

Complementarity and Substitution between Types of Intellectual Property in Software

Stuart Graham

DuPree College, Georgia Institute of Technology

stuart.graham@dupree.gatech.edu

Deepak Somaya

R.H. Smith School, University of Maryland

dsomaya@rhsmith.umd.edu

OECD 2003 Conference: IPRs, Innovation, and Economic Performance

Motivation

- U.S. Legitimation of patent protection for software by the early 1990s
 - Policy debate (ongoing)
- Explore relationships between different types of IP use within firms
 - Relatively unexplored question
 - Software is a particularly good candidate
 - Patent, Copyright, and Trademark are available

Graham-Somaya

Research Question(s)

- What are the characteristics, and determinants, of IP litigation in software?
- Do different types of IP protection (in software) serve as complements or substitutes?

Graham-Somaya

Background: Primary focus patent/secretcy

- IP Types as Substitutes:
 - Supreme Court *Kewanee Oil* decision (1974)
 - Theory suggests other types of IP may substitute for patent when patent fails, is uneconomical (Horstmann, et al. 1985; Friedman, et al. 1991)
 - (scant) Evidence (Levin, et al. 1987) that firms' use of appropriability mechanisms grouped into patent and non-patent (latter incl. secrecy)
- IP Types as Complements:
 - More nuanced view, “bundle” of rights
 - Cohen, Nelson, Walsh (2000) show that while patenting distinct from other capabilities, secrecy may be pursued in concert with either
 - Arora (1997) suggests different IP used for different knowledge
 - Graham (2003) shows firms pursue secrecy strategies as a part of patenting

Graham-Somaya

Software: Complements or Substitutes?

- Substitutes (policy debate):
 - Patent better (worse) suited to software than copyright (CONTU, 1979; Samuelson, 1984; Menell, 1987)
 - Graham/Mowery (2003) show “crossing propensities”
- Complements (overlap; protect diff't “things”):
 - Patents for “ideas” - Copyright for “expressions”
 - Patents for technologies, Copyrights for products
 - Patent protection => success; attracts “pirates” (needing copyright enforcement)
 - Firms tackle patent/copyright issues => build capability in IP law => use in other IP contexts
 - Other ...

Graham-Somaya

Anecdotal Coincident IP Uses by Firms

- **Magnitude Information Systems, Inc.: “E-fuel”**
 - E-commerce transaction-monitoring
 - Registered US trademark “E-Fuel” 1999
 - “Software for compilation-receipt of information from the user”
 - Granted US patent “Computer Activity Monitoring” 2000
 - Copyright at creation
- **HiddenMind Technology, Inc.: “ActiveUniverse”**
 - Mobile-workforce information management
 - Registered US trademark: “ActiveUniverse” 2000
 - “Software for distributing data, messages, and other software“
 - Granted US patent “Transmitting data content” 2002
 - Copyright at creation

Graham-Somaya

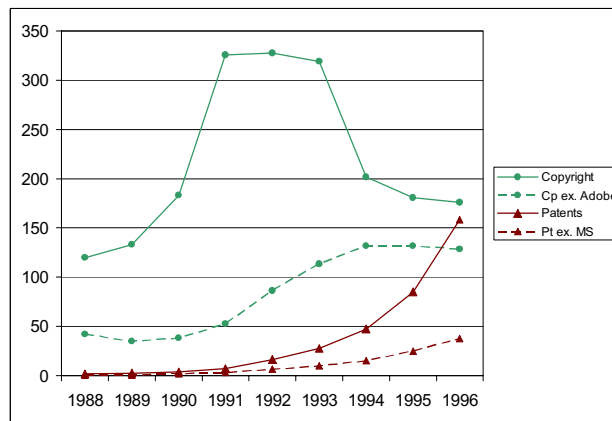
Patenting and Copyright Registrations

- Software patenting increases rapidly through the 1990s
- Software copyright registrations “plateau” and then decline
 - *Lotus v. Borland* effect?
- What about litigation?
 - Advantages vis-à-vis (esp.) registration data
 - Our sample: Softletter100 firms (PC Software)

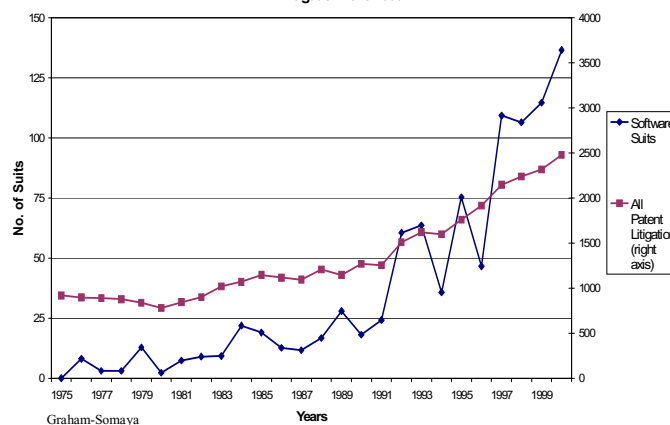
Graham-Somaya

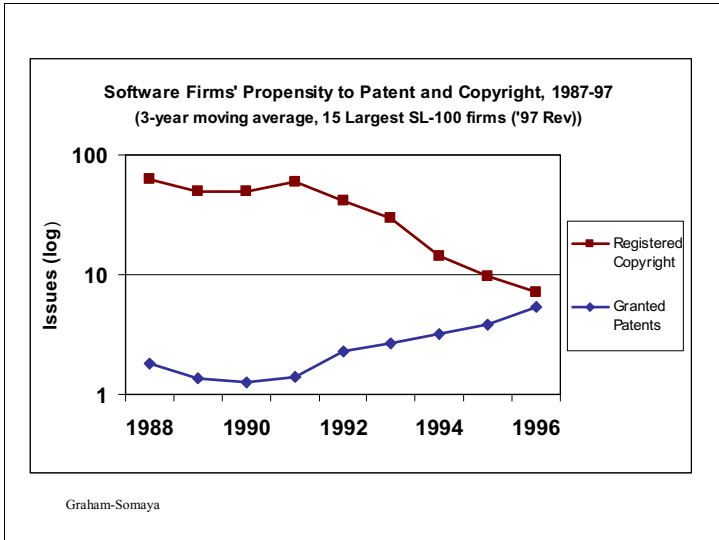
Copyright Registrations and Patent Grants, 1987-1997

(Largest 15 SL100 firms by 1997 revenues, 3-year moving average)

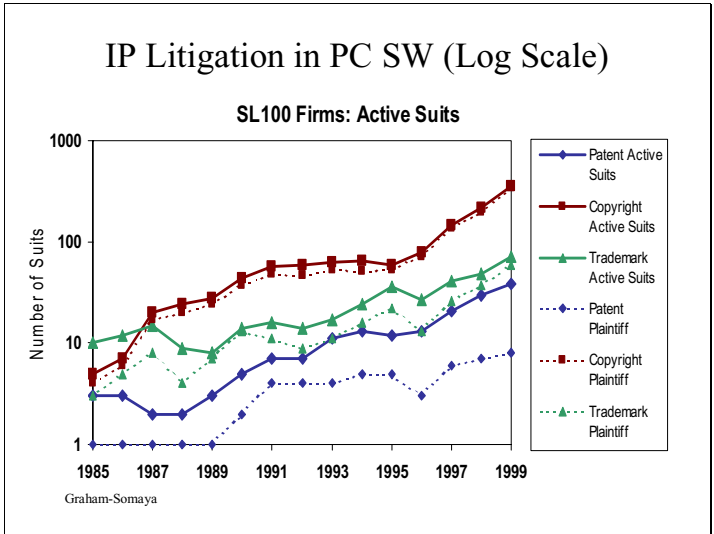


Estimated Software Patent Litigation (Graham-Mowery IPC Classes) and All Patent Litigation 1975-2000





- ### IP Litigation Data
- Comparison of copyright registration and patenting / TM data problematic
 - CR is “automatic,” registration is low cost
 - SW Industry-defined litigation sample
 - Top-100 PC software firms (“Softletter 100”)
 - Year-by-year 1985-99, 50% + revenues in software
 - 427 firms
 - Data on litigation from Federal Judicial Center
 - Litigation identified by firm name
 - Includes patent, copyright, and trademark litigation
- Graham-Somaya



Analysis of Softletter100 Panel

- Unit of observation: Firm-year
- Dependent variable: No. of suit-days
- Fixed Effects, S U R model
 - Series of equations (6), correlation in residuals as indication of “complementarity” in use
 - Statistically significant correlation between copyright (plaintiff), trademark (plaintiff), and patent (defendant) suit days
 - After controlling for firm revenues and revenues / employee (and fixed firm effects and year effects)
 - Firms that faced higher litigation as patent defendants also increased their copyright litigation as plaintiffs
- An overall “complementarity effect” – reason?

Graham-Somaya

Table 1: Some Comparative Statistics on Software Patent Litigation

Industry Sample:	Software IPC-Based	PC Software: Softletter 100-Based	Computers (Somaya, 2003a)	All Patents (Somaya, 2003a; 2003b)
Years:	1983-1993	1985-2000	1983-1993	1986-95
Number of Suits:	170	127		
Variables:				
Fraction of Decl. Judgment Suits	0.153 (0.029)	0.167 (0.048)	0.096 (0.014)	-
Fraction of Multi-patent Suits	0.076 (0.020)	-	0.076 (0.012)	0.040 (0.003)
Ratio of Suits to Patents (per 100)**	1.270 (0.487)	-	2.474 (0.891)	1.873 (0.212)
Fraction of Individual-Assigned Patents Involved	0.165 (0.028)	-	0.228 (0.021)	0.323 (0.006)
Fraction of Foreign-Assigned Patents	0.041 (0.015)	-	0.052 (0.011)	0.121 (0.004)
Fraction of Counter-Suits	-	0.071 (0.023)	0.143* (0.017)	-

Standard errors appear in parentheses ()

* Unbiased estimates computed from the observed sample ratios.

** For Software: Average suits per 100 contemporaneous patents. Others: Average suits over patent life per 100 patents issued in 1975-78.

Table 2: Probit Estimates for Litigated Software Patents

Dependent Variable = Litigated Patent	Model (1)	Model (2)	Model (3)	Model (4)
constant (std. err.)	0.128 * (0.053)	-1.537 ** (0.234)	-1.290 ** (0.302)	-0.496 (0.494)
foreign assignee (std. err.)	-1.349 ** (0.142)	-1.192 ** (0.150)	-1.242 ** (0.157)	-1.275 ** (0.164)
individual assignee (std. err.)	0.910 ** (0.166)	1.093 ** (0.174)	1.064 ** (0.176)	1.111 ** (0.181)
log of forward citations (std. err.)		0.866 ** (0.111)	0.881 ** (0.112)	0.867 ** (0.114)
log of backward citations (std. err.)		0.225 (0.169)	0.222 (0.172)	0.223 (0.182)
delay in patent issuance (std. err.)			-0.190 (0.131)	-0.184 (0.136)
square of delay in issuance (std. err.)			0.030 (0.018)	0.031 (0.019)
number of inventors (std. err.)				0.023 (0.030)
inventor countries (no. of) (std. err.)				-0.836 * (0.386)
No of Obs.	790	790	776	754
Log Likelihood Ratio	-475.66	-438.29	-427.56	-410.86
Pseudo R-squared	0.1313	0.1996	0.2051	0.2139

*, ** indicate statistical significance at the 5% and 1% level respectively

Fixed Firm- and Year-Effects SUR Model

- Dep. Var. = Log (No. of suit days per year)
- 51 largest SL100 firms
- Controlling for revenue and revenue per employee

Correlation matrix of residuals:

	copyrt_ptf	copyrt_def	patent_ptf	patent_def	trdmrk_ptf	trdmrk_def
copyrt_ptf	1					
copyrt_def	0.115	1				
patent_ptf	0.097	0.072	1			
patent_def	0.153	0.108	0.214	1		
trdmrk_ptf	0.144	0.016	0.076	0.144	1	
trdmrk_def	-0.026	0.084	0.098	0.117	0.185	1

Breusch-Pagan test of independence: **chi2 (15) = 86.564, Pr = 0.0000**

Graham-Somaya

Concluding Questions

- Why has copyright litigation continued to rise despite reverses in “look and feel” cases and demonstrated drop in copyright registrations?
 - Why are SL 100 firms primarily defendants in patent litigation?
- What explains the correlation between firms being patent defendants and copyright/ trademark plaintiffs at the same time?
 - Large firms/deep pockets; avoid risk of invalidation, “court testing” patents?

Graham-Somaya