Trade secrets vs Patents

Bronwyn H. Hall
University of Maastricht and
University of California at Berkeley

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Introduction

- Firms investing in innovation face the problem of securing returns to that investment in the face of imitation by competitors – the appropriability problem
- Commonly available options:
  1. Intellectual Property— registered and unregistered (formal)
  2. Range of “alternative” protection strategies (informal)
- These methods often used together
  – They are complements
- In an important case, they are subsitutes
  – patent vs secrecy

Two contrasting views

- Trade secret law provides far weaker protection in many respects than the patent law. [...]The possibility that an inventor who believes his invention meets the standards of patentability will sit back, rely on trade secret law, and after one year of use forfeit any right to patent protection […] is remote indeed.

  US Supreme Court (Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 1974)

- Judges and lawyers have sometimes thought that because trade secret law provides less protection to the inventor than patent law does, no rational person with a patentable invention would fail to seek a patent. […] This reasoning is incorrect.

  Friedman et al. (1991: 62-63)

Valuable trade secrets

- "Motorola said the R&D costs of the information in Ms. Jin's [the alleged Huawei spy] possession exceeded $600m and the company would lose substantial global revenues if it was made public."

  Financial Times July 22 2010
- "IBM has agreed to pay Compuware $400m over four years to settle claims that it stole trade secrets from the Detroit-based software company. [...] Compuware filed claims three years ago that IBM had used information obtained improperly from former employees [...]"

  Financial Times March 22 2005

The tradeoff

- Purpose of IP system: provide ex ante incentives for inventors
- In exchange: explain & publish innovation in specific,standardized technical format
  - Incentives vs. disclosure
- Some questions:
  - How important are the knowledge spillovers generated by the patent system?
  - Why do firms with a given innovation that can be protected by patents choose to rely on secrecy to protect an innovation?

Patents vs secrecy – the differences

	Patents	*Secrecy*
Disclosure (codifiable knowledge)	Yes	No
Disclosure (tacit knowledge)	No	No
Ease of delimiting invention	Yes	Not clear
Reverse engineering allowed	No	Yes
Subject matter	Statutory	Broader
Timing	After invention	Work-in-progress
Process vs. product	Both	Easier for process
Length	20 years	Longer (potentially)
Cost to obtain	Higher	Nonzero
Enforcement cost	Expensive	Expensive

Partial answer to the spillover question

- Harhoff (2011): InnoS&T FP7 project with Bocconi, LMU, KU Leuven, IESE (in cooperation with MIT and RIETI)
- Covers EU, US, Japan
- Asked inventors about cost-saving from reading patents
  - Highly heterogeneous across and within sectors
  - Median was 1.2 hours in telecommunications, also low in IT, audiovisual, electrotechnical
  - 27.6 hours in organic chemicals, also high in pharma, polymers, materials chemistry

Importance of patent literature

- Shares of inventors answering a Likert scale question on importance for their invention, classified by main patent class (Harhoff et al. 2011)

Main technology area	Impt or very impt	Not used
Chemistry	61.4	9.1
Process engineering	48.0	15.6
Instruments	47.8	14.7
Consumption & construction	45.8	16.7
Mechanical engineering	44.9	15.9
Electrical engineering	34.1	21.7

Innovation and IP use

Share of firms rating protection mechanism of high or medium importance

US 2008	All firms	R&D-doing firms
Patents	5	41
Secrecy	14	67
From NSF BRDIS, shares of firms, population weighted		

UK 1998-2006	All firms	Innovators
Patents	10	26
Secrecy	21	45
From CIS 3,4,5 –shares of firms, population weighted (38,760 obs)		

Theory: costs and benefits of patenting

- Costs
  - Direct and indirect financial expenditures for application and maintenance
  - Disclosure of information (published 18 months after priority)
  - Grant uncertain
  - Enforcement uncertain
- Benefits
  - Exclude competitors from using technology
  - Licensing income
  - Block competitors by restricting their freedom-to-operate
  - Signalling of quality of invention to public or potential research collaborators
  - Deter infringement suits
  - Increase in bargaining power in (cross)-licensing negotiations

Theory: costs and benefits of secrecy

- Costs
  - Direct and indirect financial expenditures
  - Active knowledge management (internal secrecy policy)
  - Need to sign confidentiality agreements
  - Enforcement uncertain & difficult
- Benefits
  - Protect the invention indefinitely
  - Not limited to certain technologies
  - Broader scope (example - customer lists)
  - Applicable to ‘work in progress’

Theoretical literature

- Horstmann et al. (1985): "[...] propensity to patent will be lower the more profitable (ex ante) a competing product is expected to be."
- Anton and Yao (2004): if patent protection weak, only small & medium value inventions are patented; high value innovations kept secret.
- Kultti et al. (2006): However, when there is a strong likelihood of simultaneous invention, patenting takes on a defensive role: the choice is now not between patenting and secrecy, but between patenting or allowing a competitor to patent.
- Scotchmer and Green (1990): sequential innovation - lowering novelty threshold will not lead to more patents if firms prefer secrecy
- Ponce (2007): sequential innovators – lowering the novelty threshold may increase the use of secrecy if innovation is very cumulative (added assumption that prior art makes patenting more difficult)
- Schneider (2008); Zaby (2010): importance of lead time – if large, prefer secrecy

Theoretical literature

- Results are very mixed
  - Depend on the nature of competition
  - Whether the lead innovator is far ahead
  - Information assumptions
  - Largely based on the one product-one patent model

Empirical literature

- Survey evidence on patent/secrecy use
- Cross country comparisons
- Impact on performance and diffusion
- Natural historical experiments

Empirical evidence: surveys

- Fundamental problem is ‘observability’ - need for survey data
- Levin et al. 1987 (Yale I survey) and Cohen et al. 2000 (Carnegie Mellon survey)
  - Firms in different industries favor secrecy and lead time over patents to protect innovation
  - Firms patent for strategic reasons (block competitors, improve reputation, gain bargaining power)
- Large number of similar surveys: CIS in Europe, similar surveys around the world...
  - Most find firms systematically regard lead-time and secrecy as more important to protect innovation than patents

CIS literature on IP protection

- Brouwer and Kleinknecht (1999): Dutch CIS 1
- Arundel (2001): CIS 1 data for 7 European countries
- Pajak (2009): French CIS 4
- Heger and Zaby (2010): German CIS 2005
- Hussinger (2006): German CIS 3
- Hall et al (2013): UK CIS 3,4,5
- Main limitations:
  - Cross-sectional data
  - Firm-level; actual use generally not observed

CIS Literature – Main Findings

- Patenting propensity
  - + Size
  - + Sales of innovative products
  - + R&D collaboration agreements
  - + High-tech
  - + Inventions characterized by a smaller inventive step
  - + Technological lead where reverse engineering easy
- Propensity to use secrecy relative to patents
  - – Firm size for product innovations
  - + – Cooperation in R&D/innovation
  - + Process innovation
  - – High-tech
  - – Part of MNCs

Cross country evidence

- Moser (2005): innovations presented at two 19C world fairs in the 19th century, from countries with and without patent systems
  - Patent protection not critical to innovation
  - Does affect the industrial distribution of innovative activity - countries without patent protection concentrate in industries where secrecy effective such as textiles, food processing and watch making

Empirical evidence: performance

- Impact of protection method on firm performance and knowledge diffusion
  - Hanel (2002) – increased profits from all forms of IP
  - Hussinger (2006) – patents assoc with innov sales, but secrecy is not
  - Hall et al. (2013) – both patents and secrecy associated with higher innovative sales share
- Very little work on this topic due to the data challenges (use of secrecy not observed)

Evidence on value to the firm

- Litigation data – highly selective so difficult to draw strong conclusions
  - Lerner (2006) – most cases in sectors where patents are less important; damages relatively low compared to patents
  - Almeling et al. (2010a,b) – federal and state appeals court cases. Most are against former employees
  - Both studies find win rates less than 50%

Natural experiments

- Png (2011): impact of secrecy on R&D and patenting
  - Uniform Trade Secrets Act (UTSA) in US - exploit variation over time and across states in enactment (strengthening)
  - Associated with average drop of 2.4% in R&D in US manufacturing (1976-2006)
  - Differential impact across sectors: drop of 4.2% in medicinal chemicals & 4.7% in computer terminals, but no impact in pharmaceuticals and computer communications equipment
  - negative impact on patenting in sectors in which patenting of process innovations relatively more important/effective
- Carr and Gorman (2001): Economic Espionage Act (1996)
  - Criminalized theft of trade secrets
  - Impact on stock market value of firms affected by theft
  - Ranged from $0.04 to $20 million, with an average of $5 million.
  - Much larger than actual value of trade secrets (from court records)

Natural experiments

- Younge and Marx (2013) – look at change to Michigan law
  - Made non-competes enforceable (strengthening of trade secrecy)
  - Immediate positive impact on market value of affected firms, especially those in sectors known to rely more on secrecy (from Yale/CM survey)
- Contrast with the sectoral development argument of Saxenian, Gilson et al.:
  - Silicon Valley grew relative to route 128 because non-competes were not as enforceable in California as in Massachusetts
  - Allowed migration of knowledge to new startups, i.e., more spillovers

Some key findings

- Theoretical literature is inconclusive
- Empirical literature suffers from focus at firm level, rather than invention level (very coarse)
- Sectors where patents are important are also those where reading patents saves time, suggesting spillovers are enhanced
- Trade secret enforcement largely directed at former employees
- Strengthening trade secret protection is generally positive for incumbent firms, but may not enhance innovation and development in the aggregate
- Weakening patent protection pushes firms towards secrecy