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Economic structure, innovation and firm growth

Bart Verspagen



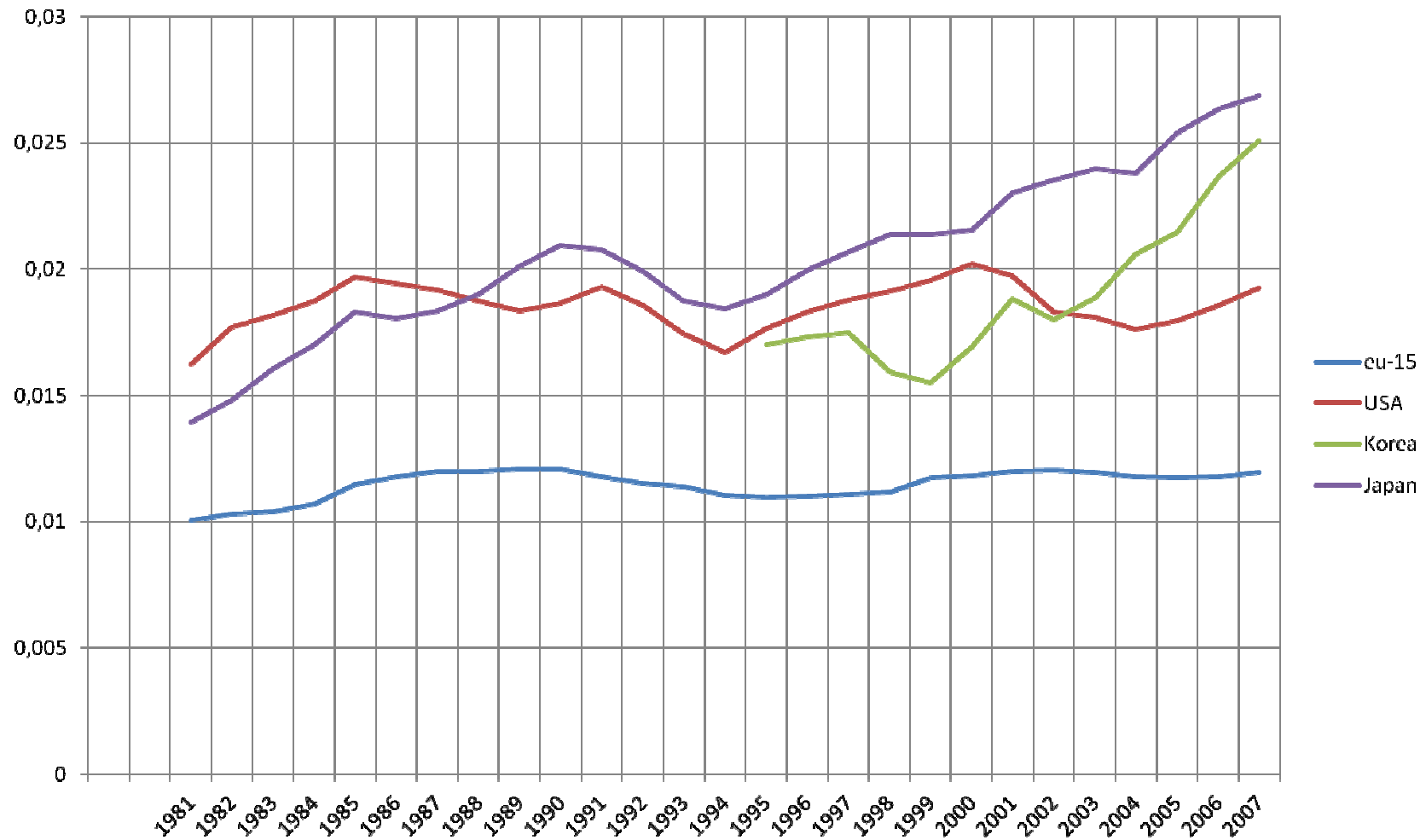
MICRO-DYN

The questions I will try to answer

- Is there a complete and robust picture of the dynamics of the EU and worldwide economic structures for both manufacturing and services sectors?
- What do we know about the link and interactions between industrial structures and the successful transition to a knowledge-intensive economy and society?
- How important are R&D and innovation (both technological and non-technological), economic flexibility and adjustment capacity are for European competitiveness?

Business R&D intensity

(BERD as % of GDP)



The role of economic structure

- “The EU has low R&D intensity because it is specialized in industries in which R&D is not so important”
 - But how did the EU get specialized in those industries? Because the conditions for R&D are not favourable in Europe?

A Decomposition

- Aggregate R&D intensity is a weighted sum of sectoral R&D intensities

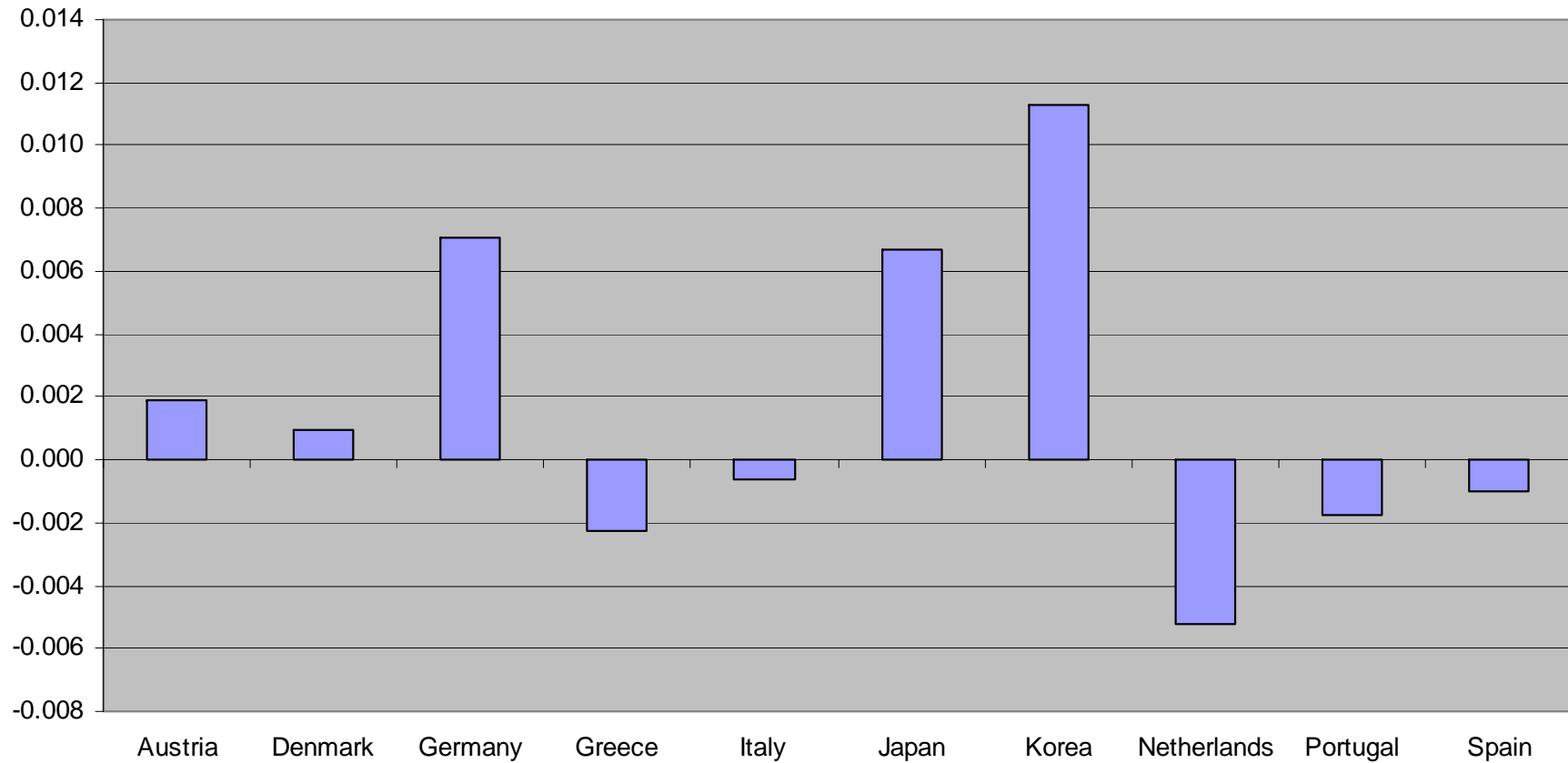
$$RDI = \frac{\sum_i RD_i}{\sum_i VA_i} = \sum_i \frac{RD_i}{VA_i} \frac{VA_i}{\sum_j VA_j} = \sum RDI_i S_i^{VA}$$

- We calculate a “structural” RDI, where the sectors’ shares in VA are equal to those of the USA
- Calculate the difference in RDI relative to USA, real and “structural” RDI

Caveats

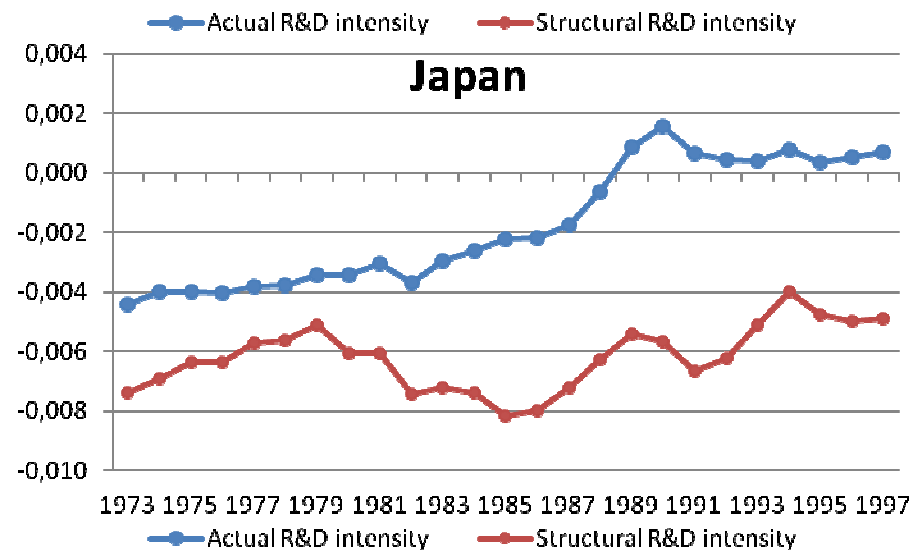
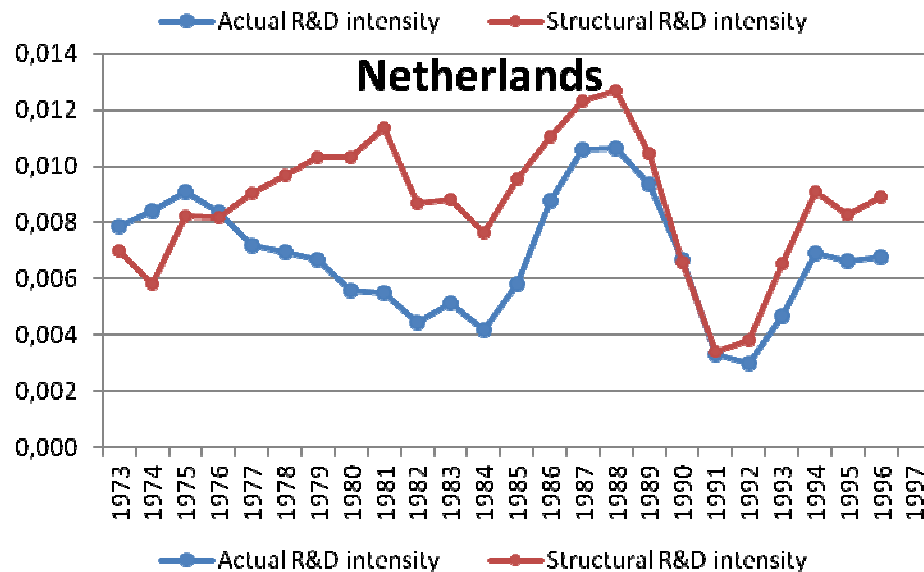
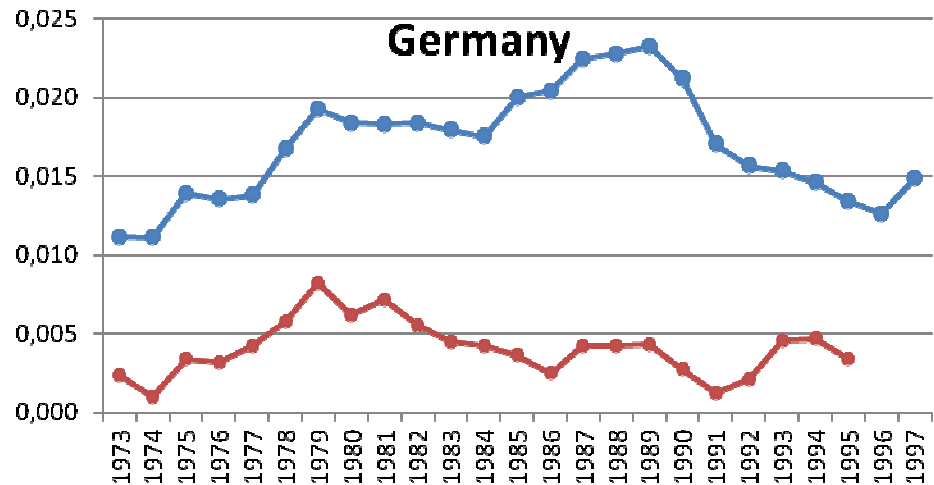
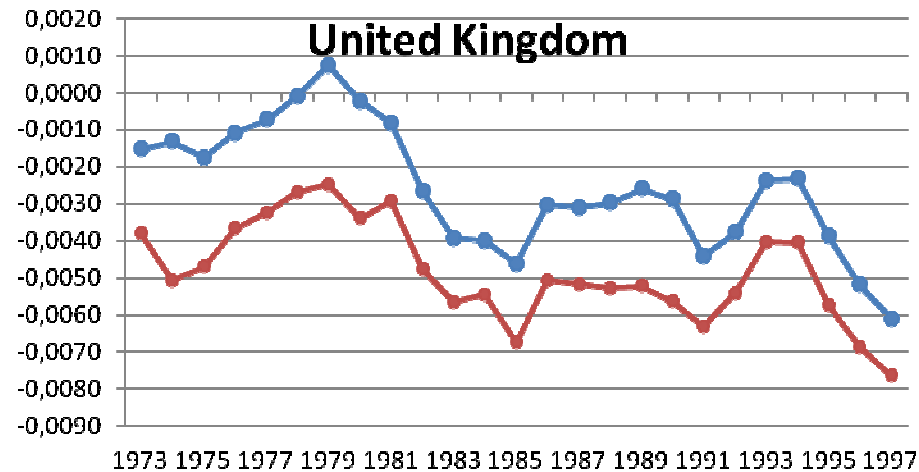
- The results depend on the level of aggregation
- The USA may not be the ideal reference country
- The available data (OECD-STAN) are not very complete
 - Only for individual countries, not EU as a whole

Results – the effect of having the own structure on RDI gap relative to USA (2003)



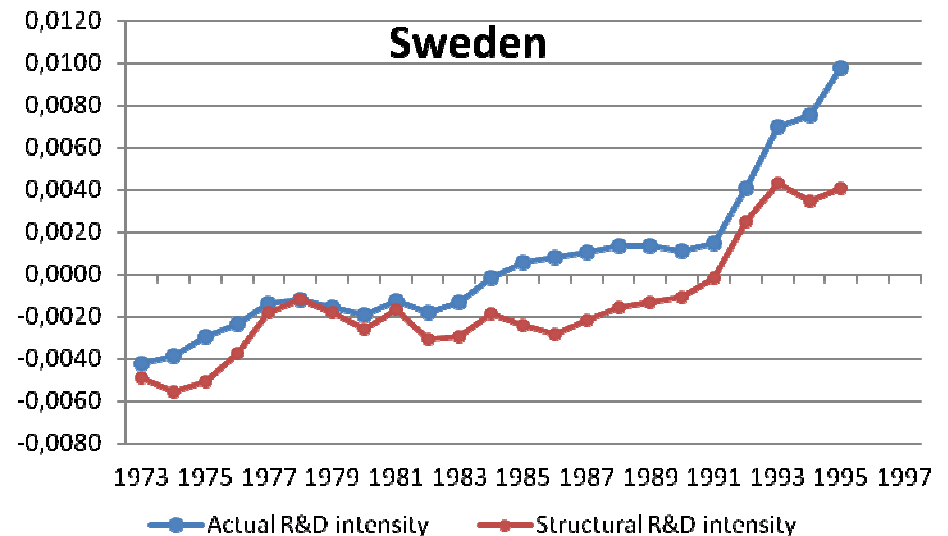
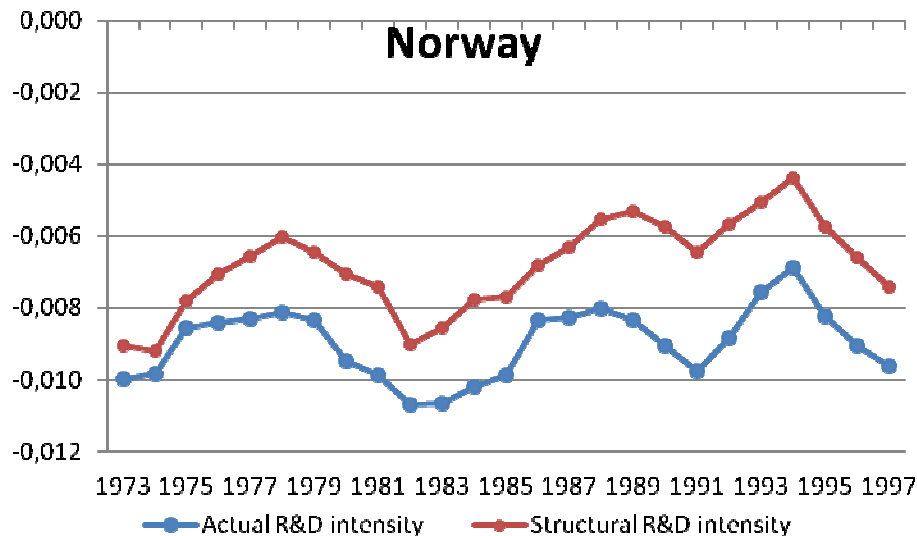
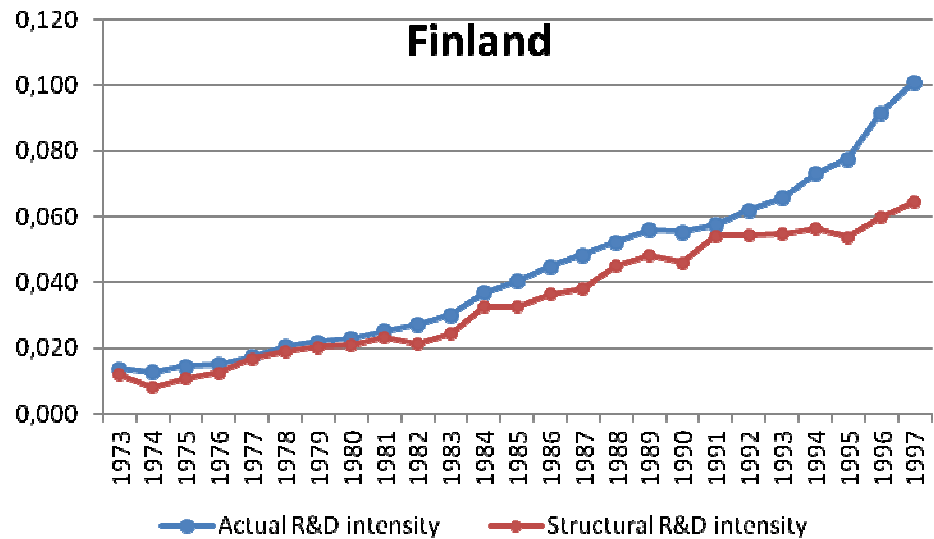
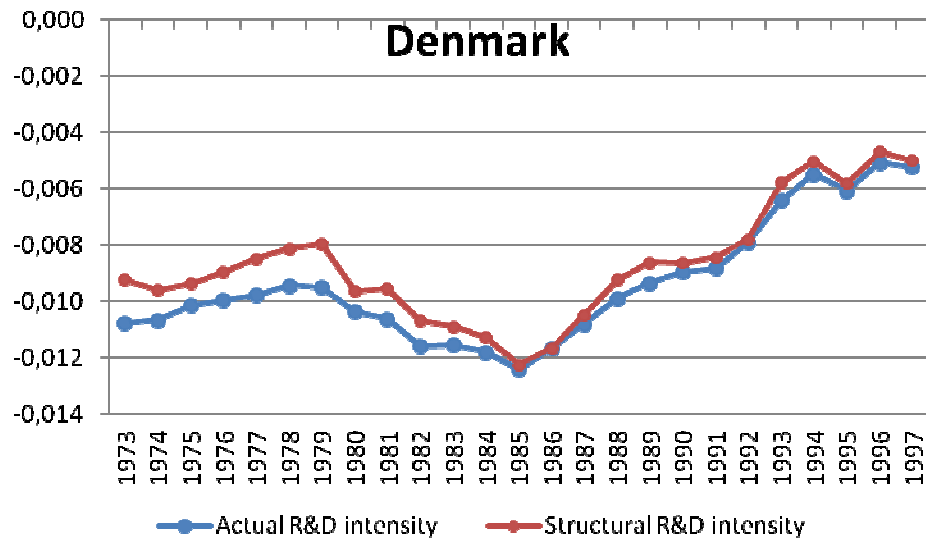
Dynamic picture

(less sectors!)



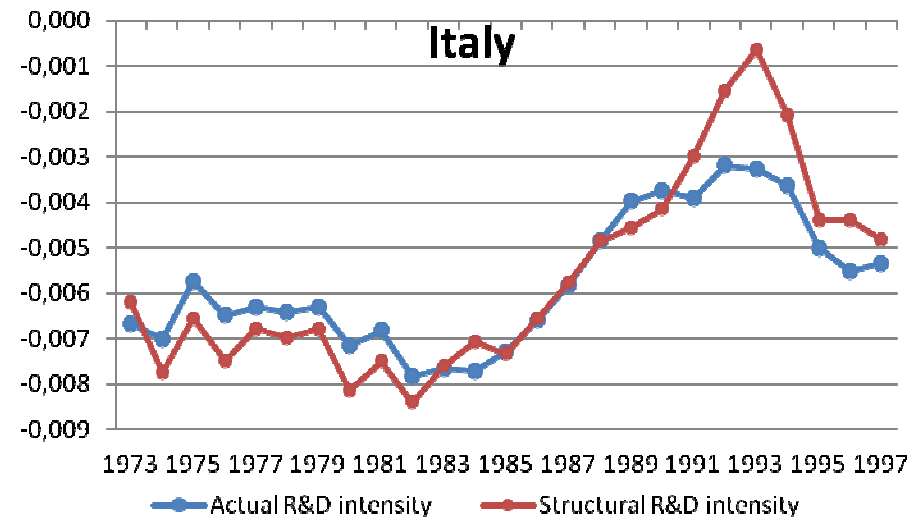
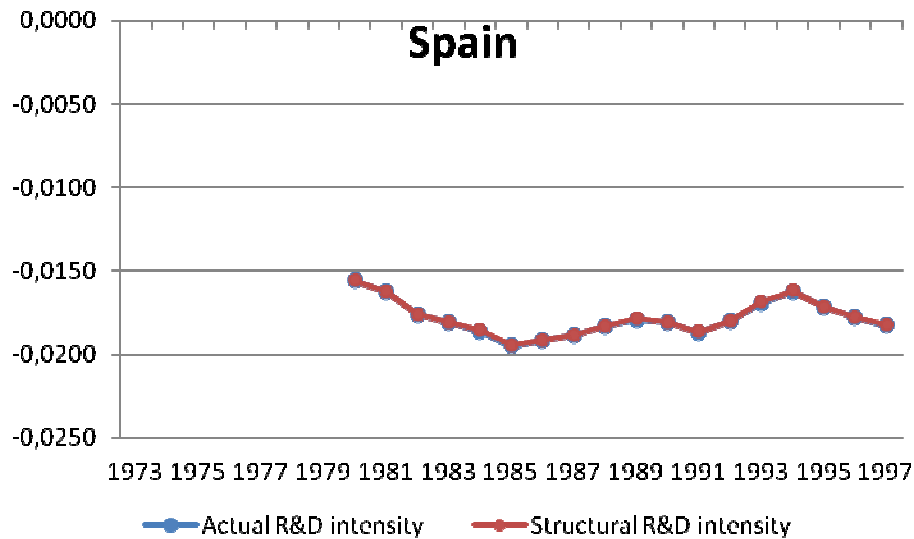
Dynamic picture

(less sectors!)



Dynamic picture

(less sectors!)



Conclusion on economic structure and R&D intensity

- Great variety in the EU
- No systematic bias towards a European economic structure that is non-favourable to R&D

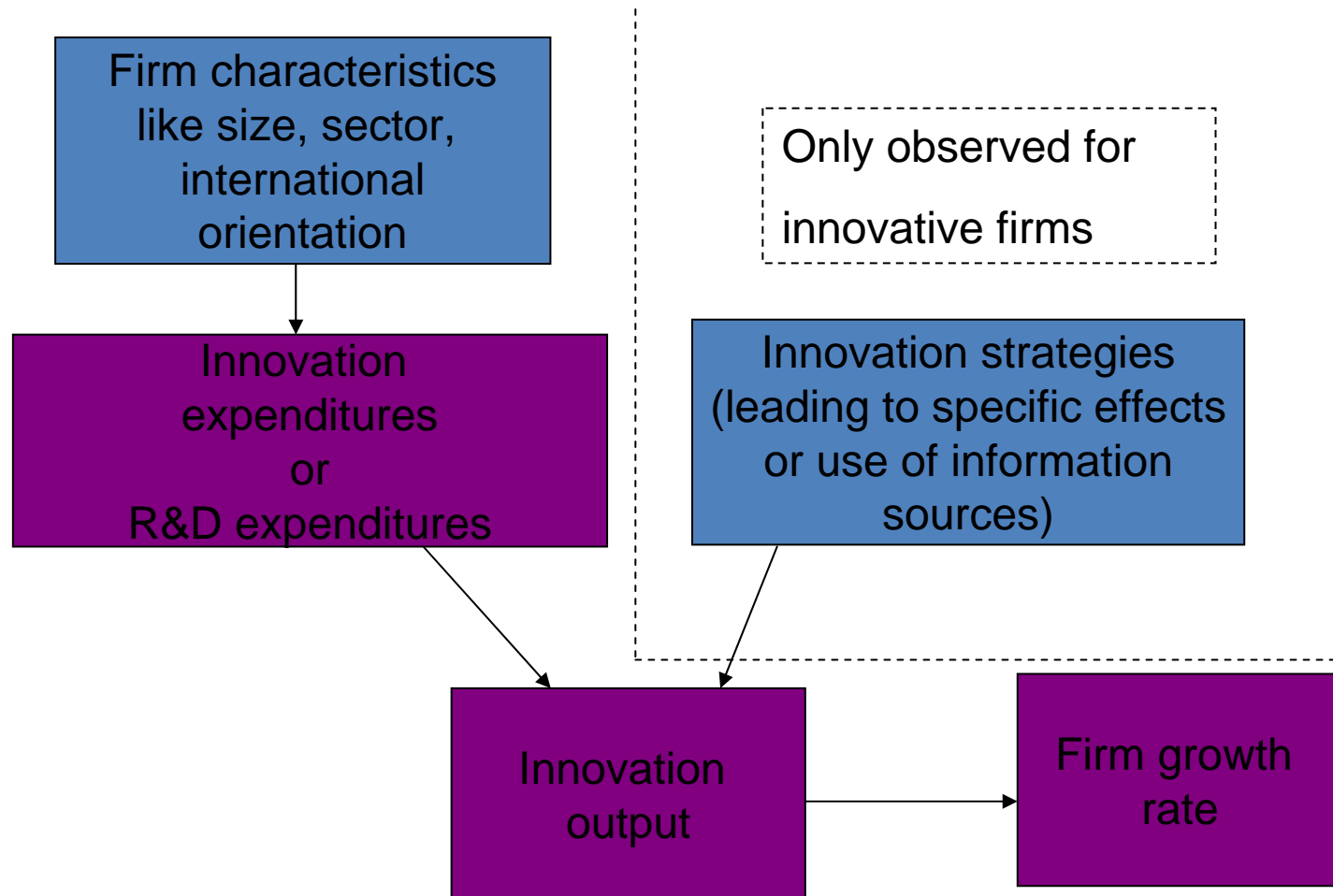
R&D, Innovation expenditures and firm growth

- The industrial structure is endogenous, i.e., the result of firm growth processes
- If firm growth depends on R&D and innovation, we may have cumulative causation, or virtuous/vicious circles
- Test on firm level database (Netherlands)
 - Ongoing work with Tommy Clausen & Martin Srholec (Microdyn EU project)

Firm growth and R&D / Innovation

- The literature has *not* (yet) identified a robust link
- Econometric problems
 - Skew distribution of growth rates
 - R&D and innovation are endogenous
 - Selection bias
- Community Innovation Survey
 - NLD/CIS-2: Innovation 1994-96, growth 1997 – 2004
 - NO/CIS-3: Innovation 1999-01, growth 2002-2006

The econometric model



Which kind of innovation (strategy)?

- Netherlands: product innovation
- Norway: process innovation

(See Fagerberg, Mowery and Verspagen on Norwegian innovation system)

Results – growth equation

	R&D expenditures		All innovation expenditures	
	NLD	NO	NLD	NO
Innovation probability	0.050 ***	0.035 **	0.051 ***	0.036 **
ln(employment)	−0.002	0.004	−0.002	0.007
Export/sales	0.010 *	−0.033 *	0.009 *	−0.028
Part of a group	0.004	−0.029 **	0.004	−0.029 **
Mills	0.012	0.054 ***	0.031	0.055 ***
Skills		0.057 *		0.062 *

Conclusions

- A knowledge-intensive economic structure is created over the long run by a self-reinforcing process of firm growth
- R&D or total innovation expenditures are both good indicators of this process
- Externalities lead market failure in this process
- But government policy to address market failure is difficult