- Asymmetric media

Market structure and rivalry in Internet provision

- Overbuilding of backbone bandwidth capacity in Internet bubble
- Local loop broadband availability lagged
 - Japanese industry heavily subsidized broadband (including fiber-optic cable to residences – FTTH), but slow diffusion
 - Maybe lack of content more important?
- Results
 - Very competitive market for backbone bandwidth
 - Local loops monopoly or oligopoly as regulated utility

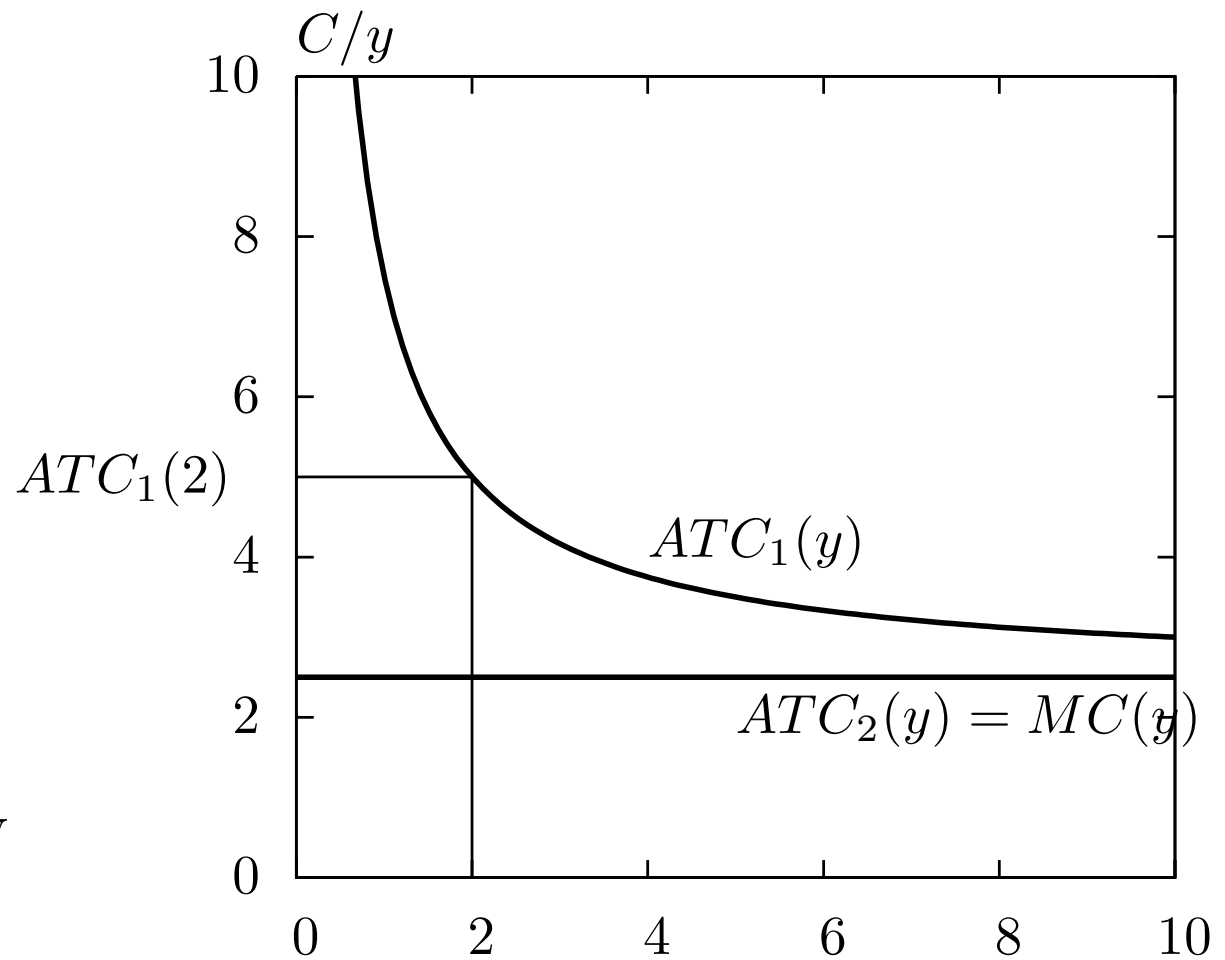
Service provision via the Internet

- Service provision is more what Deak calls e-commerce
- Services that are *enabled* by the Internet (*e.g.*, shipment tracking for postal service) tend to be low-bandwidth
 - Quality of implementation (especially security of financial services) is more important
 - Large investment in software (social fixed cost)
- Content provision (multimedia streaming, podcast) uses more bandwidth; not a problem in the current bandwidth glut, but in the future?
 - Quality of content is more important (but consider porn, juvenile content)
 - Large investment in content production (social fixed cost)

Rivalry in consumption of intellectual assets

- Software (intermediate good) and content (consumption good) are *intellectual assets* (also called *intangible assets*)
- Digital technology means any single copy can be turned into an arbitrary quantity of perfect copies at constant marginal cost
 - *Media* (disks, Internet connection, players) are rival
 - *Intellectual assets* are non-rival
 - Copying technology is available to consumers
- Not a classical natural monopoly!

Second mover advantage



There is no need
for copycats to pay
fixed cost!

Homework #2

Due Tuesday, April 22 at 3:30 pm.

Send an email to me at `sturnbul@ucsc.edu`. The subject *must* include the phrase “Econ 139A HW #2”, or it will not be counted.

The answer to each question is worth **10 homework points** (scoring will be described later; check the course home page). The *most unique, verifiable* answer to each question will be awarded **10 bonus homework points**.

1. Find an article in a “high-quality” news source (*The Economist*, *The New York Times*, etc.) dealing with e-commerce in the sense of “doing business on the Internet.” Provide the publication data or URL in your report.
2. Explain briefly how this article relates to e-commerce.

3. Does the e-commerce aspect use the WWW mostly, the Internet mostly, or a mixture of both?
4. Is this a B2B or a B2C kind of e-commerce?
5. If you were offered the chance to invest in this business, would you? Why or why not? (Base your answer on the e-commerce aspect, not any fundamentals of the industry.)