



## COUNTRY SPECIALISATION REPORT

**Country: Hungary**

**Date: June 2006**

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## COUNTRY SPECIALISATION REPORT - HUNGARY

### MAIN FINDINGS

Hungary's economy, as expressed by value added and employment specialisations (Figures 14 & 16), appears more directed towards the secondary productive sector and particularly in sectors such as the motor vehicles, electronic and electrical equipment, office machinery, plastics, pharmaceuticals, petroleum, textiles and food industries. In services, the sectors where Hungary is specialised in both benchmarks are the telecommunications and transportation services.

Some strong correlation (Table 2) emerge between value added and BERD which stands for both periods under examination (1993-95 & 2001-2003). Exports during the period 1993-95 were also correlated with BERD and value added for both periods. However this relationship does not stand for the 2001-2003 period. Finally, no correlations exist between economic specialisation or BERD with patents.

R&D intensity in Hungary (Figure 1) remained constant over the whole 1993 – 2003 period at 1% of GDP, with significant fluctuations however particularly in the middle of the 1990's. These fluctuations of the share of GERD in GDP were not so much the result of a reduction in business expenditure on R&D as a share of GDP, but the result of the decline of public research expenditures in HEI's and PRO's. However these negative trends were reversed by 2003.

Moreover it appears that the share of government as a financing source of research has increased (Table 1), while the private sectors relative share was reduced. BERD however, as a share of GERD increased from 40.6% in 1993 to 43.9% in 2004. One of the main reasons for this rise is the increased funding that Hungarian enterprises received from abroad that was directed mainly to the private sector.

When we examine GERD by type of research (Figure 2) we can observe that the share of basic research has remained relative constant at one third of GERD. At the same time the share of applied research was reduced in the benefit of experimental research. As far as HERD by scientific field is concerned, it appears that the distribution of funds is balanced between the various scientific fields with natural sciences, engineering and humanities receiving relatively larger shares of total funding.

More profound changes took place in public research centers and particularly with regard to the steep reduction of the share of natural sciences from 59.3% in 1993 to 37.3% in 2003 (Figure 5) . In addition, while during 1993 the shares of humanities and social sciences in GOVERD were null, their respective shares during 2003 rose to 10.5% and 13%.

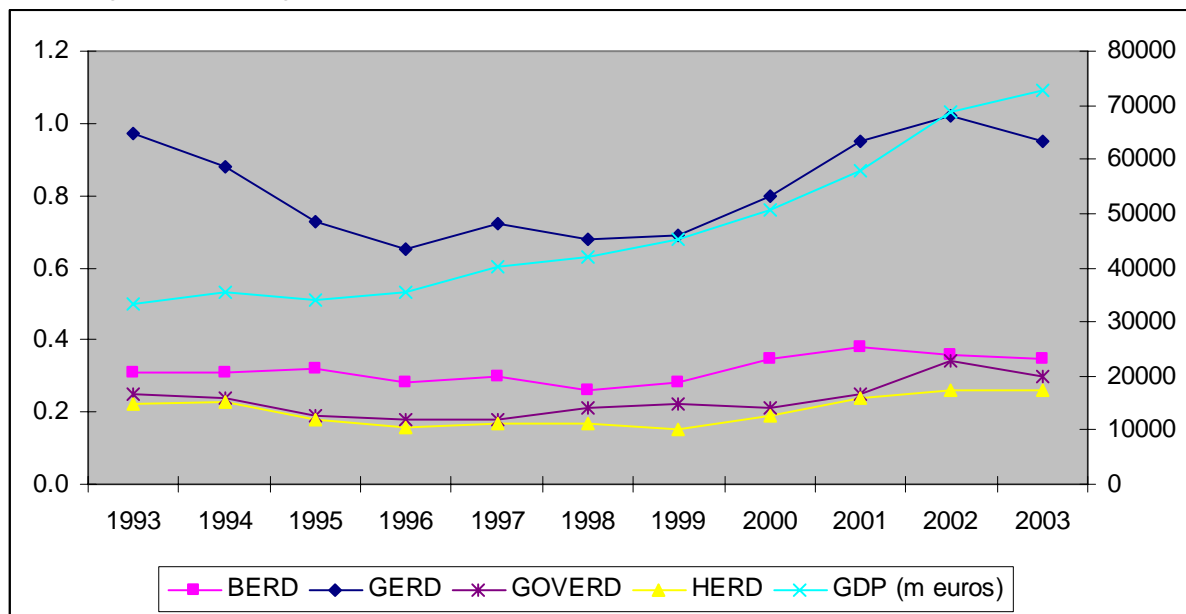
An important point of notice, regarding BERD specialisation (Figure 6), is the small number of sectors where Hungary appears specialised for both periods of reference. During 2003, the government provided funding for a large number of sectors (Figure 8) for research and development activities, with the largest shares being directed towards business activities, IT services, community services, agriculture, chemicals and the motor vehicles industries. Particularly for manufacturing, the sectors that receive public funding were underspecialised in terms of BERD for the 2001-03 period.

Regarding scientific specialisation, Hungary presents a diversified picture with high specialisations in natural sciences such as mathematics , physics and chemistry but also in other scientific fields such as neurosciences, pharmacology, agriculture and computer sciences.

(Figure 9). In terms of technological specialisation (Figure 12), Hungary appears underspecialised in most sectors with the exception of pharmaceuticals, chemicals and food.

Main R&D figures – Total R&D expenditure

Figure 1. R&D expenditure by performing sector as per cent of GDP (left axis). GDP in million Euros (right axis). Hungary. 1993-2003.



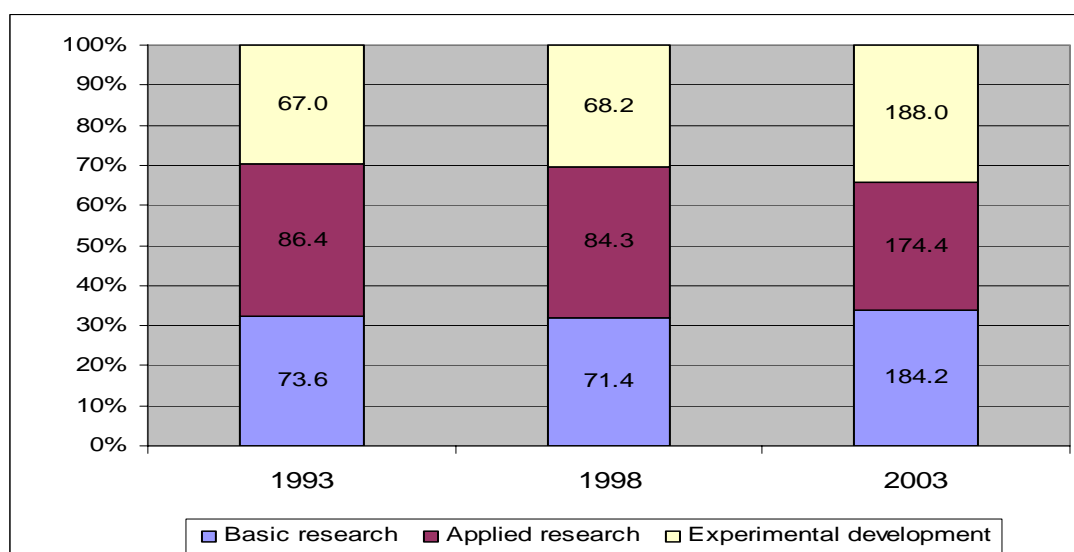
Source : OECD, Main Science and Technology Indicators, November 2005

Table 1. R&D expenditure by sector of performance and source of funds .Hungary. 1993 and 2004. Million Euros. Current prices.

	GOVERD		BERD		HERD		Total	
	1993	2004	1993	2004	1993	2004	1993	2004
Business	23.5	15.3	85.3	229.3	6.7	22.8	115.5	267.4
Government	52.7	183.7	11.9	12.3	59.5	143.1	124.1	339.1
Non profit		2.8		0.2		1.1		4.1
From Abroad	2.3	10.2	3.4	54.4	2.2	10.0	7.9	74.6
Total	78.4	201.8	100.6	296.2	68.5	177.0	247.5	674.9

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Hungary. 1993, 1998 and 2003



Source: OECD OFFBERD 2005

## **PUBLIC R&D STATISTICS**

### **GBAORD by socioeconomic objective**

*Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Hungary. 1993 and 2003.*

#### **Not available**

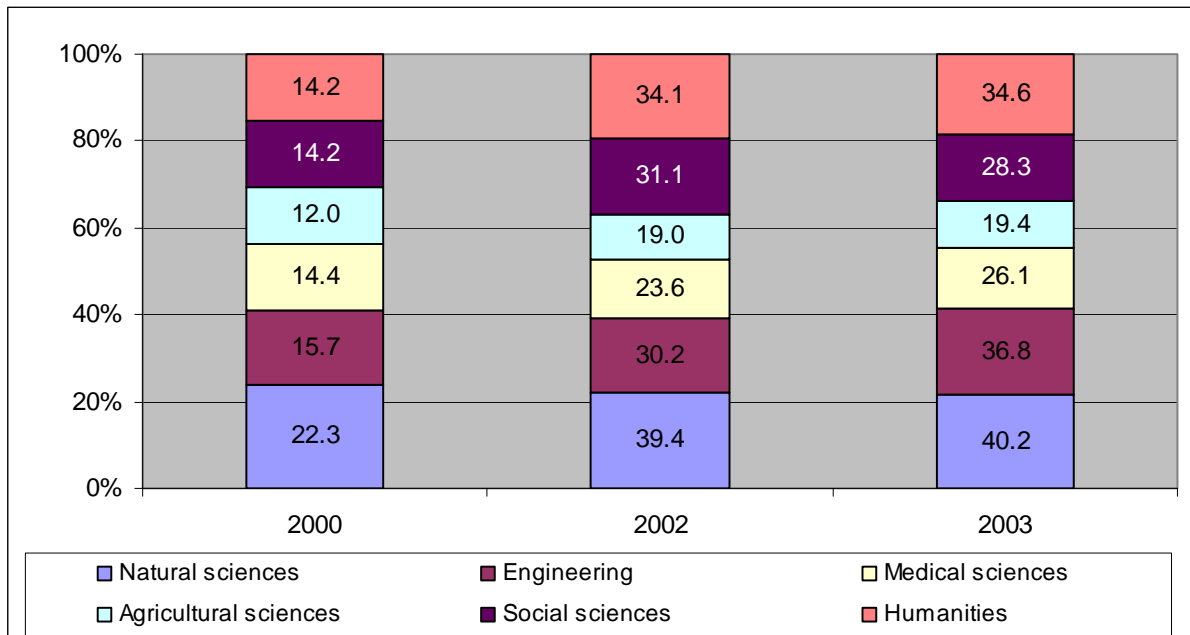
*Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.*

*Source: OECD Basic Science and Technology Statistics 2005, own calculations.*



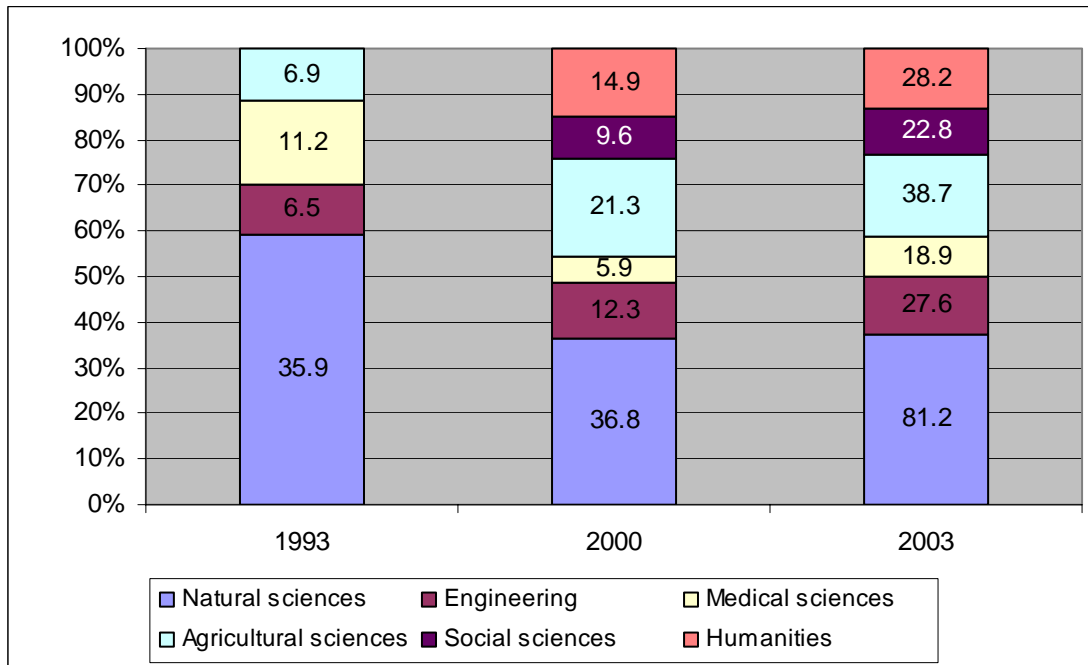
**HERD by field of science**

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Hungary. 2000, 2002 and 2003. Per cent of total HERD and in million Euros.



Source: OECD Basic Science and Technology Statistics 2005.

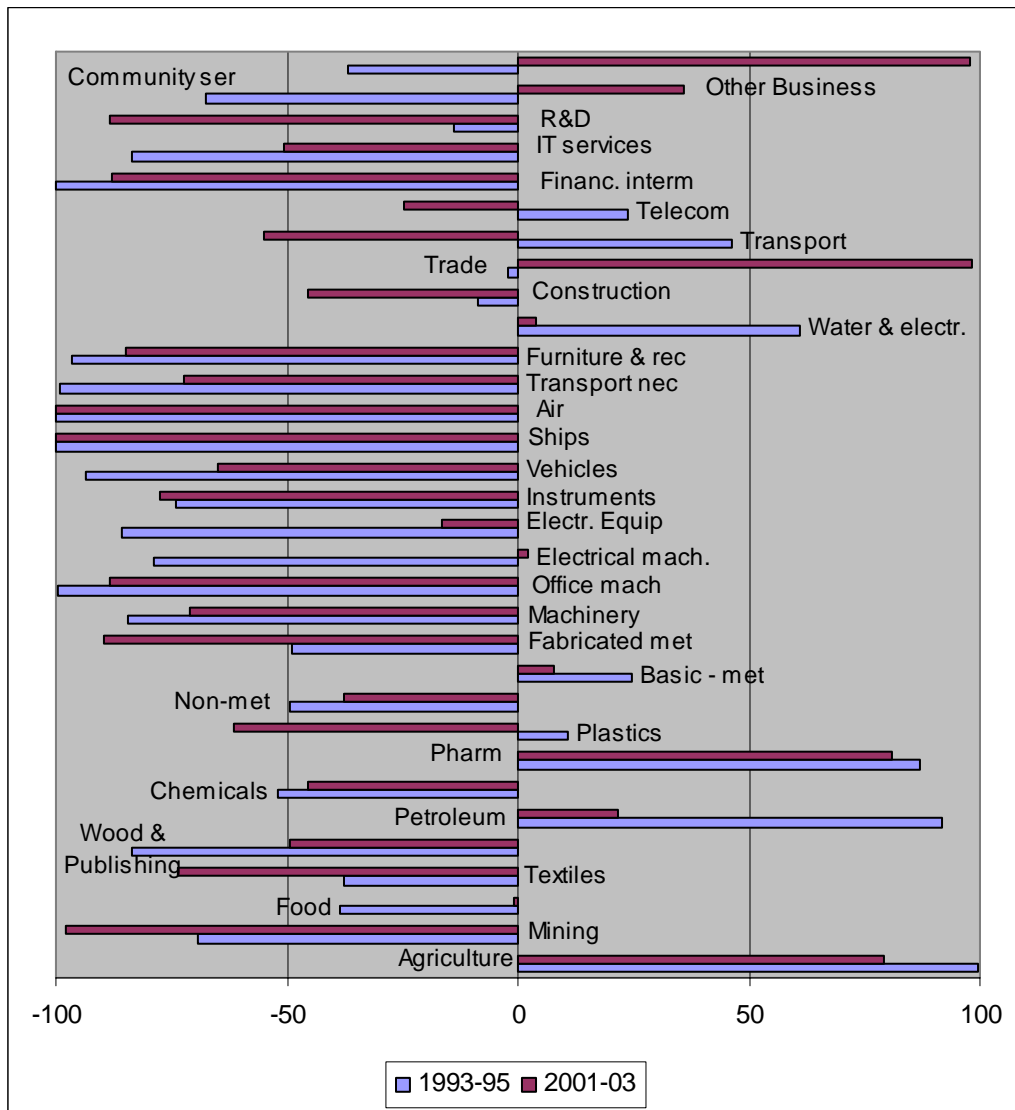
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Hungary. 1993, 2000 and 2003.



Source: OECD Basic Science and Technology Statistics 2005

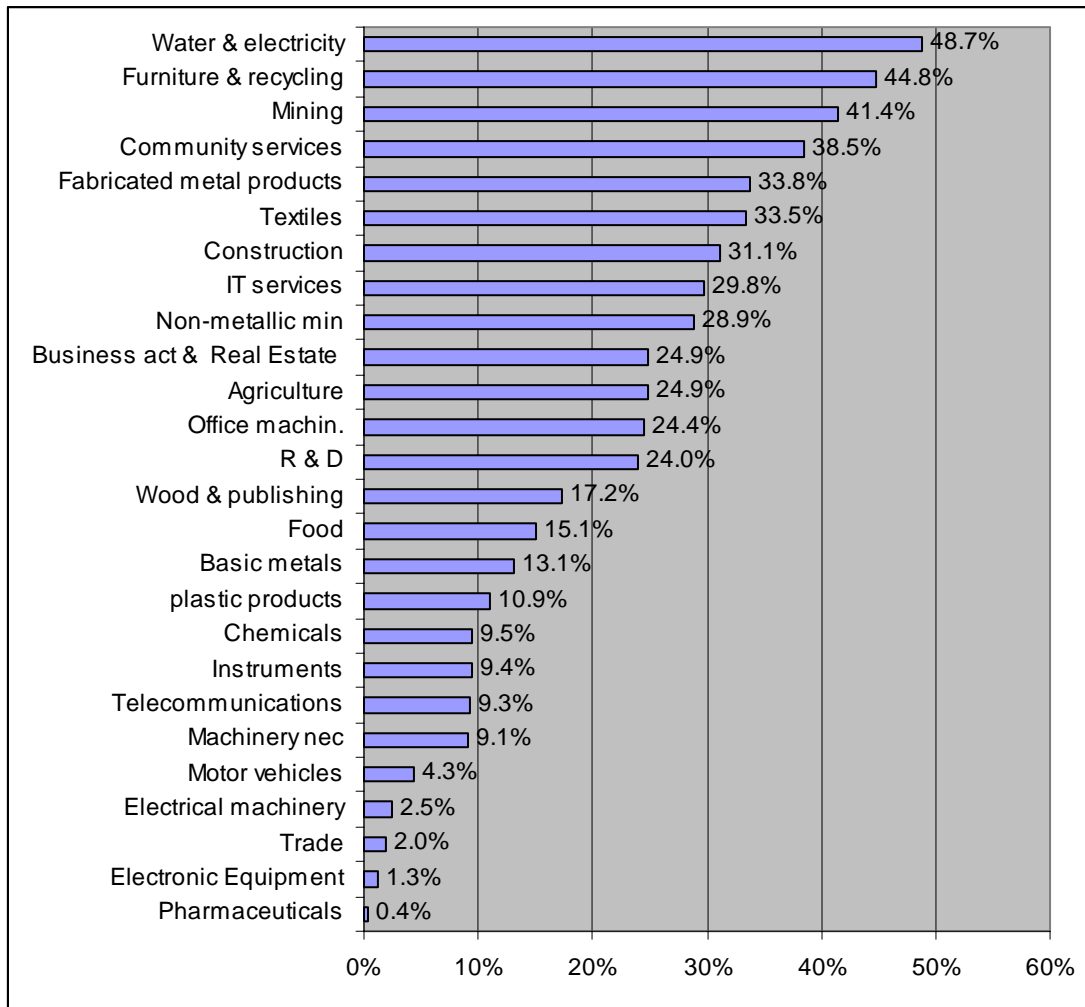
**BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)**

Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. 31 sectors. Specialisation profile. Hungary. Averages 1993-1995 and 2001-2003.



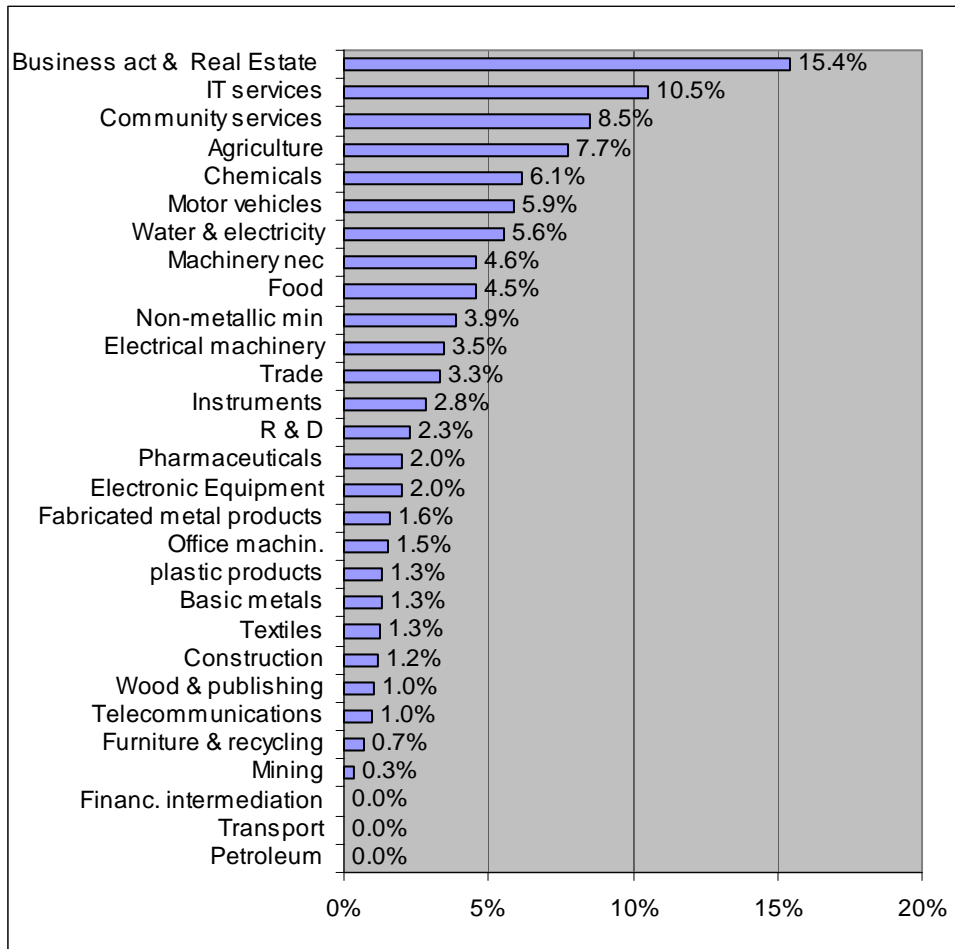
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
 Source: OECD Basic Science and Technology Statistics 20052005, ANBERD 2005, own calculations

Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sector funded by government. 2003 last available year in OECD statistics.



Source:OECD Basic Science and Technology Statistics 2005, own calculations

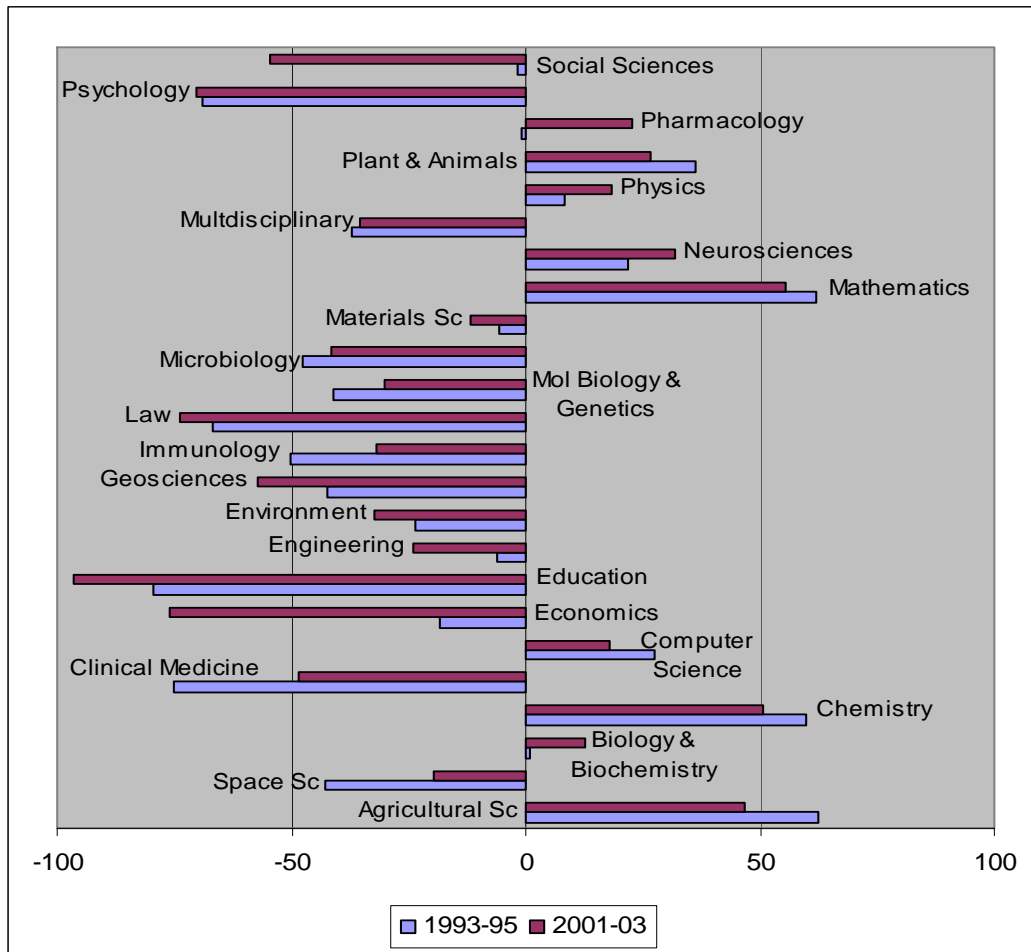
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003 last available year in OECD statistics.



Source: OECD Basic Science and Technology Statistics 2005, own calculations

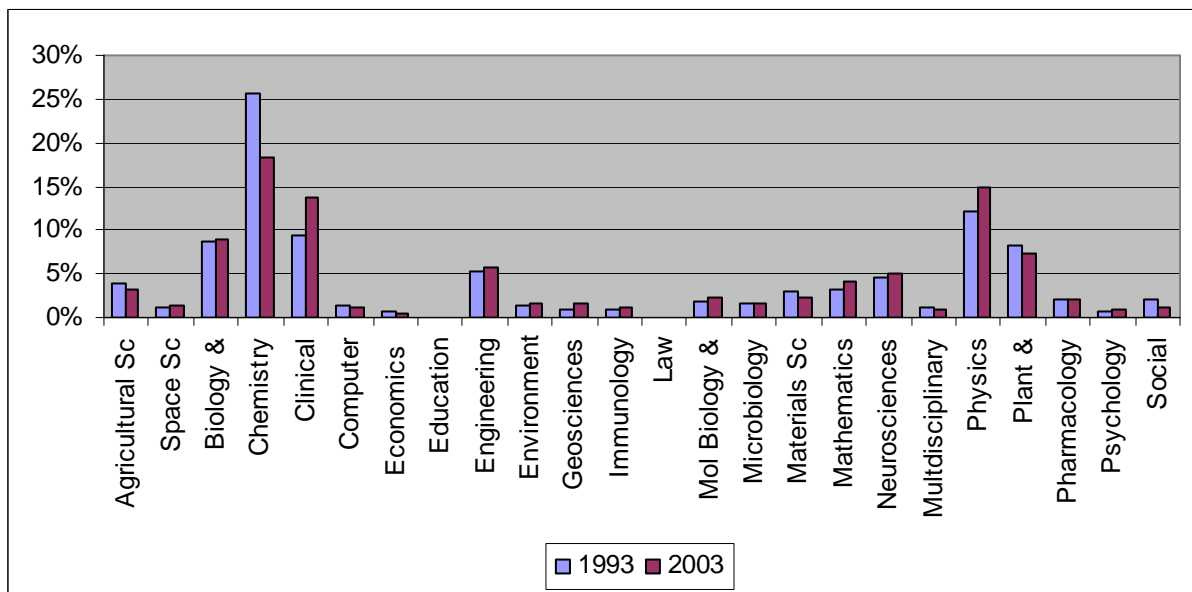
**BIBLIOMETRICS**

Figure 9. Number of publications by scientific field. 25 Scientific fields. Specialisation profile. Hungary. Averages 1993-1995 and 2001-2003.



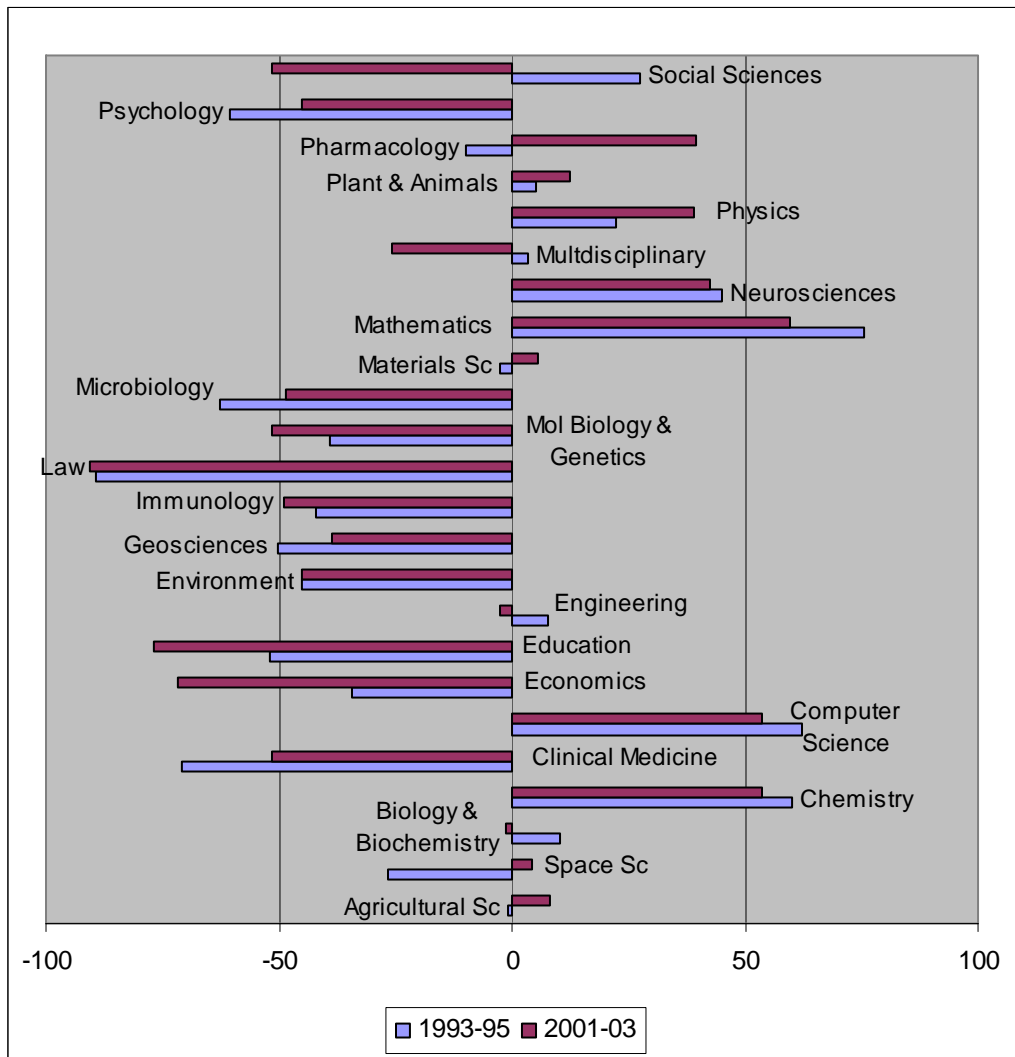
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

Figure 10. Shares of total publications by scientific field. 25 Scientific fields. Hungary. 1993 and 2003.



Source: Thomson ISI, NSIODE 2005.

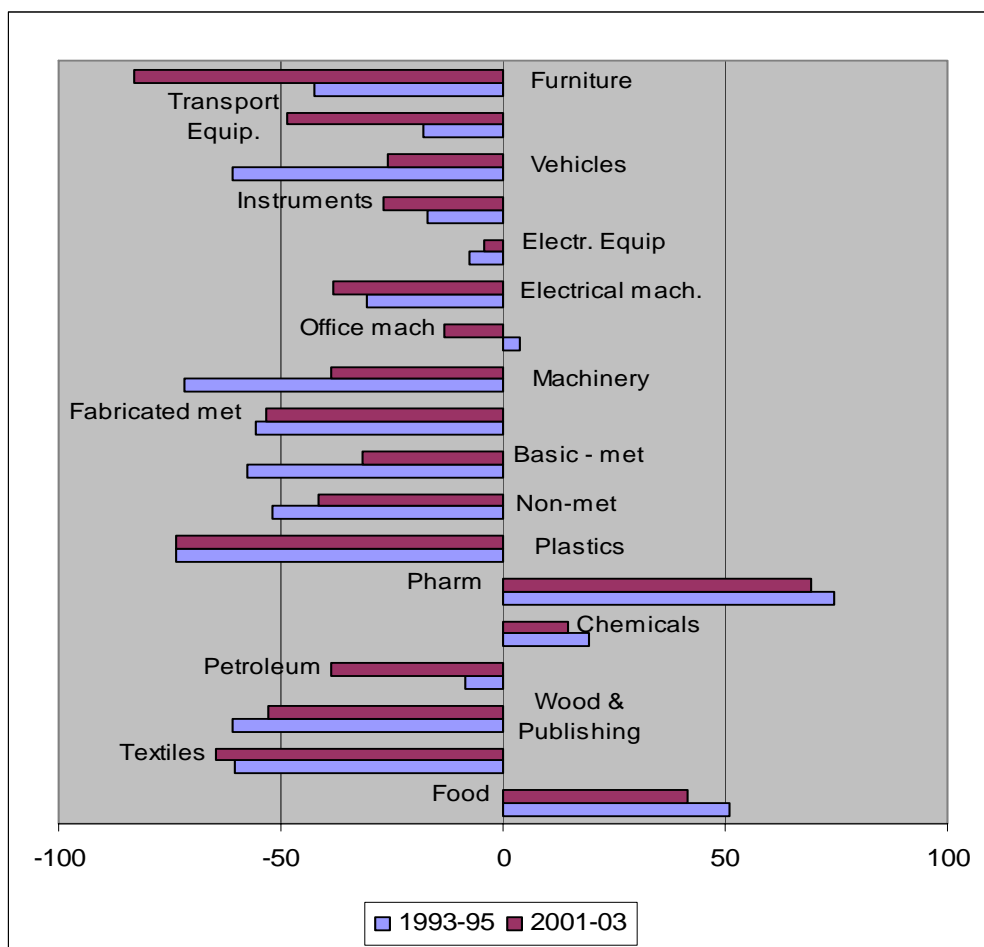
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Hungary. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
 Source: Thomson ISI, NSIODE 2005, own calculations.

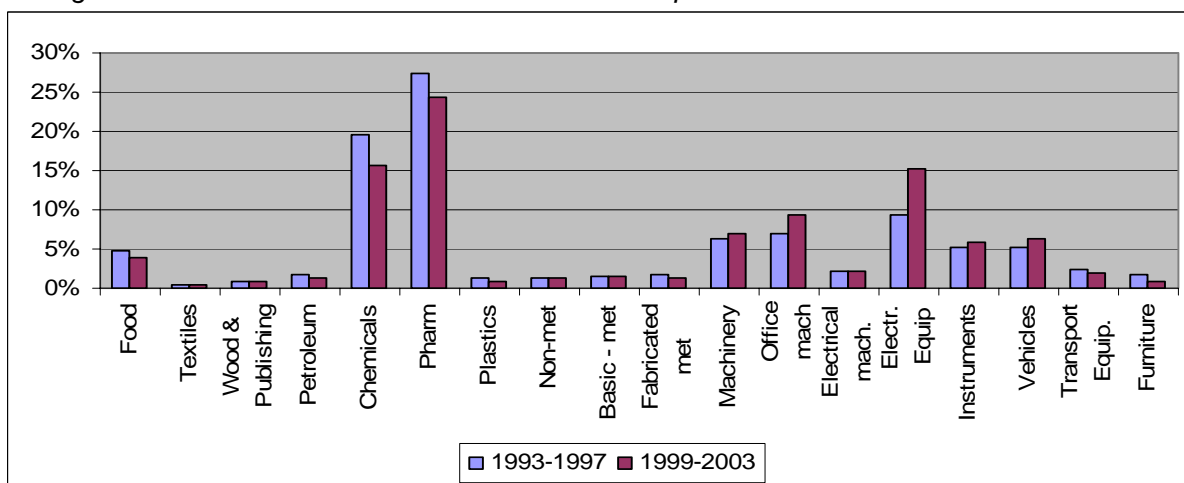
**PATENTS**

Figure 12. Number of patents by industrial sector. 18 sectors in manufacturing. Specialisation profile. Hungary. Averages 1993-1995 and 2001-2003. Based on correspondence matrix ISI-SPRU-OST.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: European Patent Office 2005, own calculations.

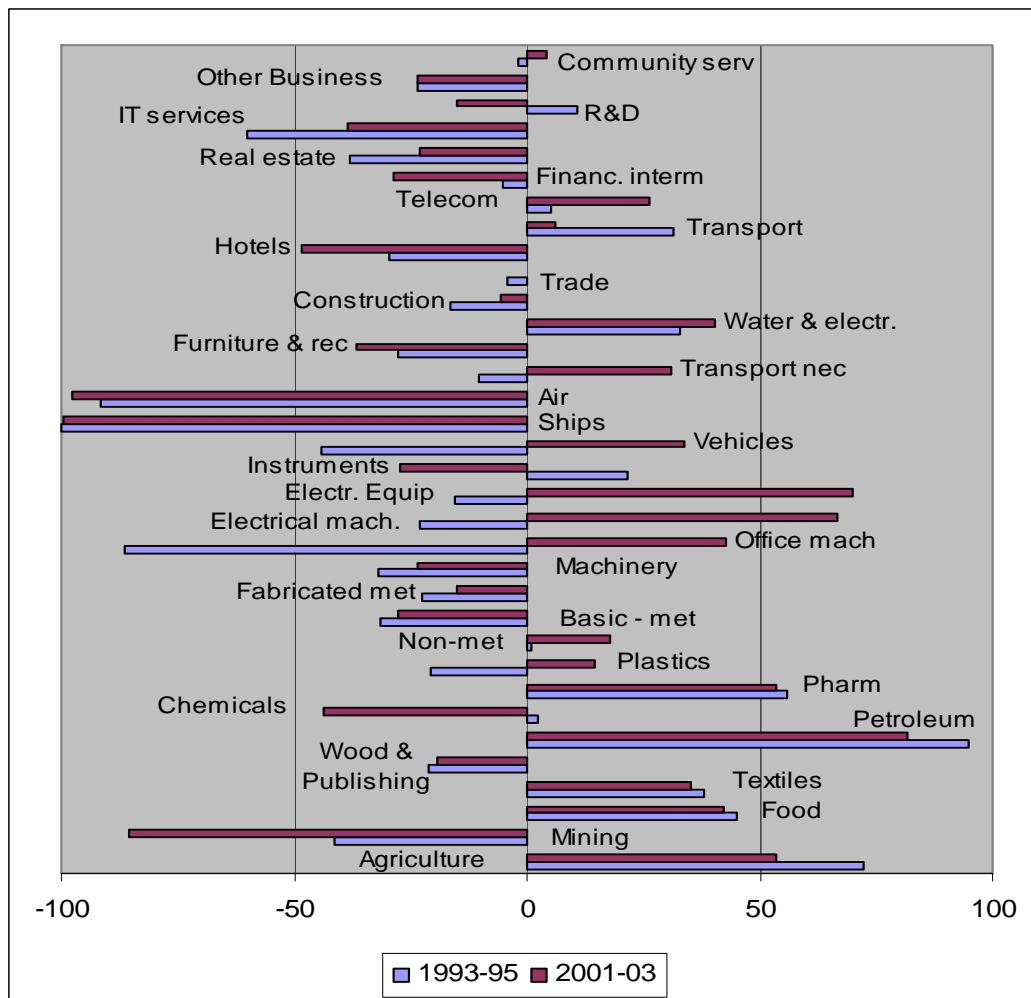
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Hungary. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: European Patent Office 2005, own calculations.

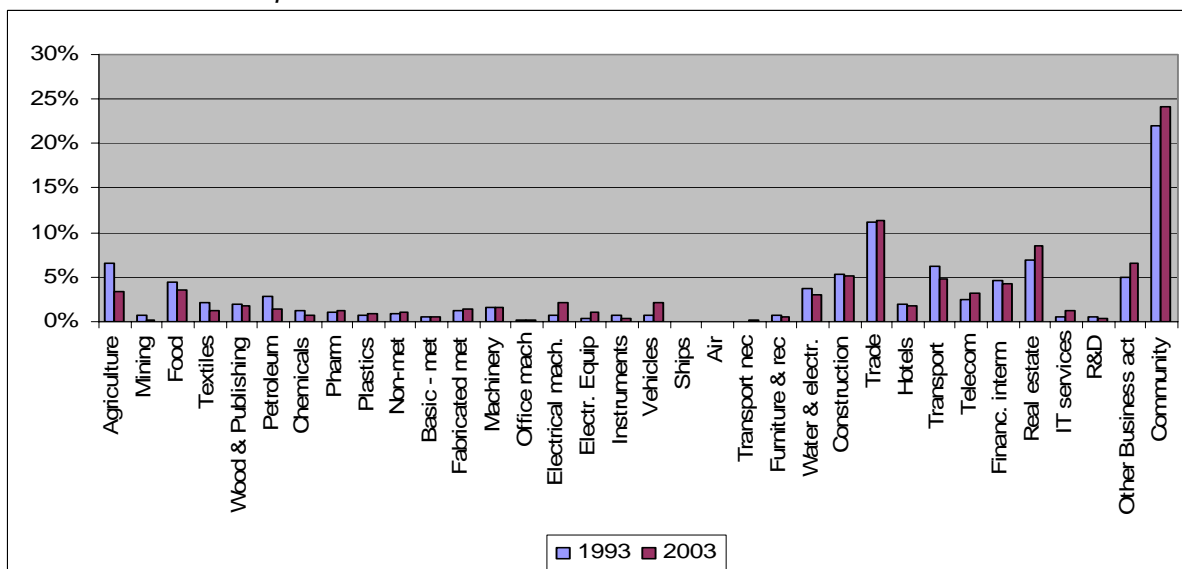
**ECONOMIC SPECIALISATION**

Figure 14. Value added by industrial sector. 34 sectors. Specialisation profile. Hungary. Averages 1993-1995 and 2001-2003. Million Euros. Current prices.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
 Source: OECD, STAN 2005, own calculations.

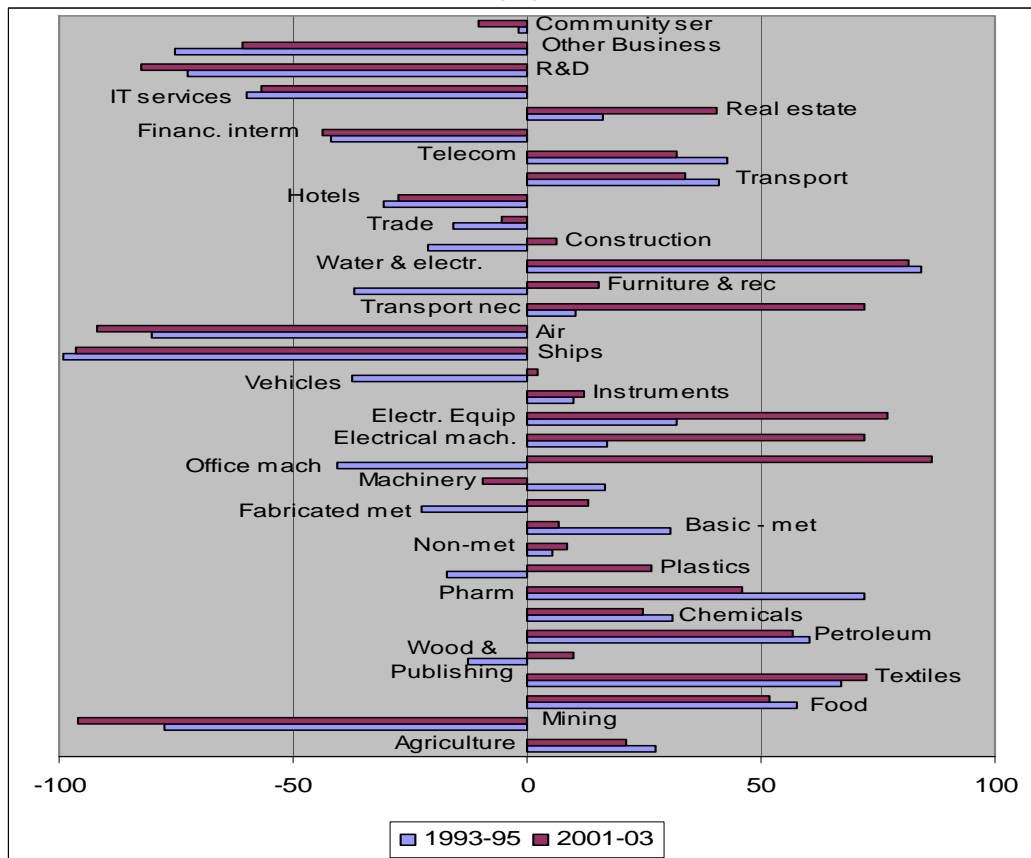
Figure 15. Shares of total value added by industrial sector. 34 sectors. Hungary. 1993 and 2003. Million Euros. Current prices.



Source: OECD, STAN, 2005.

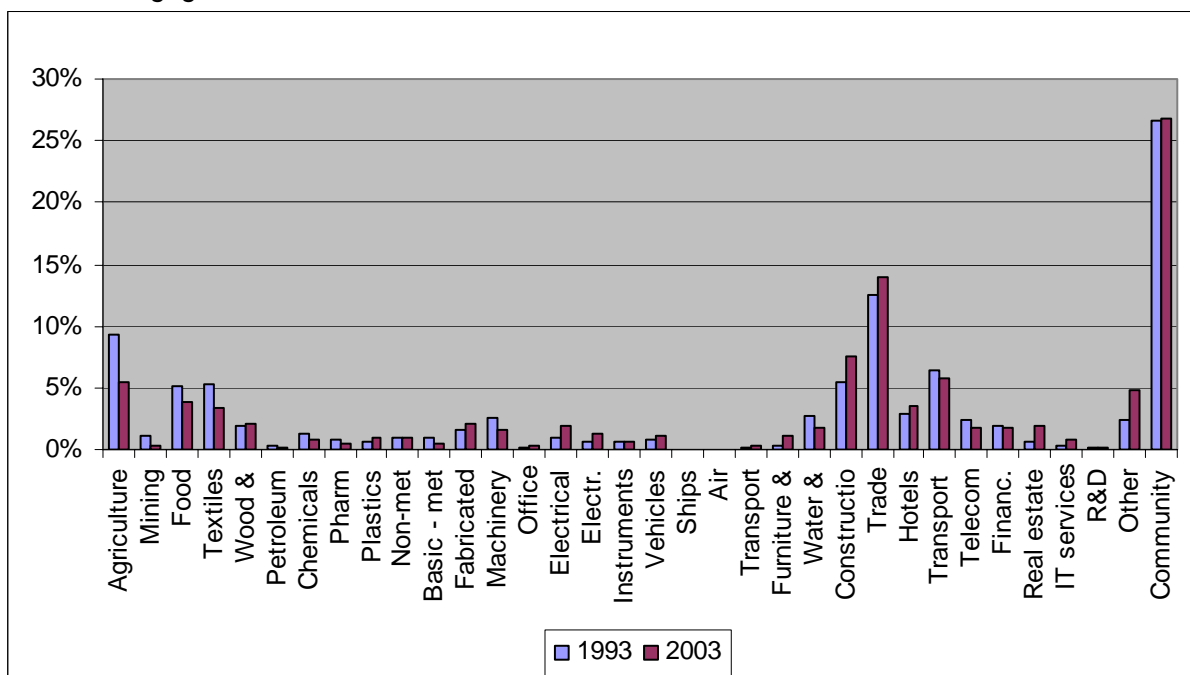


Figure 16. Employment by industrial sector. Specialisation profile. Hungary. 34 sectors. Averages 1993-1995 and 2001-2003. Numbers engaged – hundreds.



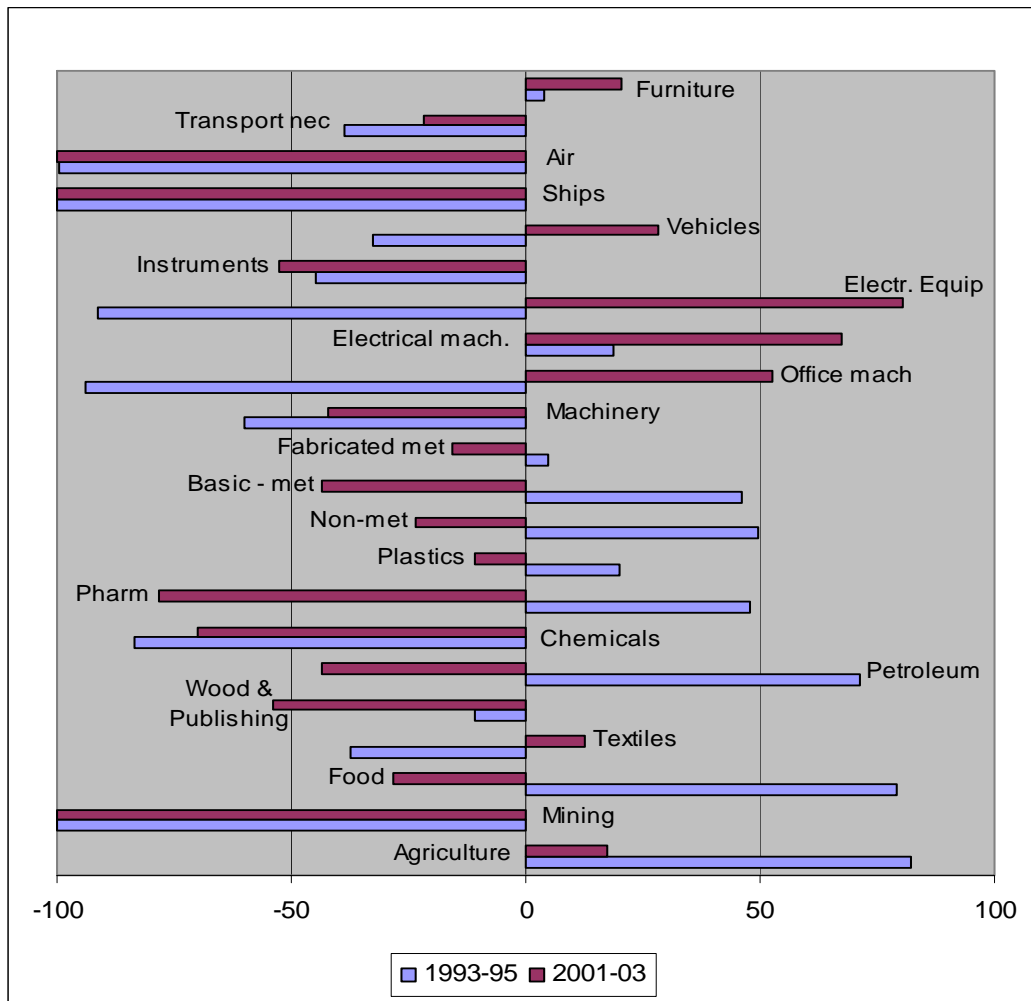
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
Source: OECD, STAN, 2005, own calculations.

Figure 17. Shares of total employment by industrial sector. 34 sectors. Hungary. 1993 and 2003. Numbers engaged – hundreds.



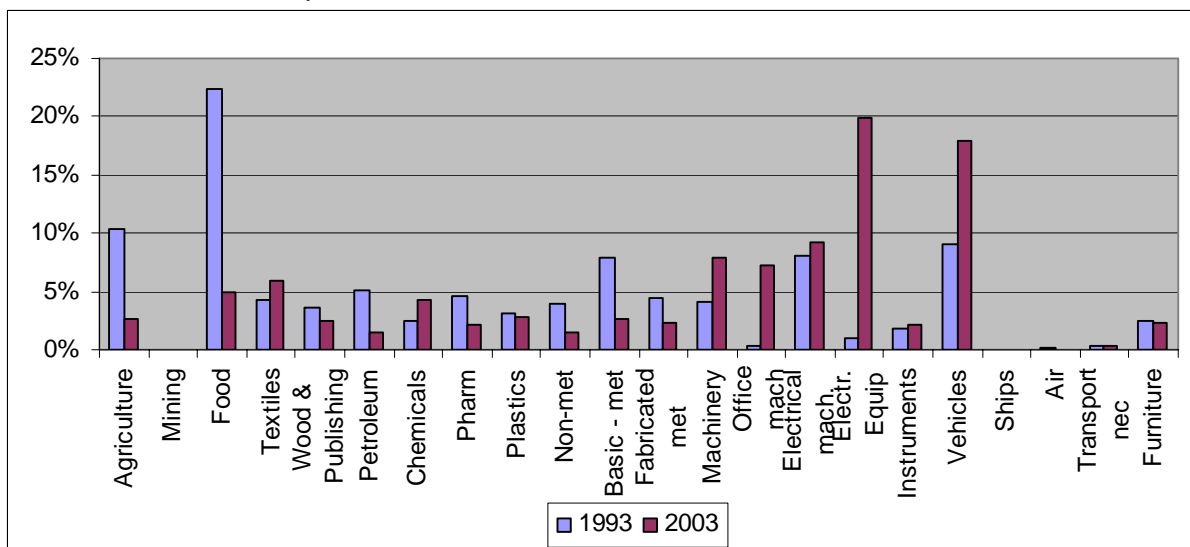
Source: OECD, STAN, 2005.

Figure 18. Exports by industrial sector. Specialisation profile. Hungary. 34 sectors. Averages 1993-1995 and 2001-2003. Thousand USD. Current prices.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: UNIDO, INDSTAT4 2005, ISIC Rev3 and COMTRADE 2005, own calculations.

Figure 19. Shares of total exports by industrial sector. 34 sectors. Hungary. 1993 and 2003. Thousand USD. Current prices.



Source: UNIDO, INDSTAT4 2005, ISIC Rev3 and COMTRADE 2005, own calculations.

**CORRELATION ANALYSIS**

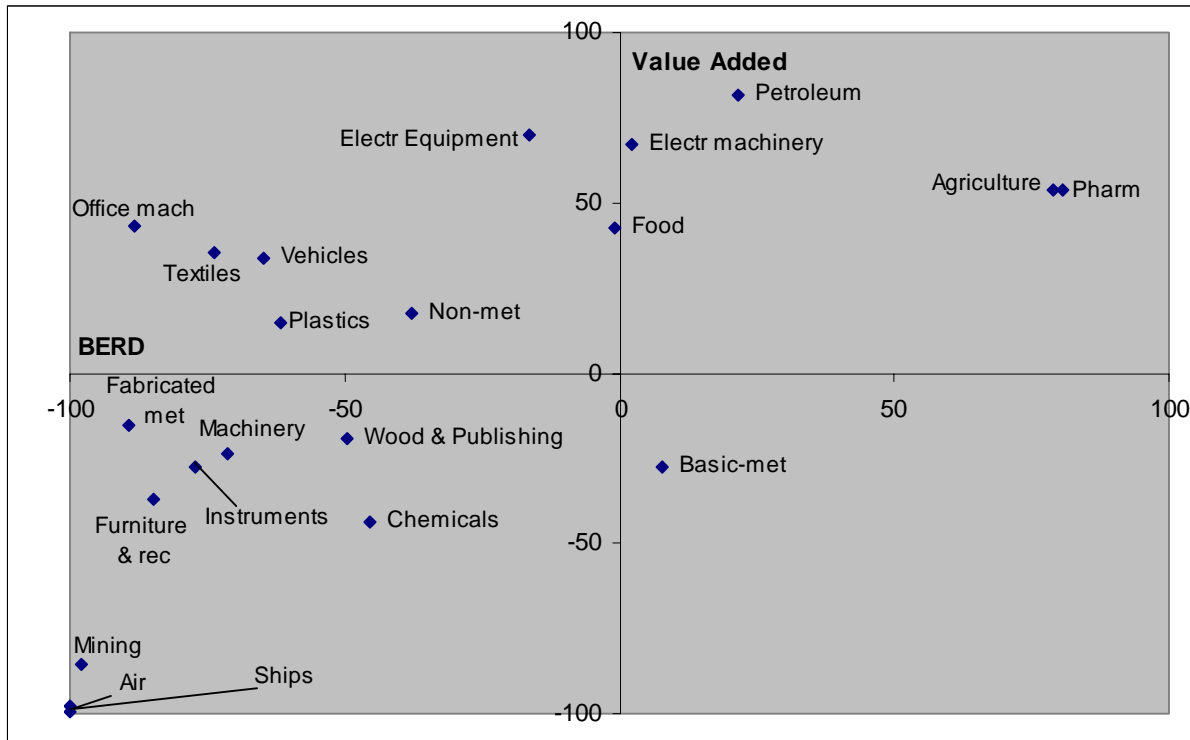
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. Hungary. Averages 1993-1995 and 2001-2003.

	HU_BERD 9395	HU_BERD 0103	HU_PAT 9395	HU_PAT 0103	HU_VA 9395	HU_VA 0103	HU_EMP 9395	HU_EMP 0103	HU_EXP 9395	HU_EXP 0103
HU_BERD9395 Pearson Correlation Sig. (2-tailed)	1 .									
HU_BERD0103 Pearson Correlation Sig. (2-tailed)	.598** .000	1 .								
HU_PAT9395 Pearson Correlation Sig. (2-tailed)	.334 .189	.601* .011	1 .							
HU_PAT0103 Pearson Correlation Sig. (2-tailed)	.292 .255	.638** .006	.890** .000	1 .						
HU_VA9395 Pearson Correlation Sig. (2-tailed)	.740** .000	.517** .002	.453 .068	.322 .207	1 .					
HU_VA0103 Pearson Correlation Sig. (2-tailed)	.461** .008	.484** .005	.359 .157	.301 .241	.620** .000	1 .				
HU_EMP9395 Pearson Correlation Sig. (2-tailed)	.601** .000	.449** .010	.507* .038	.517* .034	.756** .000	.706** .000	1 .			
HU_EMP0103 Pearson Correlation Sig. (2-tailed)	.304 .091	.259 .152	.469 .058	.263 .308	.479** .005	.832** .000	.808** .000	1 .		
HU_EXP9395 Pearson Correlation Sig. (2-tailed)	.721** .000	.724** .000	.126 .630	.063 .810	.700** .000	.542** .009	.582** .004	.377 .083	1 .	
HU_EXP0103 Pearson Correlation Sig. (2-tailed)	-.104 .646	.153 .497	-.201 .438	-.275 .286	.071 .753	.693** .000	.251 .261	.708** .000	.146 .516	1 .

\*\* Correlation is significant at the 0.01 level (2-tailed).

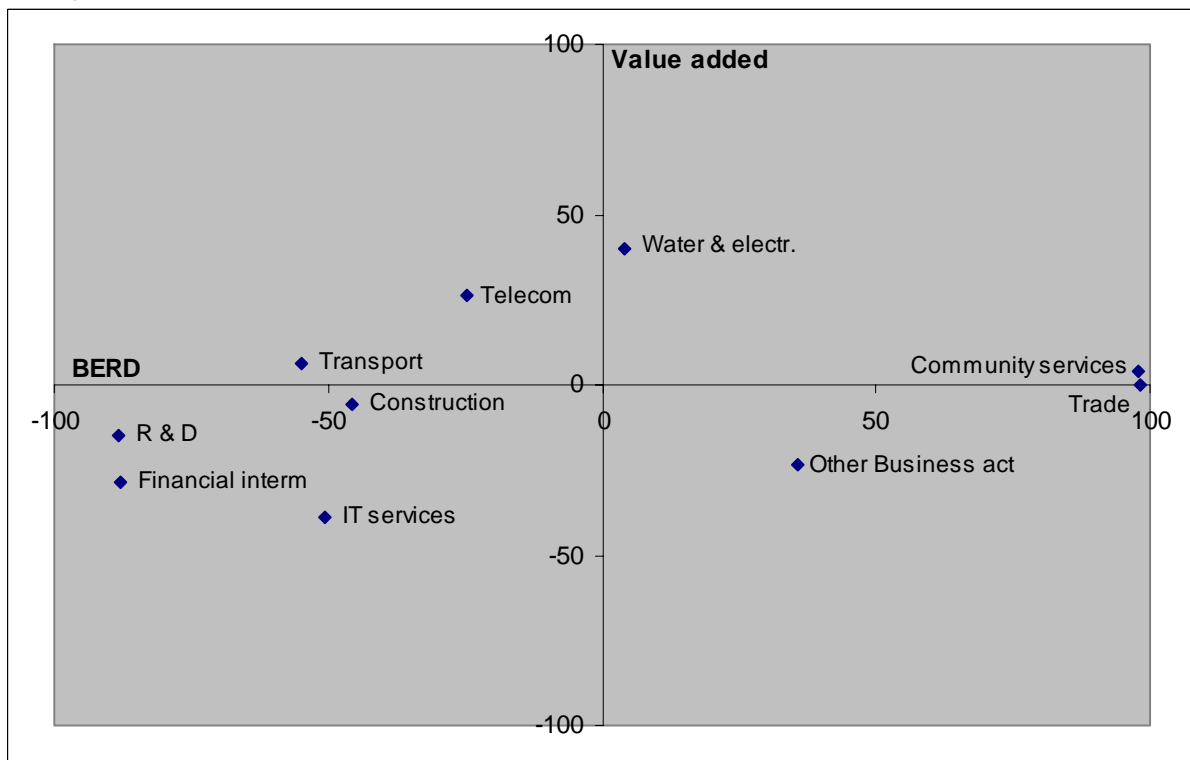
\* Correlation is significant at the 0.05 level (2-tailed).

Figure 20. BERD versus Value added specialisation in the primary and secondary industrial sectors. Hungary. Based on average values 2001- 2003.



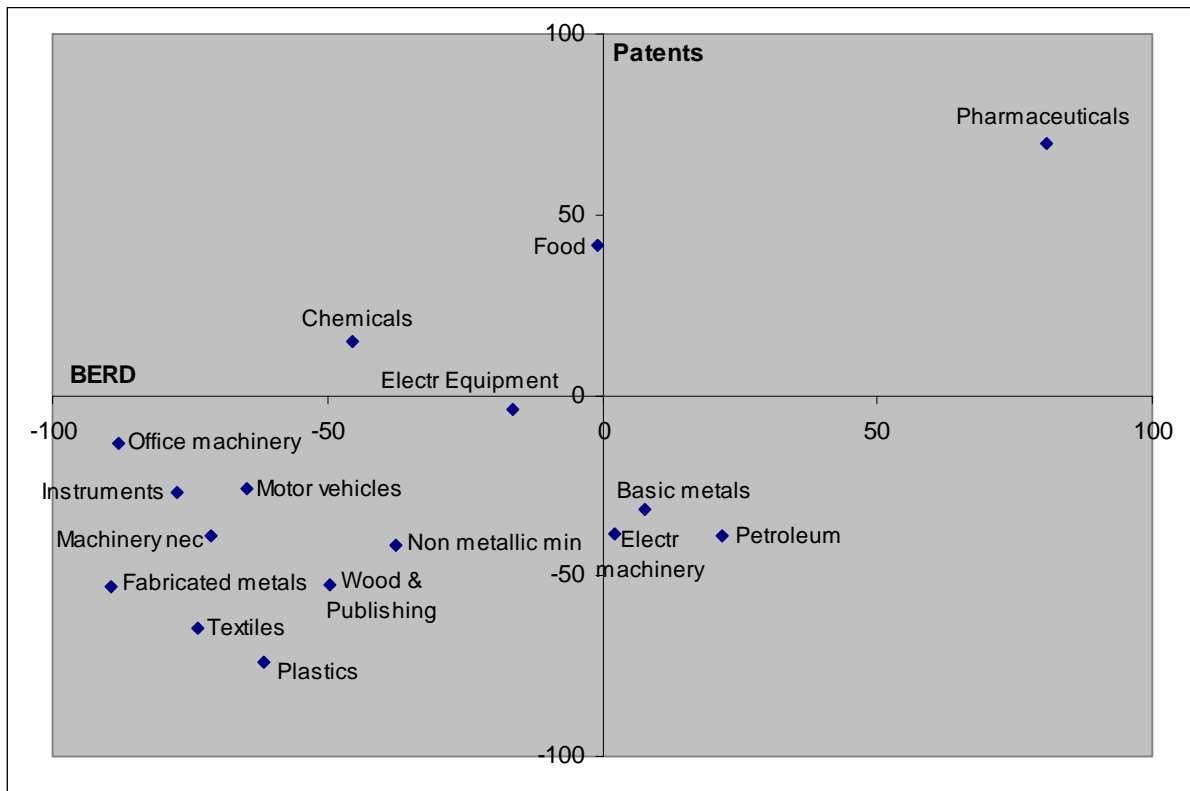
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
Source: Own calculations

Figure 21. BERD versus Value added in services. Specialisation indexes. Hungary. Based on average values 2001- 2003.



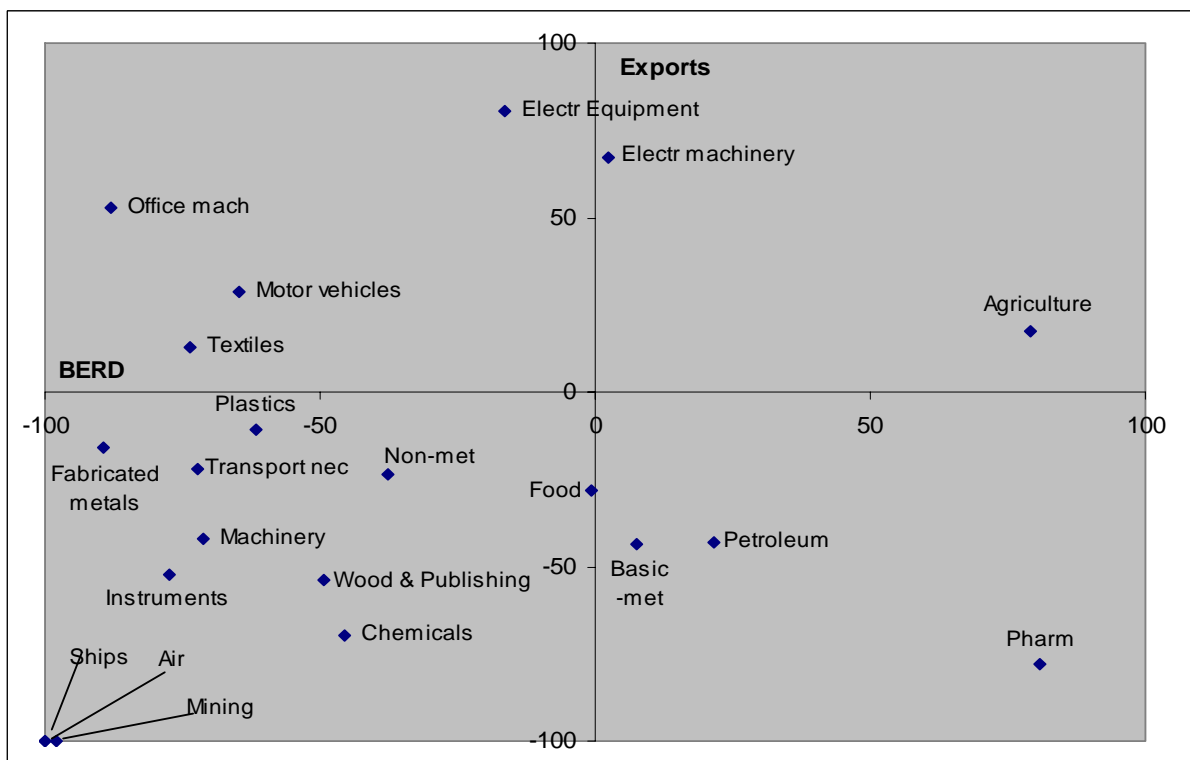
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Hungary. Based on average values 2001-2003.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
Source: Own calculations

Figure 23. BERD versus exports. Specialisation indexes. Hungary. Based on average values 2001-2003.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.  
Source: Own calculations

Table 3: Specialisation Profile

Areas of specialisation	Fast growing sectors >4.9%			Medium-Low growth sectors =<4.9%			Declining sectors <0		
	Increase Specialisation	Stable Specialisation	Losing Specialisation	Increase Specialisation	Stable Specialisation	Losing Specialisation	Increase Specialisation	Stable Specialisation	Losing Specialisation
Specialisation BERD	75-99; 74; 50-52;		60-63; 2423; 23	31;		64; 40-41; 27; 25; 01-05			
Specialisation Patents			2423; 24ex2423; 15-16			30;			
Specialisation Value Added	75-99; 352+359;		73; 60-63; 2423; 23;	64; 40-41; 34; 32; 31; 30; 26; 25;		33; 24ex2423; 15-16; 01-05			17-19
Specialisation Employment	45; 352+359;		60-63; 2423; 24ex2423; 23;	36-37; 33; 32; 31; 30; 28; 26; 25; 20-22		64; 40-41; 29; 27; 15- 16; 01-05	17-19		
Specialisation Exports			2423; 23;	36-37; 34; 32; 31; 30;		28; 27; 26; 25; 15-16; 01-05	17-19		

Red numbers: Decrease specialisation from specialised to non specialised

Blue numbers: Increase specialisation from non specialised to specialised

**EXPLANATORY NOTES****ISIC v3 codes and sector description**

Agriculture	01-05
Mining	10-14
Food	15-16
Textiles	17-19
Wood & Publishing	20-22
Petroleum	23
Chemicals excluding pharmaceuticals	24ex2423
Pharmaceuticals	2423
Plastics	25
Non-metal minerals	26
Basic metals	27
Fabricated metals	28
Machinery nec	29
Office machinery	30
Electrical mach.	31
Electr. equip.	32
Instruments	33
Motor vehicles	34
Ships	351
Air	353
Transport nec	352+359
Furniture & recycling	36-37
Water & electr.	40-41
Construction	45
Trade	50-52
Hotels	55
Transport	60-63
Telecoms	64
Financial intermediation	65-67
IT services	72
R & D	73
Other Business activities	74
Community services	75-99

**How to read specialisation profile figures**

Plotting specialisation indexes against each other is a method for visualising differences in specialisation patterns. The most interesting analytical dimension in this report is comparing business enterprise intramural R&D expenditure specialisation patterns with specialisation patterns in value added, employment, exports and technological specialisation (patents). The result of the plots is four distinct specialisation quadrants showing:

1. Sectors with **neither specialisation in BERD nor in the other analytical dimension** (lower left quadrant)
2. Sectors with **a specialisation in BERD and in the other analytical dimension** (upper right quadrant)
3. Sectors with a **specialisation in BERD but none in the other analytical dimension** (lower right quadrant)
4. Sectors that display a **specialisation in the other analytical dimension but not in BERD** (upper left quadrant)

If there is a good match between BERD and, say, value added specialisation patterns we expect to find all sectors either in the lower left or in the upper right quadrant. Sectors in the upper left or in the lower right of the graphs indicate anomalies, that is, specialisation in one dimension and non-specialisation in the other. If there are many sectors in these quadrants the graph indicates lack of correlation between BERD and, say, economic specialisation.

*BERD and Value Added specialisation – an example*

