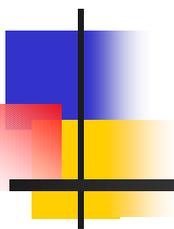


Intellectual Property and Innovation

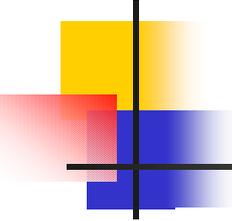


By Robert Stoner

Senior Vice President, Economists, Inc.

Berkeley, California--February 25-28

FTC/DOJ Hearings on “Competition and Intellectual Property Law and Policy in the Knowledge- Based Economy”

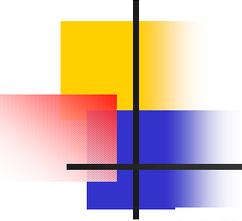


Rationales For Patent Protection

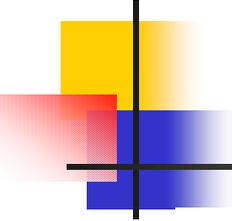
(following Mazzoleni & Nelson, 1998)

1. “Invention Motivation”: patent protection allows appropriability and internalizes externalities
2. “Invention Dissemination”: patent protection encourages wider disclosure and use of inventions
3. “Invention Commercialization”: patent protection induces development and commercialization of non-commercial inventions
4. “Orderly Cumulative Development of Inventions”: patent protection assures orderly development of inventions which are cumulative

Theory 1—Invention Motivation

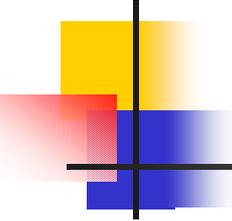


- Without patent protection, lack of appropriation of full benefits of innovation leads to free-rider problem
- Patent protection internalizes this externality
- This theory usually assumes innovation not cumulative
- Cost of granting full appropriability is restricted access to the completed innovation and ability of the patent holder to exercise monopoly power
- Also, full appropriability can lead to wasteful patent races
- Optimal patent literature attempts to balance these benefits and costs of full appropriability



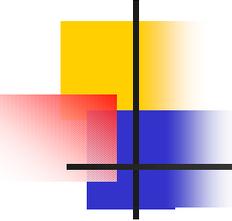
Theory 2—Invention Dissemination

- Role of patents in encouraging wider use
- Patents encourage licensing rather than relying on secrecy to obtain innovation rewards
- Theory 2 consistent with Theory 1 to the extent that licensing both increases the rewards to innovation and leads to wider dissemination
- Theory 2 most applicable when secrecy is likely to be effective in reaping returns from innovation
- Theory 2 may be more applicable to process innovation than product innovation



Theory 3—Invention Commercialization

- Patents induce development and commercialization of initial inventions that would otherwise have limited commercial value
- Theory is relevant to the efficacy of granting patent rights on inventions emanating from government-financed research—Bayh-Dole Act of 1980
- Patenting the original invention is arguably not necessary to induce the inventing activity if this activity is paid for with government funds
- Case for patents on the original government-financed research output is weakened further if patents can be taken out on subsequent development work
- Bayh-Dole may encourage small firm development



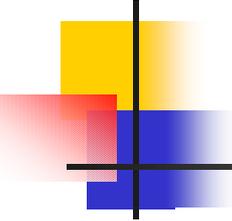
Theory 4—Orderly Cumulative Development of Invention

- Patents assure appropriability in the case of inventions with strong cumulative potential (“broad prospects”)
- Broad patent on the original inventor argued to be necessary to create “broad shoulders” by assuring appropriability against close imitation
- Offsetting effect is that broad patent protection might hinder later stages of development if licensing has high transactions costs and infringement threat dampens subsequent investment

Optimal Patent Length/Breadth Literature

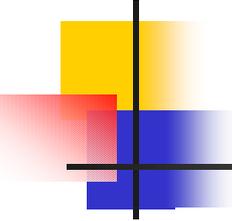
Non-Cumulative Innovation Framework

- Tradeoff between providing adequate incentive to innovate and static efficiency loss associated with monopoly grant
- Optimal patent life—Nordhaus (1969) and Scherer (1972)
- Optimal patent life and breadth—Gilbert & Shapiro (1990), Klemperer (1990) and others
- Latter literature chooses breadth and length to minimize welfare loss associated with a specific innovation incentive
- Gilbert & Shapiro conclude, in the context of a homogeneous product model, that long-lived patents of narrow breadth are likely to be optimal
- Klemperer concludes, in a differentiated product model, that either broad or narrow patents could be optimal depending on characteristics of substitution



Patent Race Literature

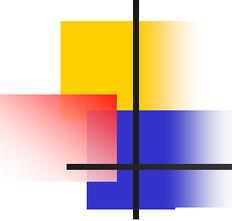
- Possible inefficiencies that arise from the strategic interaction of multiple firms investing in innovation need to be taken into account in any optimal patent policy
- Patent race and “over fishing” literature
- Framework for analysis:
 - limited research alternatives
 - returns to inventive activity depend on being first
- Broad patent protection may lead to over-investment in inventive activity
- Outcome is less likely in industries where there is a broad menu of potential non-competing ideas



Optimal Patent Length/Breadth Literature

Cumulative Innovation Framework

- When innovation is cumulative, optimal patent policy must provide adequate incentives to develop the primary invention as well as incentives for follow-on
- Kitch (1979) argues that granting broad patent rights to a pioneering inventor (with subsequent licensing) will assure orderly development
- More recent work by Scotchmer and others confirms Kitch's view that broad protection ought to be given to the initial invention in a cumulative series
- These results depend on a known trajectory of innovation and a strong *ex ante* incentive to license. If licensing breaks down, broad patents could slow second generation invention due to heightened fear of infringement
- Hopenhayn and Mitchell (1999) suggest that offering a menu of patent breadths for innovations of different types may be superior to “one size fits all”



Empirical Work on Patent Effect

- Empirical work has tended to look at Theory 1-type questions regarding whether patents appear to aid innovation through increasing appropriability
- Interview/survey studies by Mansfield (1986), Levin et al (1987) and Cohen et al (1996) indicate that patents are important inducement to innovation in only a few industries (e.g., pharmaceuticals)
- Kortum & Lerner (1998) and Brandsetter & Sakakibara (1999) find little evidence that changes in patent scope have lead to increased R&D or patent output in the US or Japan
- Hall and Zionidis (2001) find no evidence that increased patent scope in the US is driving innovation effort or output in the semiconductor industry
- Merges and Nelson (1990) find that in the historical development of several industries, strong patent rights inhibited the broad development of the technologies