



COUNTRY SPECIALISATION REPORT

Country: Slovakia

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COUNTRY SPECIALISATION REPORT - SLOVAKIA

MAIN FINDINGS

Slovakia's economic specialisation spreads over a large number of sectors. Thus Slovakia during the 2001-03 period was specialised in terms of value added, exports and employment in manufacturing sectors such as furniture, transport equipment, electrical machinery, basic metals, plastics and textiles. In the tertiary sector it appears specialised in terms of value added and employment over the same period in sectors such as the telecommunications, transportation services and trade. However, there are no strong correlations (Table 2) in terms of economic specialisation, BERD and technological specialisation.

Over the period of analysis Slovakia witnessed one of the sharpest declines in R&D intensity in Europe. GERD as a percentage of GDP declined (Figure 1) from 1.4% in 1993 to 0.6% in 2003. This downward trend was exhibited by almost all components of GERD and particularly by BERD that dropped from 1% of GDP in 1993 to 0.3% in 2003. Similarly HERD as a percentage of GDP was halved and during 2003 amounted to 0.2% of GDP. Only GOVERD exhibited an opposite trend which was not sufficient to reverse the overall negative trend.

These trends had also an impact on the sources of funding for research (Table 2). Thus while during 1994 business enterprises provided the bulk (59.9%) of funding for research, their share was reduced to 38.3% by 2004 and the government became the most important funding source contributing 57.1% of GERD. Moreover, the increase for funding from abroad was not enough in order to compensate for the reduction of business expenditure, since funding from abroad accounted for only 2.1% of enterprises R&D intramural expenditure in 2004.

The decline in business expenditure can also be depicted in the increased share of basic research in GERD (Figure 2). Thus while during 1994 the share of basic research was 24.7%, in 2003 it climbed to 37.3%. Correspondingly, the share of applied research fell from 54% to 44.7%. This negative impact was also depicted in terms of GBAORD priorities (Figure 3). Thus during 2003, Slovakia was specialised in only four socioeconomic objectives, social issues, other civil research, agriculture and non-oriented research. Furthermore, over the 1993-2003 period Slovakia lost its specialisation in four more socioeconomic objectives, human health, land use, industry and the environment.

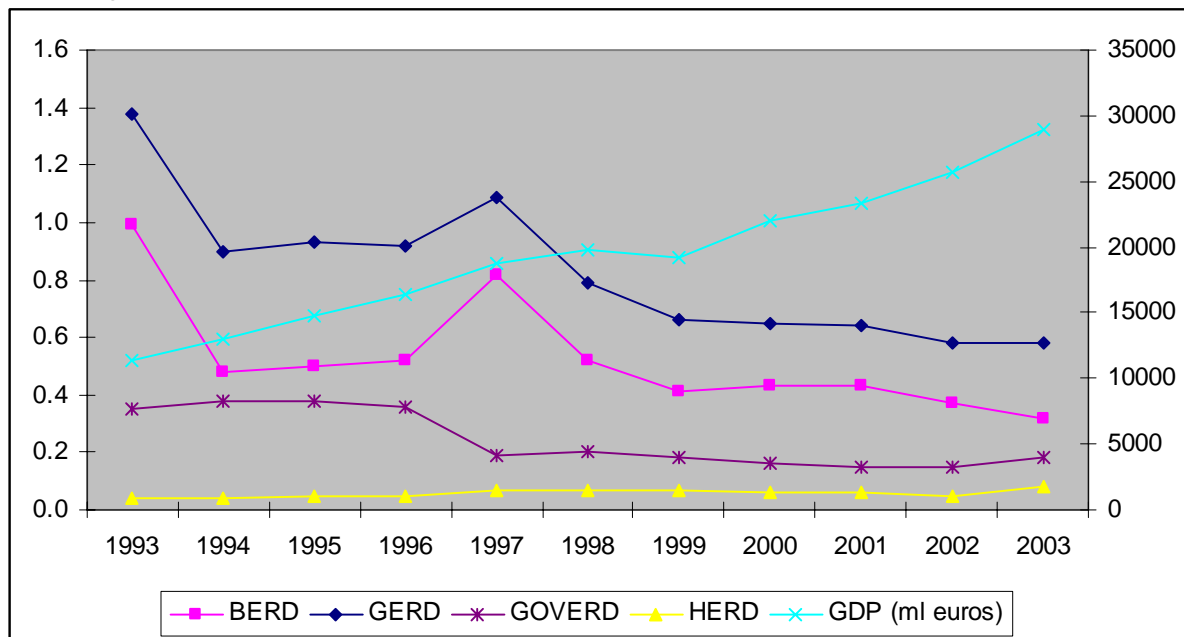
Important changes also occurred in the composition of HERD in terms of scientific fields (Figure 4). Thus, the share of engineering sciences in HERD was reduced from 40.7% in 1996 to 22.5%, while the share of natural sciences increased to 41.5%. Similar trends prevailed also in public research centers with the shares in GOVER (Figure 5) of engineering and agricultural sciences being reduced while the share of natural sciences increased.

This increased focus in natural sciences is also depicted in terms of scientific specialisation (Figure 9), where Slovakia is specialised in physics, chemistry and biology, while in terms of citations (Figure 11) it also appears specialised in mathematics, material sciences and engineering sciences. In addition, in terms of technological specialisation (Figure 12), Slovakia is highly specialised in a limited number of sectors, namely pharmaceuticals, chemicals and food. Moreover, over the 1993-2003 period, Slovakia became underspecialised in several sectors such as furniture, transport equipment and vehicles.

Regarding BERD specialisation (Figure 6) Slovakia is specialised on a limited number of sectors, such as business activities, research and development, basic metals and plastics. Public support for R&D (Figure 8) in Slovakia is also limited on a very small number of sectors the majority of which coincide with those where Slovakia is specialised in terms of BERD, i.e agriculture, plastics, other business activities and research and development.

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). Slovakia. 1993-2003.



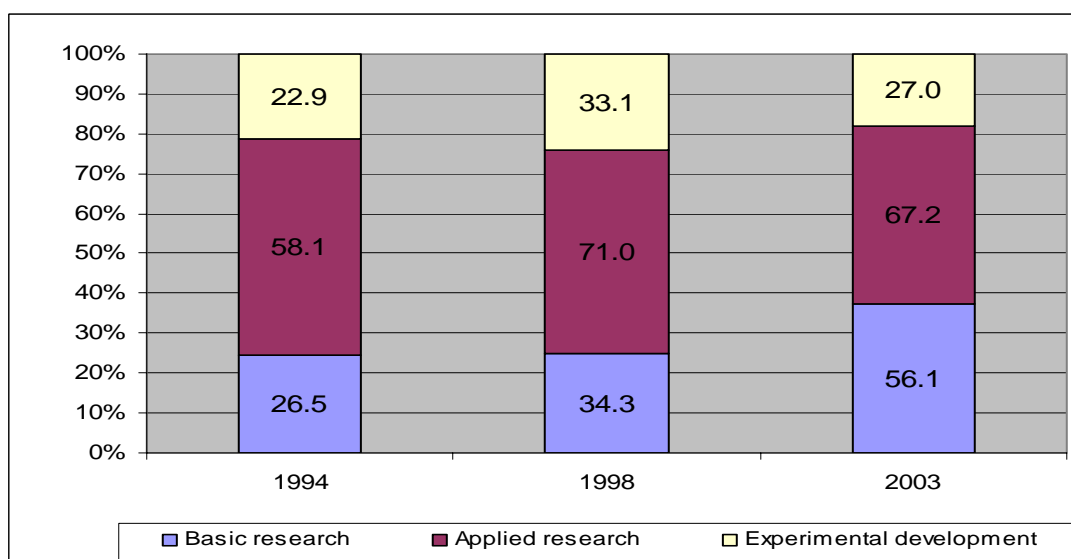
Source : OECD, Main Science and Technology Indicators, November 2005.

Table 1. R&D expenditure by sector of performance and source of funds .Slovakia. 1994 and 2004. Million Euros. Current prices.

	GOVERD		BERD		HERD		Non profit		Total	
	1994	2004	1994	2004	1994	2004	1994	2004	1994	2004
Business	19.2	5.6	55.1	60.6	0.1	0.2	0.0	0.2	74.4	66.5
Government	33.0	43.5	9.0	23.1	5.9	32.6	0.0	0.1	47.9	99.3
Higher Education	0.0	0.0	0.0	0.0		0.4	0.0	0.0	0.0	0.5
Non profit	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0
From Abroad	0.3	3.8	1.2	1.8	0.1	1.8	0.0	0.0	1.6	7.5
Total	52.6	53.0	65.4	85.5	6.1	35.0	0.0	0.3	124.1	173.8

Source: OECD OFFBERD 2005

Figure 2. GERD by type of research. Slovakia. 1994, 1998 and 2003

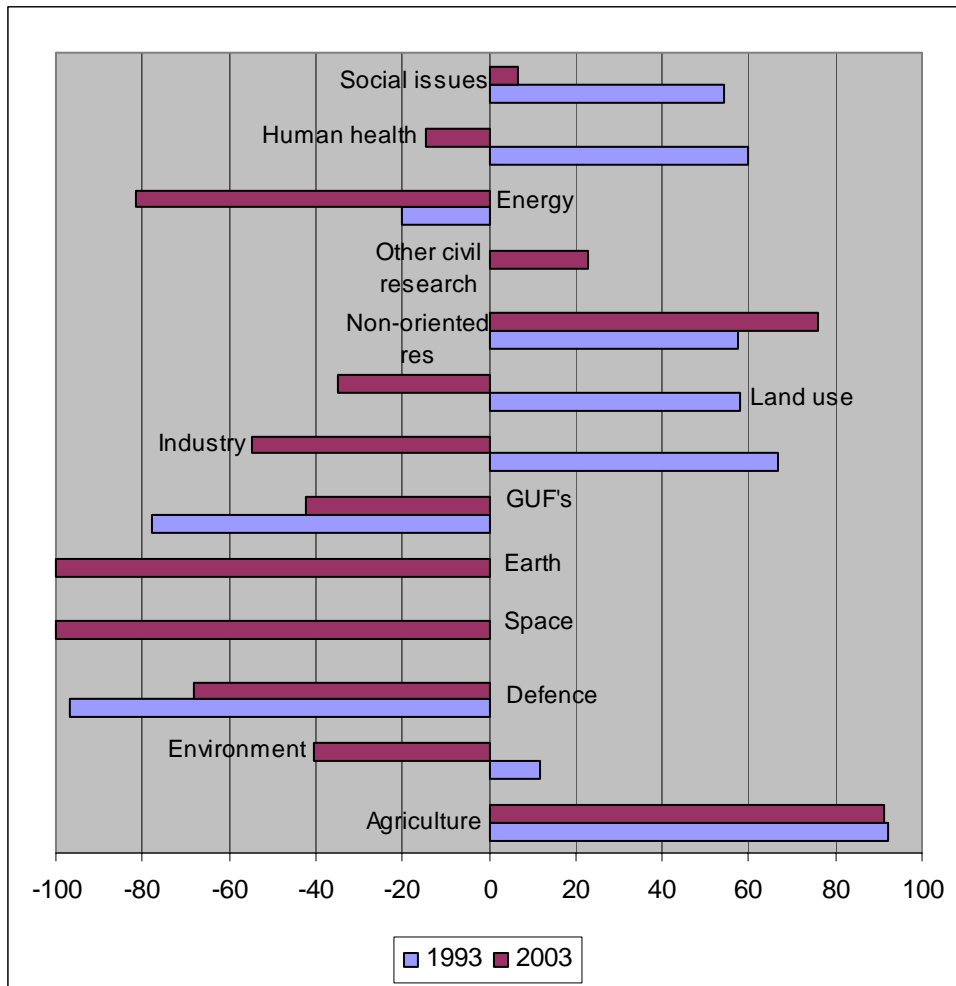


Source: OECD OFFBERD 2005

PUBLIC R&D STATISTICS

GBAORD by socioeconomic objective

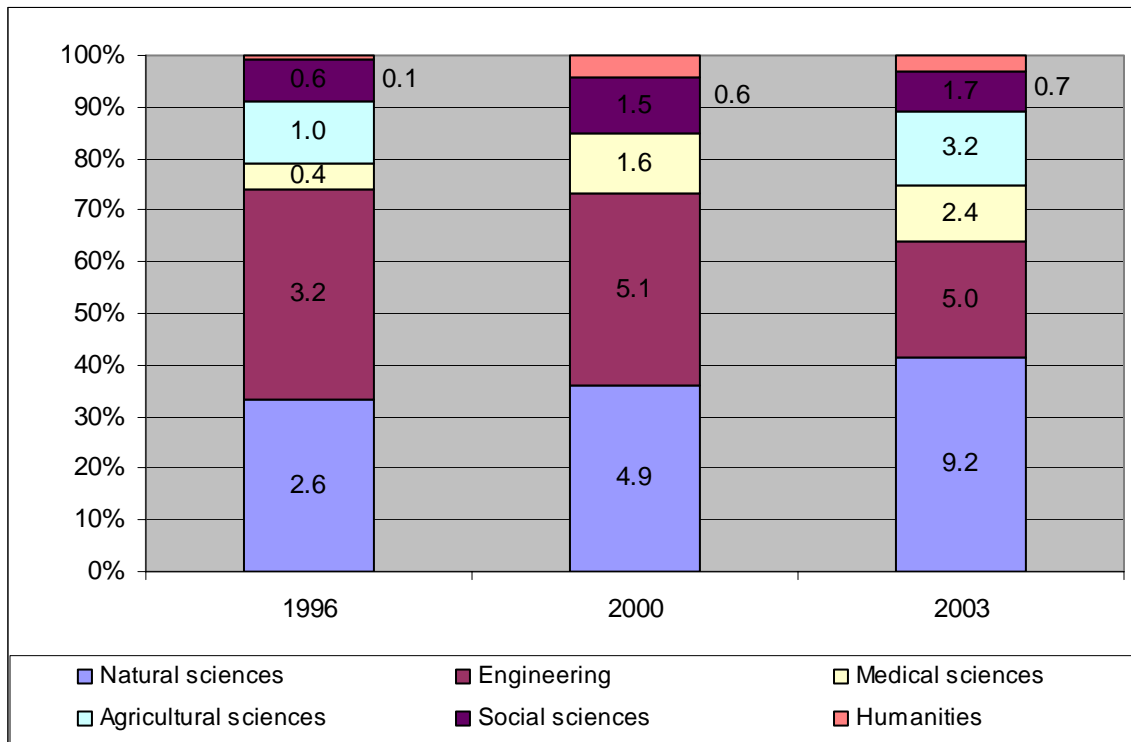
Figure 3. Government Budget Appropriations or Outlays for R&D (GBAORD) by socio-economic objective. Specialisation profile. Slovakia. 1993 and 2003.



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

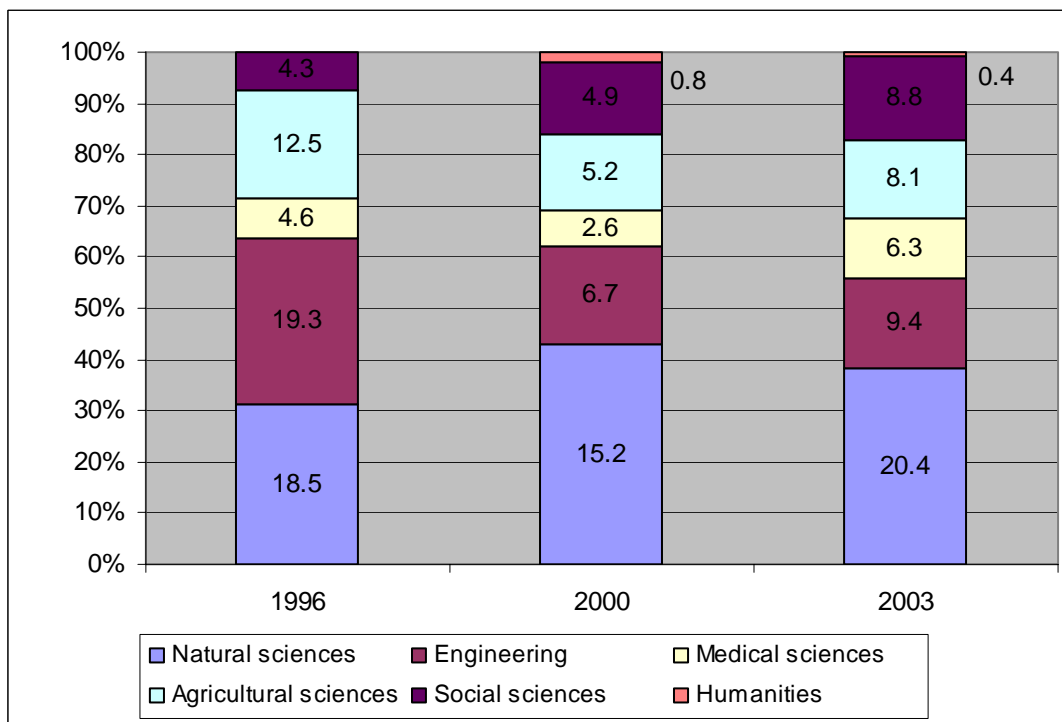
HERD by field of science

Figure 4. Expenditure on R&D in the Higher Education Sector (HERD) by field of science. Slovakia. 1996, 2000 and 2003. Per cent of total HERD and in million Euros.



Source: OECD OFFBERD 2005

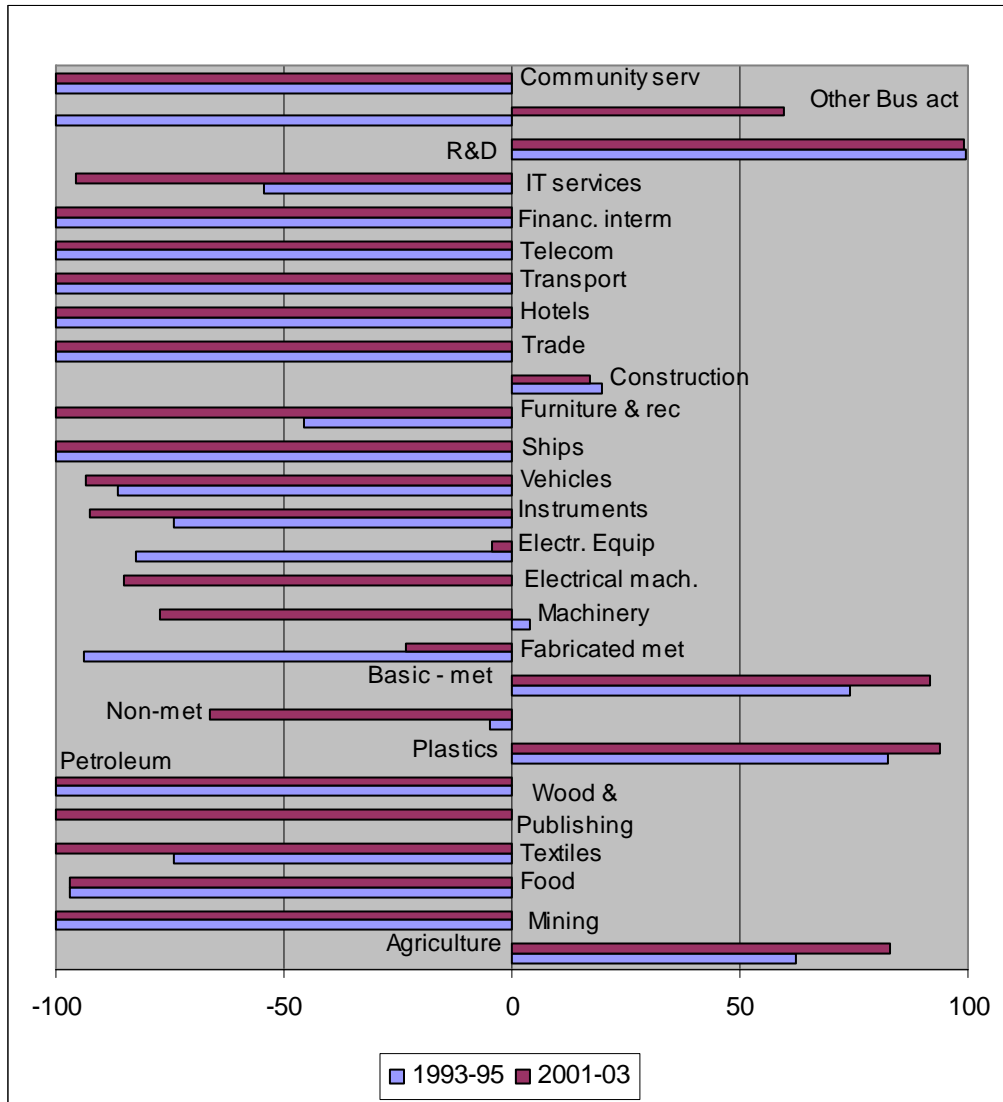
Figure 5. Expenditure on R&D in the Government sector (GOVERD) by field of science. Specialisation profile. Slovakia. 1996, 2000 and 2003.



Source: OECD OFFBERD 2005

BUSINESS ENTERPRISE INTRAMURAL EXPENDITURE ON R & D (BERD)

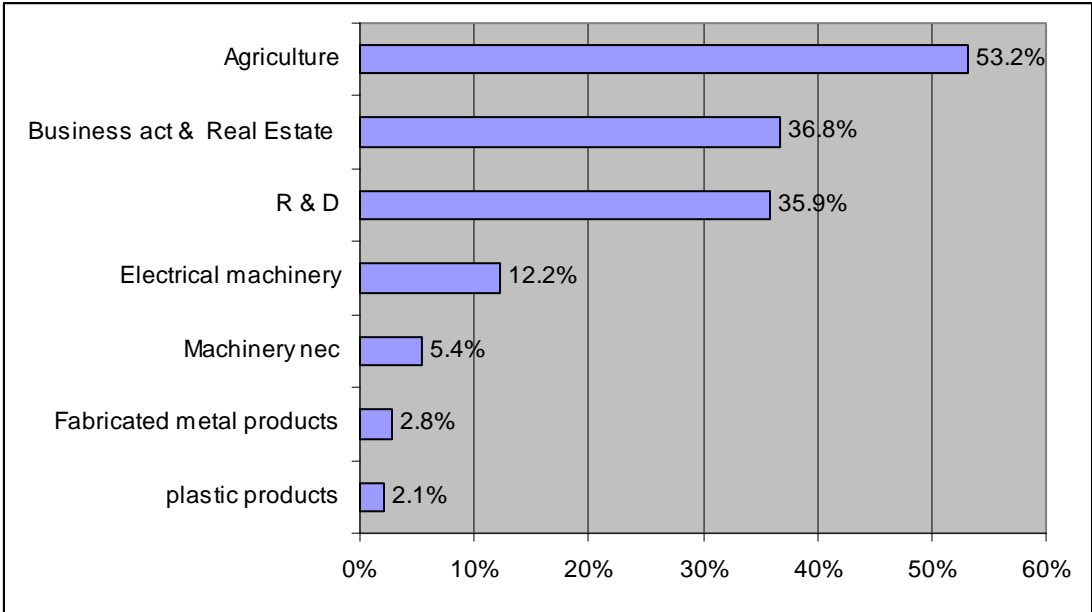
Figure 6. Business enterprise intramural expenditure on R&D by industrial sector. 31 sectors. Specialisation profile. Slovakia. Averages 1993-1995 and 2001-2003.



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

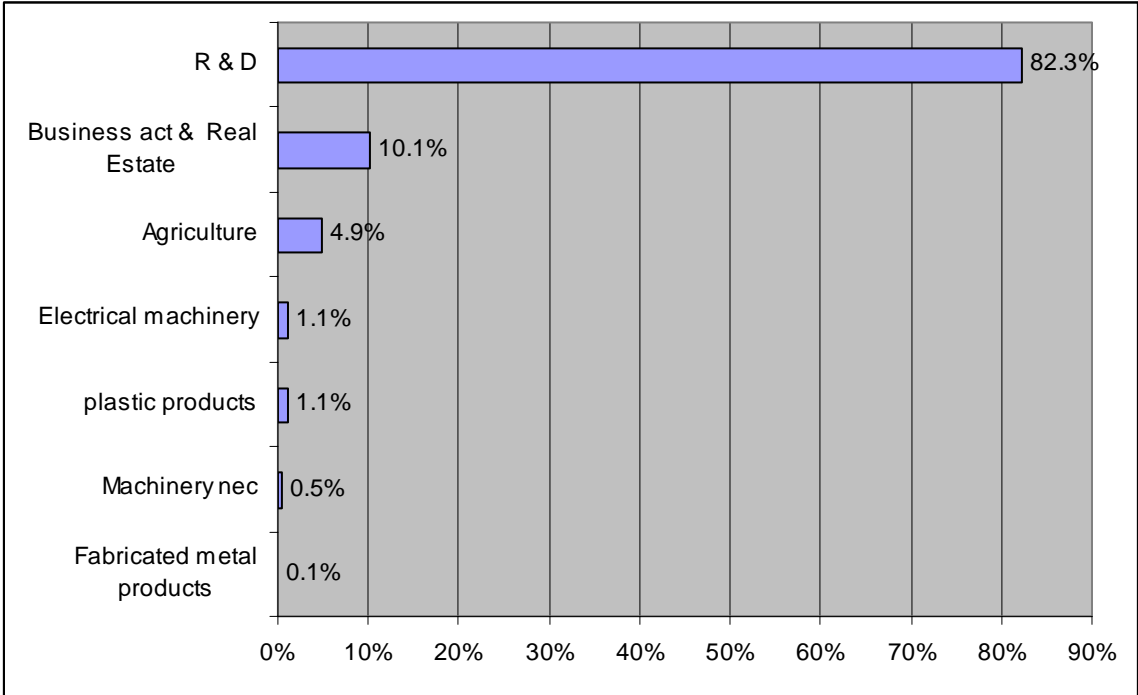
Source: OECD Basic Science and Technology Statistics 2005, ANBERD 2005, own calculations

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



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

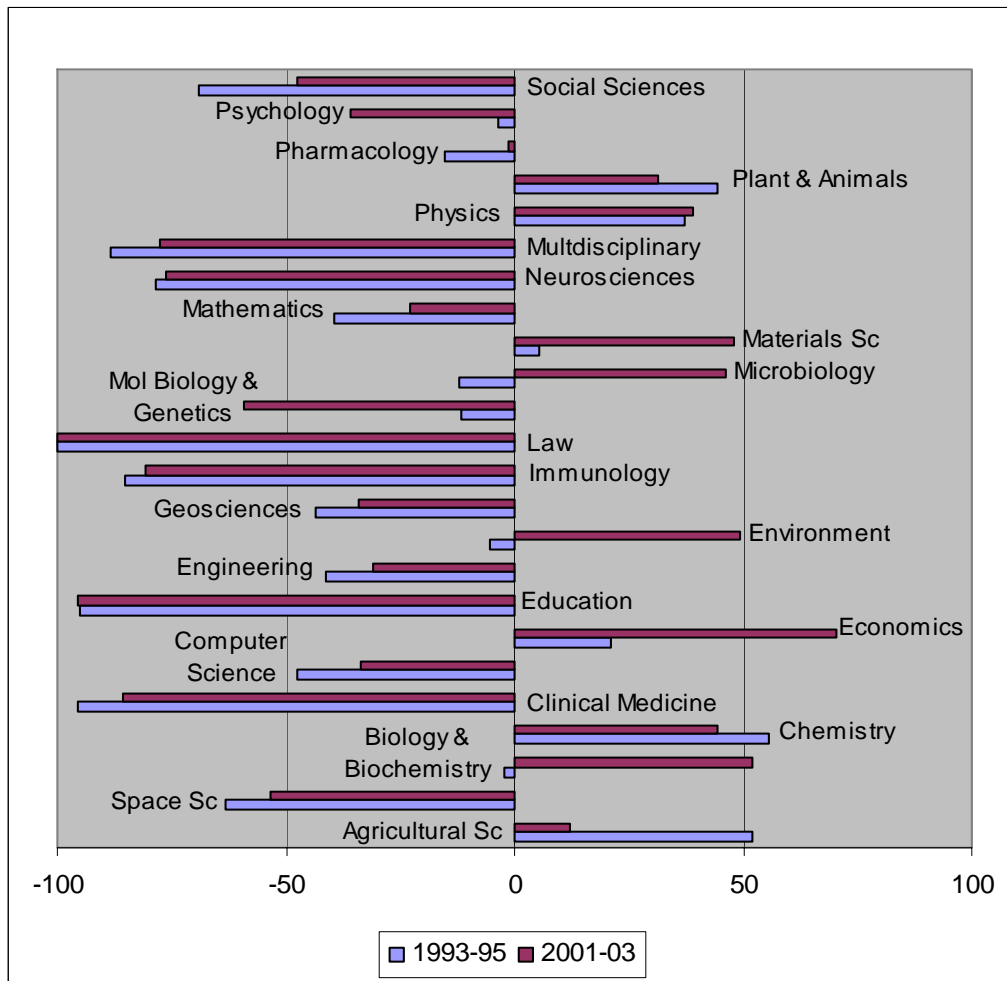
Figure 8. Shares of total government funding of Business enterprise intramural expenditure on R&D (BERD) by industrial sectors. 2003 last available year in OECD statistics.



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

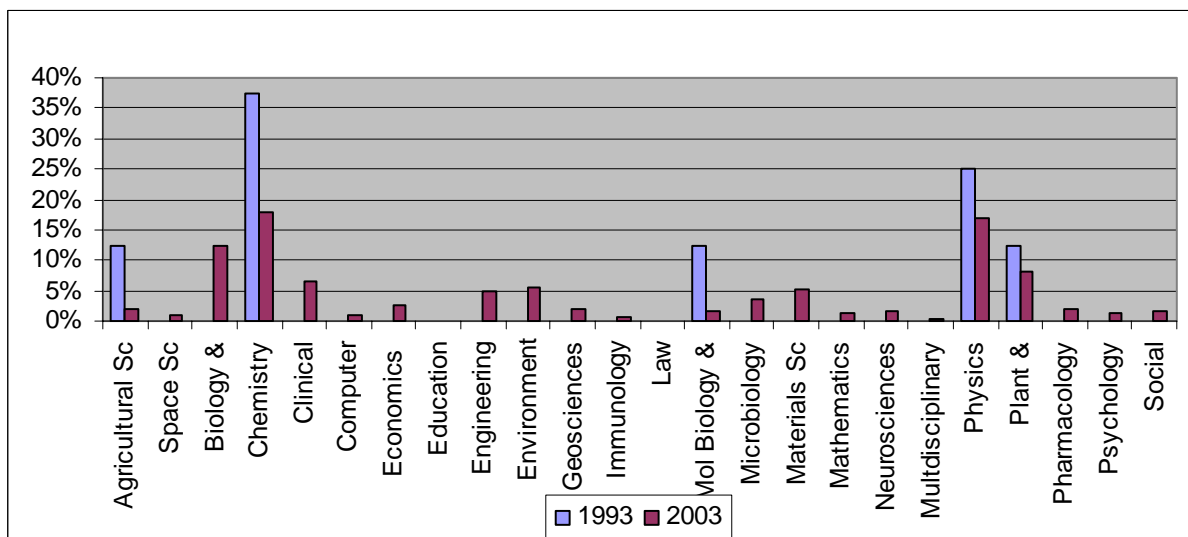
BIBLIOMETRICS

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



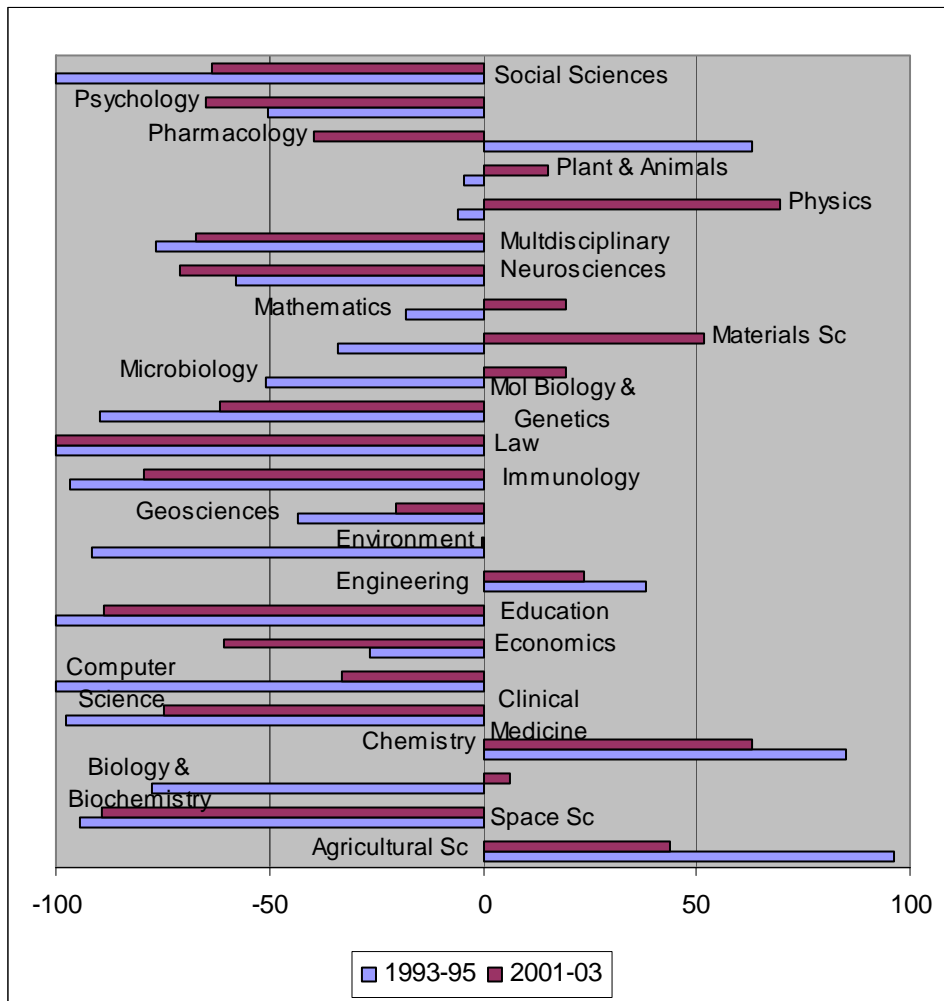
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100. Source: Thomson ISI, NSIODE 2005, own calculations.

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



Source: Thomson ISI, NSIODE 2005.

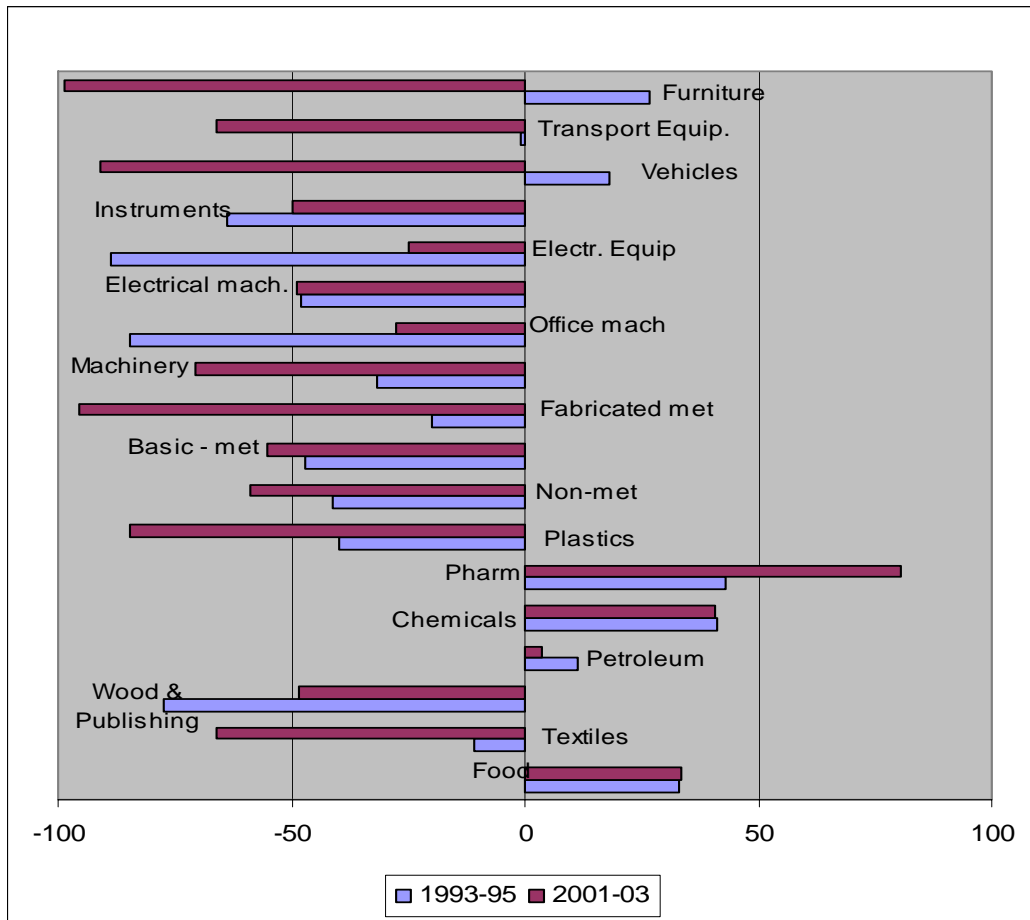
Figure 11. Number of citations by scientific field. 25 scientific fields. Specialisation profile. Slovakia. Averages 1993-1995 and 2001-2003. Five years citation window. (i.e. citations to papers published in the period 1989-1991 and in the period 1997-1999).



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

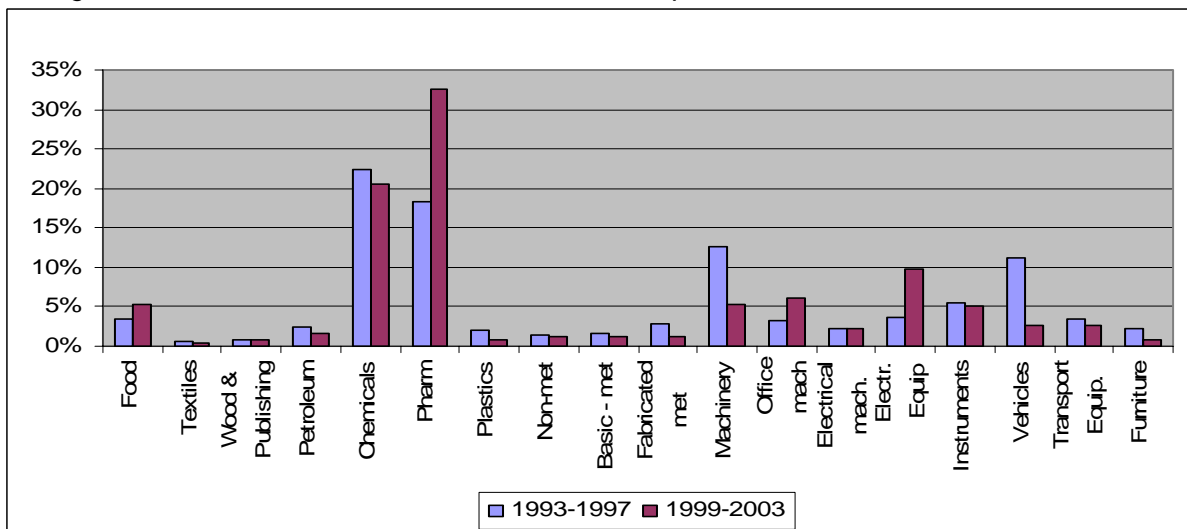
PATENTS

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

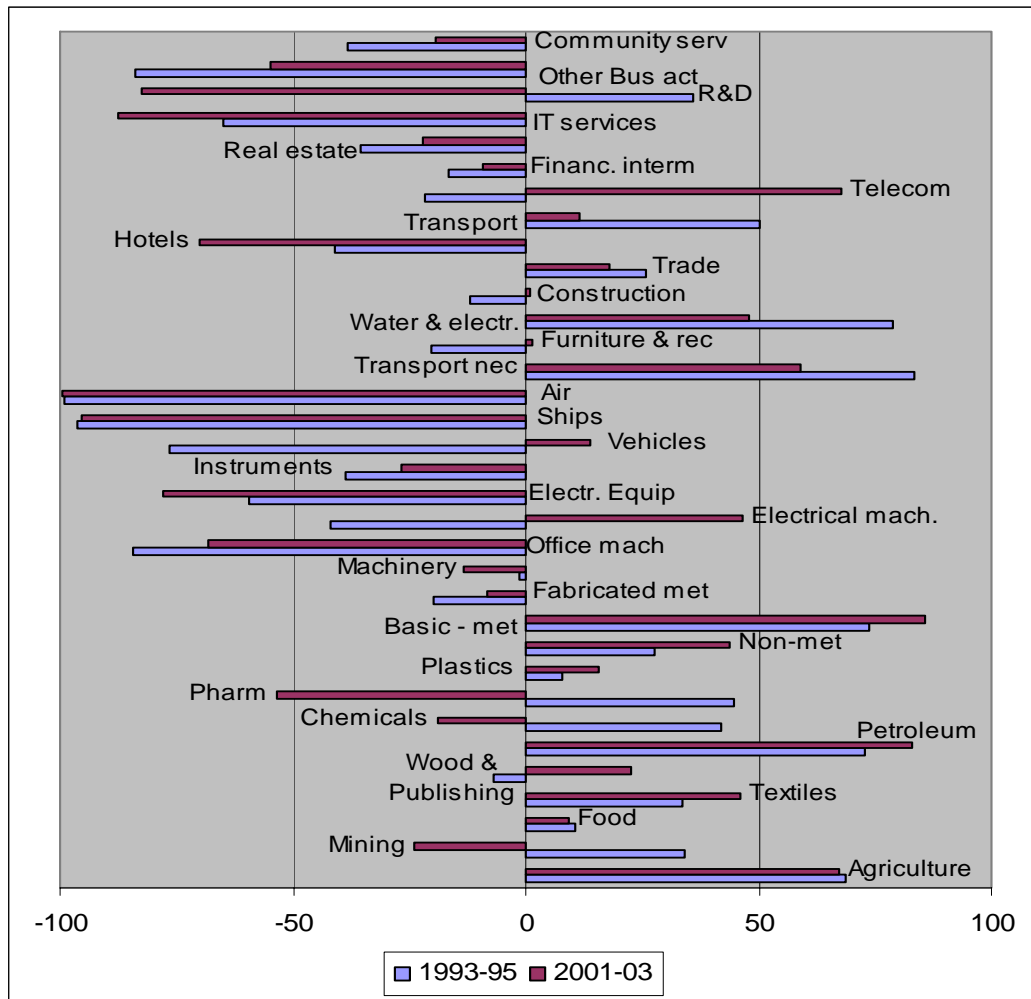
Figure 13. Shares of total patents by industrial sector. 18 sectors in manufacturing. Slovakia. Averages 1993-1997 and 1999-2003. Based on correspondence matrix ISI-SPRU-OST.



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

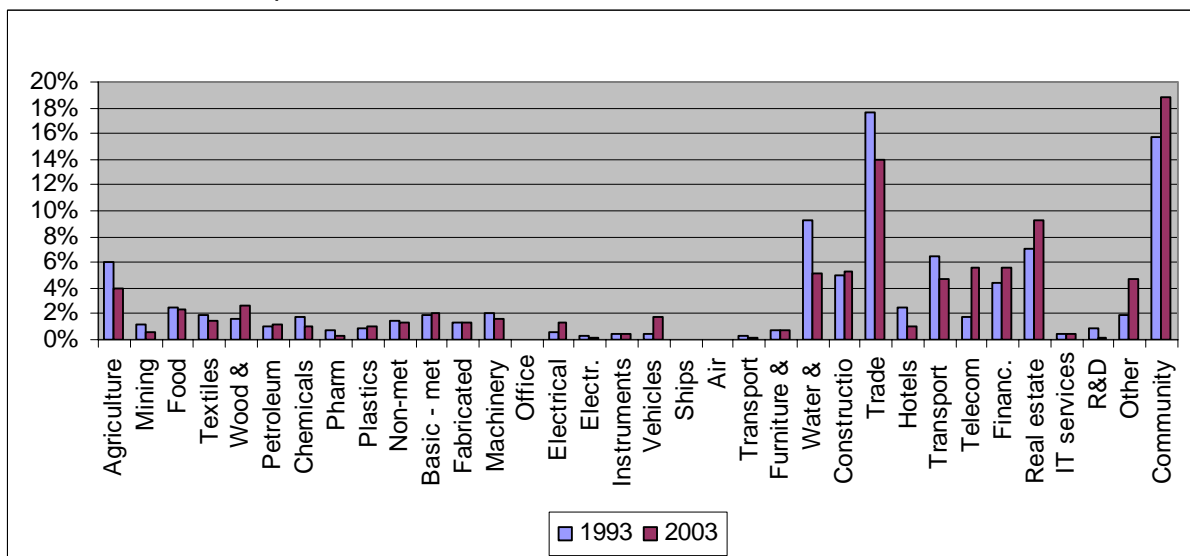
ECONOMIC SPECIALISATION

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



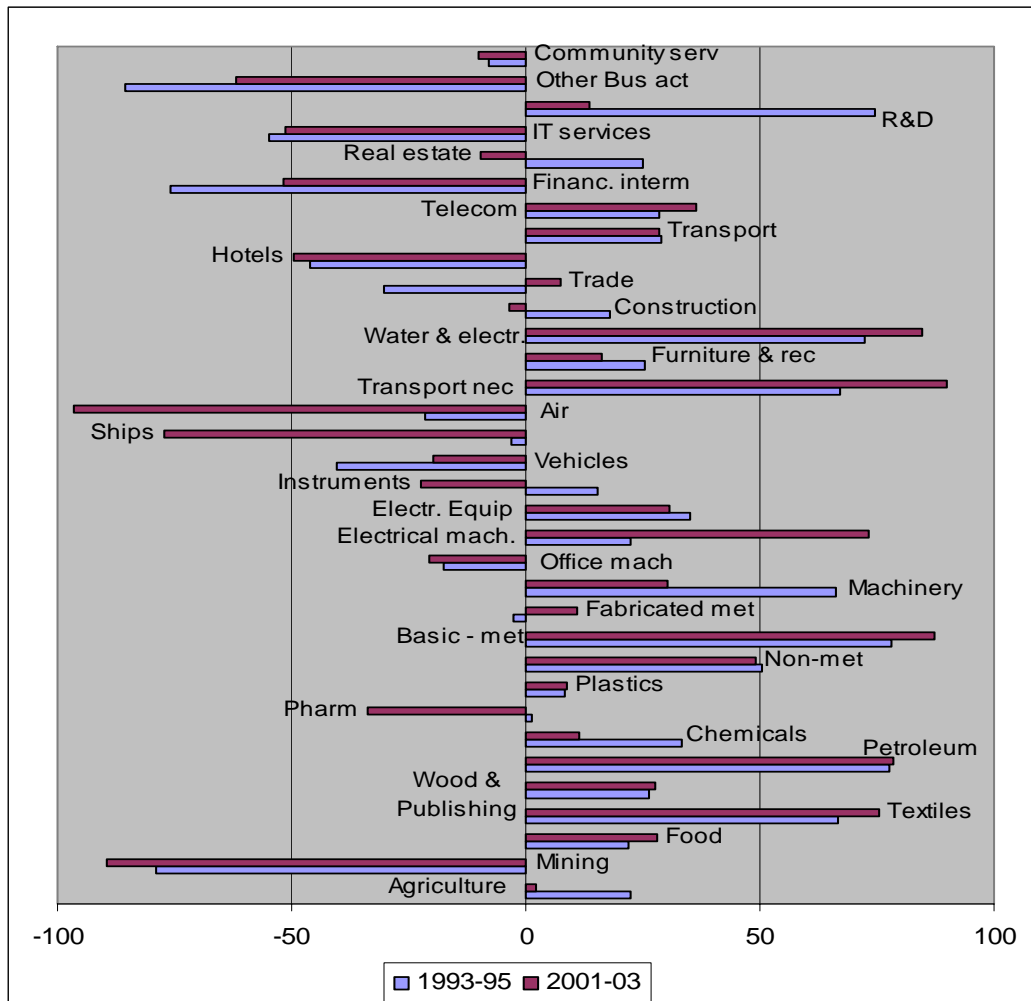
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN 2005, own calculations.

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



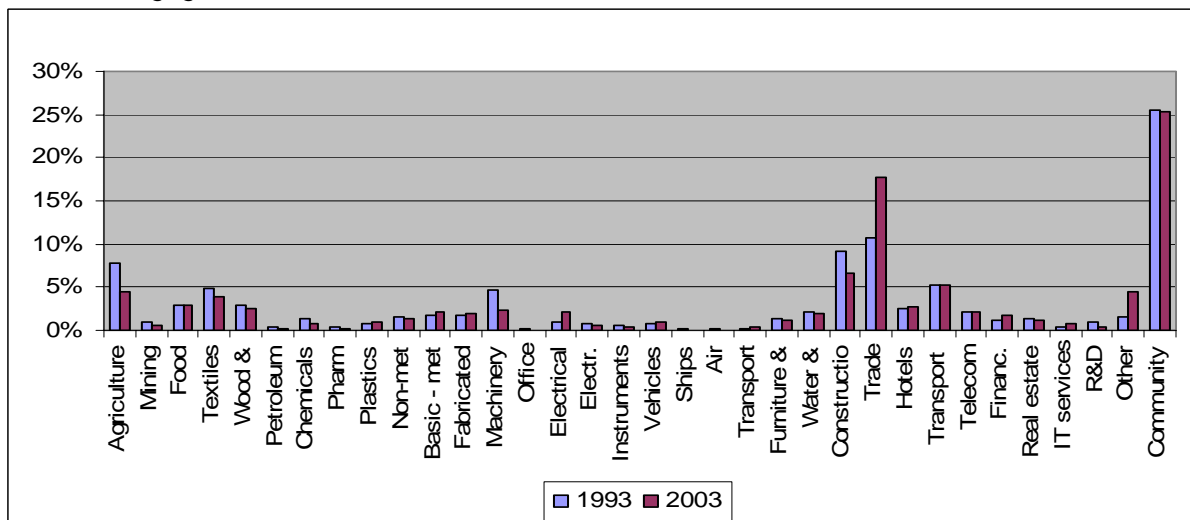
Source: OECD, STAN, 2005.

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



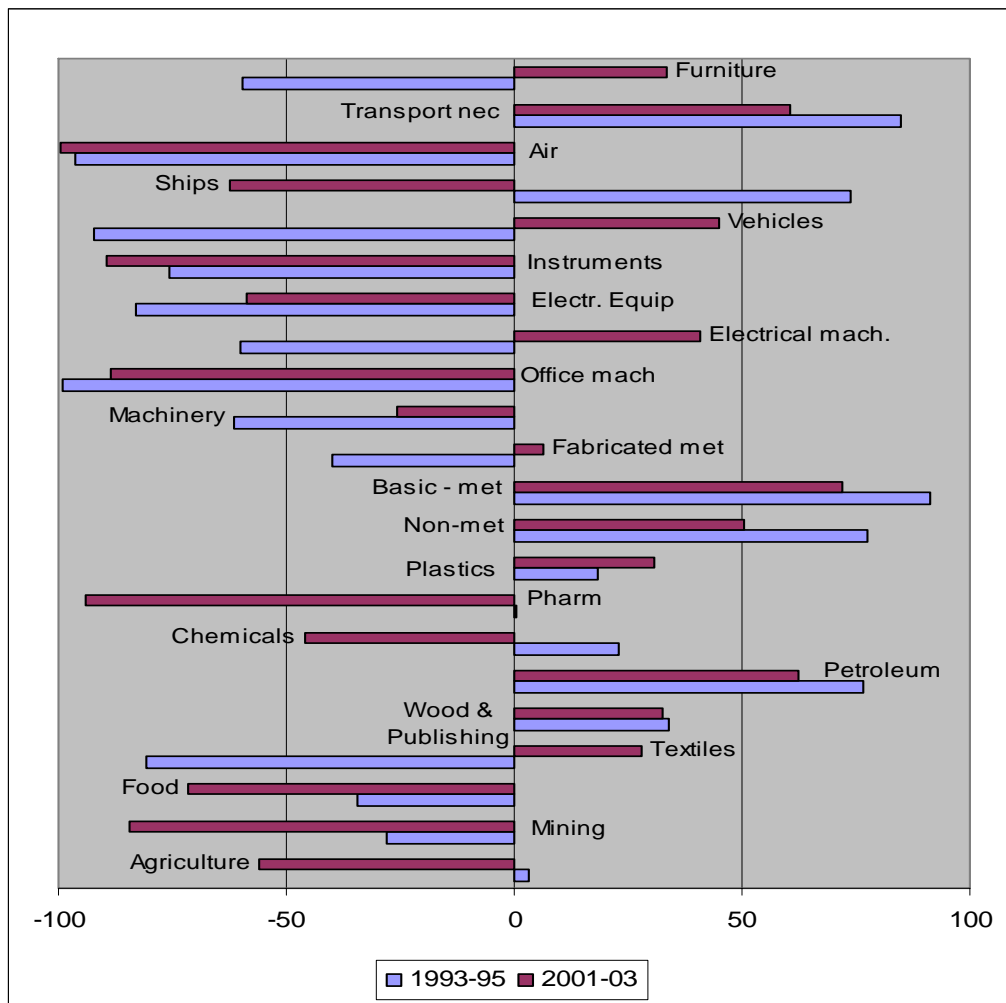
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: OECD, STAN, 2005, own calculations.

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



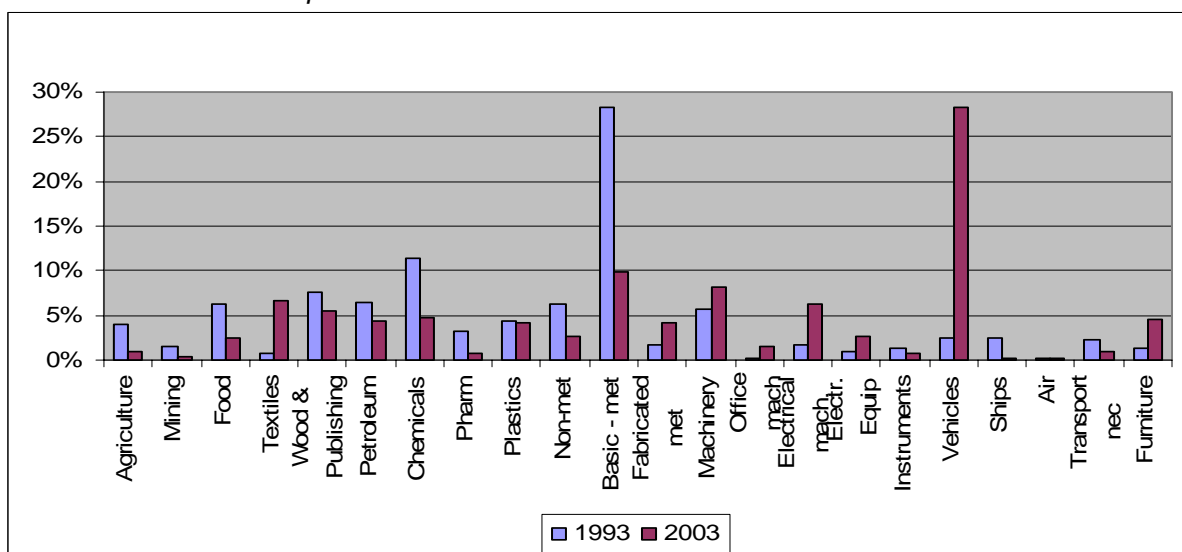
Source: OECD, STAN, 2005.

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

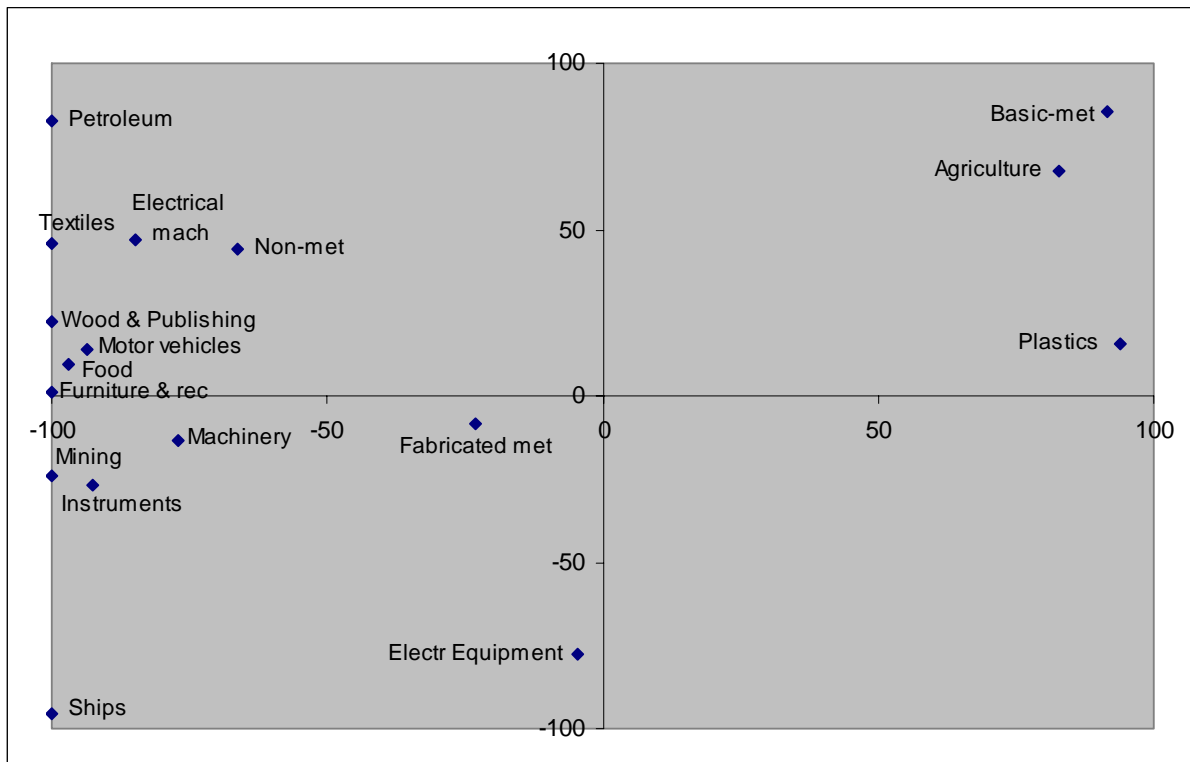
Correlations

	SK_BERD 9395	SK_BERD 0103	SK_PAT 9395	SK_PAT 0103	SK_VA 9395	SK_VA 0103	SK_EMP 9395	SK_EMP 0103	SK_EXP 9395	SK_EXP 0103
SK_BERD9395 Pearson Correlation Sig. (2-tailed)	1									
SK_BERD0103 Pearson Correlation Sig. (2-tailed)	.788** .000	1								
SK_PAT9395 Pearson Correlation Sig. (2-tailed)	-.353 .260	-.361 .205	1							
SK_PAT0103 Pearson Correlation Sig. (2-tailed)	-.340 .279	-.207 .478	.390 .121	1						
SK_VA9395 Pearson Correlation Sig. (2-tailed)	.431* .031	.244 .220	.428 .087	.378 .134	1					
SK_VA0103 Pearson Correlation Sig. (2-tailed)	.182 .385	.018 .930	.140 .591	-.260 .314	.661** .000	1				
SK_EMP9395 Pearson Correlation Sig. (2-tailed)	.481* .015	.202 .312	-.047 .857	.056 .832	.588** .000	.504** .003	1			
SK_EMP0103 Pearson Correlation Sig. (2-tailed)	.318 .122	.110 .585	-.118 .653	-.151 .562	.625** .000	.763** .000	.835** .000	1		
SK_EXP9395 Pearson Correlation Sig. (2-tailed)	.360 .188	.286 .265	.120 .646	.235 .365	.607* .003	.457* .033	.436* .043	.333 .130	1	
SK_EXP0103 Pearson Correlation Sig. (2-tailed)	.322 .241	.119 .648	.003 .992	-.565* .018	.371 .089	.775** .000	.541** .009	.754** .000	.435* .043	1

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

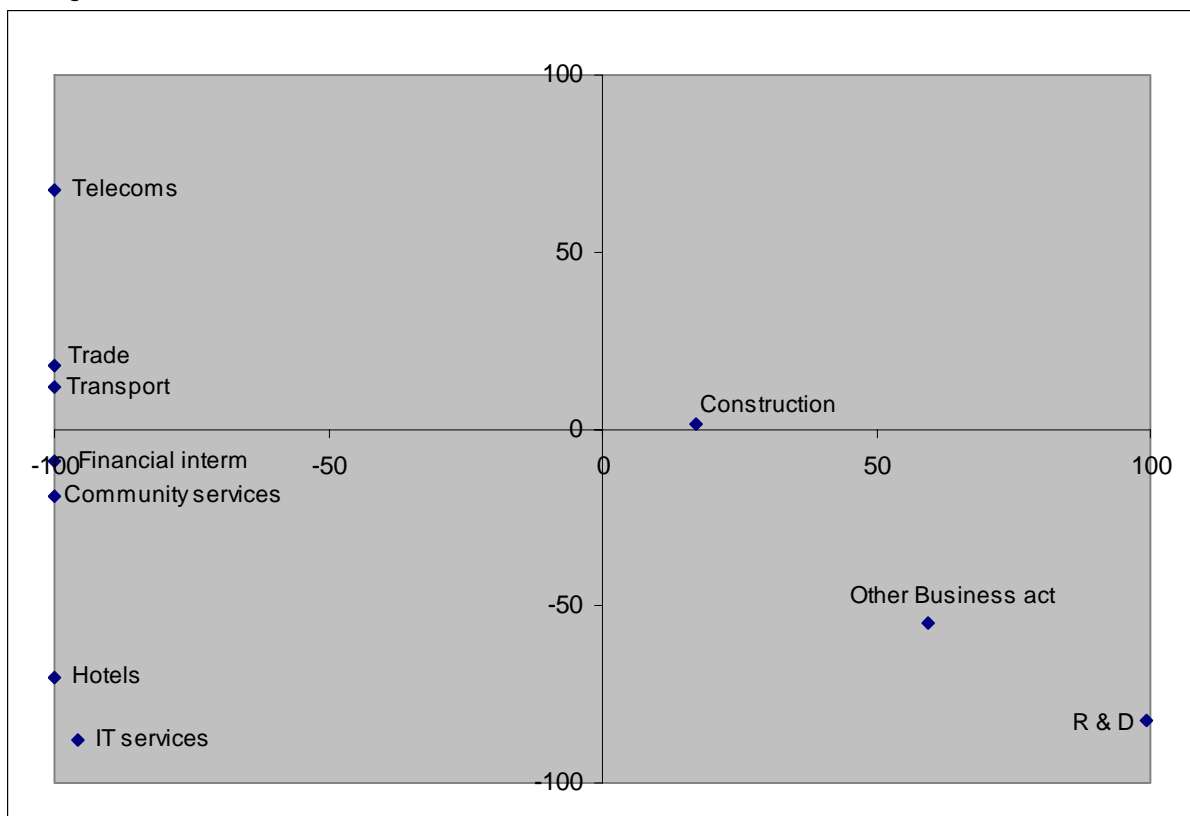
* Correlation is significant at the 0.05 level (2-tailed).

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



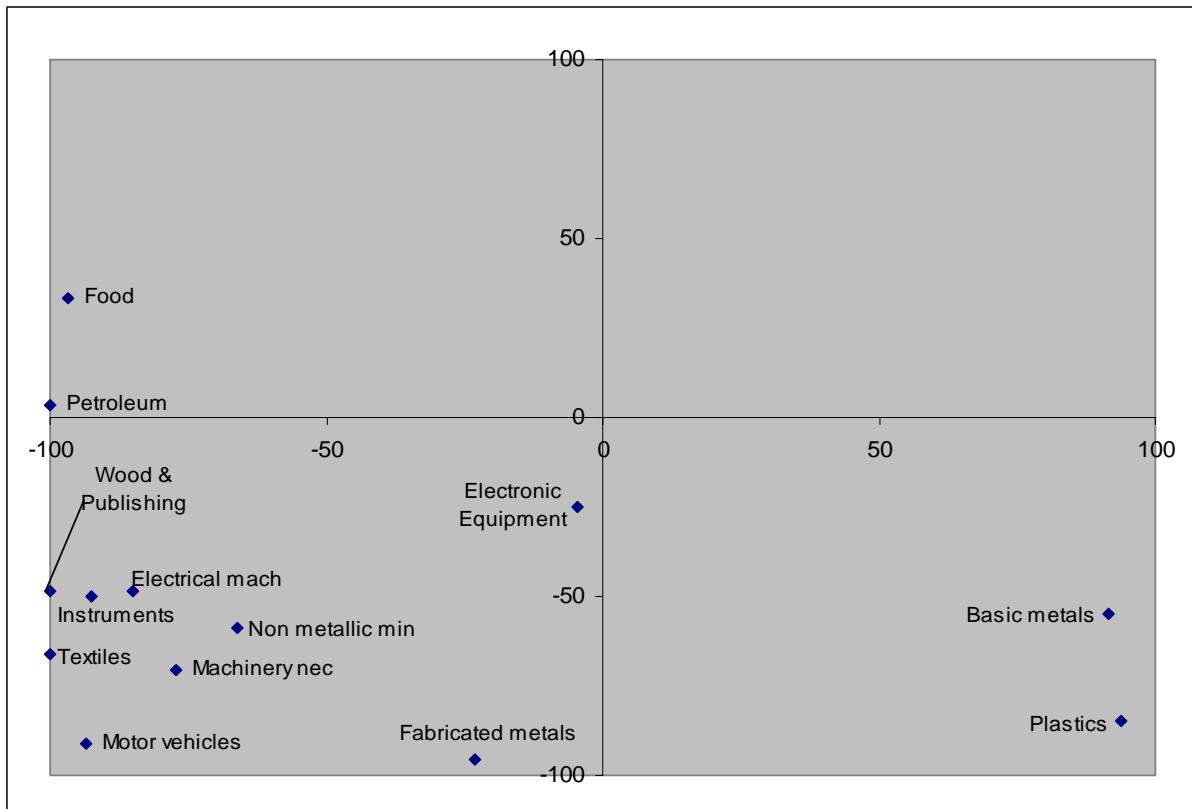
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

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



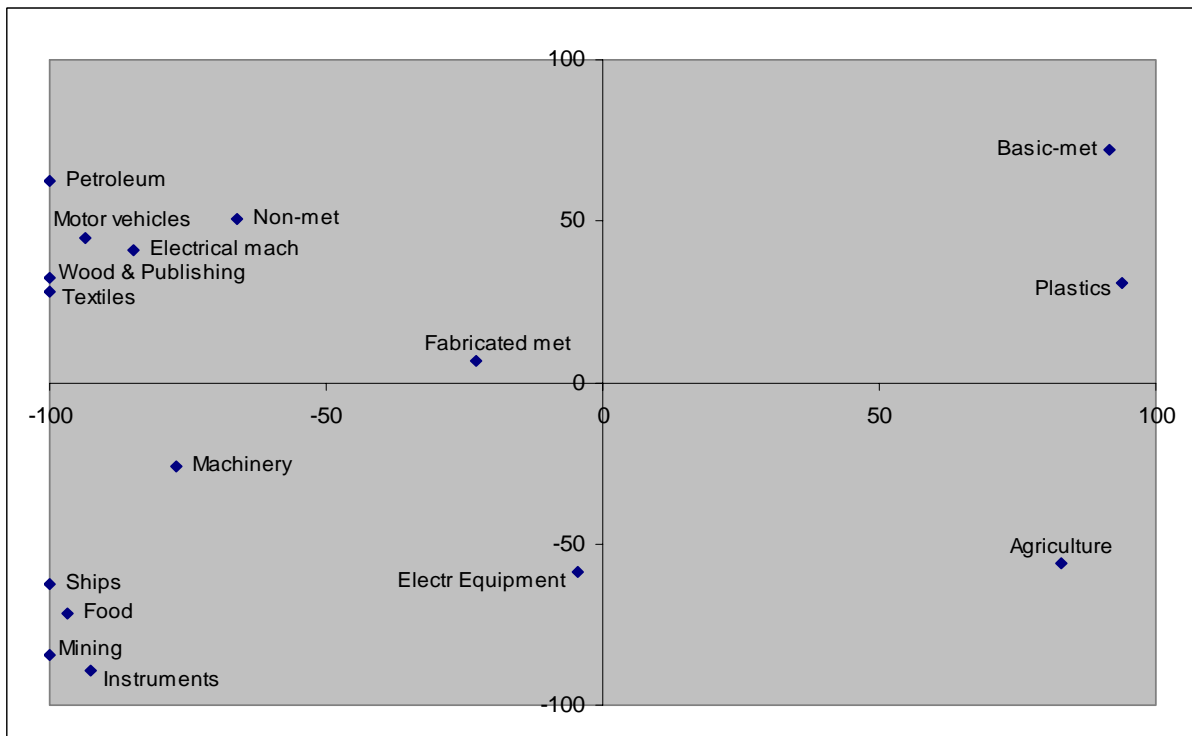
Notes: Specialisation index with EU15 as reference. Max specialisation: + 100. Min. specialisation: -100.
Source: Own calculations

Figure 22. BERD versus patents. Specialisation indexes. Slovakia. 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. Slovakia. 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	74;	45; 73;		01-05; 25; 27;		29;			
Specialisation Patents	2423;		23;		15-16; 24ex2423;	34; 36			
Specialisation Value Added	23; 45;		2423; 352+359; 50-52; 60-63; 73	20-22; 25; 26; 27; 31; 34; 36-37; 64;	01-05; 15-16;	10-14; 24ex2423; 40-41;	17-19;		
Specialisation Employment	352+359; 50-52;	23; 60-63;	2423; 45; 73	15-16; 27; 28; 31; 40-41; 64;	20-22; 25; 26;	01-05; 24ex2423; 29; 32; 33; 36-37; 70-71	17-19;		
Specialisation Exports			23; 2423; 352+359;	25; 28; 31; 34;36	20-22;	01-05; 24ex2423; 26; 27; 351;	17-19;		

Red numbers: Decrease specialisation from specialised to non specialised

Blue numbers: Increase specialisation from non specialised to specialised

Note: For ISIC sectors 20-22 and 31, there are no available time series data, so the trend for these sectors 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
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

