JÖNKÖPING INTERNATIONAL BUSINESS SCHOOL
JÖNKÖPING UNIVERSITY

Locational Conditions, Local vs. Nonlocal Cooperation and Firm Innovativeness

Evidence from Research and Company Spin-Offs

Local to global, global to local

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CESIS

Centre of Excellence for Science and Innovation Studies

Introduction

- Spin-offs and their unique role in the economy (means of transferring knowledge and technology, product innovators, higher survival rates)

- Research focus of studies on spin-offs
  - Process of creation and development of spin-offs (parent organization's support)
  - Locational patterns: role of proximity to knowledge source, locational decisions
  - Either on research spin-offs only or company spin-offs only

Research Questions

- To what extend do locational conditions influence the cooperation activities and innovativeness of spin-offs?
- Does cooperation have an effect on spin-off innovativeness? If so, is it local or nonlocal cooperation that is the more conducive to innovativeness?
- How important is the entry type (research vs. company origin of the spin-off) for the firm's innovativeness and performance?

Hypotheses

H1: Suitable locational conditions (such as availability of qualified labor, transportation infrastructure, proximity to research facilities) enhance the cooperation intensity, in particular with local partners, and the innovativeness of firms.

Hypotheses

H2(a): High cooperation intensity enhances firm innovativeness.

H2(b): Nonlocal collaboration ties enhance the innovativeness of established spin-offs to a greater extent than purely local links.

Hypotheses

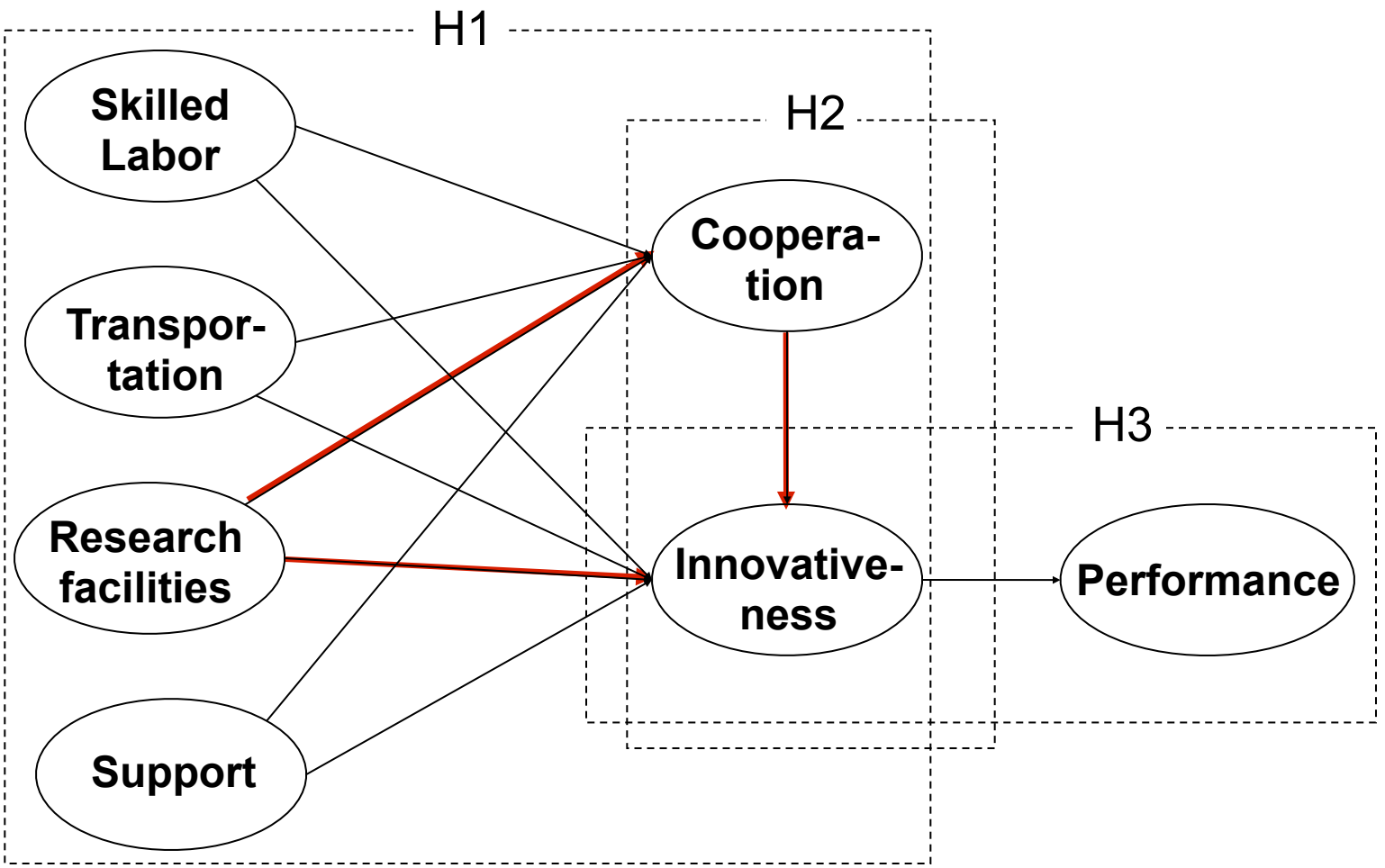
H3: Firm performance is positively affected by innovativeness.

Hypotheses

H4: Spin-offs are more innovative than firms created in other ways.

H5: Established spin-offs show better firm performance than types created in other ways.

Structural Model (Basic)



Estimation of the Structural Equation Model (SEM)

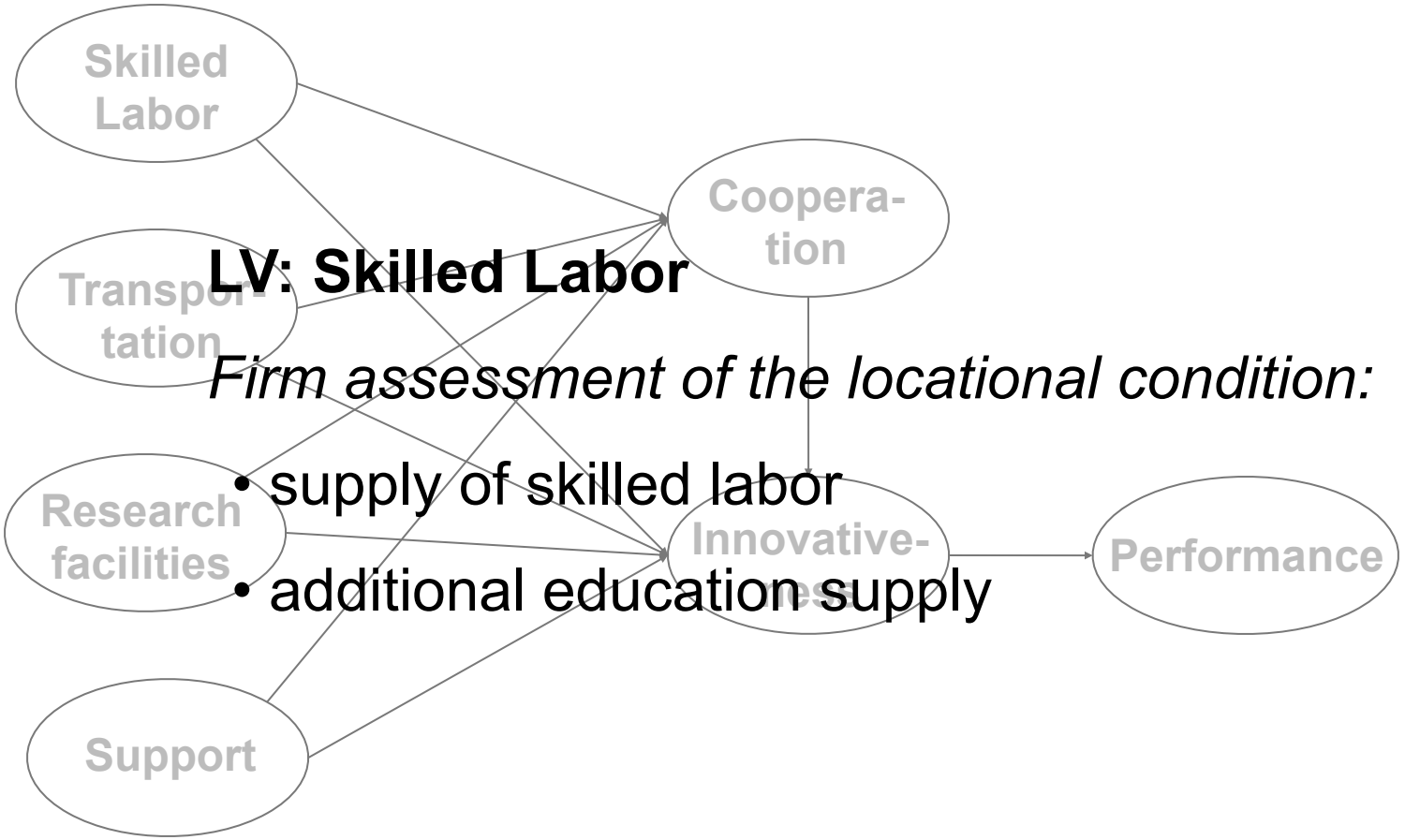
Comparison of SEM estimation approaches

PLS (Herman Wold, 1982)	**LISREL (Karl Jöreskög,**
variance-based	covariance-based
OLS	Maximum Likelihood
soft-modelling (distribution free)	distributional assumption on model variables
explicit estimation of LV	—
small-sized samples	200 and more observations
reflective and formative LV	reflective LV; formative LV only for exogenous LV
statistical inference based on bootstrapping	direct tests of model parameters using

Data

- Large survey conducted in year 2004 for the German Ministry of Education and Science
- Responses from about 6200 East German firms (response rate 20%)
- 79 research spin-offs, 410 company spin-offs from knowledge-intensive branches
- Special focus on innovativeness and collaboration activities
- Assessment of the (1) the importance and (2) the quality of 12 different locational factors, e.g.
  - local qualified labor availability
  - presence of local public research institutes / universities
  - business promotion and support by the local government
  - …

Empirical Implementation of the Structural Model

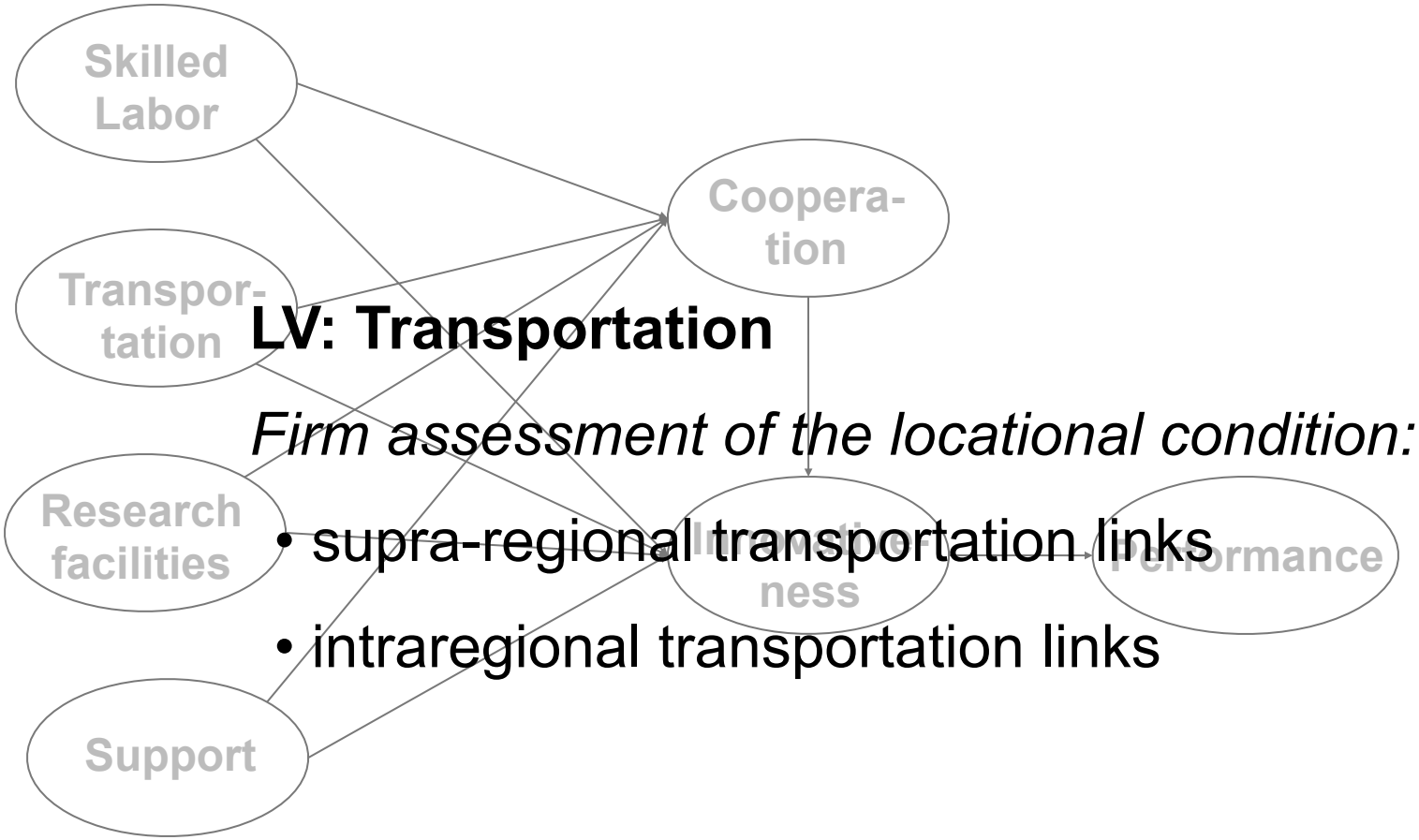


LV: Skilled Labor

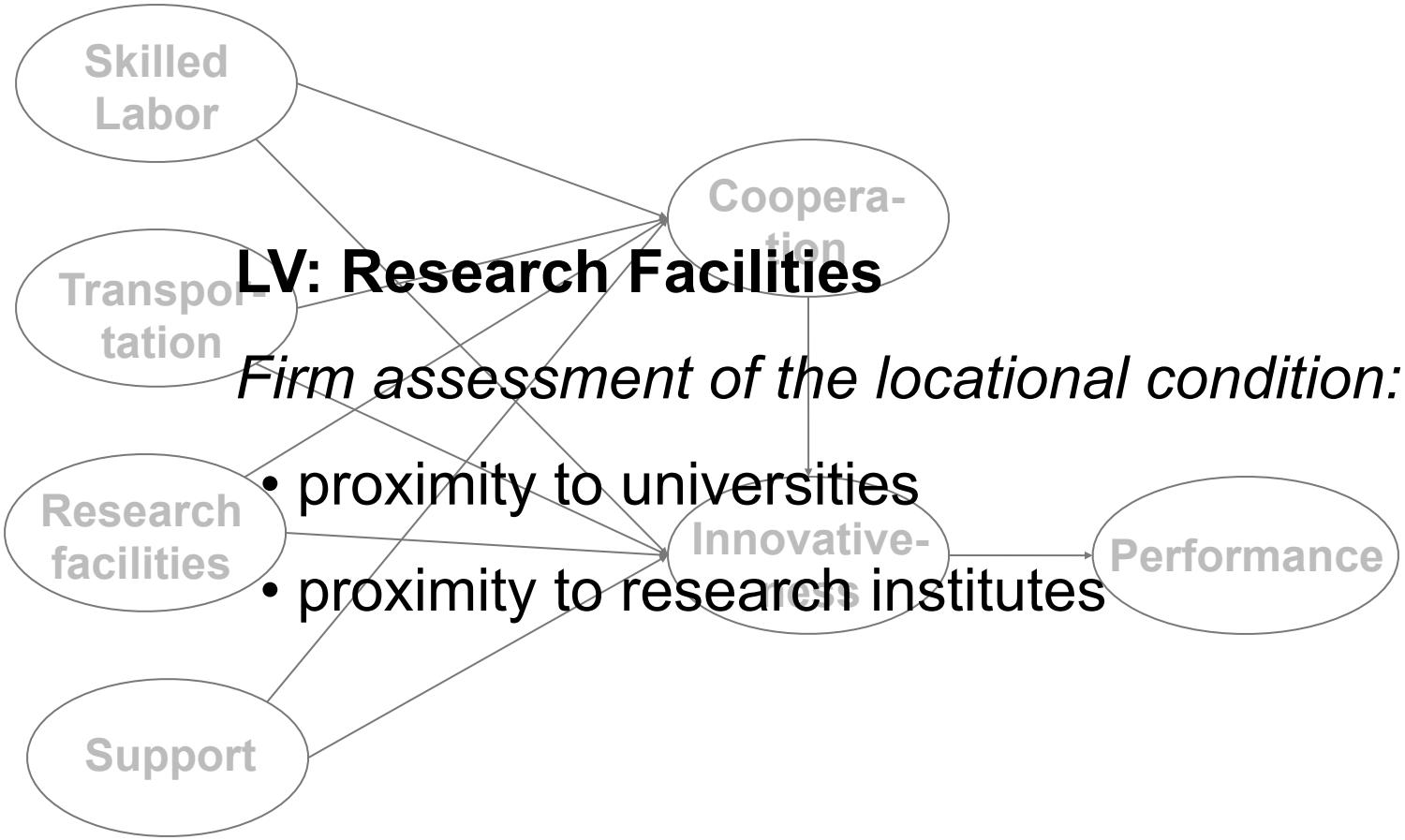
Firm assessment of the locational condition:

- supply of skilled labor
- additional education supply

Empirical Implementation of the Structural Model



Empirical Implementation of the Structural Model



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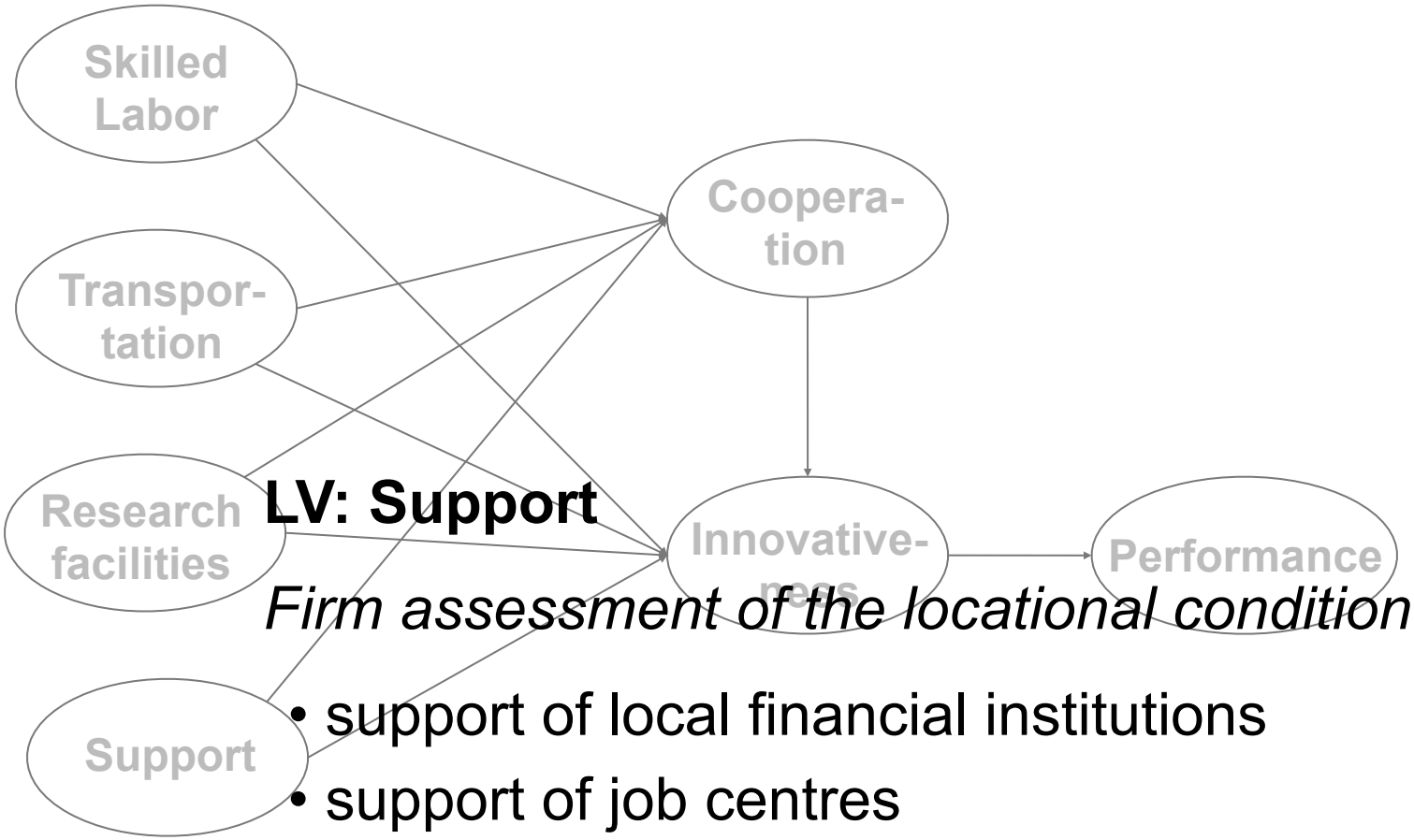
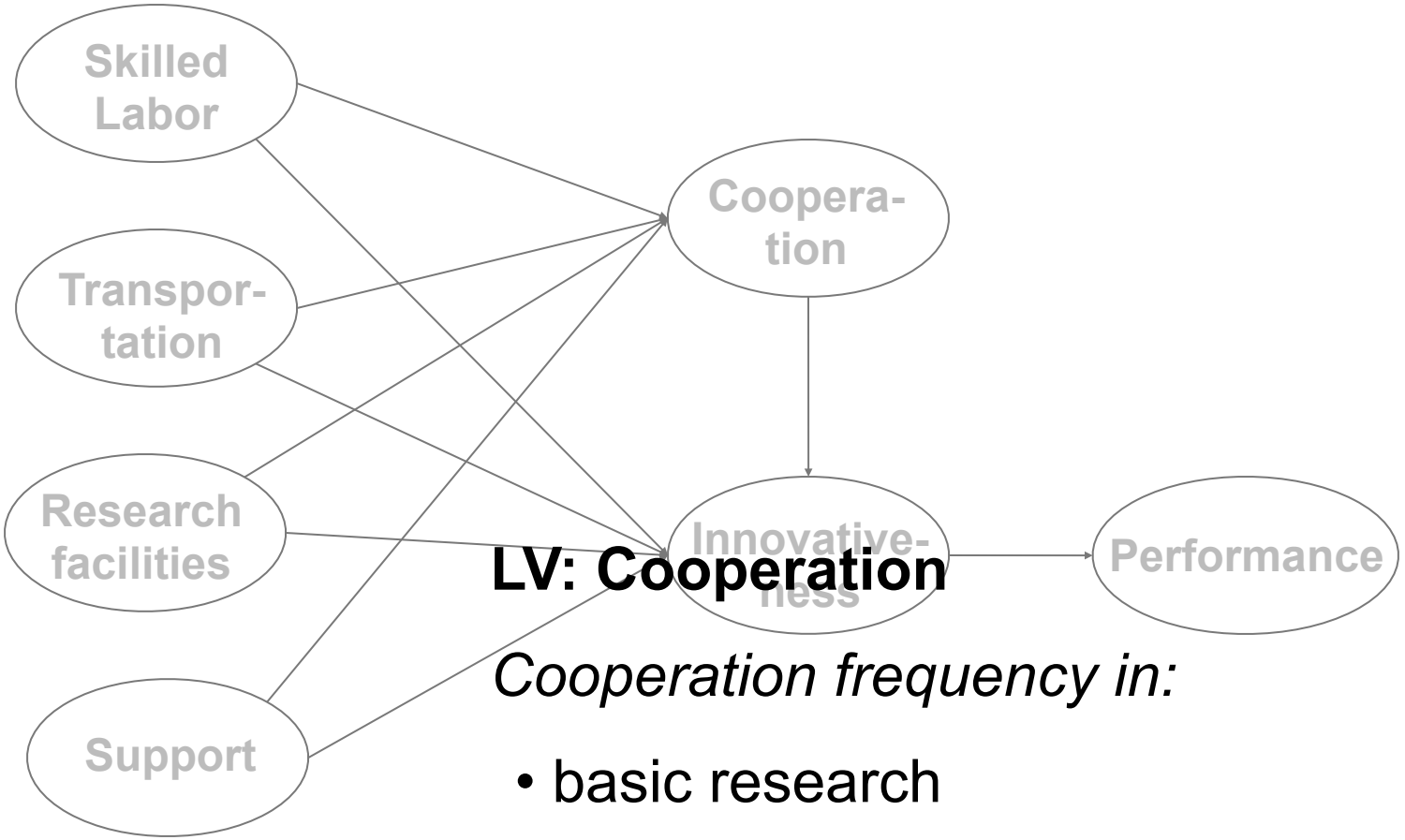


LV: Support

Firm assessment of the locational condition:

- support of local financial institutions
- support of job centres
- local government support
- support of business development corporations
- state government support

Empirical Implementation of the Structural Model

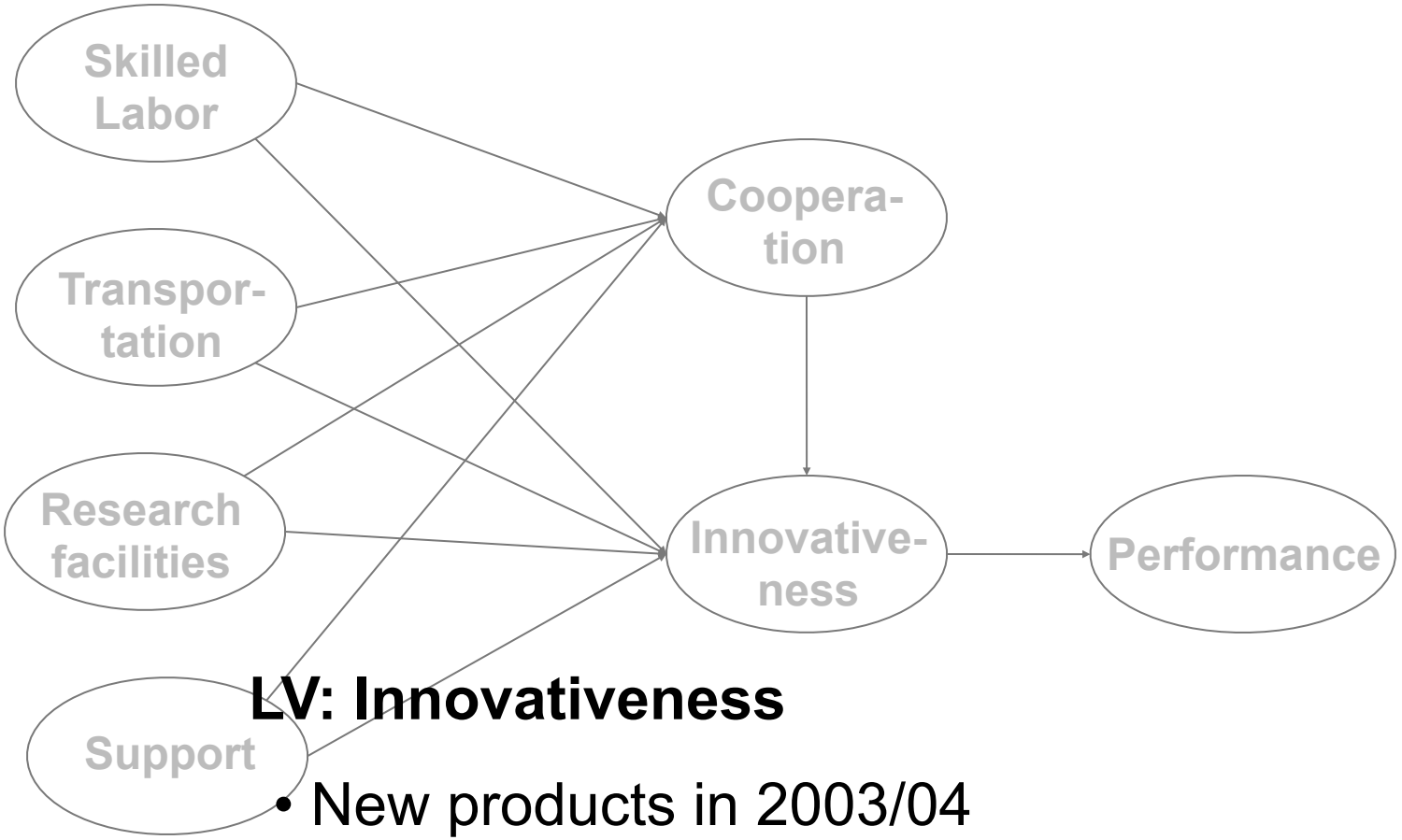


LV: Cooperation

Cooperation frequency in:

- basic research
- product development
- process development
- additional education

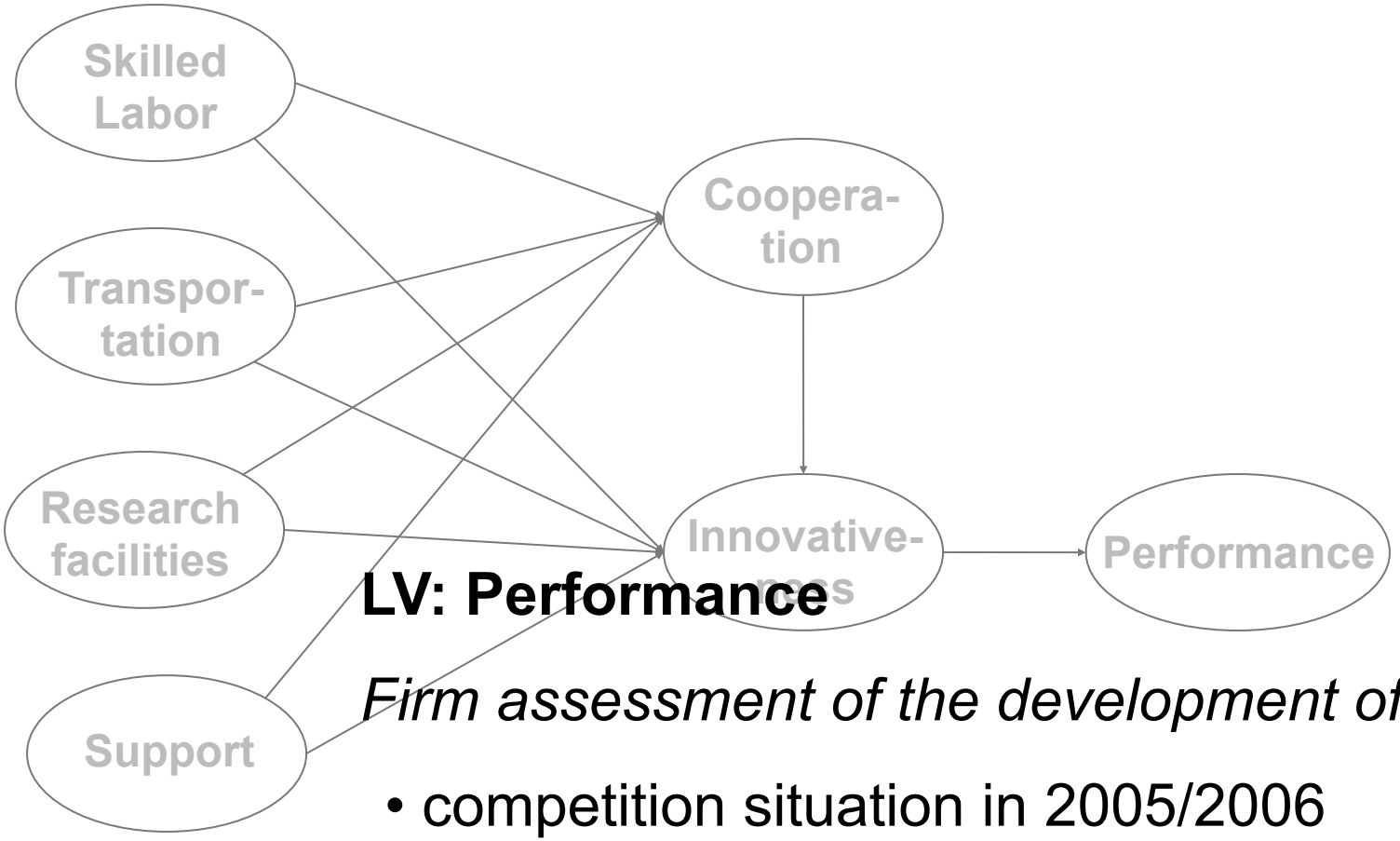
Empirical Implementation of the Structural Model



LV: Innovativeness

- New products in 2003/04
- New processes in 2003/04
- Number of patent applications in 2003/04

Empirical Implementation of the Structural Model



LV: Performance

Firm assessment of the development of:

- competition situation in 2005/2006
- market volume for a medium term

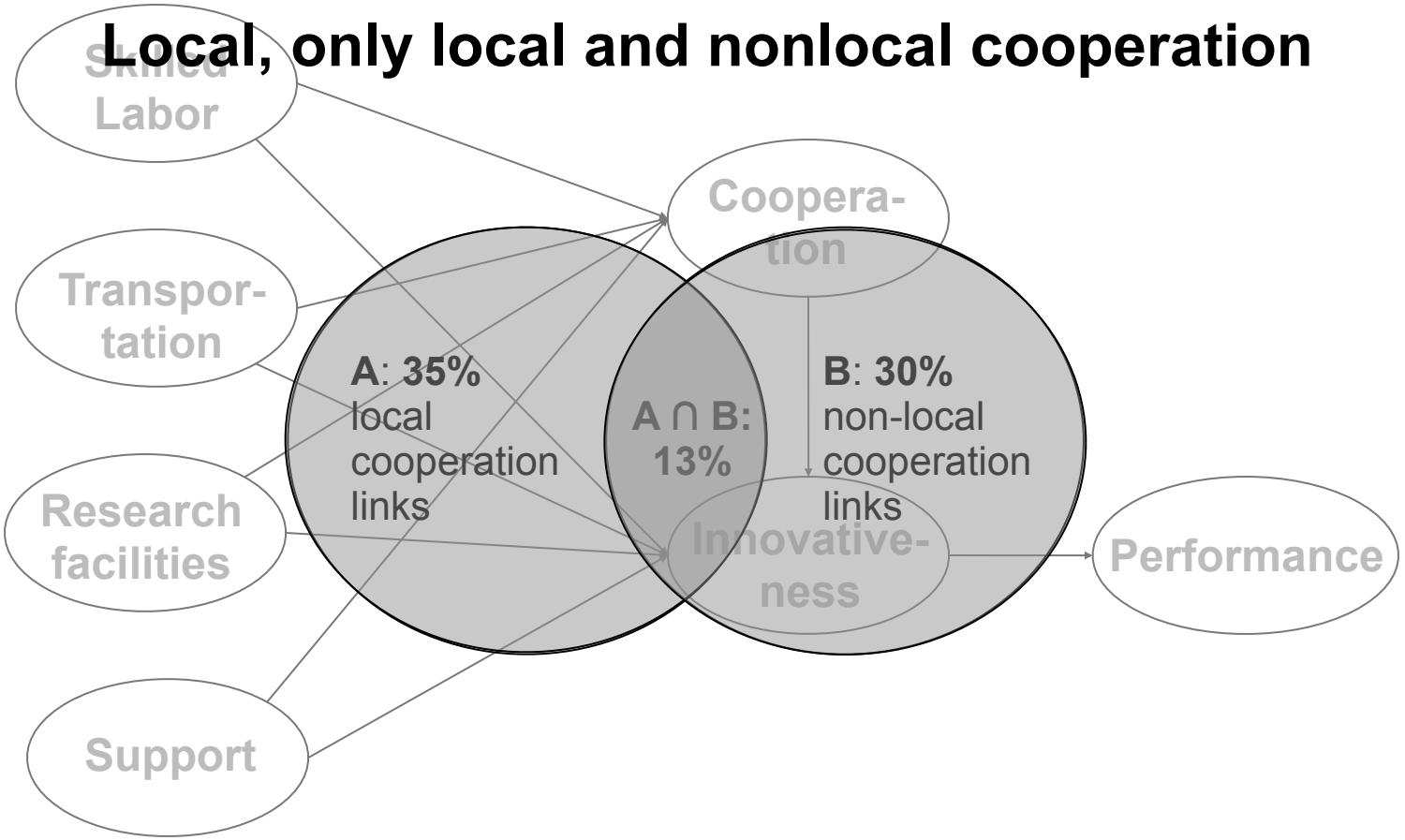
Estimation Results (I): Test of H1, H2a and H3

Inner Model

	Research spin-offs			Company spin-offs		
	Coopera-tion	*Innova-tiveness*	*Perfor-mance*	*Coopera-tion*	*Innova-tiveness*	*Perfor-mance*
Skilled Labor						
Transportation	0.280					
Research facilities	0.302			0.407	0.132	
Support		0.477 *		0.146	0.208	
Cooperation		0.644 *			0.364	
Innovativeness			0.334			0.301
R^2 value	*0.326*	*0.576*	*0.112*	*0.255*	*0.309*	*0.090*

* a very large effect size f^2

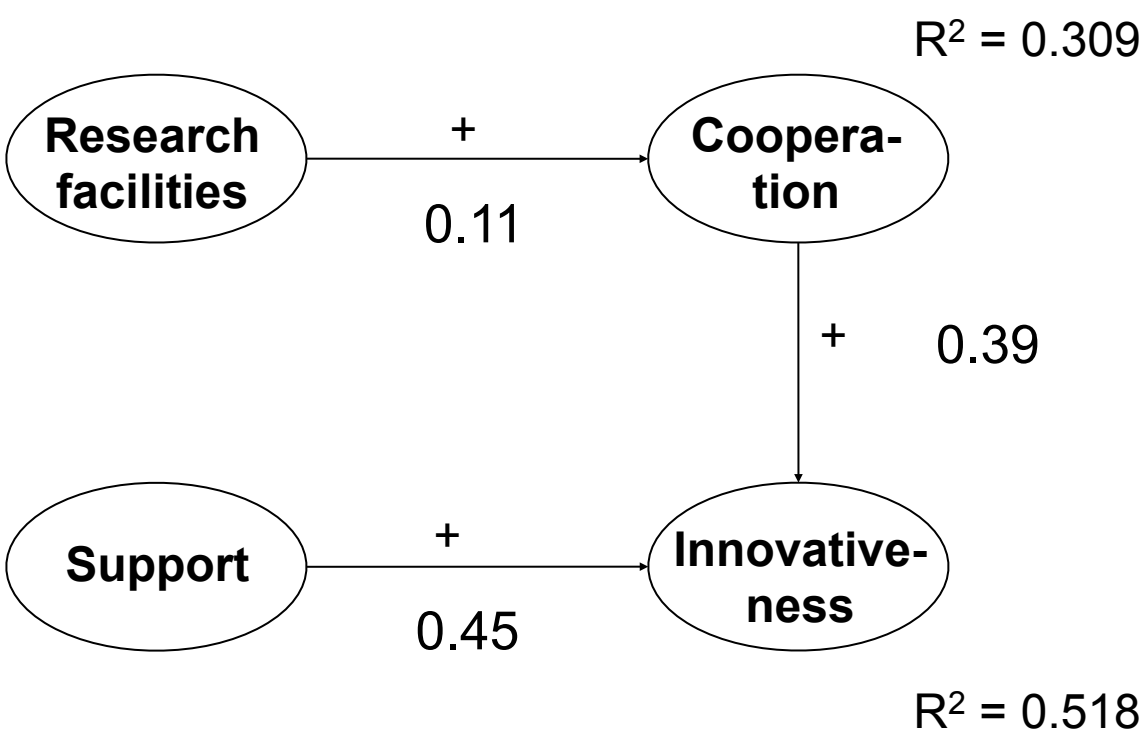
Test of H2b



Locality = within 30 km radius from firm headquarter

Estimation Results (II): Research Spin-offs

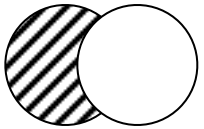
Cooperation = Local Cooperation (A)

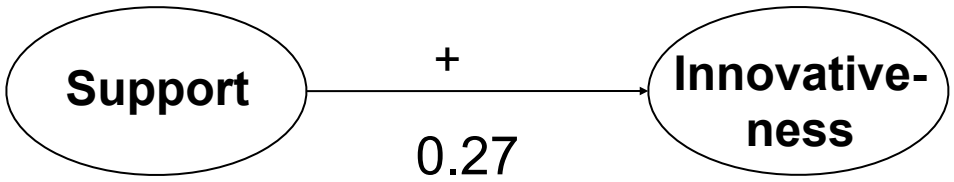


f^2 = 0.02, 0.15, 0.35 → a small, medium, large effect size

Estimation Results (II): Research Spin-offs

Cooperation = Only Local Cooperation (A\B)



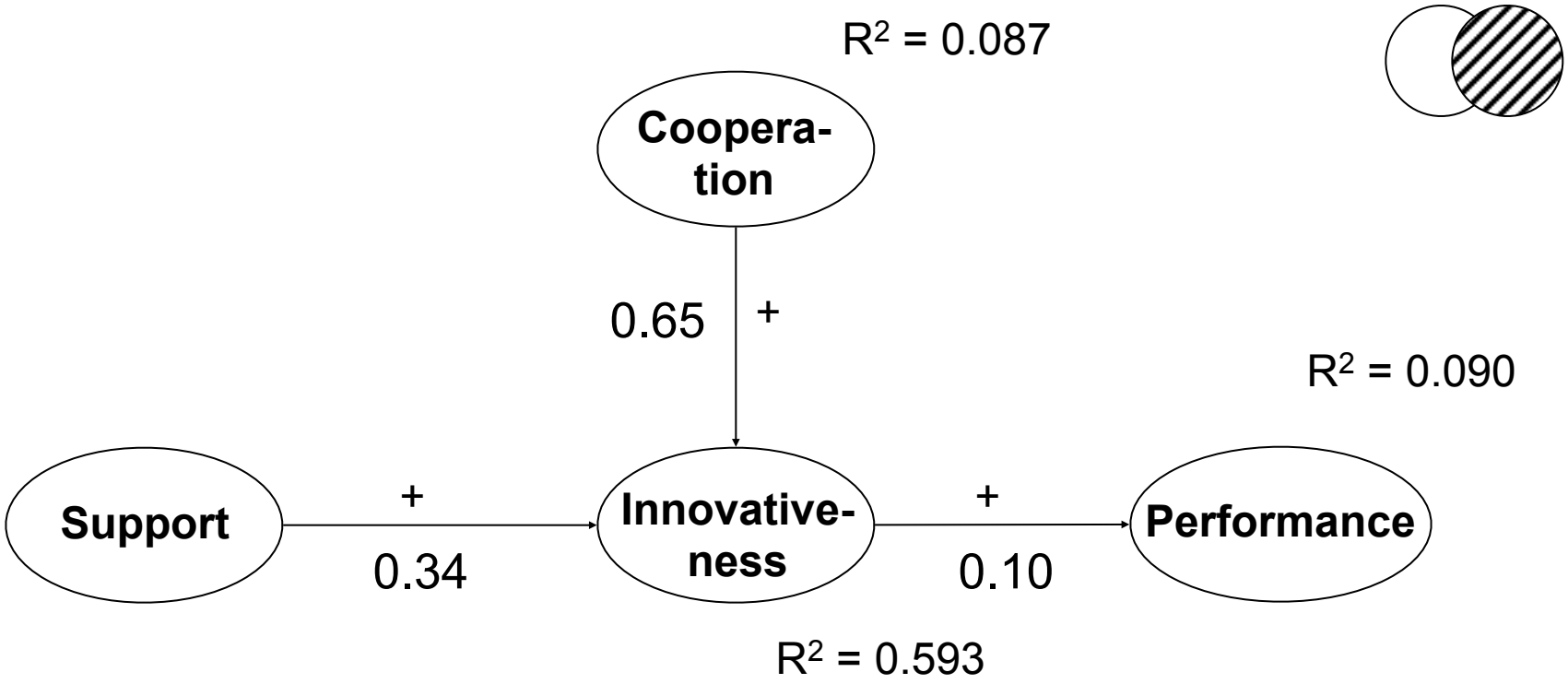


$R^2 = 0.310$

$f^2 = 0.02, 0.15, 0.35$ → a small, medium, large effect size

Estimation Results (II): Research Spin-offs

Cooperation = Nonlocal Cooperation (B)



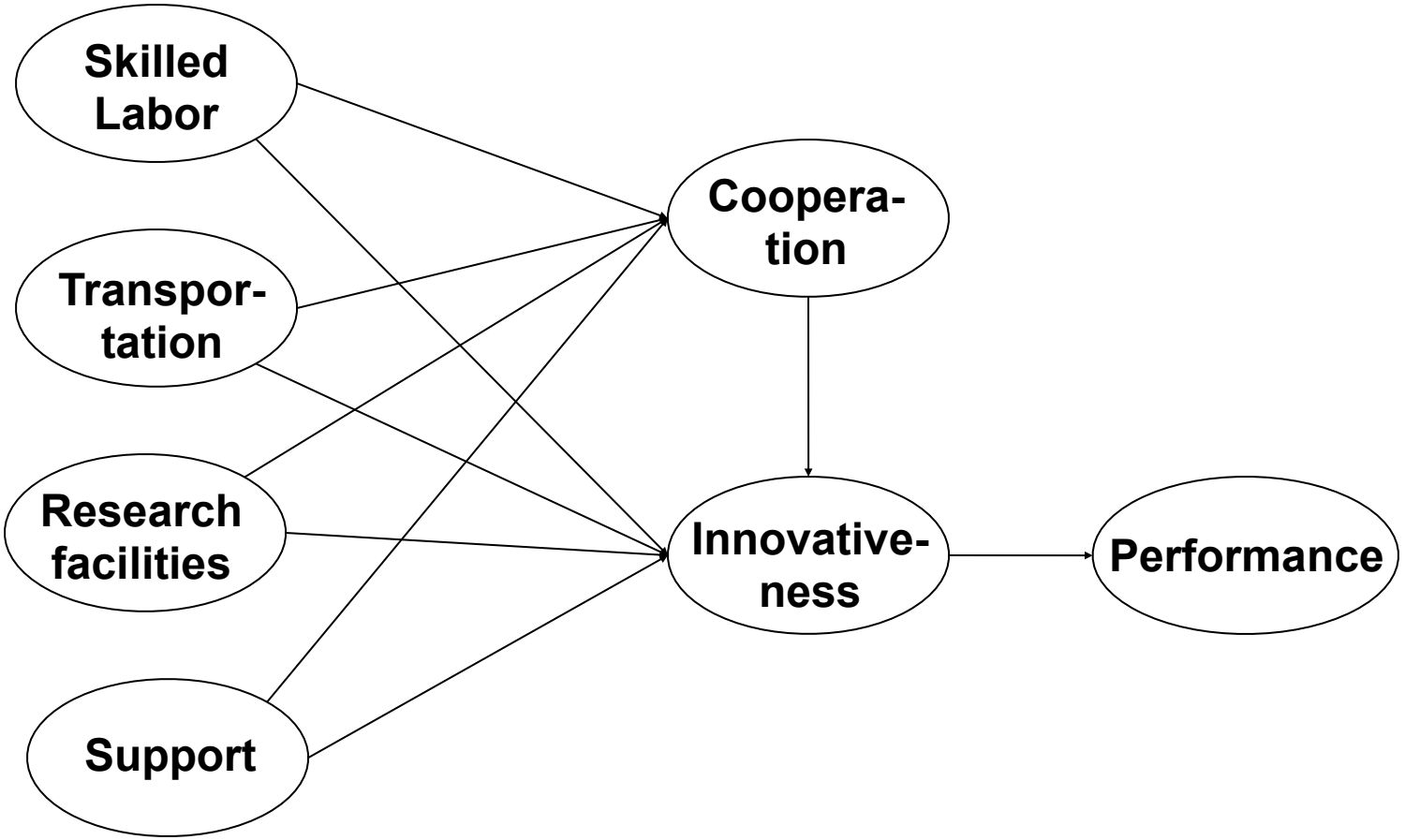
f^2 = 0.02, 0.15, 0.35 → a small, medium, large effect size

Test of H4 and H5: Descriptive Analysis

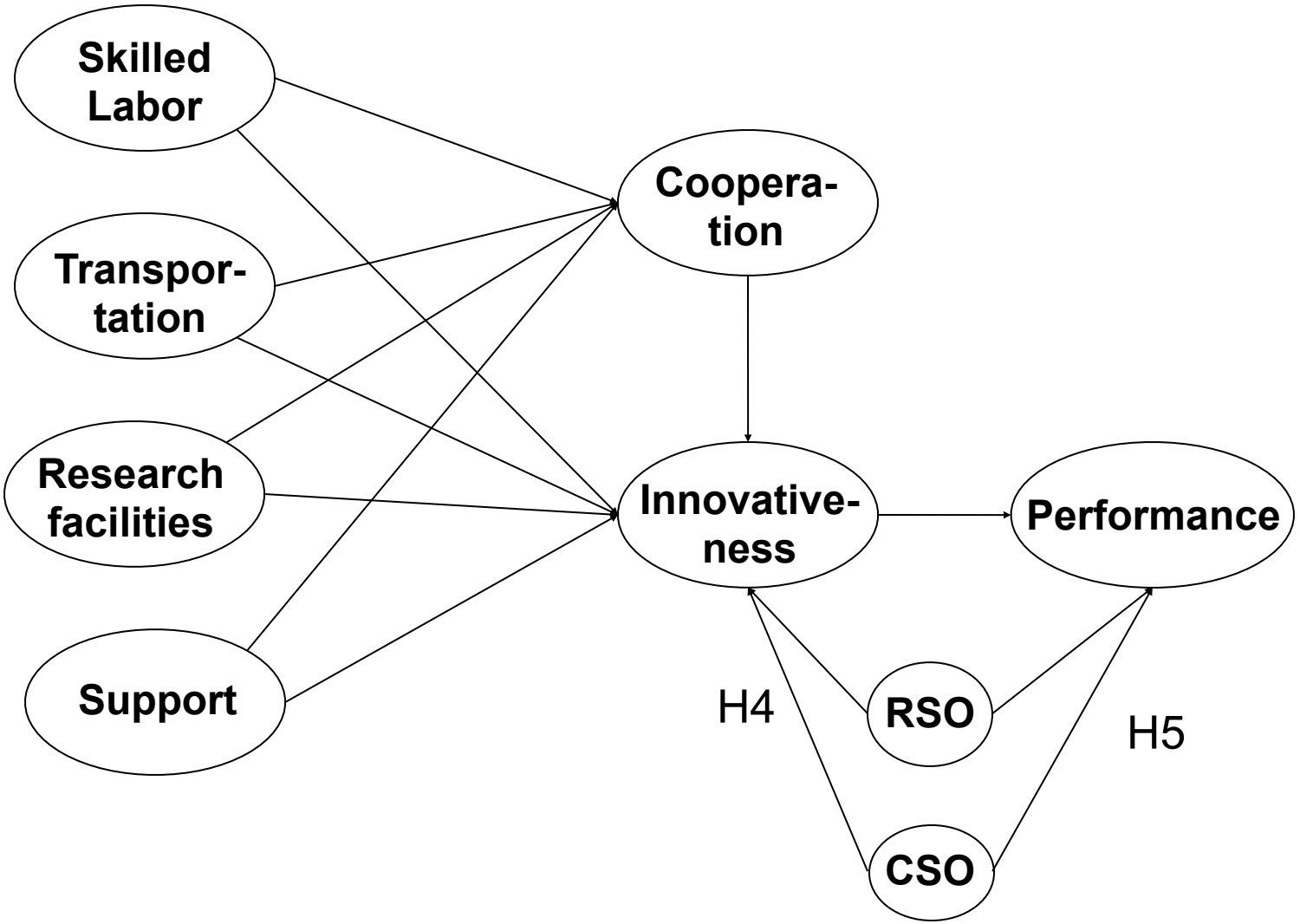
Variables	**Research spin-offs** *Mean*	**Company spin-offs** *Mean*	**Otherwise created firms** *Mean*
LV: Innovativeness			
New products in 2003/04	0.90 *	0.74	0.71
New processes in 2003/04	0.44 *	0.35	0.32
Number of patent applications in 2003/04	1.14 *	0.41	0.39
Deployment share in R&D in 2003	35.04 *	10.60	10.93
LV: Performance			
Expected development of:			
competition situation in 2005/06	3.52 *	3.31	3.27
market volume	3.58 *	3.10	3.09

* Significantly larger than otherwise created firms at 5% level (t-tests on differences of means)

Structural Model (Basic)



Structural Model (Extended): Test of H4 and H5



Estimation Results (III): Test of H4 and H5

f^2 values

	All firms		
	Cooperation	*Innovativeness*	*Performance*
Skilled Labor	0.01		
Transportation			
Research facilities	**0.16**	0.02	
Support	0.02	0.01	
RSO	-	0.01	
CSO	-		
Cooperation	-	**0.19**	
R^2	*0.225*	*0.342*	*0.090*

f^2 = 0.02, 0.15, 0.35 → a small, medium, large effect size

Conclusions:

- Cooperation activities and locational condition governmental support have a very large effect on explaining the innovativeness of spin-offs (in particular of research spin-offs)
- Nonlocal collaboration ties are more conducive to the innovativeness of the established research spin-offs
- Type of entry as a research spin-off has only a minor impact on firm innovativeness

Backup

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Literature Review

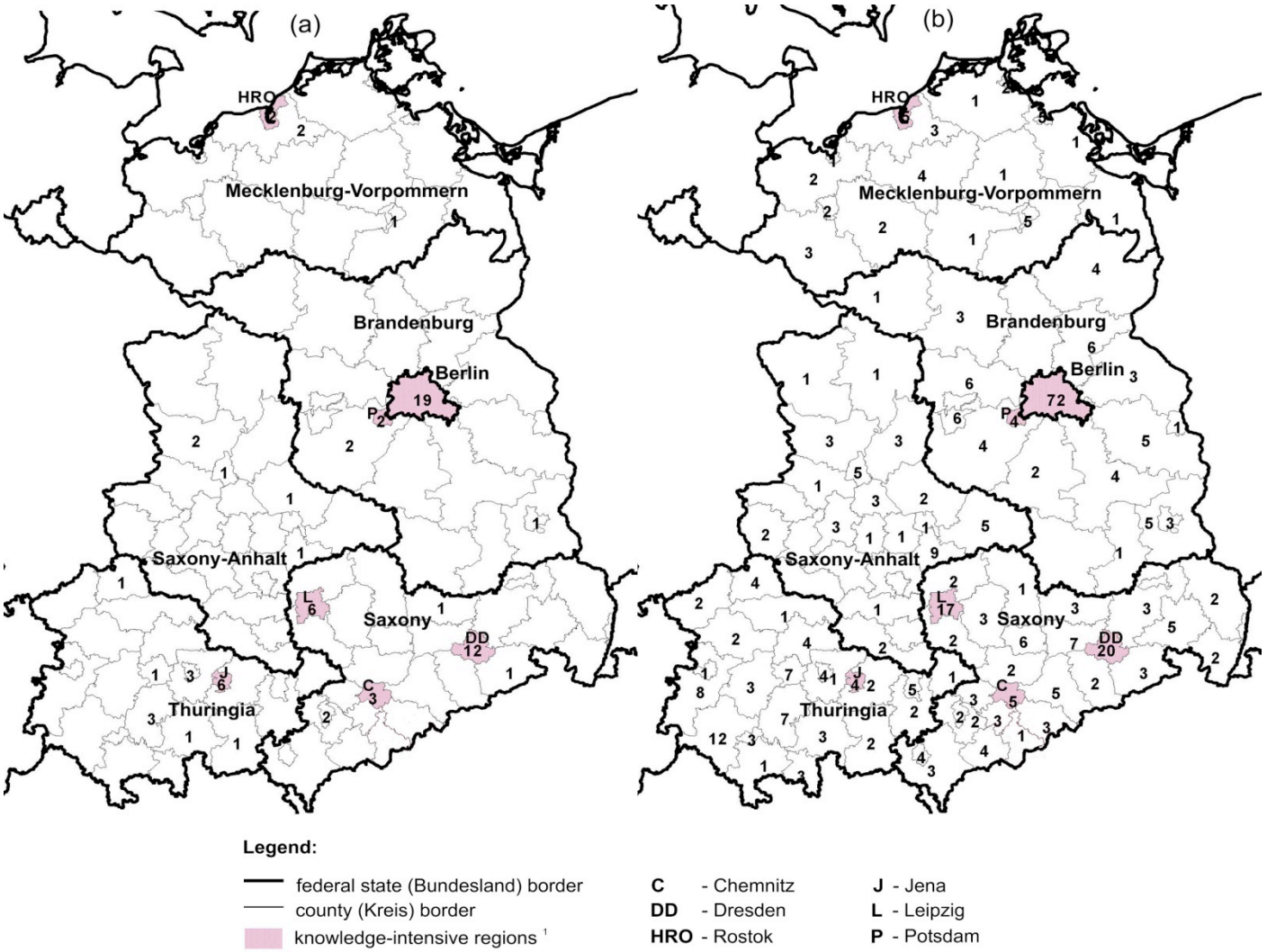
Determinants of firm innovativeness

- Firm environment / locational conditions: availability of research facilities and skilled labour
- Role of support (seed capital, R&D and network-building grants, commercial advice and consultancy)
- Cooperation and networking
- Geographical proximity to cooperation partners:
  - Crucial (face-to-face interactions and informal contacts, reducing uncertainty, spatial limits of knowledge transfer, complexity of innovative activities, knowledge exploitation, lower transaction costs)
  - Not very important (planned contact, knowledge exploration, middle or lower-ranked locations, Raspe et al. (2007): a very small spatial effect on firm productivity; Britton (2004): market regions shape network connections)
  - Complementary nature of local and external cooperation links

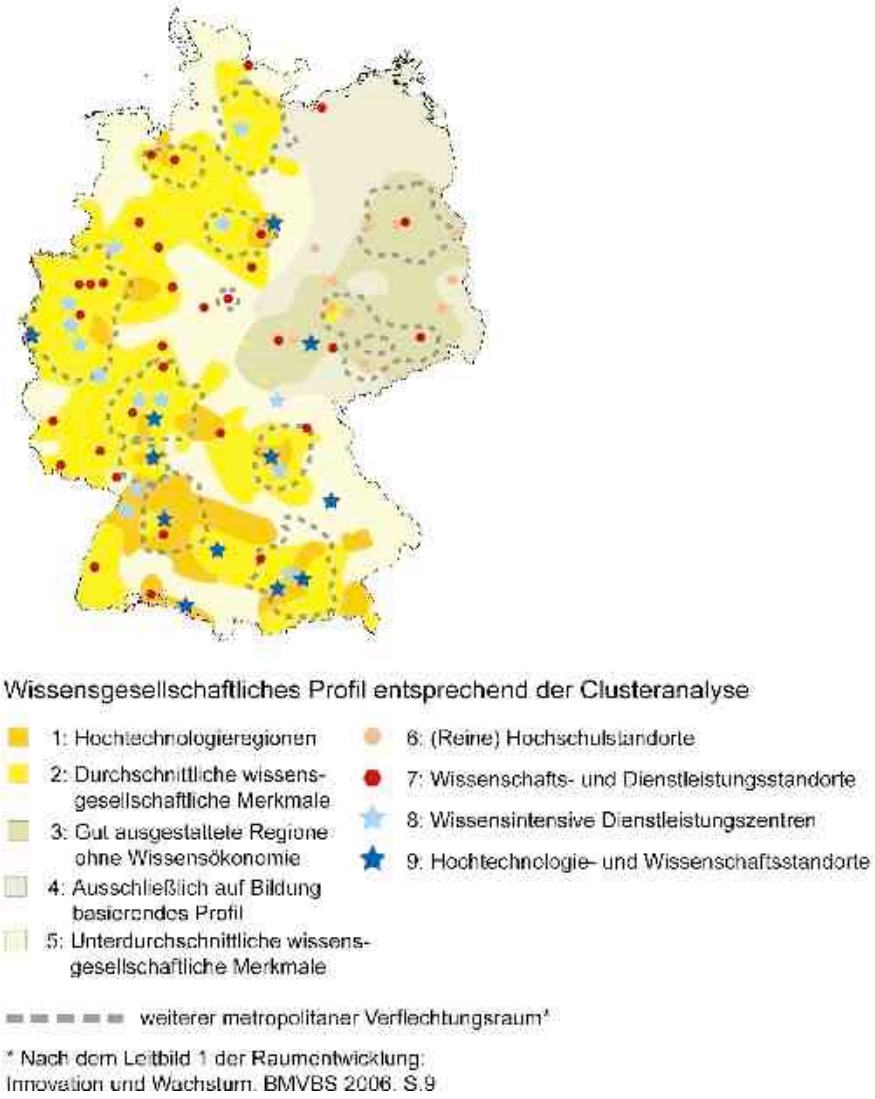
OECD: Knowledge-intensive Branches

NACE		Research spin-offs		Company spin-offs	
High and medium high technology manufacturing		***N***	***in %***	***N***	***in %***
	Manufacture of				
24	chemicals and chemical products	4	5.06%	21	5.12%
29	machinery and equipment	-	-	100	24.39%
30	electrical and optical equipment	2	2.53%	3	0.73%
31	electrical machinery and apparatus	3	3.80%	32	7.80%
33	medical, precision and optical instruments, watches and clocks	16	20.25%	61	14.88%
34	transport equipment	-	-	14	3.41%
35	and other transport equipment	-	-	12	2.93%
Knowledge-intensive services					
70	real estate activities	-	-	3	0.73%
71	renting of machinery and equipment	-	-	10	2.44%
72	computer and related activities	19	24.05%	39	9.51%
73	research and development	15	18.99%	9	2.20%
74	other business activities	20	25.32%	104	25.37%
80	education	-	-	1	0.24%
92	recreational, cultural and sporting activities	-	-	1	0.24%
Total		**79**	**100%**	**410**	**100%**

Geographical Distribution of (a) Research and (b) Company Spin-offs



BBR: Spatial Development of Knowledge Society



Cooperation Activities of Research Spin-offs

		Cooperation				
	No	Partners are		Partners' headquarters are		
Cooperation field	**coope-ration**	other firms	research facilities	local	non-local	both local and non-local
basic research	53	11	42	32	25	13
product development	22	49	43	57	43	23
process development	44	33	32	32	30	10
additional education	49	16	33	23	20	13
sales	49	39	5	33	32	8
Mean	***44***	***30***	***31***	***35***	***30***	***13***

(Mean values in %)