



COUNTRY SPECIALISATION REPORT

Country: France

Date: June 2006

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

The opinions expressed in this publication are those of the individual authors alone and do not necessarily reflect the position of the European Commission.

ERAWATCH® is a registered Trade Mark.

Reproduction of content is authorised provided the source is acknowledged.

© European Communities, 2007.

Website: <http://cordis.europa.eu/erawatch/>

Index

COUNTRY SPECIALISATION REPORT - FRANCE.....	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 .France. 1993 and 2003. Million Euros. Current prices.....	3
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. France. 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). France.1993-2003.	3
Figure 2. GERD by type of research. France.1993, 1998 and 2003.....	3
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. France. 1993 and 2003.....	4
Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. France. 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. France. 1993, 1998 and 2002.....	5
Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. 31 sectors. Specialisation profile. France. 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. 2001 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. 2001 last available year in OECD statistics.....	8
Figure 9. Number of publications by scientific field. 25 Scientific fields. Specialisation profile. France. Averages 1993-1995 and 2001-2003.	9
Figure 10. Shares of total publications by scientific field. 25 Scientific fields. France. 1993 and 2003.	9
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. France. 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. France. 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. France. 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. France. Averages 1993-1995 and 2001-2003. Million Euros. Current prices.	12

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

COUNTRY SPECIALISATION REPORT - FRANCE

MAIN FINDINGS

Over the period under examination, France's R&D intensity declined. During 1993 GERD amounted to 2.4% of GDP, while during 2003 it amounted to 2.2%. This relatively small decline can be attributed to the decline of BERD and GOVERD as a percentage of GDP. Moreover, it appears that BERD and GERD in France have remained relatively constant despite the increase in nominal GDP prices (Figure 1). Regarding the financing sources of R&D, the relative balance has not changed dramatically over the decade. Enterprises account for half of R&D expenditure, while the government research appropriations account for 39% of GERD.

Regarding the distribution of GERD by type of research, the share of basic research exhibited a small growth over the period 1993 -2003 reaching 24.1% of GERD on 2003. At the same time experimental development lost ground from almost half of GERD to 39.7%, while applied research increased its share by almost seven percent.

In terms of technological specialisation, France exhibits a strong specialisation in natural sciences such as Mathematics, Physics, Chemistry and Materials and at a lesser extent in medical sciences such as Molecular biology and genetics, biology & biochemistry and microbiology. The specialisation profile (Figure 11) for the same field exhibits a similar pattern, indicating high quality research in those scientific fields.

As far as GBAORD by socioeconomic objective is concerned, France has increased its specialisation in the fields of Energy, Space, Environment and non – oriented research, while it decreased its specialisation in Defence and Human health. A sharper decline in specialisation can be observed in agriculture where France became unspecialised during a 10 year period.

The French public research system has undergone significant changes since 1999, after the introduction of the Law for Innovation and Research. These changes are reflected both in the funding mechanisms for HEIs and PROs (table 1) but also with regard to the roles in the overall National Innovation System.

The bulk of public funding of BERD is oriented toward the aerospace industry which received 34.6% during 1999 (Figure 8) of public funds directed towards research in enterprises. This fact is reflected in the high specialisation of BERD in the sector. The same appears to hold for two other sectors that receive high shares of government funding, such as the instruments and electronic equipment. However, this relationship does not hold for the machinery sector. Thus, the significance and impact of public funding of BERD needs further examination since it might be sector specific.

By examining table 2, there appears to be a strong correlation between Value Added and Employment, and between Value Added and Exports. In more detail, value added and employment appear to be strongly related in the field of services. A weaker but at the same time significant correlation also exists between Value added (2001-2003) and BERD (1993-1995), particularly in manufacturing. However, there is no significant correlation between technological specialisation and economic specialisation.

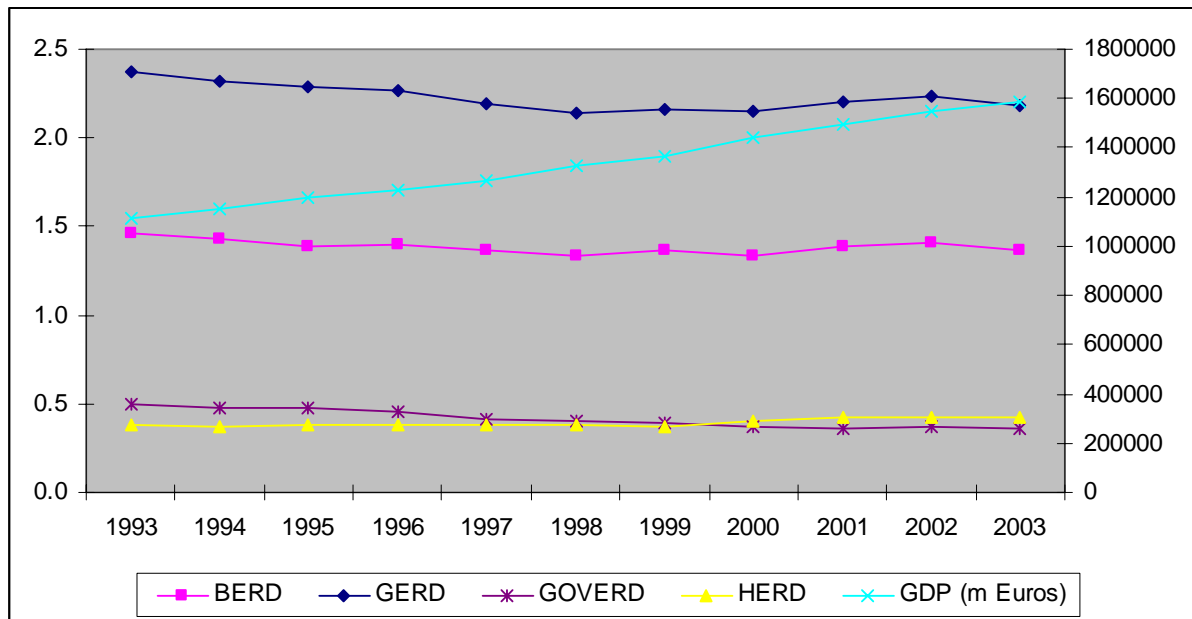
In addition, France appears to be increasing its specialisation over the period 1993-2003 in almost all benchmarks in the medium – low growth sectors, as can be seen at table 3. In the fast growing sectors, the only notable exceptions are pharmaceuticals that increased in specialisation

ERAWATCH – R&D specialisation project / WP1 /Country Report

in Patents and value added and transport services that increased their specialisation in BERD and employment.

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). France.1993-2003.



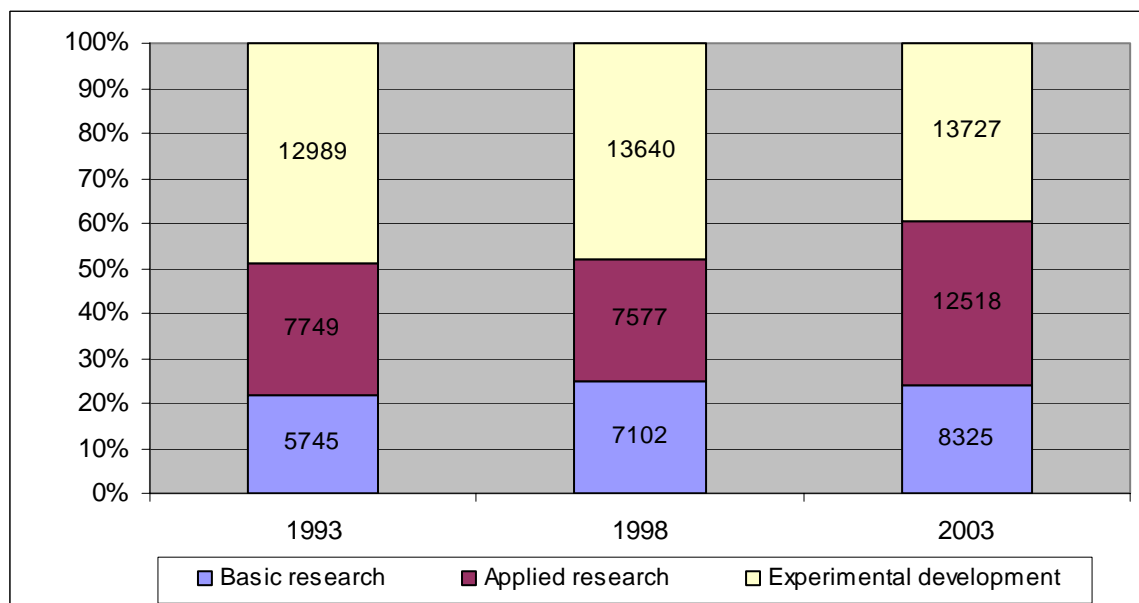
Source: OECD MSTI 2005

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

	GOVERD		BERD		HERD		Non profit		Total	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
Business	262.5	327.6	11993.0	16969.8	138.0	177.9	66.2	78.2	12459.6	17553.4
Government	5114.1	4976.7	2497.0	2406.2	3867.8	6036.6	36.1	67.4	11515.0	13487.0
Higher Education	8.3	19.0	2.6	3.0	97.7	286.5	22.3	17.9	130.9	326.5
Non profit	2.1	11.0	7.5	8.7	8.1	30.1	203.8	262.4	221.4	312.3
From Abroad	207.3	432.2	1839.8	2258.5	80.3	161.9	29.3	37.4	2156.7	2890.0
Total	5594.3	5766.6	16339.8	21646.2	4191.9	6692.9	357.6	463.4	26483.6	34569.1

Source: OECD OFFBERD 2005

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

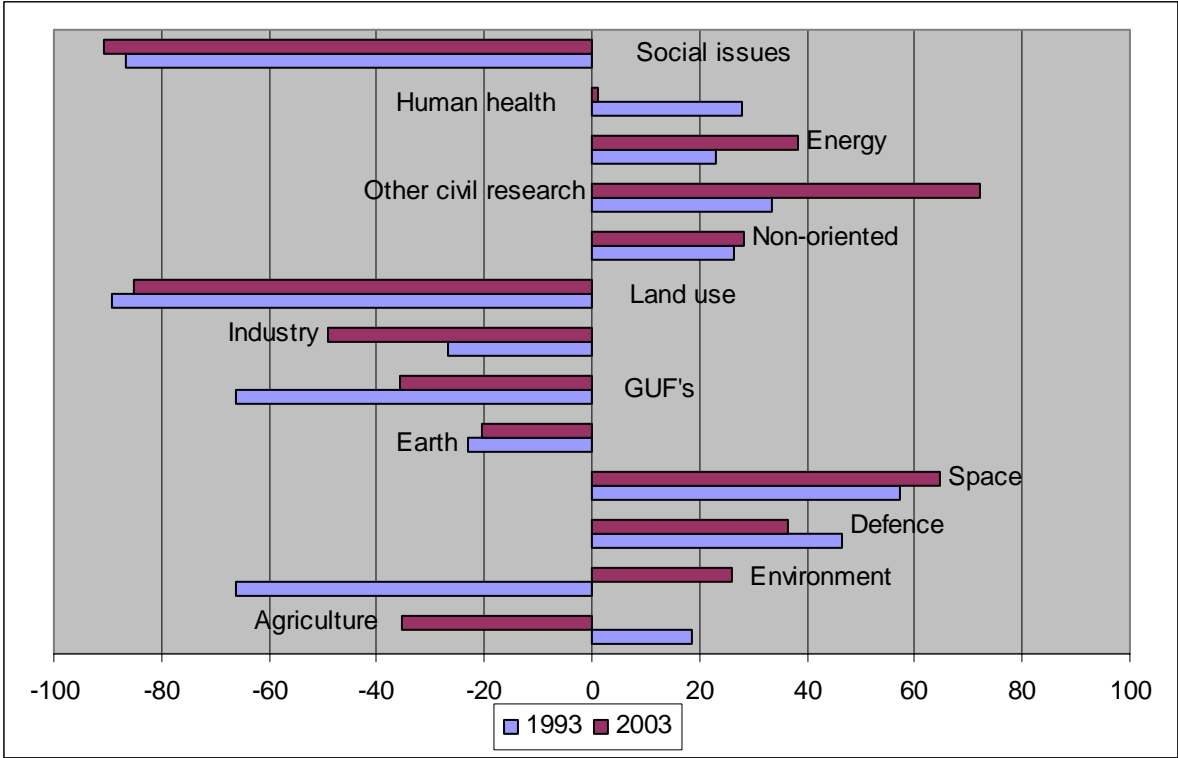


Source: OECD OFFBERD 2005

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. France. 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. France. 1993, 1998 and 2002. Per cent of total HERD and in million Euros.

Not available

Source: OECD Basic Science and Technology Statistics 2005.

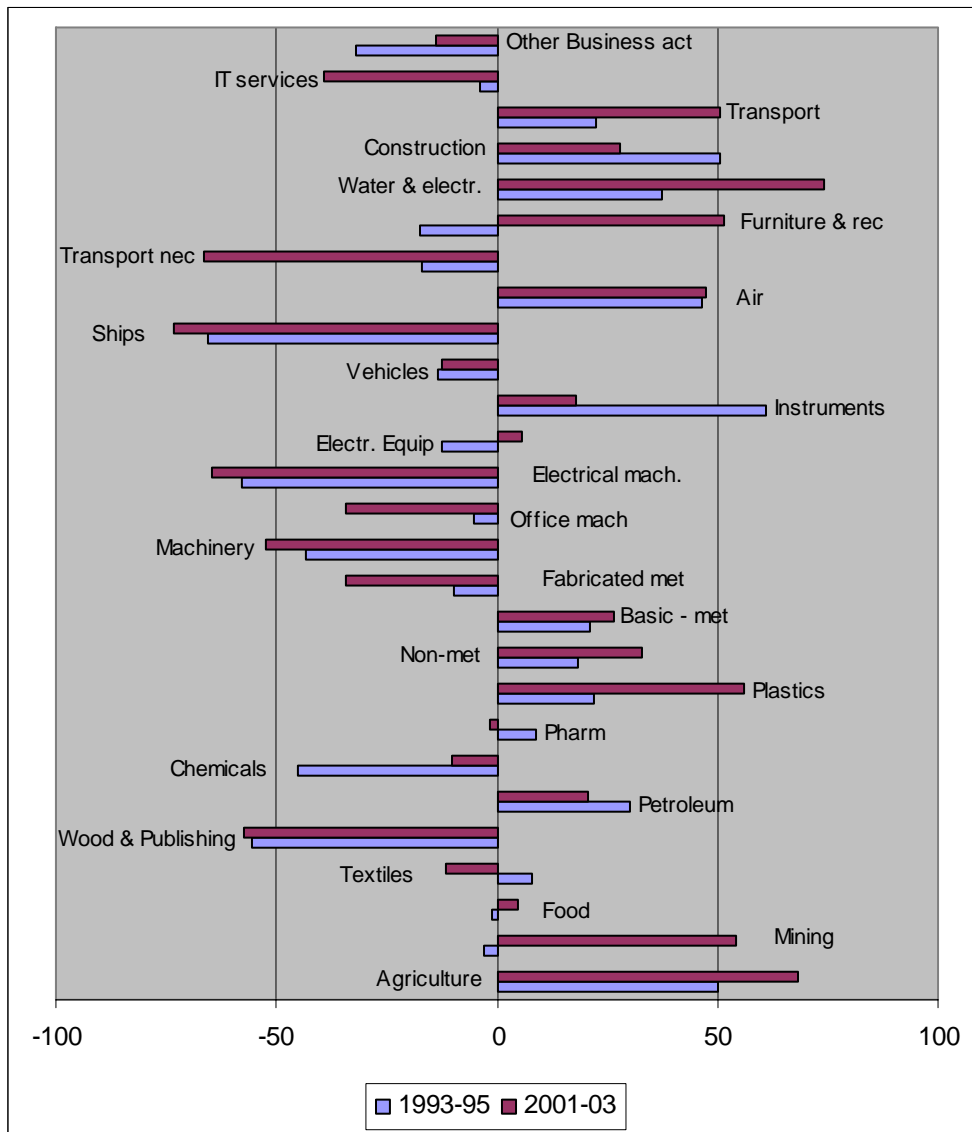
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. France. 1993, 1998 and 2002.

Not available

Source: OECD Basic Science and Technology Statistics 2005

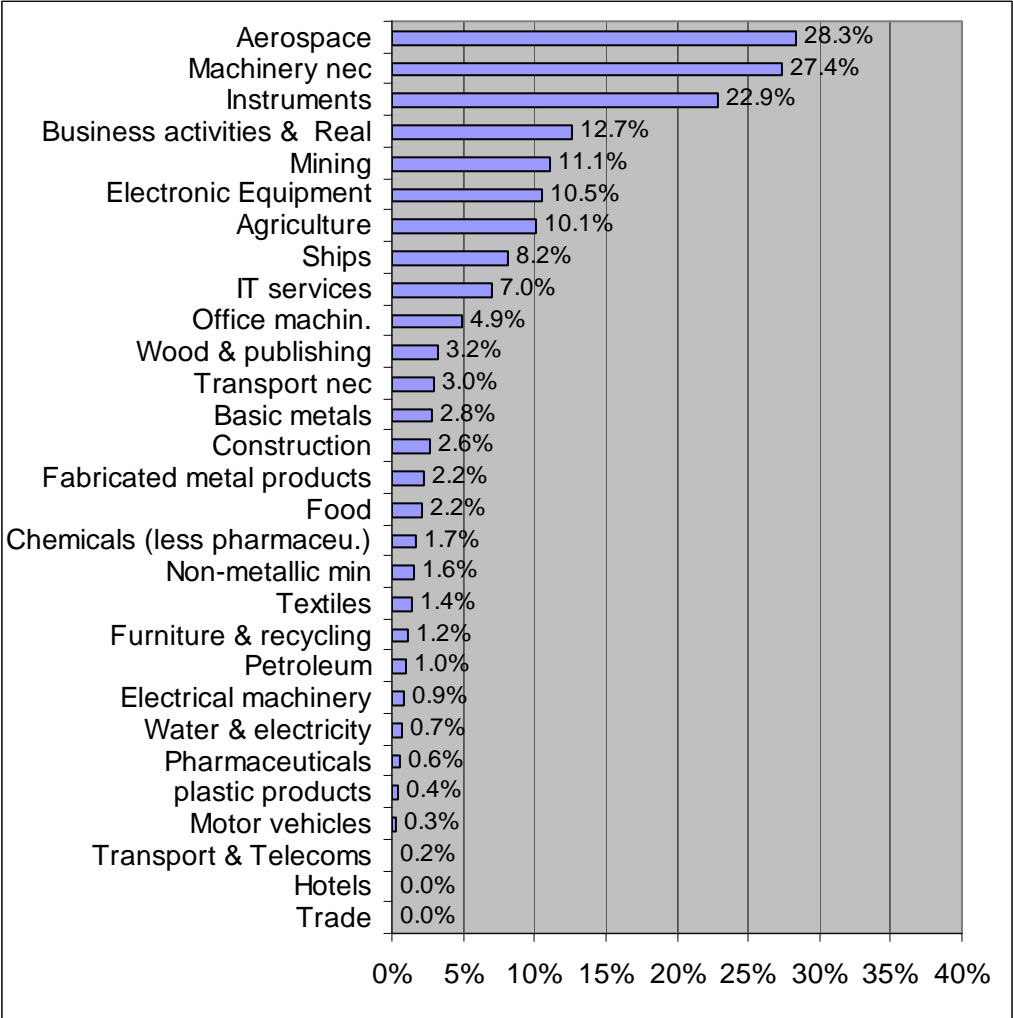
BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)

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



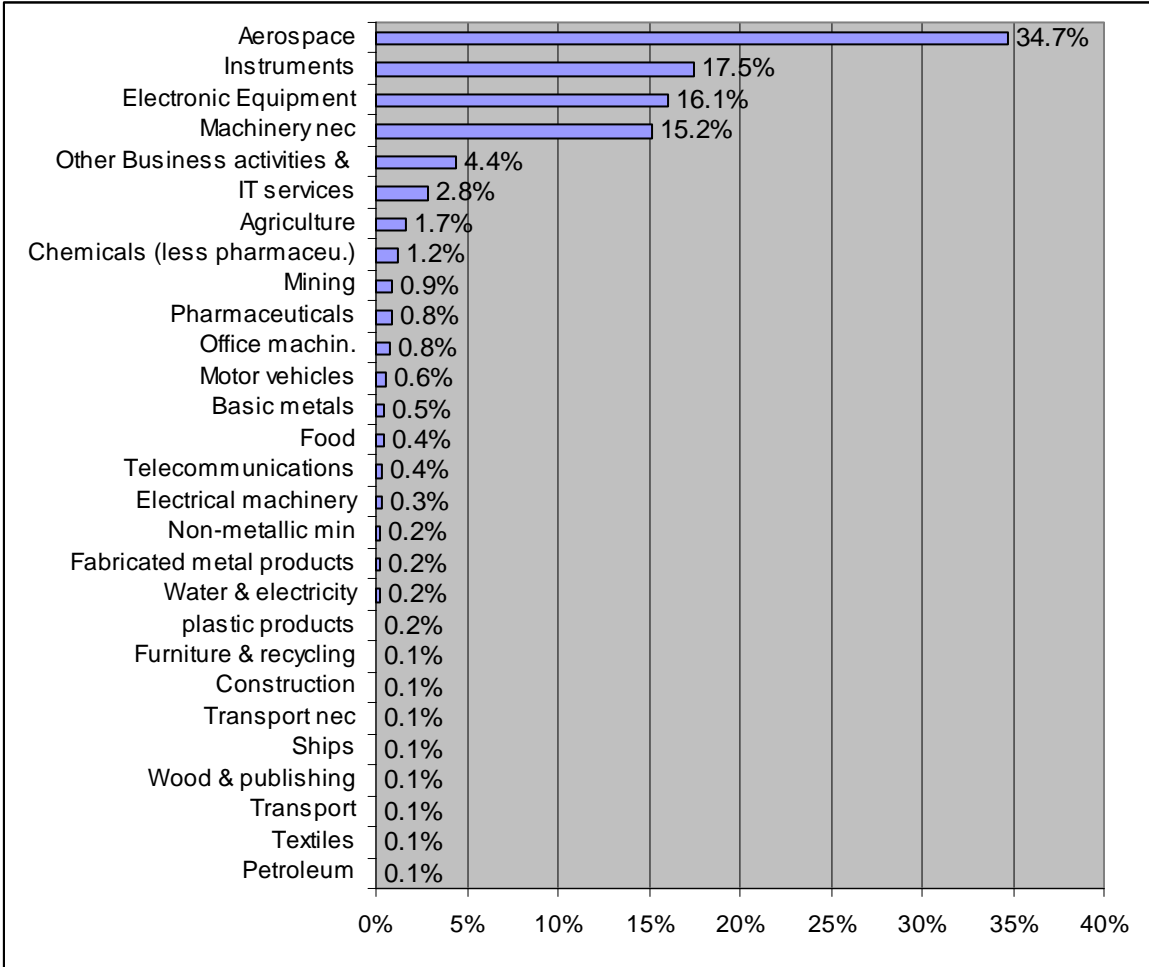
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD Basic Science and Technology Statistics 2005/2005, ANBERD 2005, own calculations

Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sector funded by government. 2001 last available year in OECD statistics.



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

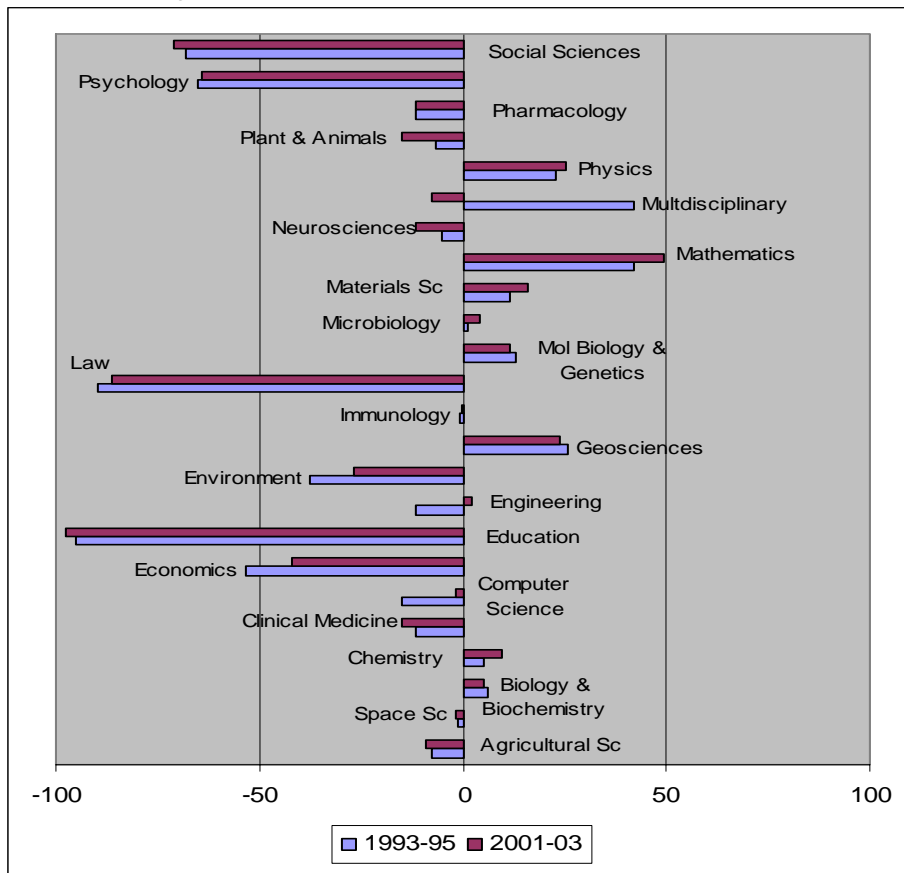
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2001 last available year in OECD statistics.



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

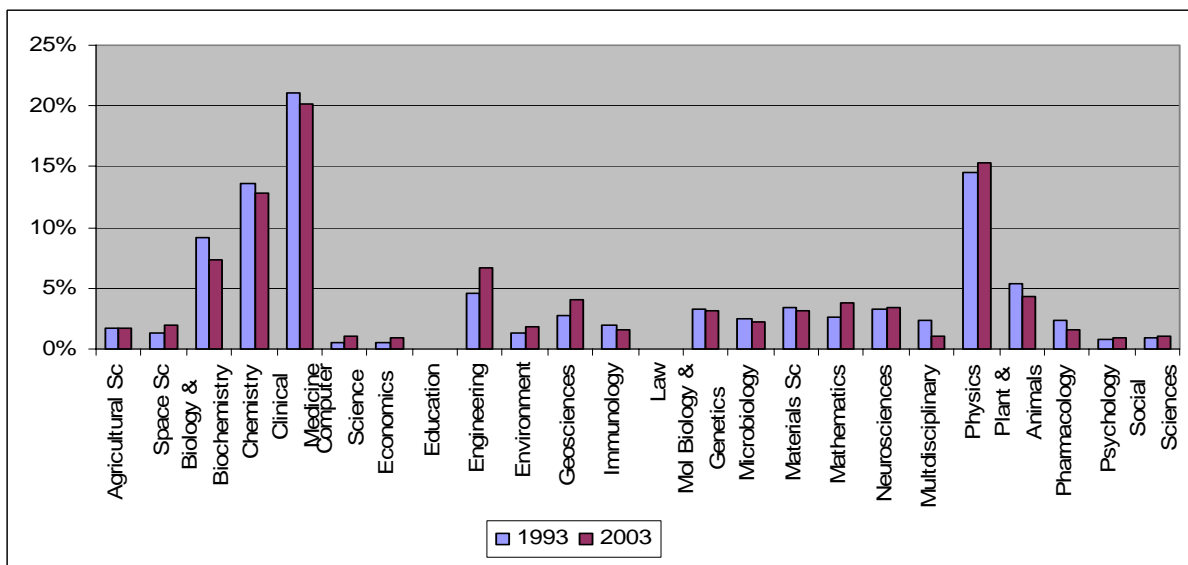
BIBLIOMETRICS

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



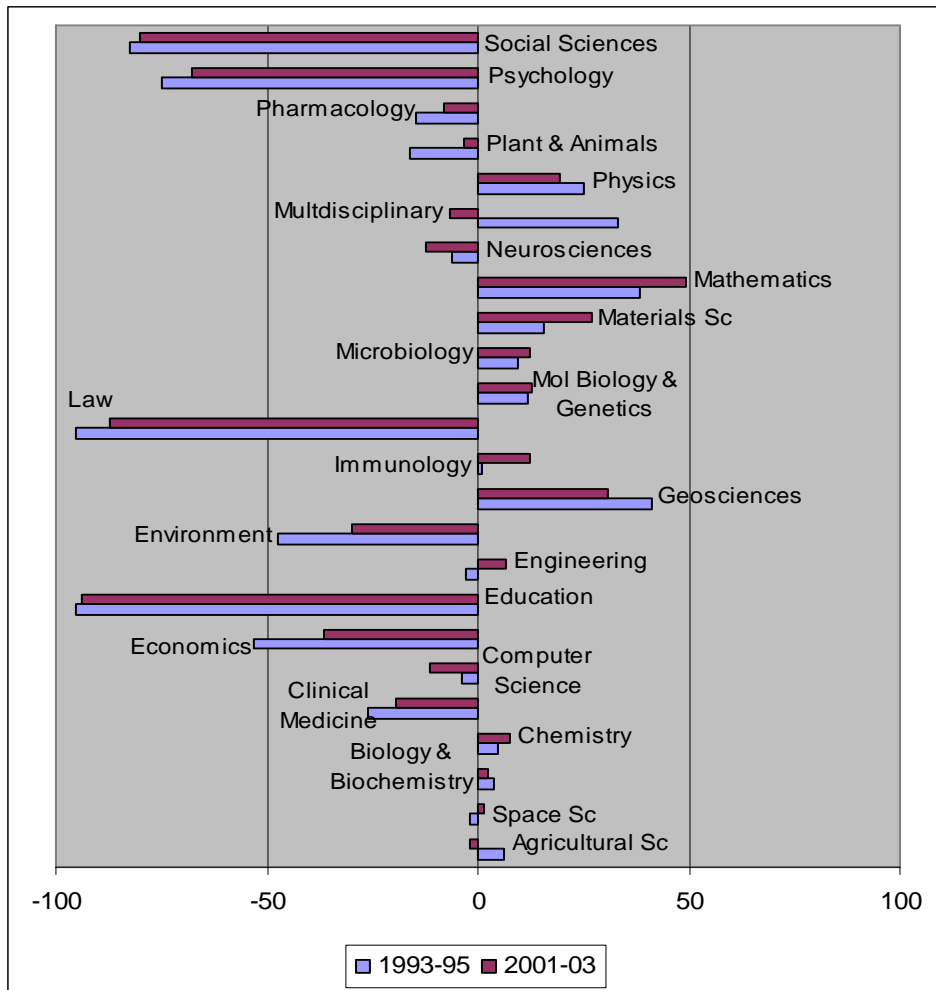
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

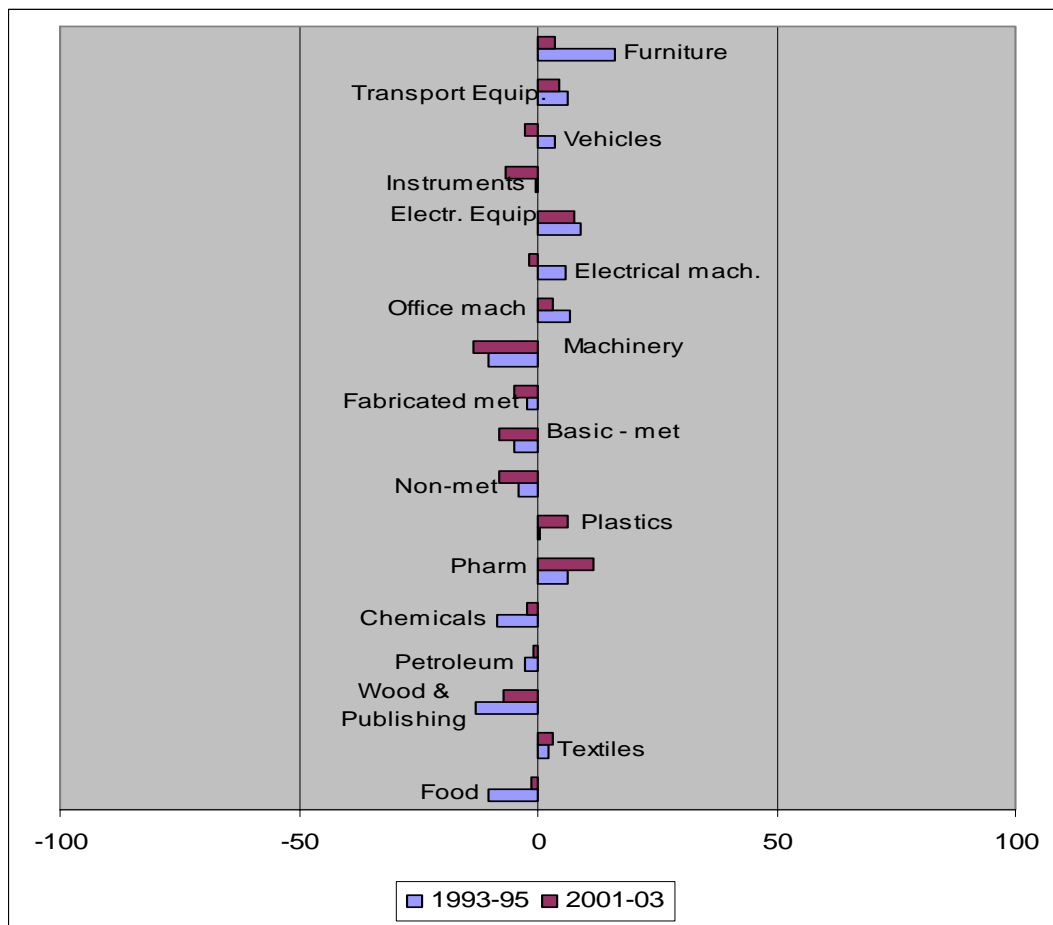
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. France. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

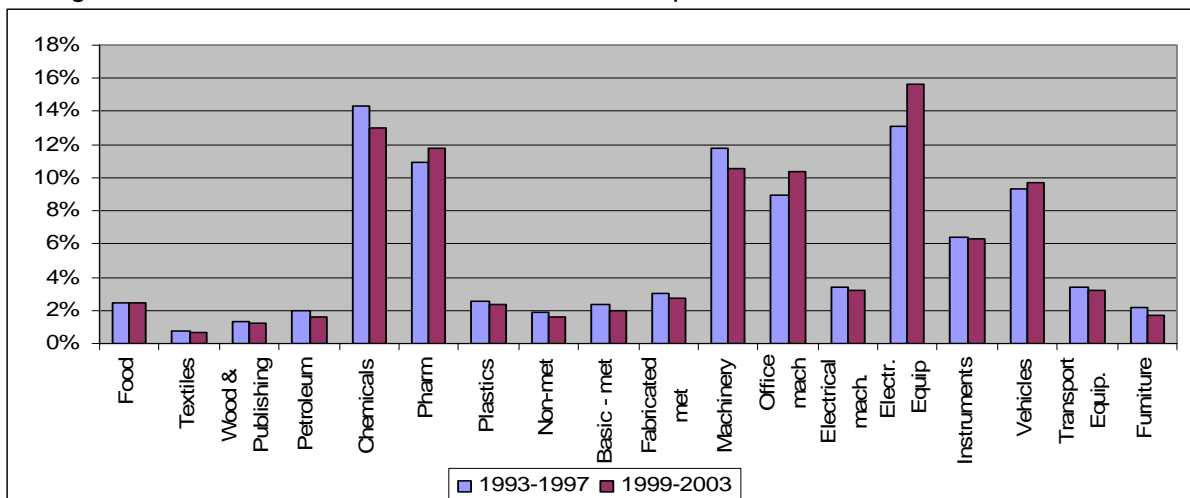
PATENTS

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

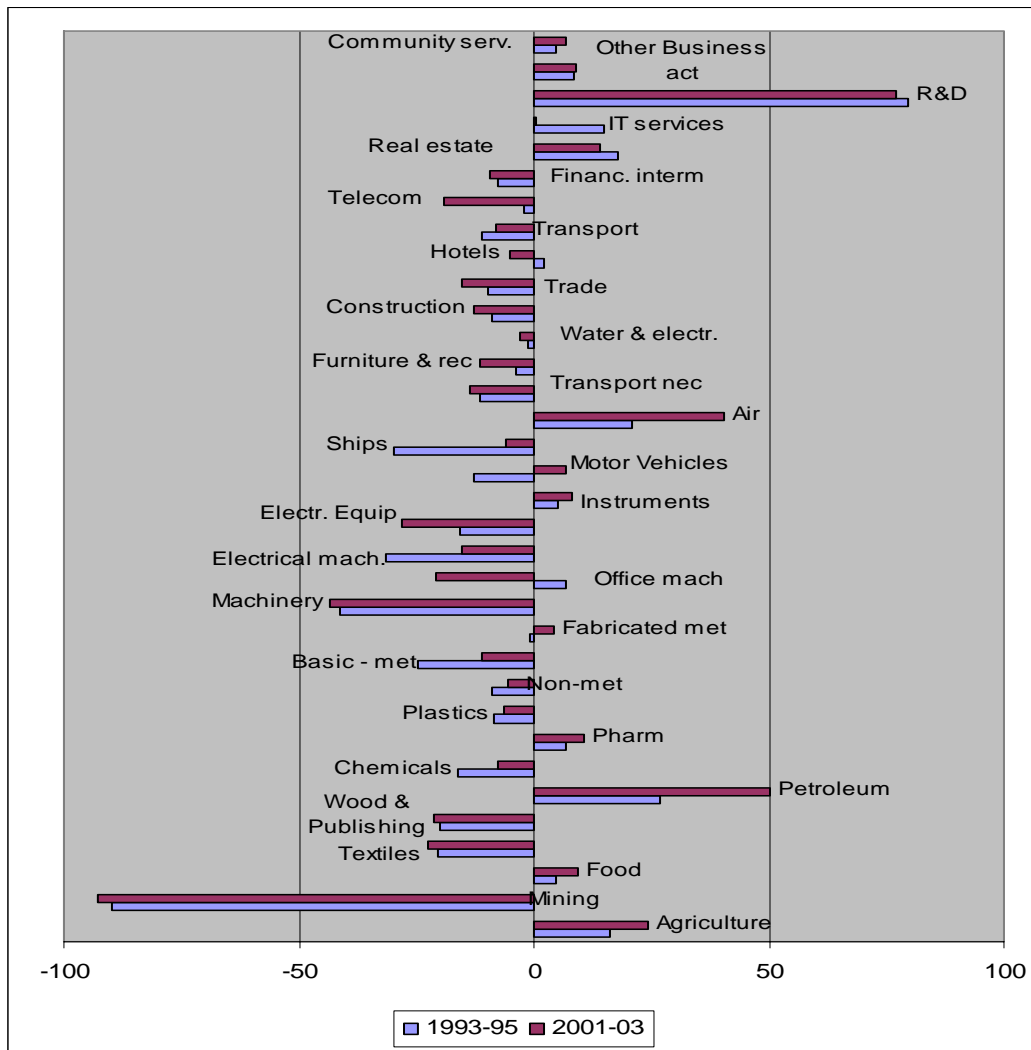
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. France. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

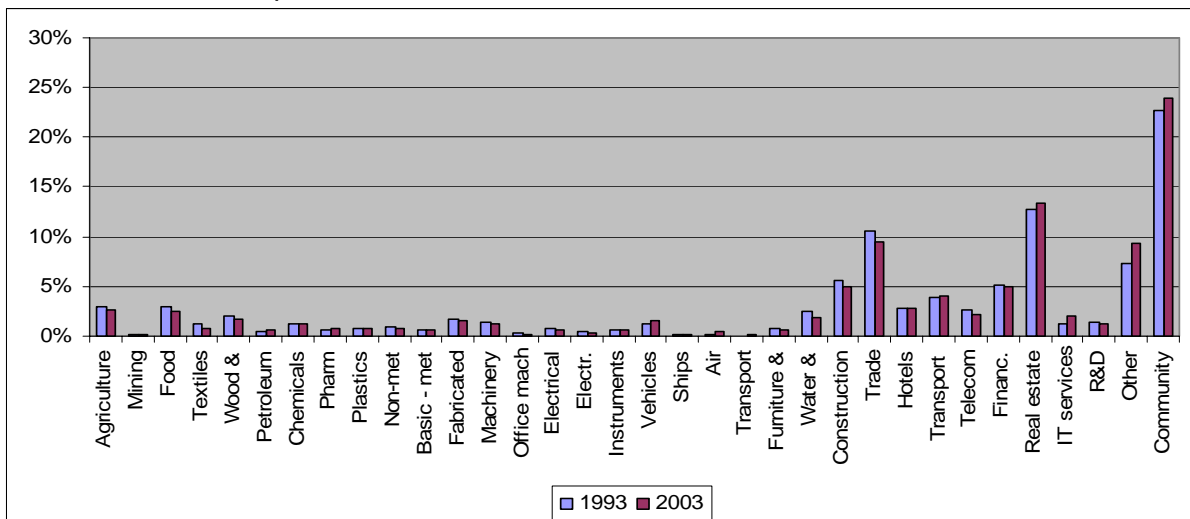
ECONOMIC SPECIALISATION

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



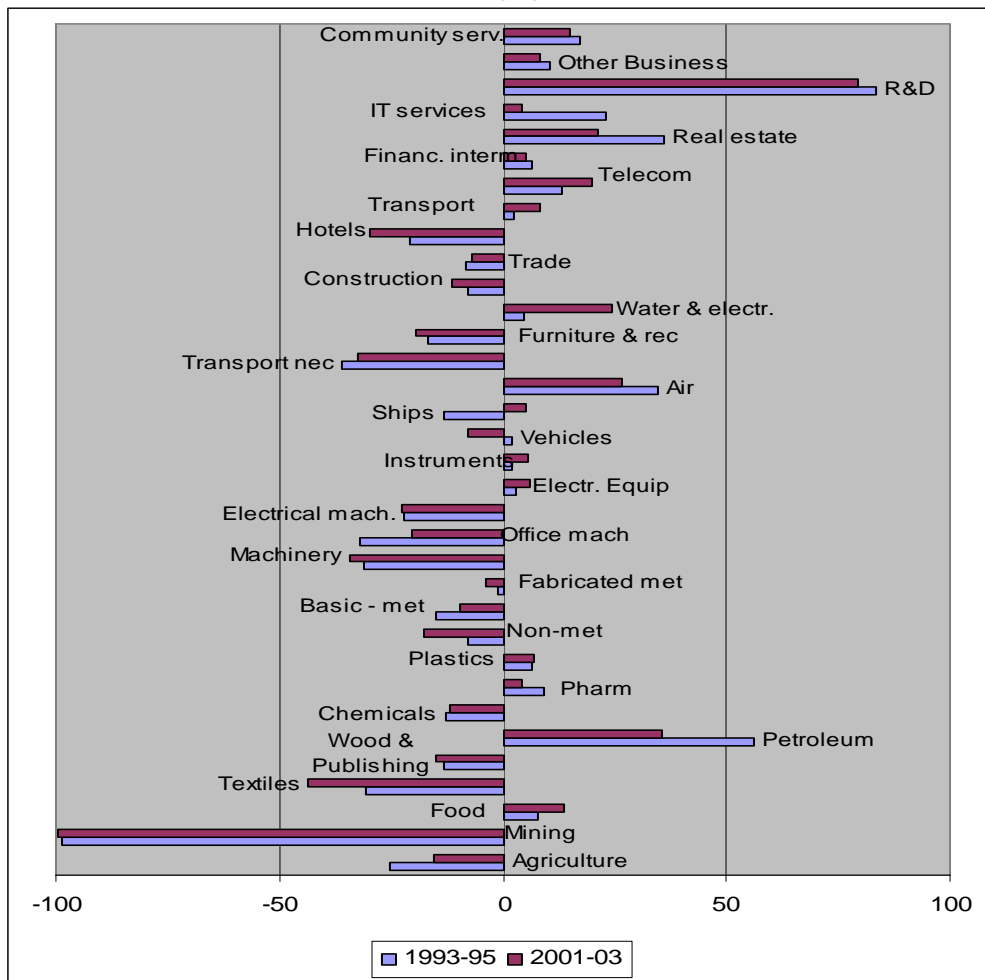
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



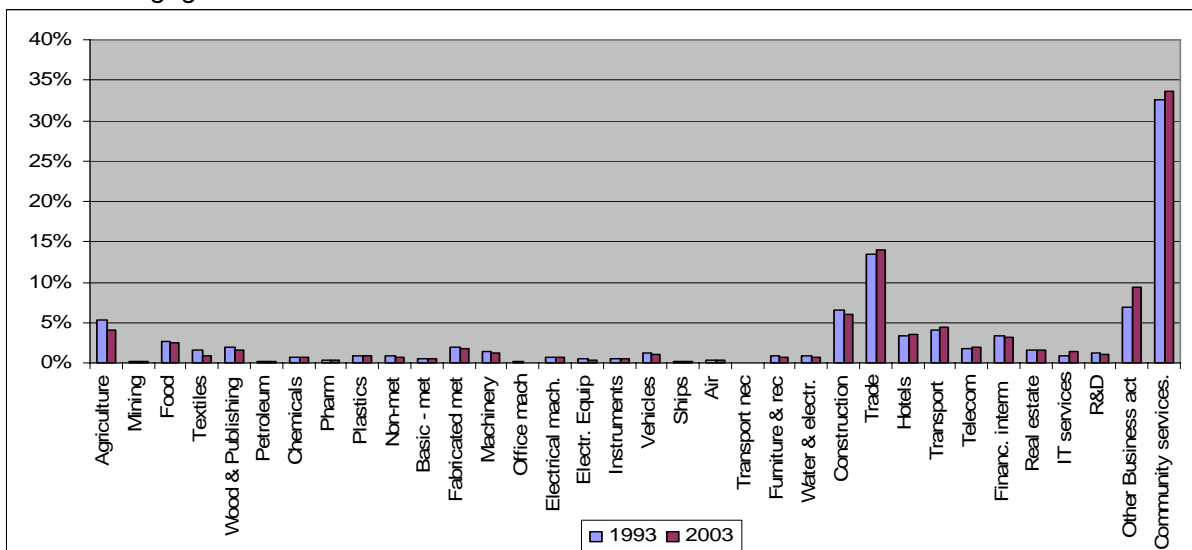
Source: OECD, STAN, 2005.

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



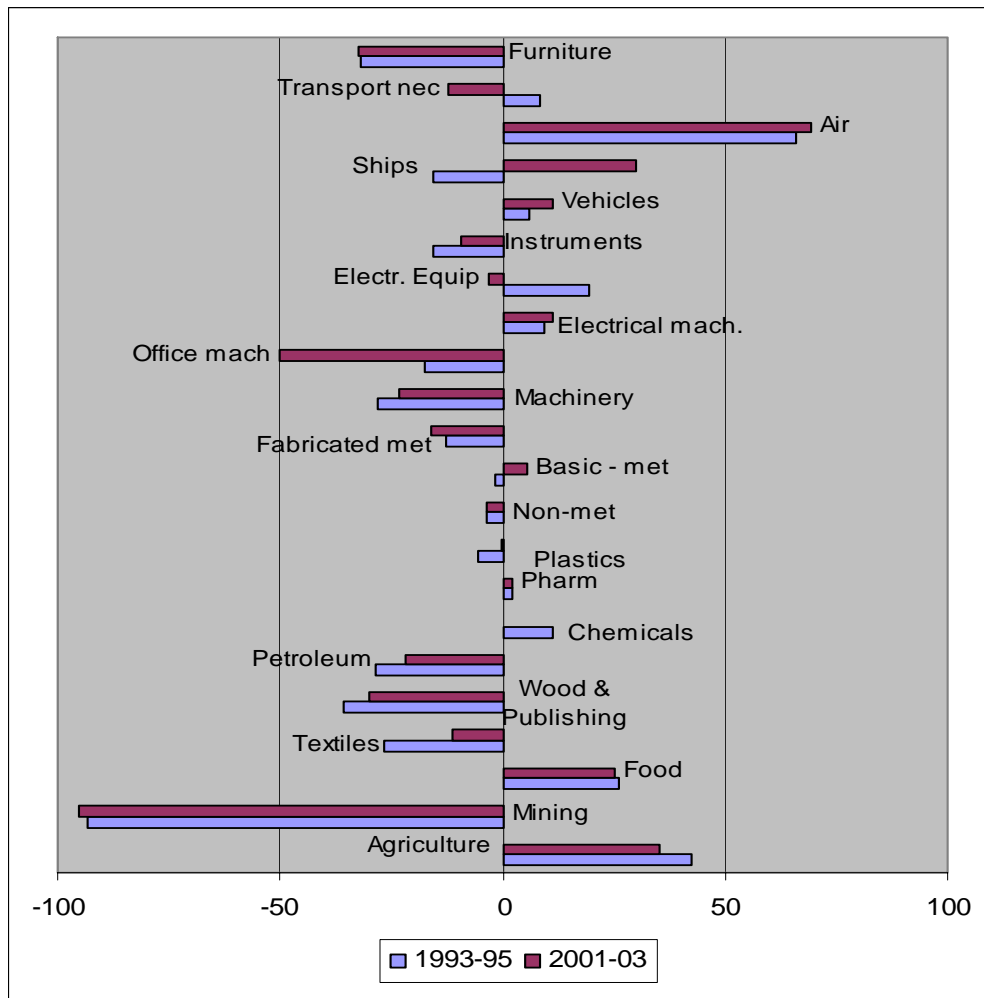
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



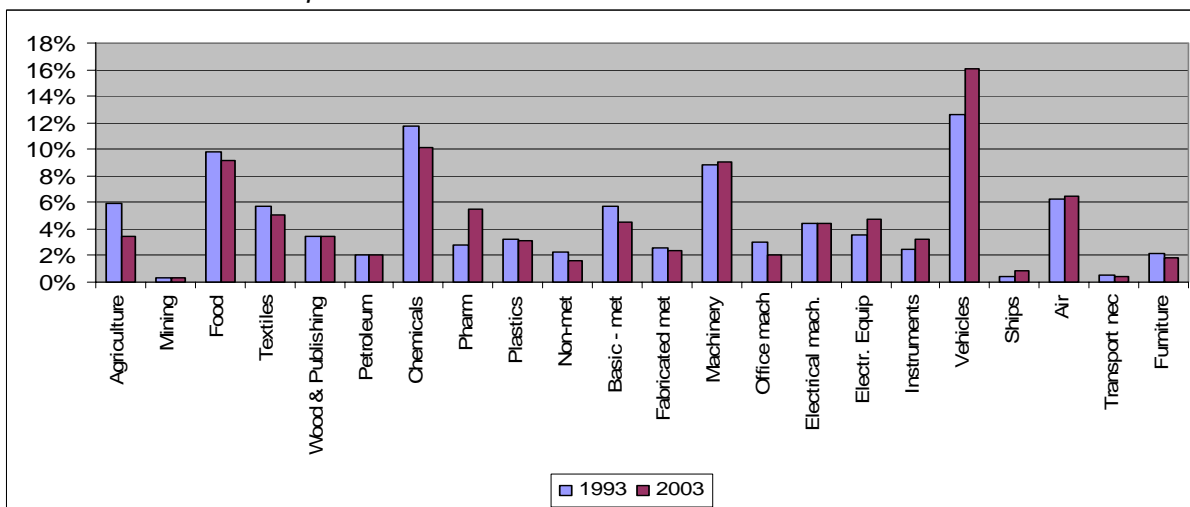
Source: OECD, STAN, 2005.

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



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

CORRELATION ANALYSIS

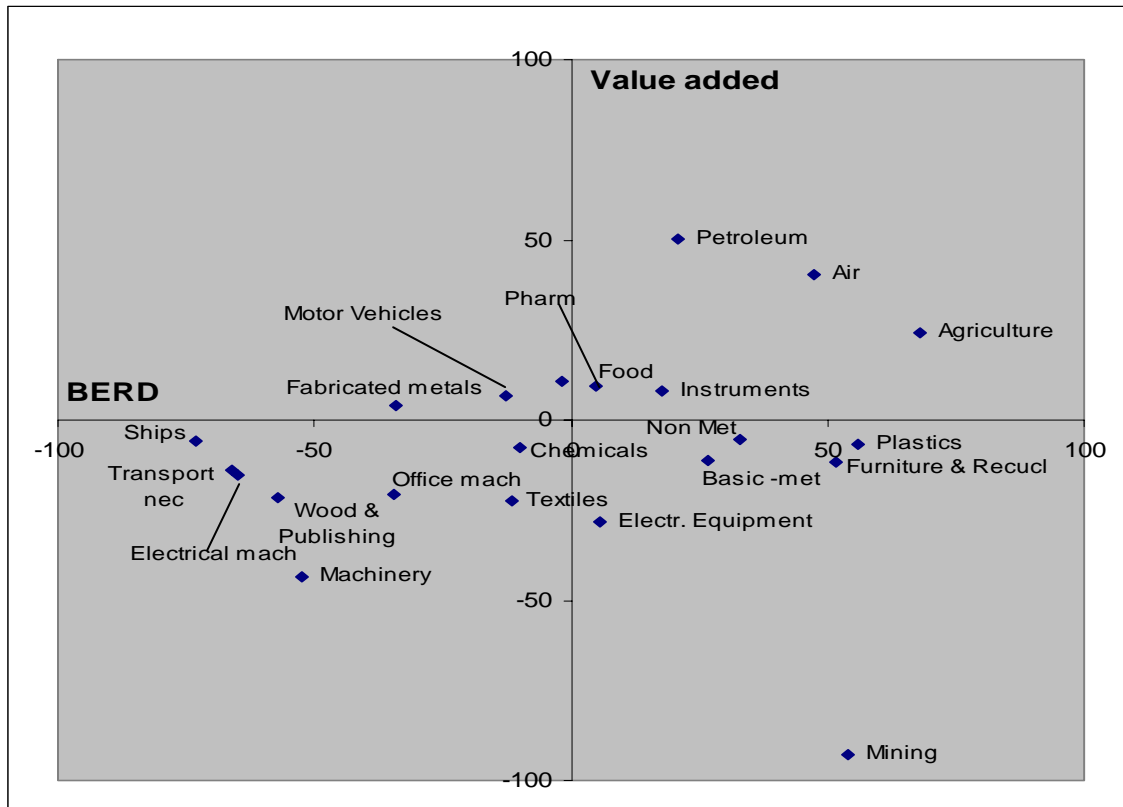
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. France. Averages 1993-1995 and 2001-2003.

		FR_BERD9 395	FR_BERD0 103	FR_PAT 9395	FR_PAT 0103	FR_VA 9395	FR_VA 0103	FR_EMP 9395	FR_EMP 0103	FR_EXP 9395	FR_EXP 0103
FR_BERD9395	Pearson Correlation Sig. (2-tailed)	1 .									
FR_BERD0103	Pearson Correlation Sig. (2-tailed)	.757** .000	1 .								
FR_PAT9395	Pearson Correlation Sig. (2-tailed)	.138 .598	.277 .281	1 .							
FR_PAT0103	Pearson Correlation Sig. (2-tailed)	.150 .566	.310 .226	.676** .003	1 .						
FR_VA9395	Pearson Correlation Sig. (2-tailed)	.430* .025	.143 .475	.193 .458	.404 .108	1 .					
FR_VA0103	Pearson Correlation Sig. (2-tailed)	.375 .054	.135 .503	-.017 .948	.155 .553	.915** .000	1 .				
FR_EMP9395	Pearson Correlation Sig. (2-tailed)	.284 .150	.099 .624	-.056 .830	.219 .398	.852** .000	.867** .000	1 .			
FR_EMP0103	Pearson Correlation Sig. (2-tailed)	.275 .164	.129 .520	-.057 .827	.255 .323	.829** .000	.837** .000	.956** .000	1 .		
FR_EXP9395	Pearson Correlation Sig. (2-tailed)	.264 .235	.090 .689	.012 .962	.252 .329	.632** .002	.665* .001	.541** .009	.618** .002	1 .	
FR_EXP0103	Pearson Correlation Sig. (2-tailed)	.191 .394	.042 .853	-.161 .538	.047 .857	.531* .011	.704** .000	.594** .004	.668** .001	.891** .000	1 .

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

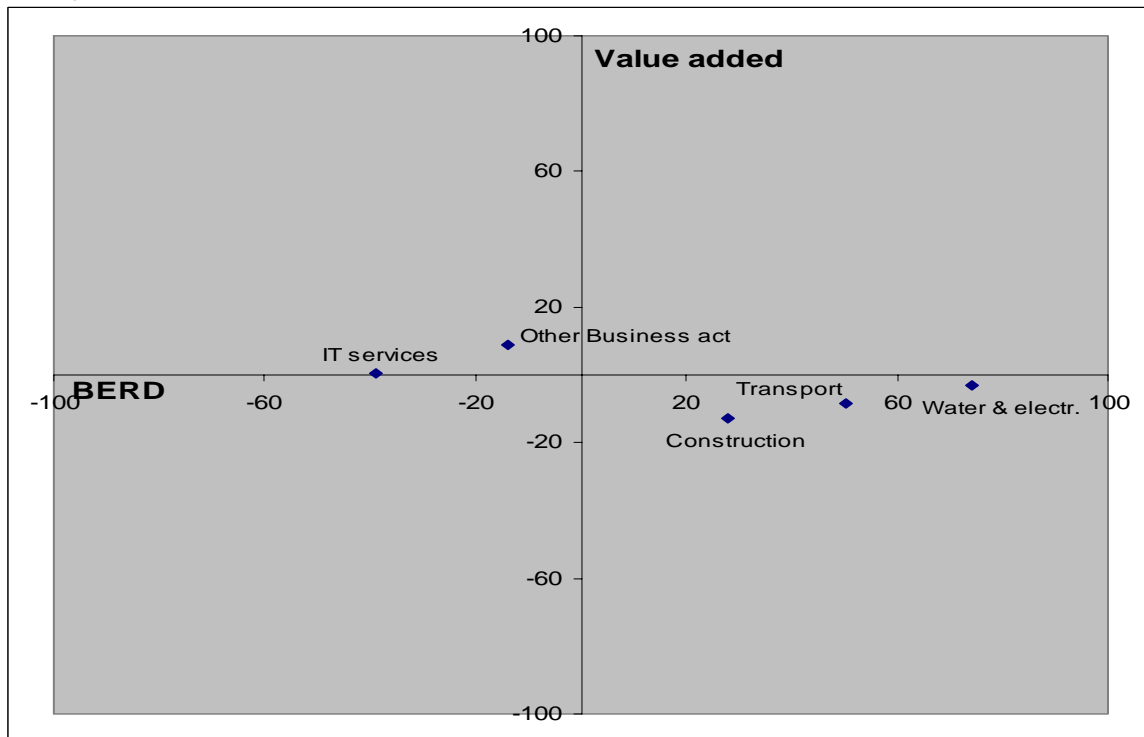
* Correlation is significant at the 0.05 level (2-tailed).

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



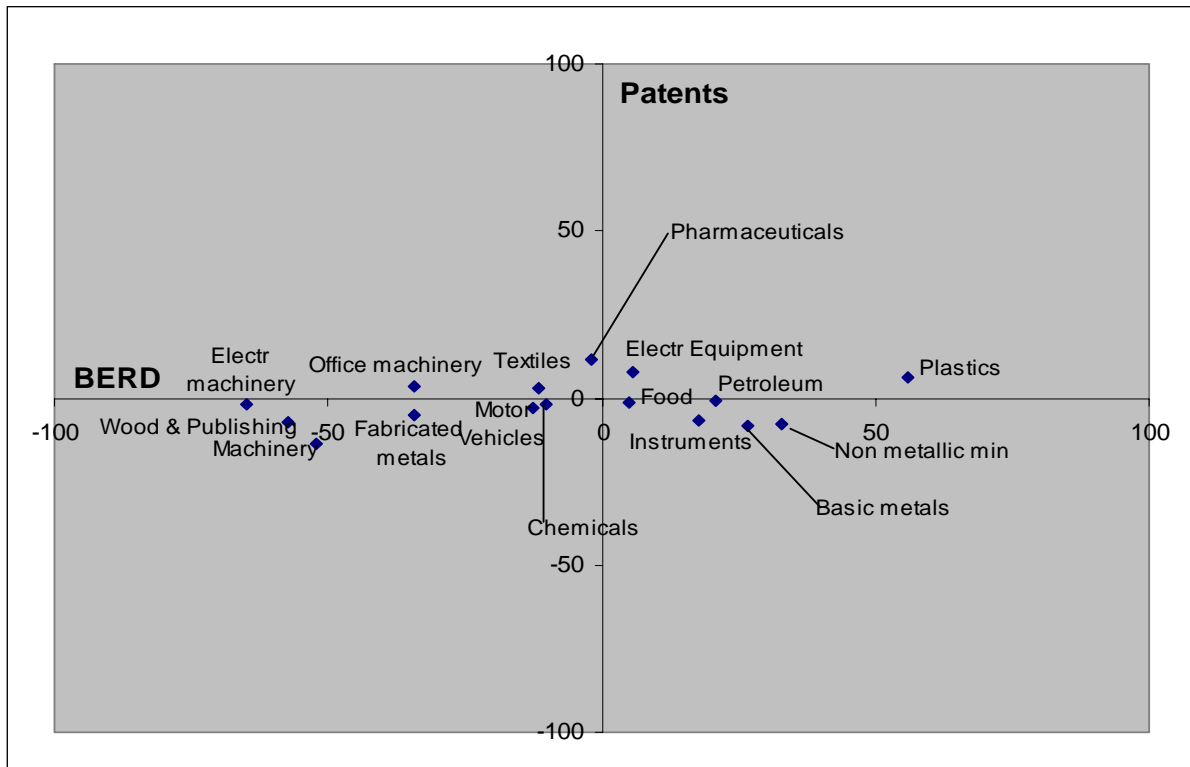
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



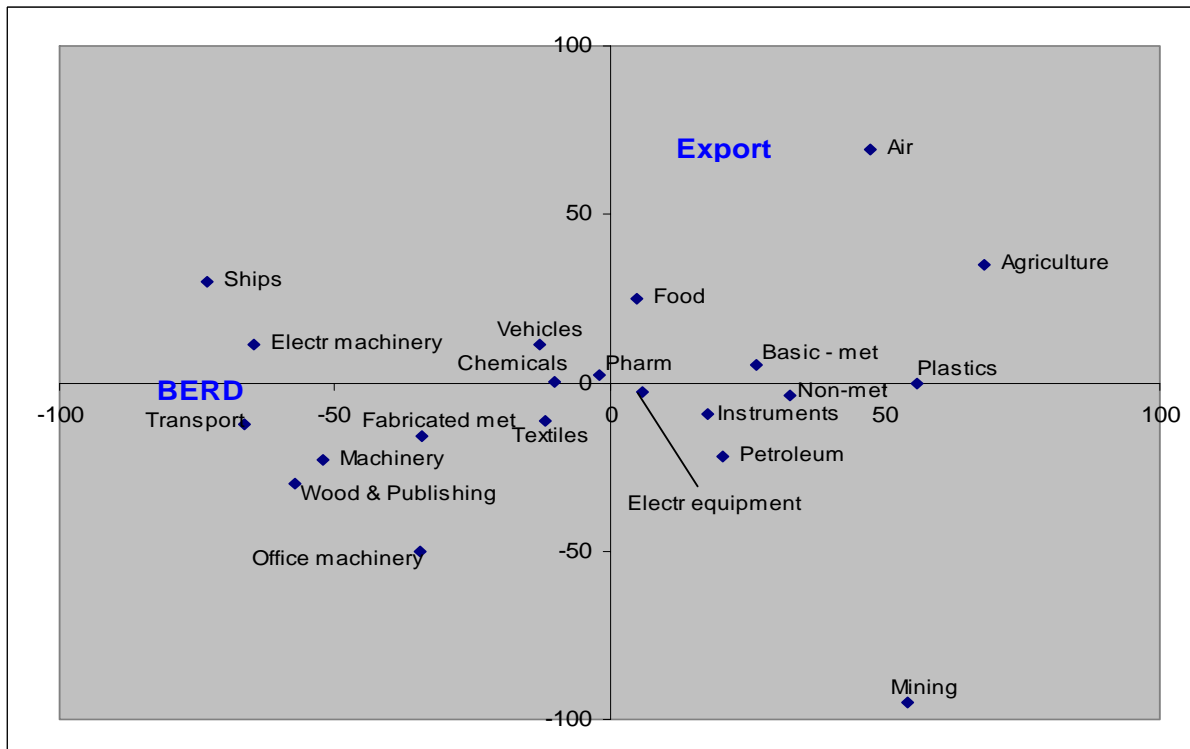
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. France. 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. France. 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	60-63	23; 2423	352+359 45;72	01-05;10-14 15-16; 26;27; 32;36-37; 40-41	25;353	33			17-19
Specialisation Patents	2423			25		30;31; 32; 34			
Specialisation Value Added	23;2423; 75-99	73;74	55; 70-71;72	01-05;15-16;28; 33; 34;351;353		30;64			
Specialisation Employment	60-63	65-67;73; 75-99;	23;2423 70-71; 72;	15-16;32;33 40-41;351 64	25	34; 353			
Specialisation Exports			2423	25;27;34;351 353	15-16;31	01-05 24ex2423;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:

Sectors with **neither specialisation in BERD nor in the other analytical dimension** (lower left quadrant)

Sectors with **a specialisation in BERD and in the other analytical dimension** (upper right quadrant)

Sectors with a **specialisation in BERD but none in the other analytical dimension** (lower right quadrant)

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

