ANTITRUST ECONOMICS 2013

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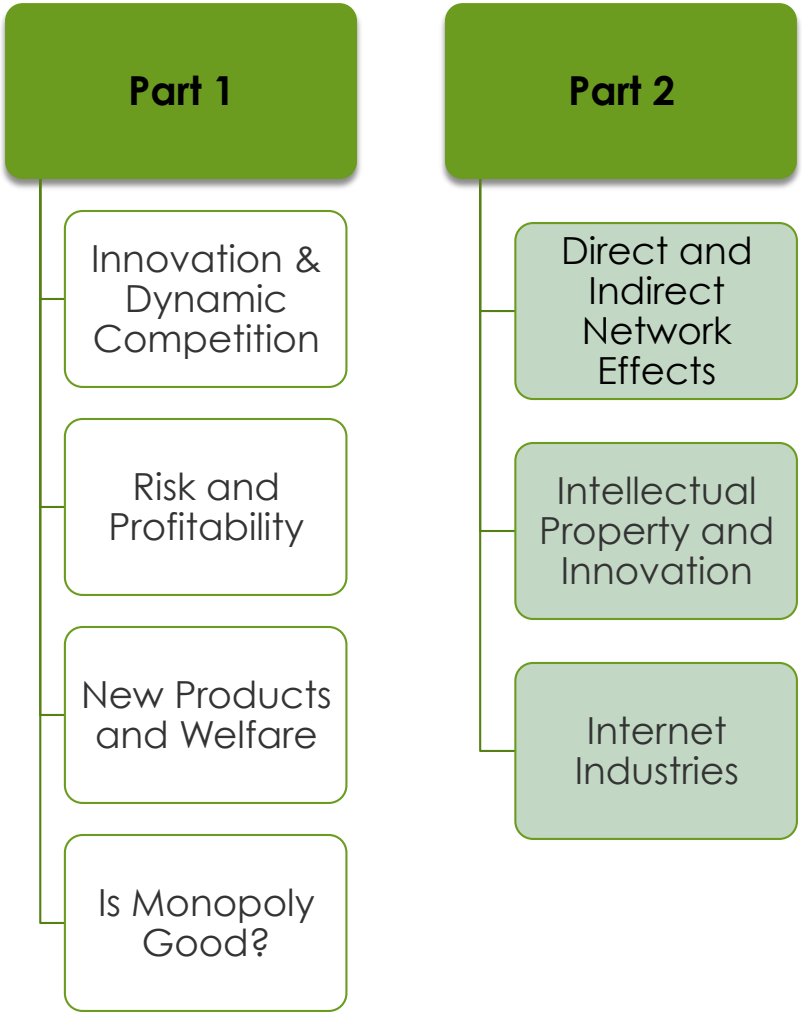
TOPIC 4: INNOVATION AND DYNAMIC COMPETITION

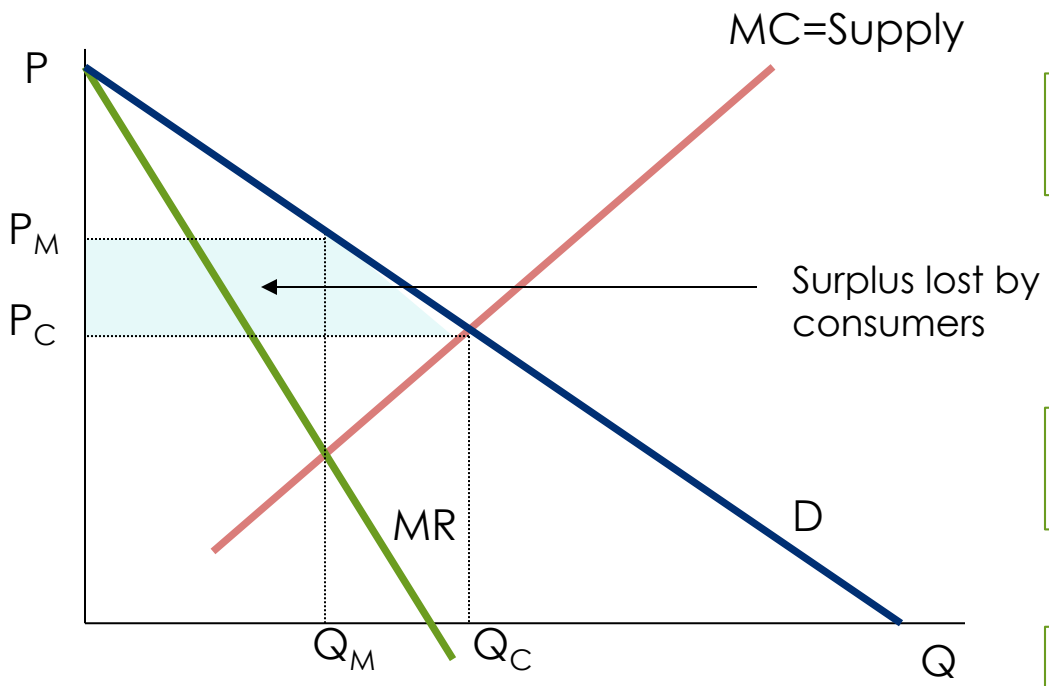
Overview


Part 1
Innovation & Dynamic Competition
Risk and Profitability
New Products and Welfare
Is Monopoly Good?
Part 2
Direct and Indirect Network Effects
Intellectual Property and Innovation
Internet Industries

Competition versus Monopoly

Review

Pricing in Competitive and Monopoly Markets



In Perfect Competition, Price is set equal to Marginal Cost, P=MC

Equilibrium Price and Quantities are P_C and Q_C

In Perfect Monopoly, a firm produces until its Marginal Revenue equals its Marginal Cost, MR=MC

This determines equilibrium Price and Quantity, P_M and Q_M

Price is maximum willingness to pay for those quantities (demand)

The surplus lost by the consumers is given by the light blue area

Profit-Maximizing Firms and Monopoly

Note that MR=MC is the condition for ***any*** firm to maximize profits.

Most firms in the economy operate where P>MC in part because they need to recover fixed costs; also true with product differentiation; and often on one side of a multi-sided platform

The framework in the previous slide is used to highlight the difference between perfect monopoly and perfect competition.

But in antitrust we use the notion of whether firms have "significant market power"—e.g. are in a dominant position—and recognize that most firms have some market power in the sense of P>MC.

Direct and Indirect Network Effects

Traditional network effects

- An industry is described as a "network industry" if the value of the network to any one consumer depends significantly on the number of other participants on the network.
- The network could be a firm, a collection of firms, a technology that links participants, or a standard that all players adhere to.
- Traditional examples include telecommunications—which are networks of networks, like social network platforms—transportation systems, such as railroads; information technology, such as fax machine networks; software platforms, and standards like QWERTY.
- We will see when we discuss multi-sided platforms that a much larger group of businesses have network effects and these include shopping malls, media, and many other businesses

Direct and Indirect Network Effects

Direct Network Effect: The value to a user increases if there are more users.

- A user of a word processing package such as Google Docs values the package more if there are more users because there are more people with whom she can exchange compatible documents.

Indirect Network Effect: The value to a participant increases if there are more complementary participants.

- A users of the Android operating system value it more if there are more applications for it, and the developers of applications value the operating system more if there are more users.

Economics of network effects

Network effects lead to "demand-side scale economies"

- Larger networks are more valuable. The individual's demand schedule shifts to the right as more participants join

The "largest network" is the "best network", all else equal, leading in principle to natural monopoly

- Like economies of scale in cost, biggest is best

There are potentially "first-mover" advantages so whoever gets users first is more valuable and develops a lead.

- This view led many to believe during the Internet bubble that it was optimal to price low (zero) to become biggest, fastest

There is therefore "competition for the market" with network effects.

- Whoever wins has a monopoly so investment goes into winning the race

Network effects and standards

Network effects can arise from producers and consumers coalescing around a "standard"

- Particular gauge of rail
- Fax transmission standards
- DVD standards (the VHS vs. Beta race)

No firm "owns" the network but there are nevertheless demand-side scale economies from network effects

- Programming languages like Java are another example, or operating systems like Unix

Competition issues arise from firms using patent rights in ways that are arguably anticompetitive, e.g. allegations against:

- Rambus
- Qualcomm
- Apple

Network effects and barriers to entry

Under some circumstances network effects could present serious barriers to entry

- With direct network effects no rival can "catch up"
- With indirect network effects no rival can create enough complementary goods because they don't have enough users (chicken and egg problem)
- Microsoft is an example of an "application barrier to entry"

Countervailing factors to barriers to entry

- Product differentiation (e.g. vertical search)
- Network effects that are easily reversible (e.g. social networks perhaps)
- Chicken and egg problem overstated (see number of apps for MS Mobile despite its late entry)

Coffee break questions

Orkut was by far the dominant social network in Brazil but has lost significant share to Facebook. What does this say about the permanence of network monopolies? What if anything differentiates social networks from telephone networks?

Why didn't the strategy of "price low, build fast, dominate a segment" lead to more success in the years leading up to the Internet bubble?

If natural monopoly is truly the optimal state of affairs, what is the role of antitrust?

Intellectual Property and Innovation

Innovation and IP

Firms compete to improve products and create new products, and improve processes and reduce costs

- Big firm research and development
- Inventors and entrepreneurs

Drastic versus incremental innovation

- Drastic innovation involves the creation of essentially new products or new ways of producing things
- Incremental innovation involves improvements in products and processes

Innovation is often mostly a creation of the mind

- It is "***intellectual*** property"
- Extent to which "property" is protected is subject of IP law

Economics and the Law of Intellectual Property

Fixed cost of creation

- Cost includes the risk since most efforts to innovate fail
- Labor intensive

Zero marginal cost of replication

- Once an idea is created it has essentially zero cost of replication

Nonexcludable good

- Once someone knows it they can share with others costlessly almost

IP rights provide a degree of protection

- Trade secrets
- Patents
- Copyright
- Trademarks

Innovation Races

Entrepreneurs and firms race to come up with innovations

- Race to secure IP property rights (e.g. new drugs) and "own" a category
- Race to enter first and secure network effects or other "first mover" advantages

Prizes and failure

- High aggregate costs of innovation plus risk-taking
- Must expect to realize reward that offsets high likelihood of failure, lost investment and opportunity cost

Some famous races

- Telephone
- Television
- PC operating systems

Coffee break questions

- Can antitrust interfere or enhance the process of innovation? How and when?
- Do antitrust and IP law have different views of the tradeoff between static and dynamic competition and if so what is the difference?
- Wouldn't successful entrepreneurs have to put in the same effort even if there was a smaller reward (e.g. are multi-billion dollar payoffs necessary to entice effort?)

Internet Competition

The Big Technological "Online" Developments

1995 Internet

Browser

Mobile

Broad-band

The Cloud

Smart Phones

2013 App Stores

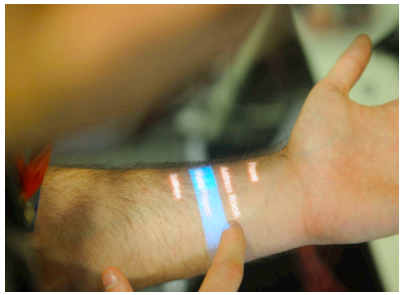
Note: "Online" refers to everything with Internet connectivity including native apps on mobile phones

Two Big Revolutions

Internet revolution: led to the creation of an "online world" of commerce and community.

Smart mobile device revolution: leading to a deep expansion of the "online world" throughout the day and throughout physical locations.

…Internet always on, everywhere…



The second revolution promises to have much more significant economic and social consequences than the first.

Merging of Online and Offline Worlds

More physical devices get direct Internet connectivity (TVs, point-of-sale devices, cars, thermostats….)

Mobile devices with location-based technologies that everyone carries.

As a result many physical activities integrate online capabilities.

Shopping, watching TV, playing games, running, traveling, …

Very Early Days

Online commerce only 5 percent of US retail sales after 17 years.

But now virtually every activity is subject to drastic innovation involving the online aspect.

Mobile devices increasing online shopping but also integrated into offline shopping experience.

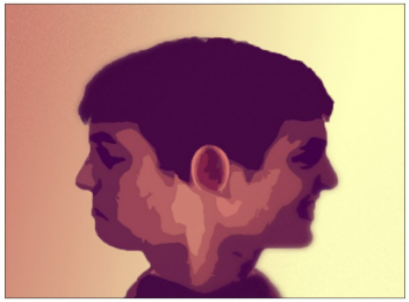
Yes, there is (or will be) an App for that!

Beware the "End of History" Illusion

It is a common perception that we've seen all the change there is and the most recent revolution is the last.

Six years ago smart phones, social networking, and micro-blogging were insignificant.

Six years from now it will probably be very different.



Frequent Drastic Innovation by Attention Seekers

craigslist
1996

PayPal
1999

Google
1998

WIKIPEDIA
The Free Encyclopedia
2001

2004

YouTube
2005

twitter
2006


2007


2010


2011


2008

foursquare
2009

Square
2010

Entry, exit and churn among industry players

Domain	Description	Rank Sept-2002	Rank Sept-2007	Rank Sept-2012
Yahoo.com	Portal	1	1	3
Msn.com	Portal	2	2	8
Ebay.com	Auctions	3	4	6
Untd.com	ISP	4	1,546	-
Google.com	Search	5	3	4
Go.com	Portal	6	8	13
Aol.com	Portal	7	7	9
Neopets.com	Children/Family	8	26	508
Pogo.com	Games	9	5	14
Sportsline.com	Sports	10	17	-
Amazon.com	Retail	11	11	15
Facebook.com	Social Networking	-	-	1
Youtube.com	Video	-	-	2
Live.com	Portal	-	-	7
Bing.com	Search	-	-	12
Twitter.com	Social Networking	-	-	16
Craigslist.org	Classifieds	103	6	5
Netflix.com	Video	209	31	10

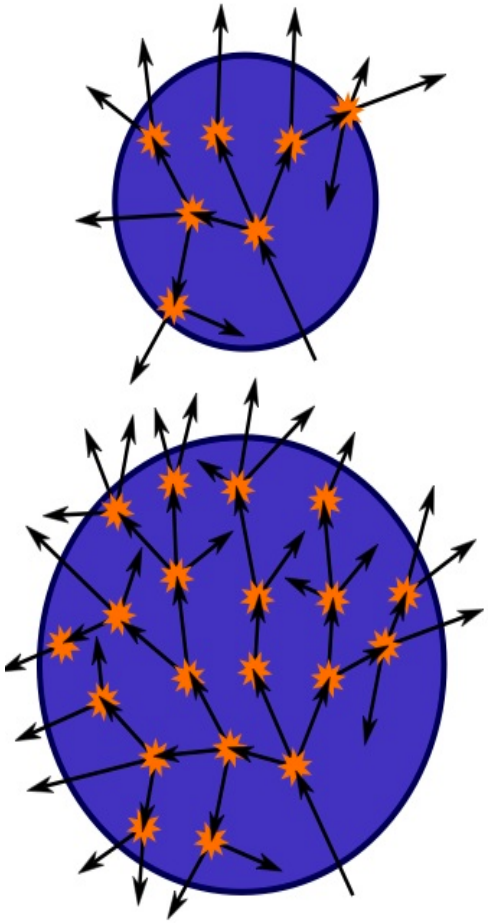
Social Networking

- Mid 1990s SixDegrees.com and makeoutclub.com
- Friendster captures space in early 2000s
- MySpace topples Friendster in mid 2000s
- Google enters with Orkut in 2004 which becomes popular outside US
- Facebook topples MySpace in late 2000s
- Facebook topples Orkut in Brazil and in India in early 2010s
- Google tries to enter with Google+ but not much traction
- Is Facebook your Dad's social network? Teens turn to Pinterest, Tumblr, and Twitter…

Many Internet-based firms are platforms

- Indirect network effects are usually economically significant.
- Securing critical mass is essential for igniting a platform. Need enough customers of each type on all sides to grow and be viable.
- Skewed pricing is common—often there is a "money side" and a "subsidy side". There is a free common price to at least one side.
- Single-homing side most desired ("competitive bottleneck")

Platforms need critical mass for network effects



Critical mass

Critical mass refers to the minimal set of customers on each side that is large enough to attract more customers and results in sustainable positive feedback

Critical mass depends on scale and balance

Probability of customers from two sides getting together and exchanging value increases with the number of customers on each side

Platforms implode if they can't reach critical mass

If there aren't enough customers on the other side, the probability of advantageous exchange falls. Customers don't join, and the early adopters eventually leave

Most Internet-based businesses are part of a platform-based ecosystem

Category	Platform Example	Types of Complementary Online Business	Complementary Business Example
eCommerce	eBay	Online merchants	Dover Jewelry
Search	Baidu	Websites	Sina
Smart mobile operating systems	Apple	Application developers	Square
Social networking	Facebook	Application developers	Zynga

Many other online platforms support offline businesses including online job boards, ad-supported online media, financial exchanges, etc.

Software Based Information Goods in the Cloud

Software-based products with fixed costs of production and low (often zero) marginal cost. Incremental costs involve adding features and content to attract additional users.

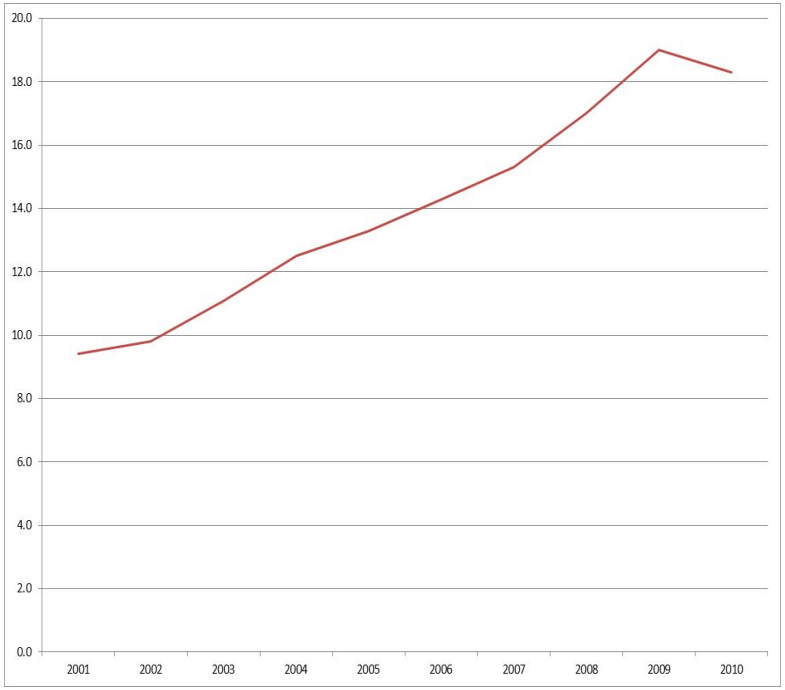
Can support third-party developers through APIs and easily turn into multi-sided platform. Obtain growth through positive feedback effects.

Run in the cloud on server farms. They allow massive scaling around the globe. Entrants can rent space and broadband on existing server farms at low cost.

Implications: Relatively low costs of entry and global expansion; easy to change and add features; positive feedback effects power growth; competition based on incremental and drastic competition

Competition for Scarce Attention

Figure 1: Hours Per Week Spent Online, US Residents Age 12+



Many platforms seek the attention of consumers and then make that attention available to advertisers, developers, and others.

But there is only so much attention to go around since people have to sleep, work, and do other offline things. So binding constraint on everyone.

Implications of competition for scarce attention:

Scarcity sets up intense competition for attention (consumers single-home with their attention).

"Attention seekers" develop different and innovative products and services to get this attention.

Mobile has dramatically increased attention availability but also created substitutes for existing players.

High Rates of Website Entry and Exit

Growth in the Number of Websites Attracting Large Amounts of Time Spent

Threshold (Hours Per Month)	*Number of Websites Exceeding Threshold*		
	September 2002	September 2007	September 2012
1,000,000	95	224	453
2,000,000	37	101	231
5,000,000	16	38	89
10,000,000	8	17	44
20,000,000	4	9	21

Share of Time Spent at September 2002's Top Websites over Time

	Share of Time Spent			Change (Percentage Points)		
	Sept-2002	Sept-2007	Sept-2012	Sept-2002 to Sept-2007	Sept-2007 to Sept-2012	Sept-2002 to Sept-2012
Top 10 Websites in September 2002	32.2%	21.2%	12.9%	-11.0%	-8.2%	-19.3%
Top 50 Websites in September 2002	40.4%	25.1%	16.1%	-15.4%	-9.1%	-24.4%
Top 100 Websites in September 2002	44.6%	27.0%	17.4%	-17.6%	-9.5%	-27.1%
Top 500 Websites in September 2002	55.1%	34.5%	26.0%	-20.8%	-8.4%	-29.1%
Top 1000 Websites in September 2002	60.0%	37.6%	28.2%	-22.4%	-9.3%	-31.7%
Top 5000 Websites in September 2002	70.2%	43.2%	32.8%	-26.9%	-10.5%	-37.4%
Top 10,000 Websites in September 2002	73.1%	45.0%	34.3%	-28.1%	-10.7%	-38.8%
Top 15,000 Websites in September 2002	73.9%	45.4%	34.9%	-28.5%	-10.5%	-39.0%

Source: Compete.com, September 2002, September 2007, and September 2012.

Attention Rivalry in Online Businesses

In these businesses, competition is ***in the market*** rather than ***for the market***, because the analysis is shifted from competition over providing a particular product, to competition for acquiring and delivering attention.

In attention seeking, there is little evidence of a "winner takes all".

Competition for attention is highly dynamic with rivals introducing new products and services, some involving drastic innovation frequently.

There are high rates of churn (entry and exit) among attention rivals

Competition among attention seekers

Attention seekers cannot profitably raise price above zero.

With price competition off the table, attention seekers must:

- Improve the quality of their service through frequent introduction of new features
- Face constant threats of entry by new attention seekers
- Face continual threats of competitors developing drastic innovations
- Operate in a business that has low barriers to entry and exit

Differentiation among attention seekers tempers these competitive constraints. They could offer services particularly attractive to some types of consumers.

Competition for attention seeking appears to be highly competitive and results more in substitution between online activities.

Concentration levels among attention seekers

Of the top 500 websites, 135 narrowly gather attention and sell it to advertisers. The **HHI** for these websites is **1345** based on time on site.

The five largest sellers of attention in the US have 67% of the attention garnered by those 135 sites.

Defined more broadly, 233 of the top 500 attention grabbers (the top 500 websites) gather attention and sell it to advertisers, with an **HHI of 1088**

End of Part 2, Next Class Topic 5