



COUNTRY SPECIALISATION REPORT

Country: Austria

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ERAWATCH Network asbl: Project team: NIFU STEP, University of Sussex (SPRU), Joanneum Research, Logotech, FhG-ISI

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Index

COUNTRY SPECIALISATION REPORT - AUSTRIA.....	1
Main findings.....	1
Main R&D figures – Total R&D expenditure.....	3
Public R&D statistics.....	4
GBAORD by socioeconomic objective	4
HERD by field of science.....	5
Business ENTERPRISE INTRAMURAL EXPENDITURE ON R & D (BERD).....	6
Bibliometrics.....	9
Patents.....	11
Economic specialisation.....	12
Correlation analysis	1
Explanatory notes	1
ISIC v3 codes and sector description	1
How to read specialisation profile figures	2

Index of tables and figures

Table 1. R&D expenditure by sector of performance and source of funds .Austria. 1993 and 2002. Million Euros. Current prices.....	3
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. Austria. Averages 1993-1995 and 2001-2003.	1
Table 3: Specialisation Profile	1
Figure 1. R&D expenditure by performing sector as per cent of GDP (left axis). GDP in million Euros (right axis).Austria.1993-2003.	3
Figure 2. GERD by type of research. Austria. 1993,1998 and 2002.....	3
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Austria. 1993 and 2003.....	4
Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Austria. 1993, 1998 and 2002. Per cent of total HERD and in million Euros.	5
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Austria. 1993, 1998 and 2002.....	5
Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. 31 sectors. Specialisation profile. Austria. Averages 1993-1995 and 2001-2003.	6
Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sector funded by government. 2002 last available year in OECD statistics.....	7
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2002 last available year in OECD statistics.....	8
Figure 9. Number of publications by scientific field. 25 Scientific fields. Specialisation profile. Austria. Averages 1993-1995 and 2001-2003.	9
Figure 10. Shares of total publications by scientific field. 25 Scientific fields. Austria. 1993 and 2003.	9
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Austria. 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	10
Figure 12. Number of patents by industrial sector. 18 sectors in manufacturing. Specialisation profile. Austria. Averages 1993-1995 and 2001-2003. Based on correspondence matrix ISI-SPRU-OST.....	11
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Austria. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.....	11
Figure 14. Value added by industrial sector. 34 sectors. Specialisation profile. Austria. Averages 1993-1995 and 2001-2003. Million Euros. Current prices.	12

Figure 15. Shares of total value added by industrial sector. 34 sectors. Austria. 1993 and 2003. Million Euros. Current prices.....	12
Figure 16. Employment by industrial sector. Specialisation profile. Austria. 34 sectors. Averages 1993-1995 and 2001-2003. Numbers engaged – hundreds.	13
Figure 17. Shares of total employment by industrial sector. 34 sectors. Austria. 1993 and 2003. Numbers engaged – hundreds.	13
Figure 18. Exports by industrial sector. Specialisation profile. Austria. 34 sectors. Averages 1993-1995 and 2001-2003. Thousand USD. Current prices.....	14
Figure 19. Shares of total exports by industrial sector. 34 sectors. Austria. 1993 and 2003. Thousand USD. Current prices.....	14
Figure 20. BERD versus Value added specialisation in the primary and secondary industrial sectors. Austria. Based on average values 2001- 2003.	1
Figure 21. BERD versus Value added in the services. Specialisation indexes. Austria. Based on average values 2001- 2003.	1
Figure 22. BERD versus patents. Specialisation indexes. Austria. Based on average values 2001-2003.	2
Figure 23. BERD versus exports. Specialisation indexes. Austria. Based on average values 2001-2003.	2
Figure 24: BERD and Value Added specialisation – an example	2

COUNTRY SPECIALISATION REPORT - AUSTRIA

MAIN FINDINGS

Over the period of the analysis, it appears that Austria exhibited a strong growth in R&D spending. This growth can be measured (Table 1) in absolute values but also in R&D intensity of the economy. Thus, while in 1993 GERD amounted to 1.4% of GDP, it rose to 2.2% by 2002. This growth can be attributed mainly in a significant increase in Business R&D expenditure that appears to have followed a rate of increase in a similar pattern to that of the nominal GDP. At the same time, HERD and GOVERD expressed as shares of GDP have remained constant. This growth in R&D spending was also accompanied by an increasing share of applied and experimental research in the economy (Figure 2), while basic research share in overall was reduced.

Over the same period the third major source of financing has become financing from abroad, which increased its share from a mere 2.6% of total R&D financing in 1993 to 21.4% in 2002. At the same time, the high share of funding from abroad for the business sector indicates a strong internationalisation of the Austrian private enterprise sector, as funds from abroad stem mainly from foreign group headquarters performing their R&D in Austria.

As the General University Fund (GUF) is part of the GBAORD data set, it is not surprising that GUF dominates GBAORD. Outstanding for Austria is that defence oriented R&D is close to zero. Non-oriented R&D focuses on University funding – most probably via the Austrian Science fund and other University related programmes, whereas the largest share of industry related R&D will be distributed via The Austrian Research Promotion Agency – Promotion Scheme “Basic Programmes”.

Moreover, during the period 1993-2003 Austria appears to have increased its specialisation in research in agriculture despite the decreasing economic importance of the sector in Europe and its own decreasing specialisation in BERD in the sector. Moreover, this increased specialisation in R&D spending by the public sector is not reflected in publications, patents, value added and employment.

In universities, the bulk of research expenditure is concentrated in natural and medical sciences which together account for over 50% of HERD. Similarly, medical sciences account for over 30% of GOVERD for the entire period under examination. However, PRO's appear to focus also on Humanities, and thus having a rather diversified approached compared to HEI's.

In addition, the large share of public expenditure in medical sciences, does not appear to be linked with either scientific or technological specialisation. The scientific specialisation of the fields of immunology and Plant and Animals constitute an exception to this trend. The same holds true for the economic specialisation, where pharmaceuticals and instruments (including medical instruments) exhibit negative specialisation in Value added, employment and exports. In contrast, in terms of citations, Austria exhibits specialisation in several fields linked to medical sciences, which implies high quality public research but weak linkages with the economy and overall scientific productivity (publications).

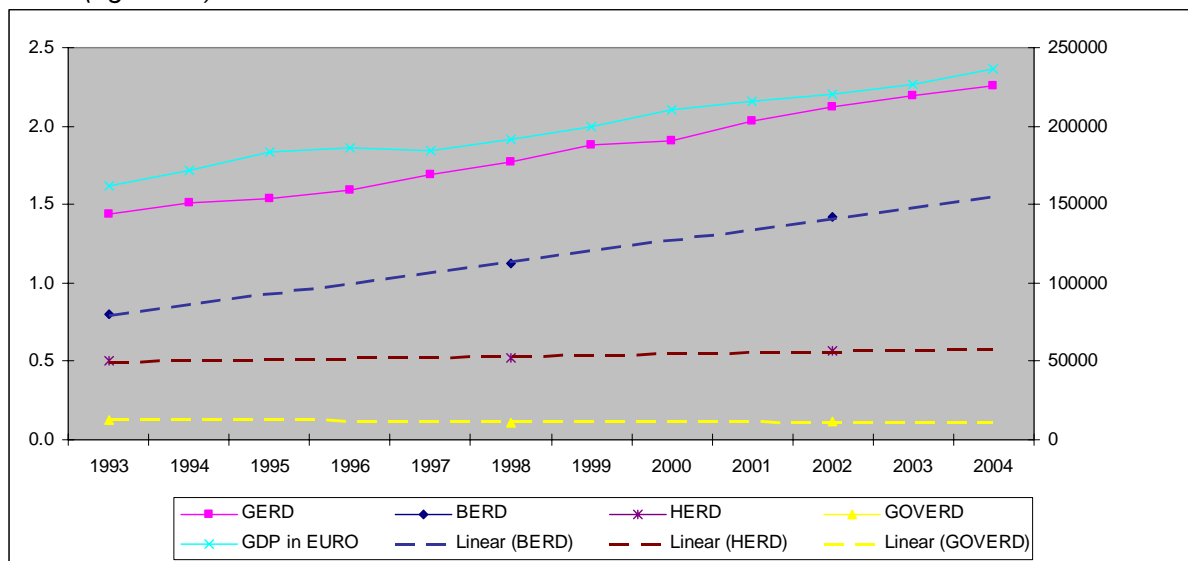
In contrast, there appears to be a linkage between BERD specialisation and the sectors in which the largest shares of public expenditure towards enterprises is directed, namely R&D activities, Machinery, Other Business Activities and Electronic Equipment which together account for over

70% of the public funding of BERD. Research and Development also shows comparatively high specialisation, though one has to take into account that most of the research institutes of the co-operative sector (Joanneum Research, ARC etc.) are gathered here. No surprisingly, government financing shares of BERD are also very high for the R&D sector.

However correlations between technological specialisation in BERD, value added, employment and exports appear to be stronger in the manufacturing sector and especially in Furniture, Other transport Equipment, Electrical Equipment, Machinery nec, Metals and Metal Products, Plastics and Wood and Publishing. The above correlations are weaker in the services sector.

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). Austria. 1993-2003.



Source: OECD MSTI 2005

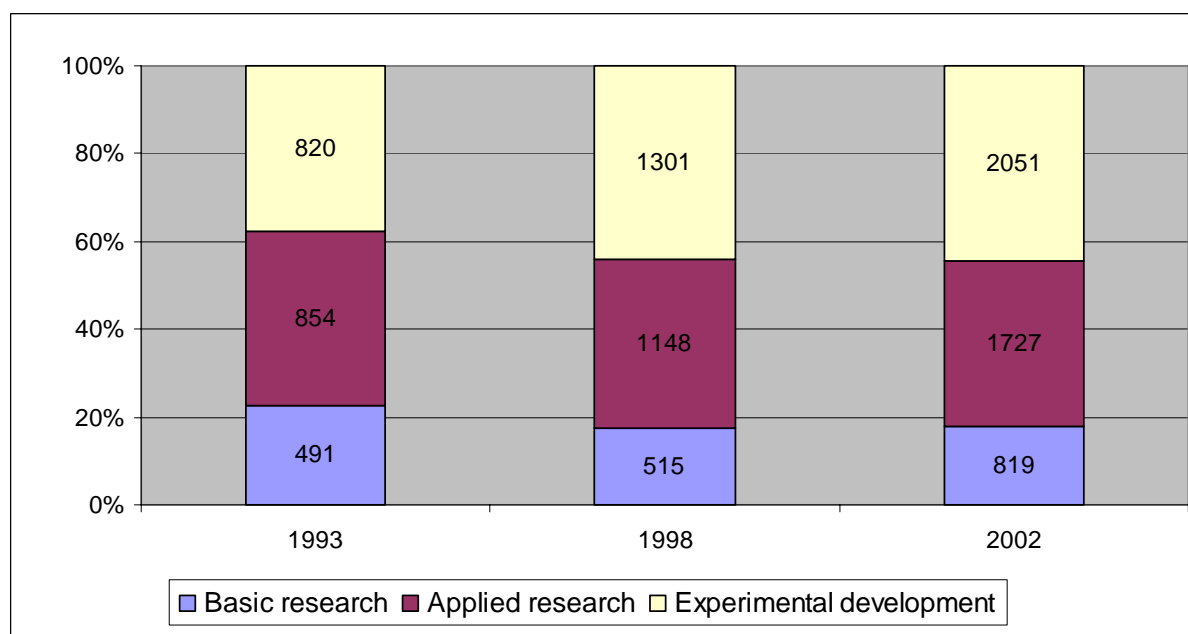
Table 1. R&D expenditure by sector of performance and source of funds .Austria. 1993 and 2002. Million Euros. Current prices.

	GOVERD		BERD		HERD		Non profit		Total	
	1993	2002	1993	2002	1993	2002	1993	2002	1993	2002
Business	4.1	16.0	1106.5	2018.1	15.9	51.3	1.9	5.2	1128.4	2090.6
Government	194.8	236.8	126.3	175.5	782.8	1156.9	1.4	5.0	1105.4	1574.2
Non profit	3.9	2.0	0.1	1.0	3.2	8.2	2.6	6.3	9.9	17.5
From Abroad	1.8	11.6	54.4	936.3	3.4	49.6	0.1	4.5	59.7	1002.0
Total	204.6	266.4	1287.4	3130.9	805.3	1266.1	6.0	20.9	2303.3	4684.3

Pre-EMU euro and EURO

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Austria. 1993, 1998 and 2002

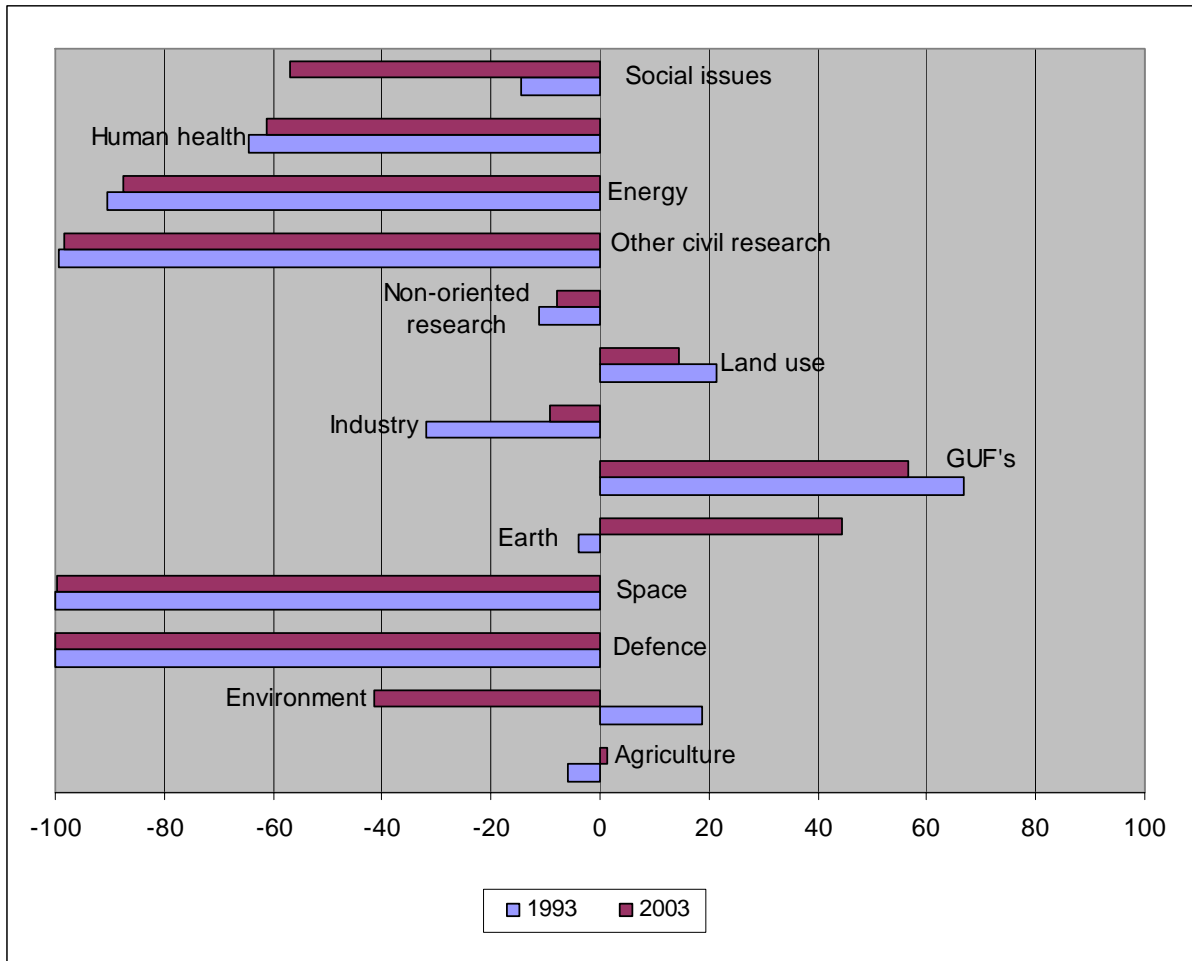


Source: OECD OFFBERD 2005

PUBLIC R&D STATISTICS

GBAORD by socioeconomic objective

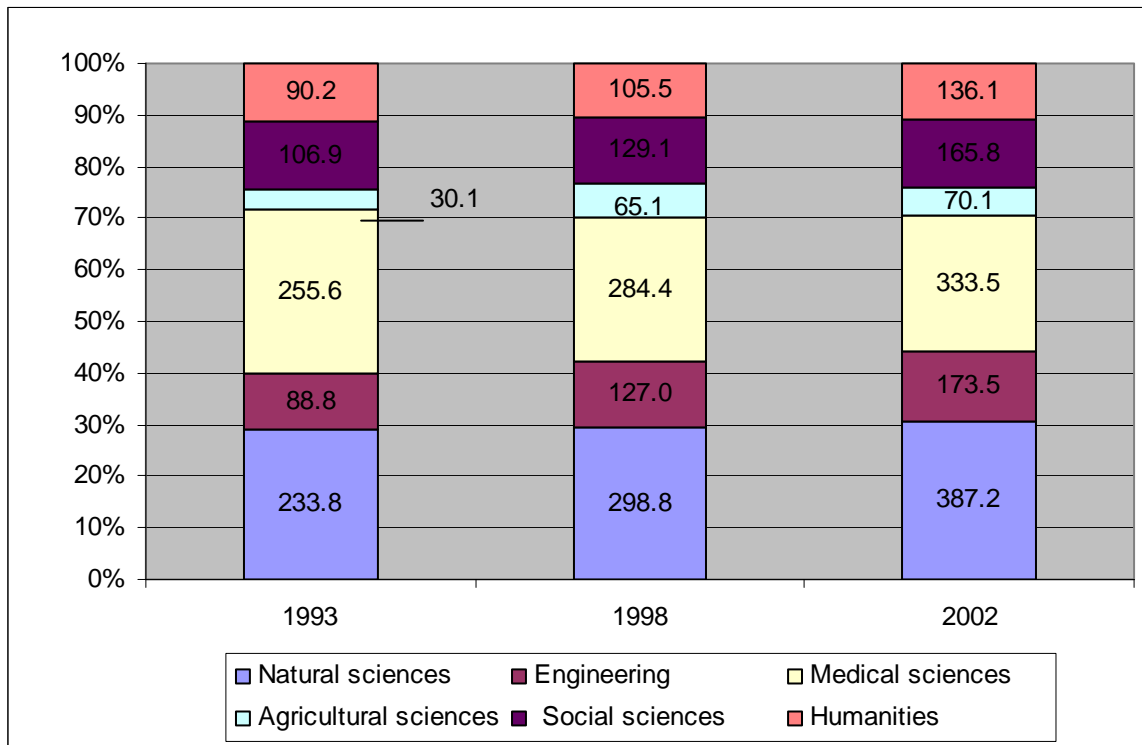
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Austria. 1993 and 2003.



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

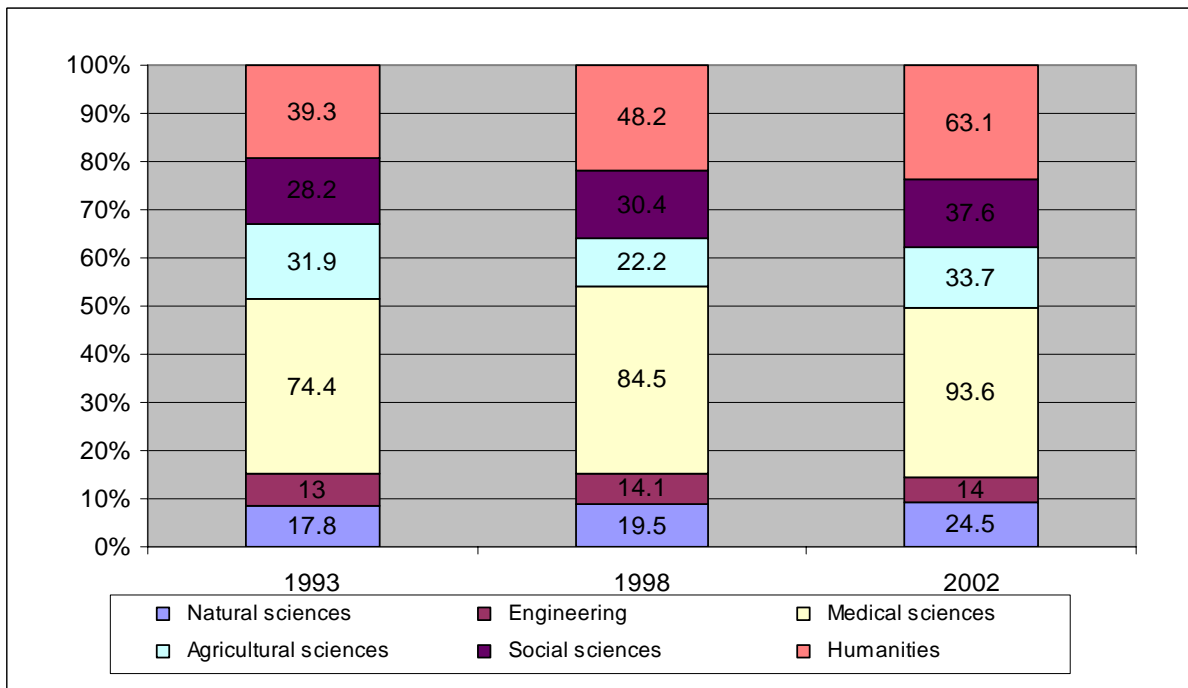
HERD by field of science

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Austria. 1993, 1998 and 2002. Per cent of total HERD and in million Euros.



Source: OECD Basic Science and Technology Statistics 2005.

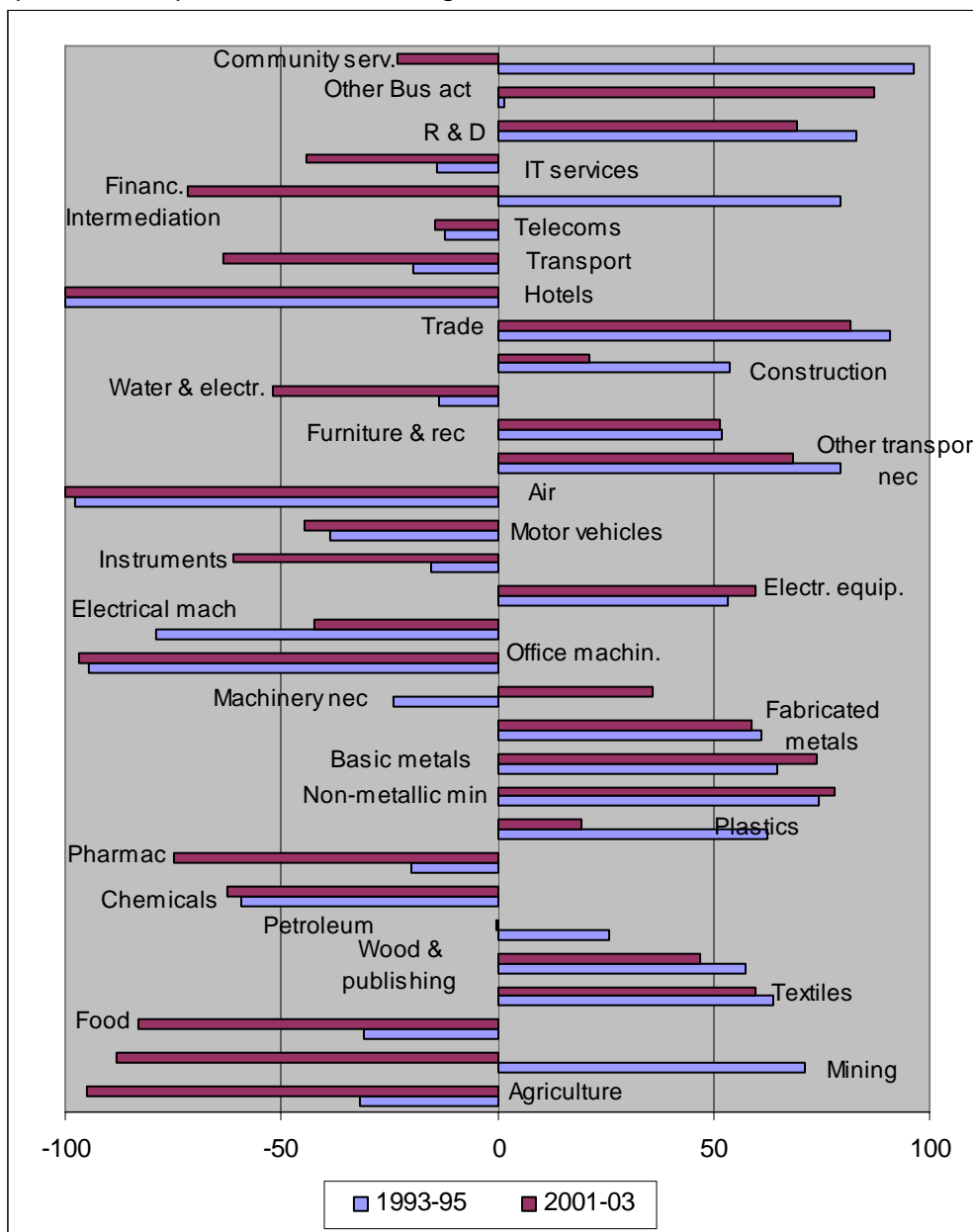
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Austria. 1993, 1998 and 2002.



Source: OECD Basic Science and Technology Statistics 2005

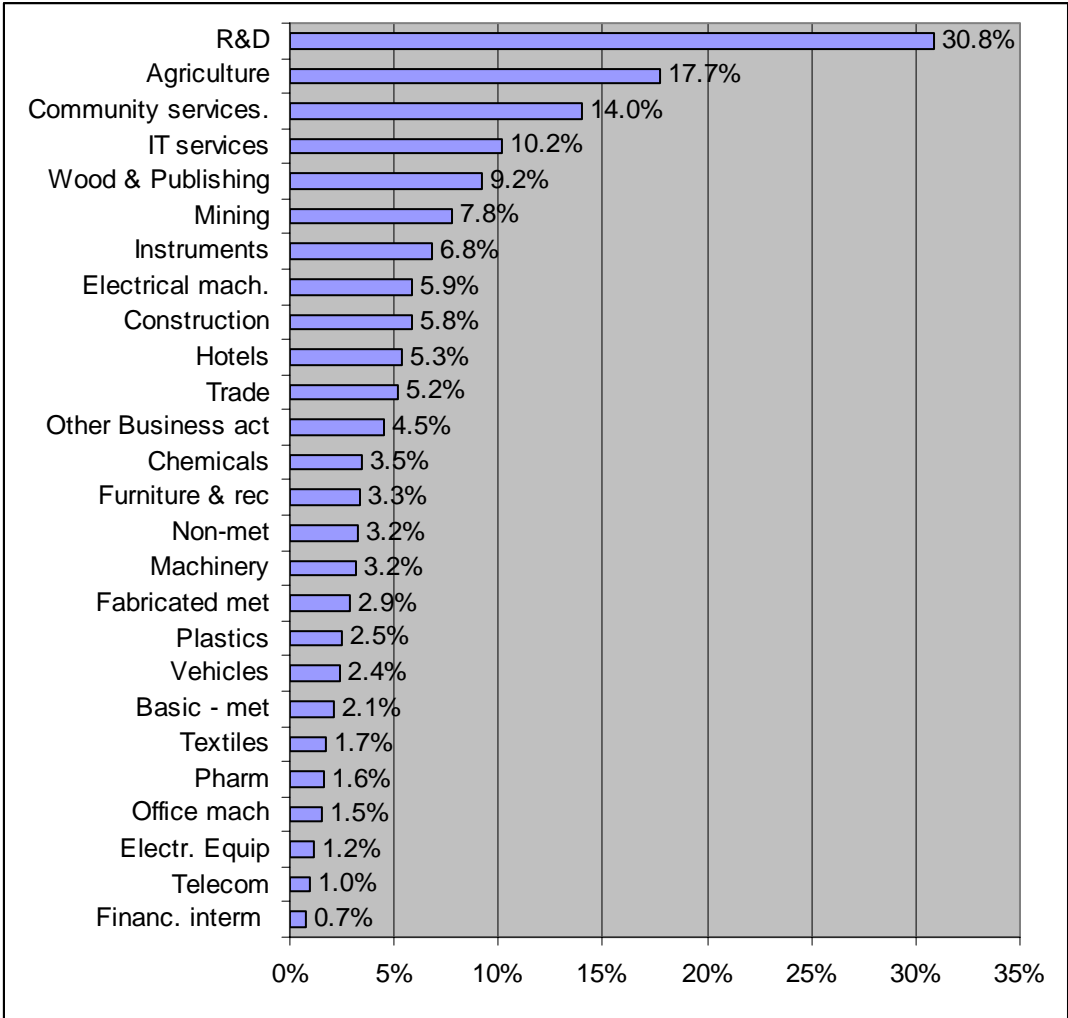
BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R & D (BERD)

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



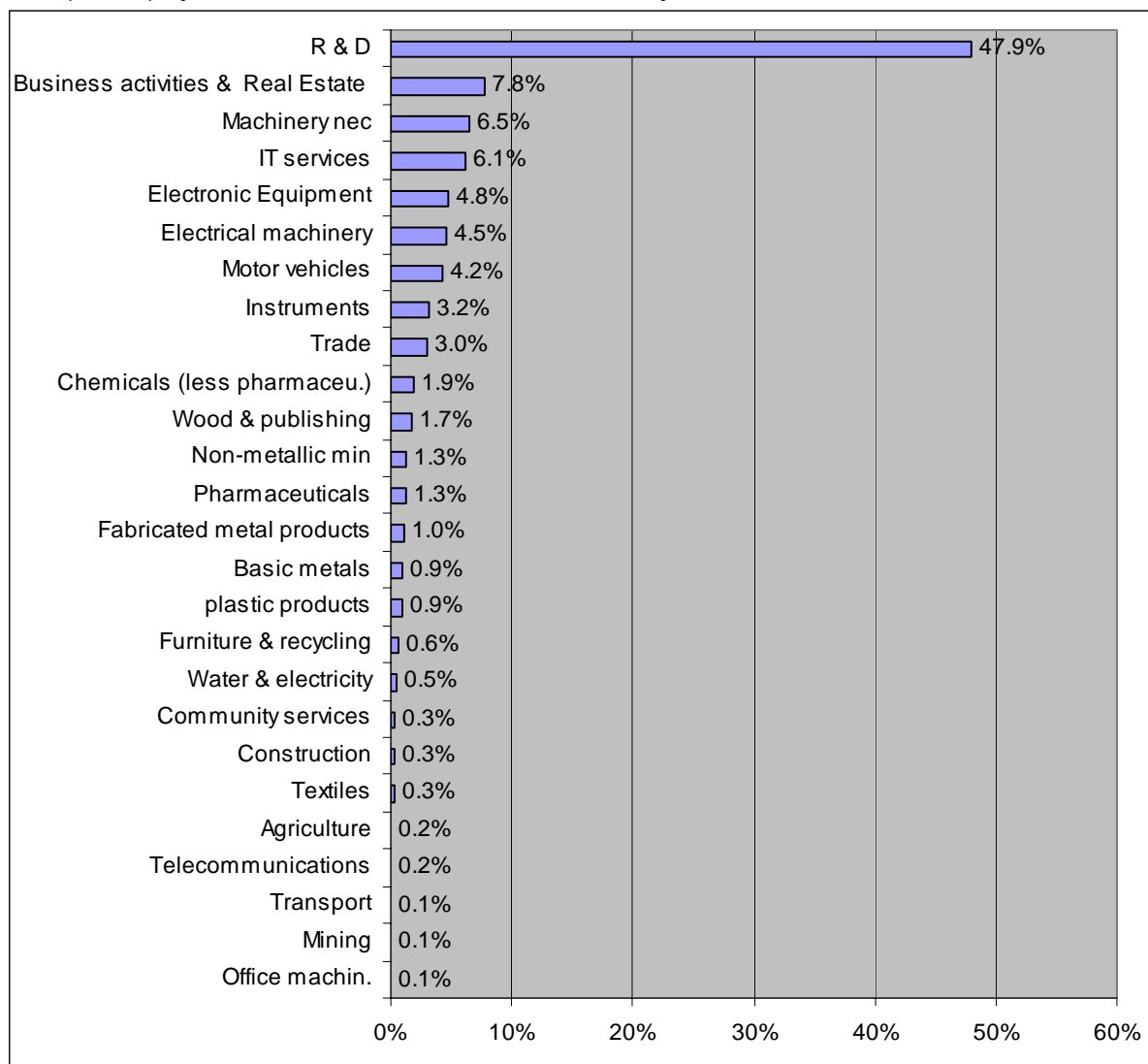
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD Basic Science and Technology Statistics 2005, ANBERD 2005, own calculations

Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sector funded by government. 2002 last available year in OECD statistics.



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

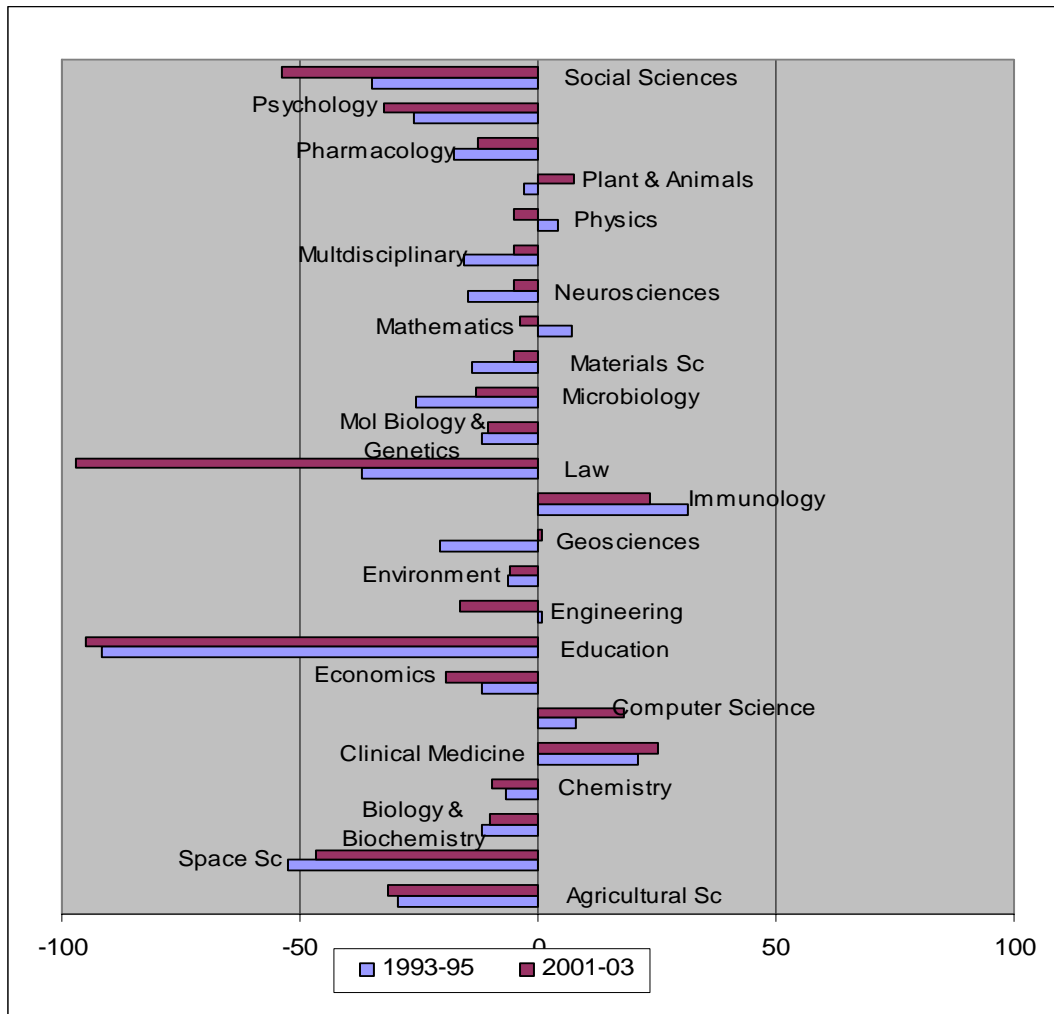
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2002 last available year in OECD statistics.



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

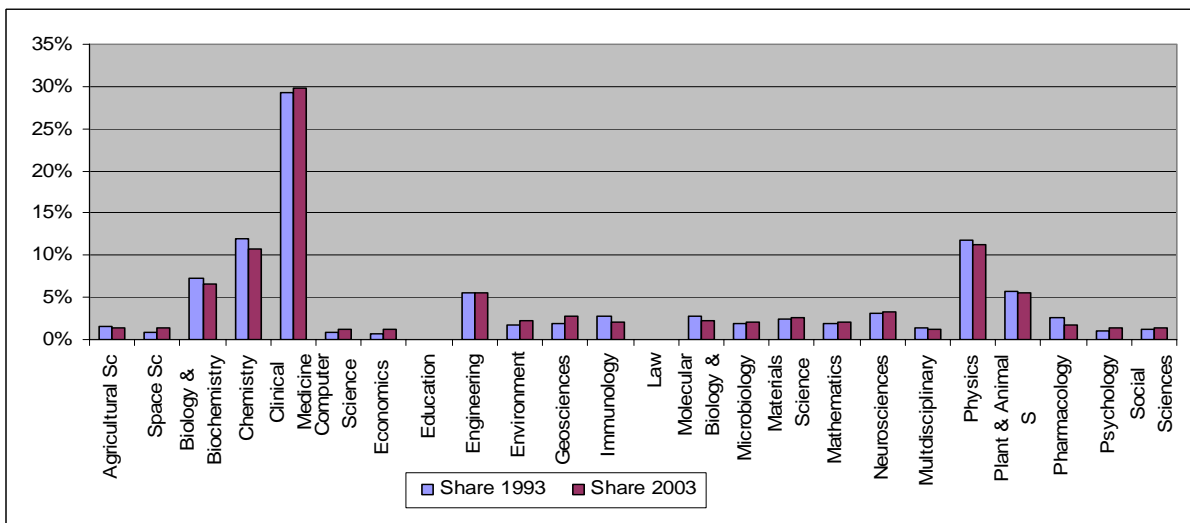
BIBLIOMETRICS

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



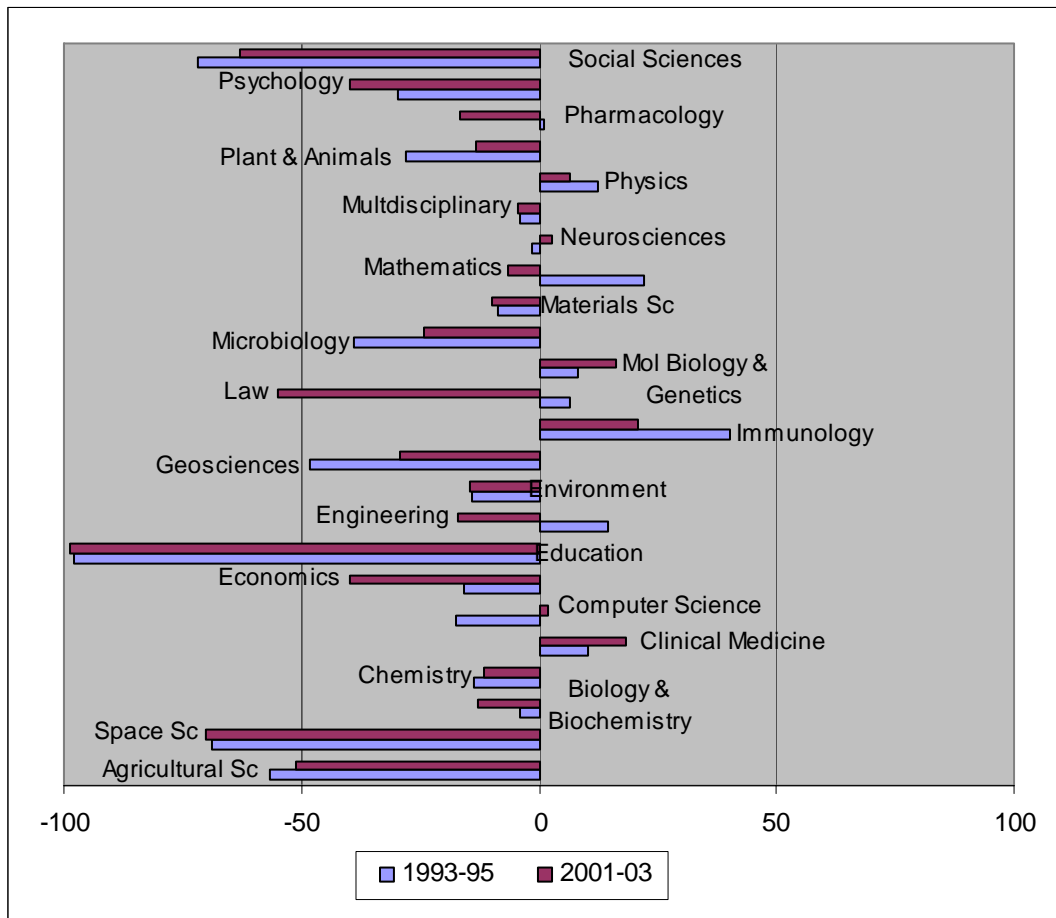
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

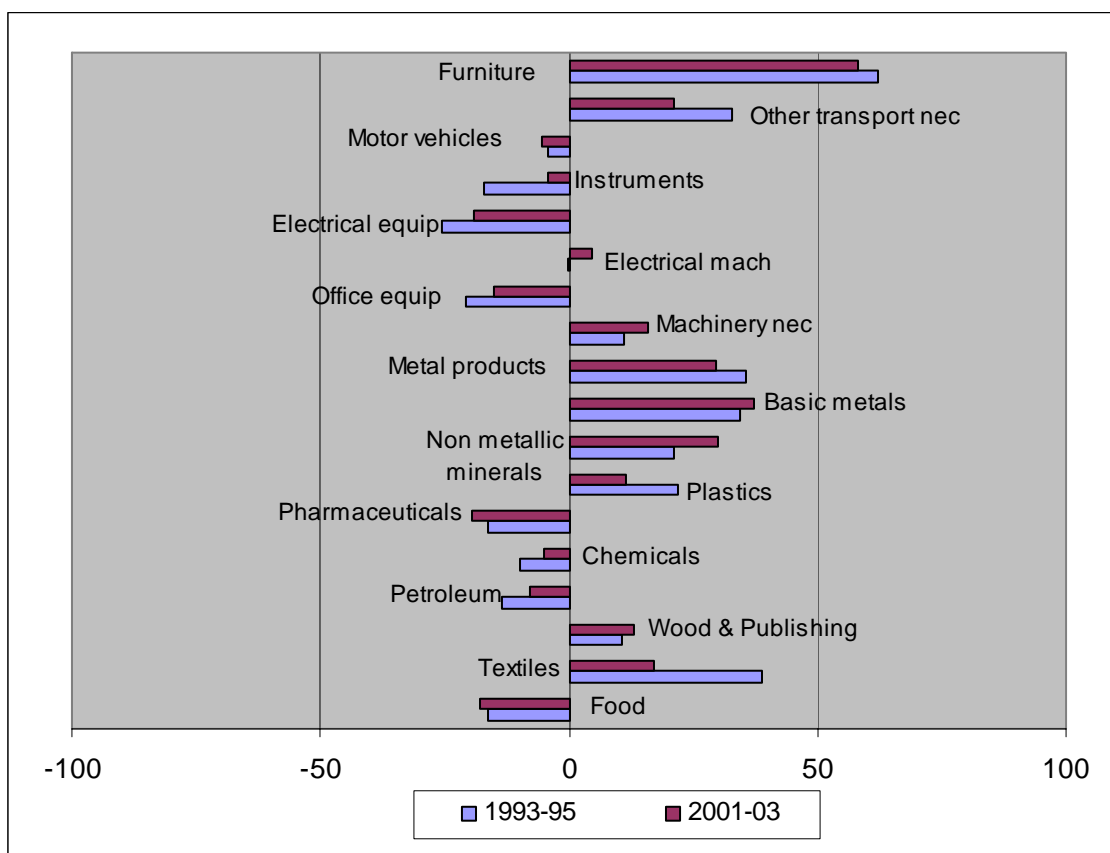
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Austria. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

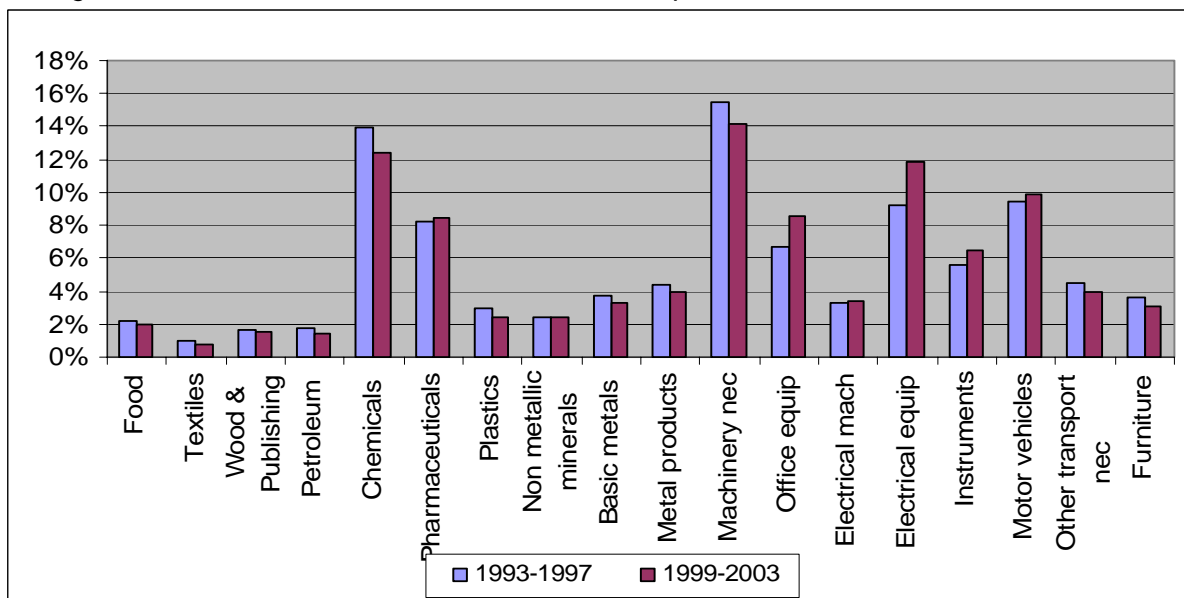
PATENTS

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

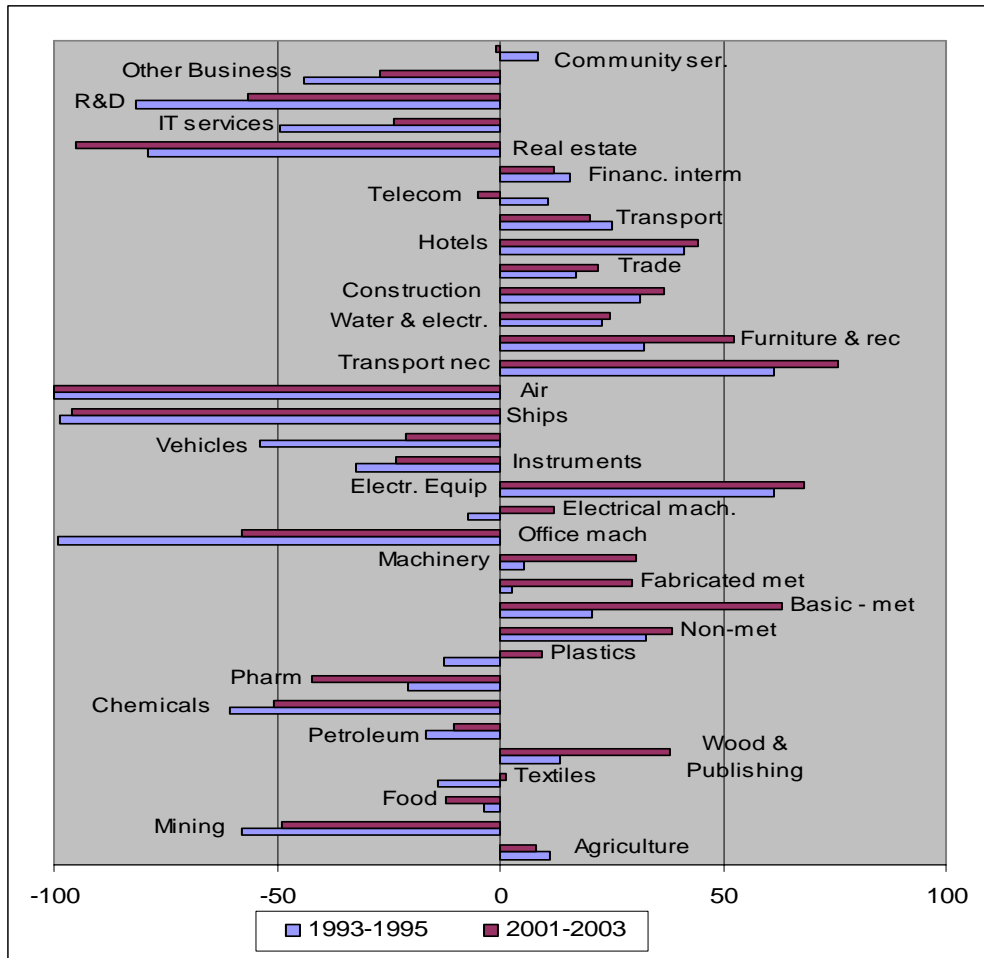
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Austria. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

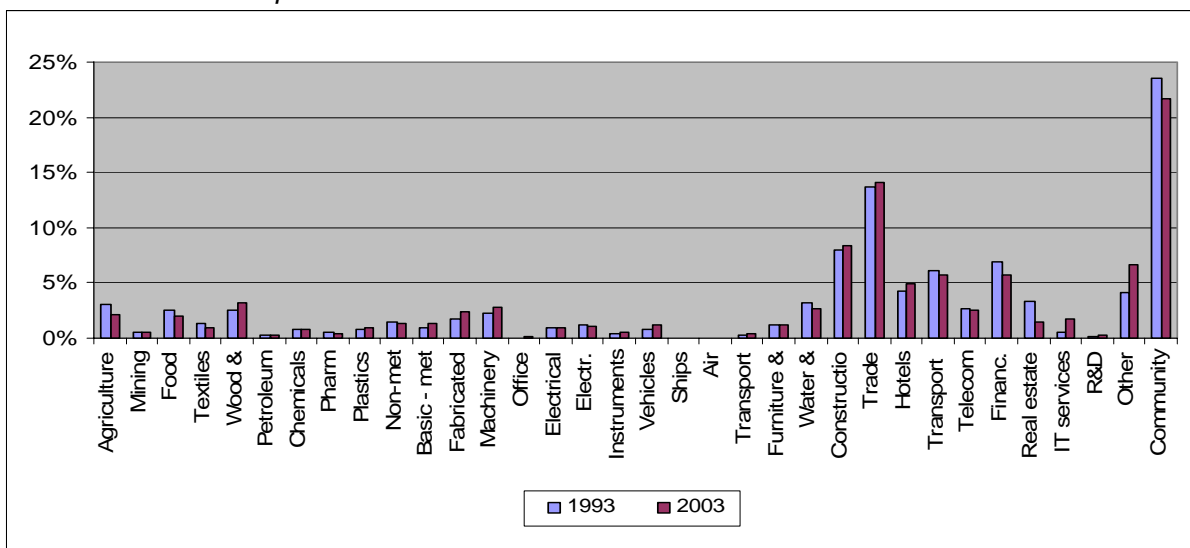
ECONOMIC SPECIALISATION

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



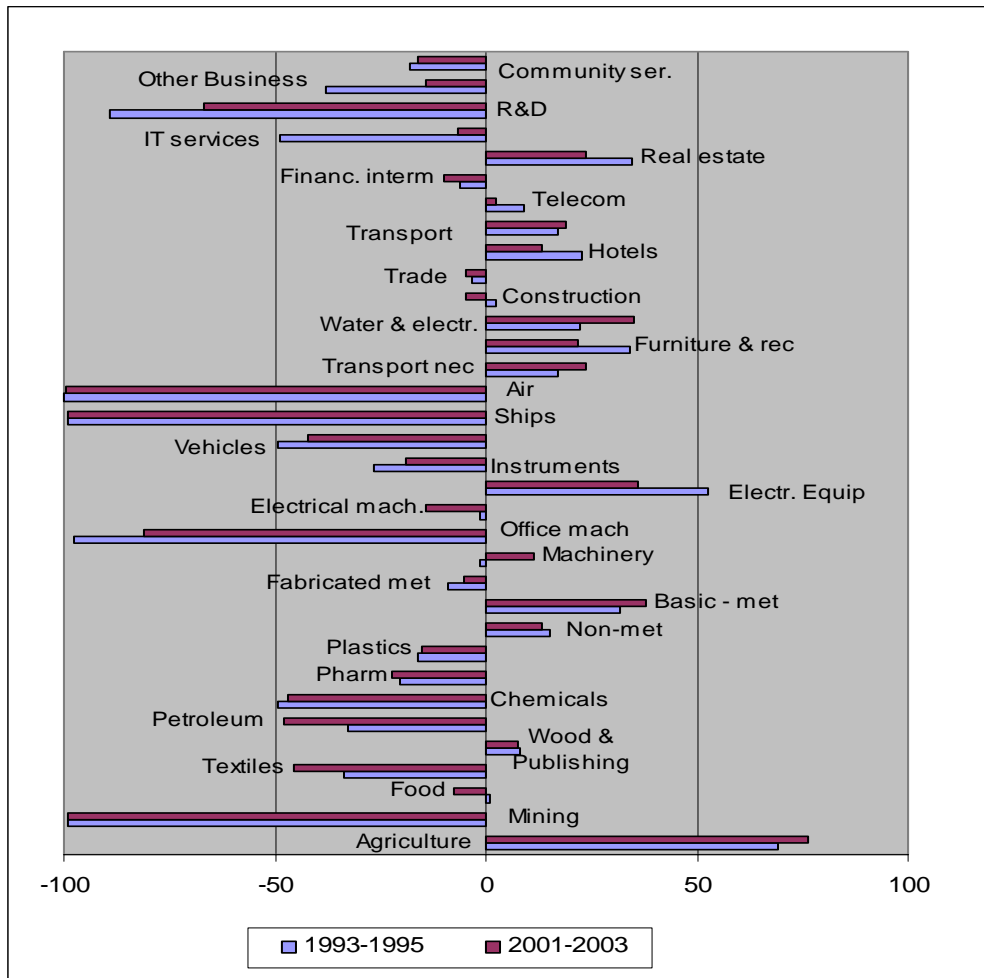
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD, STAN 2005, own calculations.

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



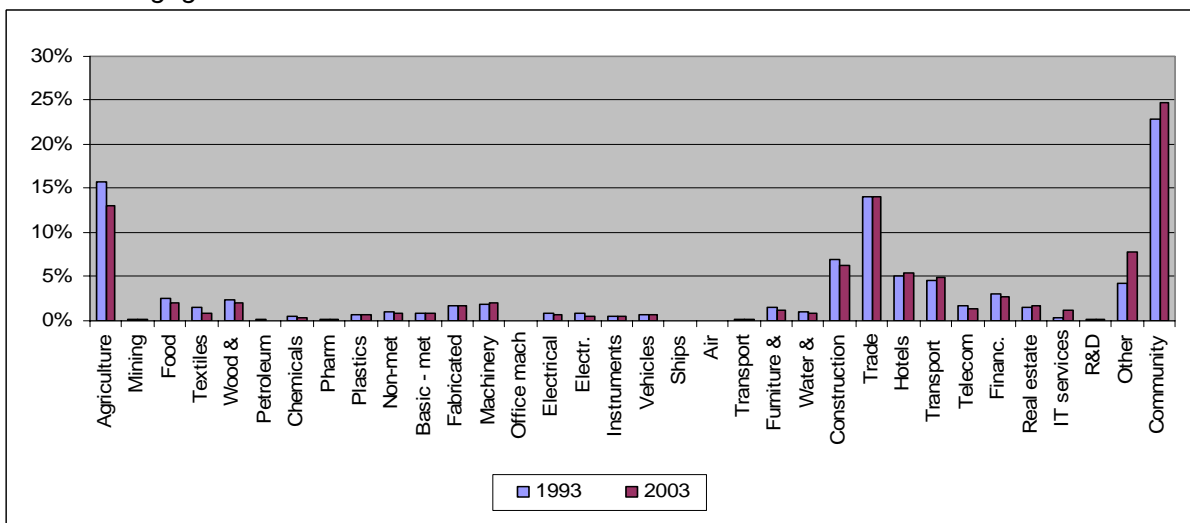
Source: OECD, STAN, 2005.

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



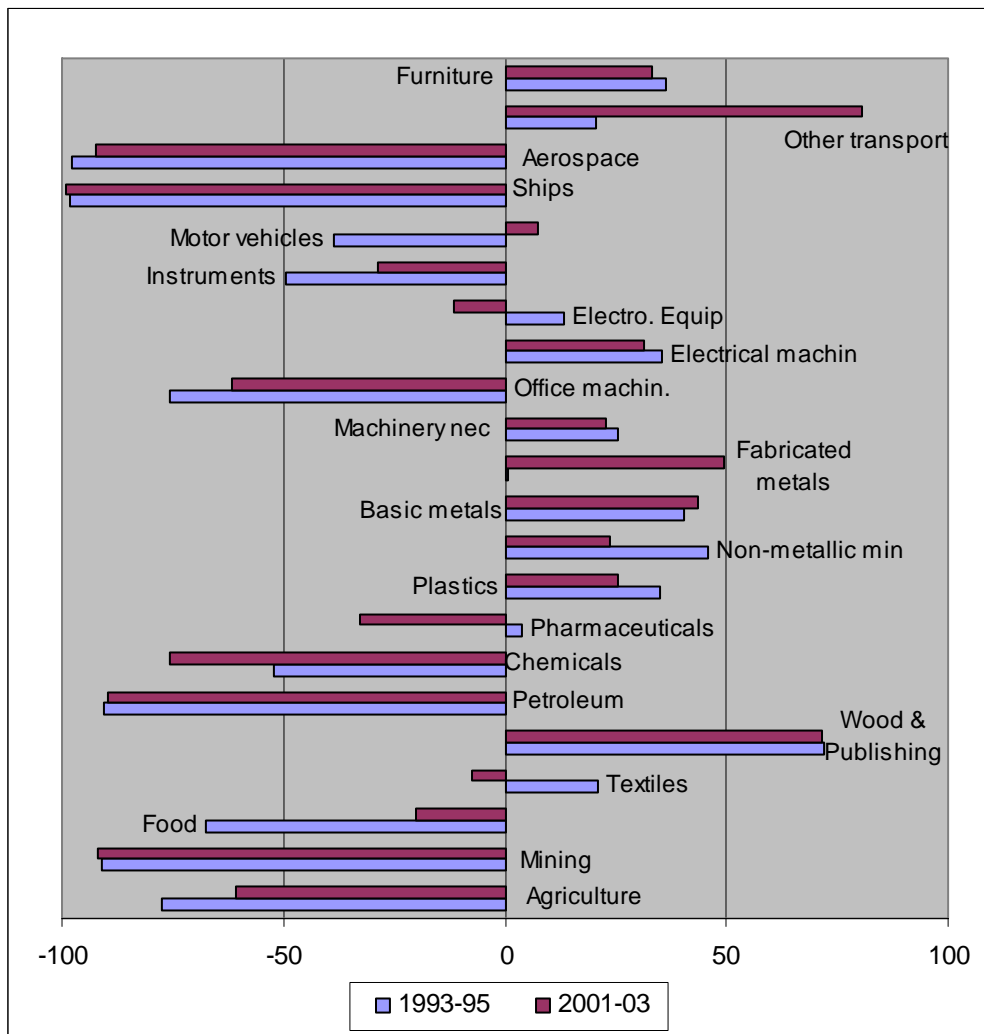
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



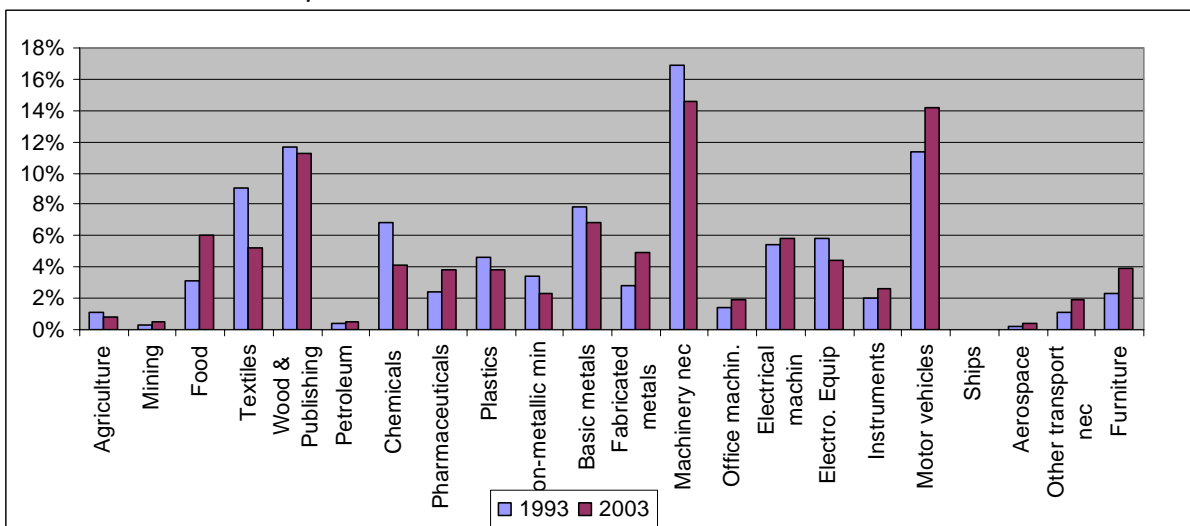
Source: OECD, STAN, 2005.

Figure 18. Exports by industrial sector. Specialisation profile. Austria. 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. Austria. 1993 and 2003. Thousand USD. Current prices.



Source: UNIDO, INDSTAT4 2005, ISIC Rev3 AND COMTRADE, 2005, own calculations

CORRELATION ANALYSIS

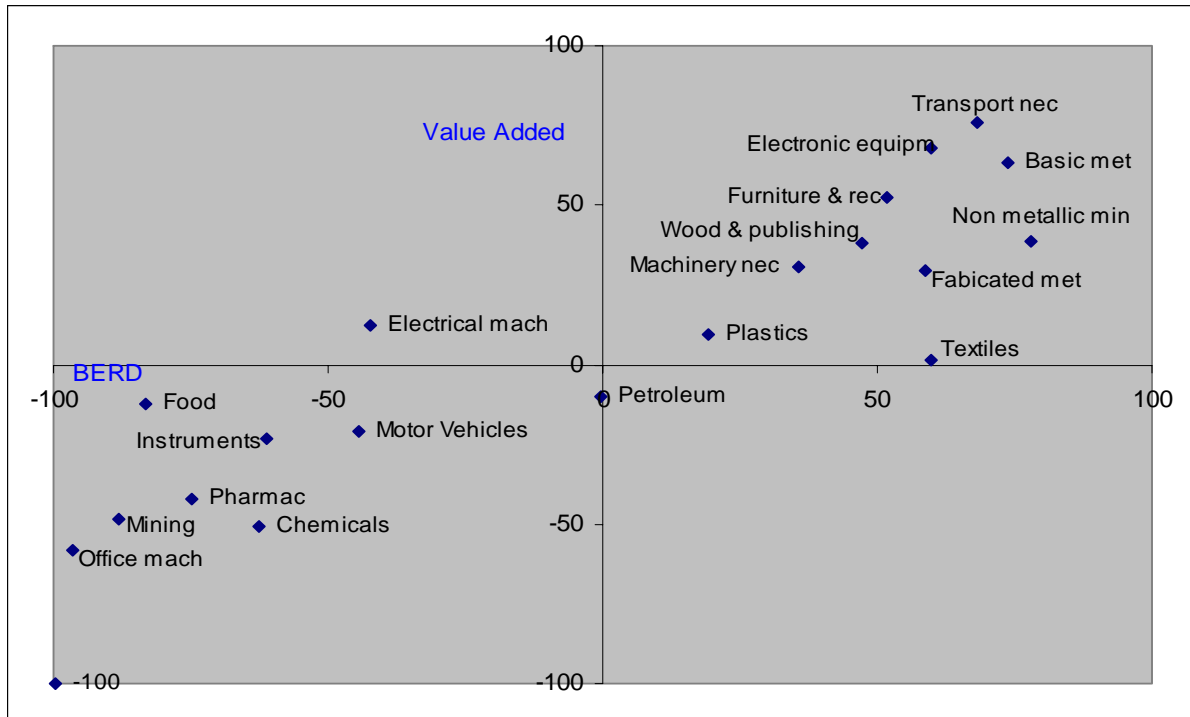
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. Austria. Averages 1993-1995 and 2001-2003.

		AT_BER D9395	AT_BER D0103	AT_PAT 9395	AT_PA T0103	AT_VA 9395	AT_VA 0103	AT_EMP 9395	AT_EMP 0103	AT_EXP 9395	AT_EXP 0103
AT_BERD9395	Pearson Correlation Sig. (2-tailed)	1 .									
AT_BERD0103	Pearson Correlation Sig. (2-tailed)	.685(**) .000	1 .								
AT_PAT9395	Pearson Correlation Sig. (2-tailed)	.620(**) .008	.703(**) .002	1 .							
AT_PAT0103	Pearson Correlation Sig. (2-tailed)	.587(*) .013	.723(**) .001	.950(**) .000	1 .						
AT_VA9395	Pearson Correlation Sig. (2-tailed)	.393(*) .026	.362(*) .042	.404 .108	.460 .063	1 .					
AT_VA0103	Pearson Correlation Sig. (2-tailed)	.424(*) .015	.516(**) .002	.559(*) .020	.637(**) .006	.941(**) .000	1 .				
AT_EMP9395	Pearson Correlation Sig. (2-tailed)	.177 .331	.249 .169	.368 .146	.449 .071	.919(**) .000	.867(**) .000	1 .			
AT_EMP0103	Pearson Correlation Sig. (2-tailed)	.157 .389	.264 .145	.385 .127	.497(*) .042	.850(**) .000	.833(**) .000	.961(**) .000	1 .		
AT_EXP9395	Pearson Correlation Sig. (2-tailed)	.523(*) .015	.793(**) .000	.621(**) .008	.626(**) .007	.711(**) .000	.779(**) .000	.613(**) .002	.600(**) .003	1 .	
AT_EXP0103	Pearson Correlation Sig. (2-tailed)	.496(*) .022	.750(**) .000	.646(**) .005	.663(**) .004	.726(**) .000	.827(**) .000	.620(**) .002	.641(**) .001	.889(**) .000	1 .

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

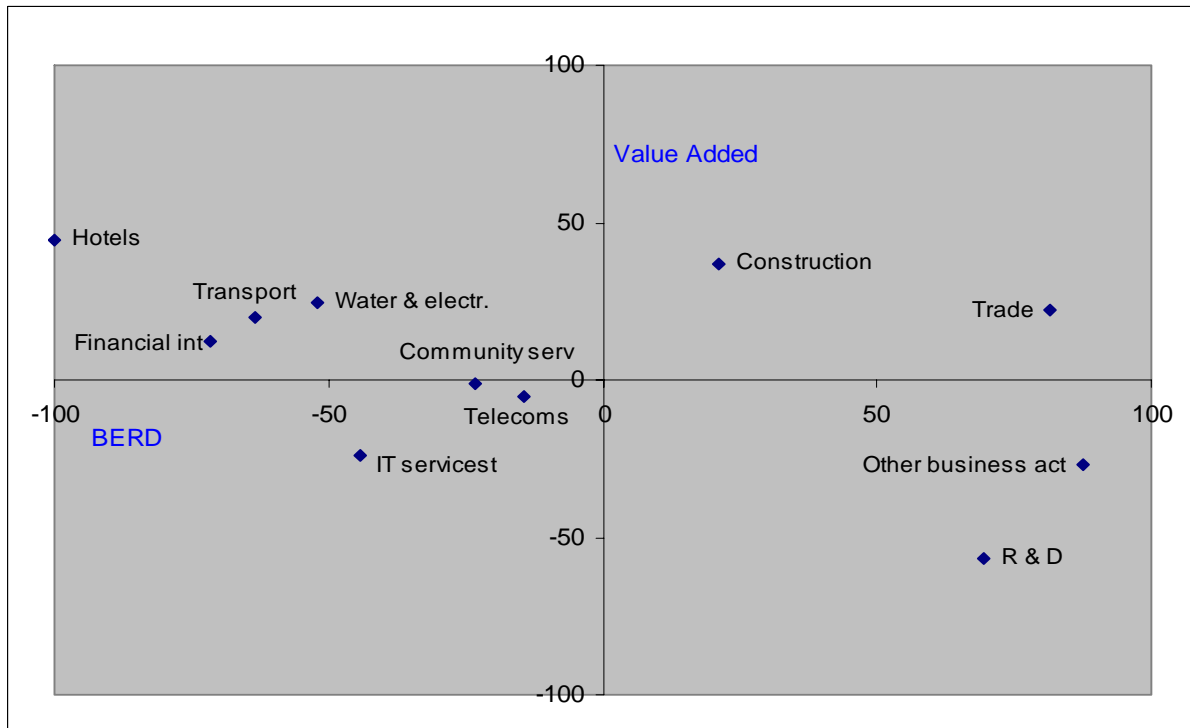
* Correlation is significant at the 0.05 level (2-tailed).

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



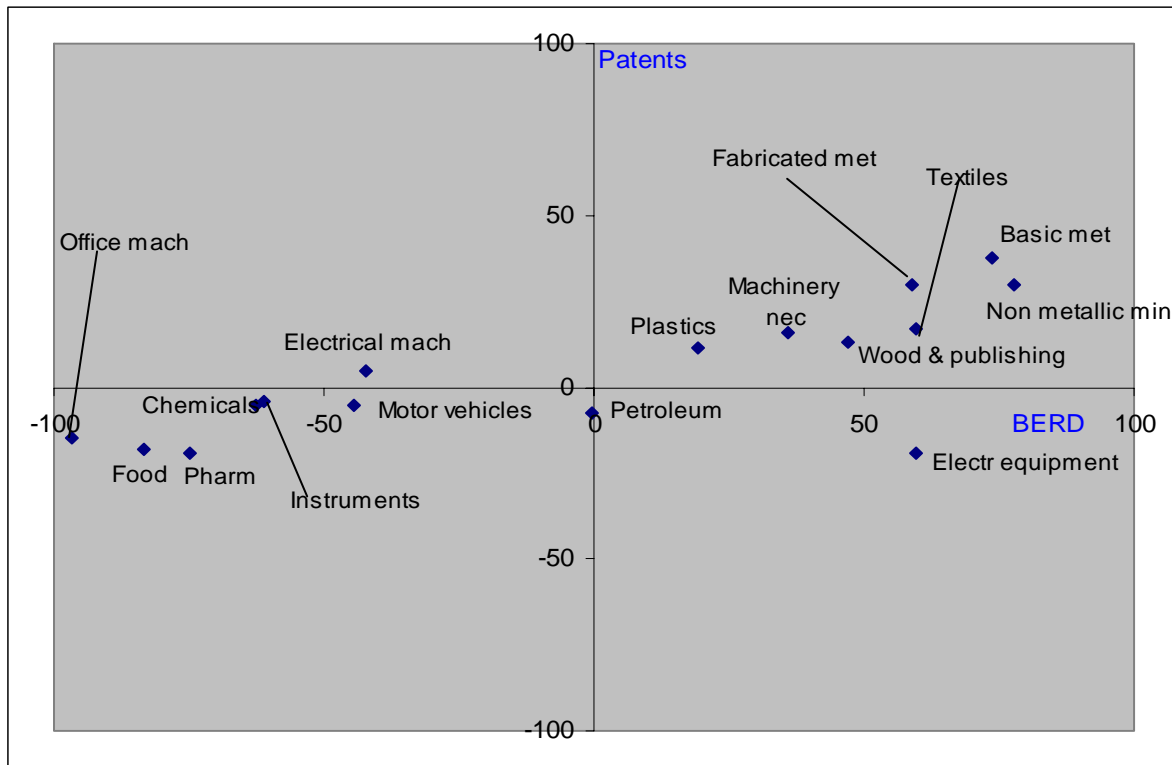
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



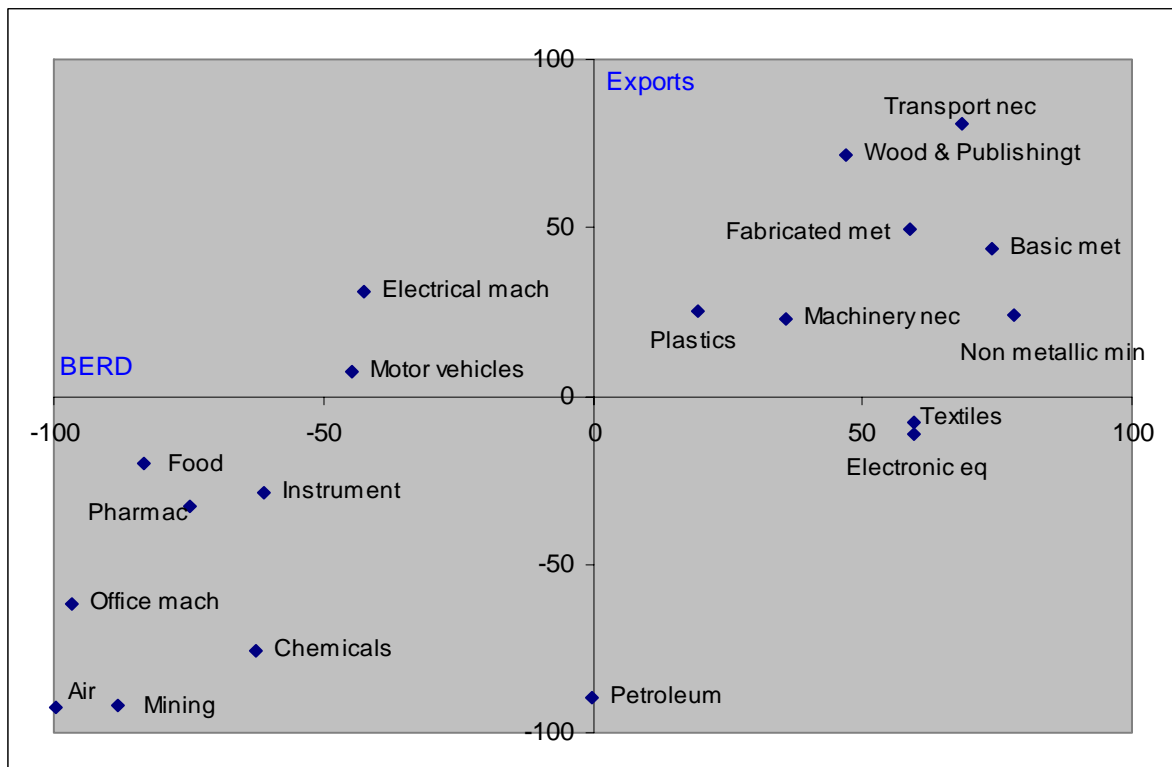
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Austria. 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. Austria. 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	74	352+359	10-14; 23; 45; 50-52; 73; 75-99	27; 29; 32; 64	26; 28	20-22; 25; 33; 36-37; 40-41		17-19	
Specialisation Patents				26	20-22; 27; 28; 29; 34; 36	25; 351		17-19	
Specialisation Value Added	352+359	55	45; 50-52; 60-63; 65-67; 70-71	20-22; 25; 26; 27; 28;29; 31; 32; 36-37; 40-41	01-05; 64	74; 75-99	17-19		
Specialisation Employment	352+359; 60-63		55; 70-71	27; 29; 40-41	01-05; 25; 26; 28; 33	31; 32; 36-37; 64			
Specialisation Exports				27; 28; 353; 36-37	20-22; 31	25; 26; 24; 32			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
Electronic 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.

Figure 24: BERD and Value Added specialisation – an example

