



COUNTRY SPECIALISATION REPORT

Country: Sweden

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COUNTRY SPECIALISATION REPORT - SWEDEN

MAIN FINDINGS

The analysis shows that Sweden exhibits a visible pattern of specialisation, both in the manufacturing as well as in the services sector, with consistency between the various benchmarks. In the manufacturing sector such examples are the motor vehicles, instruments, electronic equipment, machinery and pharmaceuticals, while in the services sector the same pattern holds for community services, IT services and research and development.

However, this picture is not validated when we look at the various correlations between BERD, technological and economic specialisation (table 2), since the interlinkages hold only for a limited number of sectors. In some cases certain weak interlinkages emerge, as in the case of BERD (1993-95) and exports for both periods, or in the case of value added and employment for 1993-95 and exports during the 2001-03 period.

Swedish aggregate R&D intensity grew significantly over the 1993-2003 period. GERD as a percentage of GDP reached 4% during 2003, with BERD accounting for over 75% of total R&D expenditure in the country. HERD also exhibited strong growth over the same period, while GOVERD as a percentage of GDP remained constant with a marginal 0.1% share. Over the same period, it appears that the governments share in financing research has been reduced, while the private sector and funding from abroad have increased their relative shares.

Priorities for GBAORD in Sweden show a pattern oriented toward social issues with strong specialisation also in General University Funds, Land Use, Defense and Agriculture. Within the higher education research system, medical sciences and engineering receive over 50% of total funding.

The public funding of BERD, is directed toward sectors in Sweden that exhibit strong or relatively strong specialisation, such as office machinery, research and various services sectors. The larger share of public funding however, was directed toward motor vehicles (35.4%) that lost in specialisation in BERD over the 1993-2003 period. What is notable in the case of Sweden is that public funding for BERD is dispersed at a relatively small number of sectors compared to other countries such as Germany and France.

In terms of scientific specialisation, as expressed by the number of publications, Sweden exhibits high specialisation in the fields of environment, and social sciences and in several medical fields such as immunology, pharmacology, neurosciences, clinical medicine, biology and biochemistry. This pattern is similar to the structure of the research system in HEI's. In addition, by examining the specialisation profile of Sweden measured by citations, it appears that Sweden is highly specialised in the same scientific fields (Figure 11). This fact however is not surprising since the above fields are of high-priority in Sweden.

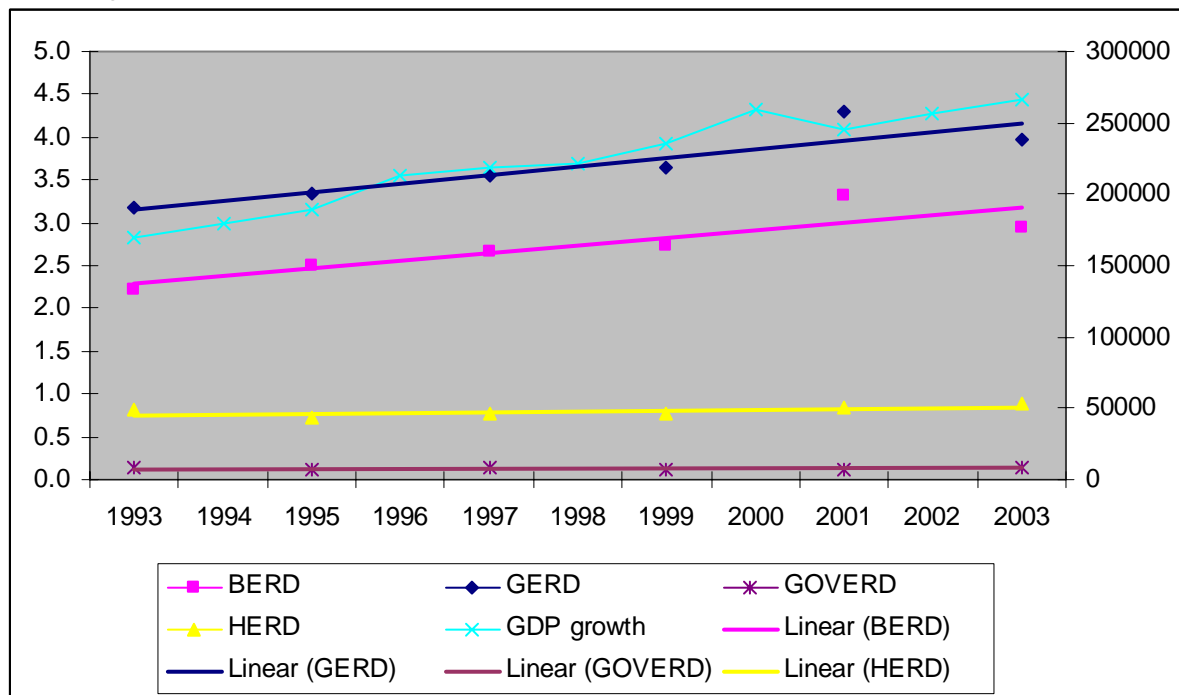
Despite this unique accord within the public research system, the high quality research and the performance in terms of patents and publications, Sweden does not escape completely from the European paradox and phases some difficulties in turning research results into commercial commodities or services.

Moreover, by examining table 3, Sweden appears to be gaining in specialisation in some fast growing sectors such as pharmaceuticals and IT services and in some medium to low growth sectors in manufacturing, such as office machinery and electronic equipment. At the same time,

when we look at the sectors that lose in specialisation the picture becomes more balanced since both fast growing and medium to low growth sectors, such as transportation services, wood and publishing and motor vehicles fall in this category.

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). Sweden. 1993-2003.



Source: OECD OFFBERD 2005

Table 1. R&D expenditure by sector of performance and source of funds .Sweden. 1993 and 2003. Million Euros. Current prices.

	GOVERD		BERD		HERD		Non profit		Total	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
Business	7.8	6.3	3208.9	6764.9	70.7	127.9		6.1	3287.4	6905.2
Government	206.3	351.9	403.5	462.4	1163.5	1662.3		16.2	1773.3	2492.8
Higher Education	0.5	0.0		0.0	24.6	38.8		0.0	25.1	38.8
Non profit	0.3	3.1	0.1	14.1	98.4	383.0	36.2	16.7	135.0	416.9
From Abroad	4.5	8.8	126.4	634.9	23.6	129.5		2.1	154.4	775.2
Total	219.5	370.1	3738.9	7876.3	1380.8	2341.4	36.2	41.2	5375.3	10628.9

Pre-EMU euro and EURO

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Sweden

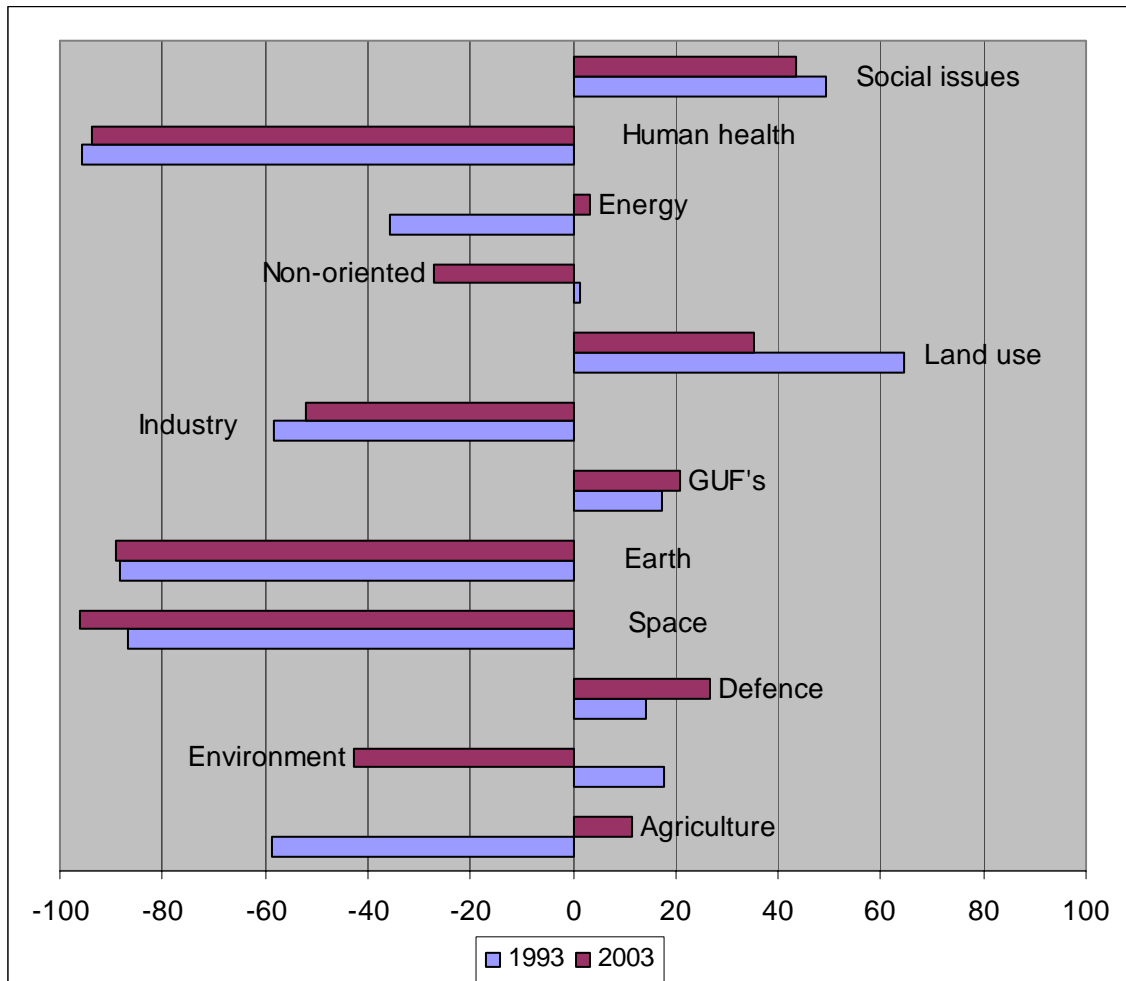
No data available

Source: OECD OFFBERD 2005

PUBLIC R&D STATISTICS

GBAORD by socioeconomic objective

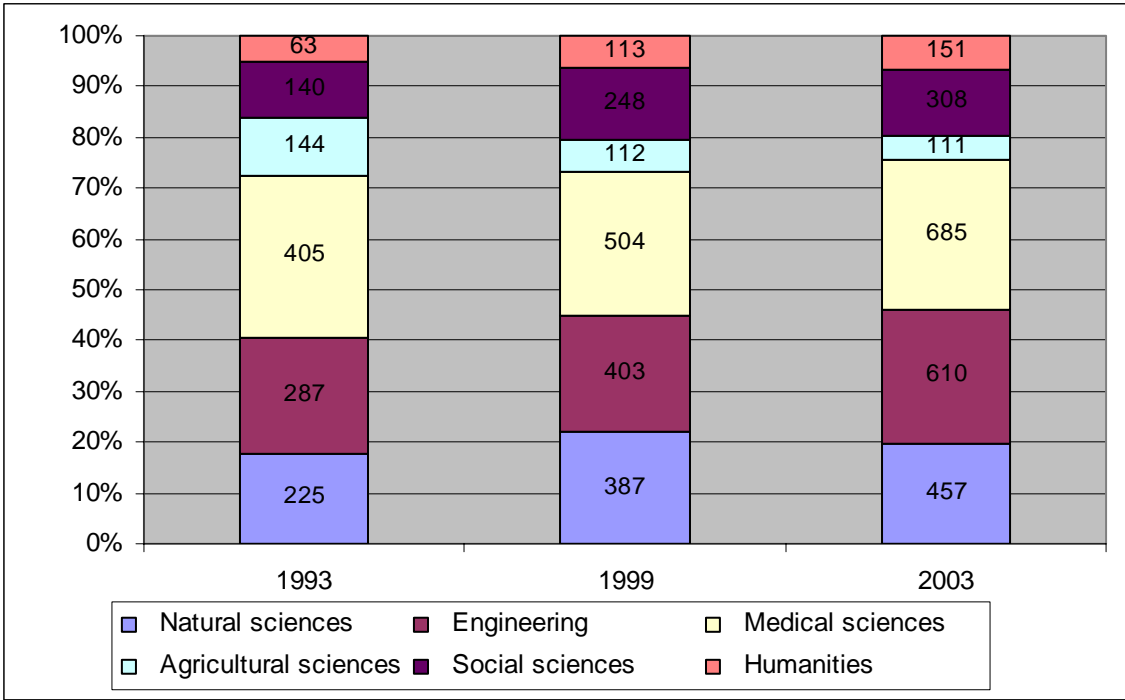
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Sweden. 1993 and 2003.



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. Sweden. 1993, 1999 and 2003. Per cent of total HERD and in million Euro.



Source: OECD Basic Science and Technology Statistics 2005.

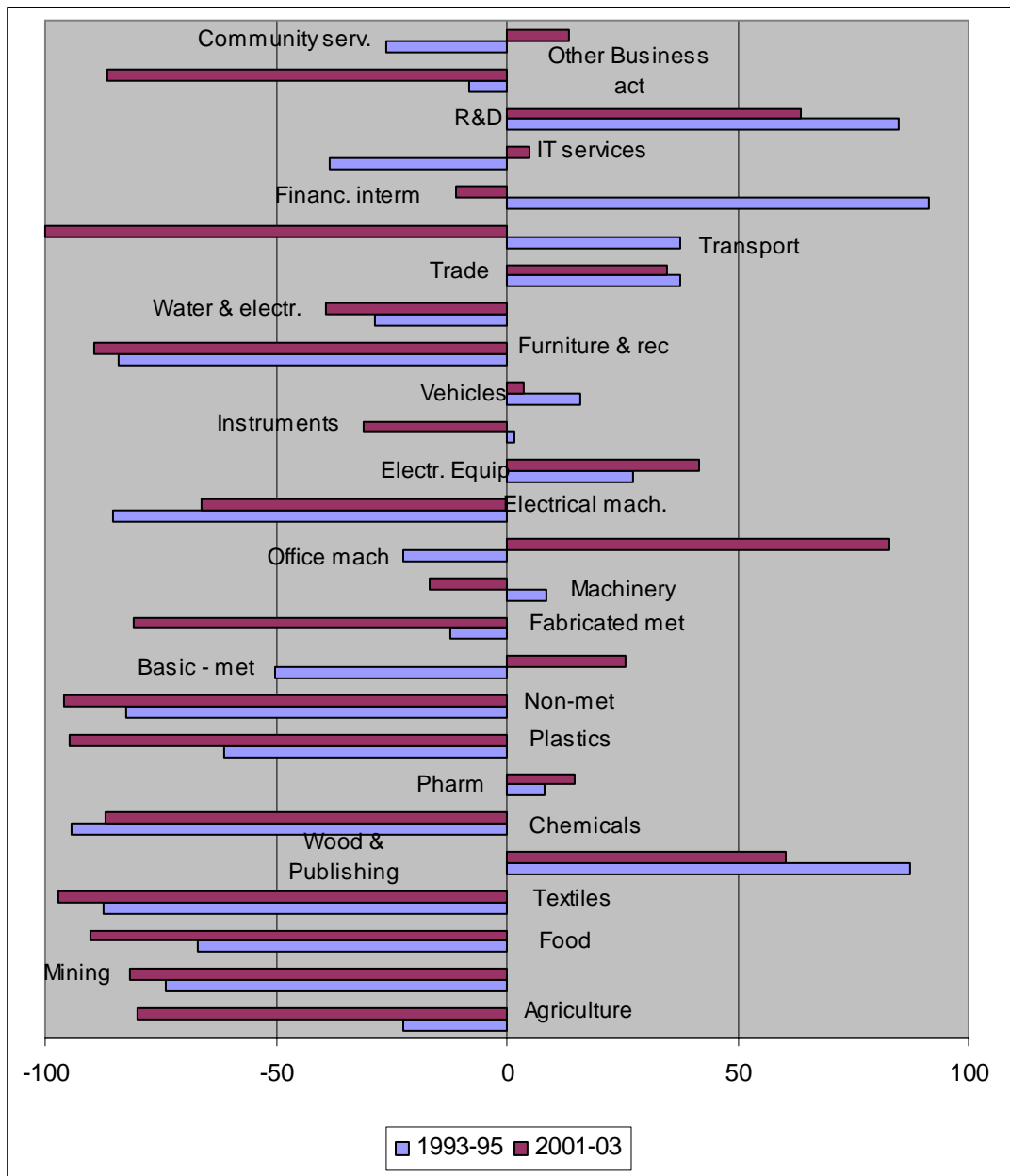
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Sweden. 1993, 1998 and 2002.

Not available

Source: OECD Basic Science and Technology Statistics 2005

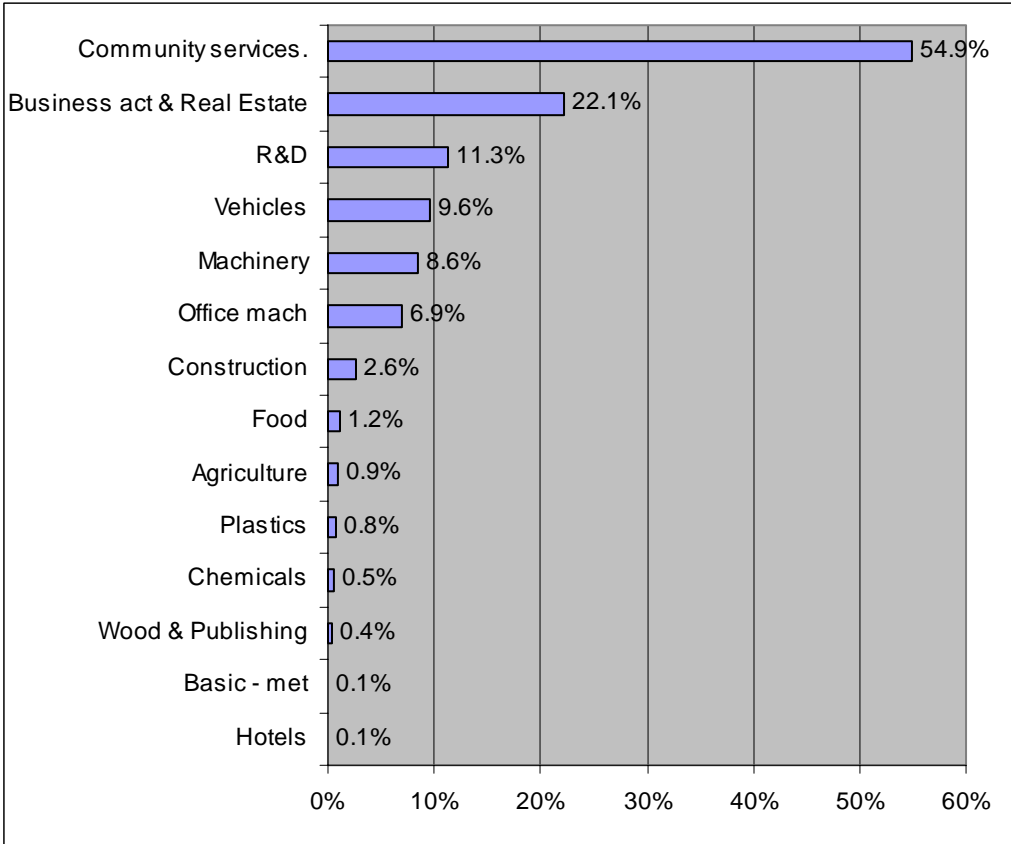
BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)

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



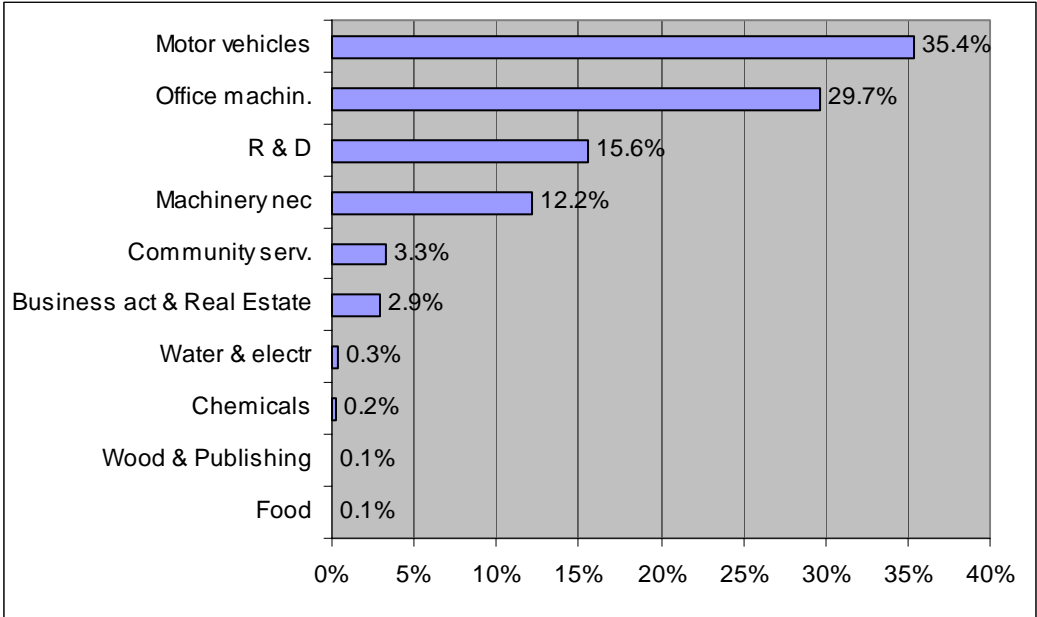
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD Basic Science and Technology Statistics 2005, ANBERD 2005, own calculations

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



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

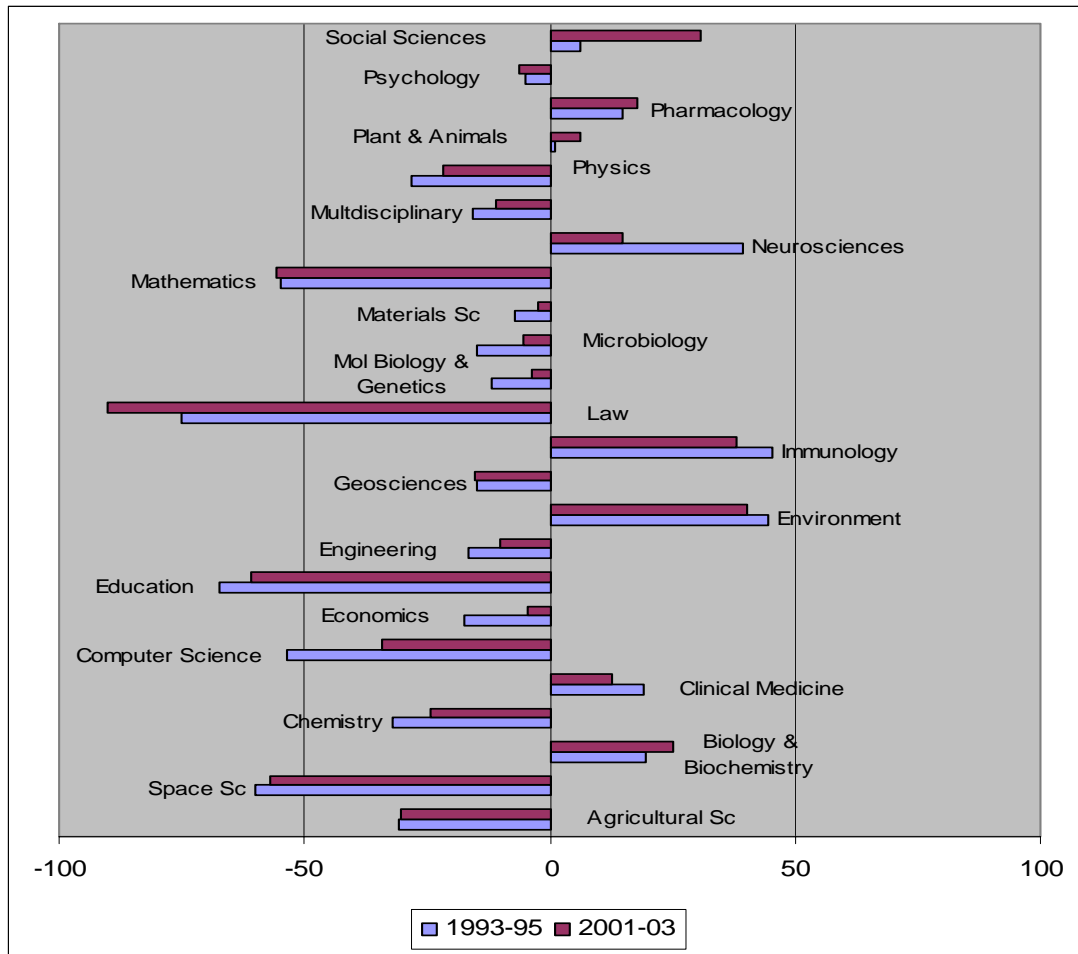
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003 last available year in OECD statistics.



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

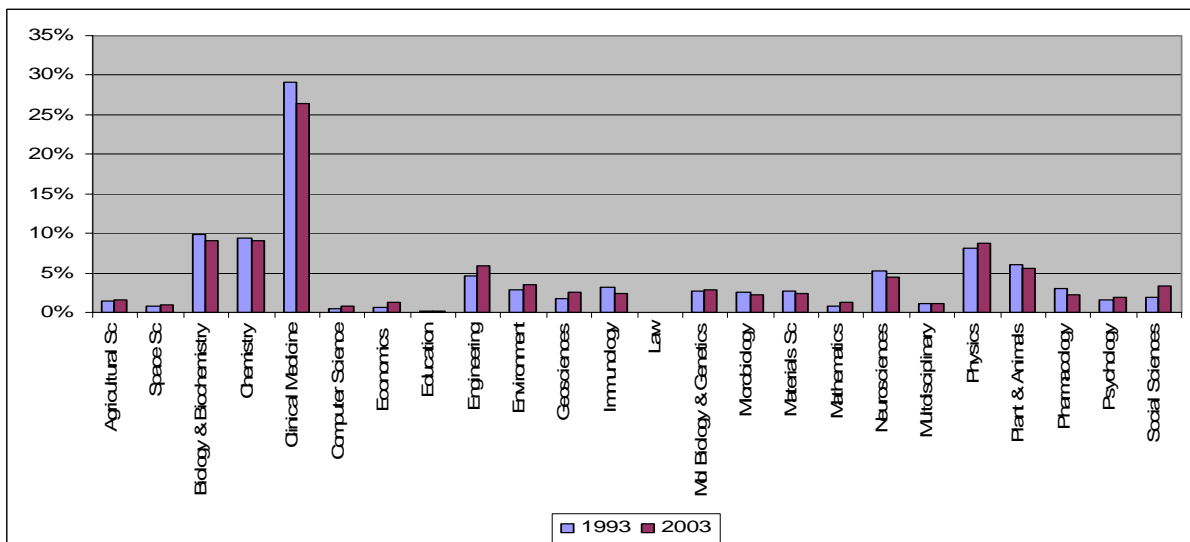
BIBLIOMETRICS

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



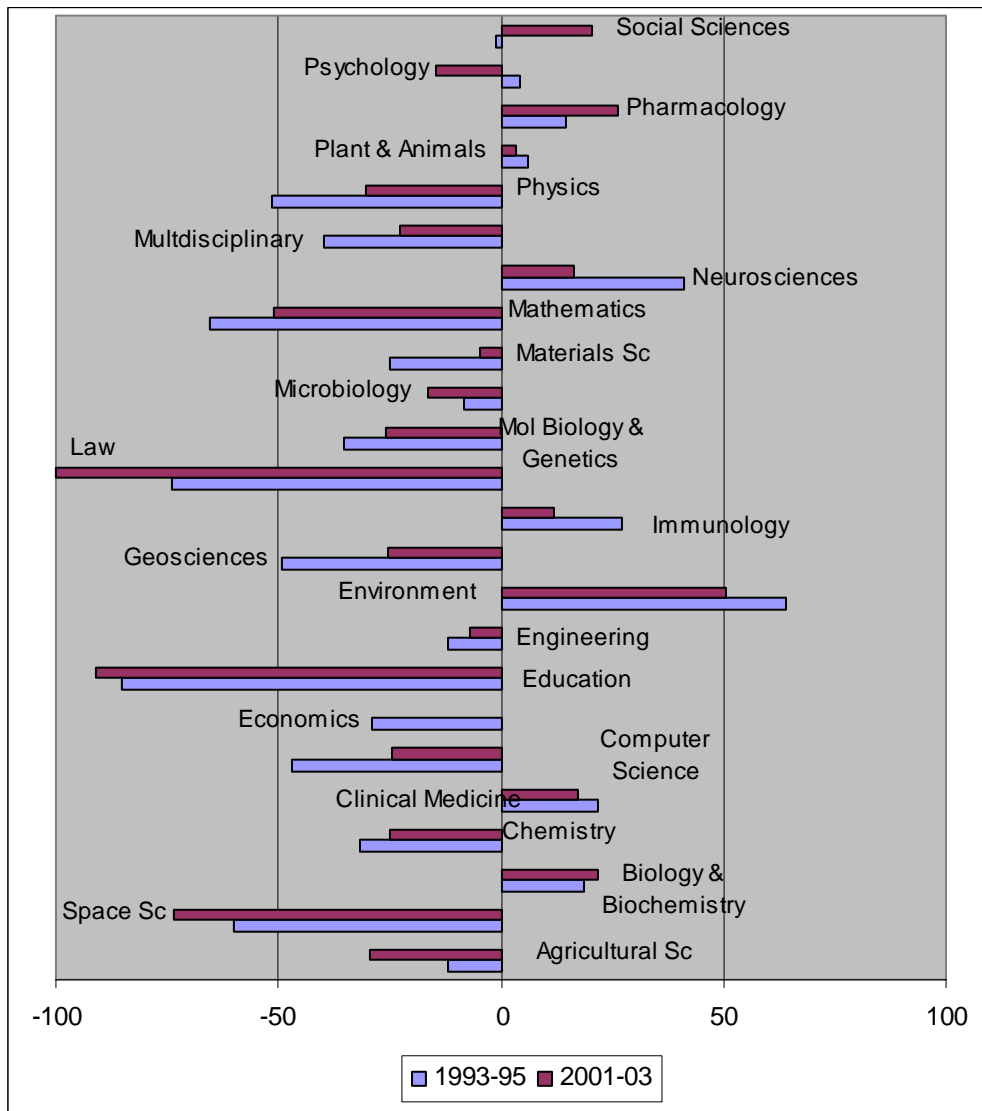
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

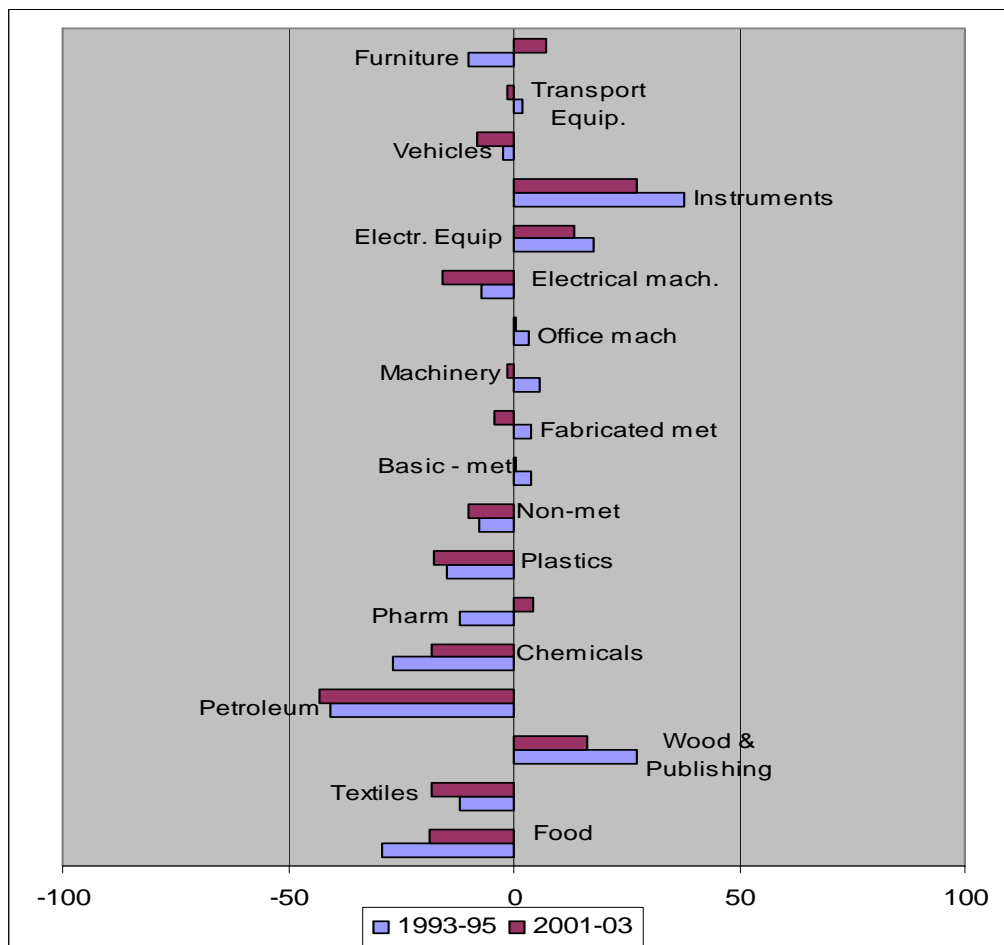
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Sweden. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

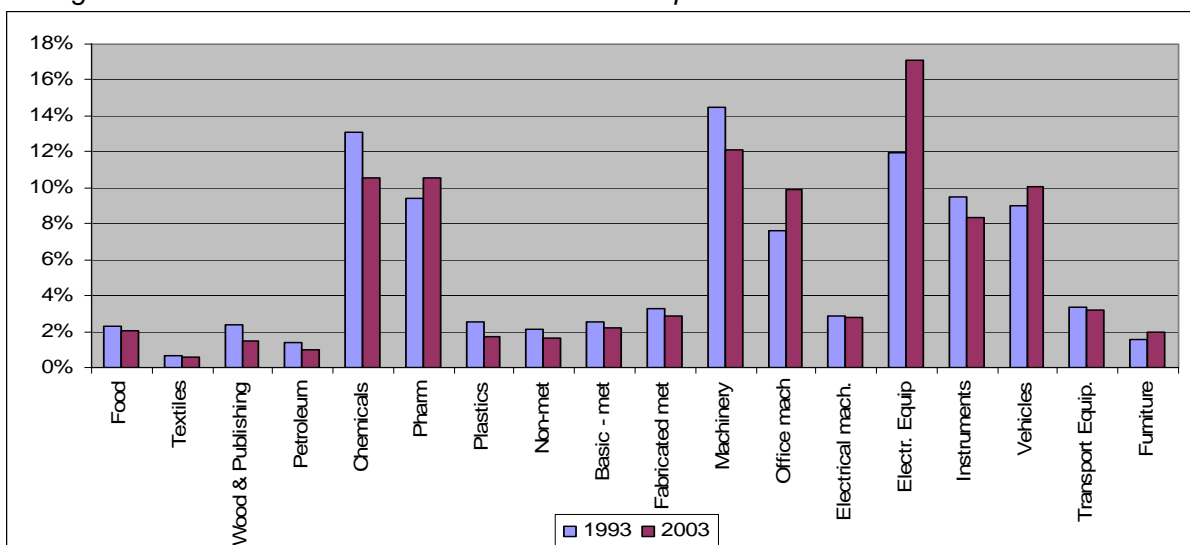
PATENTS

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

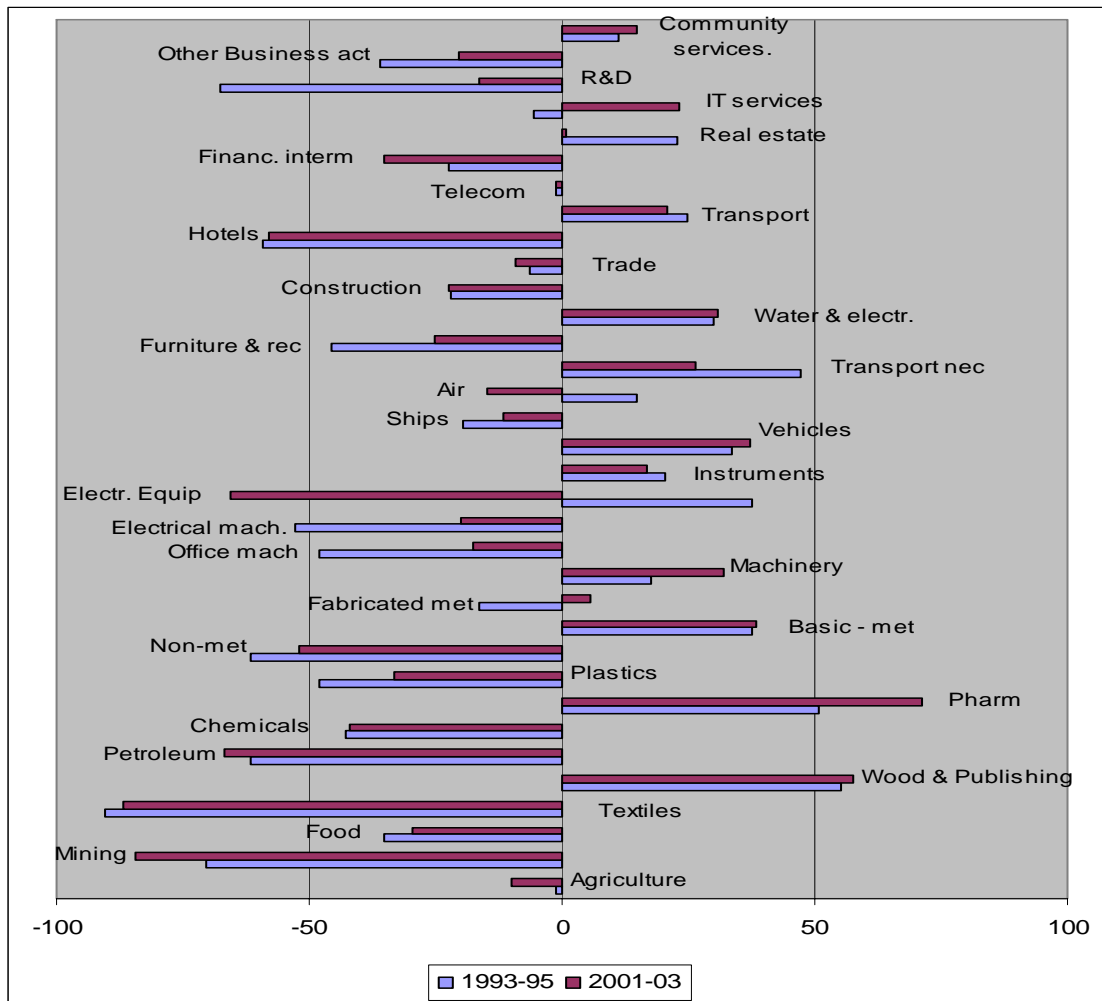
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Sweden. Averages 1993-1995 and 2001-2003. Based on correspondence matrix ISI-SPRU-OST.



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

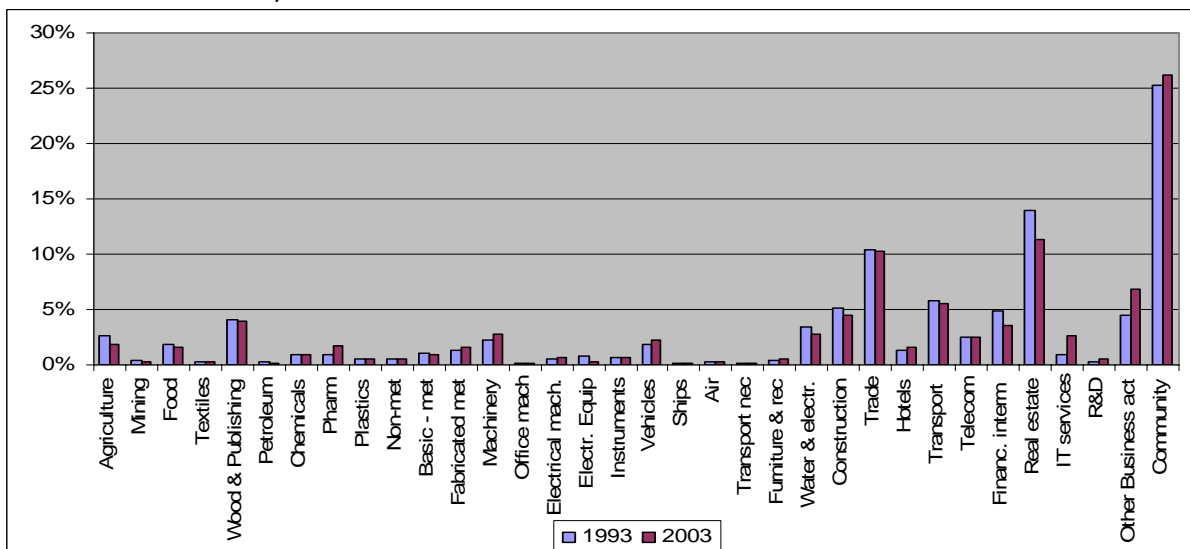
ECONOMIC SPECIALISATION

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



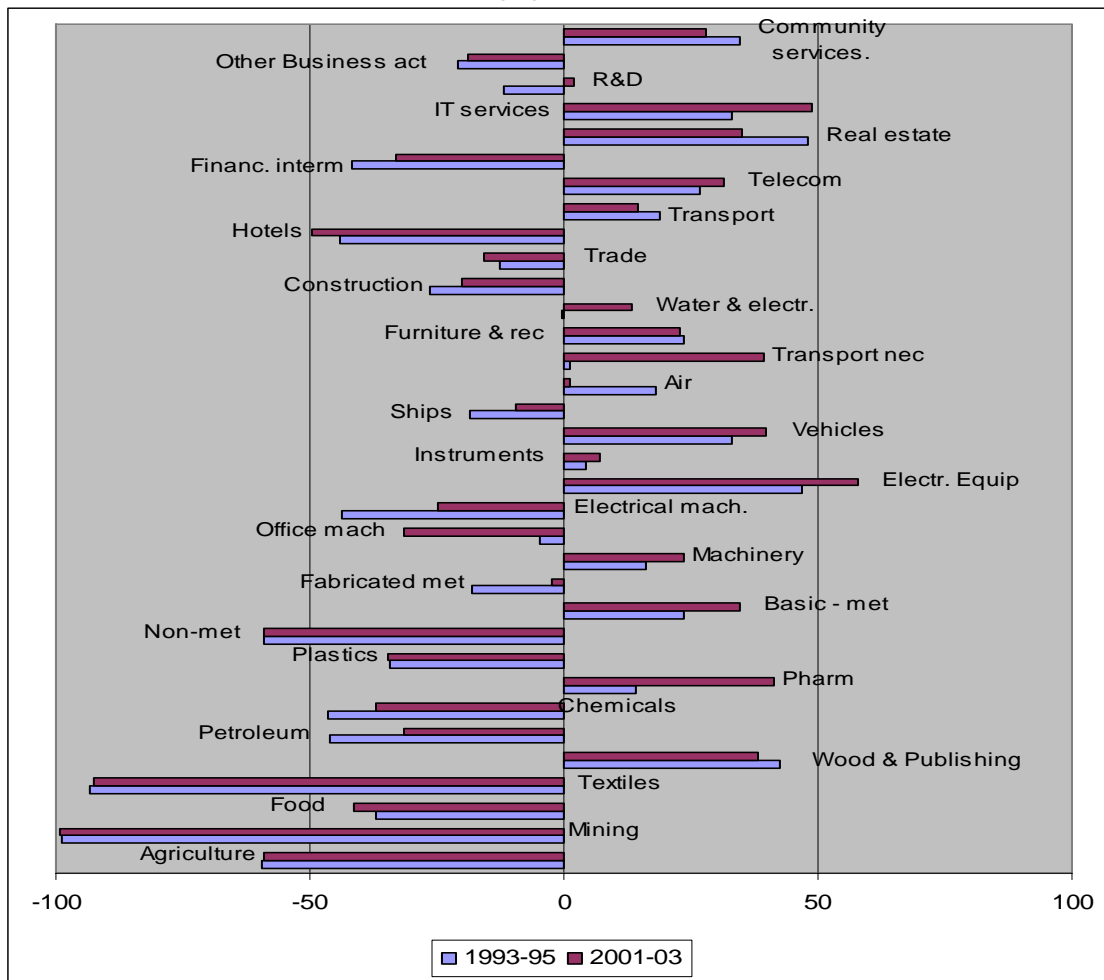
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



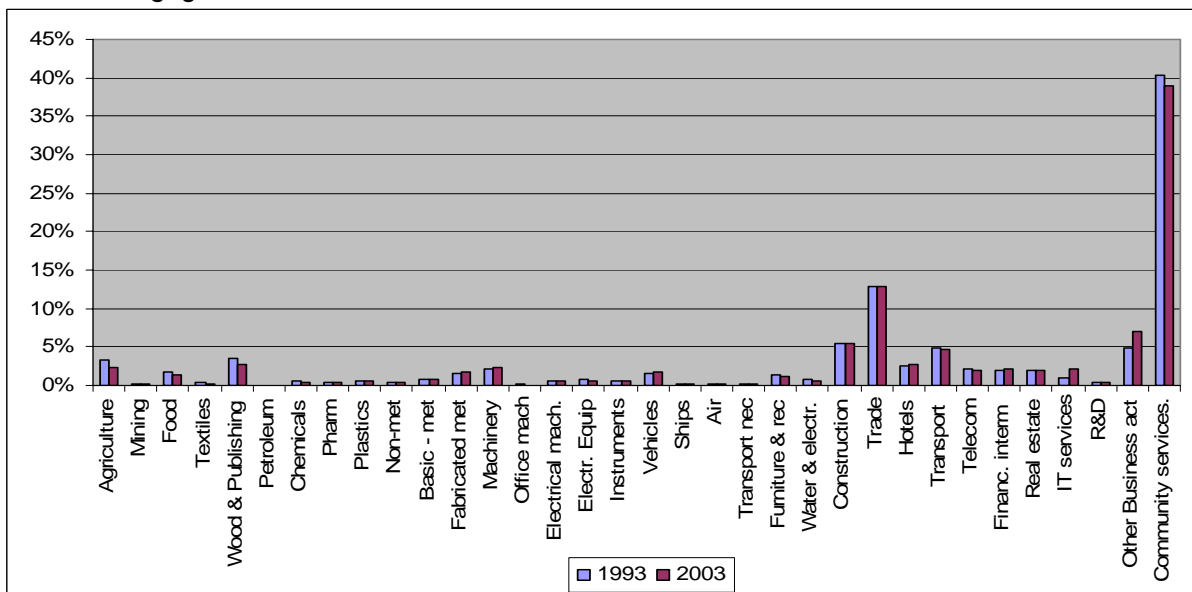
Source: OECD, STAN, 2005.

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



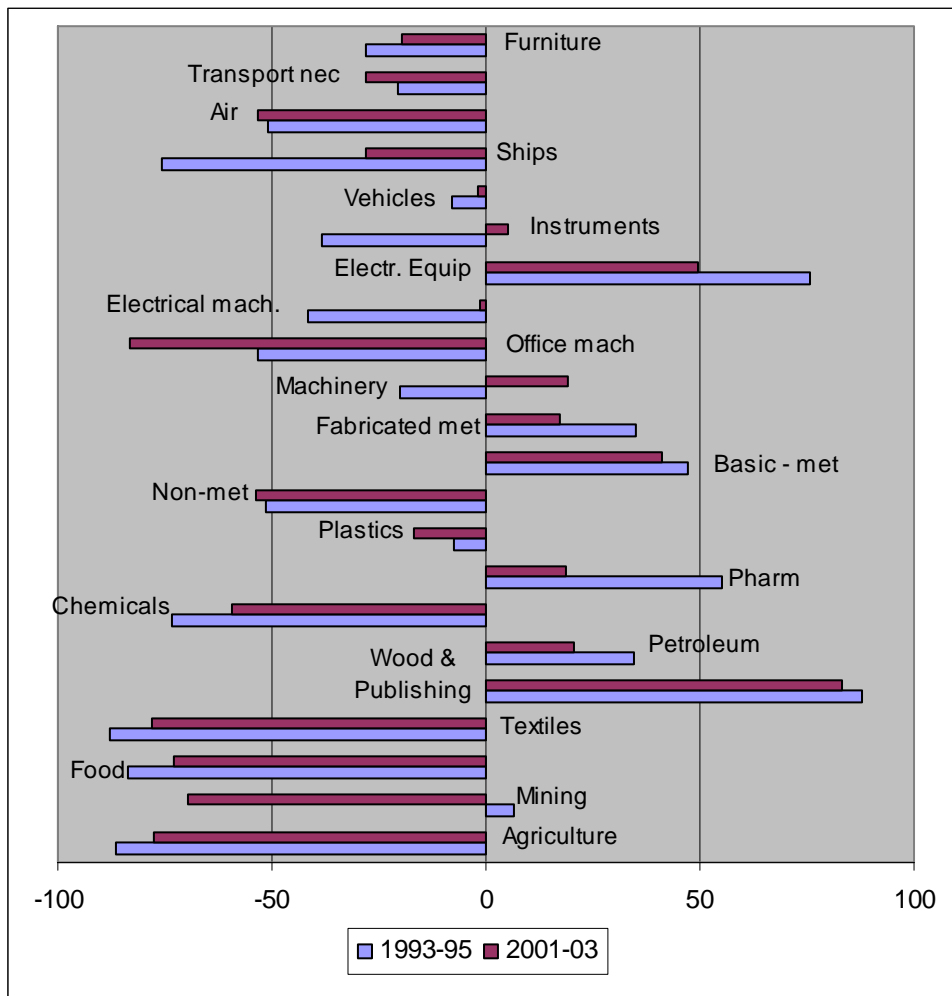
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



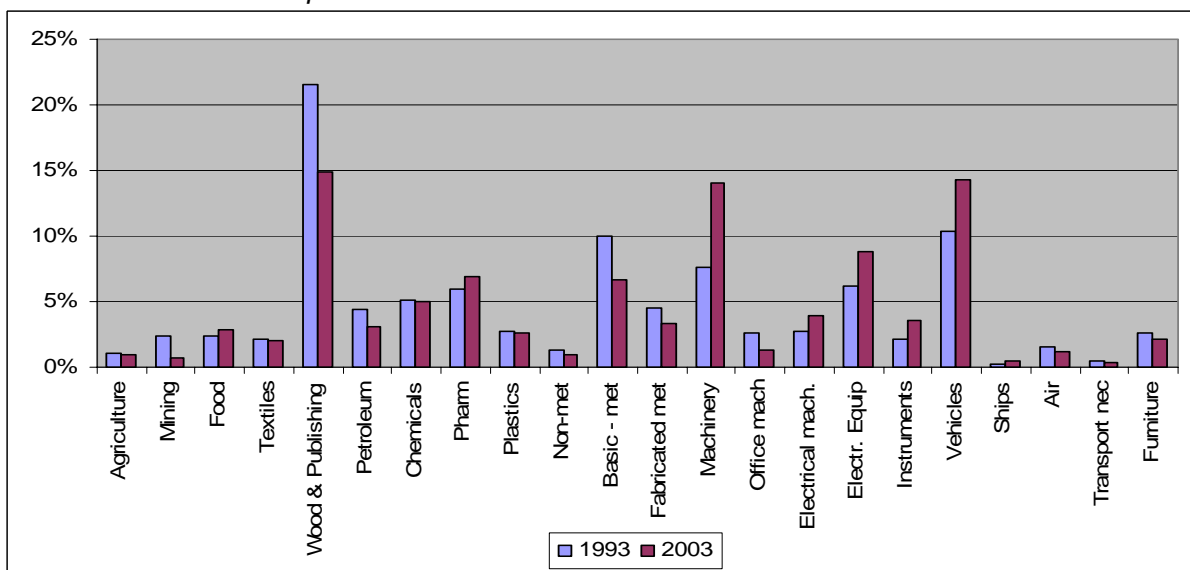
Source: OECD, STAN, 2005.

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

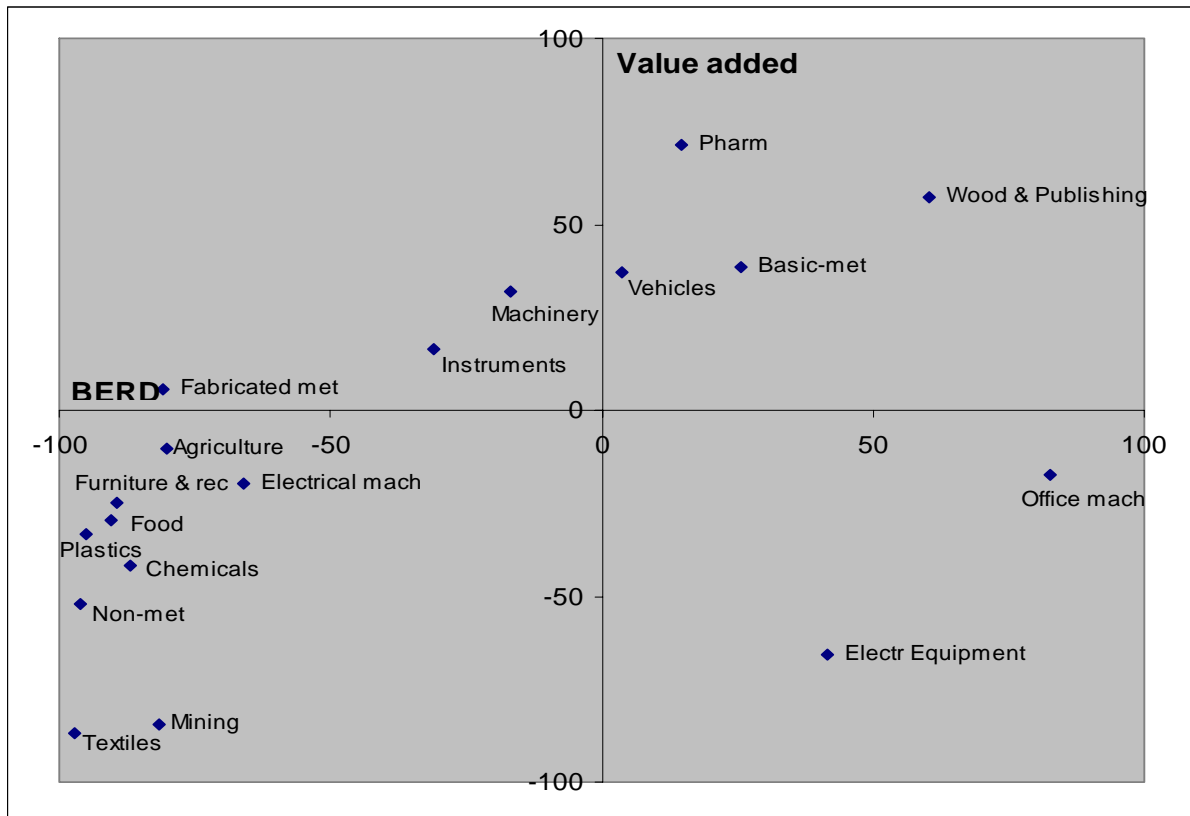
Correlations

		SE_BERD 9395	SE_BERD 0103	SE_PAT93 95	SE_PAT01 03	SE_VA939 5	SE_VA010 3	SE_EMP9 395	SE_EMP0 103	SE_EXP9 395	SE_EXP0 103
SE_BERD9395	Pearson Correlation Sig. (2-tailed)	1 .									
SE_BERD0103	Pearson Correlation Sig. (2-tailed)	.614** .001	1 .								
SE_PAT9395	Pearson Correlation Sig. (2-tailed)	.726** .001	.586* .017	1 .							
SE_PAT0103	Pearson Correlation Sig. (2-tailed)	.688** .003	.598* .014	.895** .000	1 .						
SE_VA9395	Pearson Correlation Sig. (2-tailed)	.493* .010	.443* .024	.614** .009	.672** .003	1 .					
SE_VA0103	Pearson Correlation Sig. (2-tailed)	.414* .036	.421* .032	.456 .066	.529* .029	.805** .000	1 .				
SE_EMP9395	Pearson Correlation Sig. (2-tailed)	.456* .019	.592** .001	.602* .011	.714** .001	.767** .000	.707** .000	1 .			
SE_EMP0103	Pearson Correlation Sig. (2-tailed)	.445* .023	.553** .003	.525* .031	.638** .006	.797** .000	.744** .000	.955** .000	1 .		
SE_EXP9395	Pearson Correlation Sig. (2-tailed)	.649** .004	.586* .011	.354 .163	.330 .196	.514* .014	.345 .116	.521* .013	.584** .004	1 .	
SE_EXP0103	Pearson Correlation Sig. (2-tailed)	.686** .002	.534* .022	.484* .049	.403 .109	.616** .002	.518* .014	.669** .001	.749** .000	.846** .000	1 .

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

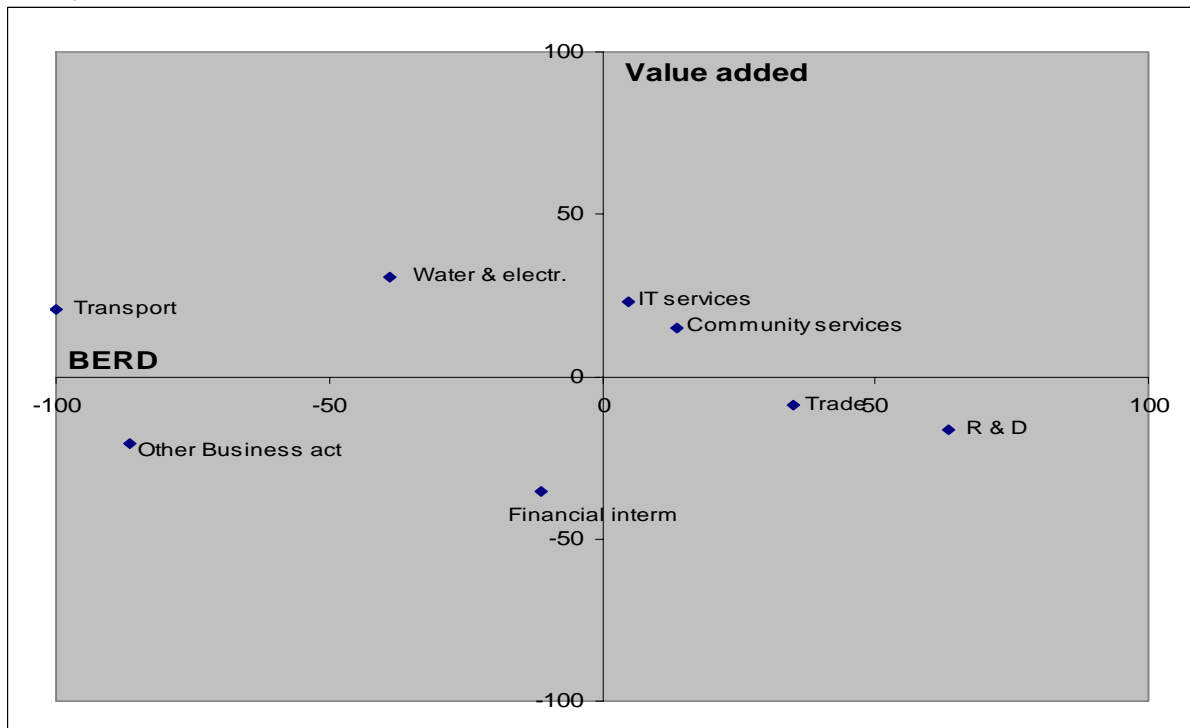
* Correlation is significant at the 0.05 level (2-tailed).

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



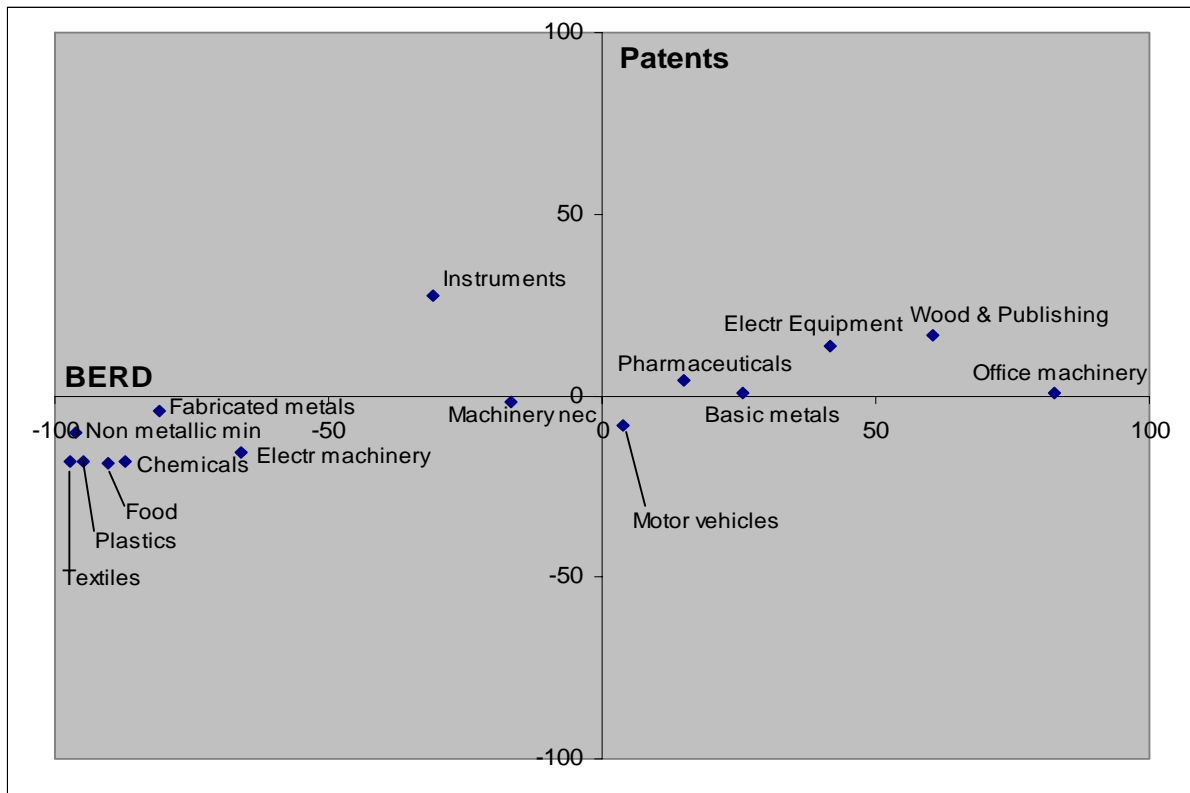
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



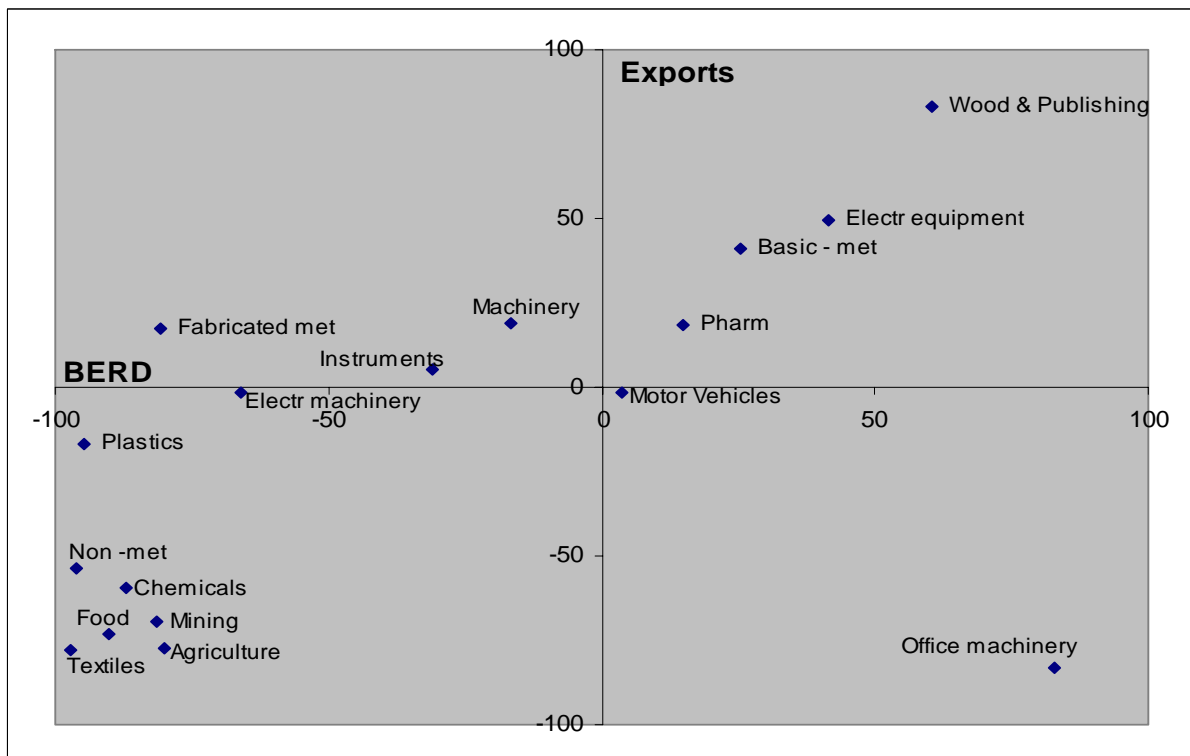
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Sweden. 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. Sweden. 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	50-52;	2423	60-63; 65-67; 73; 74	27; 30;32		01-05; 20-22; 34			
Specialisation Patents	2423			32	27	20-22; 26;28;29; 33; 34			
Specialisation Value Added	2423; 72	75-99	60-63; 70-71 352+359	20-22;28; 29 34	27;40-41	353;32;33			
Specialisation Employment	2423;352+359; 72;		60-63;70-71; 75-99	27;29;32;33; 34;40-41; 64	36-37	20-22; 30; 353			
Specialisation Exports			23;2423	29;33;34		10-14;20-22; 27;28;32			

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.

BERD and Value Added specialisation – an example

