Software patents, economic evidence and competition

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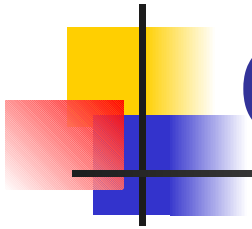
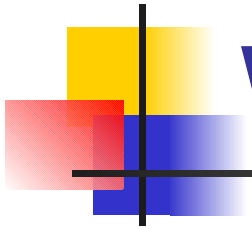


Overview

- Software patents: definitions and evidence
  - What are software patents
  - Who owns them
  - Why do firms patent software
- Software, networks and competition
  - Economic effects of patents on competition
  - Economic effects of types of standards

What are software patents?

- Computer Implemented Inventions = "inventions whose implementation involves the use of a computer, computer network or other programmable apparatus, the invention having one or more features which are realized *wholly or partly* by means of a computer program"
- If "realized wholly", then =software
- Such definitions cannot be used for large-scale empirical analysis



What are software patents?

- Large scale searches possible using:
  - Specific patent classes (“IPC method”)
  - Keywords (“Bessen & Hunt method”)
  - All classes for largest software firms (“Hall & MacGarvie method”

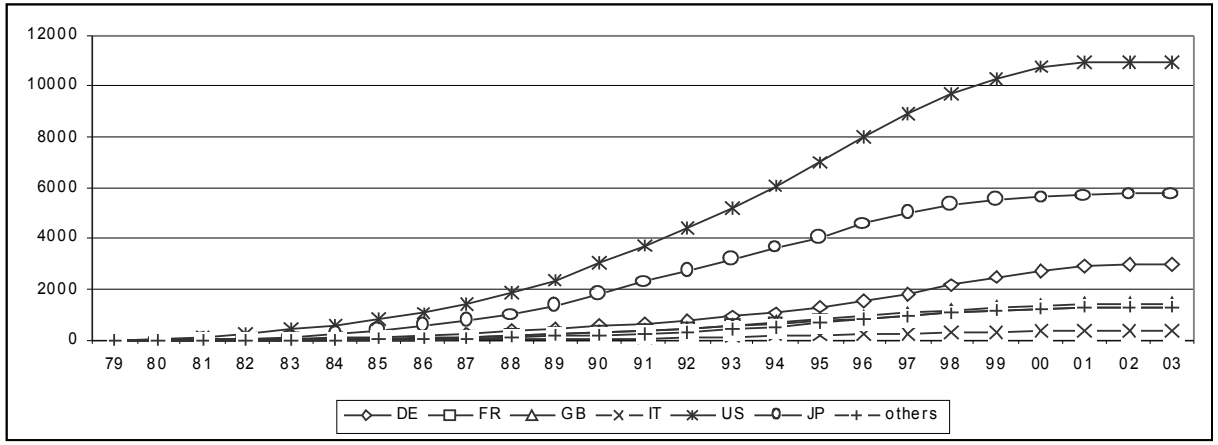
Who holds software patents?

Industry	Bessen-Hunt	Graham-Mowery	Hall-MacGarvie	All definitions combined
Telecommunications	2	1	744	222
Electrical machinery	3	2	566	137
Transportation equipment	1	415	128	54
Machinery & engines	3	576	149	47
Autos	2	386	117	38
Oil	1	475	259	28
Auto parts	497	197	64	25
Chemicals	1	160	56	23
Printing	119	96	69	12
Wholesale trade	115	250	169	8
Fabricated metals	315	93	50	7
Misc	210	82	70	7
Computing equipment	21	18	11	6
Paper	415	78	33	5
Furniture	138	45	18	4
Pharmaceuticals	1	153	87	4
Food & tobacco	253	146	94	2
Primary metals	200	74	41	2
Business services NEC	118	145	102	2
Instruments & Comm. eq.	12	9	4	2
Medical instruments	19	28	21	1
Computing systems & software	2	2	2	1
Textiles & apparel	54	105	81	1
Rubber & plastics	103	48	29	1
Stone, clay, & glass	116	50	28	1
Lumber & wood	17	27	22	0
Soap	205	24	16	0
Total	**72.657**	**63.838**	**41.361**	**10.455**

Source: Torrisi & Thoma, 2006 CESPRI

Evolution of software patents

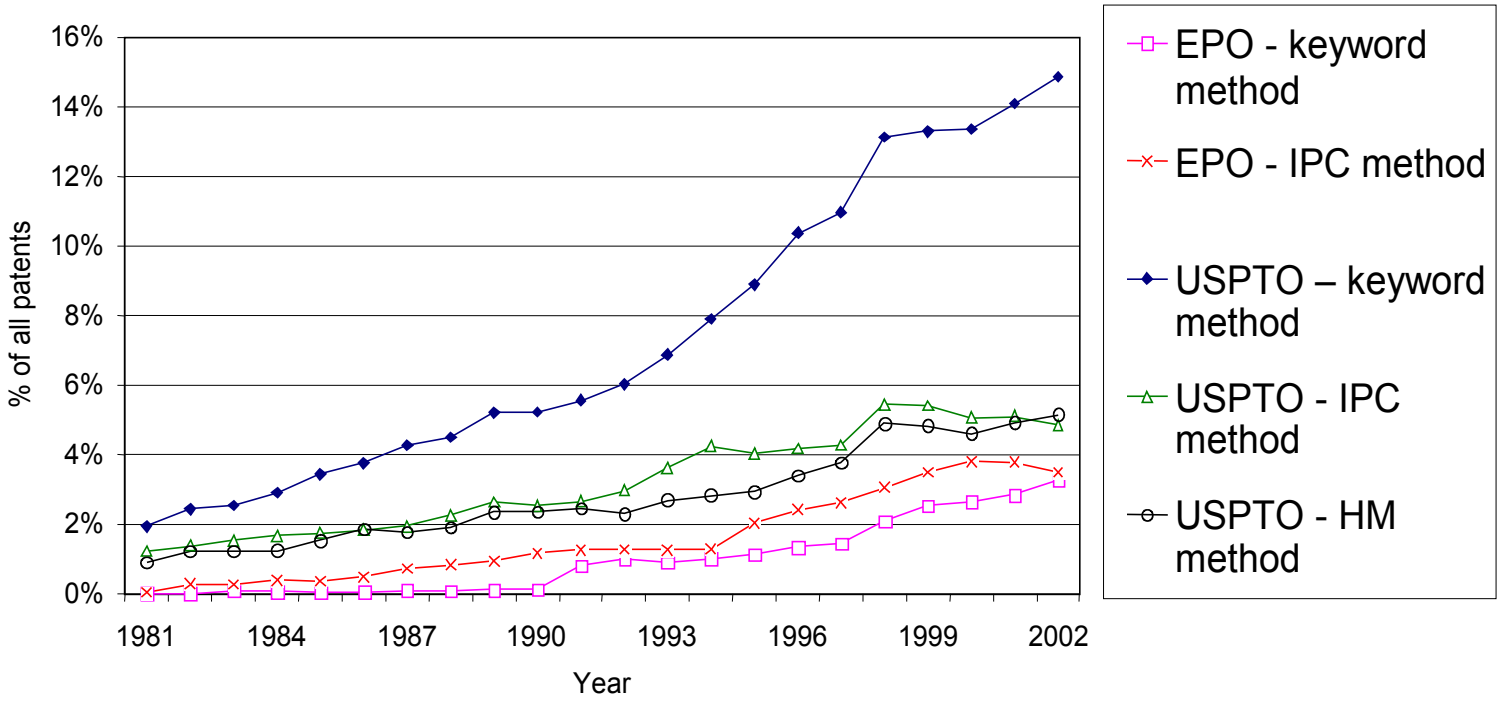
Country of assignee for EPO software patents



Source: Torrisi & Thoma, 2006 CESPRI

Evolution of software patents

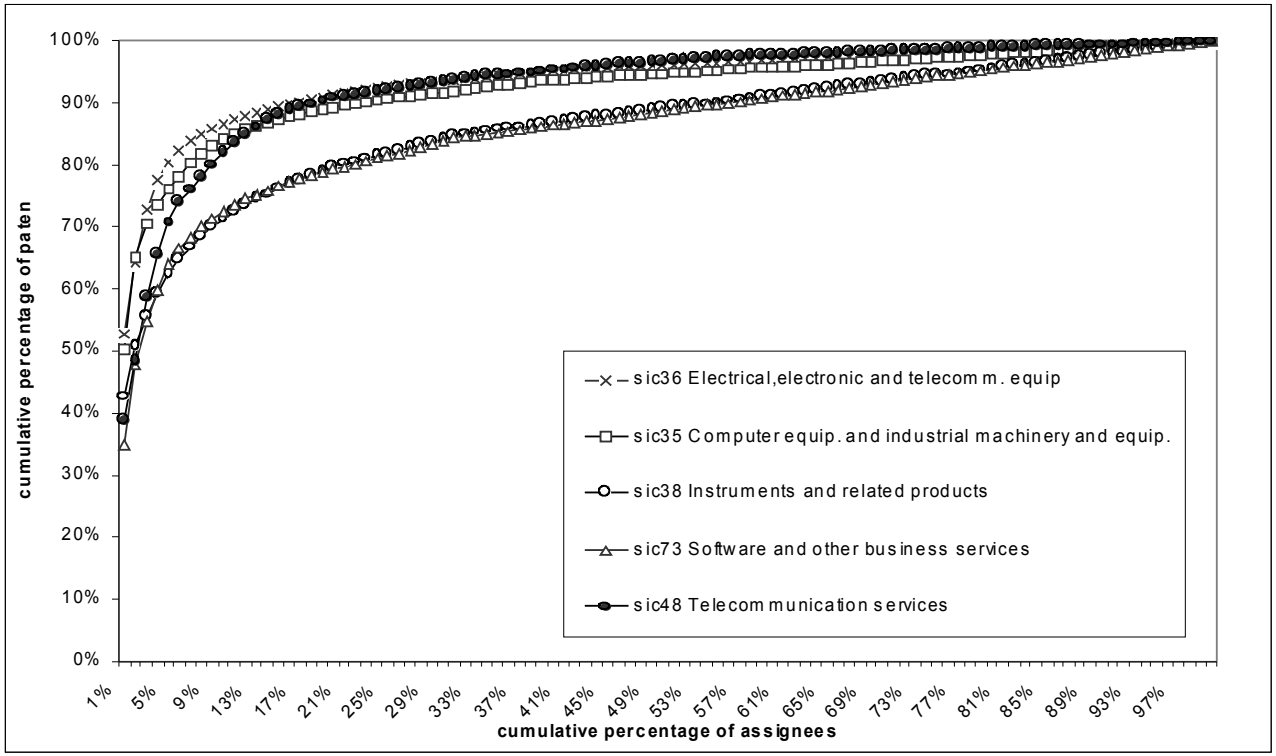
Software patents as a share of all patents, US vs EPO



Source: Torrisi & Thoma, 2006 CESPRI

Evolution of software patents

Concentration of EPO software patents by assignee sector

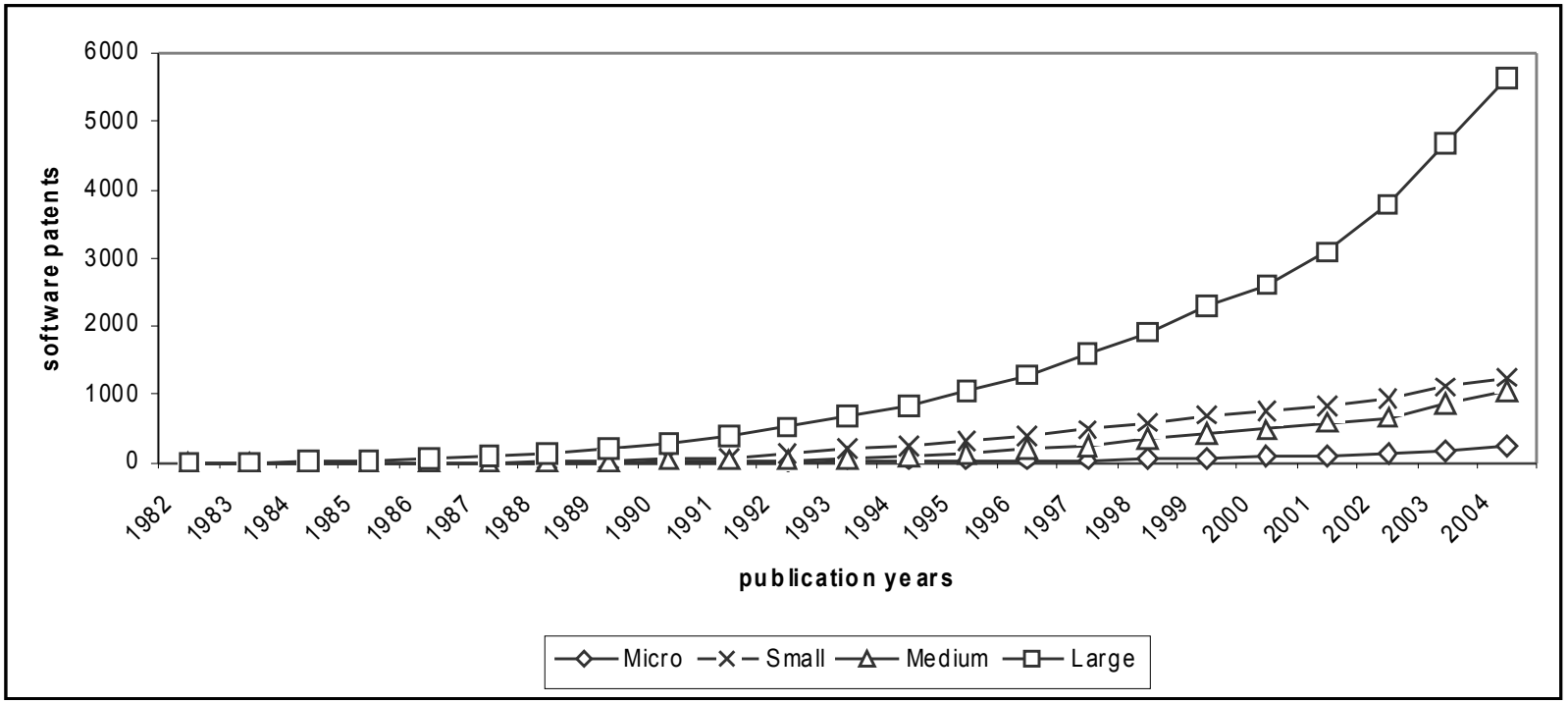


Source: Torrisi & Thoma, 2006 CESPRI

The top 10 assignees account for between 57 and 78 per cent of EPO software patents

Evolution of software patents

EPO software patents by publication year and size* of assignee

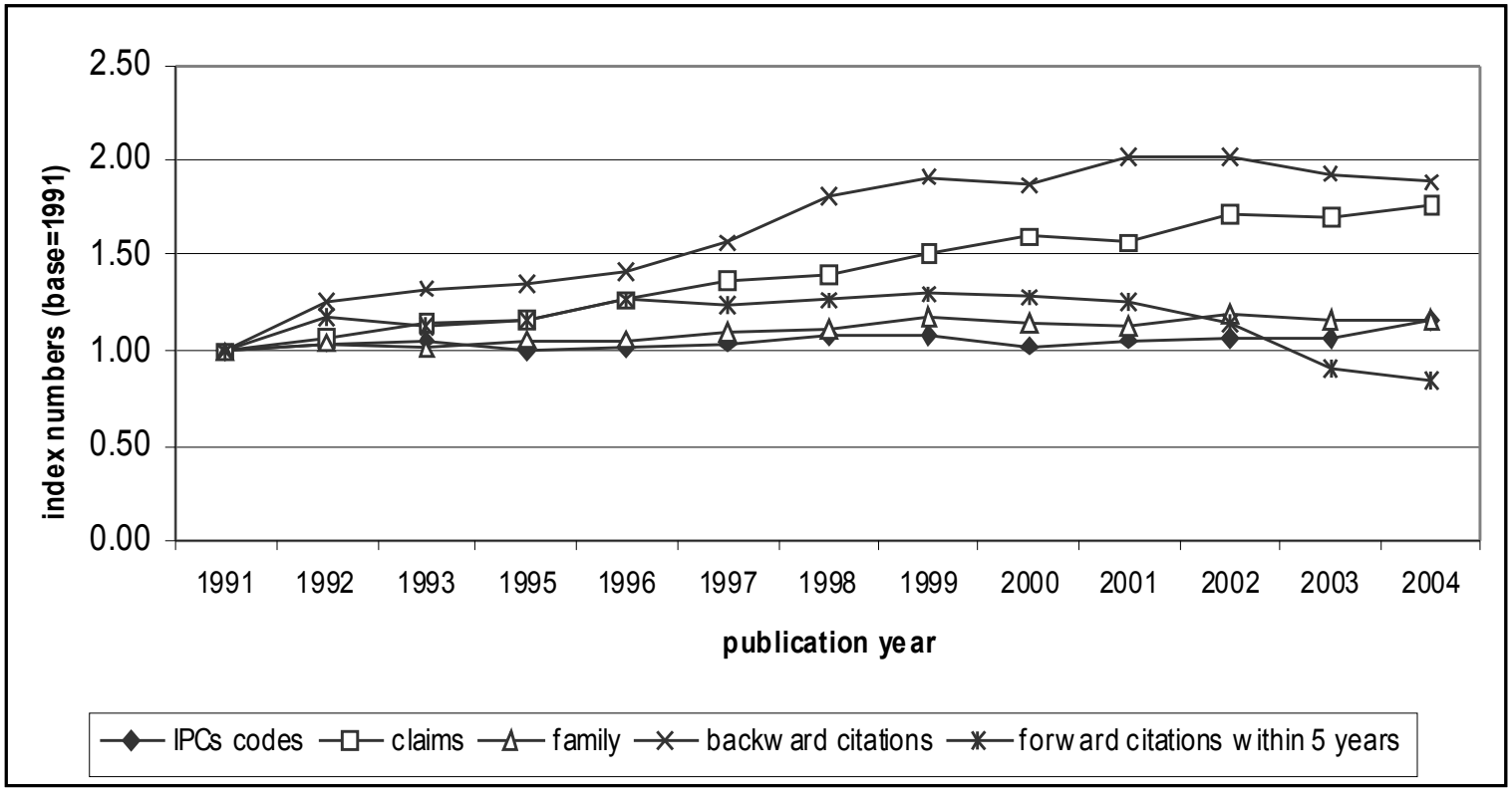


Source: Torrisi & Thoma, 2006 CESPRI

*Size is EU definition. Large >250; Medium >50, Small >10 employees

"Quality" indicators

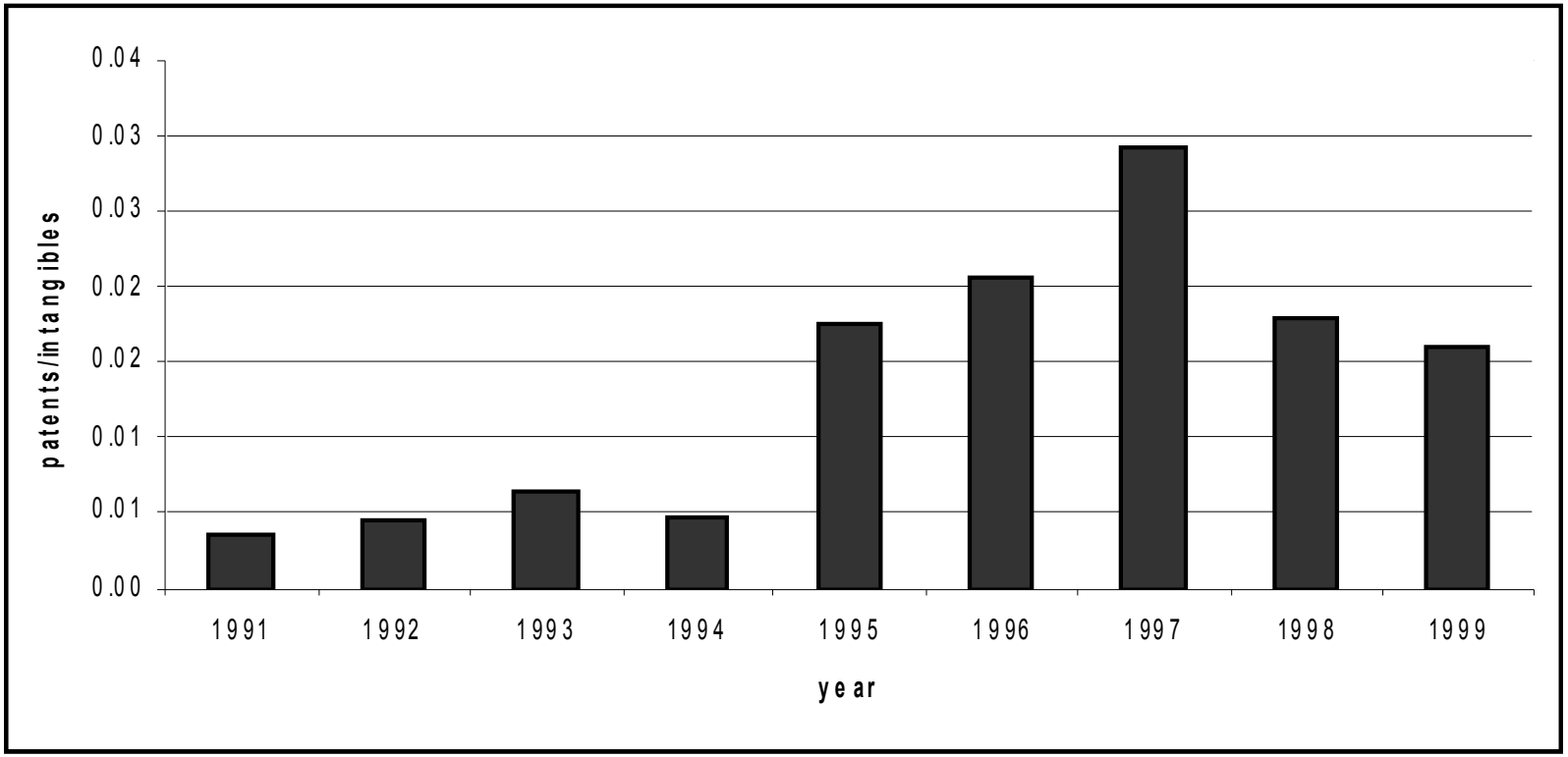
Technical quality can only be measured by inspection of patents themselves; citations etc are possible proxies



Source: Torrisi & Thoma, 2006 CESPRI

Software patents and R&D

EPO software patent stocks per million euros of R&D stocks – US software firms



Source: Torrisi & Thoma, 2006 CESPRI

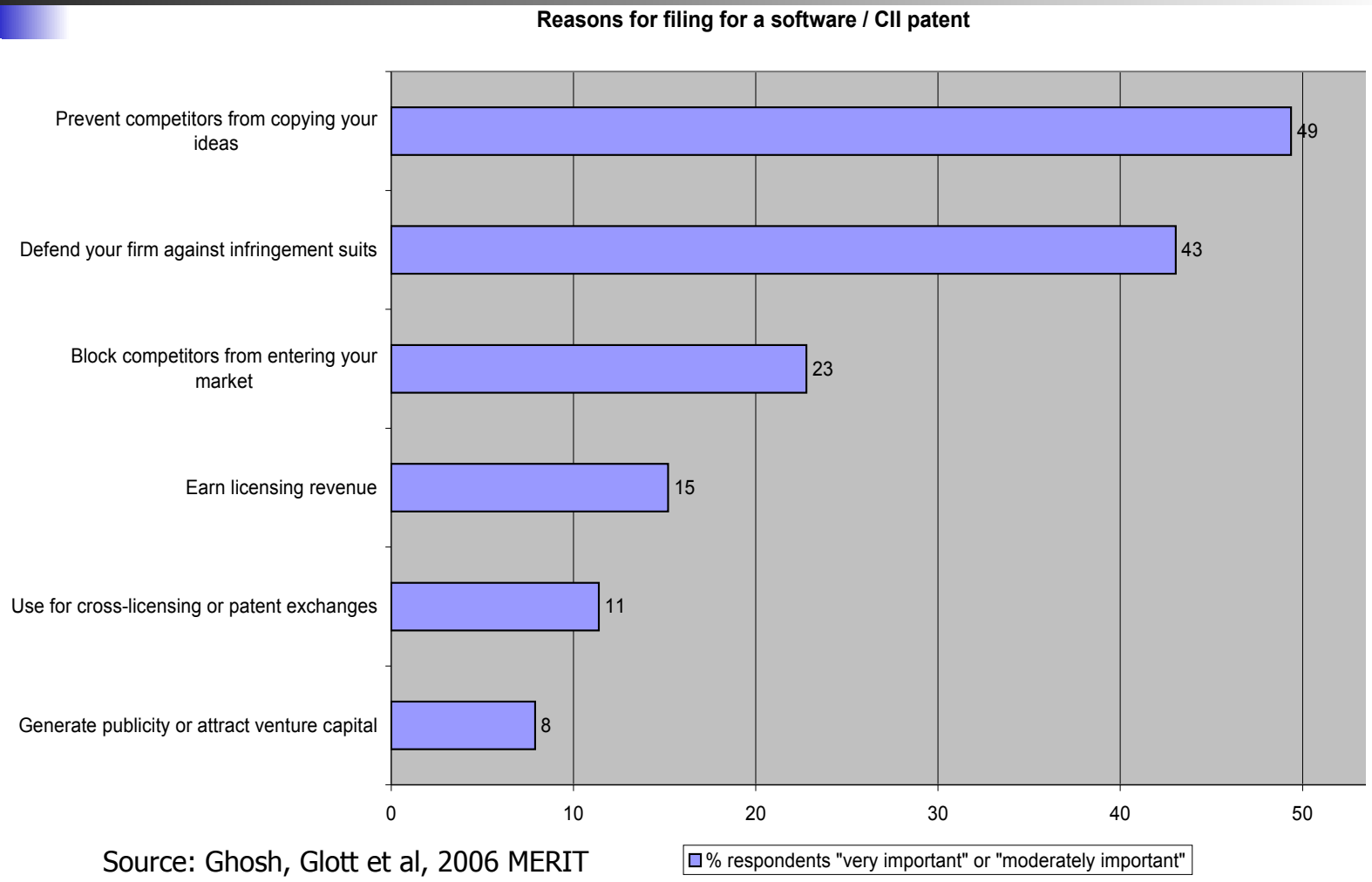
Software patents and jobs

Employment average growth rate for European SSPs, holders vs non-holders of software patents

Sector	Software patenting	1997-99 (base 1994-96)	2000-02 (base 1997-99)	2003-04 (base 2000-02)
IT services	no	81.89%	88.37%	27.96%
IT services	yes	61.47%	59.42%	-6.84%
Pre-packaged software	no	61.66%	66.13%	30.47%
Pre-packaged software	yes	107.40%	131.87%	-11.66%

Source: Torrisi & Thoma, 2006 CESPRI

Why firms patents software



Source: Ghosh, Glott et al, 2006 MERIT

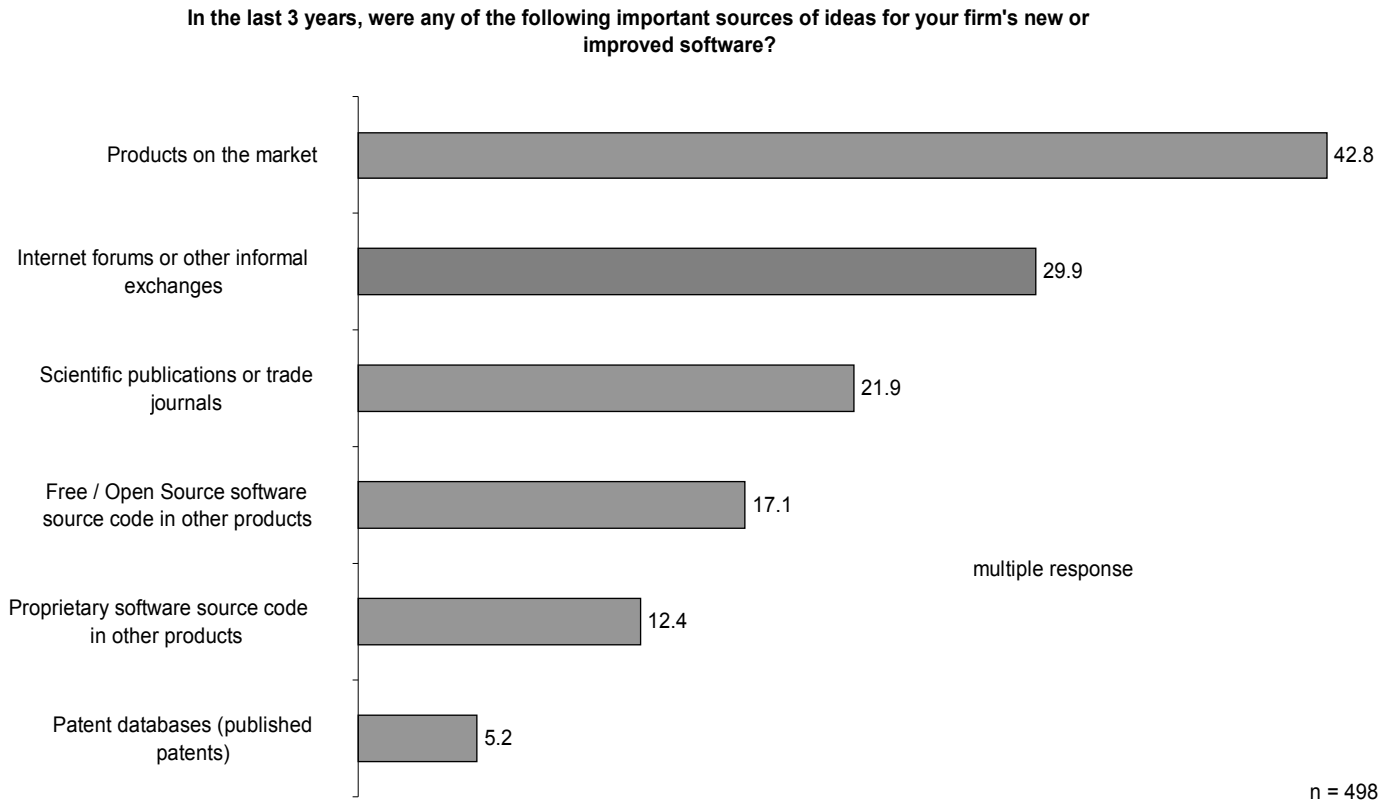
Software patents: inhibition

In the last three years, has concern that your software might infringe a patent led your firm to:	Percentage (n = 498)
Change or abandon a software development project to avoid	10.2
Avoid markets where your software might infringe	11.0
Obtain a patent license in order to develop or use	12.2

multiple response

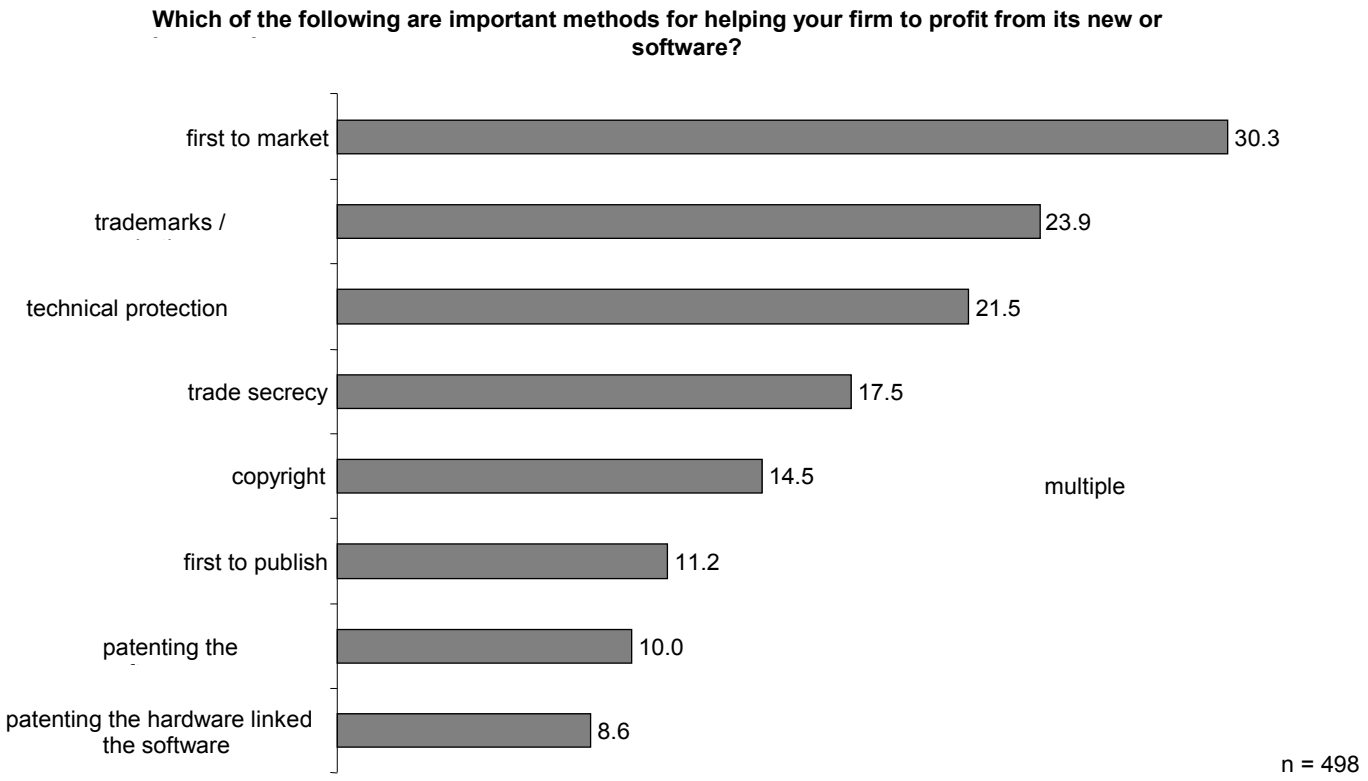
Source: Ghosh, Glott et al, 2006 MERIT

Software patents: disclosure



Source: Ghosh, Glott et al, 2006 MERIT

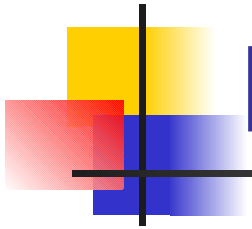
Software patents: importance



Source: Ghosh, Glott et al, 2006 MERIT

Patents and competition

- Patents do not *only* "protect ideas from theft or imitation" - they also prevent independent creation of ideas
- "Patents amount to temporary monopolies on useful new inventions" (*Economist)*
- These monopolies are justified on the basis of increasing knowledge sharing through disclosure, thus increasing innovation
- Needs to be demonstrated through evidence

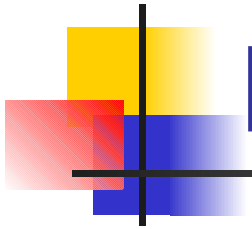


Patents and competition

- Software has three unusual properties
  - Mainly incremental innovation
  - Several problems have only one solution
  - Network effects are very strong

Patents and competition

- Network effects can form entry barriers for new technologies
- Path dependence, QWERTY...
- Natural monopolies to maximise welfare from network effects
- Monopolies can lead to rent-seeking and capture of network externalities



Economics of standards

- Alternative approach: separate technology from producer
- *Truly open standards* allow natural monopolies of technologies (standards) while providing for full competition among *vendors*

Types of standards

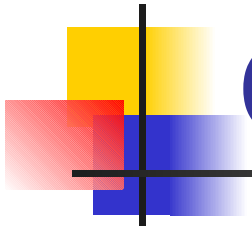
- Proprietary ("standard"?) technologies
  - Natural monopoly in technology leads to natural monopoly in market for products and services based on that technology
  - Results when access to the technology is available only to the rights holders

Types of standards

- ("Semi-open"?) Standard technologies
  - Natural monopoly in technology arises (*de facto)* or is defined (*de jure)* but some competition provided for in market for products and services
  - Results when access to the technology is available to players other than the rights holders, *perhaps retaining advantages for the rights holders*

Types of standards

- Open standard technologies
  - Natural monopoly in technology arises (*de facto)* or is defined (*de jure)* but *full* competition provided for in market for products and services
  - Results when access to the technology is available to all (potential) players on equal terms providing *no a priori advantages based on ownership of rights*



Open source software

- Provides main competing product in:
  - Web servers (#1 in market share)
  - Server operating systems (#2)
  - Network file systems (#2)
  - Office productivity software (#2)
  - Web browsers (#2)
- Assumes authors have *full rights* to created software – compatible with copyright (independent creation), not with patents