Internet Concentration and What it Tells Us About the Problems of the Information Economy

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Self-Image: "You can't tell a dog on the Internet"

Questions:

- **Has the Internet sector become more concentrated?**
- **More concentrated than other information and media industries?**
- **Causes and implications for the information sector generally**

- No past empirical study to answer the question of concentration
- My study looks at 95 US information sector industries
  - backbones, ISPs, long-distance telecom, broadcast TV, micro-computers, ISPs, mobile telecom, PBXs etc.
- Over the past 20 years
- Thousands of company reports and other sources over a 20 year period

Industries of the Internet Sector: Basic Instrumentalities

- Backbones
- ISPs
- Portals
- Broadband Providers
- Internetworking Equipment
- Browsers
- Search Engines
- Modems
- Media Player Software
- IP Telephony

Not Included

- Telecom conduits
- Applications
- Content
- Computer Hardware and OS

Concentration index #1:

• Herfindahl-Hirschman Index (HHI)

$$HHI = \sum_{i=1}^{f} S_i^2$$

Antitrust enforcement guidelines classify markets

HHI < 1,000 Unconcentrated Market

1,000 < HHI, Moderately Concentrated Market

1,800 < HHI, Highly Concentrated Market

Concentration Index #2:

C4 Index

$$C4 = \sum_{i}^{4} S_i$$

Where: S_i = firm's market share of a given sub-industry
i = firm in a sub-industry

A weighted aggregate C4 for the entire information sector then is:
Where:

$$WC4_{sector} = \sum_{j=1}^{52} \frac{m_j}{M} \sum_{i=1}^{4} S_{ij}$$

j = a sub-industry (*e.g* mobile handsets) within an industry (*e.g.* telecom equipment)

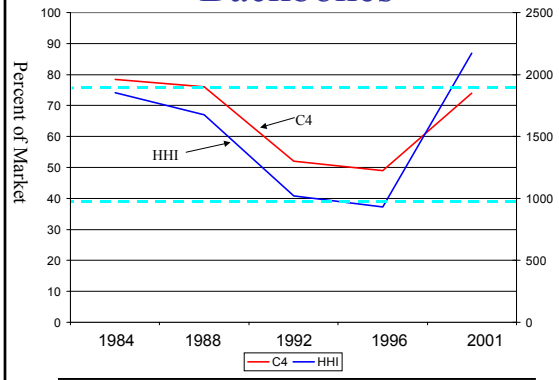
m_j = total revenue of a sub-industry

M = total revenue for the information sector

i = firm in a sub-industry

S_i = market share of firm given in a given sub-industry

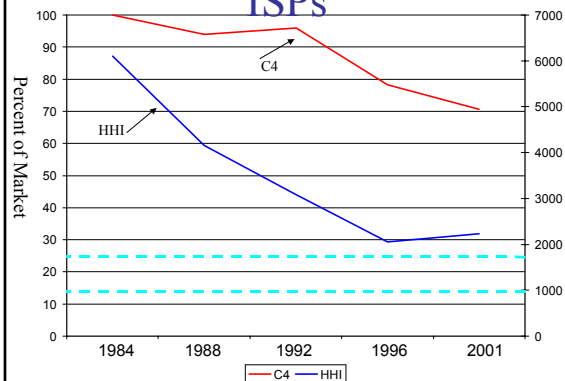
Backbones



Backbones 2002

WorldCom	41
AT&T	13
Genuity	11
C4	74.0
HHI	2174
US Total Revenues ($ mil)	10,500

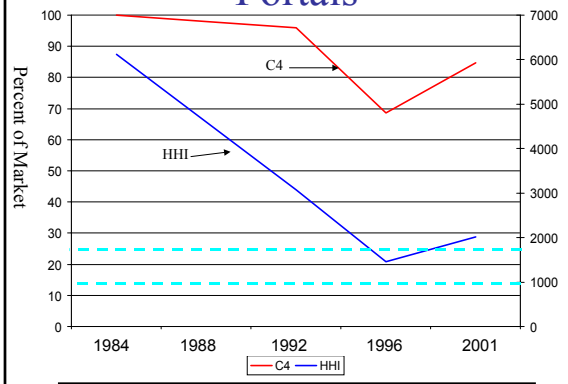
ISPs



ISPs 2002

AOL Time Warner	44.2
MSN	11.5
United Online	8.1
Earthlink	6.9
Prodigy (SBC)	5.2
AT&T WorldNet	2.0
Other	22.1
C4	70.7
HHI	2226
Total Subscribers	69.4

Portals



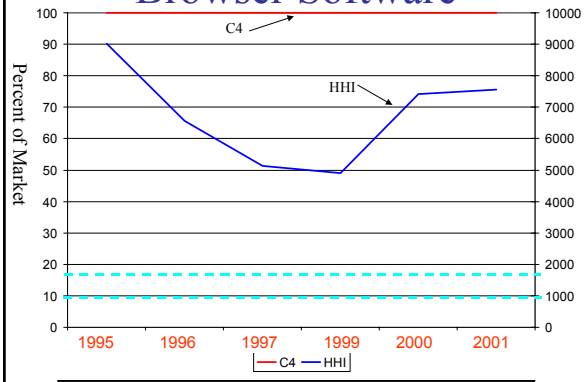
Portals (% users 2002)

AOL Time Warner	29.5
Yahoo	22.6
MSN* (Microsoft)	21.7
Other	28.9
US Total Revenues (in millions)	2908
C4	85.6
HHI	2036

Media Player Software 2002

RealNetworks	49.8
Microsoft Windows Media	27.6
Apple Quick Time	13.5
AOL Winamp	6.2
Other	2.9
Revenue ($ mil)	153
C4	97.1
HHI	3462

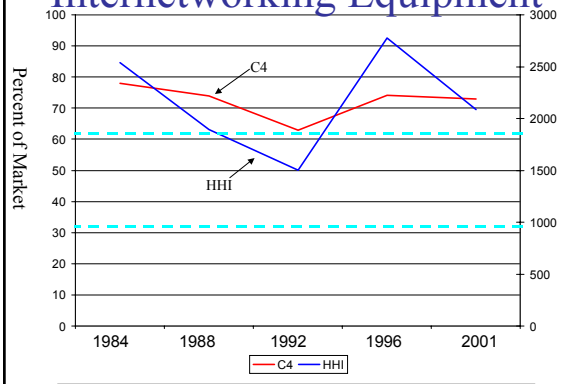
Browser Software



Browser Software 2001

Netscape (AOL TimeWarner)	13.0
Microsoft	86.0
Total Revenue ($ mil)	300.0
C2	100
HHI	7565

Internetworking Equipment



Internetworking Equip 2001

Cisco	48
Avaya	20
Marconi	8
Nortel	7
Alcatel	5
IBM (USA)	5
Siemens	2
Industry Revenue US ($mil)	14,840
C4	83.0
HHI	2871

Broadband Providers 2002

DSL	
SBC	12.8
Verizon	11.5
Bell South	6.0
Qwest (US West)	4.3
Broadwing (Cincinnati Bell)	0.6
Cable	
AOL Time Warner	18.4
Comcast Corporation	23.6
Cox Communications	8.5
Charter Communications	5.8
Cablevision Systems	4.9
Aldelphia Communications	3.6
Total Revenues (mil)	4,762
C4	66.3
HHI	1389

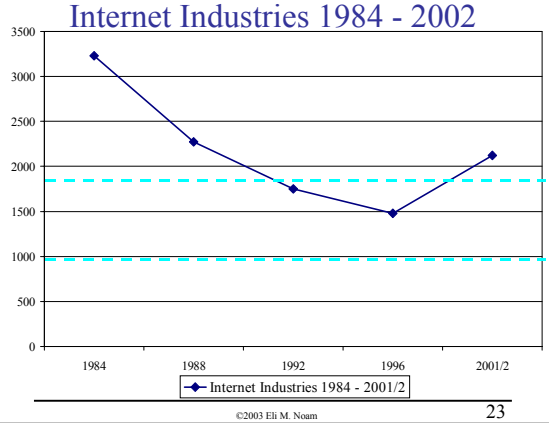
Aggregate Concentration (weighted by size)

Weighted Aggregate HHI

$$WAHHI = \sum_{j=1}^{n} \frac{m_j}{\sum m_j} \sum_{i=1}^{f} S_{ij}^2$$

Where:
- j = an industry
- m_j = total revenue of an industry
- S_i = each firm's market share of an industry
- n = number of industries
- f = number of firms in an industry

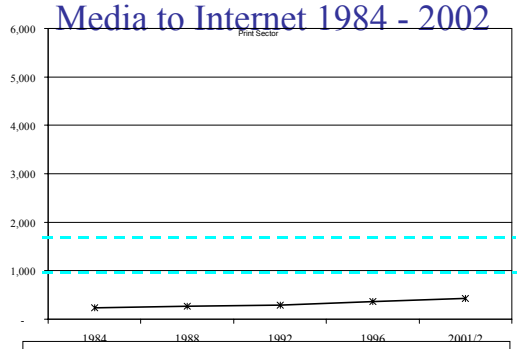
Internet Industries 1984 - 2002



Comparison #1: Internet vs Other Media

- Print
- Film
- Broadcasting
- Internet
- Broadband Internet

Media Concentration Trends: Old Media to Internet 1984 - 2002



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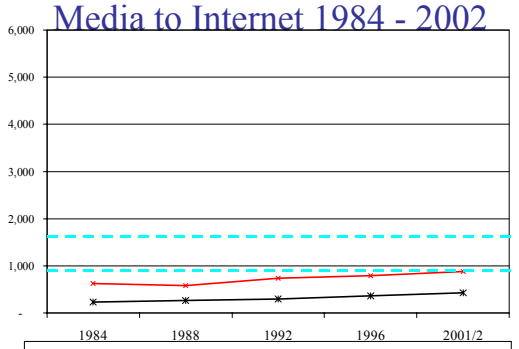

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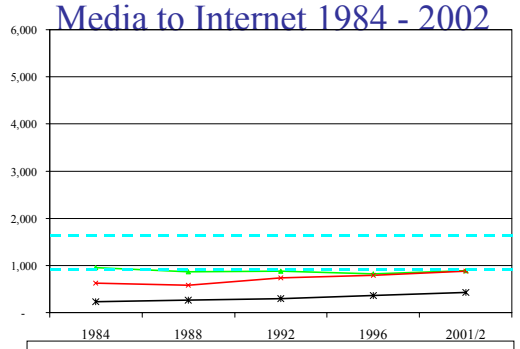
Media Concentration Trends: Old Media to Internet 1984 - 2002



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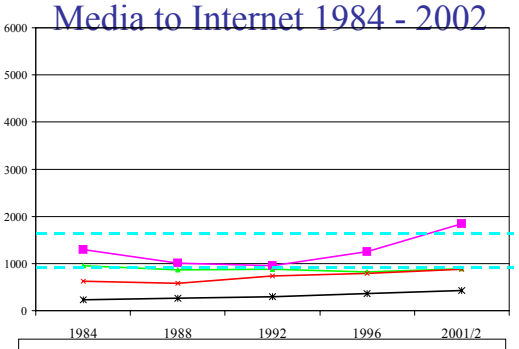

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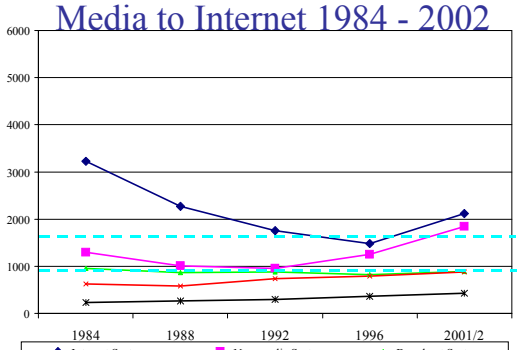

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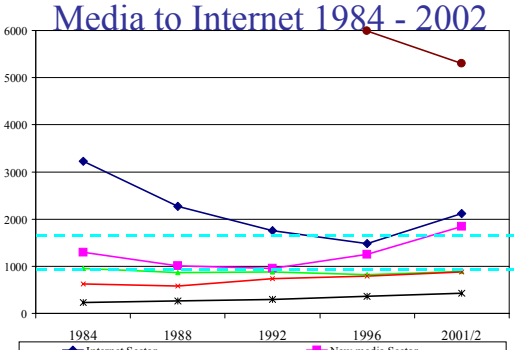

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Findings

- The younger the medium
  - –the more concentrated
  - –The stronger concentration trend after 1996
  - –

Reasons?

Higher investment needs, greater economies of scale, greater network effects, greater risk from competition

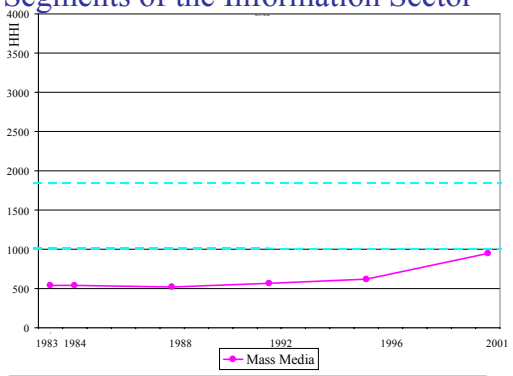
Internet concentration likely to increase in near term

- Economies of scale
- Profitability potential of oligopoly

Comparison #2: Internet vs. Other Info Sectors

- Internet
- Telecom
- Mass Media
- IT

Concentration of the Four Major Segments of the Information Sector



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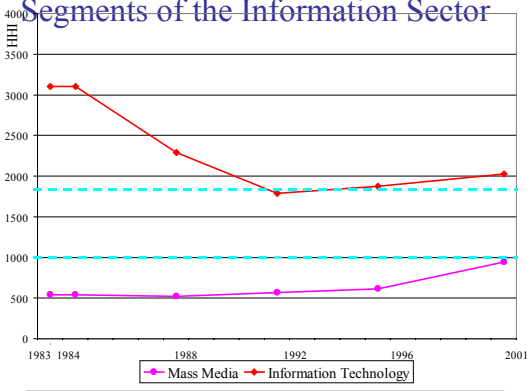

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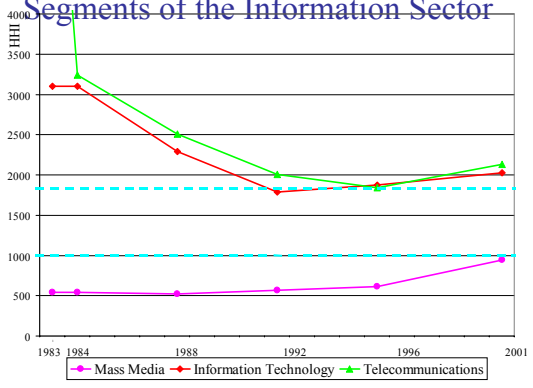

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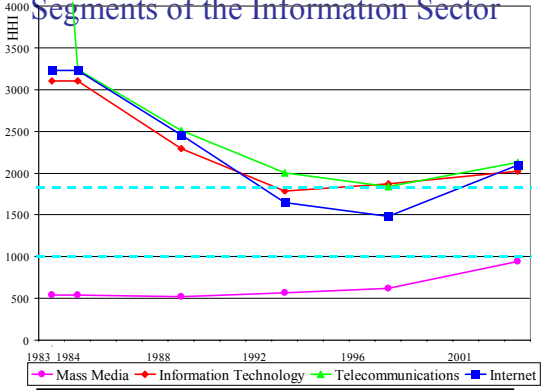
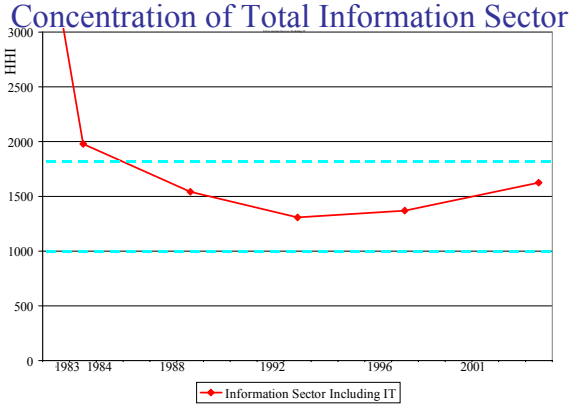


Concentration of Total Information Sector



Findings

- Mass Media concentration, though receiving much attention, and while growing, is the lowest of the 4 info-industry sub-sectors
- Internet (and telecom) are the most concentrated sub-sectors
  - Only ones above DoJ threshold of "highly concentrated"

3. Internet (and Mass Media) have highest growth in concentration
4. After 1996, telecom & Internet concentration up sharply
   - Mass Media steady up

Trends of Vertical Integration in the Internet

Even if a firm does not dominate any specific market, its presence in several markets might, in combination, become powerful

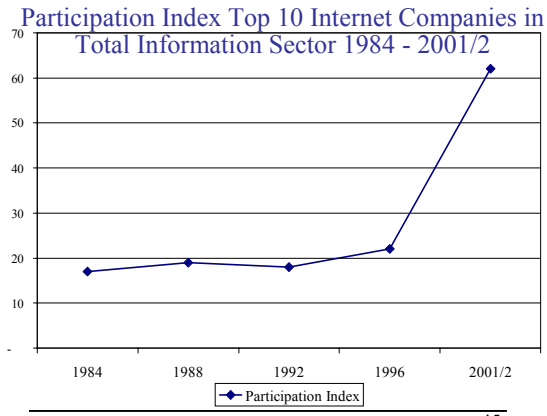
Vertical Measure I:

The Participation Index (PI) shows extent of top firm

$$PI_n = \left(\frac{1}{n}\right)\sum_i PI_i = \left(\frac{1}{n}\right)\sum_{j=1}^{n} 0{,}1$$

Where:

- i = firm (top n firms in terms of information revenues)
- j = sub-industries
- n = number of sub-markets in which a firm participates



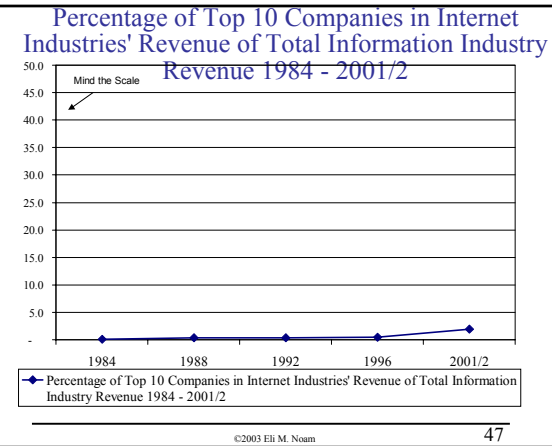
Vertical Measure II:

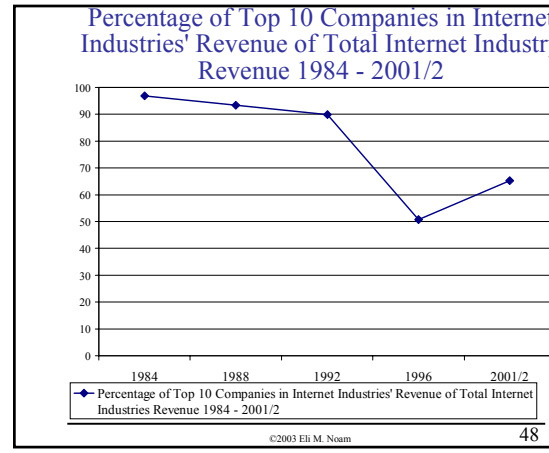
The Sector Share Index (SSI)

$$SSI_{sector} = \sum_i SSI_{firm_i} = \sum_j \frac{s_j m_j}{M}$$

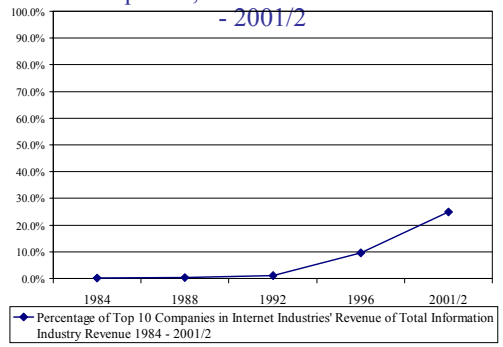
Where:

- s_j = Firm *i*'s Share in Market j, in percent
- m_j = Market revenues of sub-industry j
- M = Revenues of Total Sector





Share of Total revenue of Top 10 Companies in Internet Companies, of total information sector 1984 - 2001/2



- Internet sector increasingly part of
  - –Telecom industry
  - –Cable TV
  - –Mass Media conglomerates

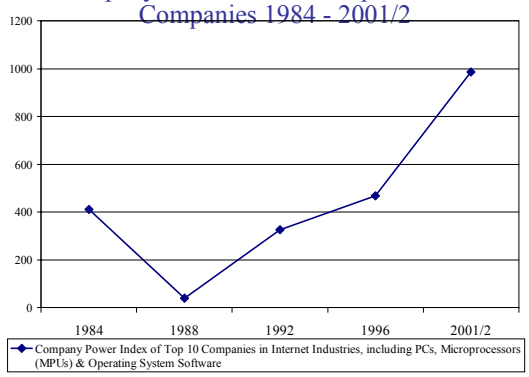
Vertical Measure III:

The Company Power Index (CPI)

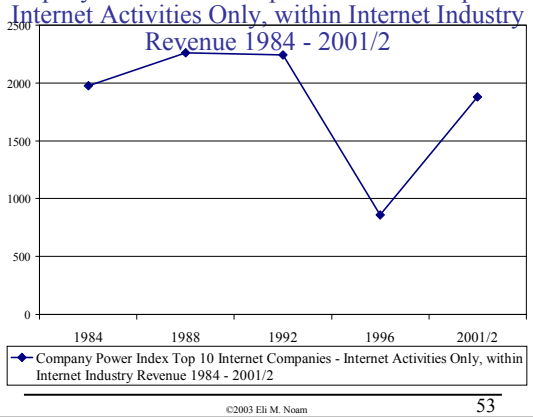
$$CPI_{industry} = \sum_i CPI_{firm} = \sum_j \frac{s_j^2 m_j}{M}$$

Where:
- s_j = firm's share in market j
- m_j = total revenue of sub-market j
- j = sub-industries, ranging from 1 to 52 (consisting of the 52 sub-industries)
- M = Revenues of total information sector

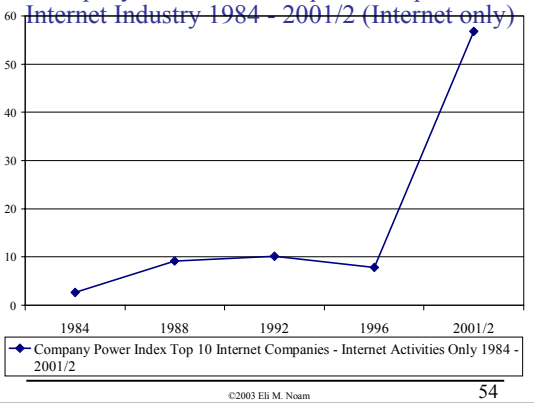
Company Power Index of Top 10 Internet Companies 1984 - 2001/2

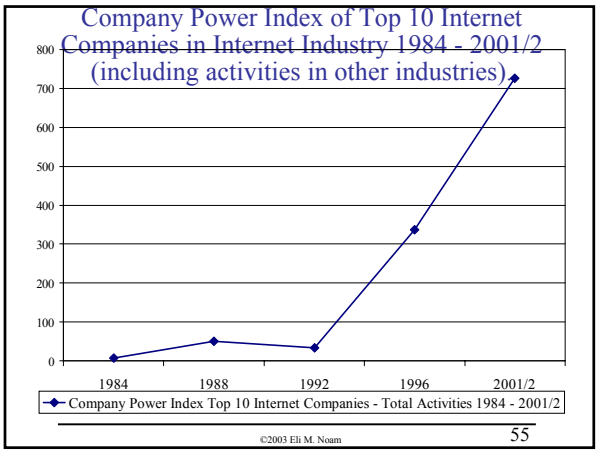


Company Power Index Top 10 Internet Companies - Internet Activities Only, within Internet Industry Revenue 1984 - 2001/2



Company Power Index Top 10 Companies in Internet Industry 1984 - 2001/2 (Internet only)





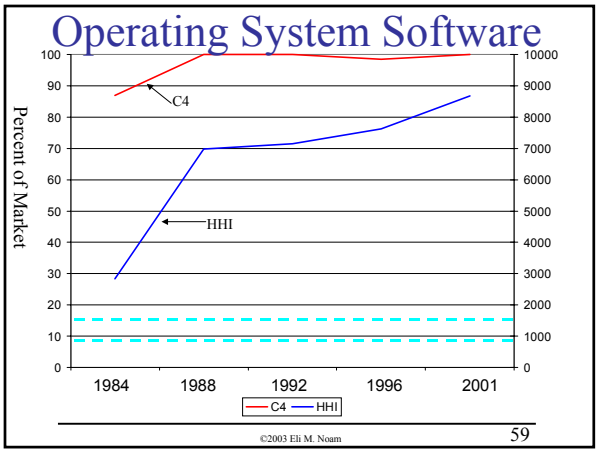
Related Industries

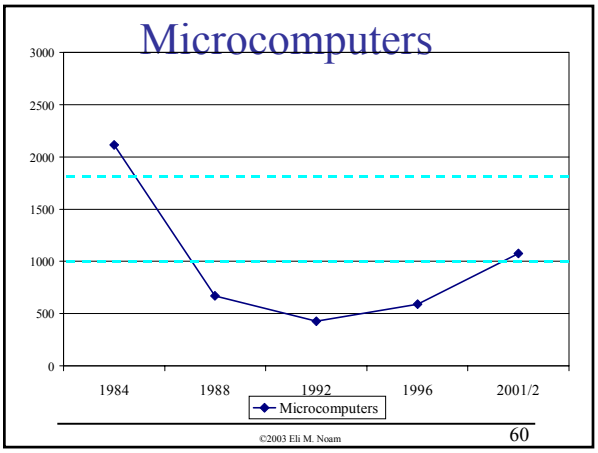
Future:

- Broadband: even greater trend to concentration
  - –Cost high
  - –Already prices high in US duopoly DSL-Cable

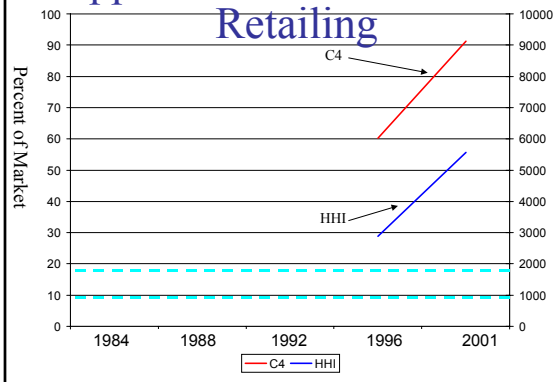
Similar trends:

- Applications
  - –eBay
  - –Amazon
- Major software
  - –Microsoft
- Key hardware
  - –Intel





Applications: Online Book Retailing



Likely Implications

- Slowing of innovation & upgrade
- Higher consumer prices, higher profits
- Restrictiveness on content and applications (cable TV model) and content access pricing
- Global strength and presence

- Greater vulnerability to disruption
- More proprietary standards and protocols?
- Internet governance replaced by cartel
- Cross-subsidies and vertical extension of market power
- Gov regulation to deal with such problems of market power

Internet Past

Internet Future?

Why Concentration?

Response to structural instability of many information industries

Information Sector Crisis

- Dot com bubble
- Telecom crash
- Music bust
- E-publishing stagnation
- PC drop
- Wireless saturation
- Semi-conductor slump
- Newspaper recession
- R&D crisis

Information Economy will be

- Volatile
- Cyclical
- Unstable
- Needed: Macro-economics of the information society

Common Revenue Problem of Information Industries

- Information has become cheaper for many a decade.
- It is now becoming difficult to charge *anything* for it.

Price Problems

- Music industry
- Online publishers
- Phone calls
- Cell phone
- Web advertising
- TV and radio
- Software
- Academic articles
- Newspaper
- Digital photos
- Semi-conductors

Two Basic Explanations for Crises

- "Perfect Storm" scenario
- "Fundamental instability"

"Fundamental Instability"
The entire information sector is subject to a gigantic market failure in slow motion.

Exceptions: Market Power

- Cable TV
- Sports rights

Basic Structural Reasons

1. High fixed costs and low marginal costs
2. Network effects
3. More competitive
4. Commodification
5. Inelastic demand

Consequence: a secular trend of price deflation in information products and services

- Price is marginal cost, which is close to zero
- Most likely below average cost, which means that it does not cover total cost

Reaction by providers

- Price discriminate
- Innovate
- Hedge
- Cut cost
- **Industry consolidation**

Same economic factors lead again to a new cycle of investment over-production and a new price collapse

Cyclical instabilities common to other industries with similar characteristics of high fixed cost and low marginal costs

–Airlines

The information industries are becoming interdependent under digital convergence

Price deflation in the information sector will drag down the rest of the economy, too, through a multiplier effect.

- As societies become information economies, they also become more volatile economies.

Business Responses

- Try to consolidate and cartelize to create pricing power
- Price discriminate
- Technological innovation
- Outsource and offshore
- Protection of property rights to differentiate product

The role of government

Finland, Nokia

- 35% of all exports
- 12% of GDP
- Plus indirect contributions

Macroeconomic instruments of governments are based on the experience of the industrial economy

- Keynsian demand generation?
- Industrial support policy?
- Monetary policy?
- Competition policy?

Another policy approach: Assure a diversification of the economy

- Reconsider emphasis towards information sector
- Encourage industries outside of the information sector
  - Often low-tech industries
- Back to the basics, the industrial sector and the basic industries
- "Info-industrial" sector

Alternative: the Civil Society Sector?

- Volunteerism has structural problems too, the classic "tragedy of the commons" problems

Conclusion

- In the information economy
  - 1. Volunteerist activities are subject to the "tragedy of the commons"
  - 2. Private information markets are likely to frequently fail in "the tragedy of the digital market"
  - 3. Governments do not have many tools to deal with these failures

Economics, the "dismal science"

Next Questions:

- What are the implications for
  - Innovation, business strategy, stability of the industry, public policy?
- Discussed in my next books
  - *"The Dark Side of the Internet"*
  - *"Media Concentration and Ownership in America"*

END OF PRESENTATION

Thank You.