

Idiosyncrasies of the Software Development Process and their Relation to Software Patents: Theoretical Considerations and Empirical Evidence

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Outline of the Talk

- Introduction: Current discussion
- Theoretical hypotheses
- Empirical results
- Summary
- Policy proposals

Background and Objective of the Study

- Current discussion on European harmonisation - German contribution
- **Consortium**
 - Max Planck Institute for Foreign and Intern. Patent, Copyright and Competition Law, Munich (Prof. Dr. Joseph Straus, Ralph Nack)
 - FhG-ISI
- Comparative legal analysis by MPI: EU, Germany, US, Japan
- **Objectives:**
 - Evaluation of the present patent protection status for software innovations
 - Effects of current and possible future IPR on innovation and growth: is software a special case?
 - Identification of policy challenges and appropriate forms of

The legal situation in Germany and Europe:

- legal doctrines of patent law unclear on patent eligibility of computer programmes
- a case analysis (court decisions) shows different levels of protection in different software areas
- general rule: the patentability of a computer programme is affirmed, if its content is related to the area of engineering sciences (“technical”)

The legal situation in the USA:

- patent eligibility of computer programmes is unlimited at present
- business process methods more and more patented
- main criticism (in the US):
 - patent eligibility of business methods
 - insufficient examination of patent applications dealing with computer programmes

Basic assumptions about software development

- The innovation activities in the software area show special features: interoperability, sequentiality, open source
- Software patents might have special - more detrimental (?) - effects in this area .
- Methodological/theoretical approach:
economic significance of software patents determined by
 - present behaviour
 - the development of future innovation activities
 - the attitudes of the actors about the effect of legal changes.

Most important idiosyncrasies of software and the innovation processes in the software area:

- Sequentiality, that is the fact that new developments build very strongly on the already existing programme parts or codes
- Importance of the possibility to use code for free for development (Open Source)
- Interoperability, i.e. the necessity to make individual developments compatible with others
- Further features:
 - speed of innovation and extreme short innovation cycles
 - intensive interaction in development
 - parallel and complementary developments
 - uncertainty of the origin of partial inventions (code)
 - cheap worldwide diffusion of products via the Internet

Hypotheses about the extent of peculiarities in the innovation process of software products

- H1: The innovation process in software development is characterised by great sequentiality, which manifests itself in a high rate of code re-use.
- H2: Enterprises which develop software utilise external code to a great extent, and increasingly also code from the Open Source area.
- H3: A central requirement for enterprises, which develop software, is the interoperability of their products with programmes of other origin, especially those of their customers and competitors.

Hypotheses about the extent of peculiarities in the innovation process of software products

H4: Proceeding from the theoretical literature, enterprises are already affected by patents covering software innovations. The more they rely on external input in their development process and the more the interoperability of their products with other software is important, the more their software development is hindered by intellectual property rights of other companies. On the other hand, if the company relies primarily on internal development, it has little problems with the intellectual property rights of others.

H5: The companies develop different positions on possible software patenting regimes, depending on their position regarding the three cited dimensions of the innovation process. The more pronounced the particularities are, the more problematical the extension of patents in the software area is estimated.

The sample of the survey

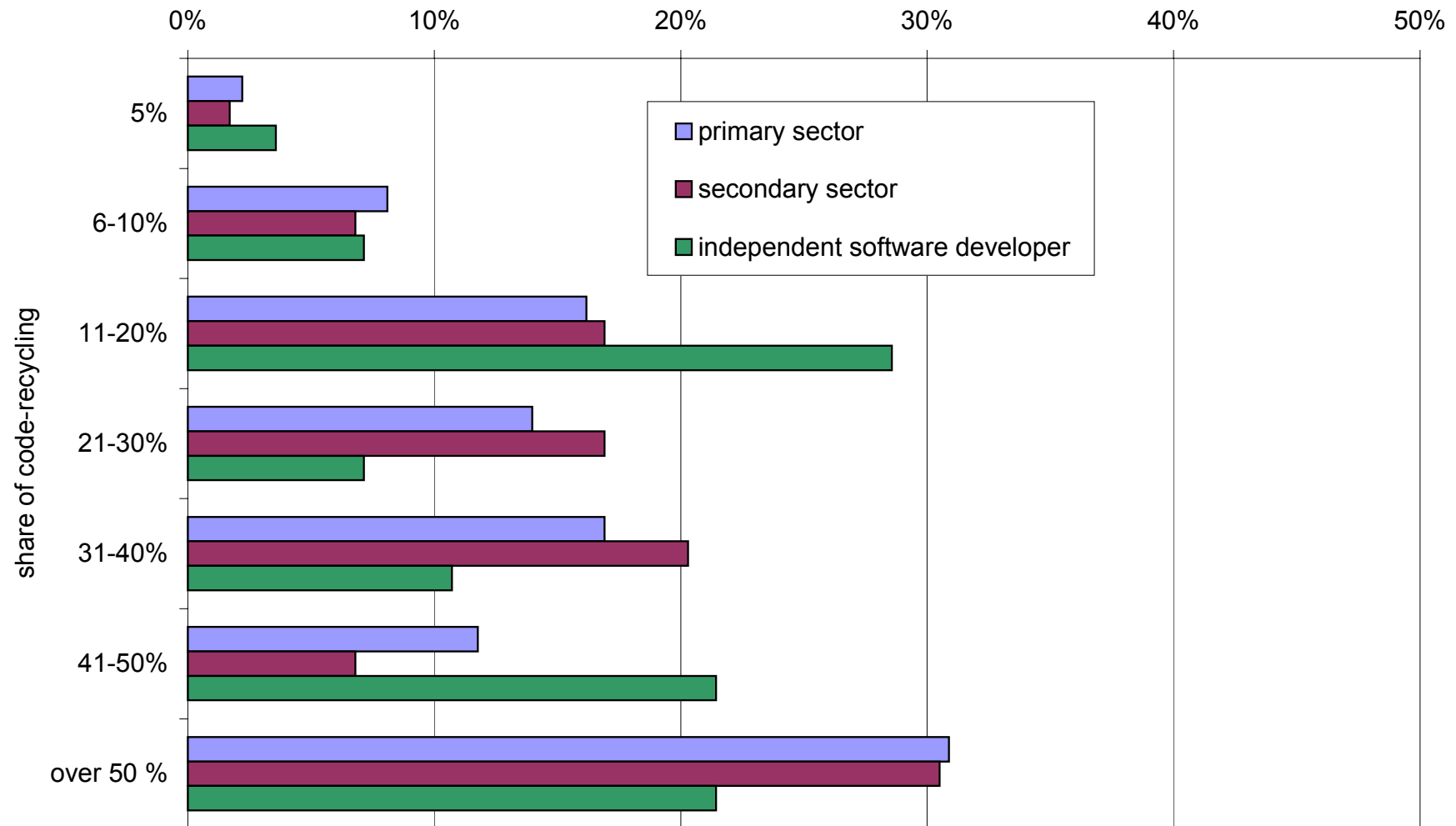
Two Groups:

- *Primary sector (answering $n = 188$):*
 - Software-developing enterprises ($n = 149$)
 - Independent Software Developers (ISD) ($n = 39$)
- *Secondary sector ($n = 68$)*

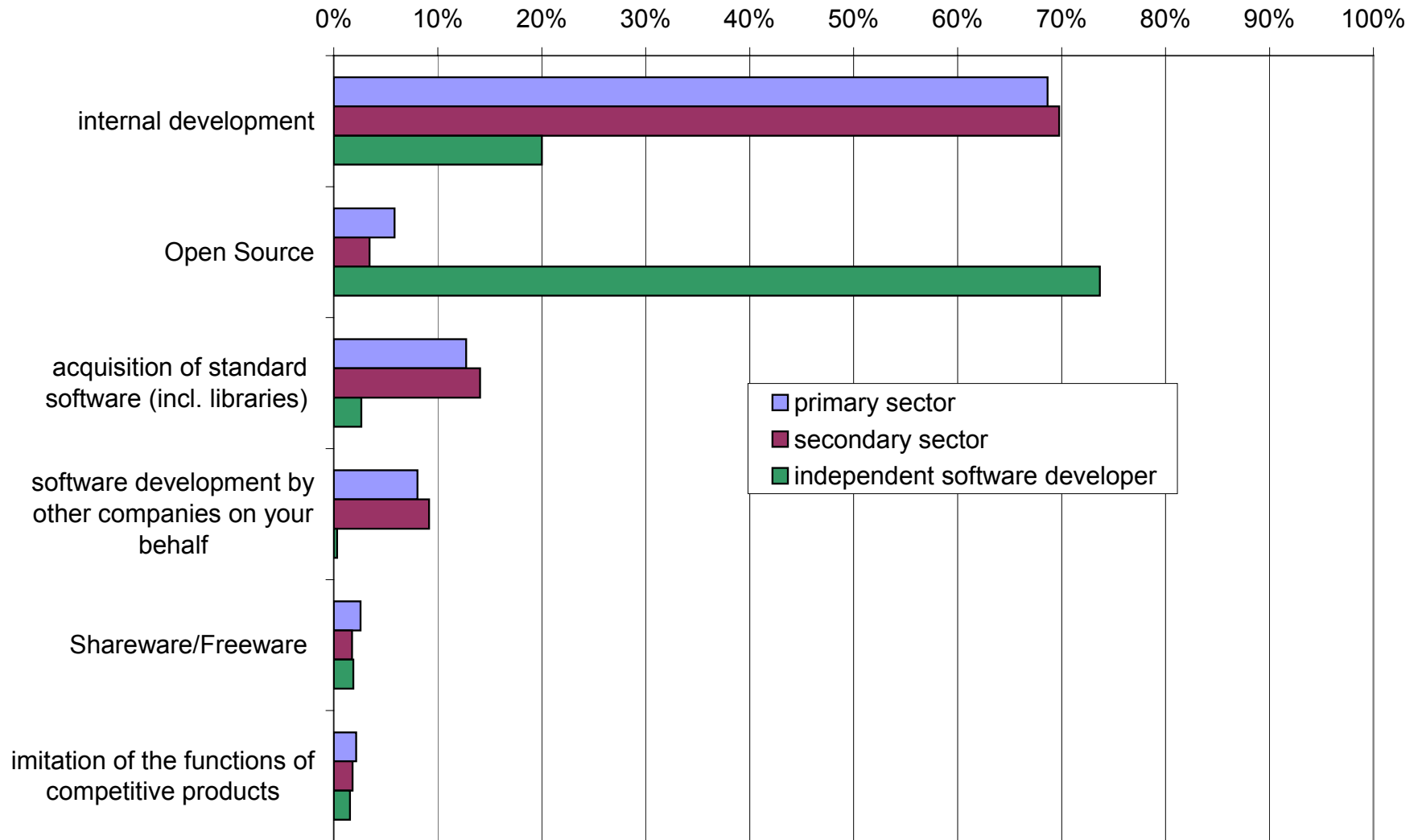
Whole range of software products covered

- independent final product, embedded, customised
- software alongside hardware production
- all kinds of functionality (technical, media, management, systems-related etc.)
- individual solutions, small lot, standardized

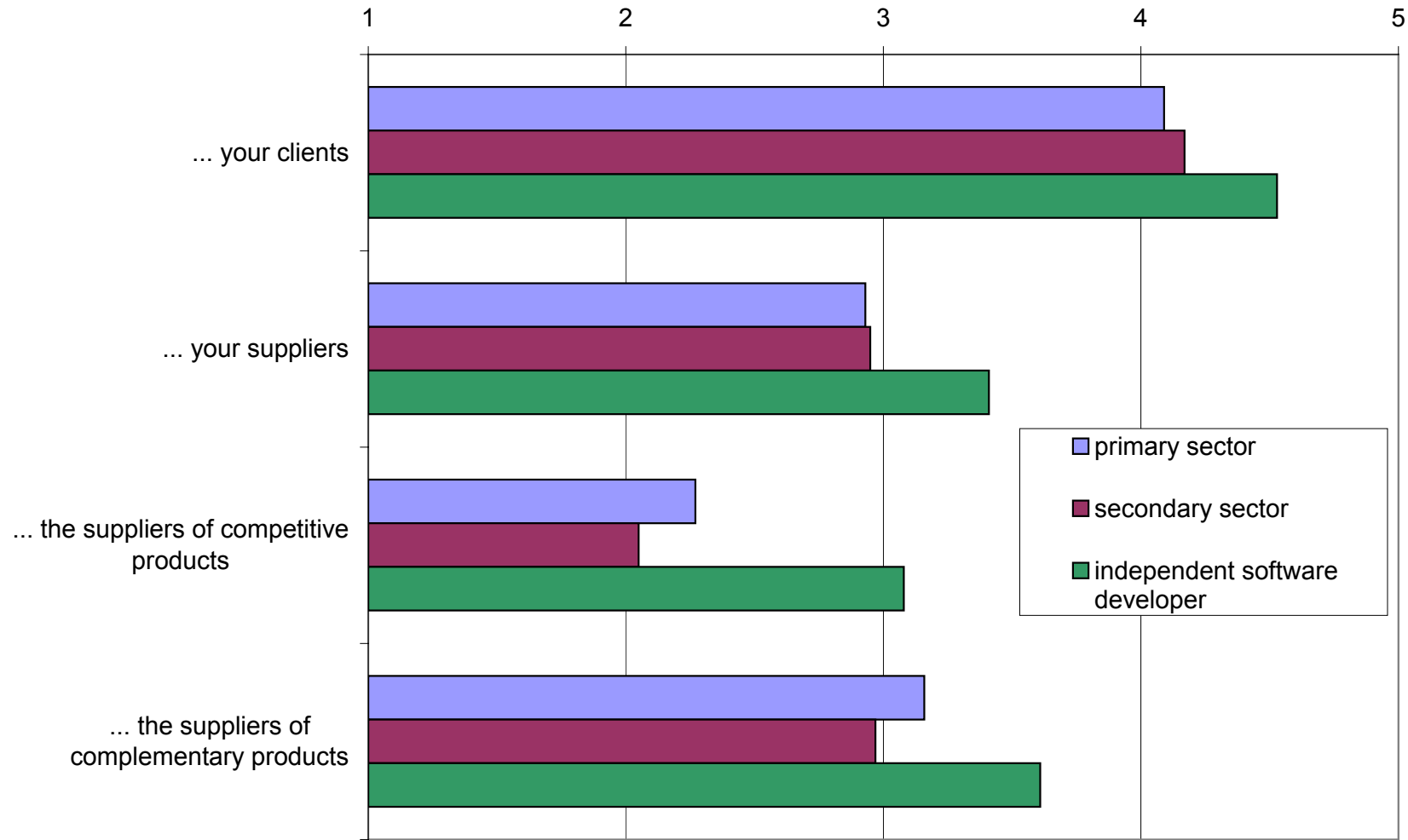
Share of Code Re-utilisation in Self-developed Software



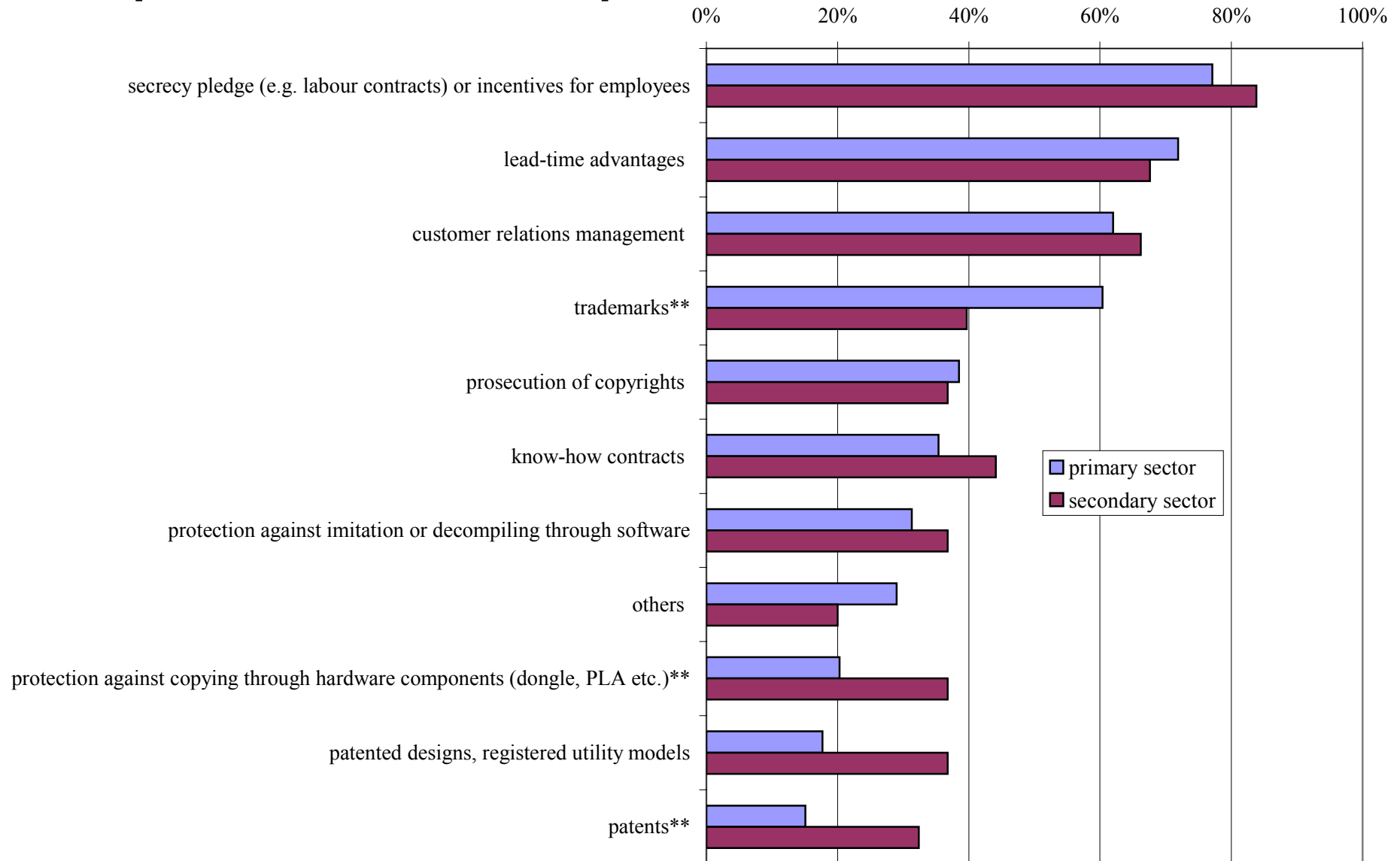
Origin of Software in Software Products



Importance of Interoperability with Software of Various Actor Groups (1 = very low, 5 = very high)



Utilisation of various Instruments to protect software- and computer-related Developments



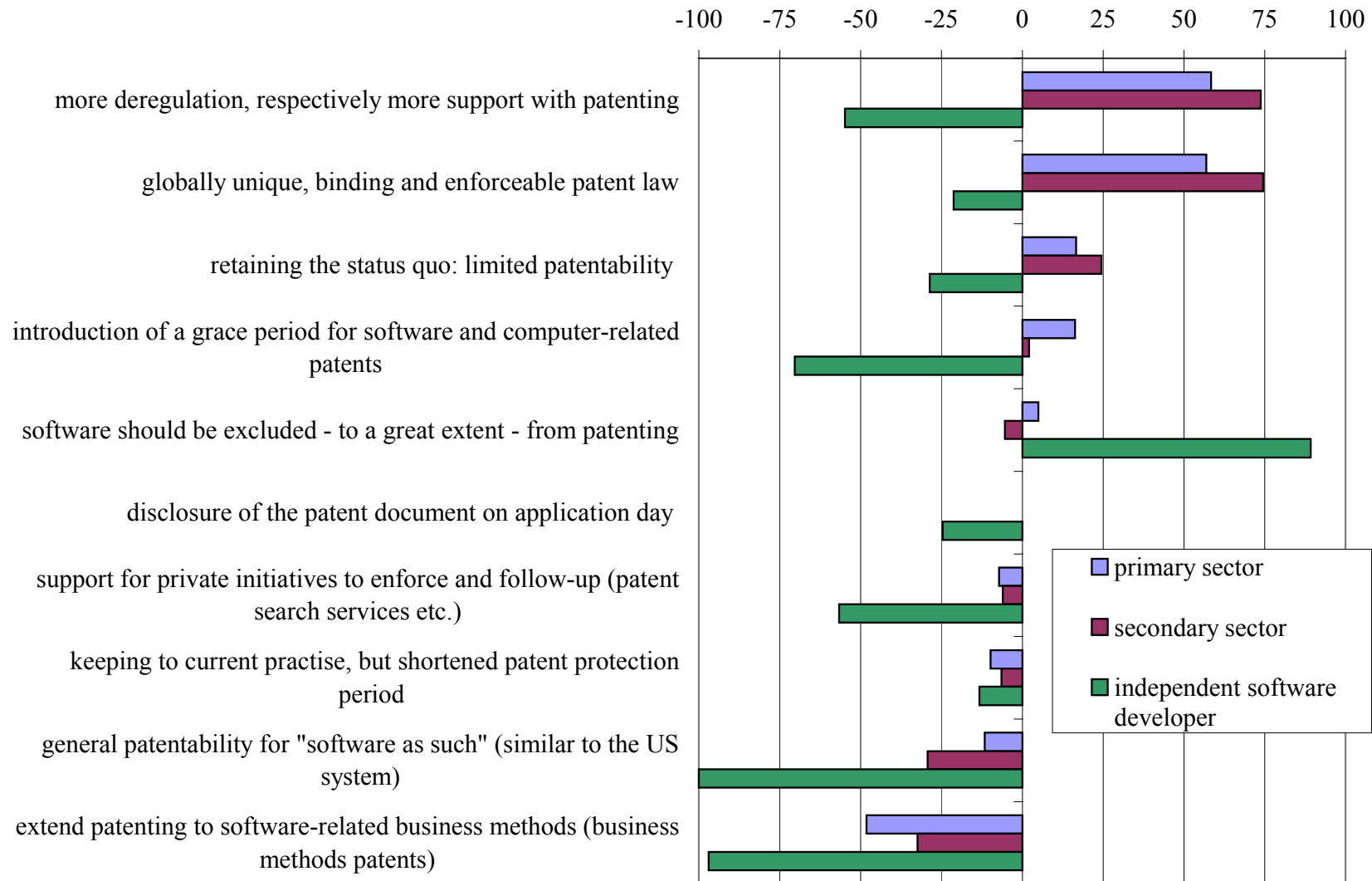
Share of companies with problems in the software development process caused by foreign intellectual property rights

	Share of Companies in %
Problems in general	26.32
Project extended	22.18
Project cancelled	7.89
Project not started	11.65

Results of a Probit analysis

	Model 1 General problems		Model 2 Delay		Model 3 Cancellation		Model 4 Ex ante renuncia- tion	
	coeffi- cient	z-value	coeffi- cient	z-value	coeffi- cient	z-value	coeffi- cient	z-value
SEQU	-0.00036	-0.61	-0.00030	-0.48	-0.00116	-1.32	-0.00031	-0.41
OPSO	0.01191***	3.01	0.01087***	2.72	0.00426	0.92	0.01221***	2.83
INTCUS	-.00310	-0.04	0.00025	0.00	-0.00374	-0.03	-0.02337	-0.22
INTSUP	-.058350	-1.01	-0.09267	-1.55	-0.04723	-0.60	0.05922	0.84
INTSUB	-.017210	-0.20	0.07835	0.91	0.05486	0.52	0.04436	0.44
INTCOMP	0.23704***	3.08	0.14344*	1.83	0.25787**	2.24	0.18369*	1.90
IND	-0.00567**	-2.31	-0.00468*	-1.88	-0.00151	-0.42	0.00096	0.30
Constant	-0.97893**	-2.26	-1.01342**	-2.31	-1.98717***	-3.07	-2.22698***	-3.61
PseudoR2	0.1387		0.1221		0.1347		0.1670	
Log Likeli- hood	-132.03888		-123.57276		-63.572559		-79.759651	
Number of Observations	266		266		266		266	

Attitudes towards Different Options to change the Current IPR Regime concerning Software Patenting



Share of Companies agreeing to Three Different IPR Regimes of Intellectual Property Rights

	Share of Agreeing Companies in %
Status quo	31.95
Restriction of software patenting	39.85
Extension of software patenting	20.30

Results of a Probit Analysis

	Status quo		Restricting software patenting		Extending software patenting	
	coefficient	z-value	coefficient	z-value	coefficient	z-value
SEQU	-0.00828**	-1.97	0.02061***	3.65	-0.044670***	-3.03
OPSO	-0.00056	-1.07	-0.00083	-1.52	-0.00010	-0.17
INTCUS	-0.06697	-0.93	0.04901	0.66	0.08489	0.91
INTSUP	-0.03134	-0.57	0.02916	0.49	0.08606	1.32
INTSUB	-0.00548	-0.07	0.10471	1.22	0.01825	0.20
INTCOMP	0.07356	1.07	-0.00047	-0.01	0.03870	0.51
IND	-0.00085	-0.38	0.00498**	2.08	0.00210	0.83
PATEX	0.11475	0.55	-0.55738**	-2.54	0.45021**	2.07
Constant	-0.00763	-0.02	-0.93930**	-2.59	-1.49922***	-3.19
PseudoR2	0.0226		0.1853		0.1370	
Log Likelihood	-162.89766		-145.71566		-115.82227	
Number of Observations	266		266		266	

Conclusions

- Existence of idiosyncrasies in software development confirmed (sequentiality, use of Open Source, necessity of interoperability (vertical and horizontal))
- Three factors influence to a different degree both the likelihood of problems with foreign intellectual property rights and the priorities of respective different IPR regimes concerning software patents:
 - sequentiality not significant
 - the intensity of Open Source is the decisive independent variable in all models
 - the interoperability of own software products with complementary software already at present seriously hampered by IPR
- Future IPR regimes in the software sector have to take into account their impact on the use and development of Open Source.
 - negative impacts negligible in the short run
 - in the long run: progress of Open Source as a kind of public good, which promotes innovation dynamics, will be seriously injured

Policy proposals

- Companies wish international harmonisation and legal security and clarity of law
- Supplementary guidelines towards a clearer and more appropriate demarcation on what is patentable and what is not (example: bio-patents): regularly updated and discussed by international experts
- Additional “software” code in patent classification in order to ease search for state of the art and existing patents
- Open Source needs some sort of protection from protection
- Of practical use would be
 - administrative simplifications, support (patent information systems, consulting infrastructure etc.)
 - knowledge building
 - improve own possibilities for utilisation
 - deal better with foreign patent systems