



COUNTRY SPECIALISATION REPORT

Country: Spain

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COUNTRY SPECIALISATION REPORT - SPAIN

MAIN FINDINGS

Spain exhibits a dual specialisation profile. Particularly in the manufacturing sector it is specialised in a number of medium to low tech sectors such as the transport equipment, building of ships, furniture, fabricated metals, non metallic mineral products, textiles and the food industry in terms of BERD, value added, employment and exports. In the services sector however, while it is specialised in terms of BERD in industries such as the community services, other business activities, research and development and IT services and despite the fact that these sectors receive large shares of public funding for BERD (Figure 8), this specialisation is not translated into economic specialisation.

In terms of correlations between the various specialisation figures (Table 2), some important relationships come out. Among these, the correlation of technological specialisation during 2001-03 with BERD for both periods, the correlations of exports during 1993-05 with technological specialisation and value added for both periods and that of exports during the 2001-03 period with BERD 2001-03, value added and employment for both period stand as the most important.

R&D intensity in Spain increased by 23.5% over the 1993-2003 period. During 2003, GERD amounted to 1.1% of GDP (Figure 1). This growth can be mainly attributed to the growth of BERD as a percentage of GDP by 39% over the same period and secondarily to the growth of the HERD share in GDP by 18.5%. In contrast, GOVERD's share in GDP declined by 5.9%. The increased role of enterprises expenditure on R&D is depicted also in the rise of their share in total funding of GERD which reached 48.4% during 2003. This rise in the relative share of enterprises expenditure in GERD was accompanied by a decline in the share of government as a funding source by 11.5 percentage points over the same period. Finally, during 2003 BERD accounted for 54.1% of GERD.

Moreover, when we examine GERD by type of research (Figure 2) we can observe a decrease in the share of experimental research by 6.4% over the ten year time frame, while at the same time the share of applied research increased and picked up to 40.3% of GERD during 2003 and that of basic research to 24%.

By looking at the GBAORD priorities (Figure 3), Spain appears specialised in human health, civil research, land use, industrial research, defense and agriculture. Over the 1993-2003 period Spain lost its specialisation in exploitation of earth and exploitation of space, while at the same time it gained in specialisation in the socioeconomic objectives of land use and defense. Particularly for the latter, the trend exhibited in Spain is the opposite to that of most EU15 countries.

When we examine HERD by field of science (Figure 4) over the 1994-2003 period, the most striking change is the reduction of the share of natural sciences from 37.6% in 1994 to 22.6% in 2003. On the contrary, engineering, social sciences and humanitites increased their relative shares in HERD. In terms of GOVERD (Figure 5) by field of science in the 1993-2003 period, engineering sciences witnessed the sharpest decline. Engineering sciences accounted for 39.5% of GOVERD in 1993 and declined to 27% in 2003. Medical sciences exhibited the opposite trend and increased their share to 31.1% in 2003, up from 15.4% in 1993. This trend is similar to most

EU countries, where medical sciences increased in importance into the decade under examination.

In addition, in terms of BERD, Spain appears specialised in a large number of services sectors, such as community services, business activities, IT services and telecommunications etc. At the same time, Spain is also specialised in a number of medium to low tech manufacturing sectors, such as the fabricated metals, basic metals, non metallic mineral products, wood and publishing and the textile industry.

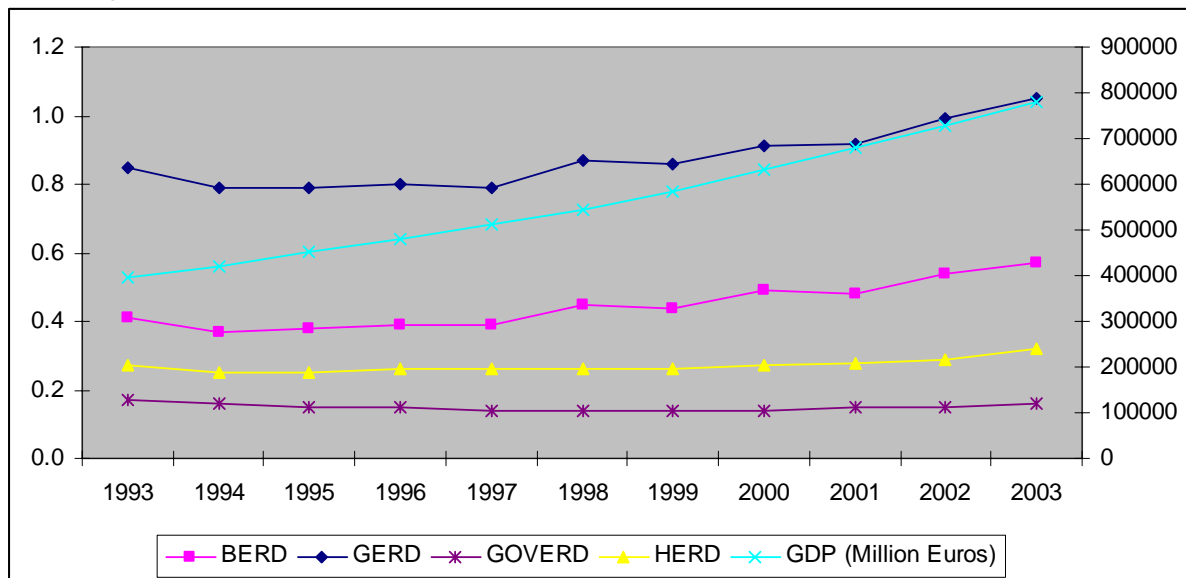
Spain finances a large number of sectors (public funding of BERD). However, the largest shares of public funding of BERD (Figure 8) are directed toward selected service sectors such as research activities, community services, IT services and business activities. Similarly, in the manufacturing sector, the sectors that receive high shares of public funding are the air, ships, other transport equipment and motor vehicles. For a large number of sectors such as community services, air, transport, ships and agriculture, the share of public funding is over 10% of total R&D expenditure (Figure 7).

Spain's scientific specialisation, as measured by the publications and citations profiles (Figure 9 & 10) is relatively stable with small changes over the 1993-2003 period. Thus Spain is specialised in scientific fields such as pharmacology, plant and animals, mathematics, environment, chemistry, material and agricultural sciences.

A similar picture is exhibited in terms of the country's technological specialisation, where Spain's specialisation profile (Figure 12) remained quite the same over the 1993-2003 period. Notable exceptions to this trend with regard to the non metallic mineral products, chemicals and petroleum industries, in which within the decade Spain turned from non specialised to specialised.

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). Spain.1993-2003.



Source: OECD MSTI 2005

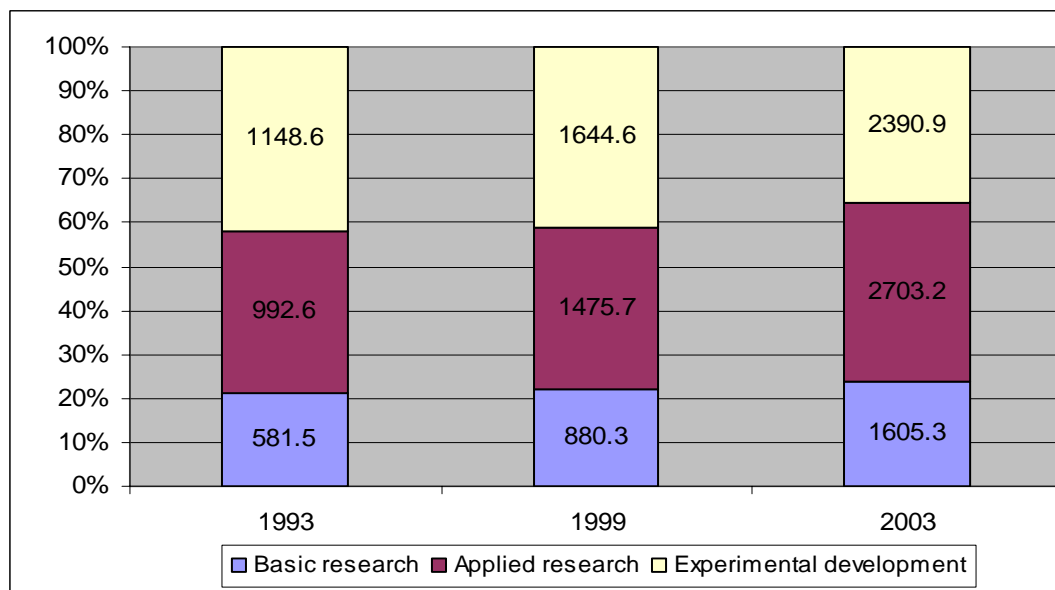
Table 1. R&D expenditure by sector of performance and source of funds .Spain. 1993 and 2003. Million Euros. Current prices.

	GOVERD		BERD		HERD		Non profit		Total	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
Business	28.174	97.163	1281.577	3708.164	62.079	160.221	2.662	5.873	1374.492	3971.421
Government	609.869	1053.703	169.717	494.544	942.545	1739.011	6.009	3.551	1728.14	3290.809
Higher Education	0	3.342	0	0.941	0	438.394	0	0.07	0	442.747
Non profit	0.579	4.652	2.318	7.204	6.58	20	23.421	5.425	32.898	37.281
From Abroad	31.471	102.903	146.129	232.586	36.611	134.332	0.313	0.957	214.524	470.778
Total	670.093	1261.763	1599.741	4443.439	1047.815	2491.958	32.405	15.876	3350.054	8213.036

Pre-EMU euro and EURO

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Spain. 1993,1999 and 2003

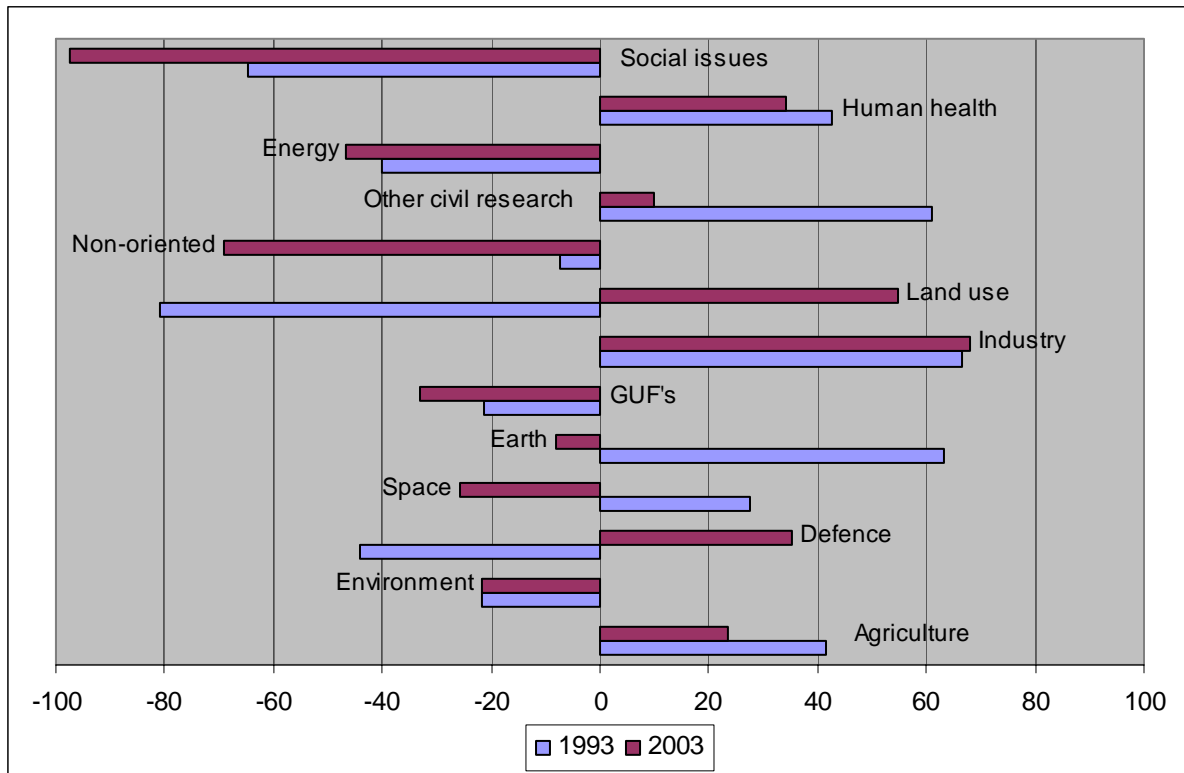


Source: OECD OFFBERD 2005

PUBLIC R&D STATISTICS

GBAORD by socioeconomic objective

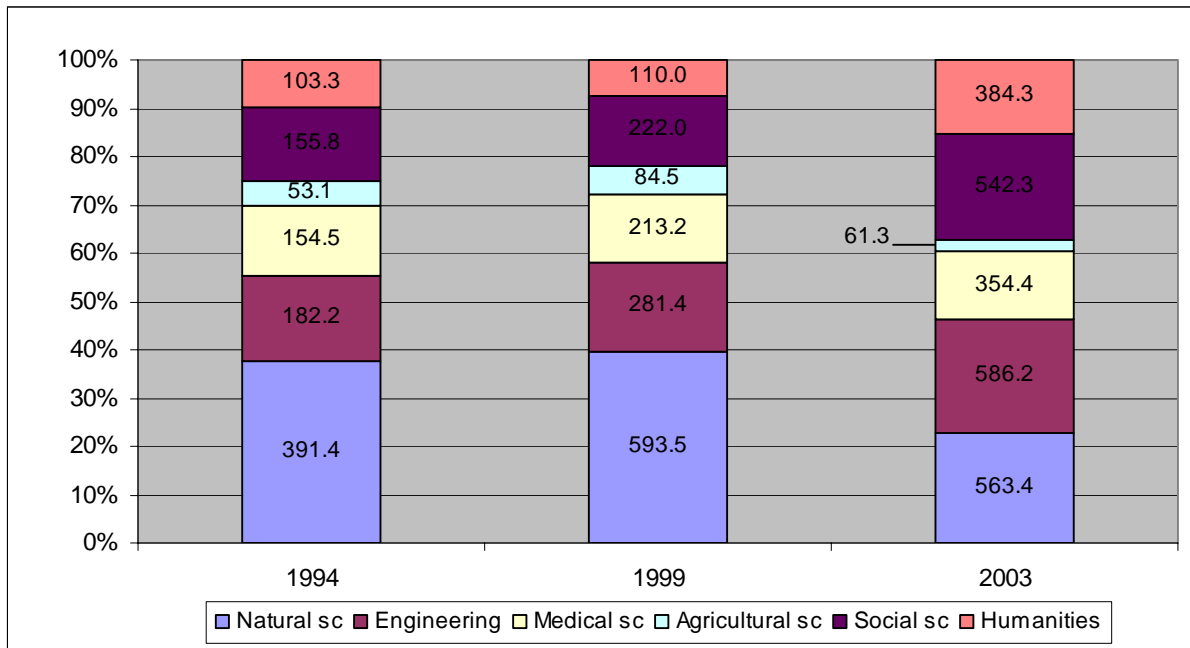
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Spain. 1993 and 2003.



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

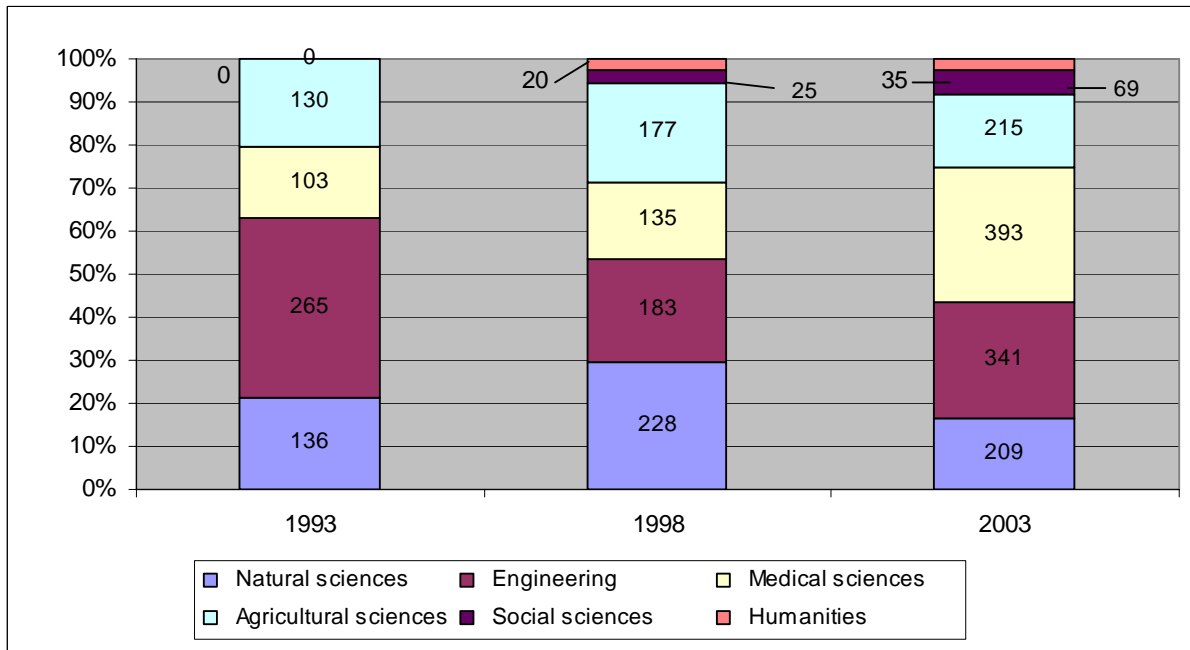
HERD by field of science

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Spain. 1994, 1999 and 2003. Per cent of total HERD and in million Euro.



Source: OECD Basic Science and Technology Statistics 2005.

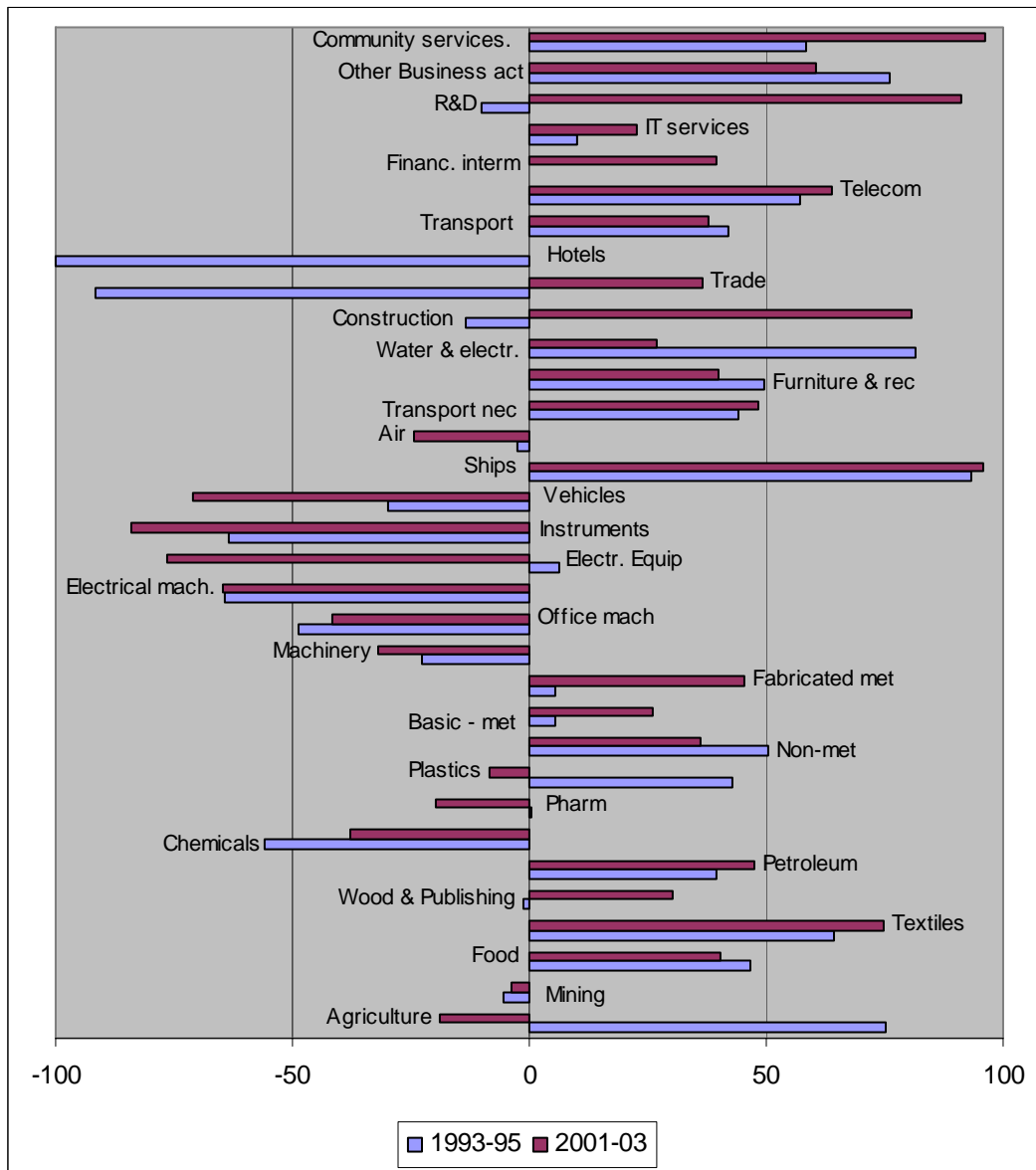
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Spain. 1993, 1998 and 2003.



Source: OECD Basic Science and Technology Statistics 2005

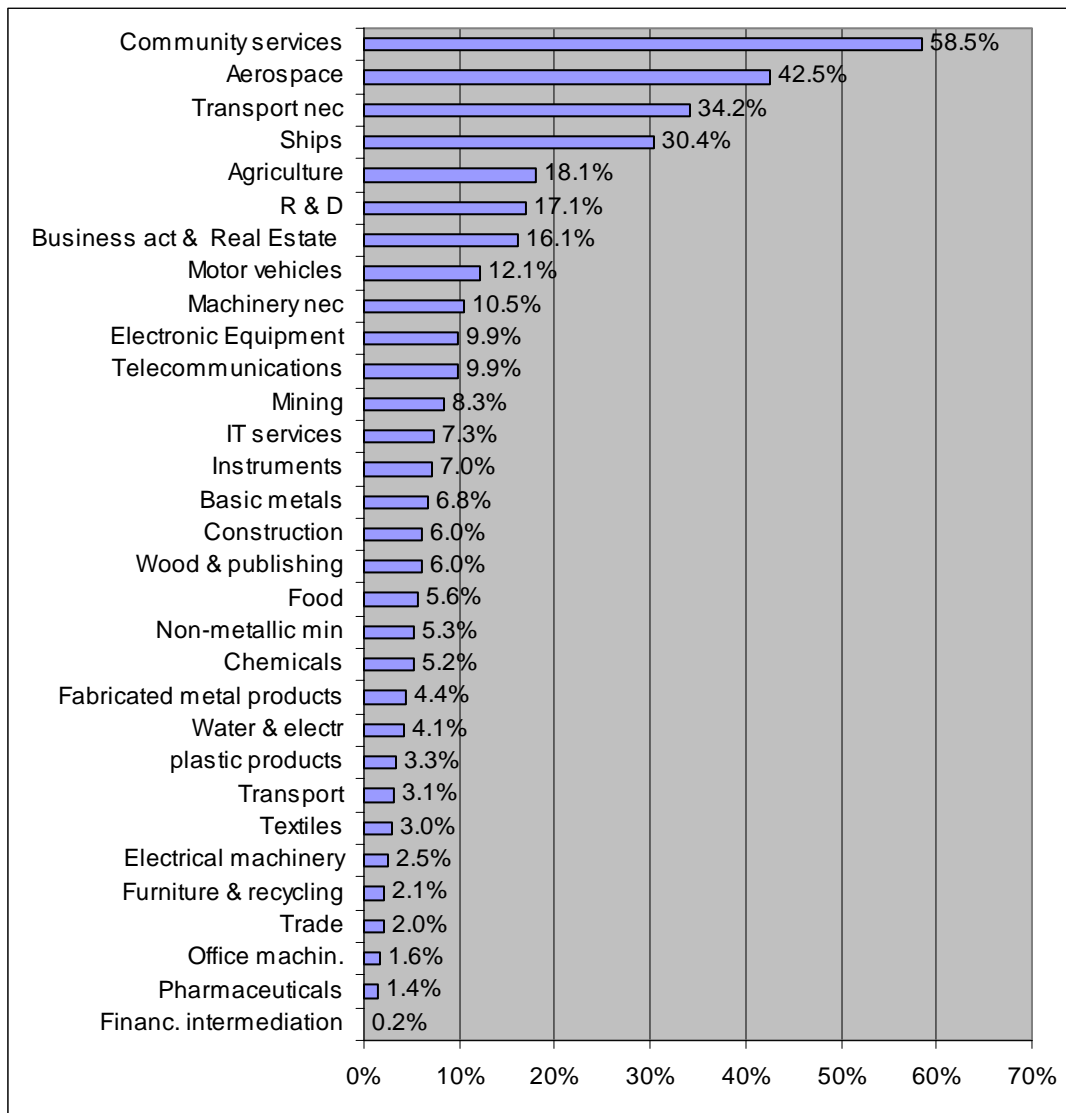
BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)

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



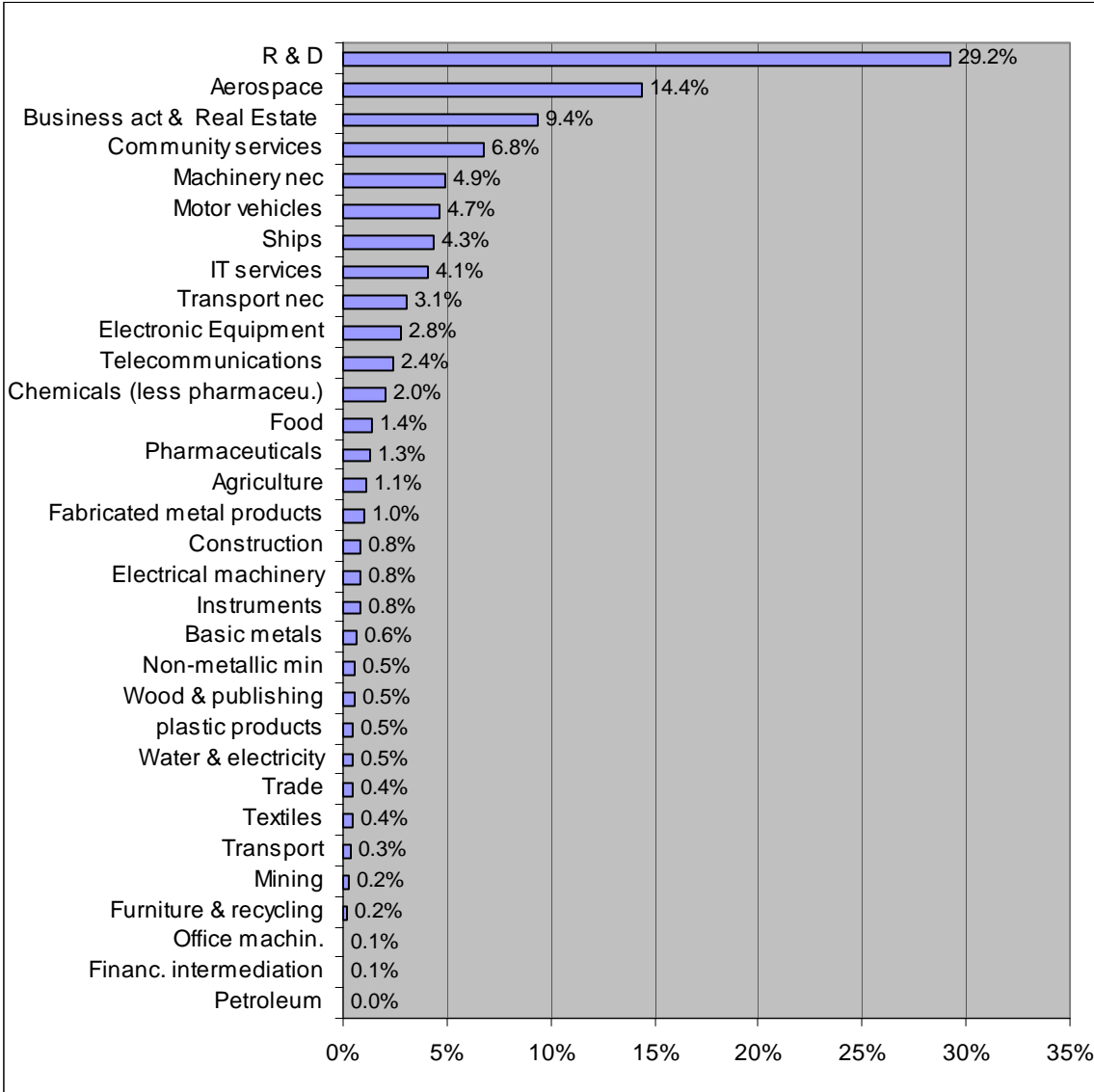
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD Basic Science and Technology Statistics 20052005, ANBERD 2005, own calculations

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

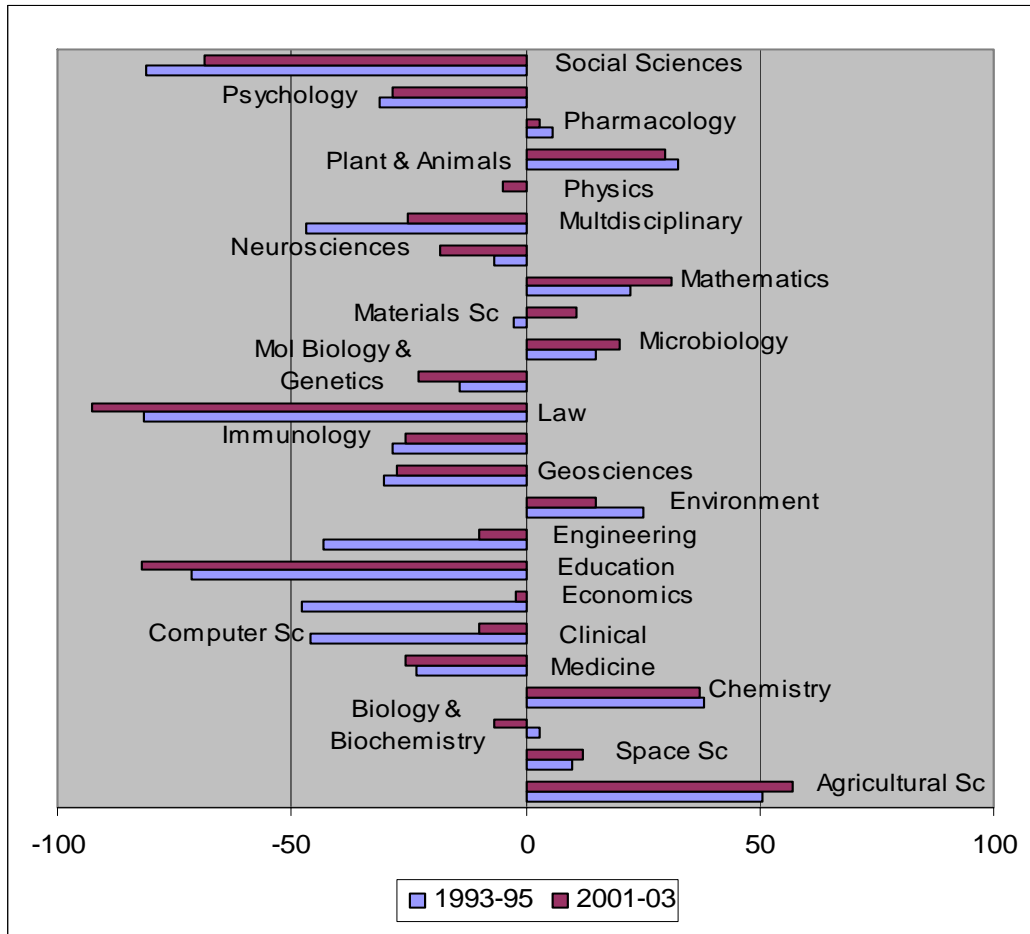
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003 last available year in OECD statistics.



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

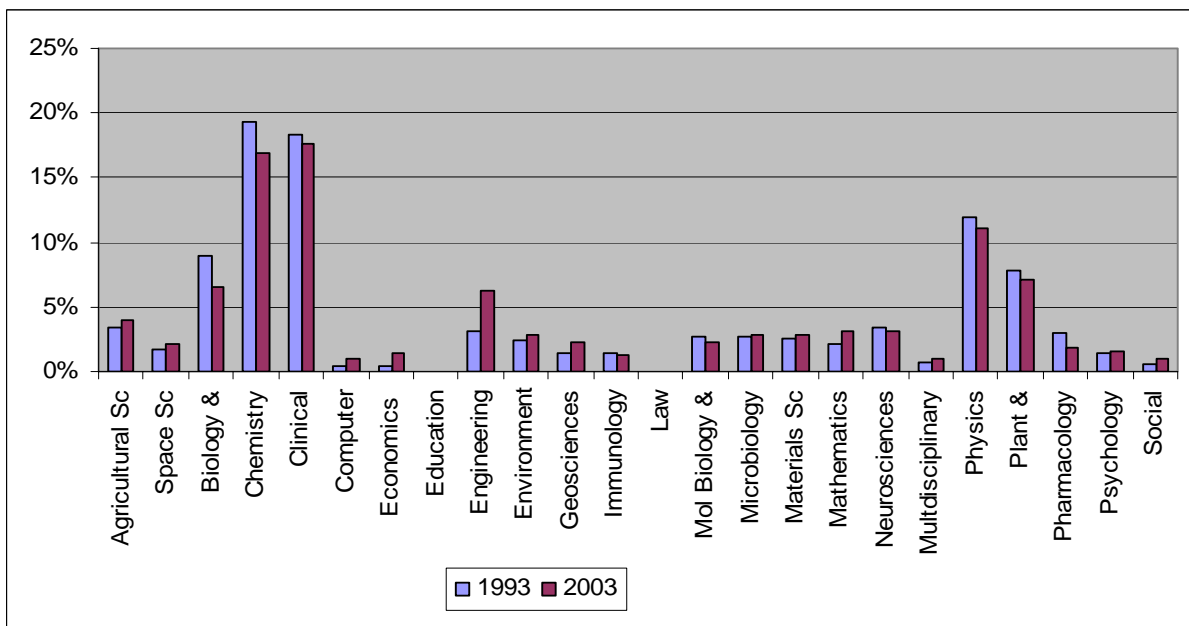
BIBLIOMETRICS

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



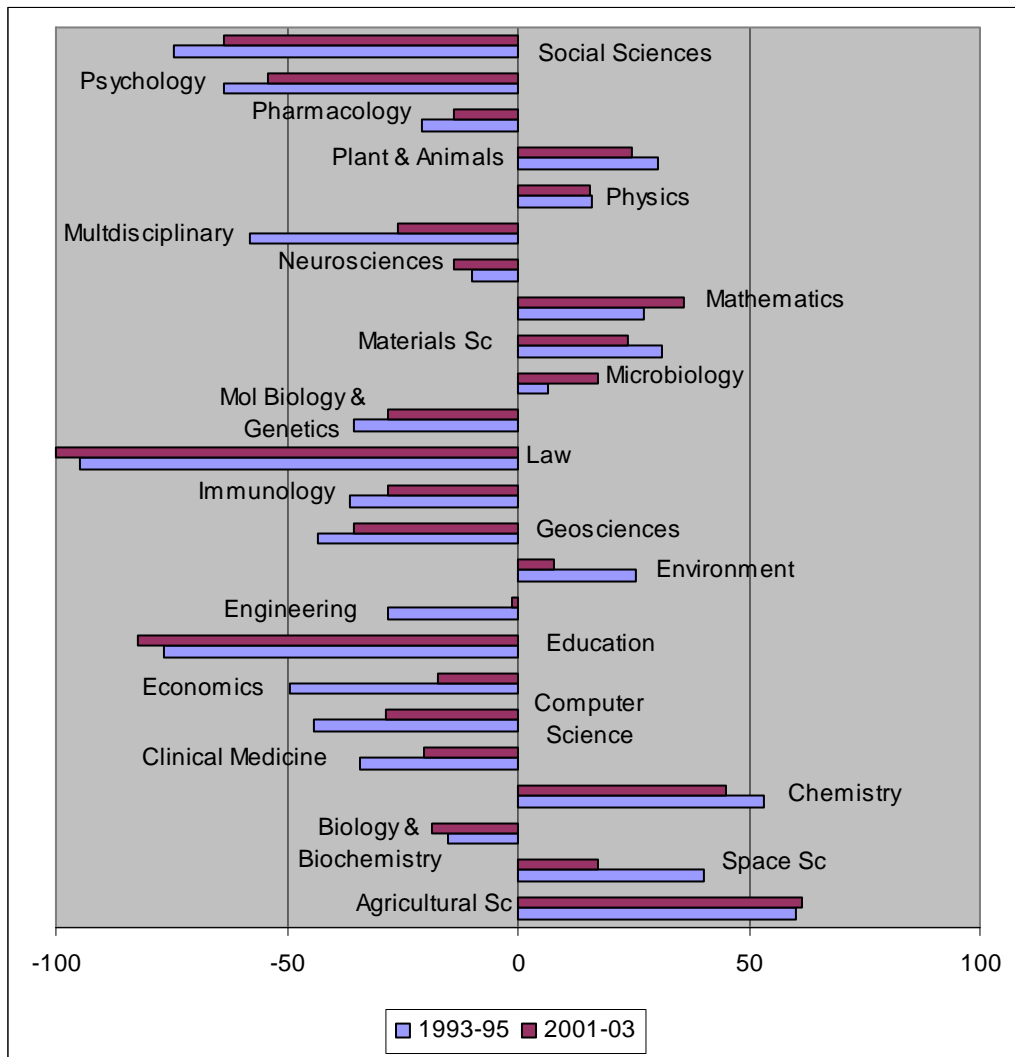
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

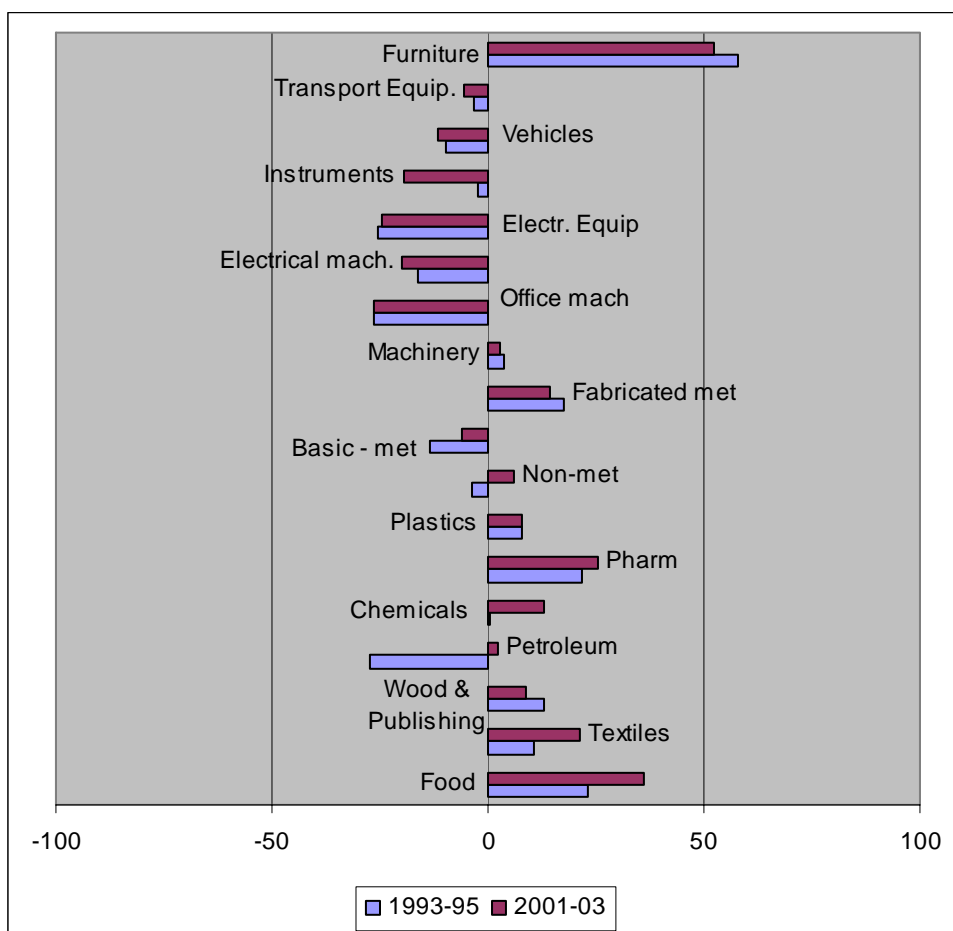
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Spain. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

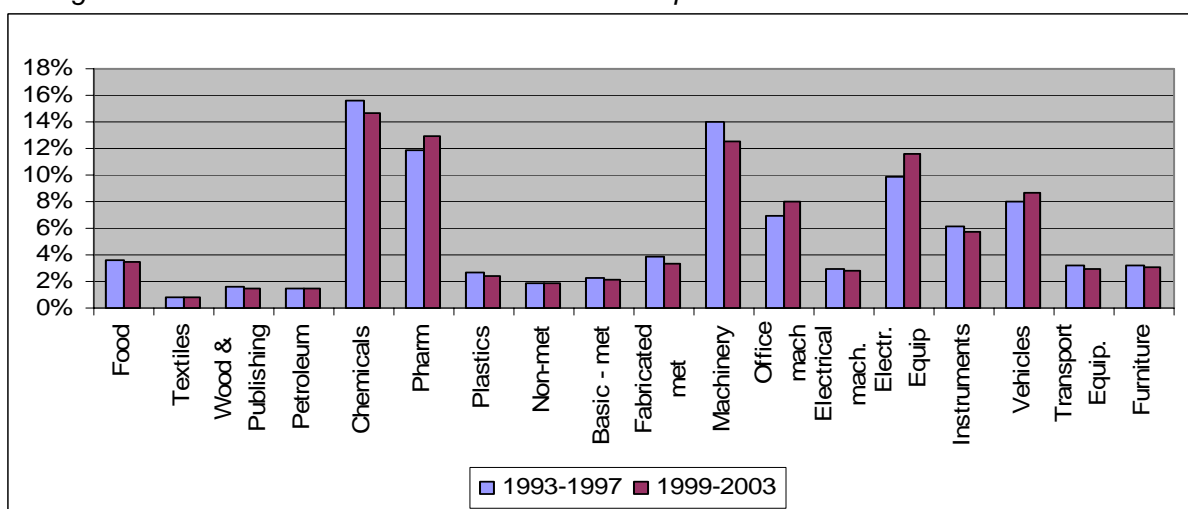
PATENTS

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

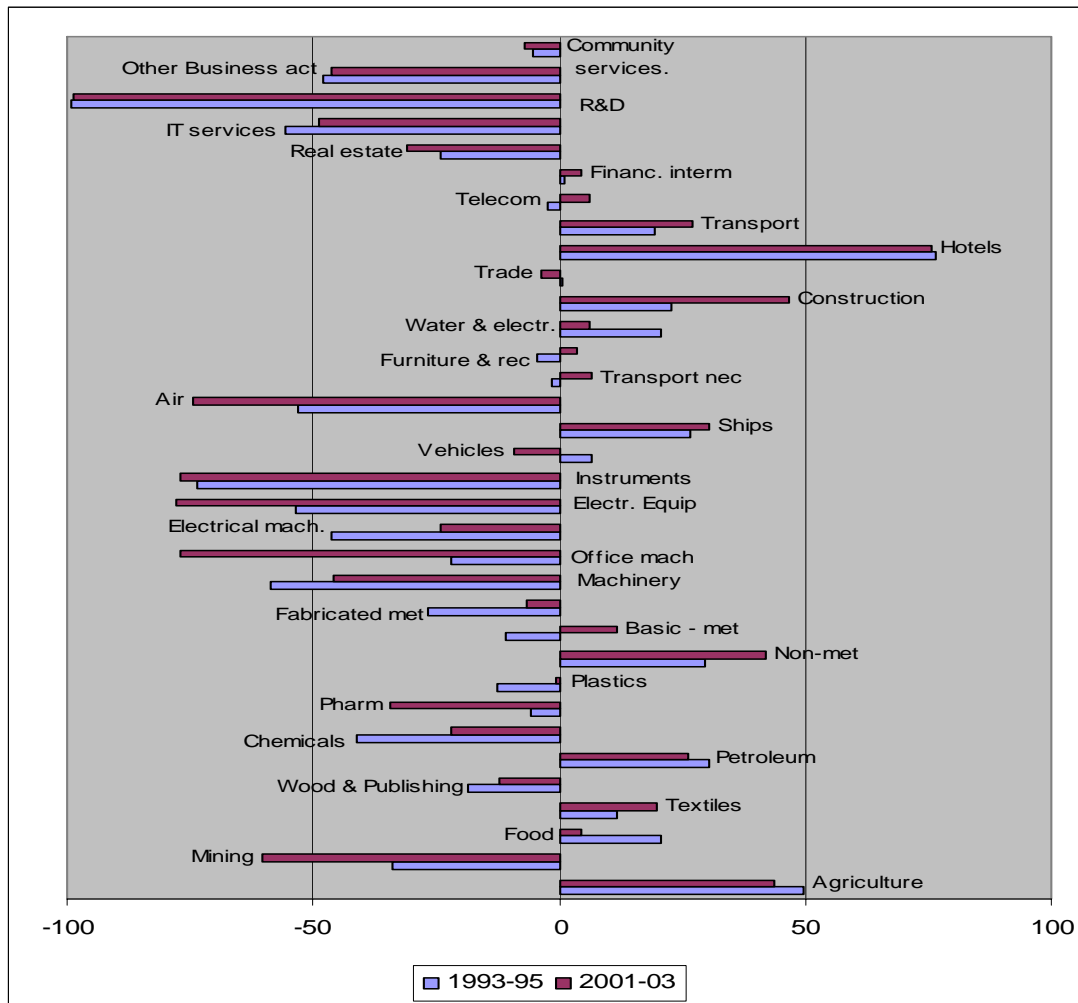
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Spain. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

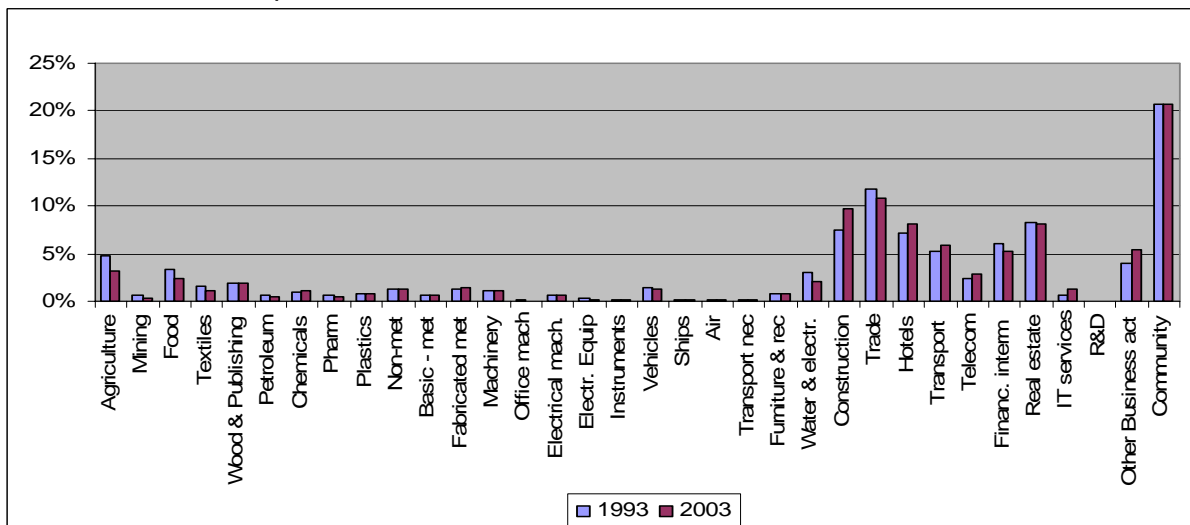
ECONOMIC SPECIALISATION

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



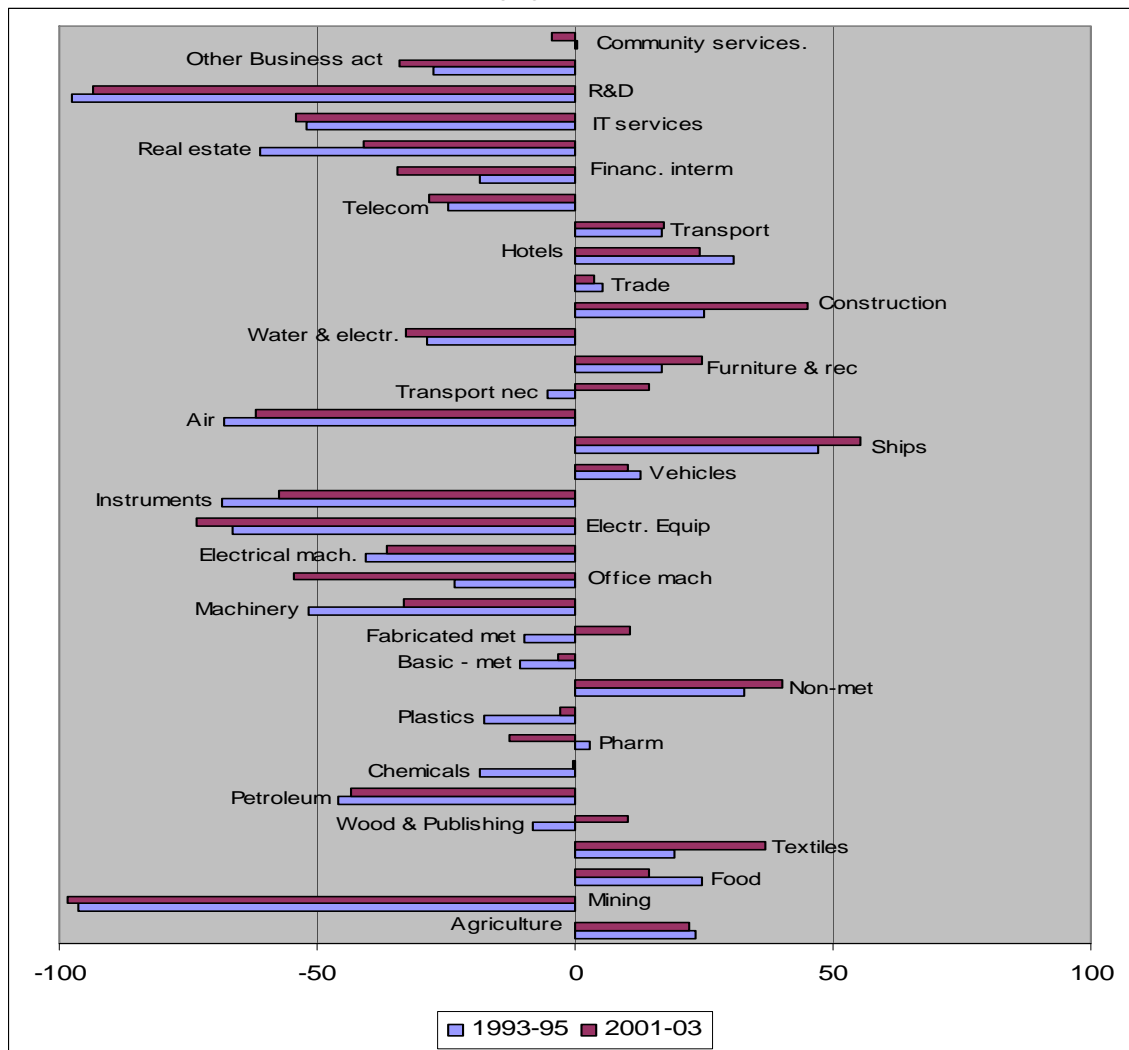
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



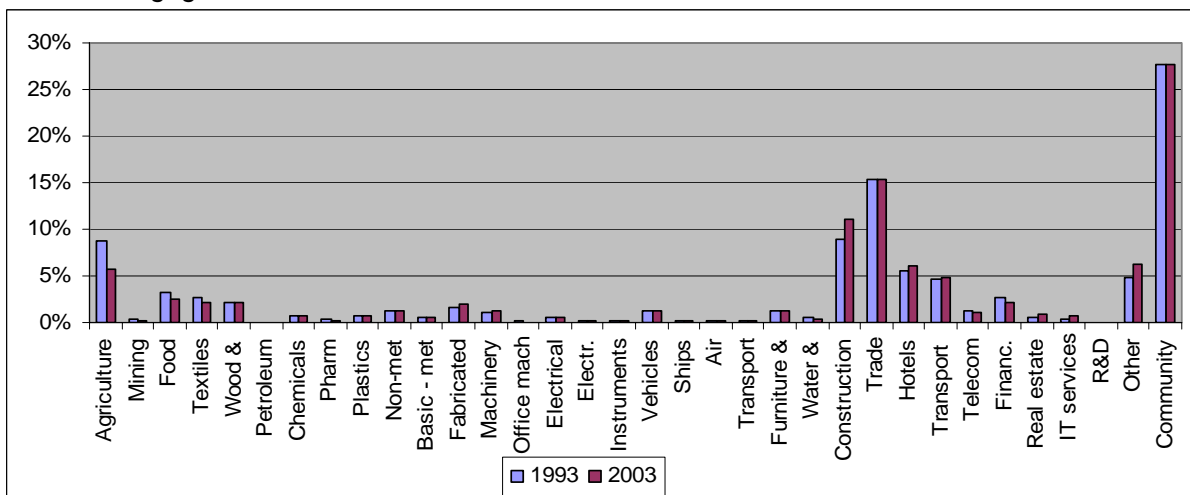
Source: OECD, STAN, 2005.

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



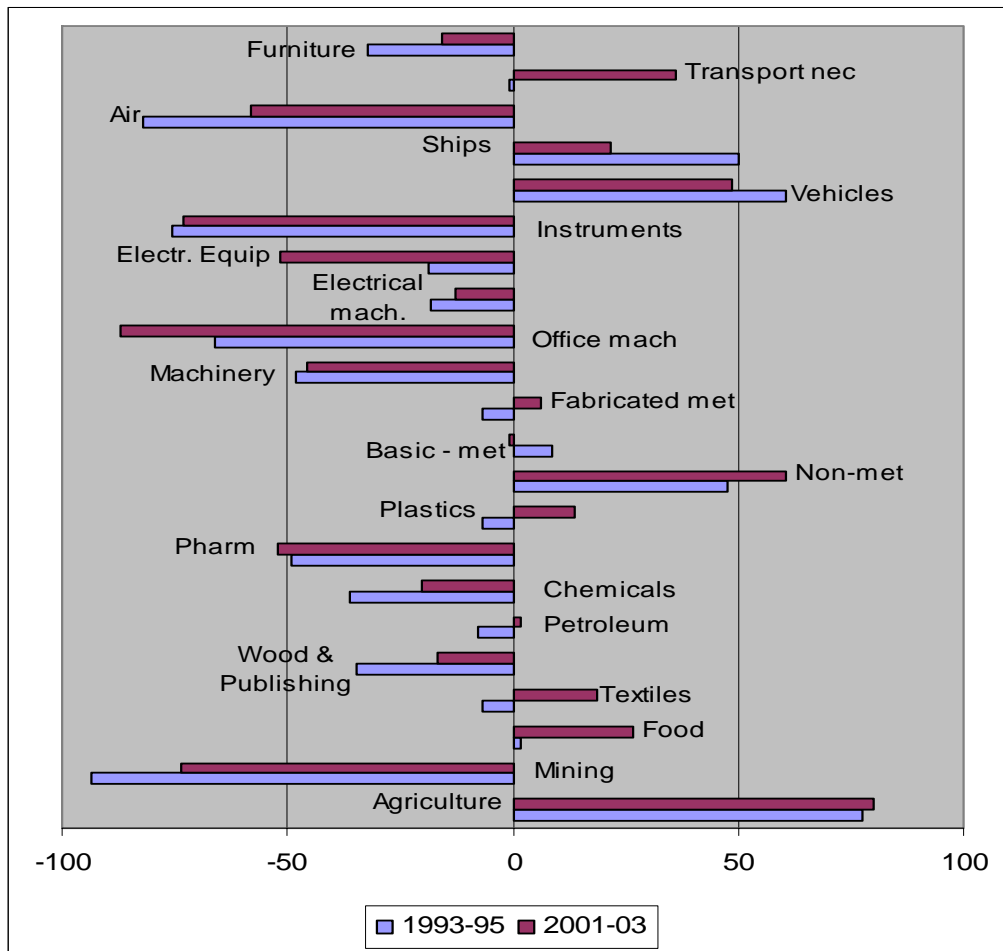
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



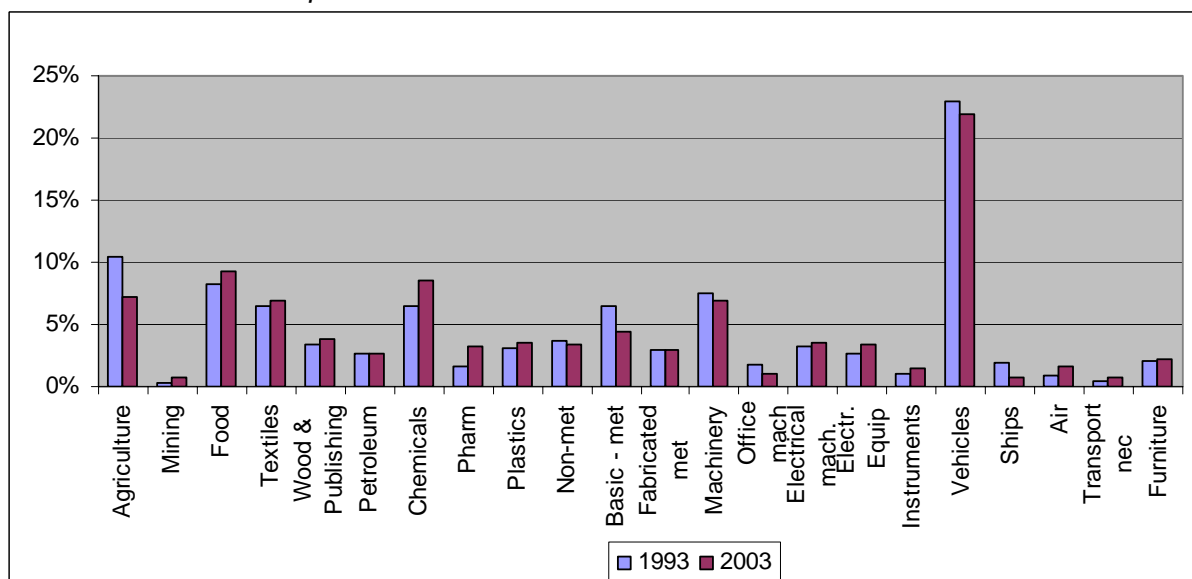
Source: OECD, STAN, 2005.

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

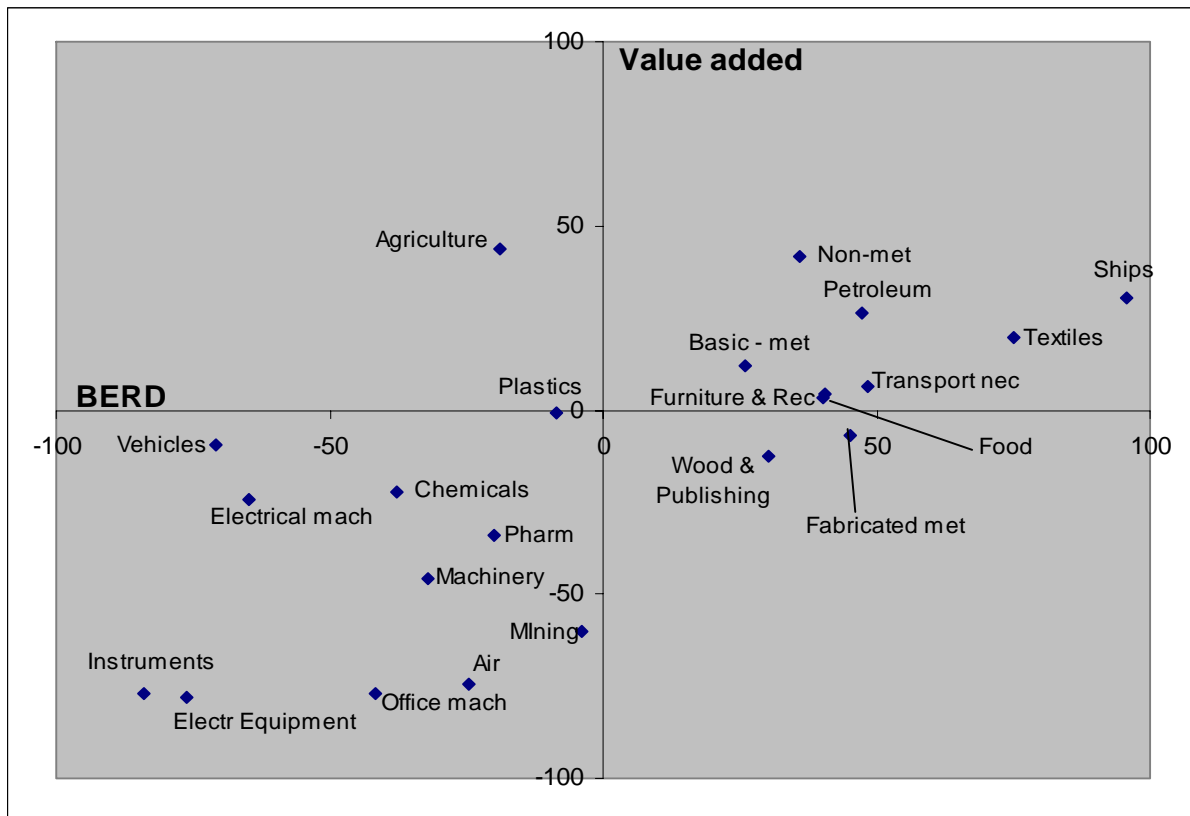
Correlations

	ES_BERD 9395	ES_BERD 0103	ES_PAT 9395	ES_PAT 0103	ES_VA 9395	ES_VA 0103	ES_EMP 9395	ES_EMP 0103	ES_EXP 9395	ES_EXP 0103
ES_BERD9395 Pearson Correlation Sig. (2-tailed)	1 .									
ES_BERD0103 Pearson Correlation Sig. (2-tailed)	.571** .001	1 .								
ES_PAT9395 Pearson Correlation Sig. (2-tailed)	.409 .103	.444 .075	1 .							
ES_PAT0103 Pearson Correlation Sig. (2-tailed)	.631** .007	.686** .002	.888** .000	1 .						
ES_VA9395 Pearson Correlation Sig. (2-tailed)	.267 .140	.343 .055	.154 .555	.469 .058	1 .					
ES_VA0103 Pearson Correlation Sig. (2-tailed)	.274 .129	.457** .008	.274 .287	.547* .023	.911** .000	1 .				
ES_EMP9395 Pearson Correlation Sig. (2-tailed)	.250 .168	.350* .050	.541* .025	.651** .005	.800** .000	.815** .000	1 .			
ES_EMP0103 Pearson Correlation Sig. (2-tailed)	.250 .167	.371* .037	.620** .008	.703** .002	.713** .000	.823** .000	.952** .000	1 .		
ES_EXP9395 Pearson Correlation Sig. (2-tailed)	.568** .006	.315 .153	-.097 .710	.069 .793	.759** .000	.809** .000	.750** .000	.732** .000	1 .	
ES_EXP0103 Pearson Correlation Sig. (2-tailed)	.630** .002	.448* .036	.156 .549	.345 .175	.781** .000	.895** .000	.744** .000	.790** .000	.921** .000	1 .

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

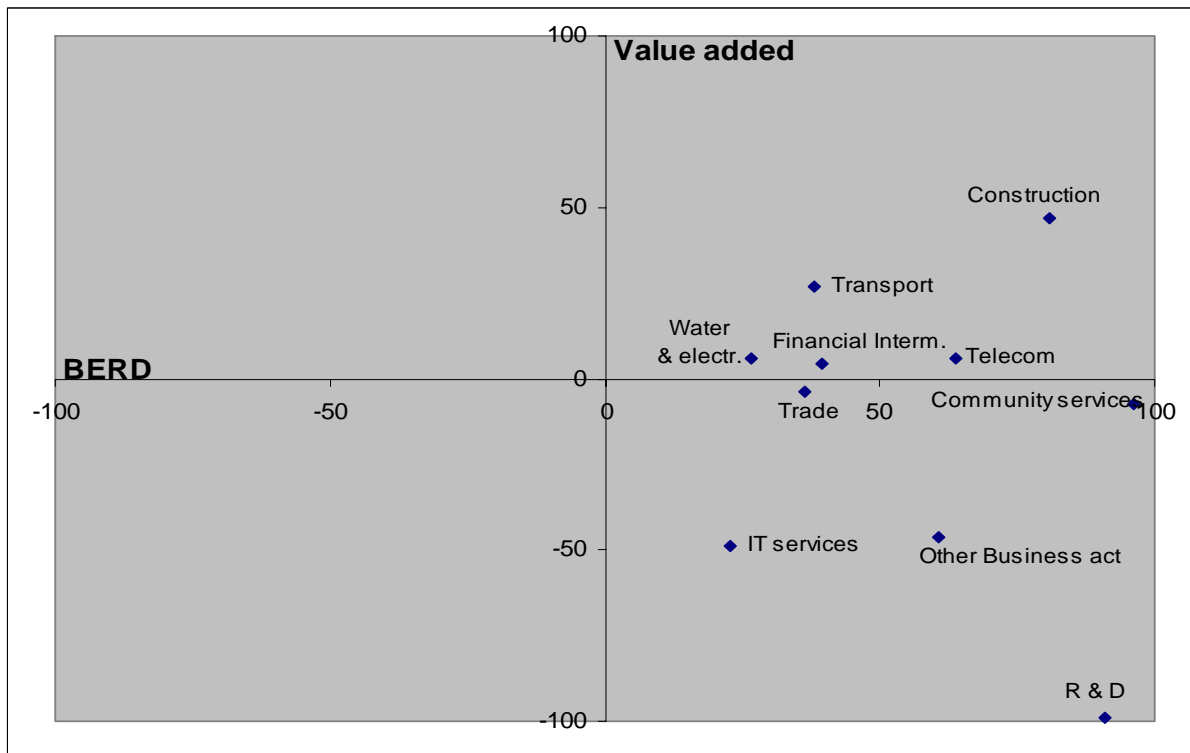
* Correlation is significant at the 0.05 level (2-tailed).

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



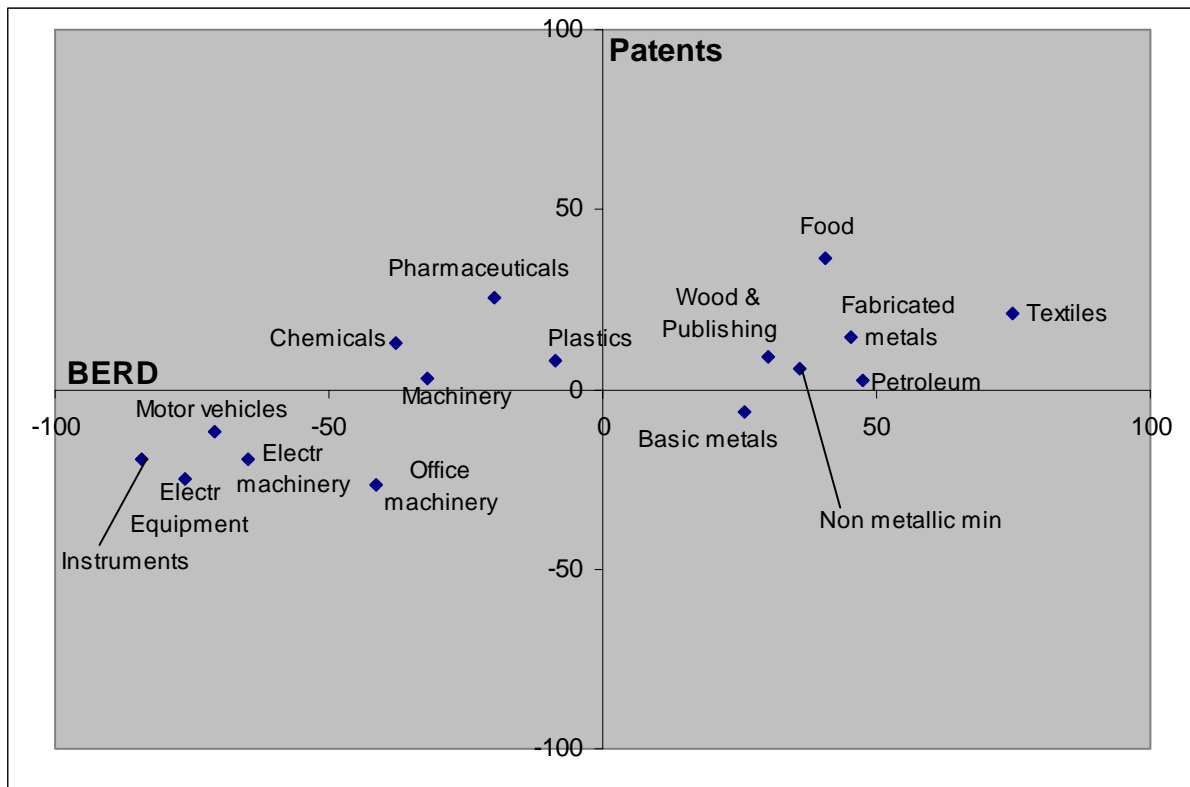
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



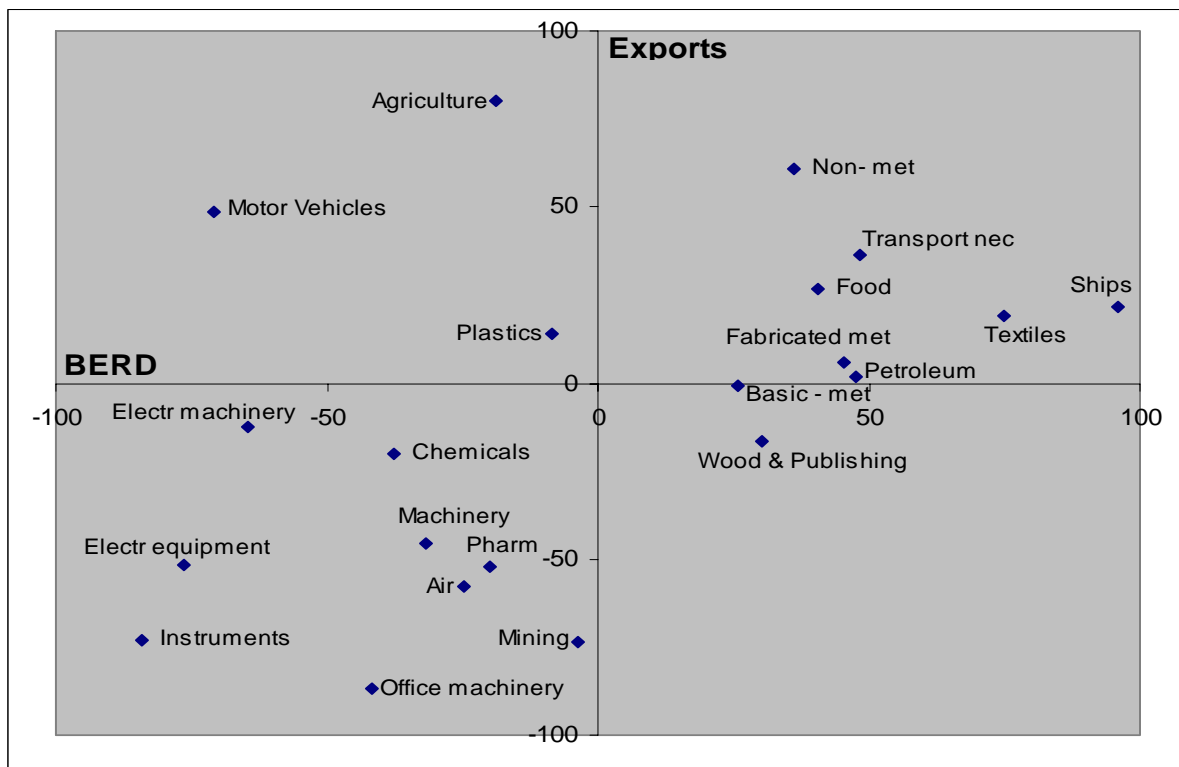
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Spain. 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. Spain. 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	23; 352+359; 45; 50-52, 55 60-63;65-67; 73; 75-99	72;74	2423	20-22; 28	10-14;15-16; 351; 64	01-05;25; 26;27; 32; 36-37; 40-41	17-19		
Specialisation Patents	2423			15-16;17-19 20-22; 24ex2423; 26	25;29	28; 33;34			
Specialisation Value Added	352+359;45 60-63	55	23;2423; 50-52; 65-67	26;27; 36-37; 64;351		01-05; 15-16 34; 40-41	17-19		
Specialisation Employment	352+359; 45 60-63	50-52	2423; 55 75-99	20-22 24ex2423;26; 28; 351; 36-37	01-05;	15-16;34	17-19		
Specialisation Exports	352+359	23		01-05; 15-16 25;26;28		27;34;351	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

