



COUNTRY SPECIALISATION REPORT

Country: Romania

Date: June 2006

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COUNTRY SPECIALISATION REPORT - ROMANIA

MAIN FINDINGS

Romania 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.

During 2003, applied research accounted for 72.1% of Romania's GERD (Figure 2), with basic research and experimental development accounting for 20% and 7.9% respectively. Over the period 1993-2002, the share of applied research declined significantly to 56.4%. In contrast, the share of applied research and experimental development rose to 23%, while that of applied research remained almost constant.

By looking at the GBAORD priorities (Figure 3), Romania presents a very polarised specialisation, with some sectors highly specialised and others completely underspecialised. Thus during the period 2001-03, Romania was specialised in the socioeconomic objectives of civil research, non oriented research, land use, industrial research and agriculture. An important point of notice, is the sharp decline in specialisation in the objectives of defence and exploitation of space within a ten years horizon.

With regard to business intramural expenditure on R&D (Figure 6), the leading sectors in terms of shares during 2003 were the motor vehicles (16.2%), machinery (11.8%), electrical machinery (10.6%), petroleum (10.6%), mining (10.1%), IT services (7.5%), basic metals (7%) and research (3.9%). At the same time, the main beneficiaries of public funding of BERD (Figure 8) were the petroleum, real estate, machinery, electrical machinery, research and IT services sectors.

In terms of scientific specialisation (Figure 9), Romania is highly specialised in all natural sciences such as mathematics, physics, chemistry, material sciences, engineering, but also in multidisciplinary research. Regarding technological specialisation (Figure 12), Romania is specialised in the sectors of transport equipment, electronic equipment, office machinery, wood and publishing, basic metals and non metallic mineral products, textiles and wood and publishing.

Finally, during the period 2001-03, the economic specialisation (Figures 14,16 &18) of Romania, based on specialisation in at least in two parameters out of value added, employment and exports was concentrated in the sectors of agriculture, food, textiles, wood and publishing, petroleum, basic metals, non metallic mineral products, shipbuilding and transport equipment.

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). Romania. 1993-2003.

Not Available

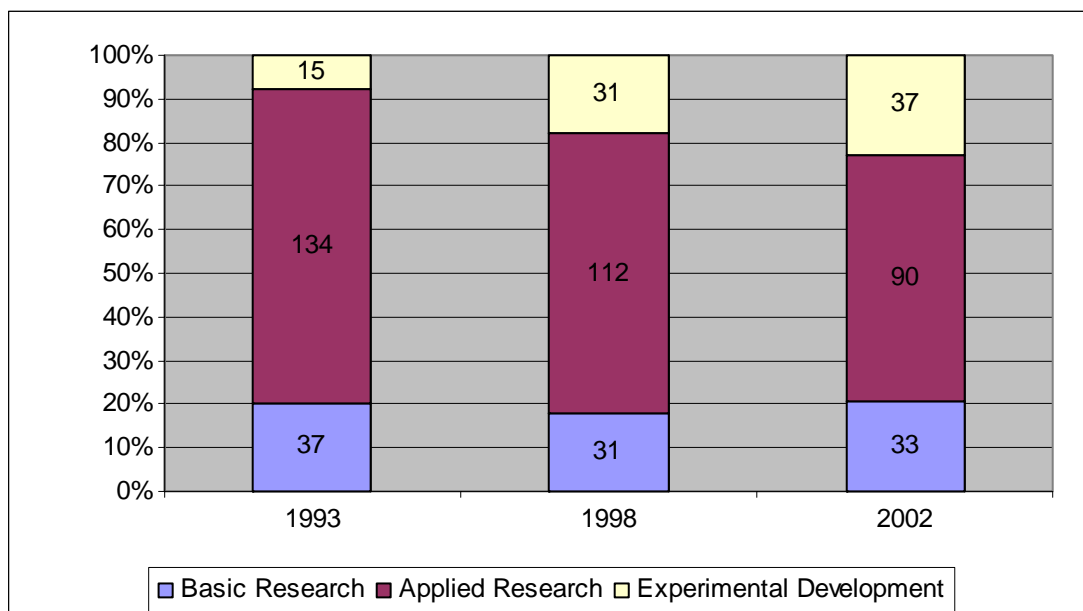
Source: OECD OFFBERD 2005

Table 1. R&D expenditure by sector of performance and source of funds . Romania. 1993 and 2004. Million Euros. Current prices.

Not Available

Source: OECD OFFBERD 2005

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

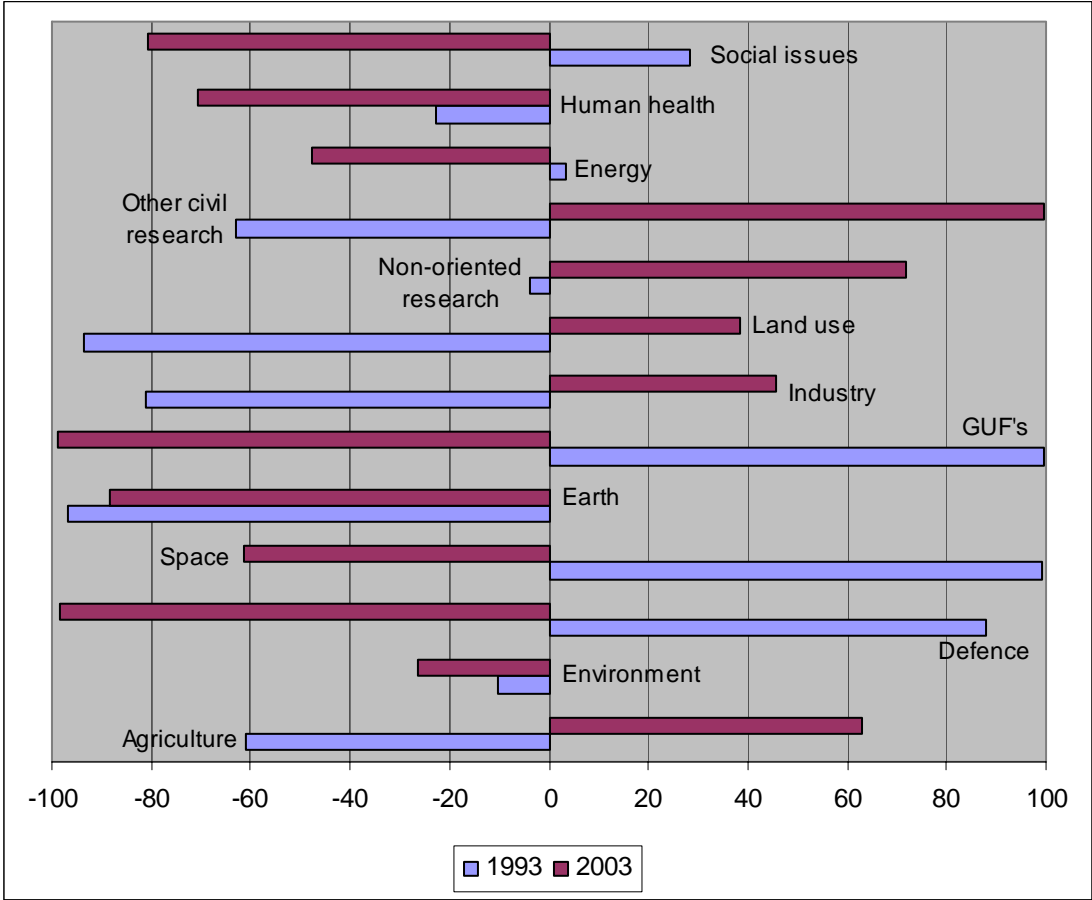


Source: Eurostat Database, S & T Data, 2005

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. Romania. 1993 and 2003.



Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Eurostat Database, S & T Data, 2005, own calculations.

HERD by field of science

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Romania. 2000 and 2001. Per cent of total HERD and in million Euros.

Not Available

Source: OECD Basic Science and Technology Statistics 2005.

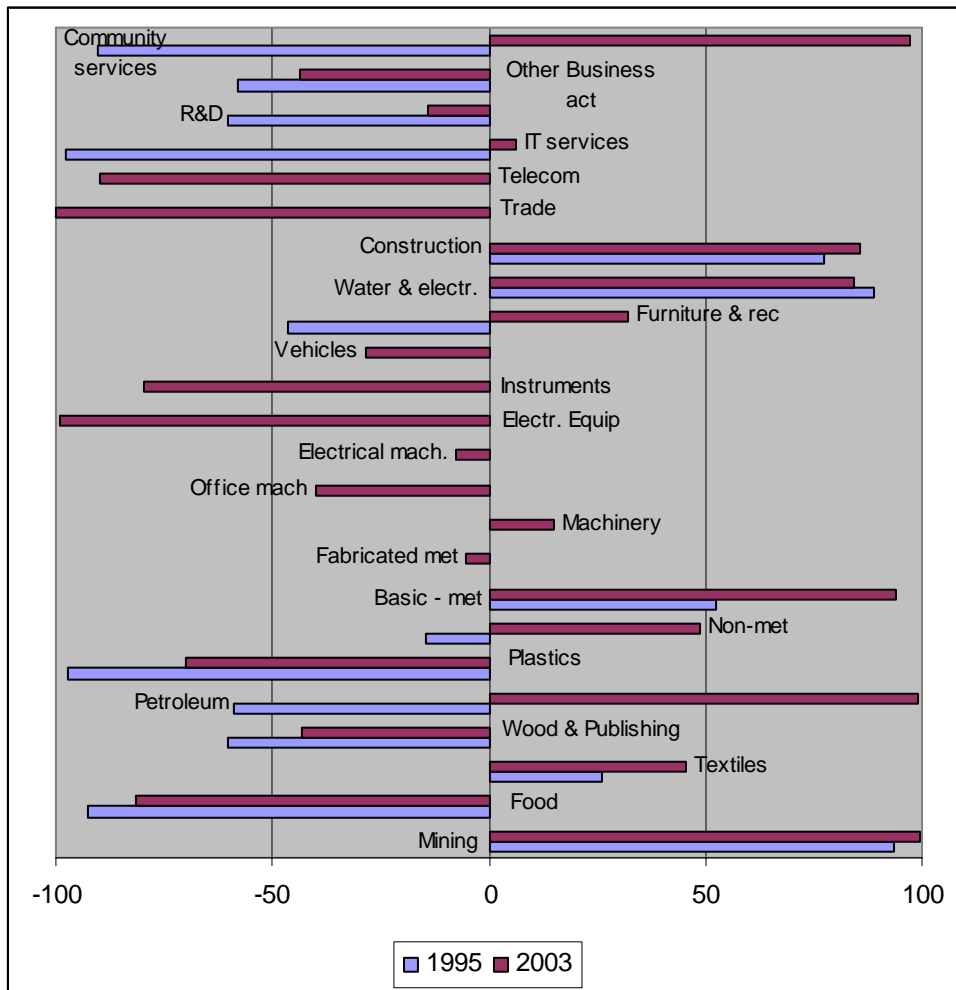
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Romania. 1999, 2000 and 2001.

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. Specialisation profile. Romania. Available years 1995 and 2003



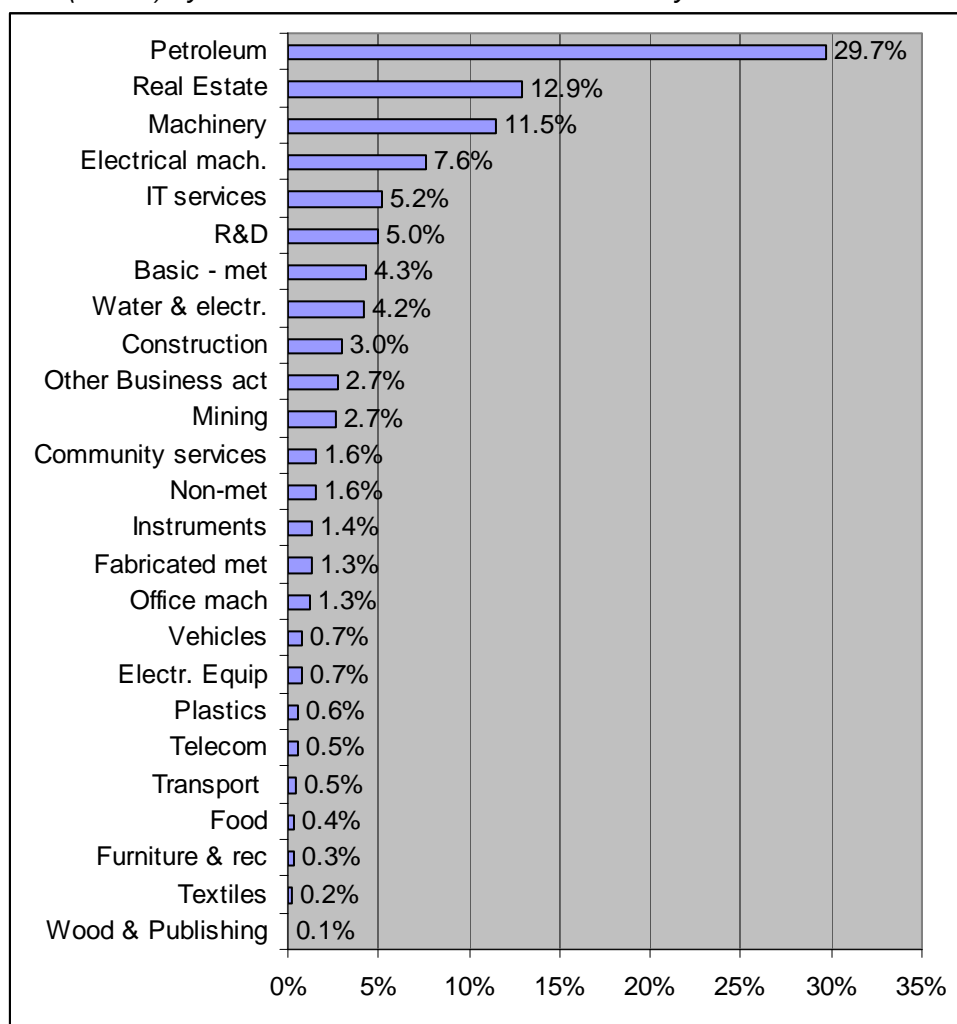
Source: Eurostat Database, S & T Data, 2005, own calculations

Figure 7. Shares of Business enterprise intramural expenditure on R&D (BERD) in the sector funded by government. 1999 last available year in OECD statistics.

Not available

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

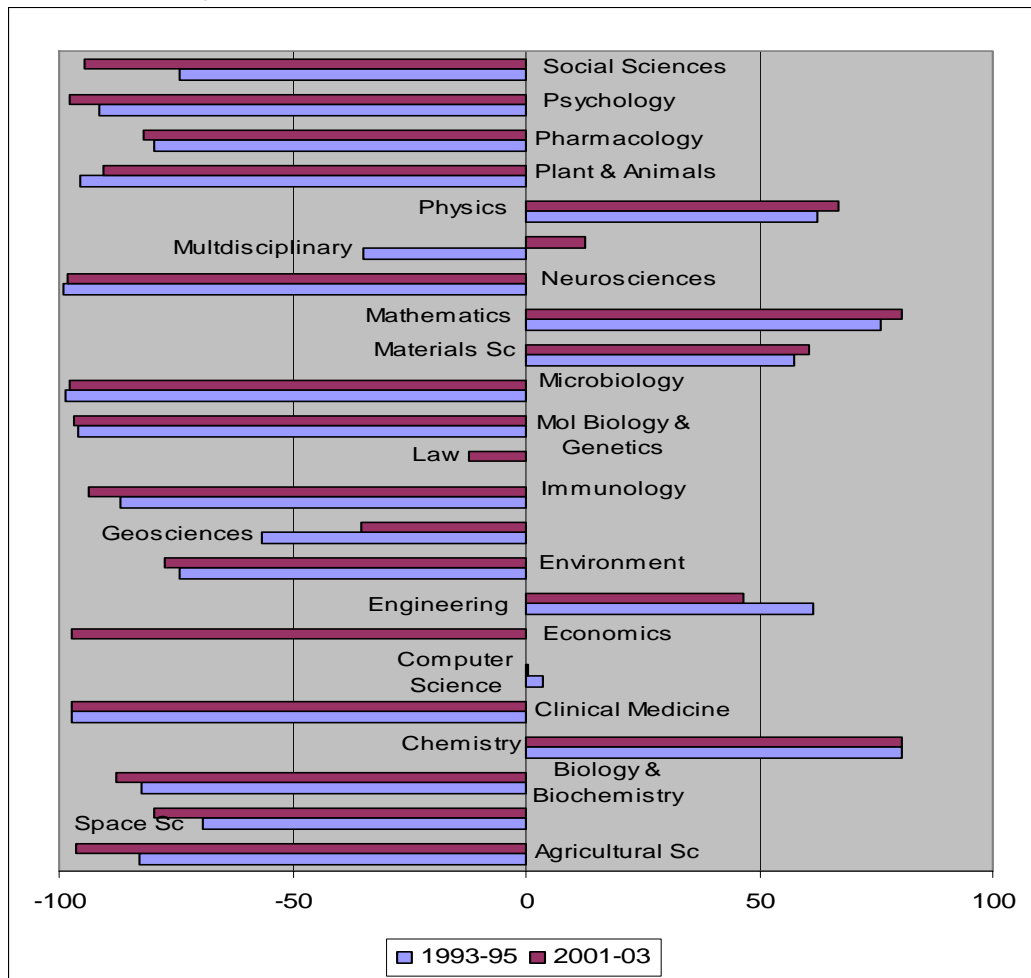
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003 last available year in Eurostat Database



Source: Eurostat Database, S & T Data, 2005, own calculations

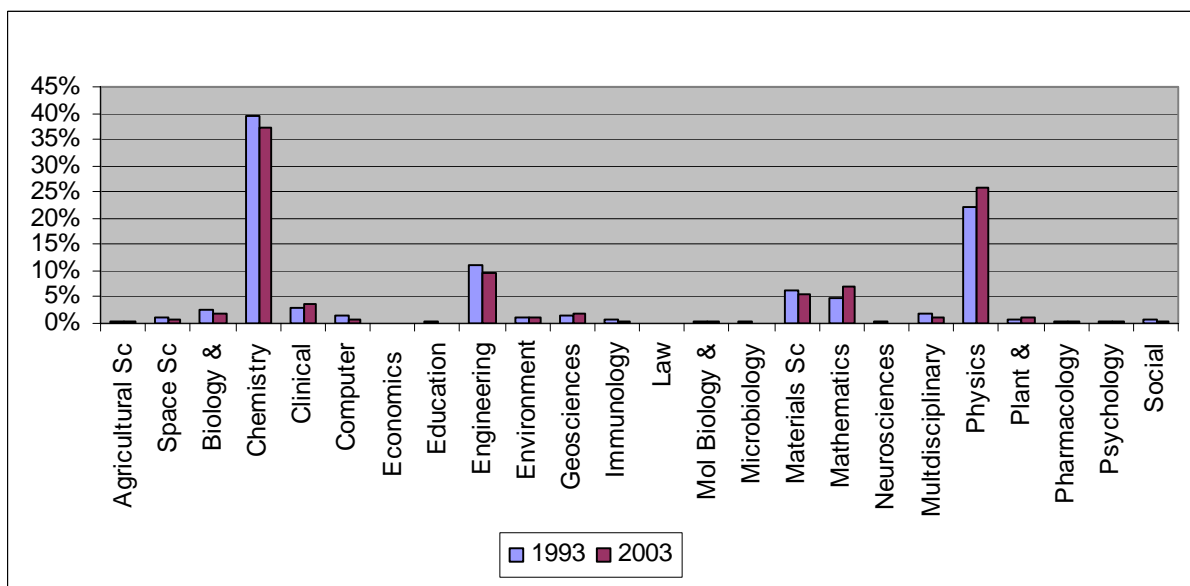
BIBLIOMETRICS

Figure 9. Number of publications by scientific field. 23 Scientific fields. Specialisation profile. Romania. Averages 1993-1995 and 2001-2003.



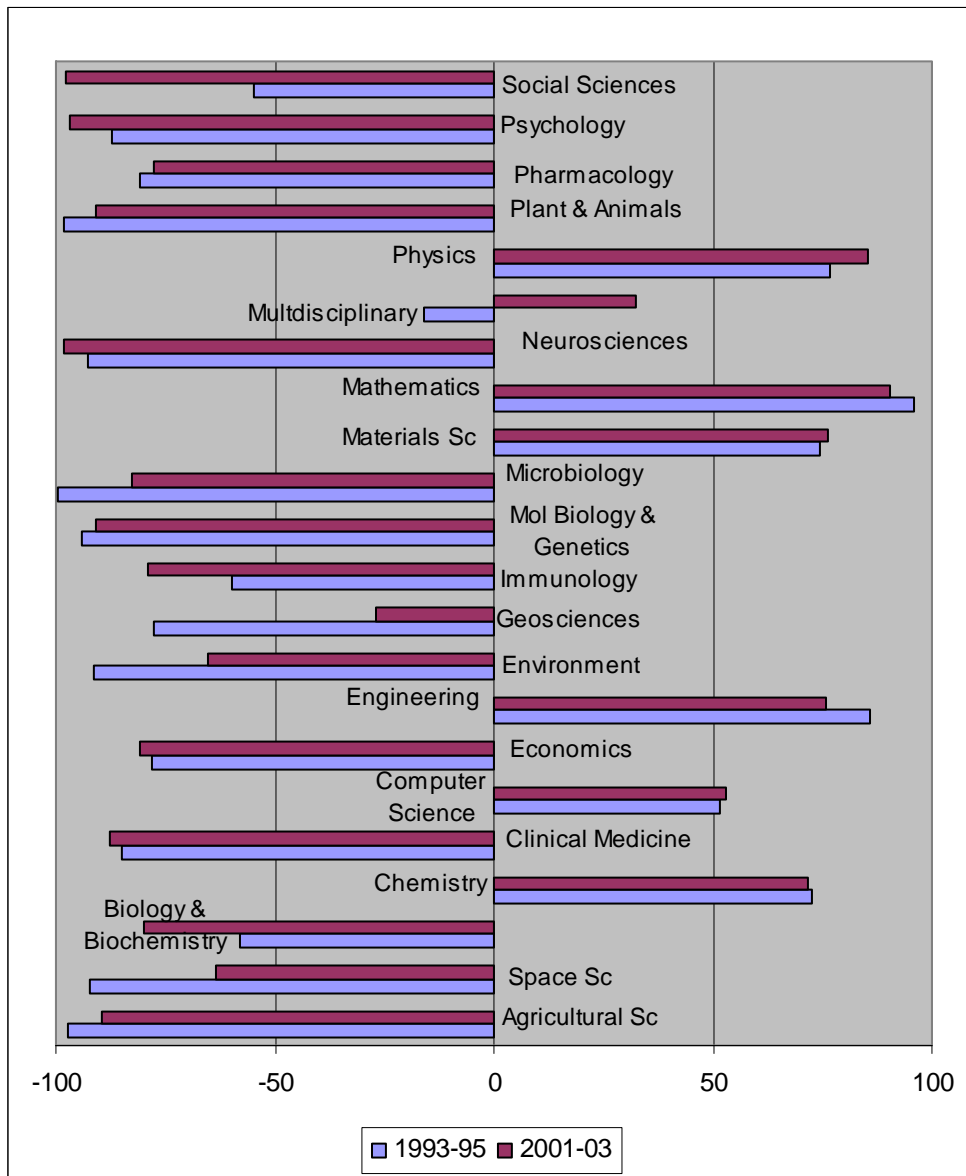
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

Figure 10. Shares of total publications by scientific field. 24 Scientific fields. Romania. 1993 and 2003.



Source: Thomson ISI, NSIODE 2005.

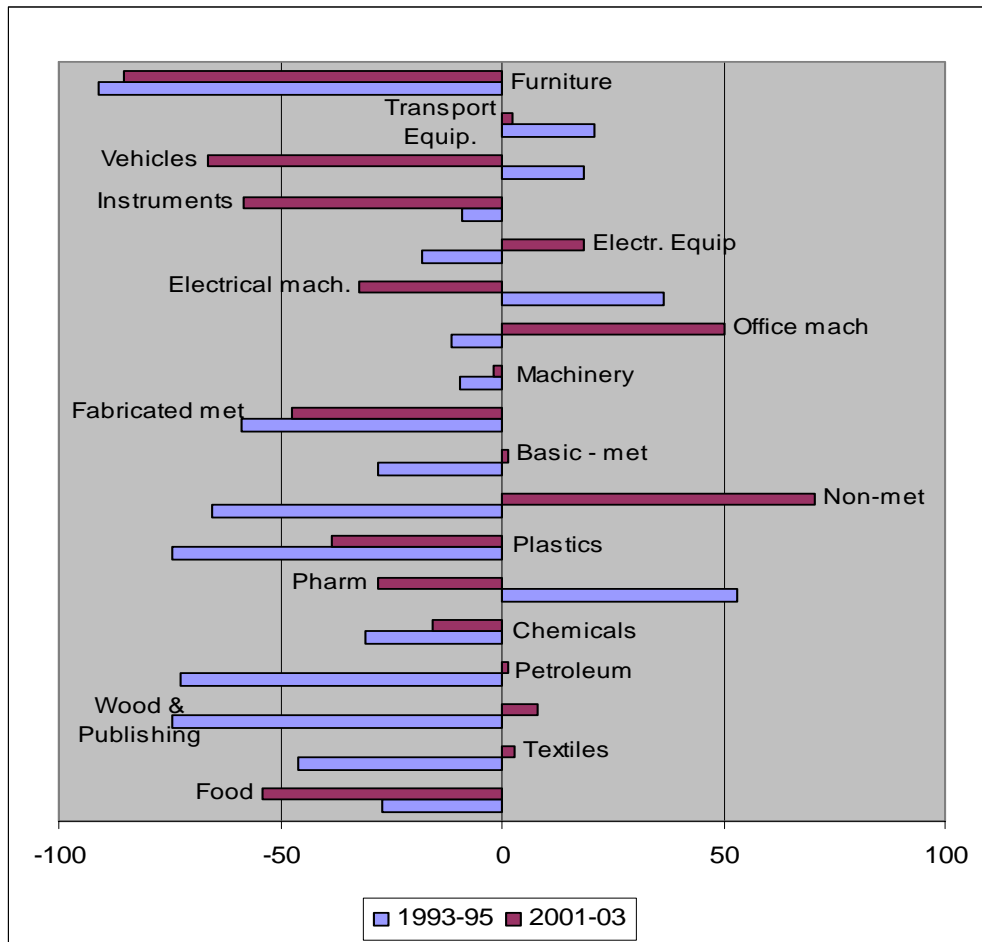
Figure 11. Number of citations by scientific field. 22 scientific fields. Specialisation profile. Romania. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

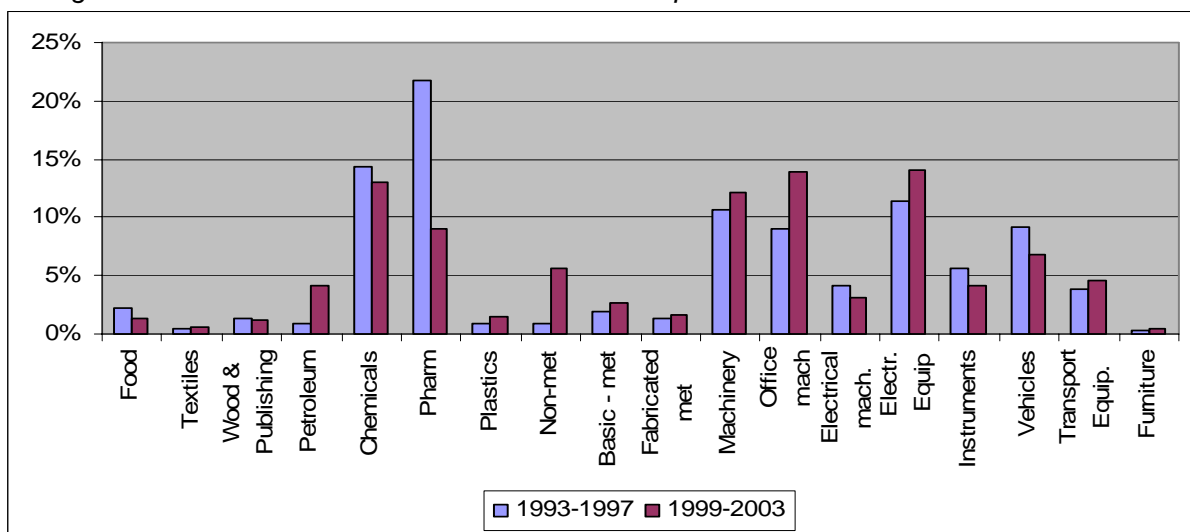
PATENTS

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

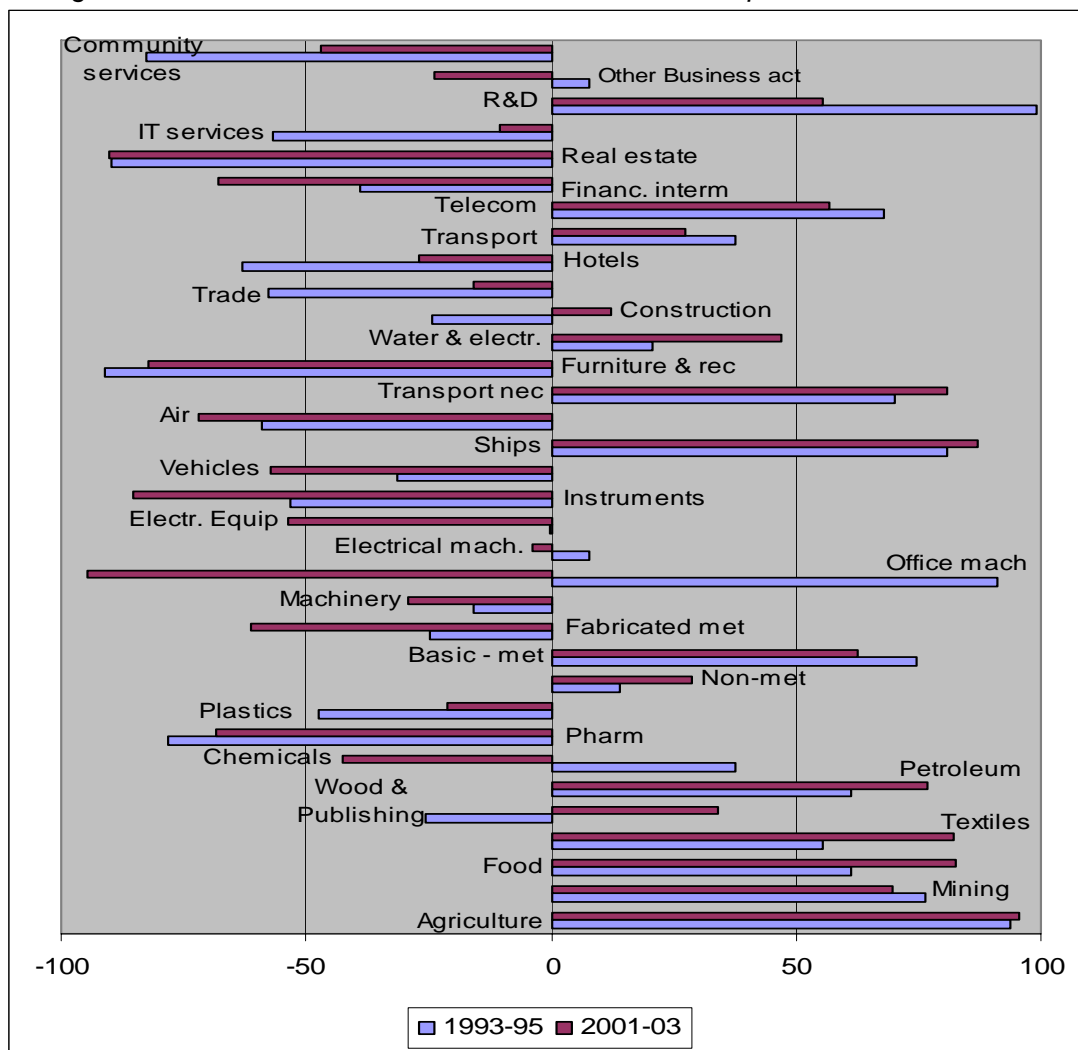
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Romania. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

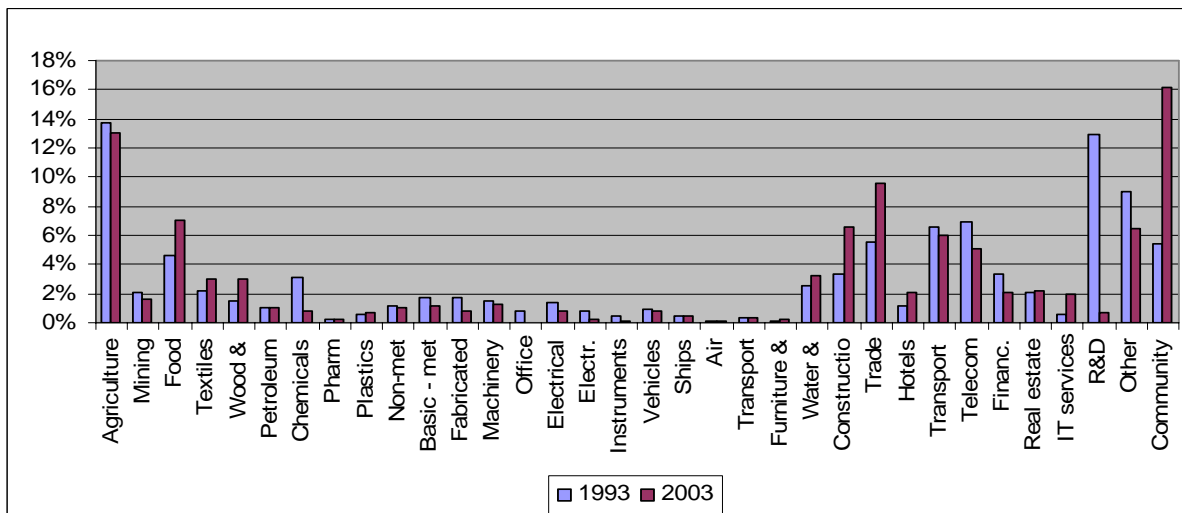
ECONOMIC SPECIALISATION

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



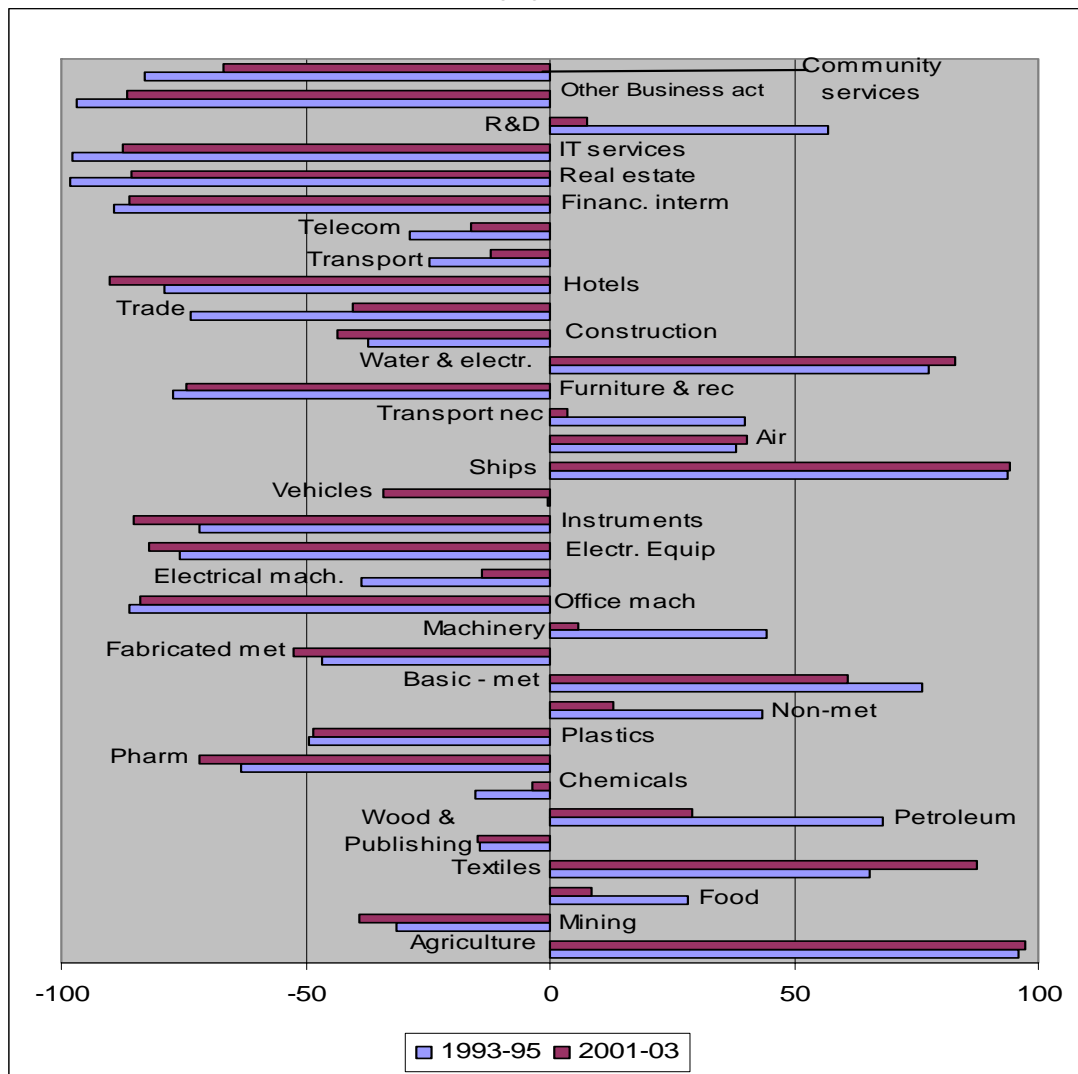
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



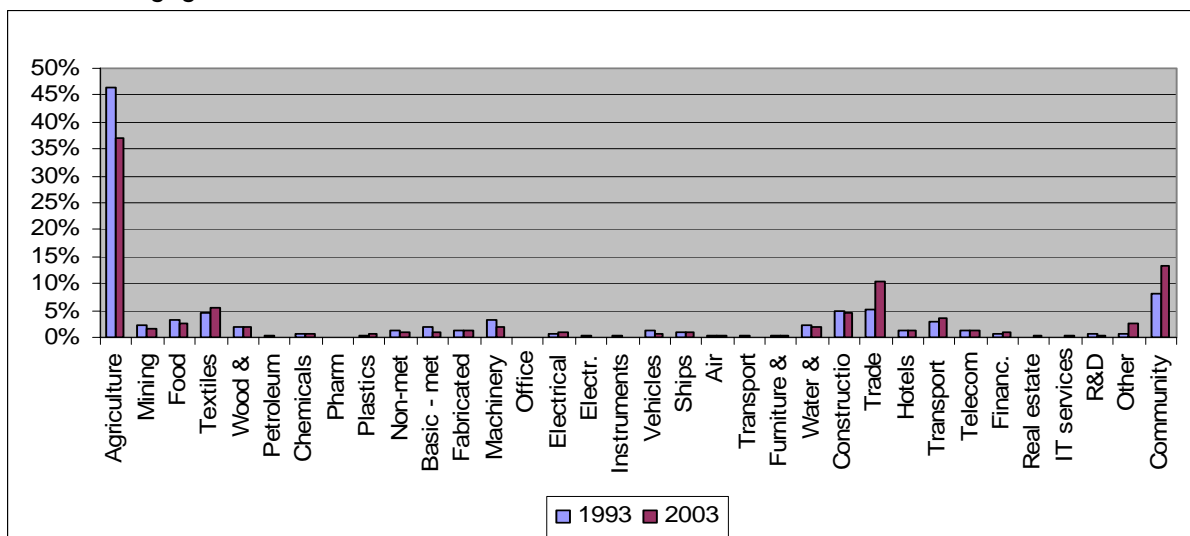
Source: OECD, STAN, 2005.

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



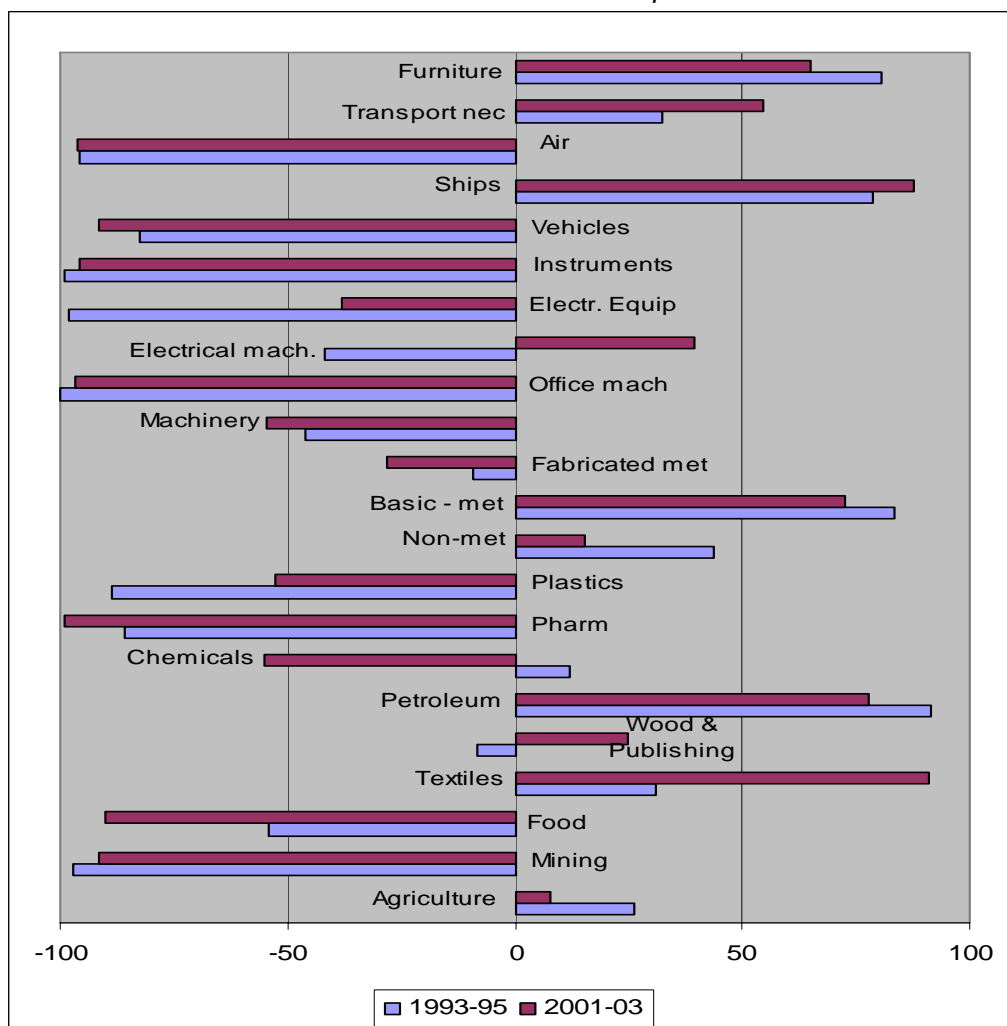
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



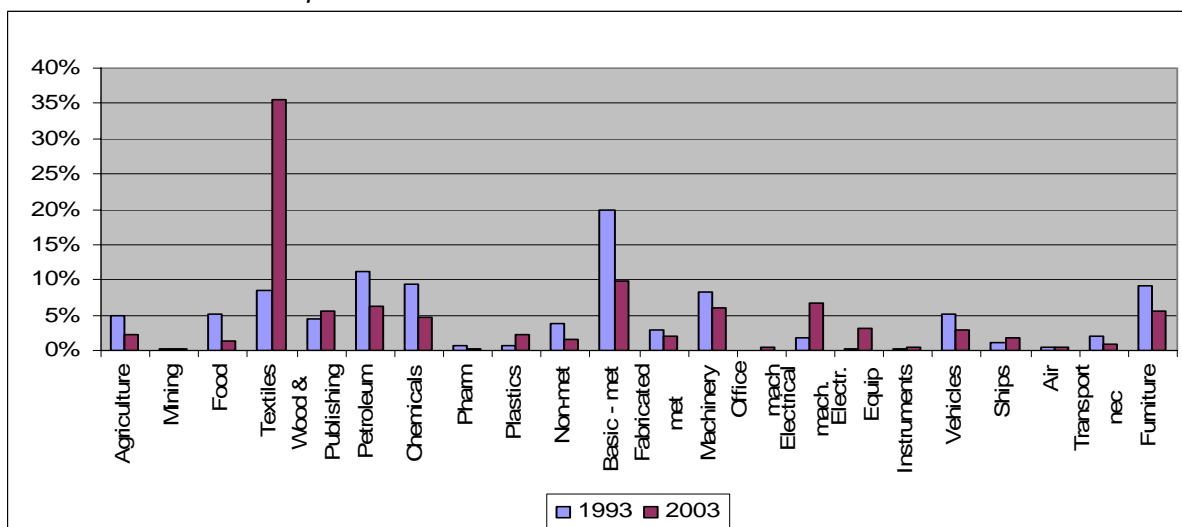
Source: OECD, STAN, 2005.

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



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

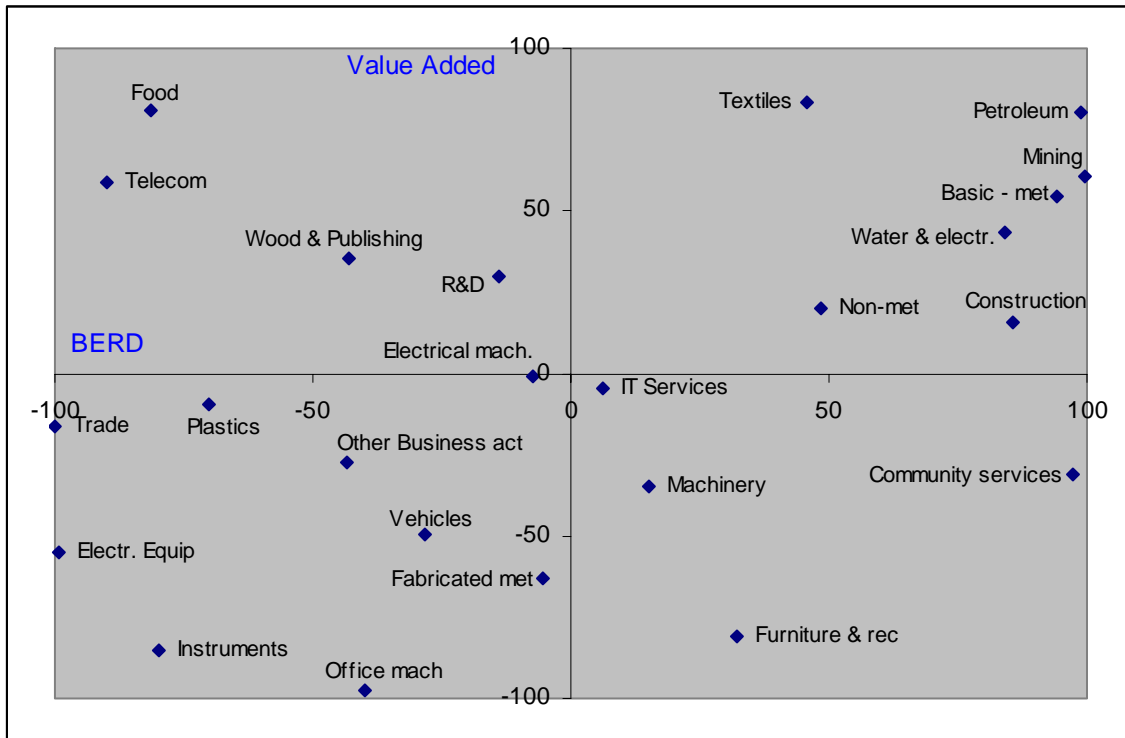
CORRELATION ANALYSIS*Table 2. Correlation analysis. Specialisation indexes BERD, Value added, Employment, Exports and patents. Romania. Averages 1993-1995 and 2001-2003.*

		RO_BERD 95	RO_BERD 03	RO_PAT 9395	RO_PAT 0103	RO_VA 9395	RO_VA 0103	RO_EMP 9395	RO_EMP 0103	RO_EXP 9395	RO_EXP 0103
RO_BERD95	Pearson Correlation Sig. (2-tailed)	1	.	.	.	.	.	.	.	.	.
RO_BERD03	Pearson Correlation Sig. (2-tailed)	,649(**)	1	.	.	.	.	.	.	.	.
RO_PAT9395	Pearson Correlation Sig. (2-tailed)	,430	-,233	1	.	.	.	.	.	.	.
RO_PAT0103	Pearson Correlation Sig. (2-tailed)	,509	,355	-,316	1	.	.	.	.	.	.
RO_VA9395	Pearson Correlation Sig. (2-tailed)	,379	,121	-,252	,460	1	.	.	.	.	.
RO_VA0103	Pearson Correlation Sig. (2-tailed)	,390	,335	-,464	,168	,716(**)	1	.	.	.	.
RO_EMP9395	Pearson Correlation Sig. (2-tailed)	,395	,425(*)	-,349	,185	,613(**)	,717(**)	1	.	.	.
RO_EMP0103	Pearson Correlation Sig. (2-tailed)	,468	,422(*)	-,339	,191	,588(**)	,723(**)	,950(**)	1	.	.
RO_EXP9395	Pearson Correlation Sig. (2-tailed)	,116	,679(**)	-,511(*)	,342	,539(*)	,691(**)	,765(**)	,738(**)	1	.
RO_EXP0103	Pearson Correlation Sig. (2-tailed)	,154	,546(*)	-,435	,360	,469(*)	,689(**)	,631(**)	,668(**)	,871(**)	1
		,717	,035	,092	,171	,032	,001	,002	,001	,000	.

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

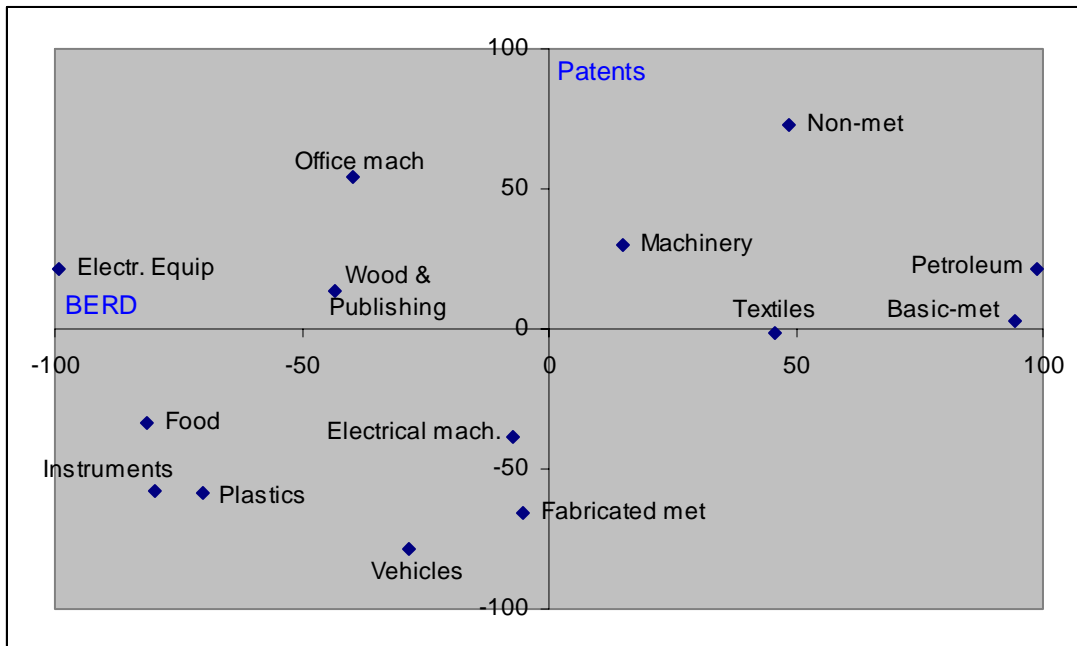
* Correlation is significant at the 0.05 level (2-tailed).

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



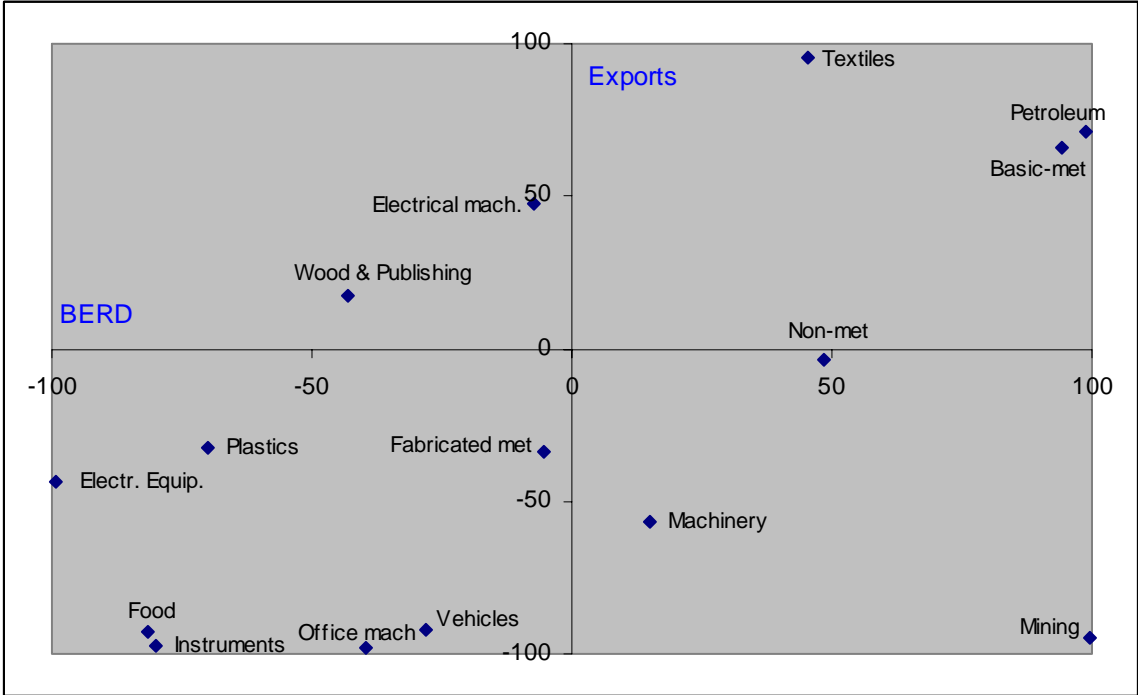
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 21. BERD versus patents. Specialisation indexes. Romania. 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. Romania. 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	23; 45; 72; 75-99			10-14; 26; 27; 36-37;	40-41;		17-19;		
Specialisation Patents	23;		2423;	20-22; 26; 27; 30; 32;		31; 34; 35	17-19;		
Specialisation Value Added	23; 352+359; 45;		60-63; 73; 74	15-16; 20-22; 26; 351; 40- 41;	01-05;	10-14; 24ex2423; 27; 30; 31; 32; 64;	17-19;		
Specialisation Employment			23; 352+359; 73	40-41;	01-05; 351; 353;	15-16; 26; 27; 29; 34;	17-19;		
Specialisation Exports	352+359;		23;	20-22; 31; 351;		01-05; 24ex2423; 26; 27; 36	17-19;		

Red numbers: Decrease specialisation from specialised to non specialised

Blue numbers: Increase specialisation from non specialised to specialised

Note: for the ISIC sectors 28, 29, 30,31, 32, 33, 34, 50-52 and 64, there are available data only for 2003. Due to non availability of time series data,

Specialization BERD is not presented in table 3.

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
Electr. equipment	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

