



COUNTRY SPECIALISATION REPORT

Country: Belgium

Date: June 2006

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COUNTRY SPECIALISATION REPORT - BELGIUM

MAIN FINDINGS

Belgium exhibits a coherent specialisation profile, particularly in the manufacturing sector. Thus, during the 2001-2003 period Belgium was specialised in terms of value added, employment, exports, BERD and patents in the basic metals, pharmaceuticals, chemicals, petroleum and food industries. A similar picture is presented by the services sectors of community services, other business activities and telecommunications that are specialised in terms of BERD, VA and employment for the same period.

There appear to be some strong correlations in a number of sectors between economic specialisation as expressed by value added, employment, exports and BERD (Table 2). These correlations hold for both the tertiary (Figure 21) and the secondary productive sectors (Figure 20). However, there are no significant correlations between technological specialisation and economic specialisation.

R&D intensity grew in Belgium by 11.2% over the 1993-2003 period. Thus GERD rose from 1.7% of GDP in 1993 to 1.9% in 2003. This moderate growth was achieved despite the decline in BERD over the 2001-03 period, which resulted in an equivalent decline in GERD as a share of GDP (Figure 1). This high correlation of BERD with GERD was exhibited for the whole period, since the rate of change for both figures was quite similar. In terms of funding sources for R&D, Belgium was one of a few countries with minor changes for the 1993-2001 period (Table 1), for which data are available. The only exception to this is the steep increase by 63.6% for funding from abroad that during 2001 accounted for 12.1% of GERD. In addition, during 2001 BERD accounted for 73% of GERD.

By looking at the GBAORD priorities, Belgium during 2003 was specialised in the socioeconomic objectives of civil research, social issues, industrial research and exploitation of space. In addition, over the 1993-2003 period, Belgium became underspecialised in the objectives of agriculture, exploitation of earth and energy.

In terms of HERD by scientific field (Figure 4), the data availability¹ does not allow for identifications of major trends for the period of reference. During 2001 however, medical sciences and natural sciences each received almost a quarter of HERD. In terms of GOVERD by scientific field (Figure 5), what is striking is the dominance of engineering for all years of reference that accounted for almost two thirds of research expenditure in PRO's, followed by agricultural and natural sciences. These figures point to a very strong specialisation of PRO's to industrial needs.

Within the services sector, the specialisation of Belgium presents a dynamic picture (Figure 6), with many sectors losing or gaining in specialisation, as is the case of IT services, telecommunications, hotels and financial intermediation. With respect to the manufacturing sector, the specialisation profile of Belgium is more consistent within the 1993-2003 period, since the industries in which Belgium was specialised are almost identical for both periods. These sectors are namely electronic equipment, fabricated and basic metals, the food and textiles

¹ Data only for 2000 and 2001.

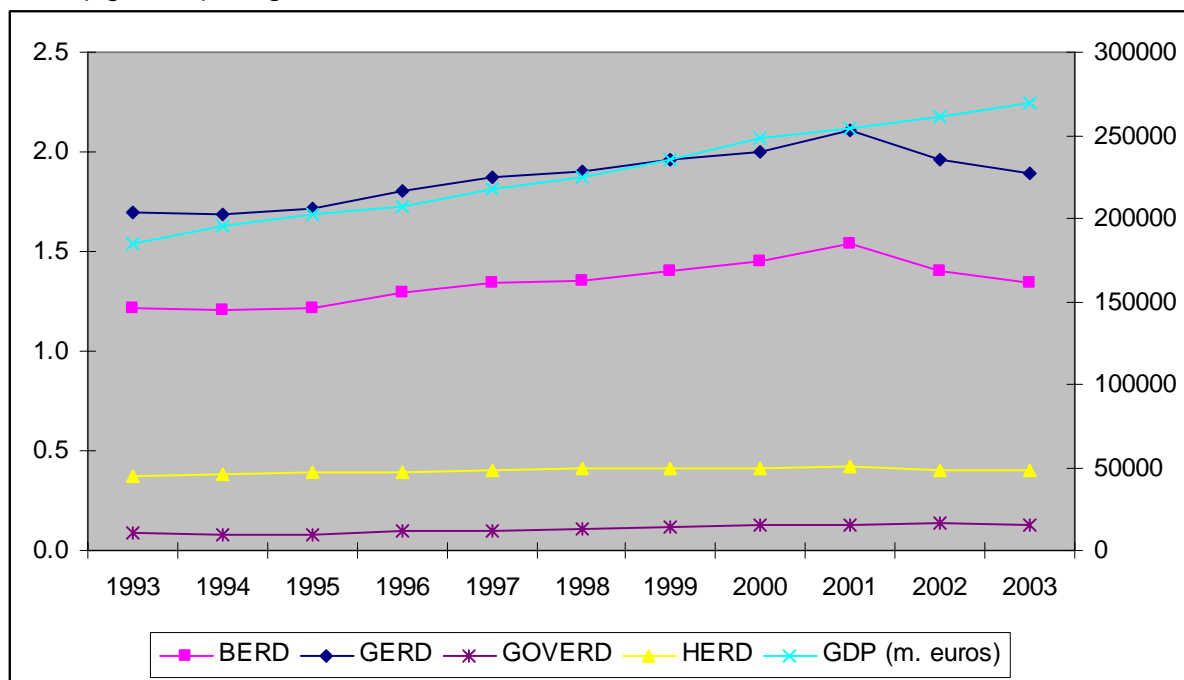
industry and the medium to high R&D intensive industries of plastics, chemicals and pharmaceuticals.

This dynamic profile is also repeated in terms of scientific specialisation (Figures 9 &11), where Belgium became specialised in a number of scientific fields such as agriculture, environment and engineering. During both periods, Belgium was also specialised in a large number of scientific fields, including pharmacology, plant and animals, microbiology, immunology, clinical medicine and economics.

This dynamic picture is not repeated in terms of technological specialisation, where for both periods of reference there were no shifts for any industry from specialised to non-specialised and vice versa. Thus, for both periods, the technological specialisation of Belgium is on the basic metals and not metallic mineral products, on plastics, pharmaceuticals, chemicals and petroleum industries and on the food and publishing sectors.

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). Belgium. 1993-2003.



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

Table 1. R&D expenditure by sector of performance and source of funds .Belgium. 1993 and 2001. Million Euros. Current prices.

	GOVERD		BERD		HERD		Non profit		Total	
	1993	2001	1993	2001	1993	2001	1993	2001	1993	2001
Business	7.9	41.1	1998.8	3219.2	83.7	134.3	7.2	10.5	2097.6	3405.0
Government	131.0	220.4	115.7	232.1	492.6	726.8	2.9	2.9	742.2	1182.3
Higher Education	0.0	0.0	16.6	1.6	51.3	115.1	1.2	0.3	69.1	117.0
Non profit	1.0	0.0	1.6	0.3	7.9	12.9	2.1	6.6	12.6	19.8
From Abroad	18.0	69.3	127.5	467.9	56.8	70.5	30.7	41.6	233.0	649.4
Total	157.9	330.9	2260.1	3921.1	692.4	1059.5	44.1	61.9	3154.5	5373.4

Pre-EMU euro and EURO

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Belgium

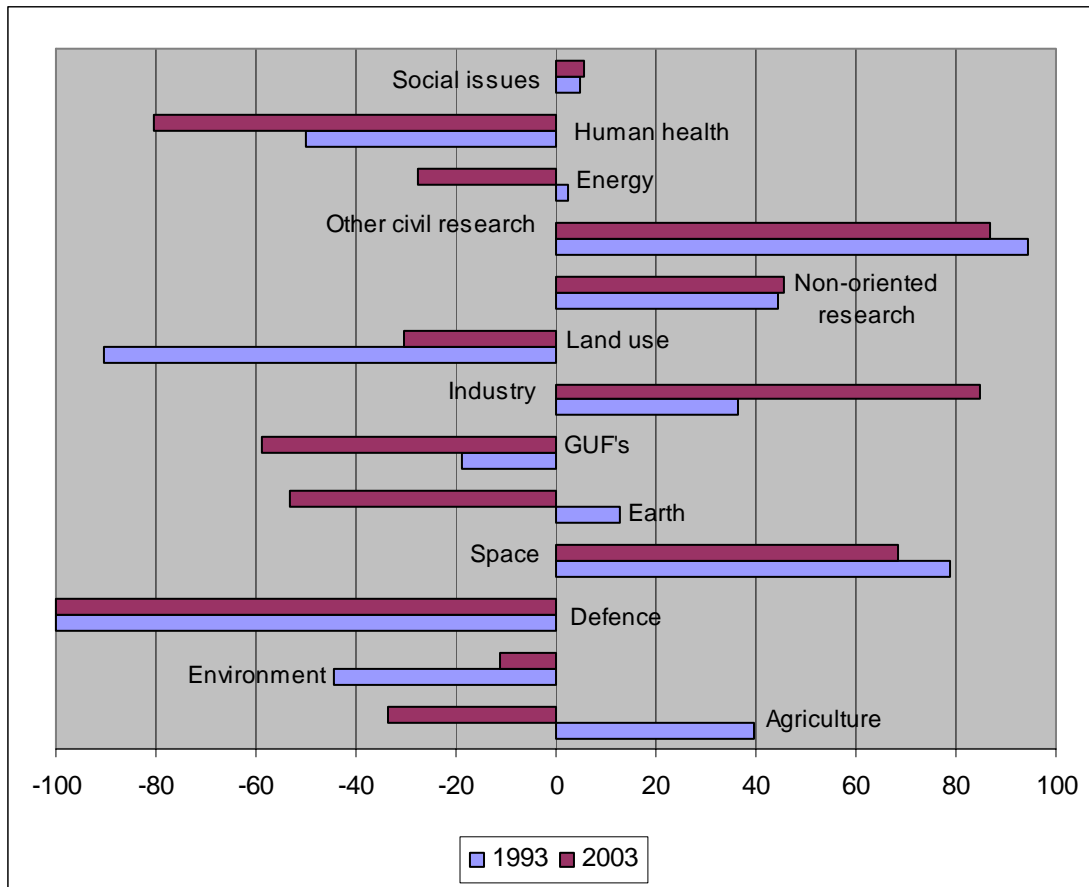
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Source: OECD OFFBERD 2005

PUBLIC R&D STATISTICS

GBAORD by socioeconomic objective

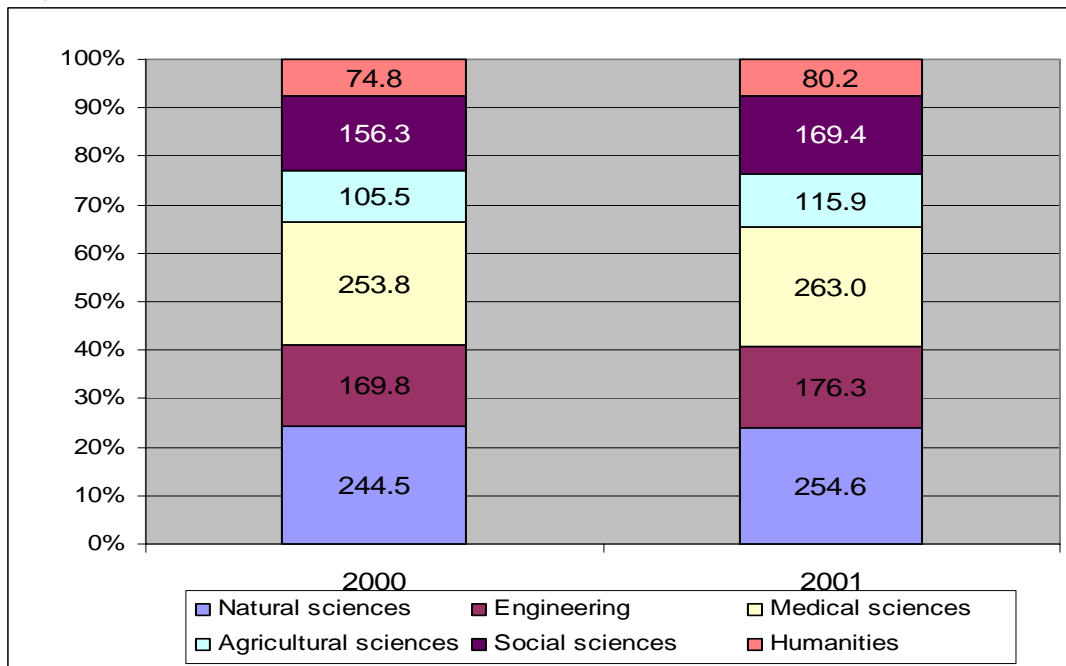
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Belgium. 1993 and 2003.



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

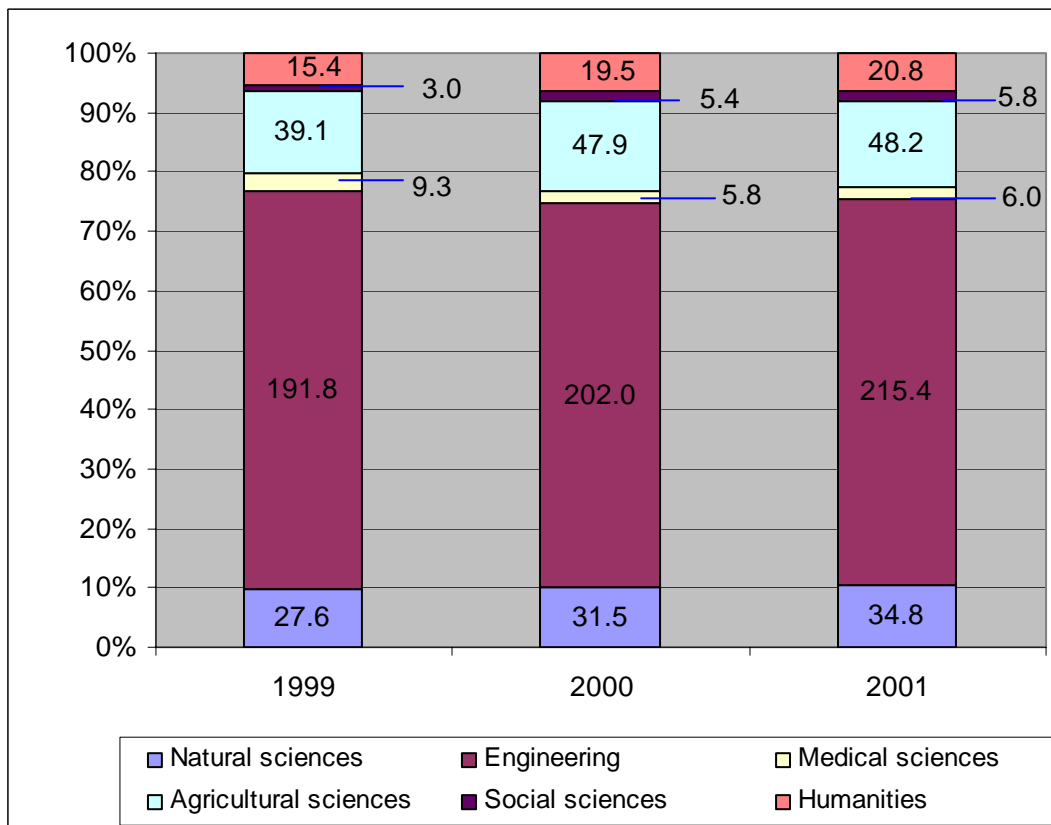
HERD by field of science

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Belgium. 2000 and 2001. Per cent of total HERD and in million Euros.



Source: OECD Basic Science and Technology Statistics 2005.

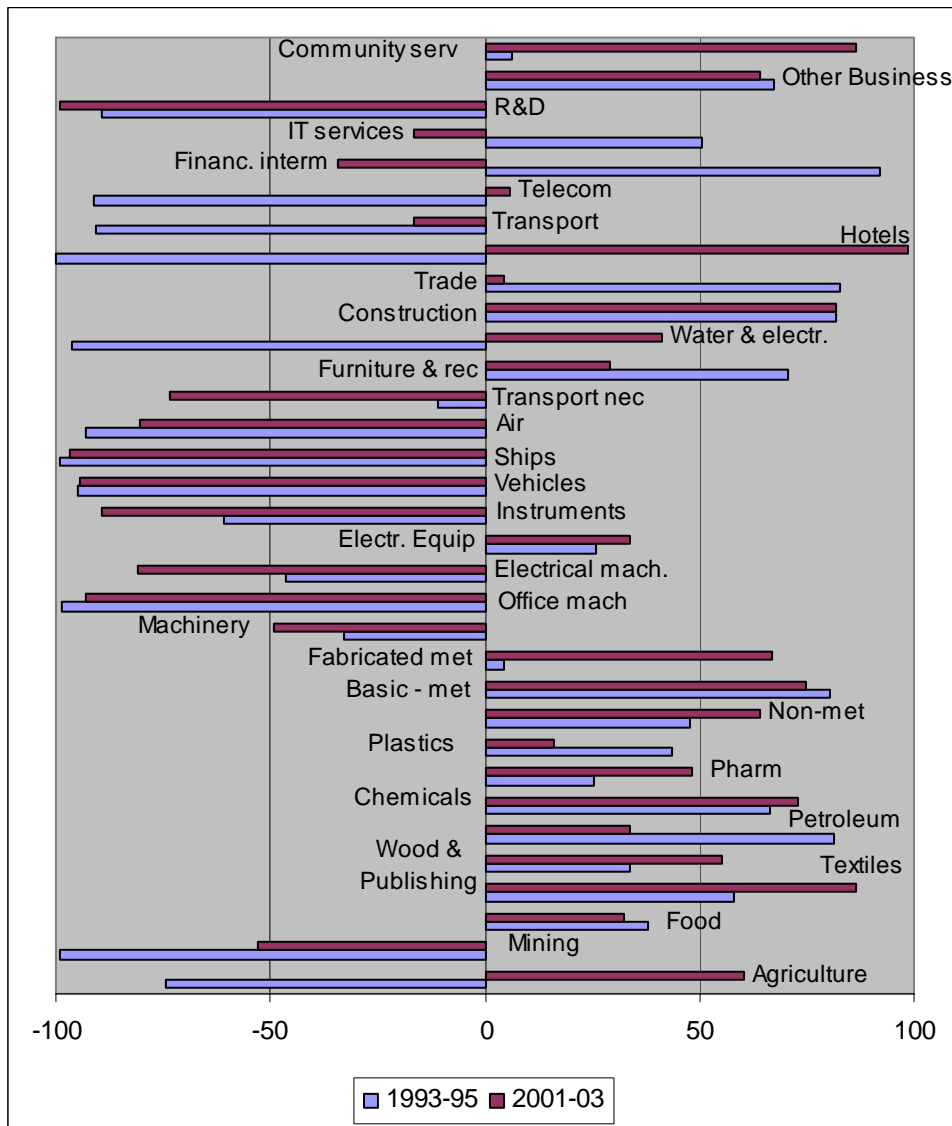
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Belgium. 1999, 2000 and 2001.



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. Belgium. 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. 1999 last available year in OECD statistics.

Not available

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

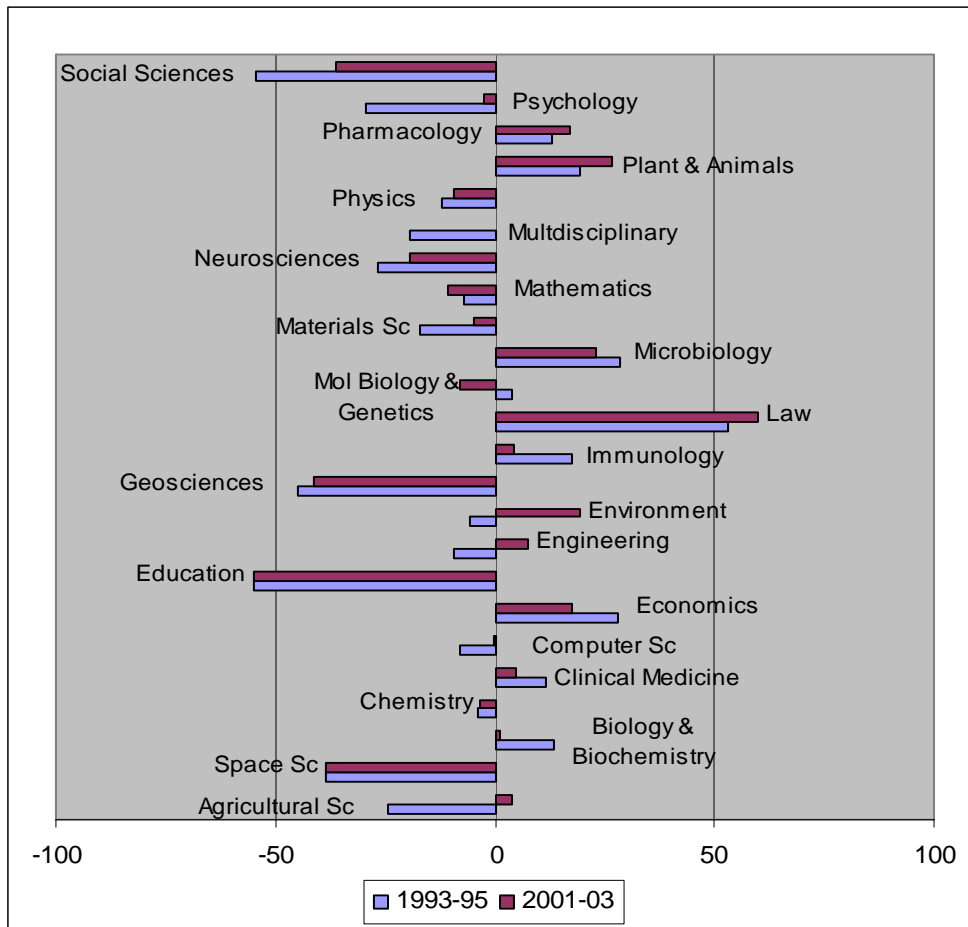
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 1999 last available year in OECD statistics.

Not available

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

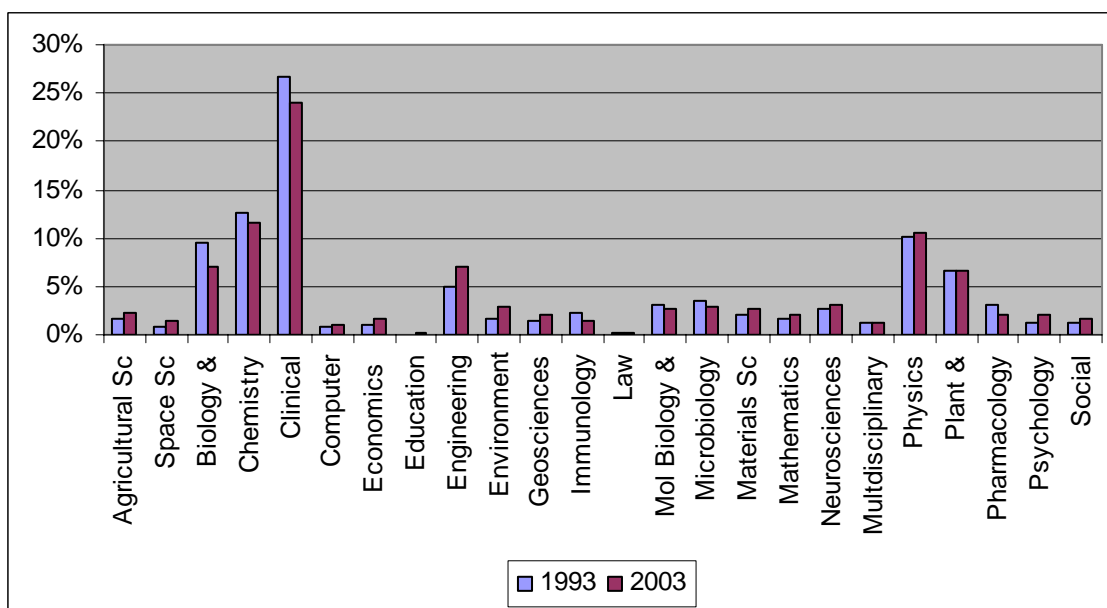
BIBLIOMETRICS

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



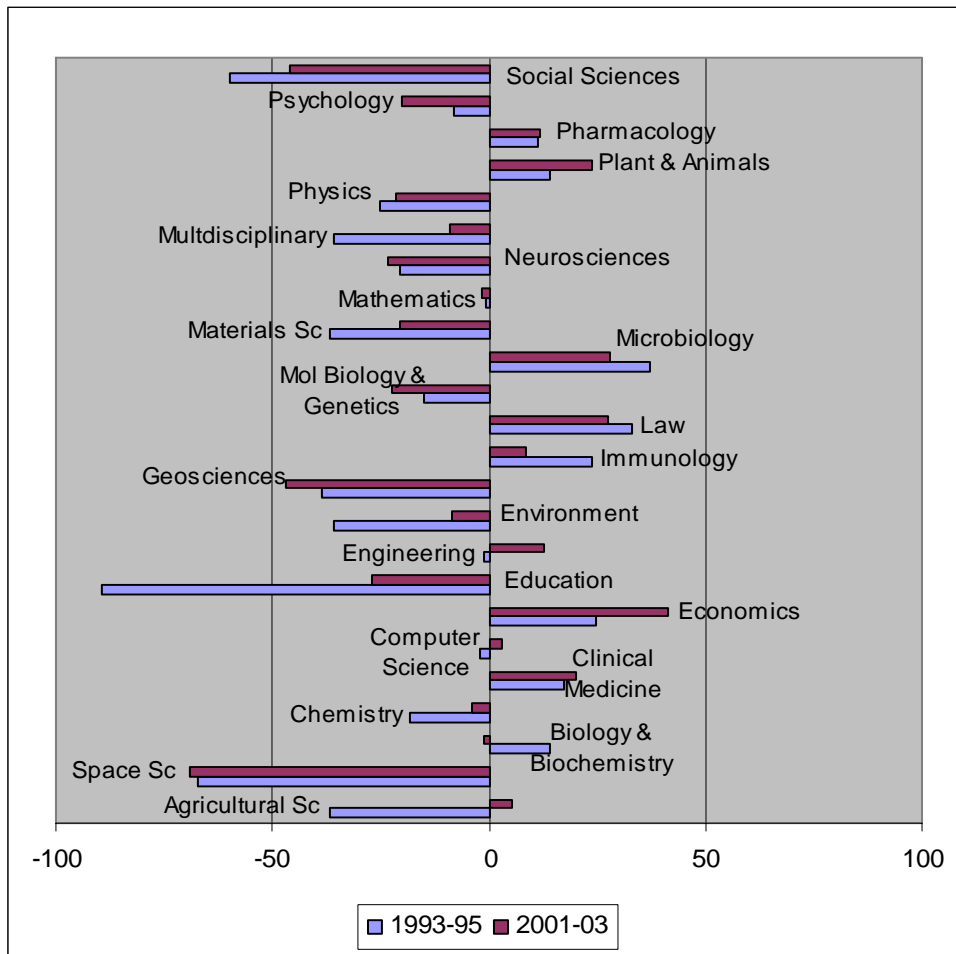
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Belgium. 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 .

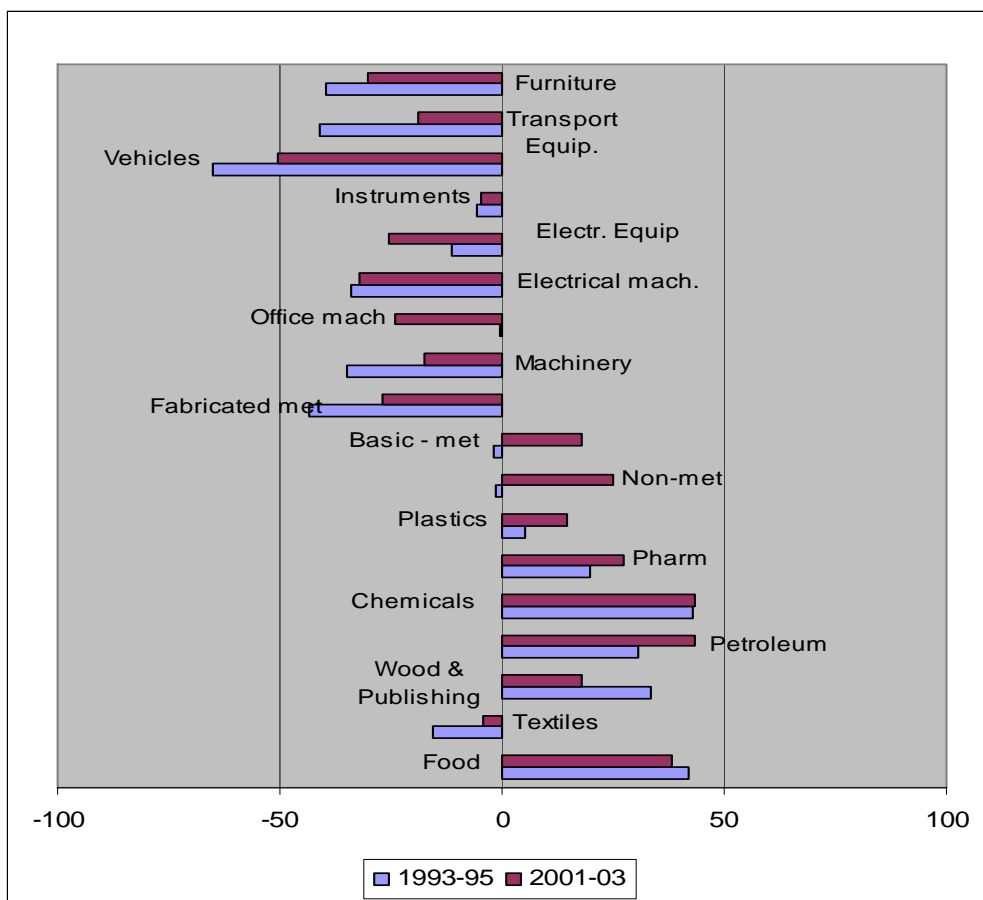


Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.

Source: Thomson ISI, NSIODE 2005, own calculations.

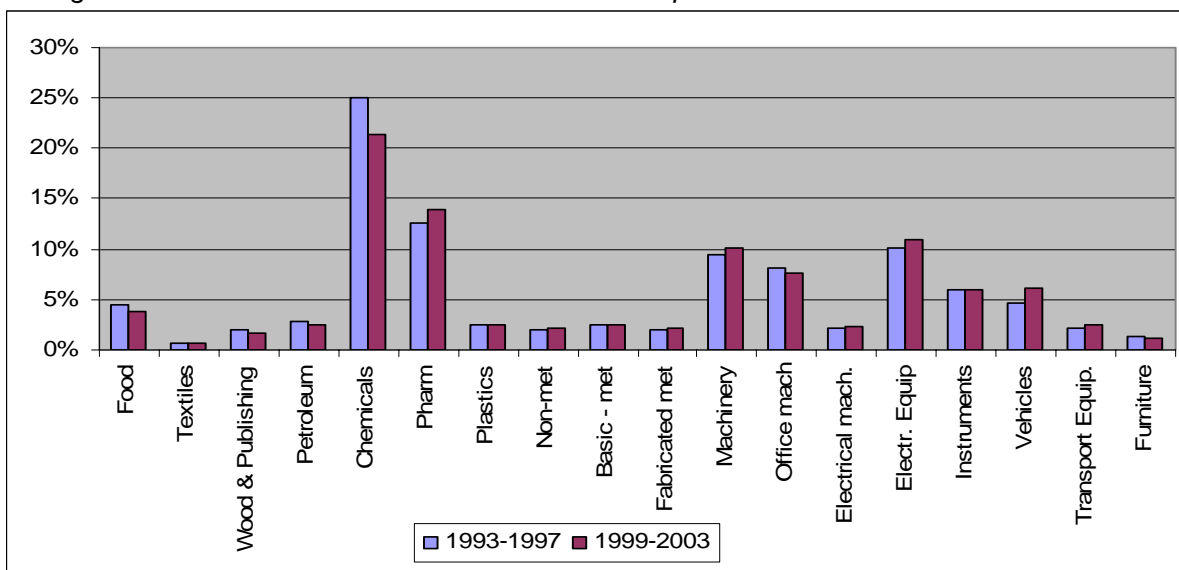
PATENTS

Figure 12. Number of patents by industrial sector. 18 sectors in manufacturing. Specialisation profile. Belgium. 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.

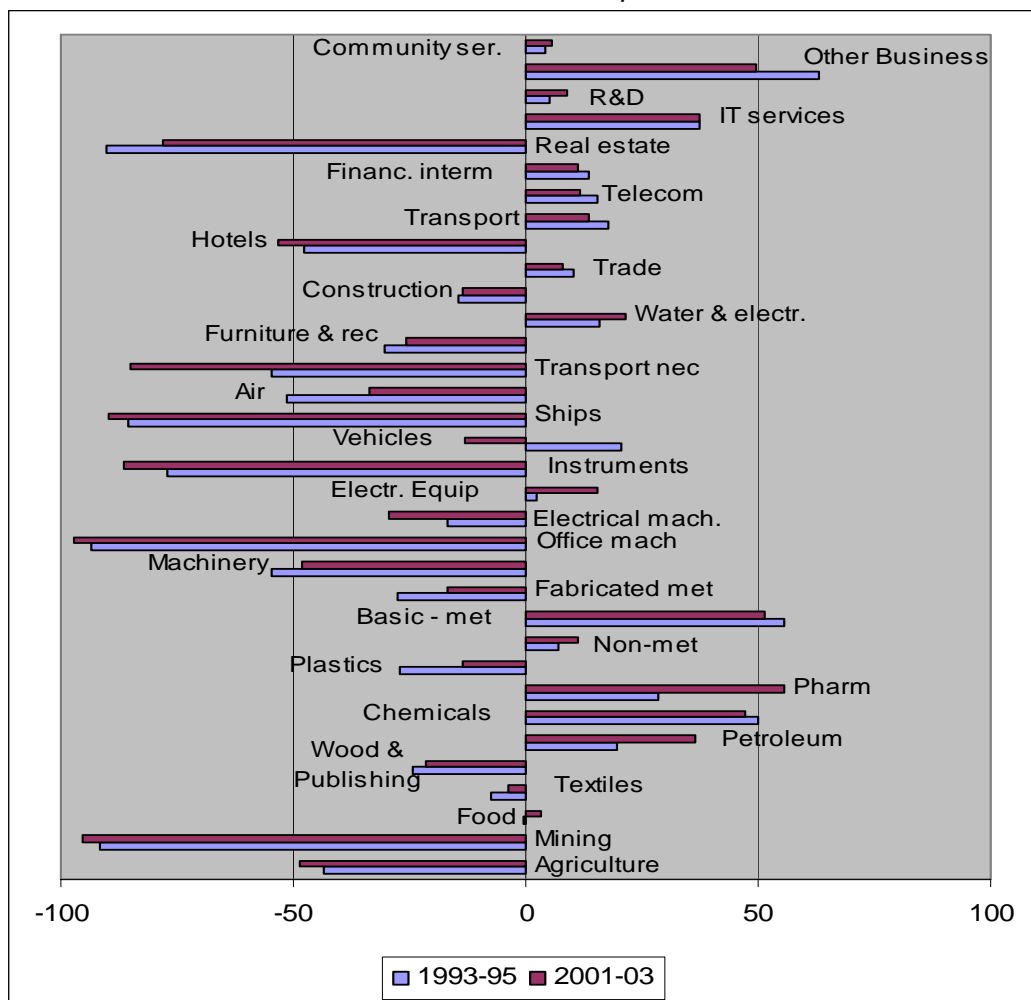
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Belgium. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

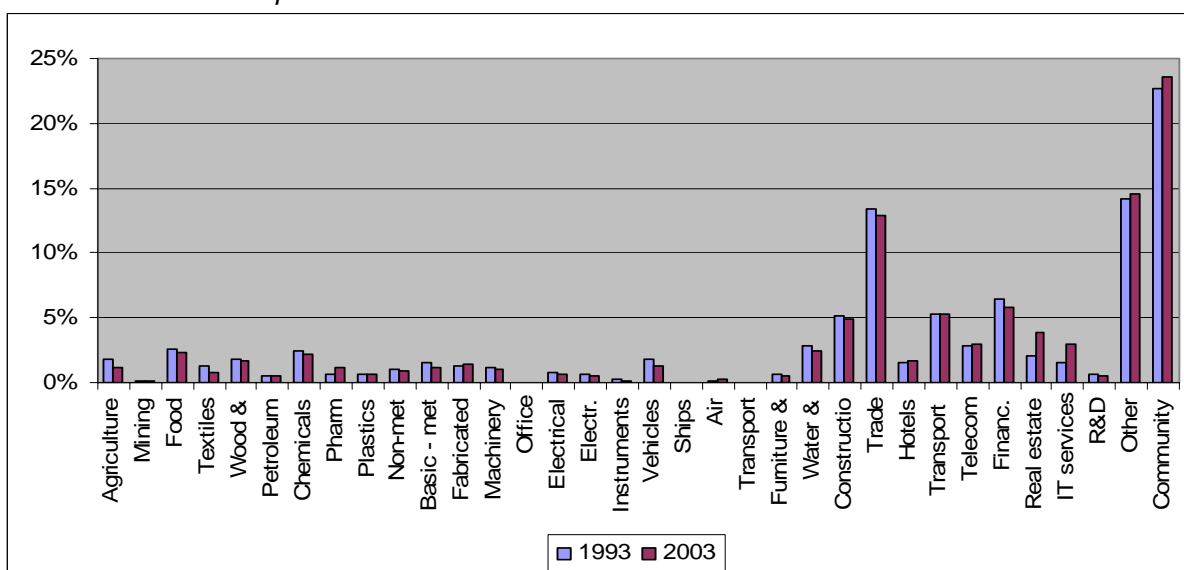
ECONOMIC SPECIALISATION

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



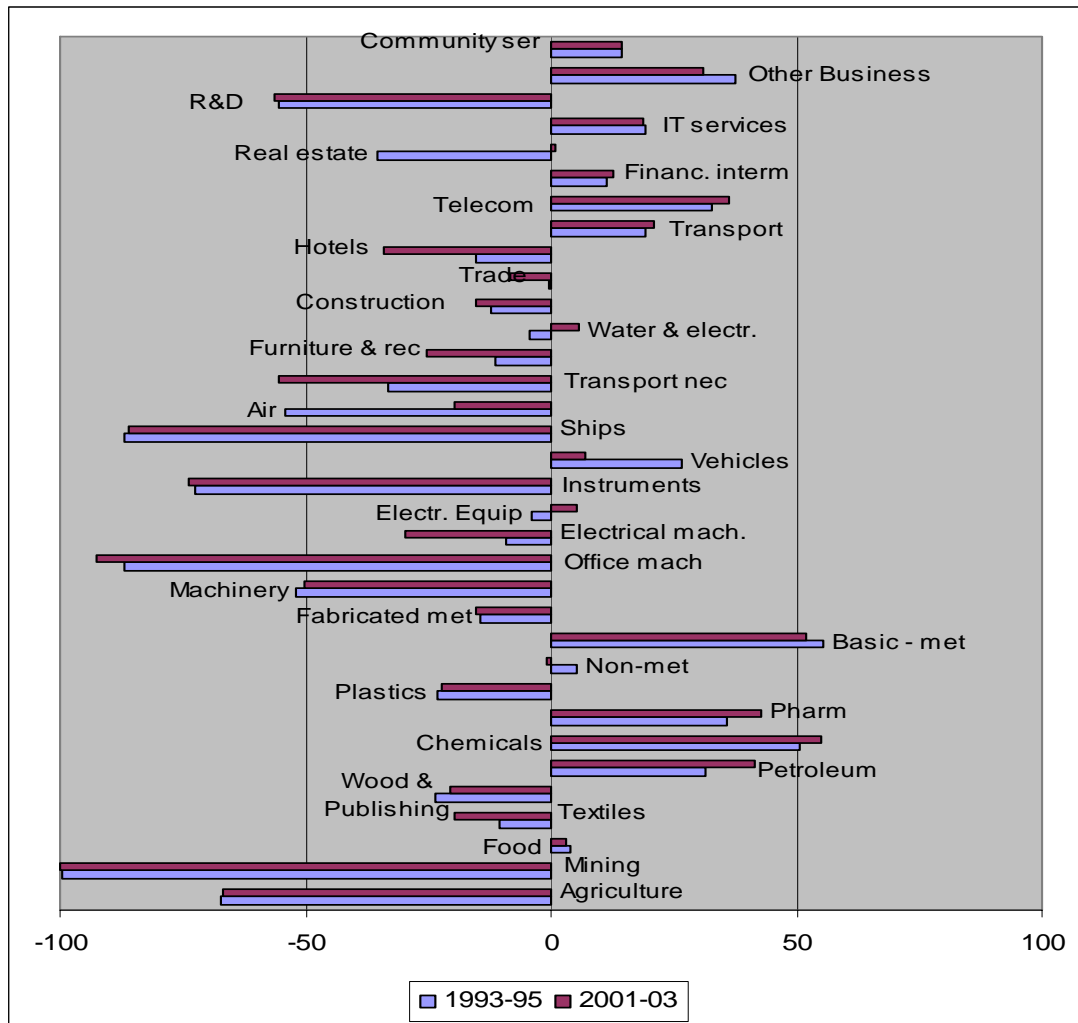
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



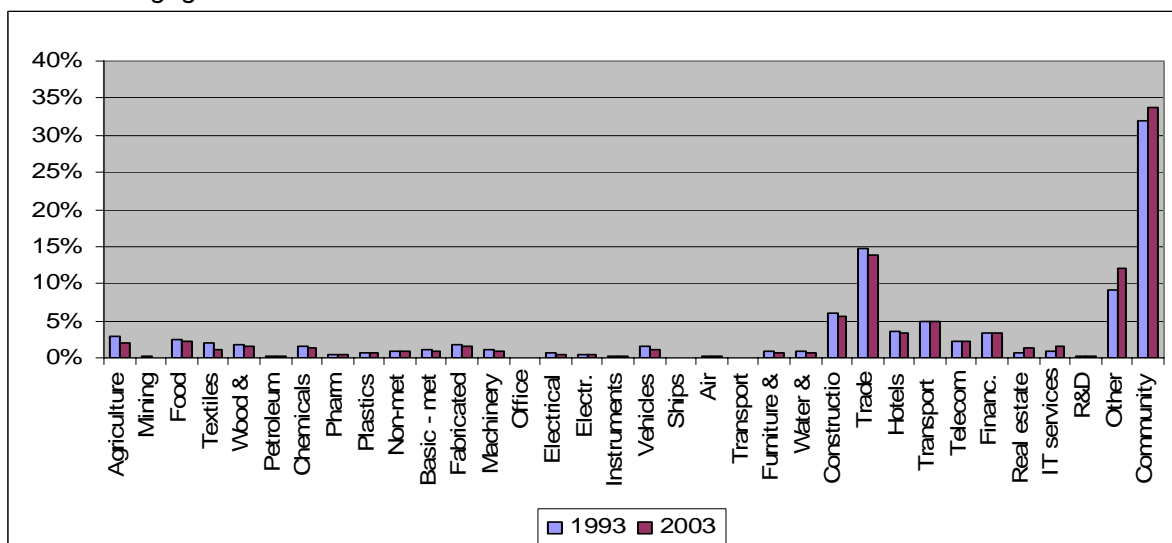
Source: OECD, STAN, 2005.

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



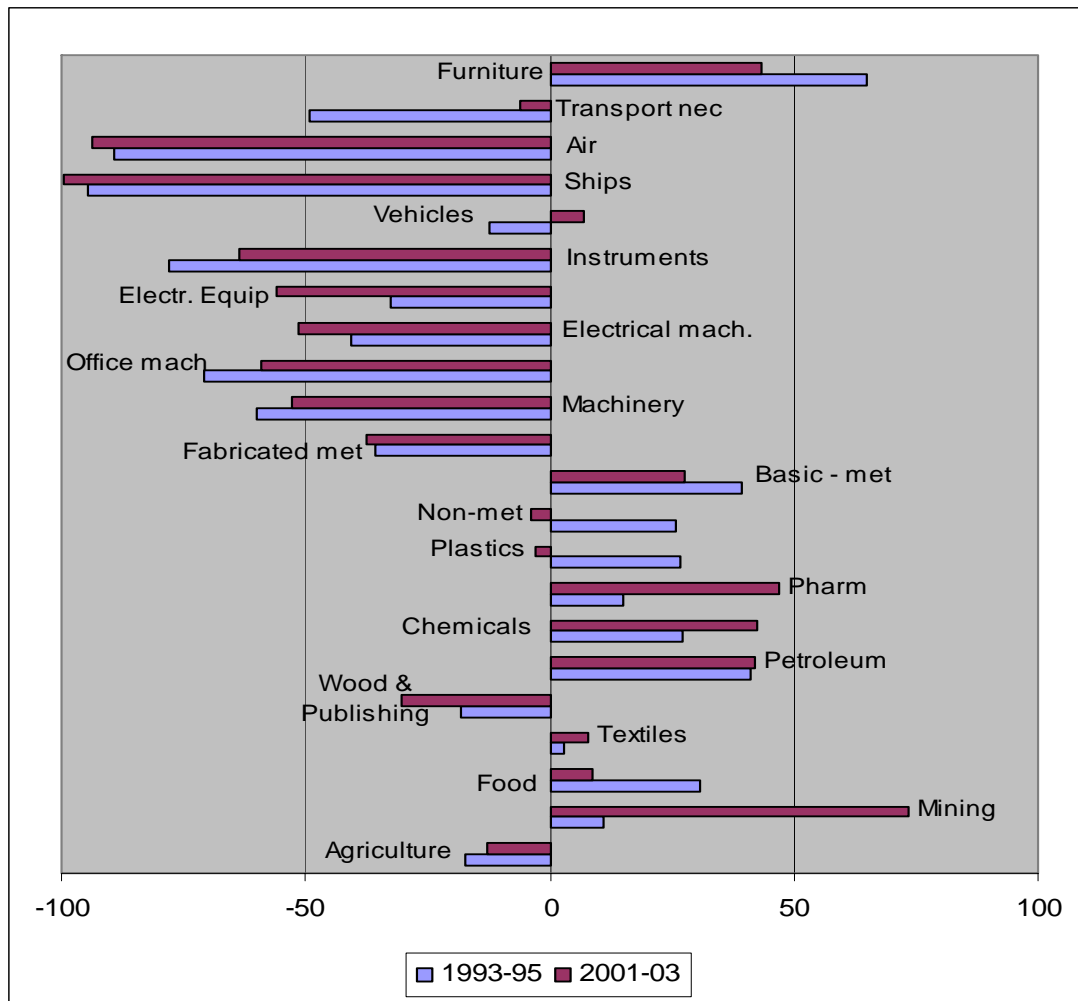
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



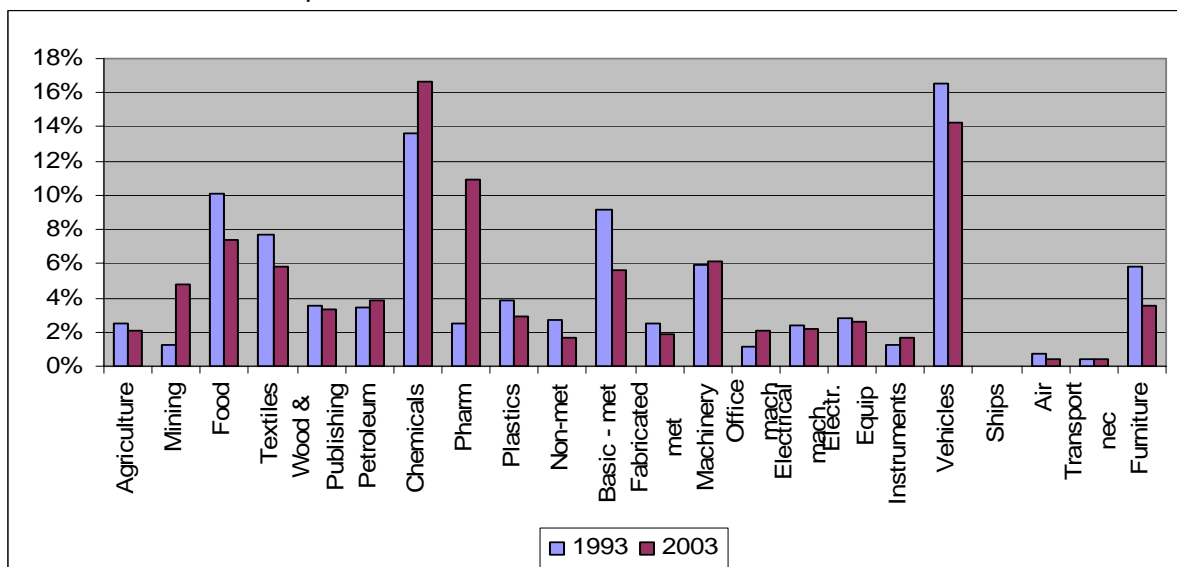
Source: OECD, STAN, 2005.

Figure 18. Exports by industrial sector. Specialisation profile. Belgium. 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. Belgium. 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. Belgium. Averages 1993-1995 and 2001-2003.*

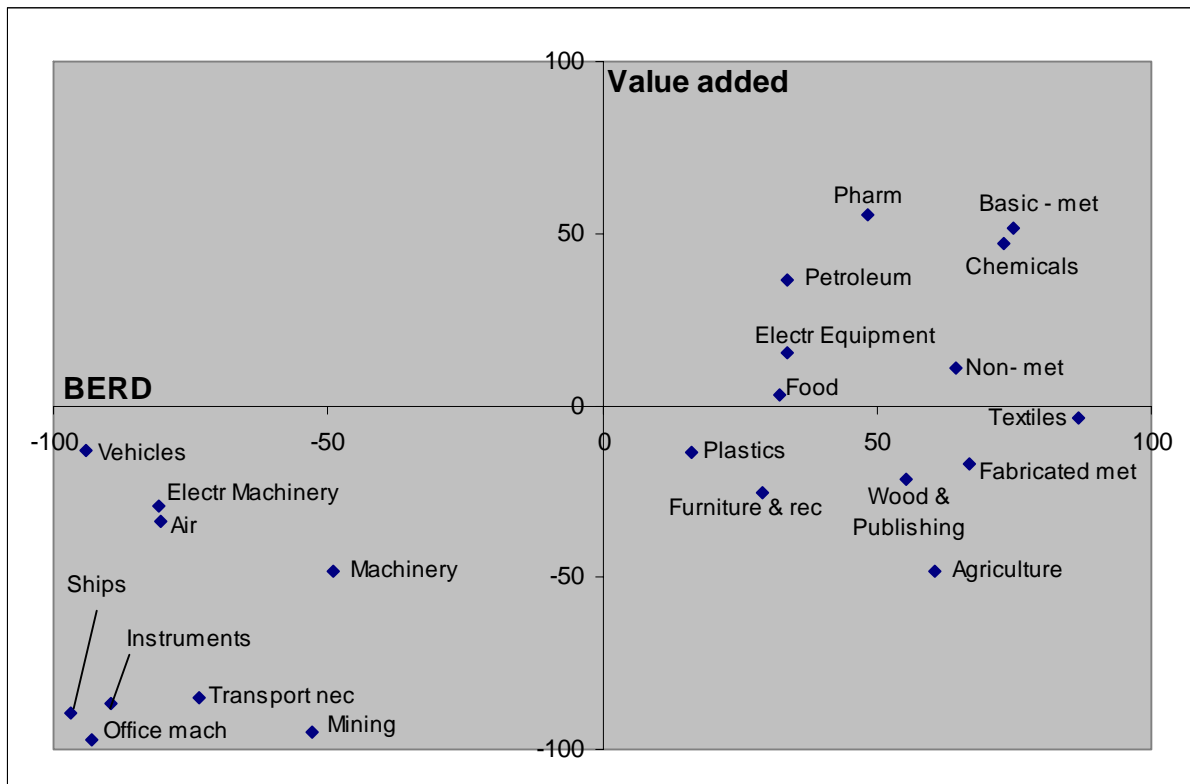
Correlations

	BE_BERD 9395	BE_BERD 0103	BE_PAT 9395	BE_PAT 0103	BE_VA 9395	BE_VA 0103	BE_EMP 9395	BE_EMP 0103	BE_EXP 9395	BE_EXP 0103
BE_BERD9395 Pearson Correlation Sig. (2-tailed)	1 .									
BE_BERD0103 Pearson Correlation Sig. (2-tailed)	.545** .001	1 .								
BE_PAT9395 Pearson Correlation Sig. (2-tailed)	.492* .453	.435 .081	1 .							
BE_PAT0103 Pearson Correlation Sig. (2-tailed)	.657** .004	.581* .014	.906** .000	1 .						
BE_VA9395 Pearson Correlation Sig. (2-tailed)	.528** .002	.465** .006	.267 .301	.460 .063	1 .					
BE_VA0103 Pearson Correlation Sig. (2-tailed)	.567** .001	.532** .001	.384 .128	.576* .016	.962** .000	1 .				
BE_EMP9395 Pearson Correlation Sig. (2-tailed)	.560** .001	.537** .001	.231 .371	.436 .080	.921** .000	.880** .000	1 .			
BE_EMP0103 Pearson Correlation Sig. (2-tailed)	.537** .001	.534** .001	.366 .149	.552* .022	.916** .000	.923** .000	.968** .000	1 .		
BE_EXP9395 Pearson Correlation Sig. (2-tailed)	.751** .000	.696** .000	.328 .199	.530* .029	.654** .001	.658** .001	.651** .001	.600** .003	1 .	
BE_EXP0103 Pearson Correlation Sig. (2-tailed)	.515* .014	.501* .017	.327 .200	.531* .028	.497* .019	.462* .031	.503* .017	.438* .041	.878** .000	1 .

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

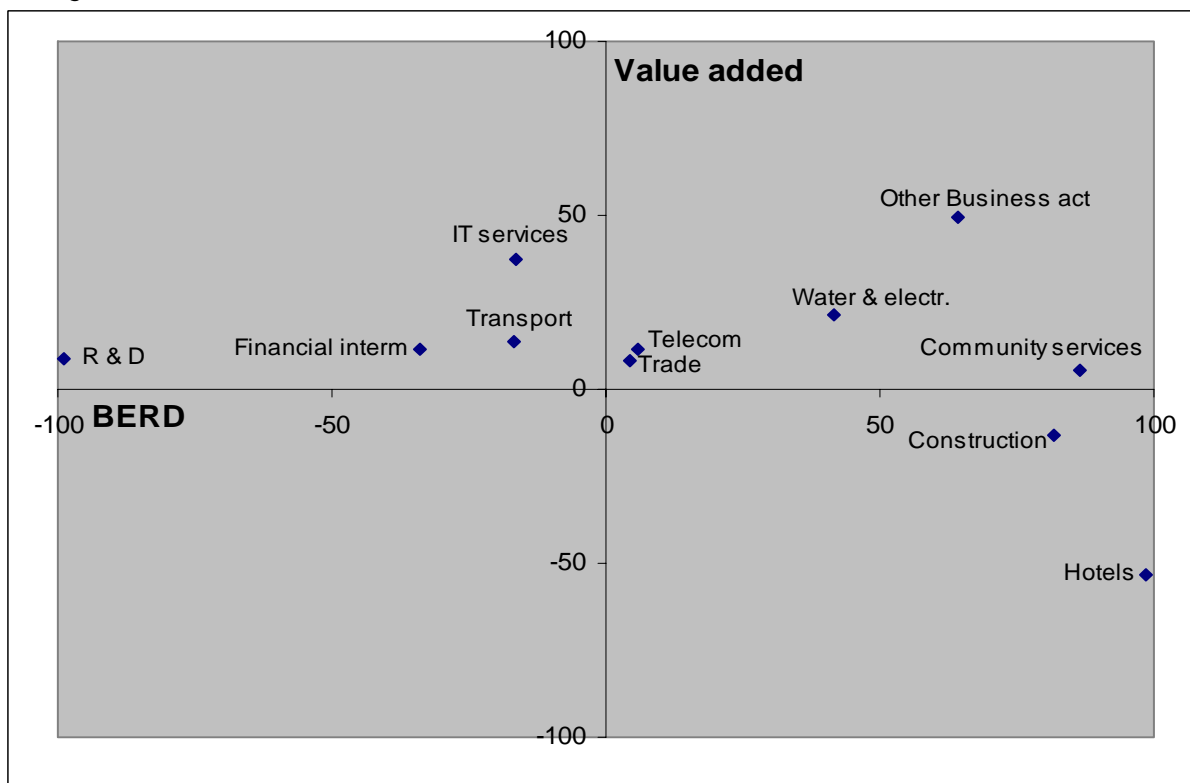
* Correlation is significant at the 0.05 level (2-tailed).

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



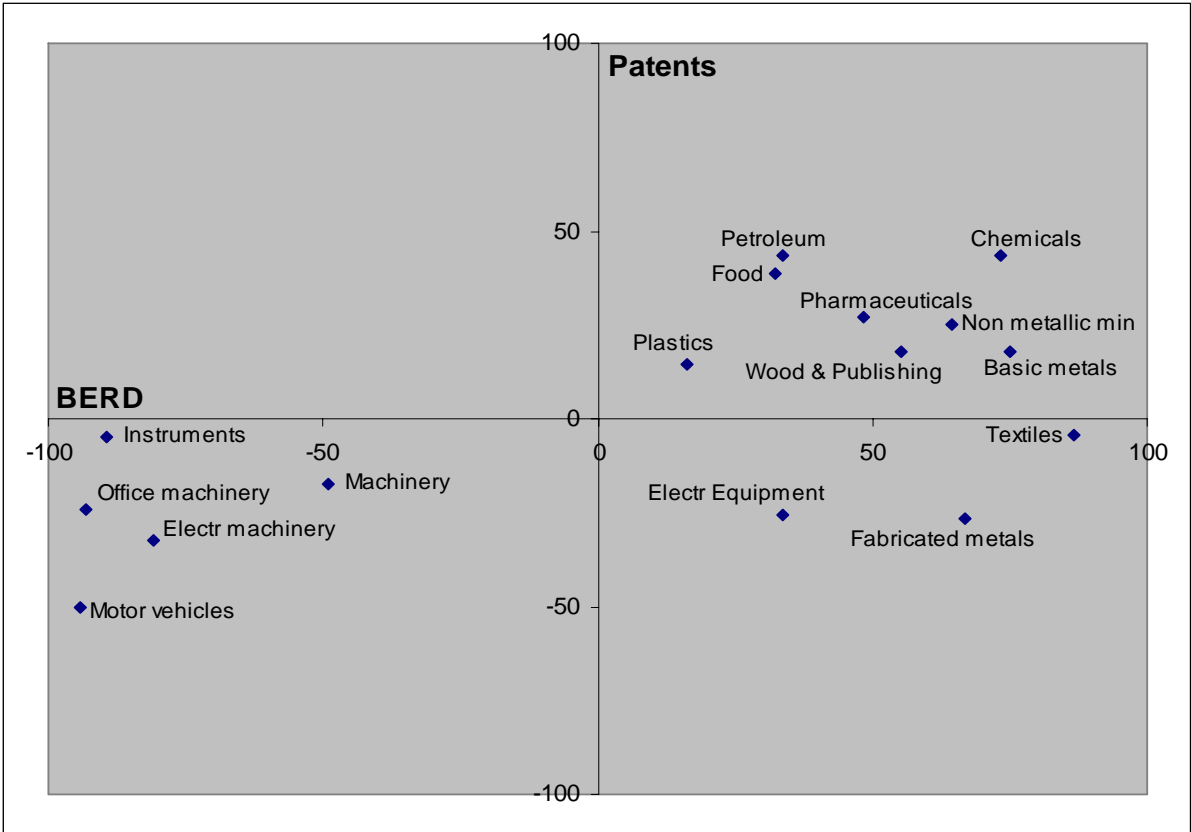
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



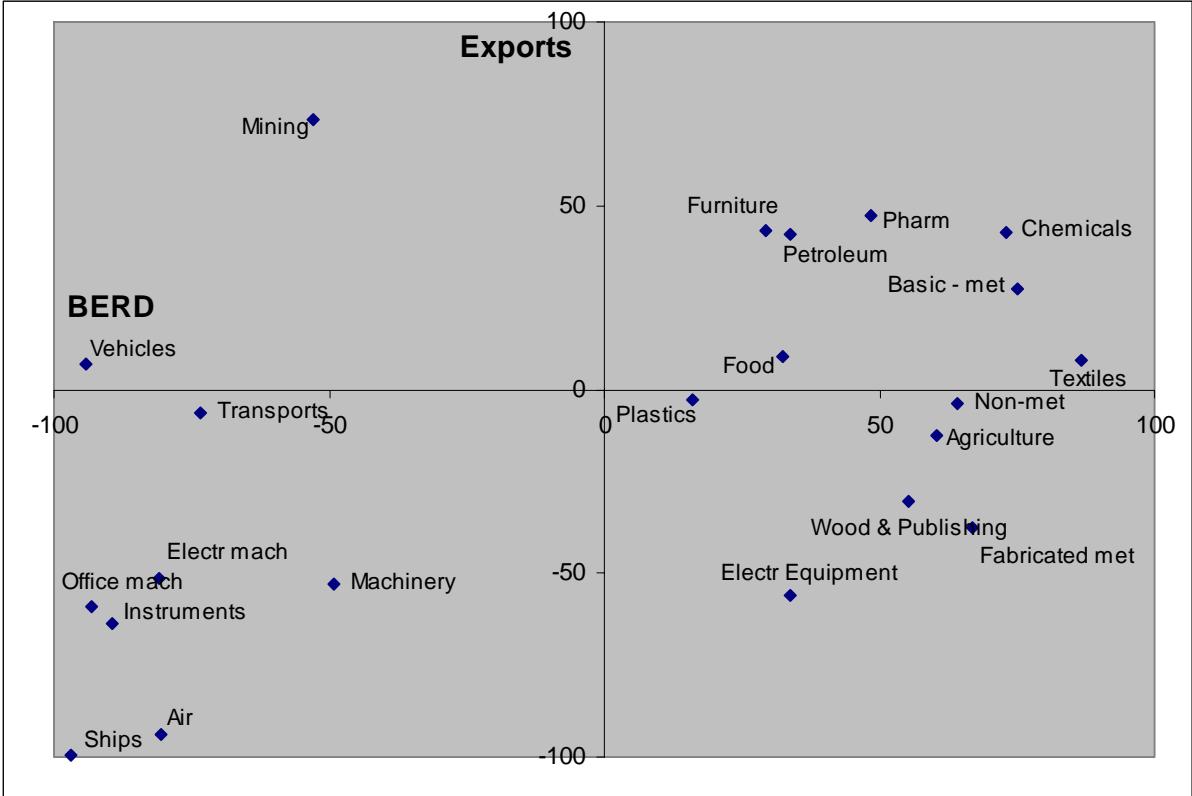
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Belgium. 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. Belgium. 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	75-79; 55; 2423; 01-05	45;	74; 72; 65-67; 50-52; 23;	64; 40-41; 32; 28; 26; 24ex2423; 20-22;		36-37; 27; 25; 15-16	17-19;		
Specialisation Patents	2423;		23;	27; 26;		25; 24ex2423; 20-22; 15-16			
Specialisation Value Added	75-79;73; 2423; 23;	72;	74; 65-67; 60-63; 50-52;	40-41; 32; 26; 15-16		64; 34; 27; 24ex2423;			
Specialisation Employment	65-67; 60-63; 2423; 23;	75-79;	74; 72;	64; 40-41; 32; 24ex2423;		34; 27; 26; 15-16			
Specialisation Exports	2423; 23; 10-14			34; 24ex2423;		36-37; 27; 26; 25; 15-16	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
Electro. equip.	32
Instruments	33
Motor vehicles	34
Ships	351
Aerospace	353
Transport nec	352+359
Furniture & recycling	36-37
Water & Electricity	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

