



COUNTRY SPECIALISATION REPORT

Country: Bulgaria

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 - BULGARIA	1
Main findings.....	1
Main R&D figures – Total R&D expenditure.....	2
Public R&D statistics.....	2
GBAORD by socioeconomic objective	2
HERD by field of science.....	3
Business ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)	4
Bibliometrics.....	6
Patents.....	9
Economic specialisation.....	10
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 .Bulgaria. 1993 and 2002. Million Euros. Current prices.....	2
Table 2. Correlation analysis. Specialisaion indexes BERD, Value added, Employment, Exports and patents. Bulgaria. 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).Bulgaria.1993-2003.	2
Figure 2. GERD by type of research. Bulgaria. 1993,1998 and 2002.....	2
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Bulgaria. 1993 and 2003.....	2
Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Bulgaria. 1993, 1998 and 2002. Per cent of total HERD and in million Euro.	3
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Bulgaria. 1993, 1998 and 2002.	3
Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. Specialisation profile. Bulgaria. Available years 1997 and 2003.....	4
Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sectors funded by government.....	5
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003	6
Figure 9. Number of publications by scientific field. 25 Scientific fields. Specialisation profile. Bulgaria. Averages 1993-1995 and 2001-2003.	6
Figure 10. Shares of total publications by scientific field. 25 Scientific fields. Bulgaria. 1993 and 2003.	7
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Bulgaria. 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	8
Figure 12. Number of patents by industrial sector. 18 sectors in manufacturing. Specialisation profile. Bulgaria. Averages 1993-1995 and 2001-2003. Based on correspondence matrix ISI-SPRU-OST.....	9
Figure 13. Shares of total patens by industrial sector. 18 sectors in manufacturing. Bulgaria. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.....	9
Figure 14. Value added by industrial sector. 34 sectors. Specialisation profile. Bulgaria. Averages 1993-1995 and 2001-2003. Million Euros. Current prices.	10

Figure 15. Shares of total value added by industrial sector. 34 sectors. Bulgaria. 1993 and 2003. Million Euros. Current prices.....	10
Figure 16. Employment by industrial sector. Specialisation profile. Bulgaria. 34 sectors. Averages 1993-1995 and 2001-2003. Numbers engaged – hundreds.	11
Figure 17. Shares of total employment by industrial sector. 34 sectors. Bulgaria. 1993 and 2003. Numbers engaged – hundreds.	11
Figure 18. Exports by industrial sector. Specialisation profile. Bulgaria. 34 sectors. Averages 1993-1995 and 2001-2003. Thousand USD. Current prices.	12
Figure 19. Shares of total exports by industrial sector. 34 sectors. Bulgaria. 1993 and 2003. Thousand USD. Current prices.....	12
Figure 20. BERD versus Value added specialisation in all sectors. Bulgaria. Based on values of 2003.	1
Figure 21. BERD versus patents. Specialisation indexes. Bulgaria. Based on values of 2003.	1
Figure 22. BERD versus exports. Specialisation indexes. Bulgaria. Based on values of 2003.....	2
Figure 23: BERD and Value Added specialisation – an example	2

COUNTRY SPECIALISATION REPORT - BULGARIA

MAIN FINDINGS

Bulgaria is one of the countries with little information available regarding technological and scientific specialisation, but with enough information regarding economic specialisation expressed by value added, employment and exports. This restriction on the availability of data creates difficulties in presenting a coherent profile of the country thus the analysis will be based on the available data.

In terms of GERD by type of research (Figure 2), it appears that significant structural changes took place in the country over the 1993-2002. Thus while during 1993, applied research accounted for 79.9% of GERD, its share was reduced by 2002 to 49.5%. At the same time the share of basic research increased and picked at 28.9% in 2002, while experimental research reached 28.9%.

Business enterprise intramural expenditure on R&D in Bulgaria (Figure 6) during 2003 was concentrated in a limited number of sectors, namely pharmaceuticals (27.7%), other business activities (14%), research and development (13.5%), financial intermediation (11.5%), machinery (7.1%) and chemicals (6.8%). During 2003, public support for research activities in enterprises (Figure 8) was limited only in four services sectors (Figure 9), namely to community services, research and development and telecommunications.

In terms of scientific specialisation, Bulgaria exhibits a strong specialisation profile in terms of natural sciences, but in most other scientific fields except pharmacology and plant and animals it is under-specialised. Finally, in terms of technological specialisation (Figure 12), Bulgaria is specialised in a number of medium to high R&D intensity sectors such as instruments, electronic equipment, office machinery, pharmaceuticals and chemicals. Moreover, in almost all of the above sectors it appears that Bulgaria increased its specialisation over the 1993-2003 period.

With regard to economic specialisation, and particularly value added (Figure 14) and employment (Figure 16), Bulgaria exhibits high specialisation in a large number of sectors in both measures, including sectors such as telecommunication and transportations services, transport equipment and shipbuilding, machinery, pharmaceuticals, petroleum, textiles, food and agriculture. Finally, for the manufacturing sector, it appears that there are no significant linkages (correlations) between economic and technological specialisation with the exception of the food, chemicals and petroleum industries. However, due to the limited data, further investigation is required.

MAIN R&D FIGURES – TOTAL R&D EXPENDITURE

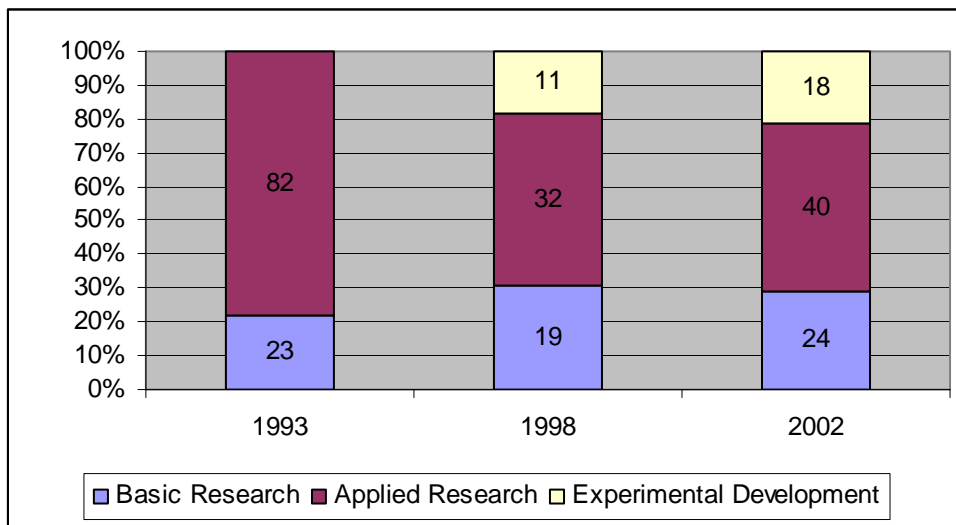
Figure 1. R&D expenditure by performing sector as per cent of GDP (left axis). GDP in million Euros (right axis).Bulgaria. 1993-2003.

Not Available

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

Not Available

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



Source: Eurostat Database, S & T Data, 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. Bulgaria. 1993 and 2003.

Not Available

HERD by field of science

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

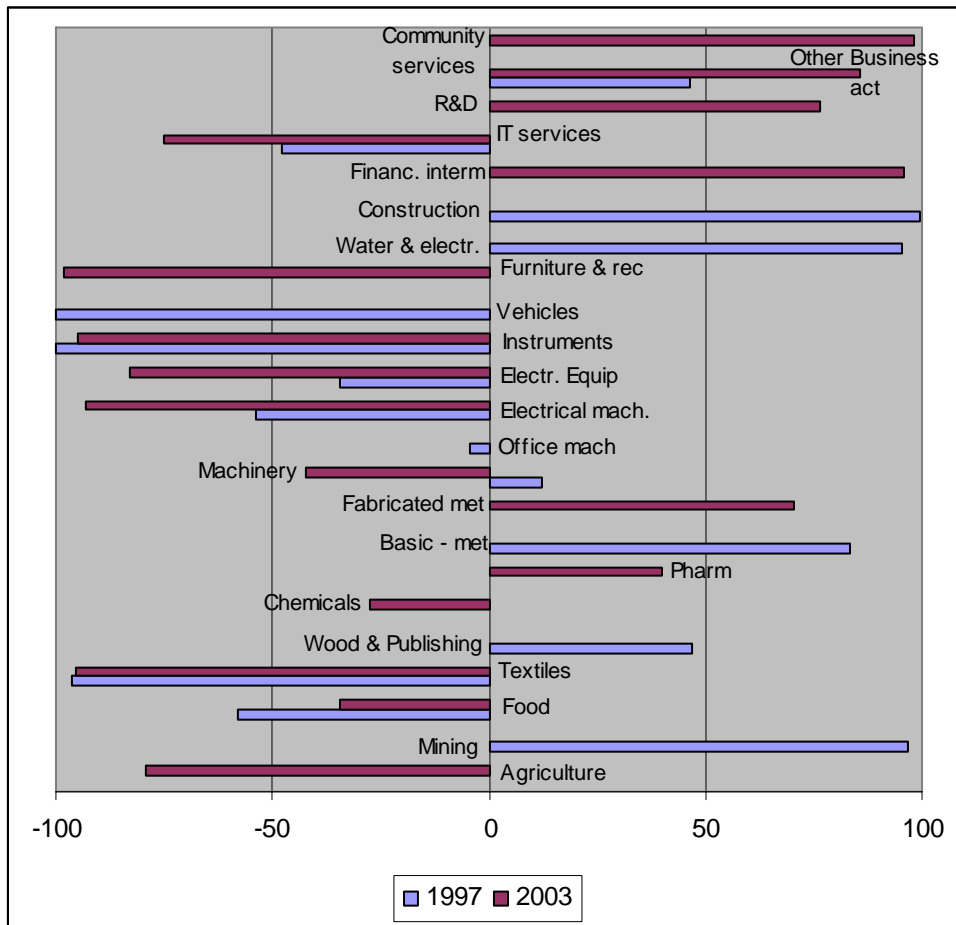
Not Available

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

Not Available

BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R&D (BERD)

Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. Specialisation profile. Bulgaria. Available years 1997 and 2003.

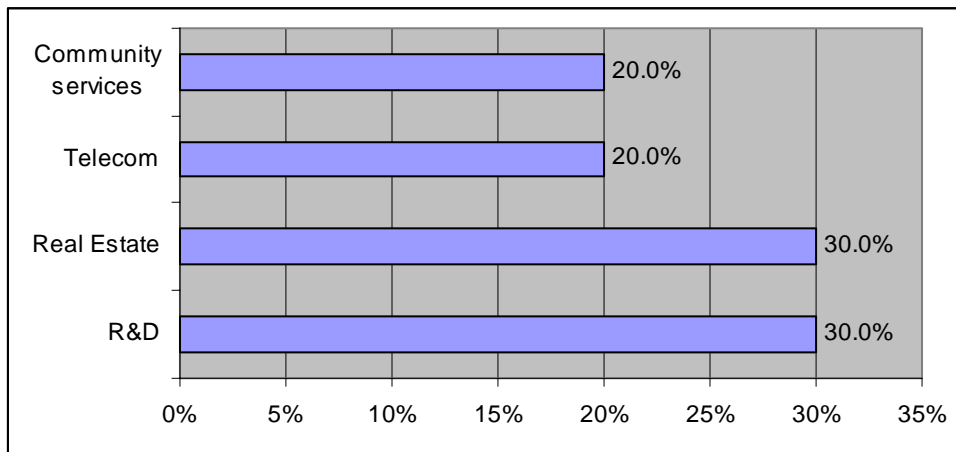


Source: Eurostat Database, S & T Data, 2005. Own calculations

Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sectors funded by government

Not Available

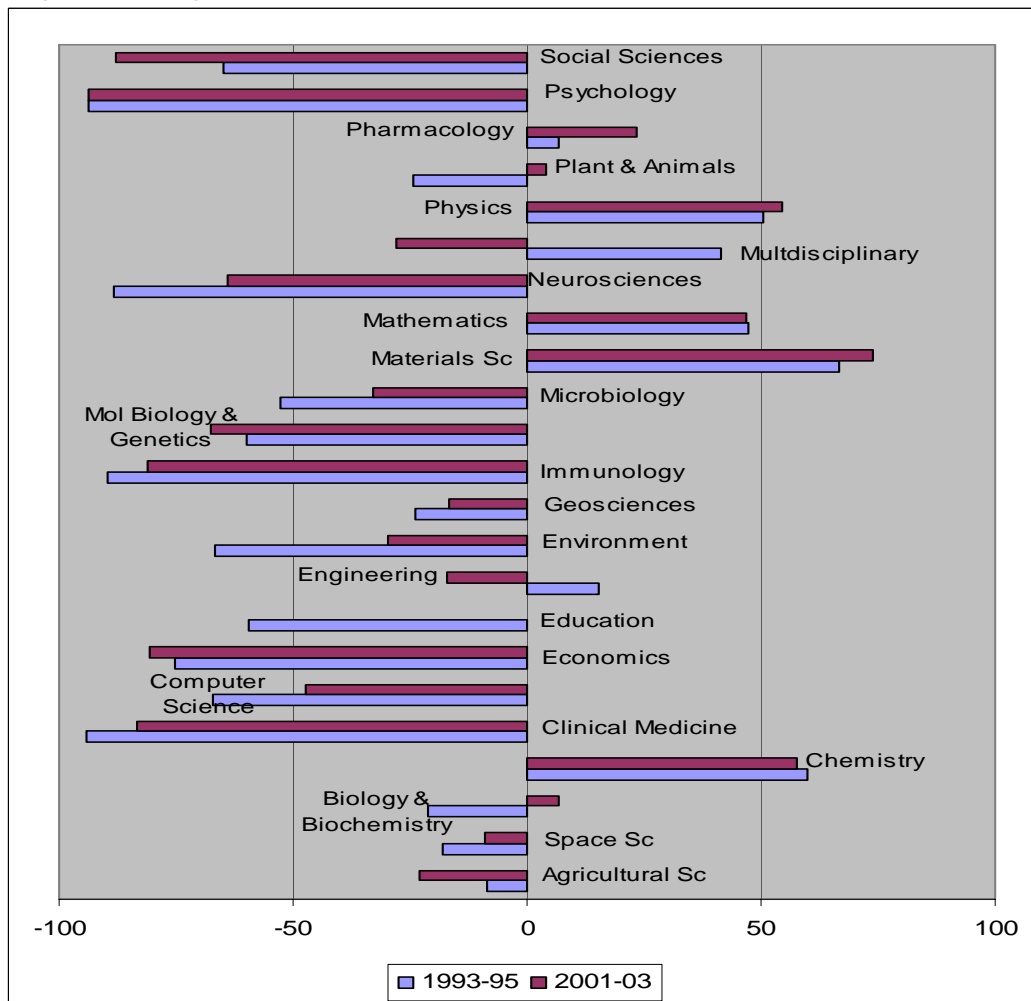
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003



Source: Eurostat Database, S & T Data, 2005. Own calculations

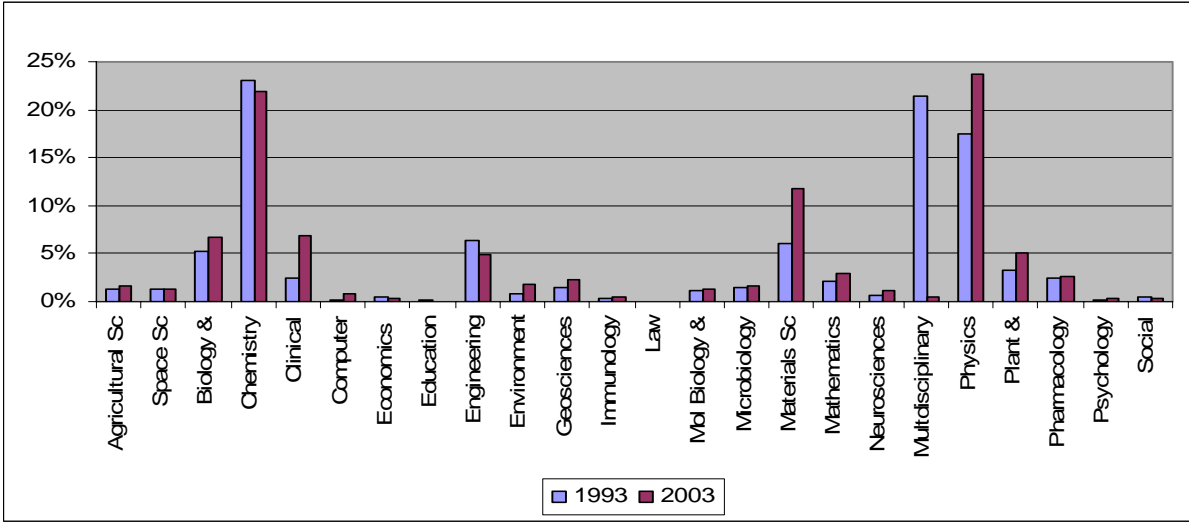
BIBLIOMETRICS

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



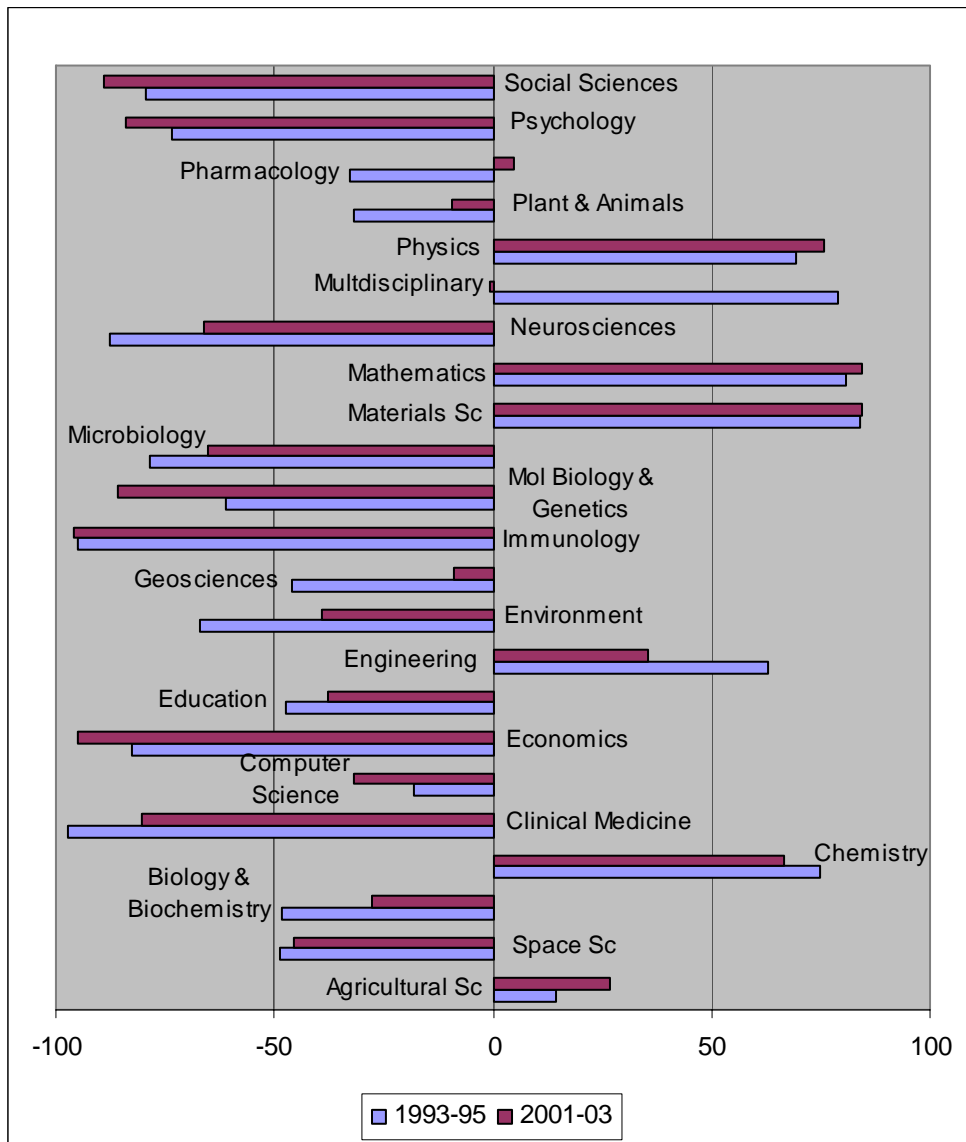
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005, own calculations

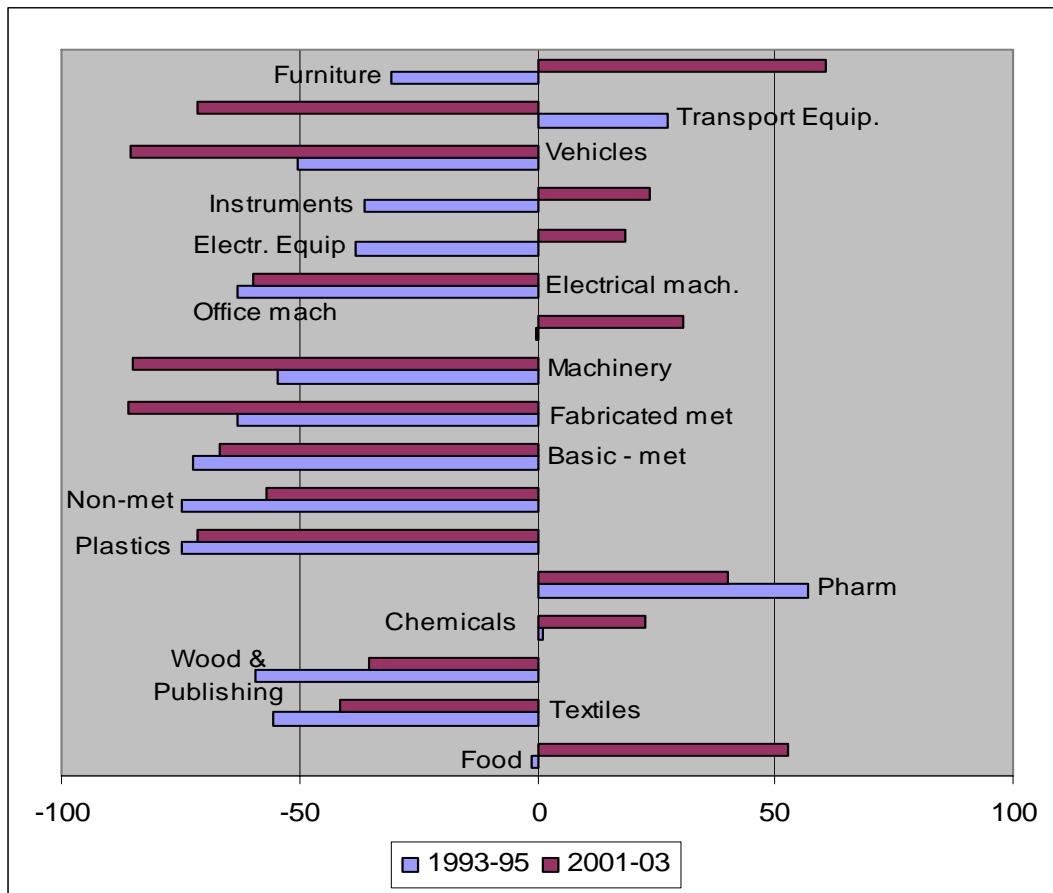
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Bulgaria. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

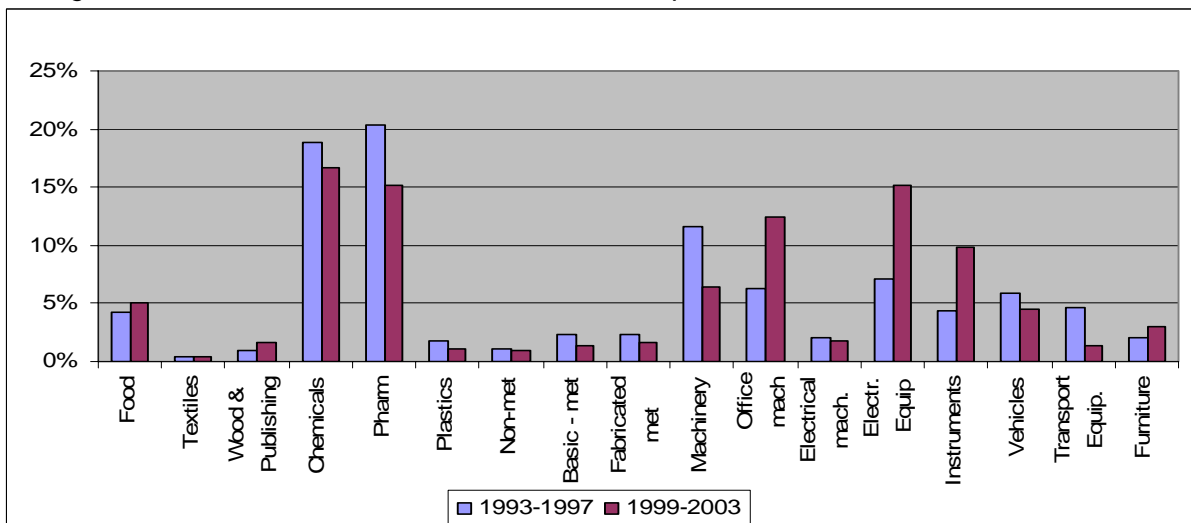
PATENTS

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

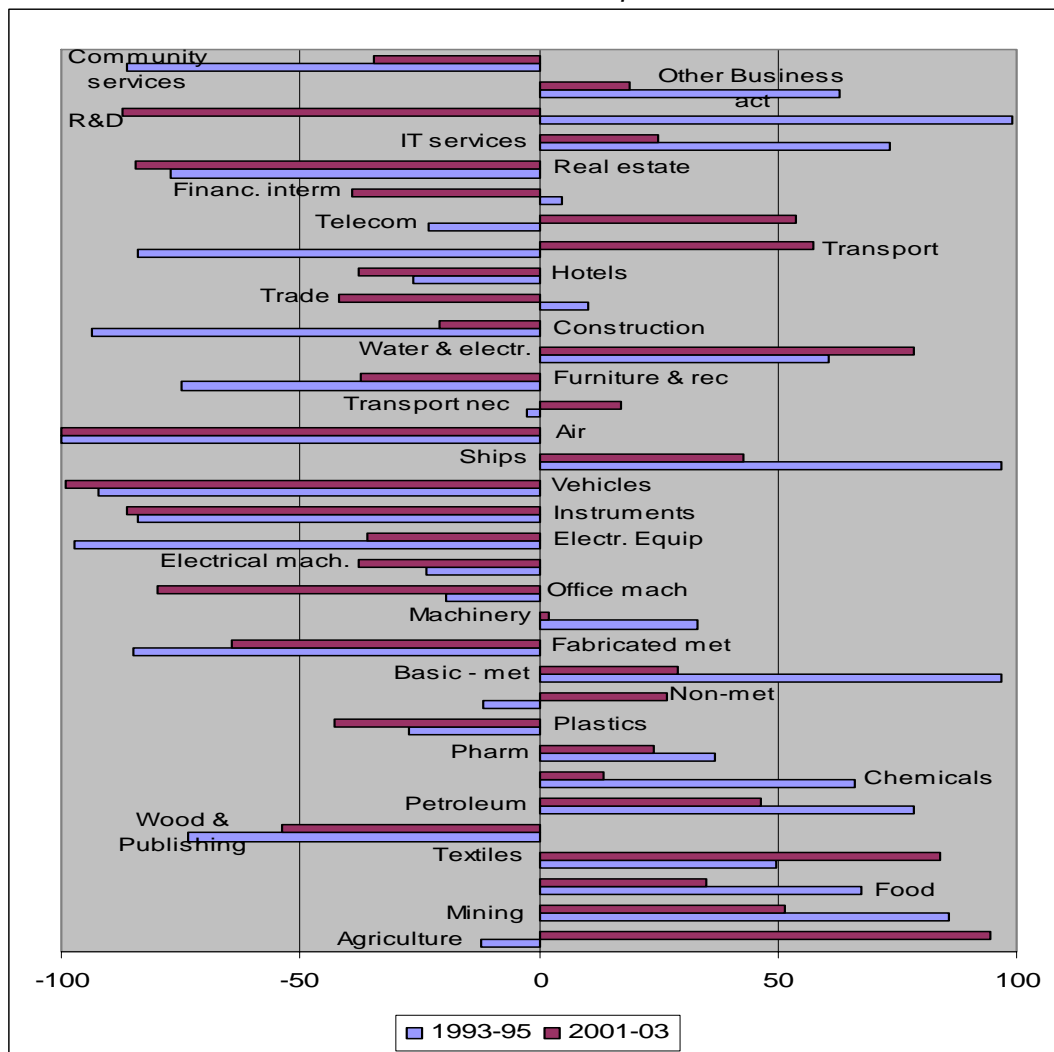
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Bulgaria. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

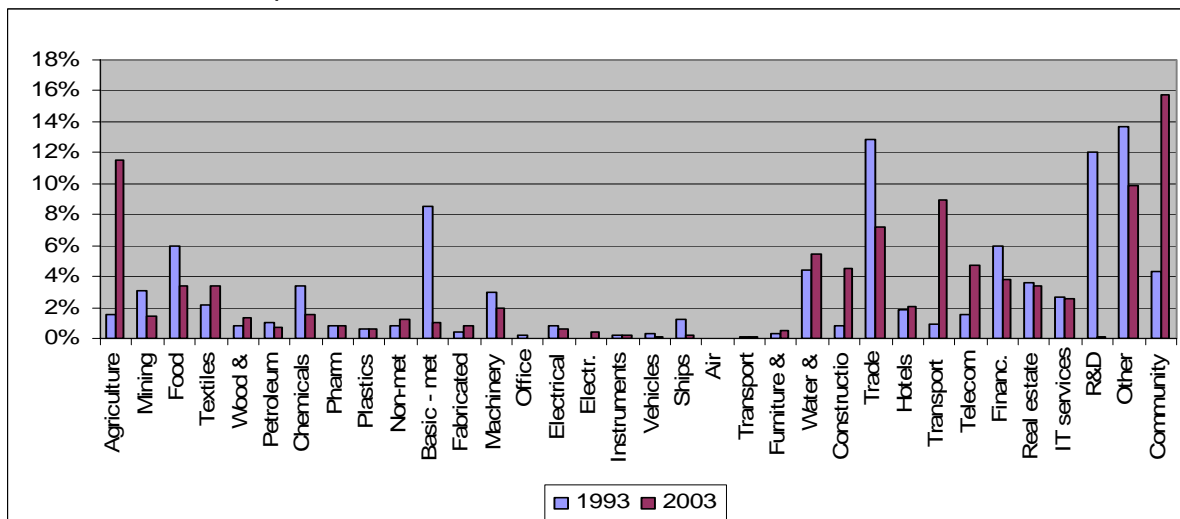
ECONOMIC SPECIALISATION

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



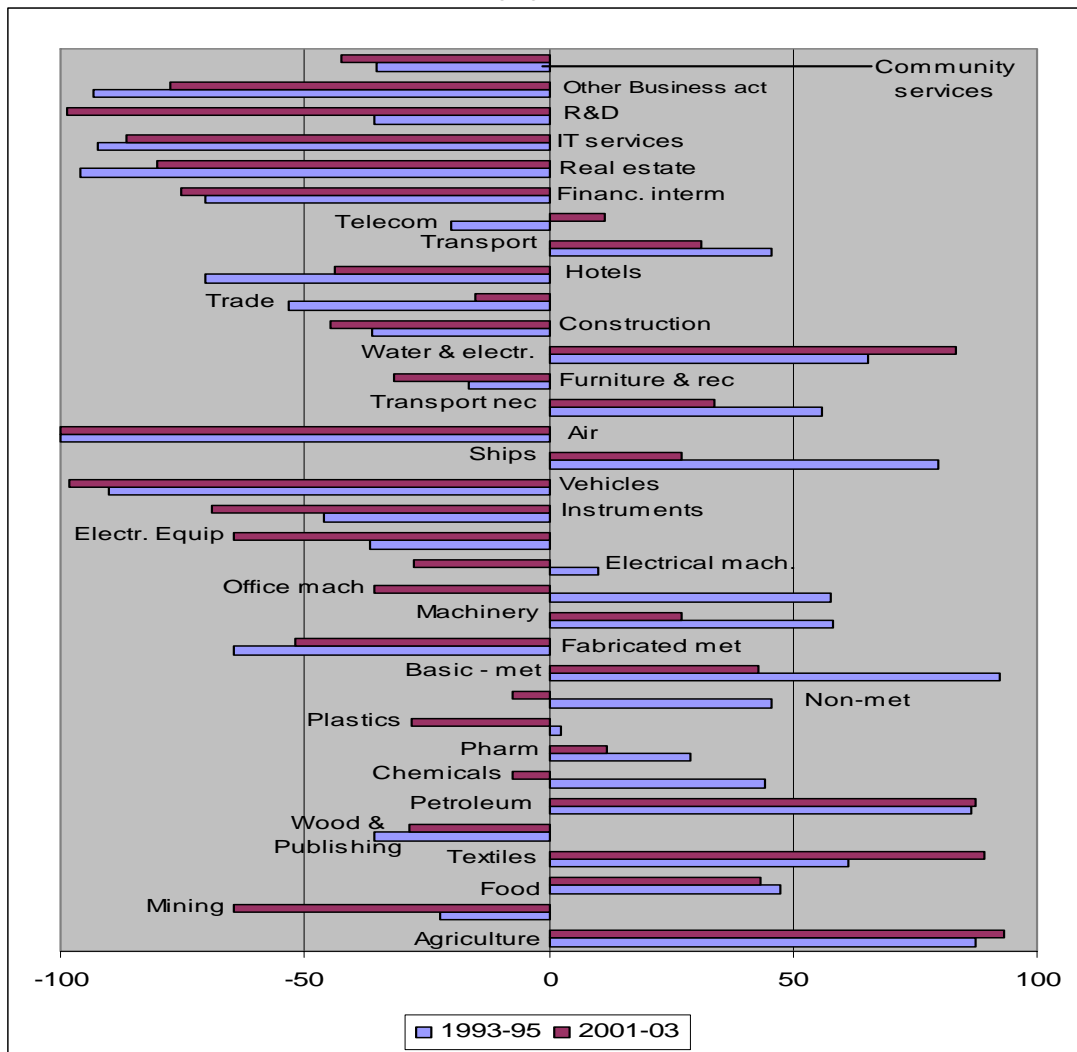
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
 Source: OECD, STAN 2005, own calculations.

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



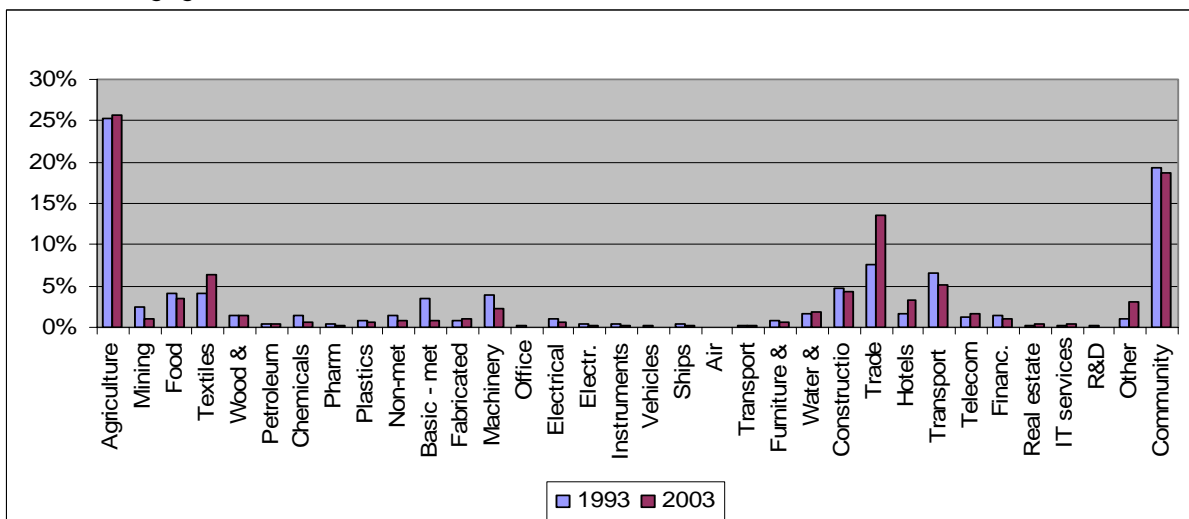
Source: OECD, STAN, 2005.

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



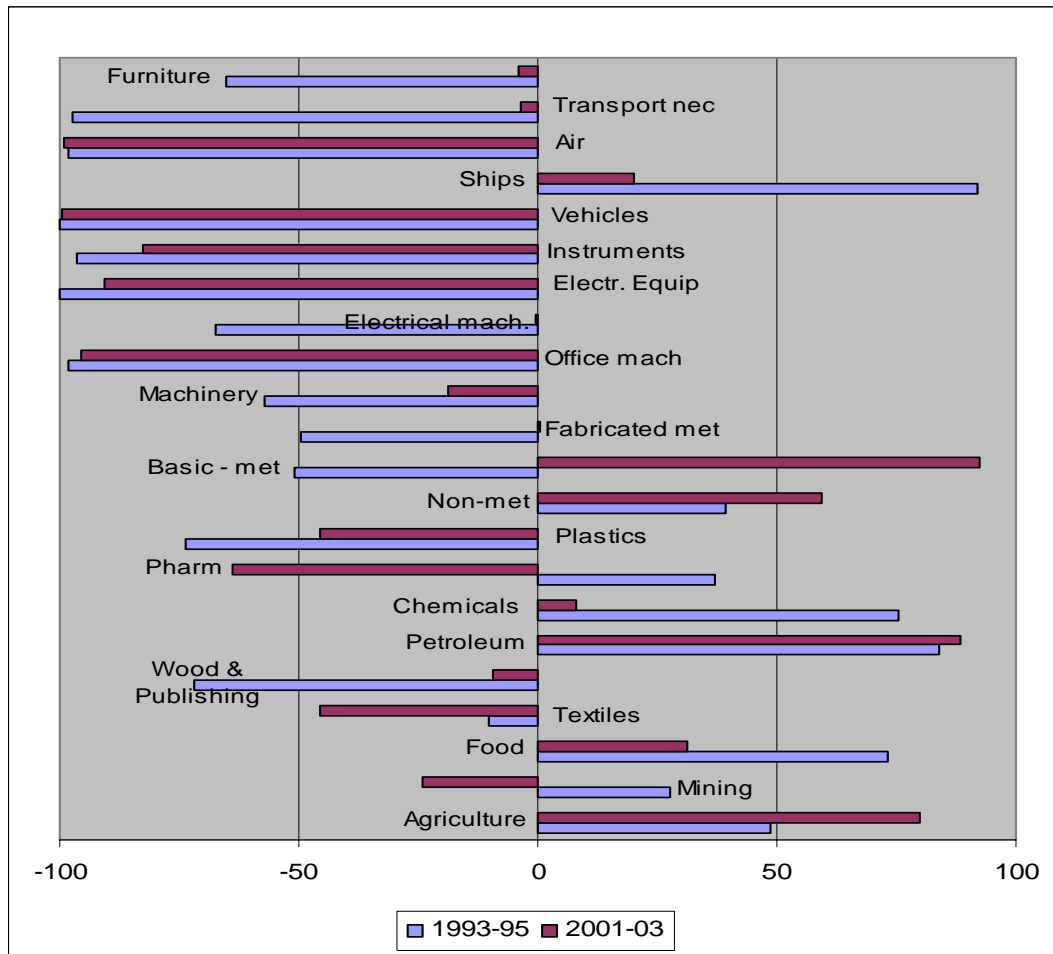
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



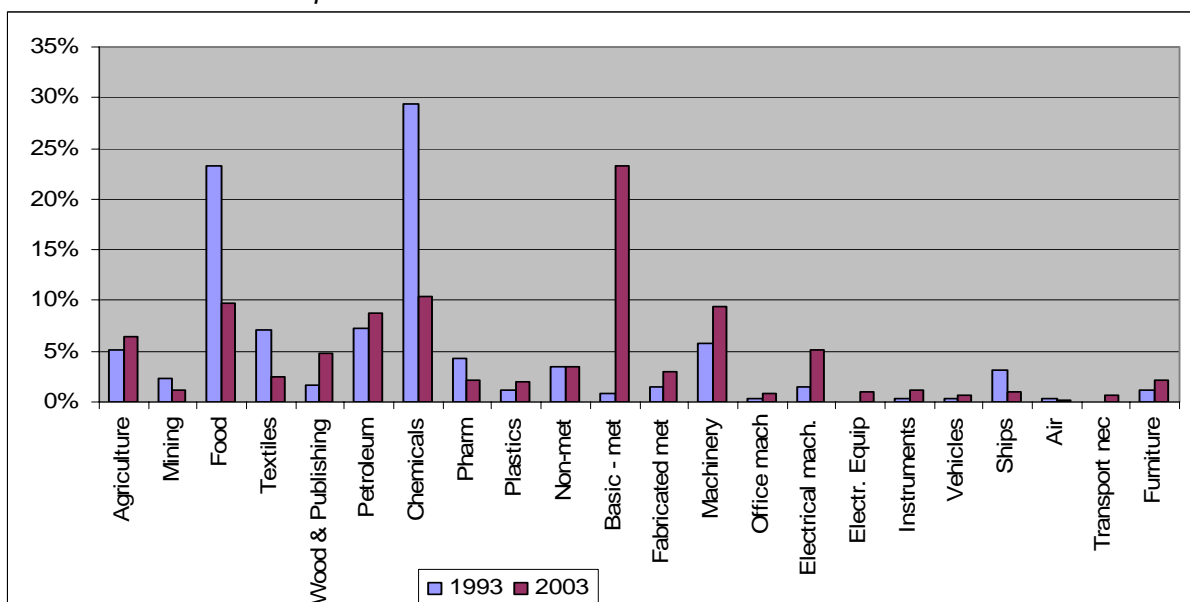
Source: OECD, STAN, 2005.

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



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

CORRELATION ANALYSIS

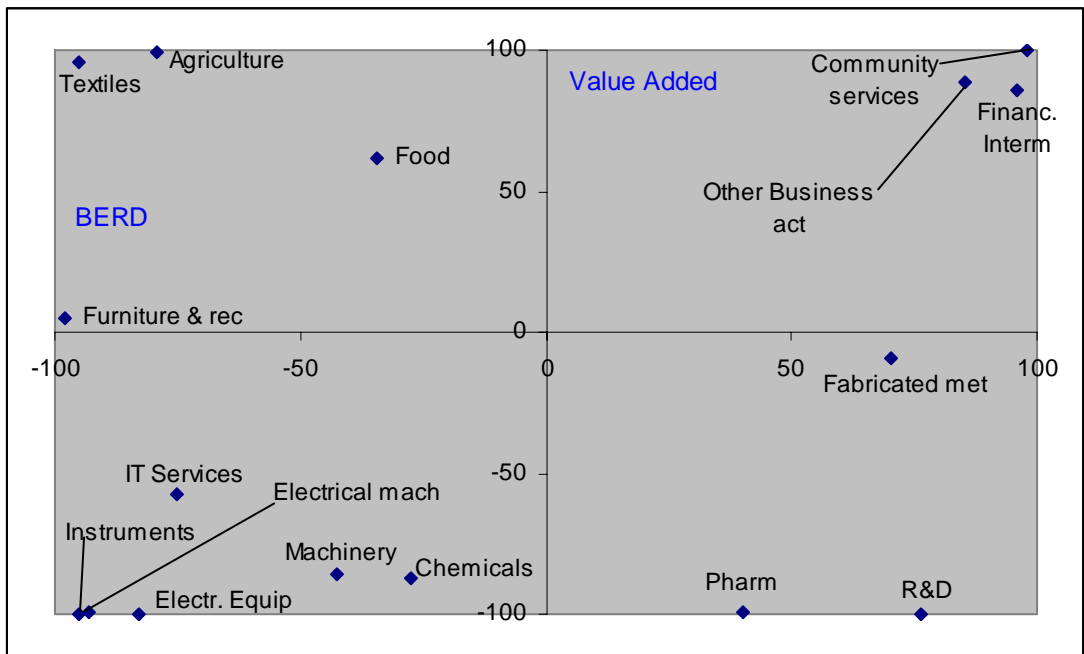
Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. Bulgaria. Averages 1993-1995 and 2001-2003.

		BG_BERD 97	BG_BERD 03	BG_PAT 9395	BG_PAT 0103	BG_VA 9395	BG_VA 0103	BG_EMP 9395	BG_EMP 0103	BG_EXP 9395	BG_EXP 0103
BG_BERD97	Pearson Correlation Sig. (2-tailed)	1	.	.	.	.	.	.	.	.	.
BG_BERD03	Pearson Correlation Sig. (2-tailed)	,821(*)	1	.	.	.	.	.	.	.	.
BG_PAT9395	Pearson Correlation Sig. (2-tailed)	-,267	,400	1	.	.	.	.	.	.	.
BG_PAT0103	Pearson Correlation Sig. (2-tailed)	-,211	-,080	,812(**)	1	.	.	.	.	.	.
BG_VA9395	Pearson Correlation Sig. (2-tailed)	,291	,143	,279	,173	1	.	.	.	.	.
BG_VA0103	Pearson Correlation Sig. (2-tailed)	,357	-,288	,129	,115	,538(**)	1	.	.	.	.
BG_EMP9395	Pearson Correlation Sig. (2-tailed)	,189	-,431	,168	,174	,431(*)	,631(**)	1	.	.	.
BG_EMP0103	Pearson Correlation Sig. (2-tailed)	,146	-,401	,092	,065	,363(*)	,774(**)	,871(**)	1	.	.
BG_EXP9395	Pearson Correlation Sig. (2-tailed)	,191	,283	,438	,356	,731(**)	,755(**)	,564(**)	,585(**)	1	.
BG_EXP0103	Pearson Correlation Sig. (2-tailed)	,524	,084	-,323	-,257	,582(**)	,675(**)	,670(**)	,701(**)	,628(**)	1
		,098	,818	,241	,354	,006	,001	,001	,000	,002	.

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

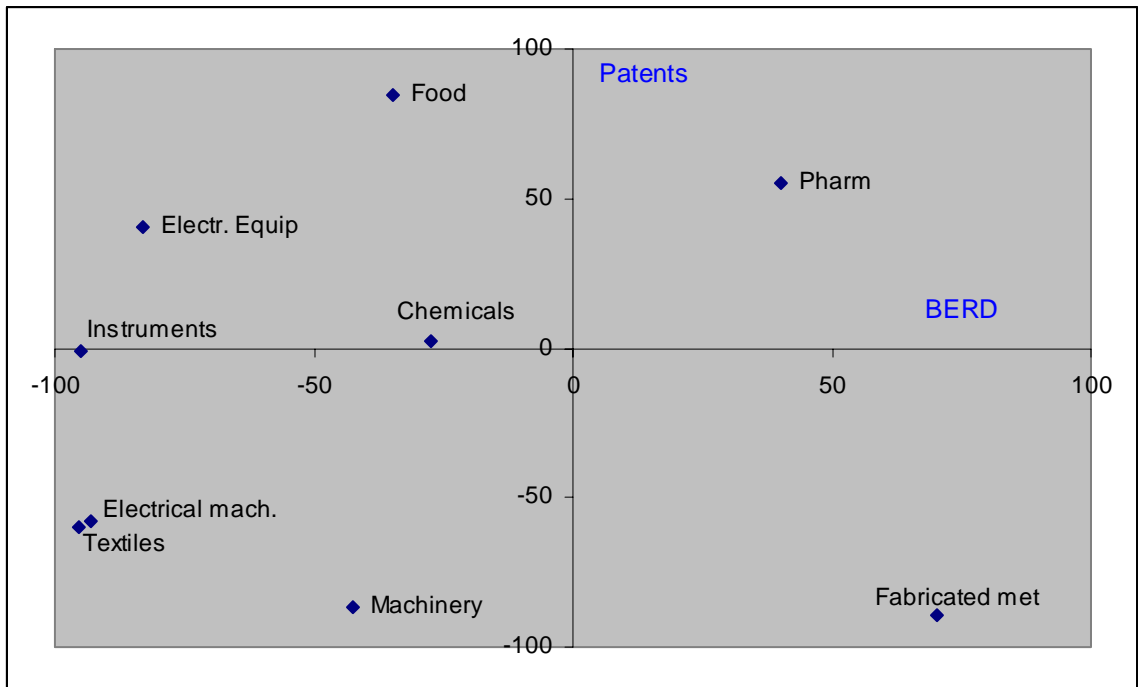
** Correlation is significant at the 0.01 level (2-tailed).

Figure 20. BERD versus Value added specialisation in all sectors. Bulgaria. Based on values of 2003.



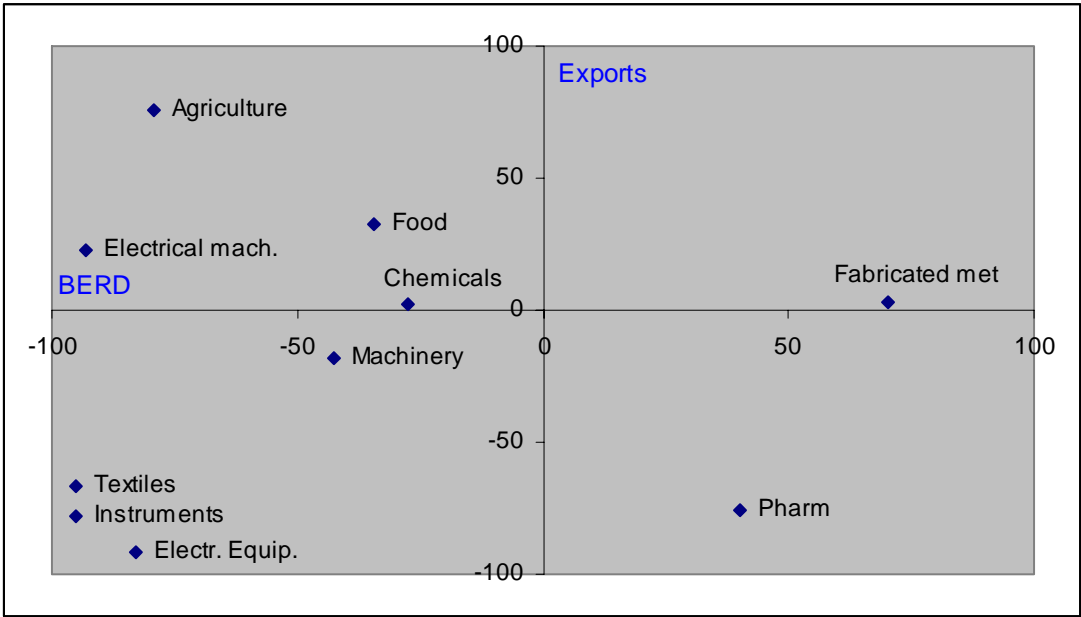
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 21. BERD versus patents. Specialisation indexes. Bulgaria. Based on values of 2003.



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

Figure 22. BERD versus exports. Specialisation indexes. Bulgaria. Based on values of 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;		72;	15-16; 32; 33;		29; 31;	17-19;		
Specialisation Patents			2423;	15-16; 24ex2423; 30; 32; 33; 36		35;			
Specialisation Value Added	352+359; 60-63;		23; 2423; 50- 52; 72; 73; 74	01-05; 26; 40- 41; 64;		10-14; 15-16; 24ex2423; 27; 29; 351; 65- 67;	17-19;		
Specialisation Employment			2423; 352+359; 60- 63;	01-05; 40-41; 64;	15-16;	24ex2423; 25; 26; 27; 29; 30; 31; 351;	17-19;		
Specialisation Exports		23;	2423;	01-05; 26; 27; 28; 31;		10-14; 15-16; 24ex2423; 351;			

Red numbers: Decrease specialisation from specialised to non specialised

Blue numbers: Increase specialisation from non specialised to specialised

Note: The ISIC Sectors 2423, 28, 65-67, 73, 75-99 are also specialized in BERD, but due to non- disposal of data for year 1997, no trend can be specified.

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 23: BERD and Value Added specialisation – an example

