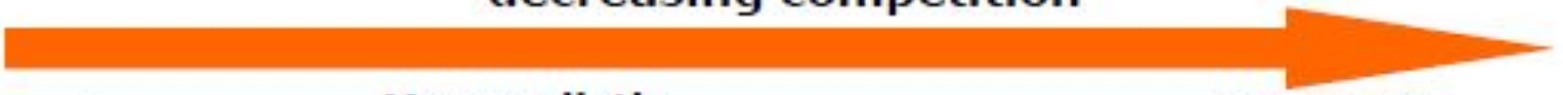
Lecture 2:
Market structure, market power, and welfare

Outline

- Perfect competition and monopoly.
- Welfare
  - Allocative efficiency
    - Surplus standard
  - Productive efficiency
- The Lerner index
- Welfare: more than just quantity
- Market power and entry threats
- Application: Internet monopolies

Typology of market structures

Increasing *concentration* and market power – decreasing competition



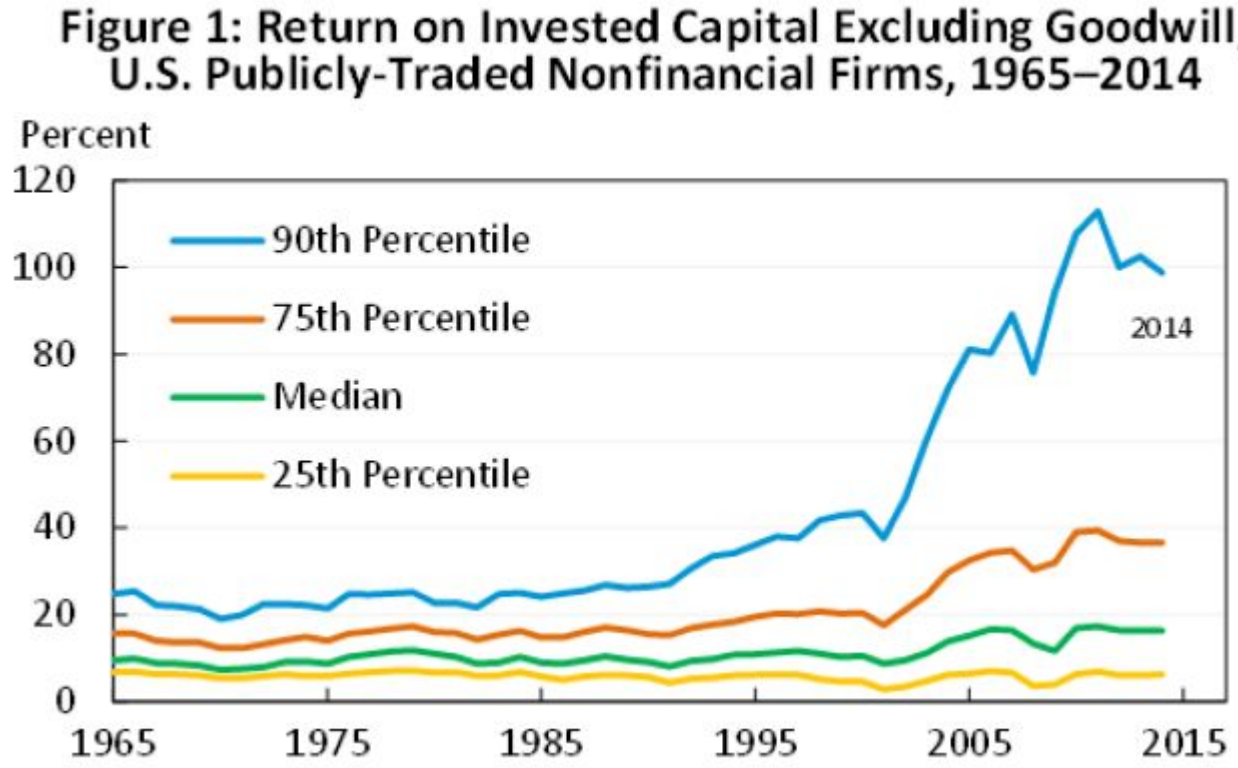
Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
•Many small firms	•Many small firms	•few large firms	•One firm
•no entry barriers	•some entry barriers	•significant entry barriers	•prohibitive entry barriers
•Homogeneous products	•Differentiated products	•Differentiated / undifferentiated	•Unique
•Firm is price taker	•Firm has some control over price	•Depends	•considerable control over price
•Firm's Demand is horizontal	•Firm's Demand is downward slopping	•Downward slopping, inelastic	•Downward slopping, more inelastic

Indicators of declining competition

- Increased concentration in many industries…

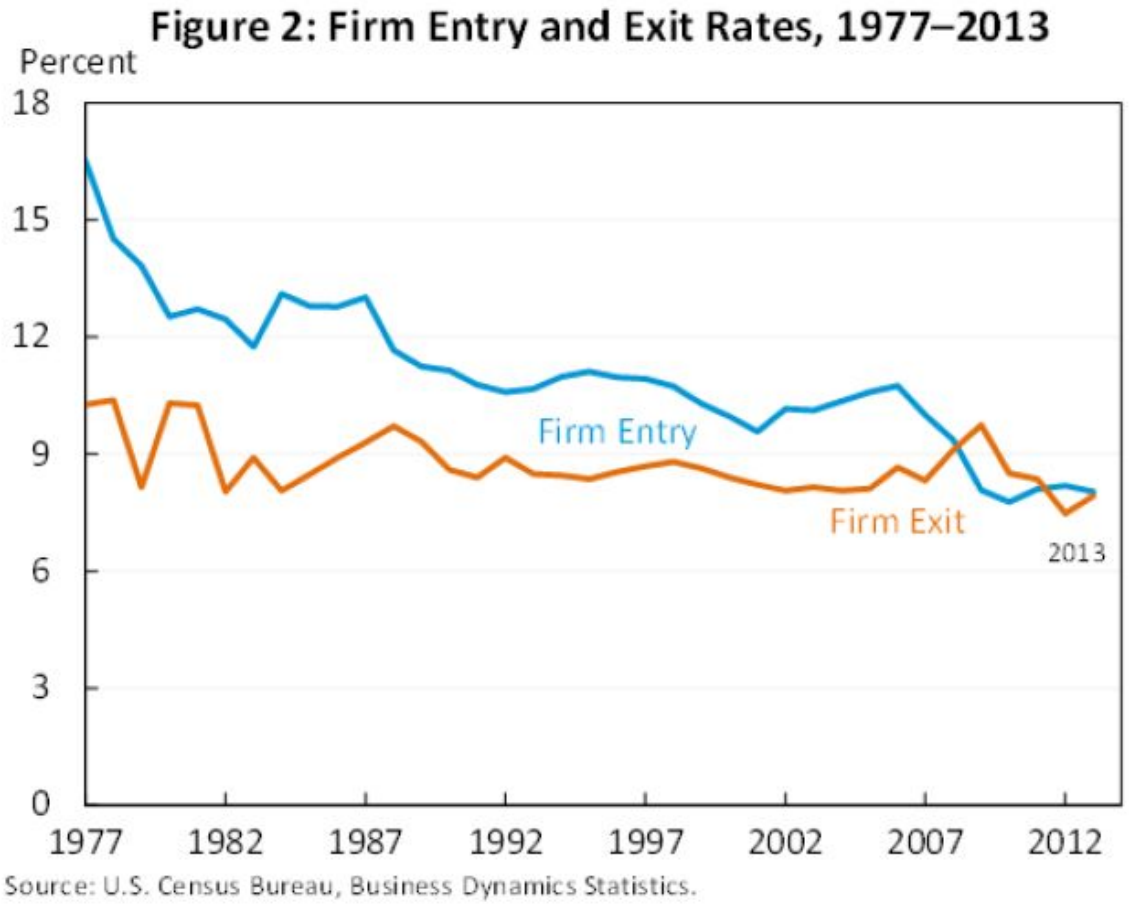
Indicators of declining competition

- Return on invested capital has become increasingly concentrated (increased rents)…



Indicators of declining competition

- Decline in the number of new firms (due to entry barriers)…



Causes of declining competition

- Mergers: in 2015,
  - Global M&A volume hit $5 trillion, U.S. M&A made up 50% of the total.
  - 69 deals over $10 billion, and 10 deals over $50 billion.
  - Pfizer's $160 billion acquisition of Allergan.
  - Anheuser-Busch InBev's $117 billion acquisition of SABMiller.
- Firm conduct
  - R&D
  - Advertising
  - Collusion
  - Erecting entry barriers

Profit maximization
(Church ch2)

- Profit function:

$$\pi = R(q) - C(q)$$

- First order condition for profit maximization:

$$\frac{\partial \pi}{\partial q} = 0 \Rightarrow MR(q) = MC(q)$$

- What if… cost reduction will dominate revenue reduction

$$MR < MC\,?$$

$$MR > MC\,?$$

Perfect competition

- Assumptions: Large number of buyers and sellers, free entry, identical goods, perfect information, no transport costs.
- Firms are price takers:

$$R(q) = pq \Rightarrow MR(q) = p$$

- Profit maximization implies that q is such that – price is equal to marginal cost:

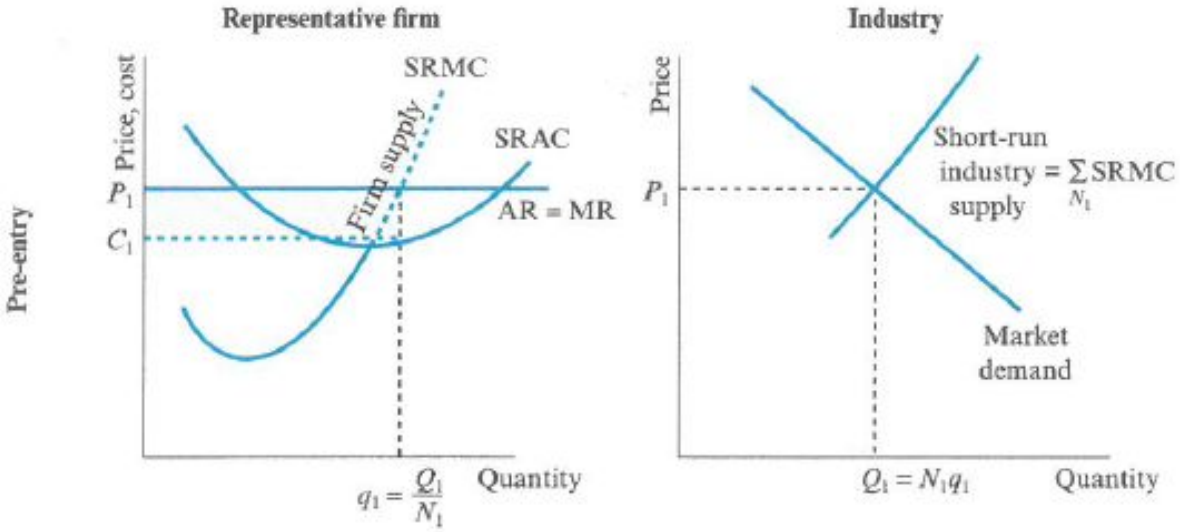
$$p = MC(q)$$

Perfect competition (another way to look at it, LWG)

- Recall from Lecture 1: $PED = \frac{\Delta Q/Q}{\Delta P/P}$
- And $MR = P\left(1 - \frac{1}{|PED|}\right)$
- For perfect competition: $|PED| = \infty$, thus MR=P
- If you increase price even a little bit, you will lose your customers.

Perfect competition: Pre-entry

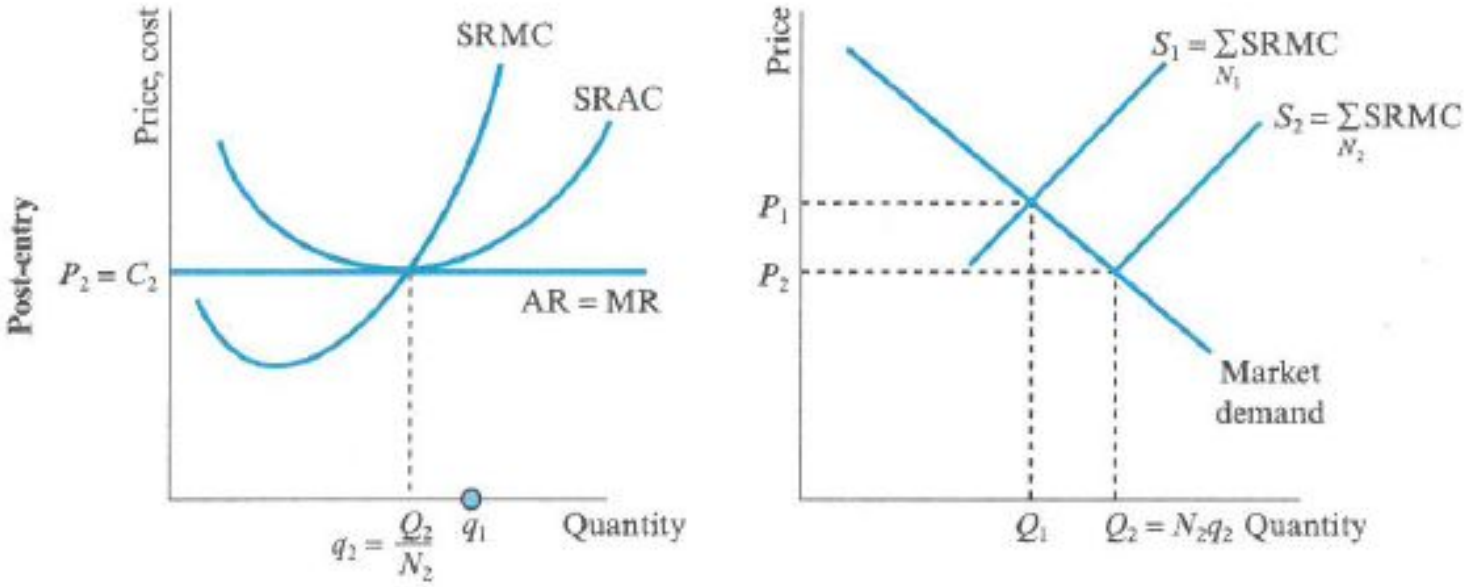
- Profit maximization requires price to be equal to the short-run MC



- Industry short-run supply determines Q1.
- Note: Existence of abnormal profits.

Perfect competition: Post-entry

- Entry leads to increased supply, and lower price (P1 P2).
- The equilibrium quantity for each firm drops; but the industry output increases to Q2.
- Abnormal profits are eliminated.



Monopoly

- Profit function for the monopolist:

$$\pi = P(Q)Q - C(Q)$$

- Profit maximization:

$$MR(Q) = MC(Q)$$

$$\Rightarrow P(Q) + \frac{dP(Q)}{dQ}Q = MC(Q)$$

$$where \frac{dP(Q)}{dQ}Q < 0$$

Monopoly

- **Market power**: The ability to set prices above MC:

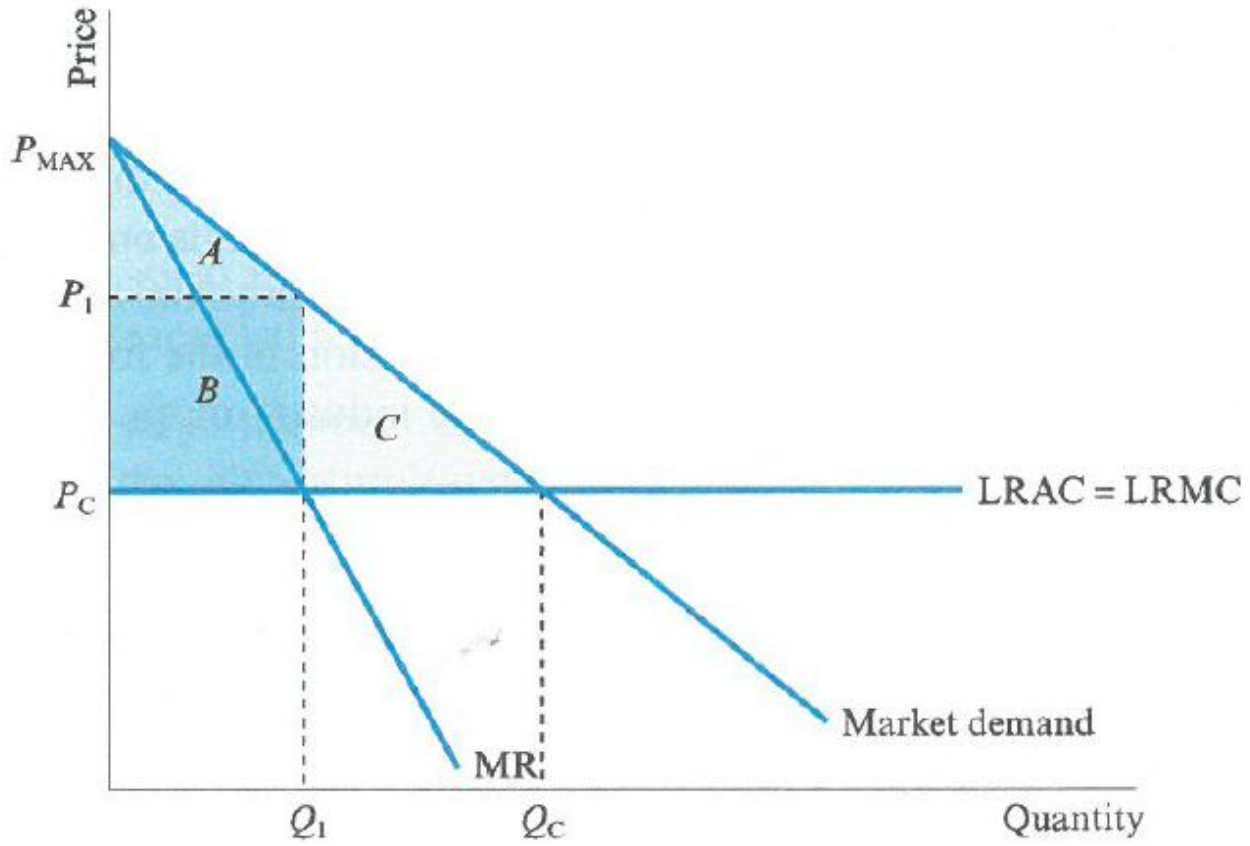
$$P(Q) = MC(Q) - \frac{dP(Q)}{dQ}Q$$

- Note that MR is less than price:

$$MR(Q) = P(Q) + \frac{dP(Q)}{dQ}Q < P(Q)$$

Monopoly

- If follows that the monopoly output is lower than the output of perfect competition.



Welfare

- Welfare depends on both allocative efficiency and production efficiency

- Allocative efficiency: there is no possible reallocation of resources that could make one agent better off without making at least one other agent worse off.
  - Requires the marginal benefit of an additional unit of output to be equal to the MC of production.

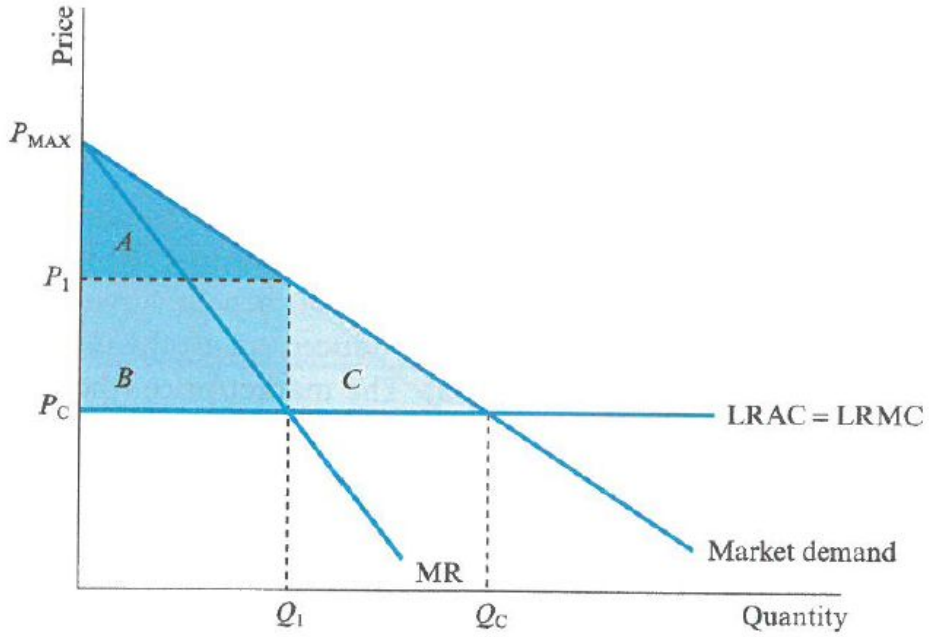
Welfare

- Productive efficiency is made of
  - Technical efficiency (x-efficiency): Producing as much output as is technologically feasible, given the inputs.
  - Economic efficiency: Best possible selection of factor inputs to produce the current output level at the lowest possible cost.

- Welfare is conventionally measured by the total surplus
  - Total surplus = consumer surplus + producer surplus

Allocative efficiency

- Perfect competition: the condition for allocative efficiency is satisfied. Total surplus = Consumer surplus = A+B+C
- Monopoly: the condition for allocative efficiency is <u>NOT</u> satisfied.
  - Total surplus = A+B . Loss of welfare = C ('deadweight loss')



Allocative efficiency: An example

- Linear Demand: $P(Q) = A - bQ$
- Monopoly
  - $MR(Q) = P(Q) + \frac{dP}{dQ}Q = A - 2bQ$
  - $MC(Q) = c \Rightarrow Q^m = \frac{A-c}{2b}$
  - $P^m = \frac{A+c}{2}$

Allocative efficiency: An example

- Perfect competition
  - Price equals MC, which implies: $A - bQ = c \Rightarrow Q^c = \frac{A-c}{b}$
- Welfare
  - $DWL = \frac{(P^m - c)(Q^c - Q^m)}{2}$
  - $DWL = \frac{(A-c)^2}{8b}$

Allocative efficiency: Quantifying the DWL

- Harberger (1954): By examining 73 manufacturing industries, he calculated DWL to be around 0.1% of the US GDP.
- Cowling and Mueller (1975) re-estimated deadweight losses in USA and UK taking with improved methodology
  - Empirical estimation of PED
  - Data at the firm level
  - They estimated DWL to be 3.9% of GDP in US and 3.8% in UK.
- Bhuyan (2000). Estimates for the US:
  - DWL triangle = 5.5% of sales on average.
  - Wide range, e.g. 33.45% for cereal production, 10.2% for canned drinks, < 0.5% for pet food and sweets.

Allocative efficiency: Quantifying the DWL

- Application to telecommunication in America.
- In 1996 the 'Telecommunication Act' has opened the US long-distance to competition, ending the monopoly of AT&T.

- What is the welfare gain associated with this decision?
  - Before : 232bn minutes, price $0.242/minute
  - After: 293bn minutes, price $0.151/minute

- $DWL = \frac{(P^m - c)(Q^c - Q^m)}{2}$
- DWL = $2.78bn

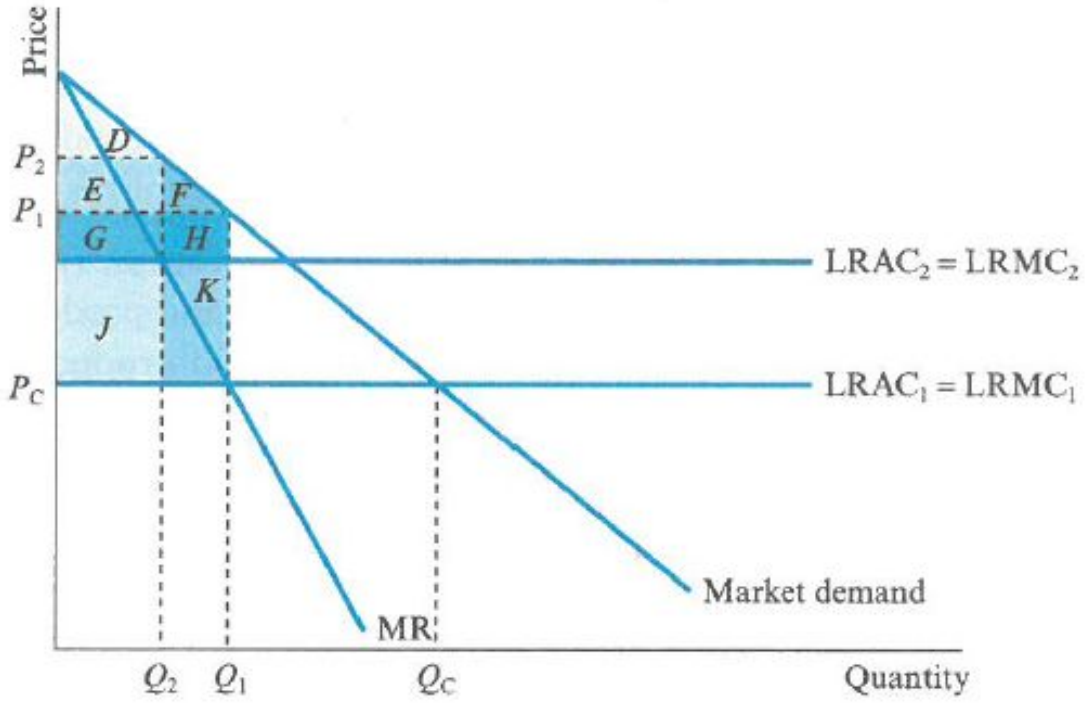
Productive efficiency

- Nearly all studies find that more competition leads to increased productivity.
- More competition usually leads to high productive efficiency as there are intense pressures to lower the costs

 to be incorporated in the welfare analysis

Productive efficiency

- '*Complacent monopolist*': Costs may increase will less competition
- TS falls further by F+H+J+K to D+E+G
- Increased cost of production causes a welfare loss, both directly and through the lower quantity.



Productive efficiency: Empirical evidence

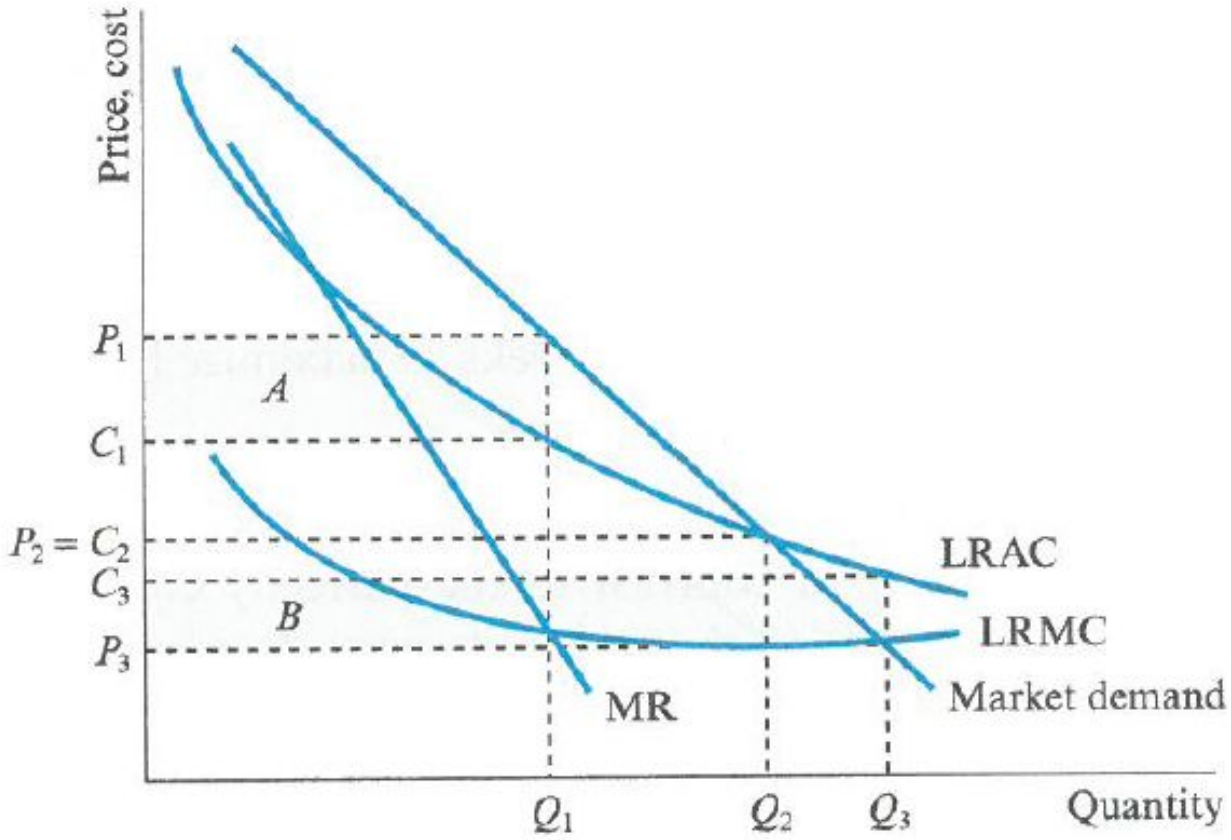
- Japan's export success stories are in industries where there is domestic competition (automobiles, electronics). Industries with little competition (such as chemicals) have not been able to export.

- US banking industry: X-inefficiency is positively related to market power. The DWL is several times larger than the inefficiency loss. [Berger and Hannan (1998)]

- US retail markets: The entry of Wal-Mart leads existing firms to improve their productivity. Existing firms reduce stockouts by 24% thanks to investment in computers tracking inventories. [Matsa (2009)]

Productive efficiency: Natural monopoly

- Sometimes, less competition may lower the costs because of scale economies (e.g. water, gas utilities).



Welfare: TS or CS?

- Pittman (2007): Wealth transfers from producers to consumers can be difficult to set up. In addition, the same amount of wealth means much more to consumers than to producers. Thus, the CS standard is more appropriate.
- Majority of economist still consider the TS as the most appropriate standard for measuring welfare.
- Using the CS standard, the negative impact of monopoly on welfare is even greater.

Welfare and competition policy

- Source: Shan et al. (2012).
- United States antitrust policy (Sherman act):
  - Focus on the CS.
  - Efficiency gains are taken into account only if they are likely to increase the CS (via lower prices)
  - In practice, the CS standard has been translated into a price standard.
    - E.g. proposed merger of Staples and Office Depot
    - It was estimated that the merger would increase prices by 7.1%: +7.3% due to market power, and -0.15% due to efficiency gains

Welfare and competition policy

- China's AML was adopted in 2007. What is the welfare standard used China?
- AML article 1:
  - "This law will be enacted for the purpose of guarding against or ceasing monopolistic conduct, safeguarding and promoting the order of market competition, improving economic efficiency, protecting the consumer's interest, protecting the public interest, and promoting the healthy development of the socialist market economy."
- Article 28 states that even if a merger eliminates or restricts market competition, the Anti-Monopoly Enforcement Authority may decide not to prohibit it if the advantages of implementing the merger exceed the disadvantages.

Welfare and competition policy

- Case 1: Coca-Cola/Huiyuan, 2009
  - Concern that the merged firm would leverage its strong position in the carbonate soft drink market to the fruit juice market.
  - Merger was blocked to prevent consumers from being harmed by higher prices in the future.
- Case 2: Pfizer/Wyeth, 2009
  - The merged firm would have 49% market share.
  - Merger blocked, to prevent post-merger price increases. No evidence that efficiency gains have been considered
- Overall, evidence that AML in China placed some weigh on the CS in cases where the M&A was rejected.

The Lerner index

- Recall that: $MR(Q) = P(Q)\left(1 - \frac{1}{|PED|}\right)$
- With MR=MC in equilibrium, we can rearrange:

$$L = \frac{P(Q) - MC(Q)}{P(Q)} = \frac{1}{|PED|}$$

- The Lerner index provides a measure of market power based on the relationship between P and MC.
- The key determinant of market power is the elasticity of demand.

The Lerner index

- Perfect competition: L=0
- Monopoly: L>0
- Market power is associated with low quantity and a smaller TS.
- Example:
  - Supermarkets: PED of -10 □ L=0.1 (10% mark-up)
  - Convenience stores: PED of -5 □ L=0.2 (20% mark-up)
  - Drug pricing: PED of -1.1 □ L=0.9 (90% mark-up)

Competition and welfare: More than just prices…

- How does competition benefits society (beyond quantity)?
  - Product variety
  - Product quality
  - Innovation
  - Rent-seeking
- A firm with market power may develop monopsony power…
  - With suppliers (low price for inputs)
  - With specialized workers (low wages)

Rent seeking

- Additional welfare costs arise due to the efforts of firms to acquire and maintain monopoly.
- Firms may lobby the government through the political action committees and campaign donations. Their objectives include:
  - Protect trade barriers
  - Obtain public contracts
  - Fight environment regulations
- Rent seeking is wasteful: Resources spent on rent-seeking produce no social benefit.
- Rent dissipation: Firms are willing to incur costs up to the value of the rents and the entire value of monopoly profit is wasted

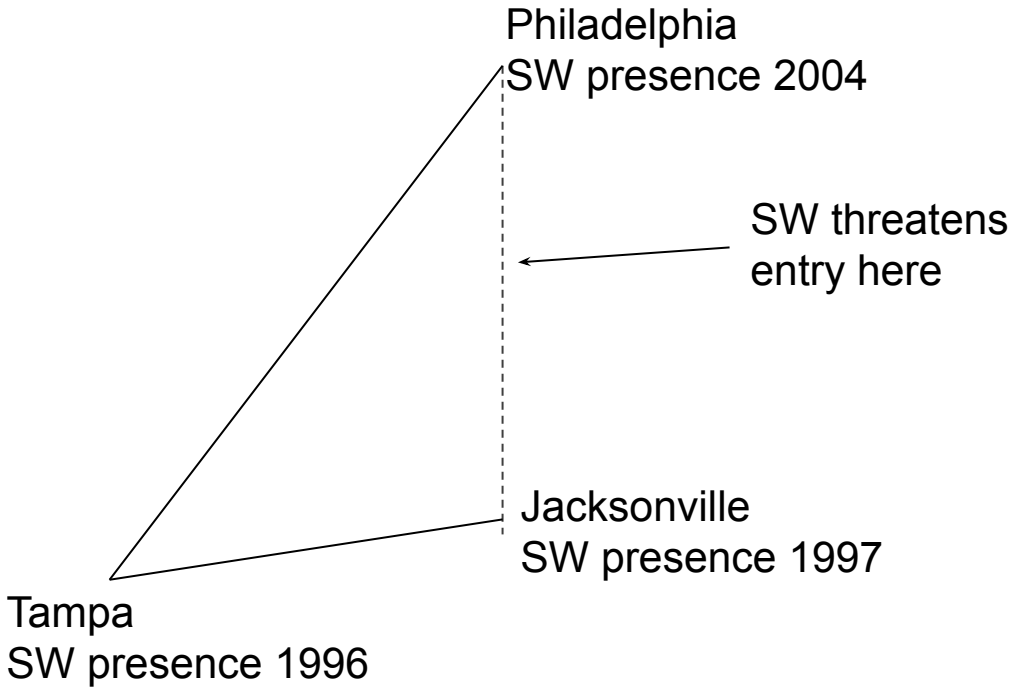
Rent seeking

Campaign contributions to the 2012 US election cycle:

Sector	Total	To Democrats	To Republicans
Agribusiness	$9,510,783	$3,849,714	$5,638,124
Communications	$46,034,171	$35,929,169	$9,957,318
Construction	$20,708,374	$9,353,692	$11,301,441
Energy	$11,359,213	$4,476,825	$6,869,133
Finance, Insurance	$132,302,697	$71,004,460	$61,169,590
Health	$41,912,484	$27,949,554	$13,868,329
Lawyers & Lobbyists	$95,114,558	$74,174,551	$20,871,969
Misc Business	$83,670,725	$53,440,413	$30,042,798
Ideological	$54,660,137	$37,687,082	$16,814,652
Other	$166,417,338	$109,051,394	$56,824,753

Market power and entry threats

- Entry threats play an important role in preventing firms from abusing market power.
- Application: Entry deterrence in the Airlines industry [Goolsbee and Syverson, 2004].
- Consider situations where Southwest begins operating in both endpoint airports of a route but before it starts flying the route itself.



Market power and entry threats

- Incumbents drop average fares substantially on threatened routes before Southwest actually enters the route (or even if they do not enter at all by the end of our sample).
- The fare cuts are only on the threatened route itself; prices do not fall on routes to nearby airports.
- There is some evidence that airlines expand flight or seat capacity to deter entry.

Internet monopolies
(The Economist, 2016)

- How worried should we be about internet monopolies?
- Are they similar to traditional monopolies?

Internet monopolies

- Capturing a dominant share of the global market is possible:
  - Amazon (>50% of America's book market)
  - Alibaba (>80% of e-commerce in China)
  - Facebook (1.5bn active members worldwide)
  - Google (68% of online searches in America, >90% in Europe)

Internet monopolies

- **Q: Does the internet favour such quasi-monopolies?**
- Internet start-ups picked markets that are not yet mature. Although they were not first to enter the market, they had features that allowed them to gain a dominant position.
  - Facebook vs MySpace, Google vs AltaVista, Amazon
- Valuation can increase rapidly
  - Uber launched in 2010 in San Francisco
  - Later raised $1.5bn in VC, giving it a valuation of $17bn
  - Later expanded to more cities, giving it a valuation of $60bn+
- Difference with traditional industries: low trade barriers, online space allowing fast global growth.


The way to grow
1
Market capitalisation, $bn
400
300
200
100
0
Google
Amazon
Facebook
2000
02
04
06
08
10
12
14*
Source: Bloomberg
*Latest

Internet monopolies

- Once growth begins, **network effects** start to kick in. Examples:
  - Facebook: having more members increases the membership benefits.
  - Ebay: indirect effect: Having more buyers does not directly help existing buyers. But more buyers means a better market for sellers, and more sellers means a better market for buyers…
  - Uber: more drivers attract more passengers, and vice-versa – self-enforcing – may lead to a large market share fast, grow fast because of the simplicity and the network effect.

Internet monopolies

- **Q: Are digital monopolies less harmful than traditional monopolies?**

1. They are not ‘real’ monopolies, either because there is no selling going on (other than advertising), or because the market they dominate is not the whole story.
   - Google has no direct revenue from internet searches.
   - Google is dominant for online searches, but it competes with many other firms for online advertising. (issue of market definition) – does not have typical welfare implications;

Internet monopolies

2. Network effects do not amount to barriers to entry. Facebook and Google faced competitors with many more users. Many small firms try to take on Google and Facebook.
3. Competition is only one click away, which limits Google ability to act anti-competitively. (same for Amazon, Skype etc.) if they do so, consumers will simply switch to other providers.

Internet monopolies

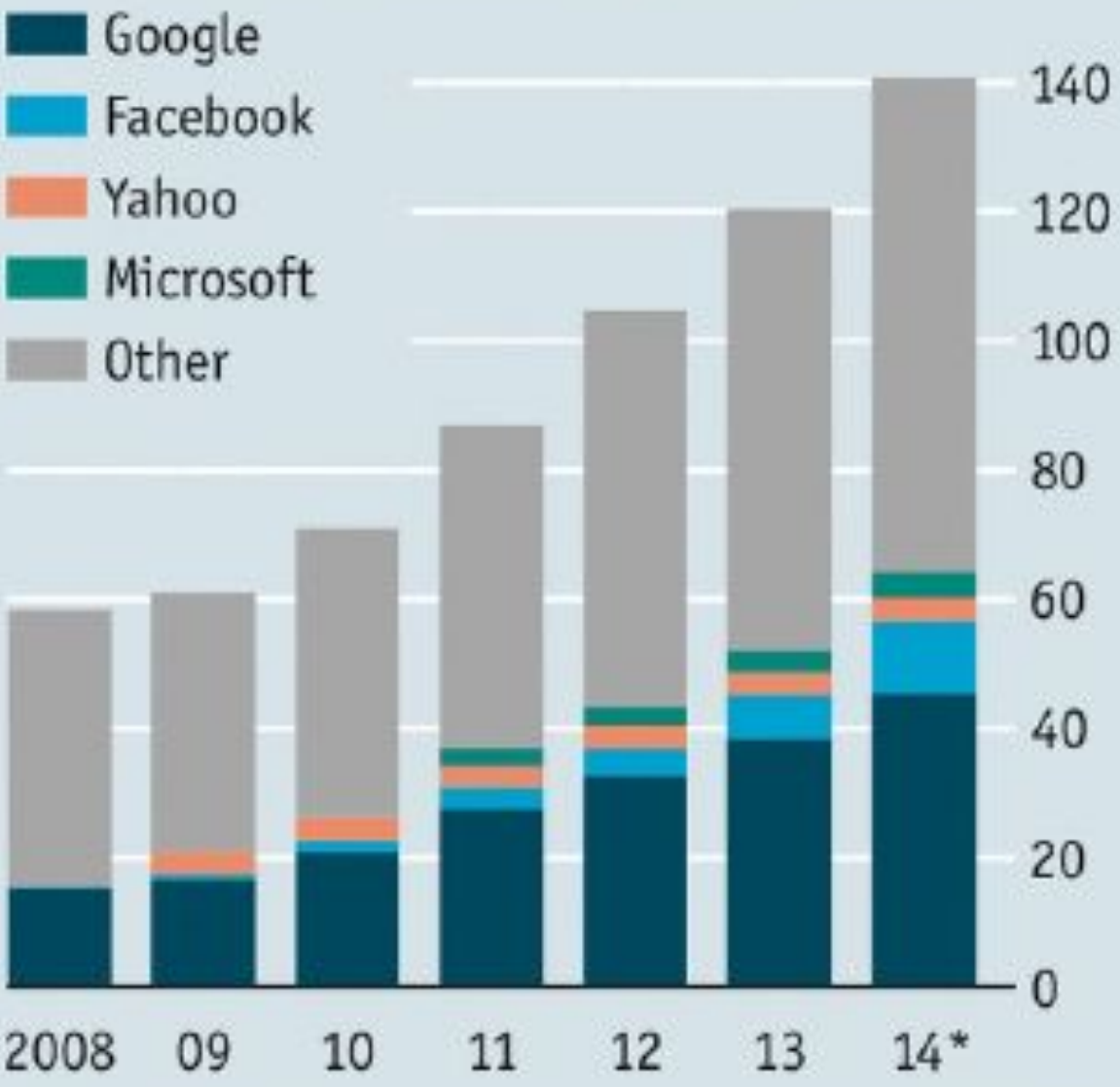
- Opposite arguments:

1. Internet giants have a huge advantage over competitors: Information. This allows them to have a profitable business.
   - Google, Amazon: Data on what people want to buy
   - Facebook: Data on the area of interests
2. Even though competition is one-click away, most users do not seem interested in taking the step. There are some switching costs (mail and map apps habits).
3. Different types of market power:
   - Traditional economy: power to increase prices without loosing (much) business
   - Digital Economy: power to stop innovating without loosing (much) business

2

Part of the whole

World net digital advertising revenues, $bn



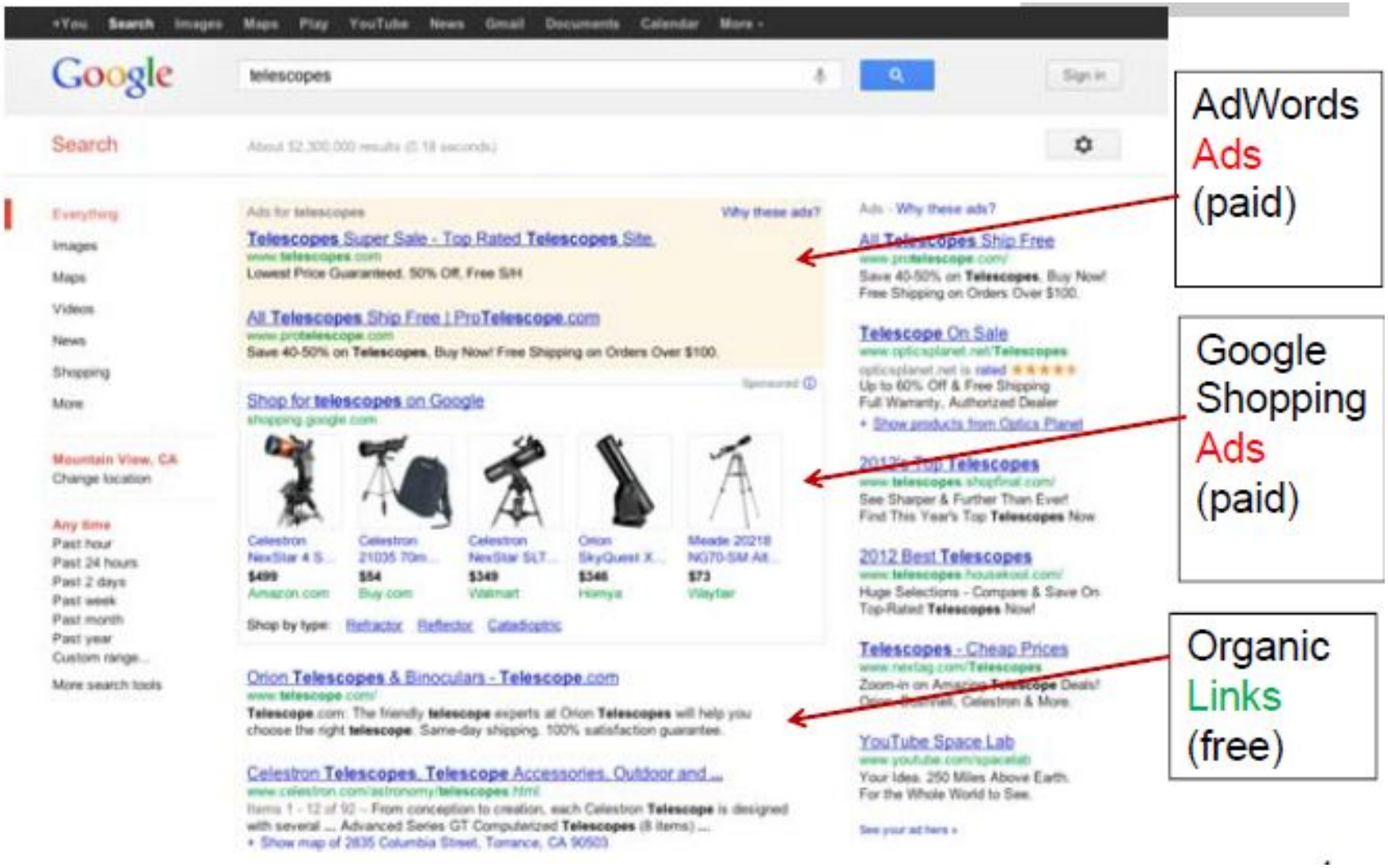
Source: eMarketer

*Forecast

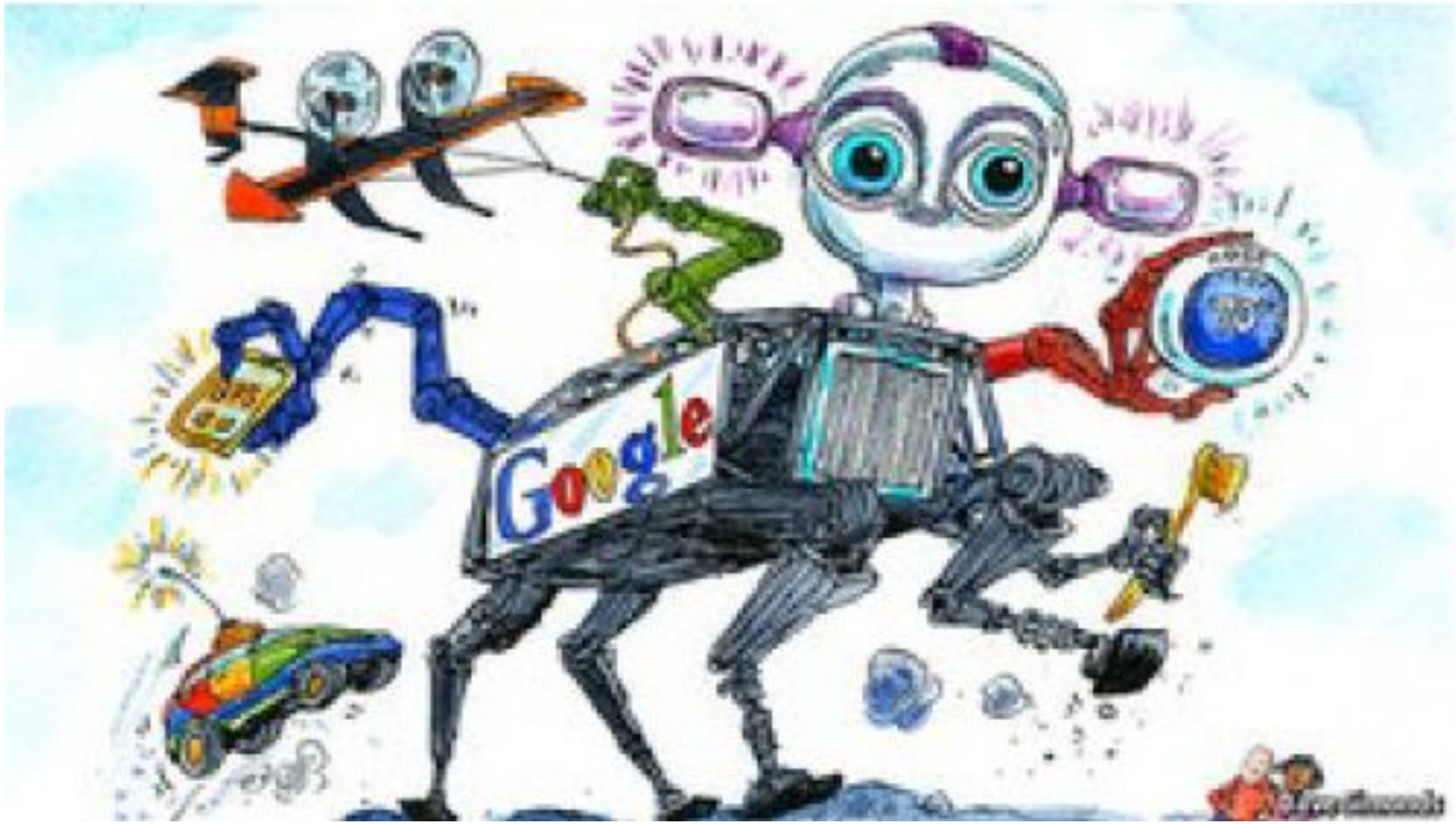
Internet monopolies

- **Q: Do internet giants abuse market power?**
- Google
  - Reserves top spots on its search-result pages for links to its own services. (Google Shopping, Google Maps)
- Could it become the ultimate digital monopoly?
  - The business of mining any and all data it can for new profits streams.
  - Google could use its assets (data) to take control of other industries (it is entering the markets of self-driving cars, smart homes, robotics, health care).

Internet monopolies



Internet monopolies



Internet monopolies

- Tim WU (FTC): Info-monopolies tend to be good in the short term and bad in the long term. For a time, firms deliver powerful efficiencies and dazzling innovations. Today, a single search engine has made virtually everyone's life simpler, just as a single phone network did 100 years ago. Monopolies also generate profits that can be reinvested into research and even public projects: AT&T wired America and invented the transistor; Google is scanning the world's libraries.
- "The downside shows up later, as the monopolist ages and the will to innovate is replaced by will to power. In the 1930s, AT&T took the measure of suppressing its own invention of magnetic recording, for fear it would deter use of the telephone.

Summary

- More competition is associated with higher welfare (allocative efficiency, productive efficiency).
- The Lerner index as a proxy for market power.
- Entry threats key in determining whether firms can abuse market power.
- Internet monopolies: differences and similarities with traditional monopolies.