Chapter II – R&D Inputs

This Research, Development and Innovation (R&D&I) Analysis 2006 measures the R&D inputs within one chapter. The number of indicators was reduced in comparison with the last year's analysis; only those most important were selected.

Chapter II has two parts:

- Part II.1 - Inputs into R&D according to the state budget documents and data entered in the R&D Information System
- Part II.2 - Outputs of R&D and their international comparison according to the Main Science and Technology Indicators (MSTI) of OECD[1]

Part II.1 shows 12 graphs and 5 tables with commentaries on the trends of overall R&D support from public funds, trends of two basic forms of state support – targeted and institutional, trend of overall support and both forms of support at the main support providers. A basic element of targeted support is the research project, a basic element of institutional support is the research plan. In addition, this part analyses the trends in targeted support and institutional support provided to research plans in individual Czech regions and number of R&D workers in these regions. Part II.1 ends with graphs depicting the amount of public funds provided for projects and research plans in the main disciplines (fields) of research and development and graphs illustrating the age structure of principal investigators of these projects and research plans.

The institutional support depicted in graphs, tables and commentaries, which measure the public support to R&D in regions, includes only support that is given to research plans. The institutional support, however, does not take into account the support given to specific research at higher education institutions (hereafter universities).

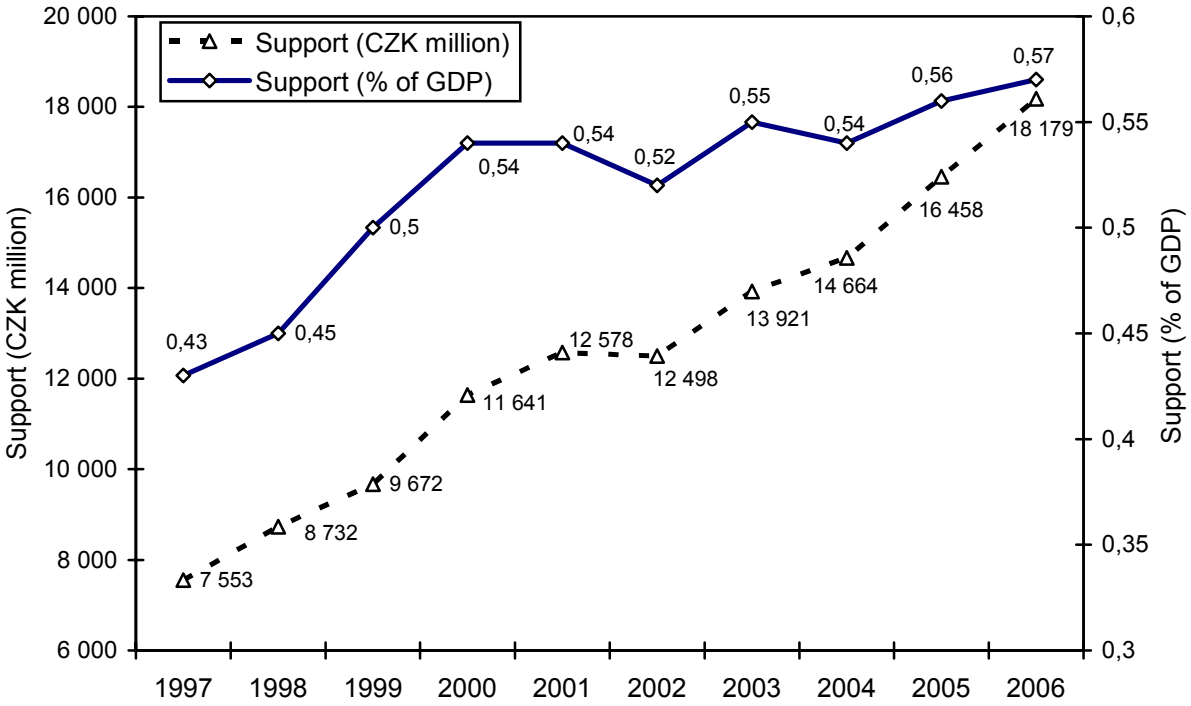
Basically, the value of all indicators in Part II.1 is growing in an agreeable manner. What is not so agreeable is the continuing trend towards concentration of R&D workers, as well as concentration of public institutional support for research plans and targeted R&D support, in three regions: the capital of Prague, South Moravia and Central Bohemia. In 2001-2005, more than 80 % of institutional support for research plans and targeted R&D support flew into these three regions. Serious problem is also the age structure of principal investigators of research plans. A marked peak of numbers of principal investigators is in the categories from 56 to 65 years (Graph II.1.12).

Part II.2 shows 11 graphs and 1 table with commentaries. As for the human resources in R&D, the numbers of R&D employees and research workers are measured per 1,000 workforce and in conversion on full time equivalent. The table in this part shows data on age structure of scientists and engineers in selected countries in 2004 taken from the Eurostat document. The part on funding shows data on trends of total R&D expenditures and expenditures from main sources (public, private and foreign). This part also gives data on funds spent in three main sectors (private, public/governmental and at universities). The set of evaluated countries is the same as in R&D Analyses from the years 2004 and 2005.

As for the numbers of R&D employees and research workers in the new EU Members States, with the exception of Slovenia these numbers are basically half in comparison with the average of enlarged EU-25. Czechia significantly lags behind the EU-25 average in the number of Science&Engineering study programmes graduates, too. The same applies also to total R&D expenditures expressed as % of GDP. In this indicator Czechia lags behind Slovenia, but is ahead of other monitored new EU Member States. At the same time, the relativity of the indicator (% of GDP) must be taken into account. The EU-15 countries attain substantially higher values of GDP which further increas the difference in actual expenditures expressed in monetary units. According to Graph I.1 in Chapter I the value of GDP per capita in Czechia was only 74% of the EU-25 average in 2005. This situation must be respected especially when interpreting indicators of R&D outputs given in Chapter III of this Analysis.

[1] This part uses also some other Eurostat documents.

II.1.1 Trend of overall R&D support from public funds (CZK mil and % of GDP)



Source: State budget of the Czech Republic, years 1997–2006

Note: The figures referring to GDP and state R&D support are based on data published by the Ministry of Finance. The latter differ from data promulgated by the Czech Statistical Office that are used in Part 2 of this chapter. The support is reported in current prices of respective years.

The public R&D expenditures in monetary units grew relatively quickly during the whole period, with the exception of 2002. The growth measured as a share of gross domestic product (GDP) has been basically stagnating since 2003 due to a dynamic GDP growth in these years. The following table shows expenditure increments in monetary units expressed in % of expenditures of the preceding year. Expenditures are reported in prices of respective years.

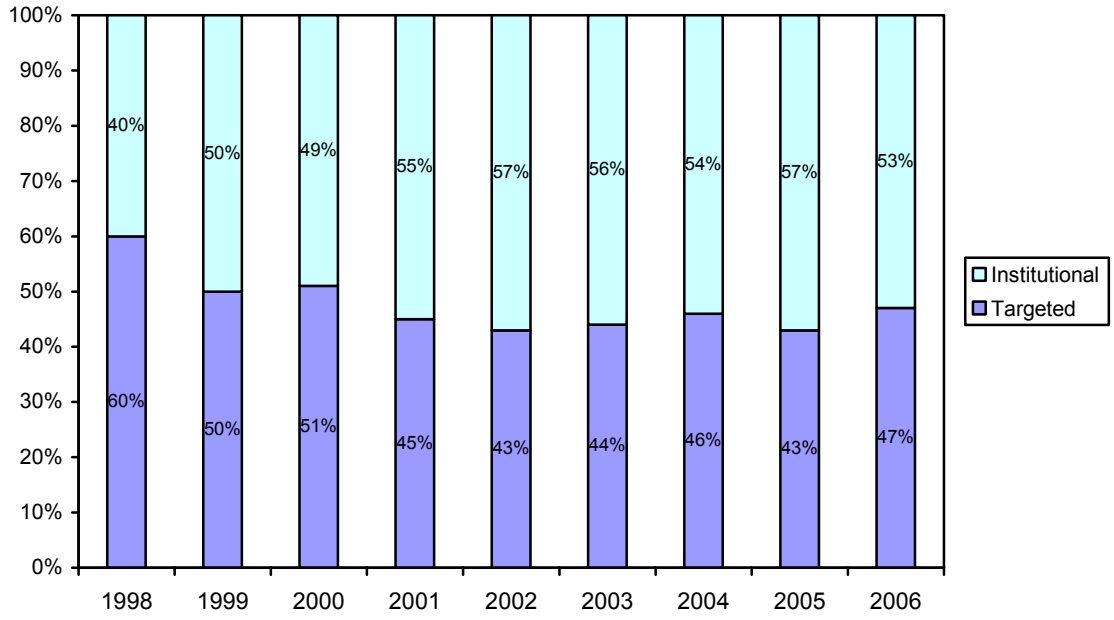
Table II.1.1 The growth of public R&D expenditures

(in % of expenditures of the preceding year)

1998	1999	2000	2001	2002	2003	2004	2005	2006
15.1	10.9	27.6	8.7	-6.4	11.4	5.3	12.2	10.5

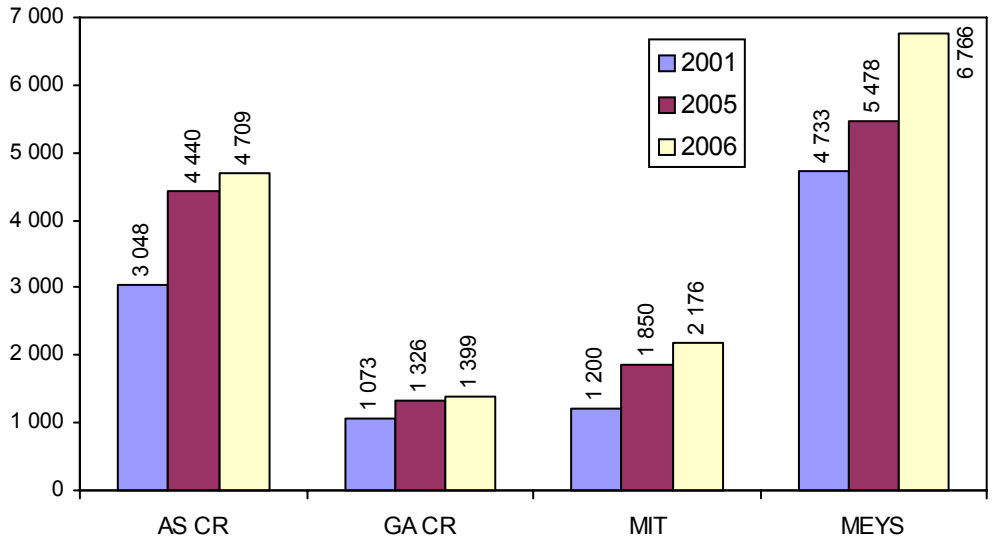
The increments are higher than in most EU-25 countries. Of the monitored countries, only Austria and Denmark have been attaining a quicker pace of growth.

II.1.2 R&D expenditures – shares of targeted and institutional support in the overall public R&D expenditures



Source: State budget of the Czech Republic, years 1998-2006

II.1.3 Trend of overall R&D support from public funds by selected providers (CZK mil)



Source: State budget of the Czech Republic, years 2001–2006

Note: AS CR – Academy of Sciences of the Czech Republic, GA CR – Grant Agency of the Czech Republic, MIT – Ministry of Industry and Trade, MEYS – Ministry of Education, Youth and Sport. Figures are reported in current prices of respective years.

Graph II.1.3 shows the trend of overall R&D support from public funds with the largest four providers. The support takes two forms: targeted and institutional. Other large providers are the Ministry of Health, Ministry of Agriculture and the Ministry of Environment. Each of the above ministries provided annually a total support in the range of hundreds of millions of Czech crowns. The overall support has been experiencing a moderate growth in the course of the monitored period – the most with the Ministry of Agriculture and the least with the Ministry of Environment, where the year 2005 was marked by a slight decline in connection with completion of several R&D programmes. All three above ministries provide both targeted and institutional support.

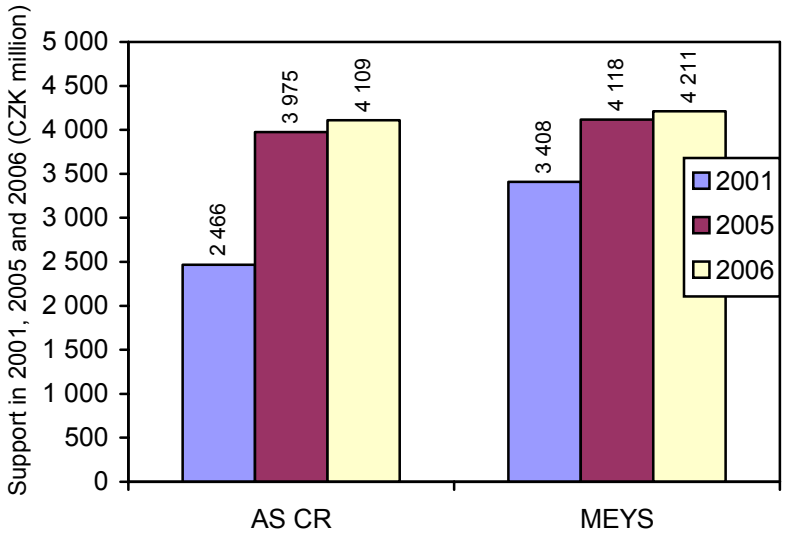
Targeted support to research and development is provided on the basis of public tenders for research projects proposals applying for the support within research programmes with specifically defined objectives and scope or within the framework of the so called grant projects in a wide spectre of disciplines. Institutional support is awarded on the basis of research plans to larger teams of research workers, or entire organisations, as the case may be. Research plan proposals must also go through evaluation.

Institutional funding on the basis of research plans was introduced into the Czech system of public R&D support in 1999. Until 1998, the public research organisations (institutes of AS CR, universities and departmental research organisations) have been supported by subsidies which became basically the call element of the support. Unfortunately, one of the objectives of this support to introduce higher dynamics into the structure of research institutions was not met. The main reason was that they were predominantly state contributory organisations, the merger, foundation, etc. of which was in principle restricted by Act No. 219/2002 Coll. An improvement should be obtained by Act No. 341/2005 Coll. on Public Research Institutions and Act No.342/2005 Coll. on amendments to some acts in connection with the adoption of the Public Research Institutions Act.

The trend of targeted and institutional support is illustrated on Graph II.1.2. In 1998, the share of targeted support in the overall public support was a relatively favourable one (60 %). In the next years it went down to 43 % in 2002. This year, the Research and Development Council sets the objective to increase step by step the share of targeted support at the expense of the institutional support. This trend has not been successfully started yet. In 2005, the share of targeted funding fell to 43 %. In 2006, this share has to increase to 47 % according to the approved state budget. This unsatisfactory development is caused by a large persistence of the whole system of R&D support. The institutional support on the basis of research plans is being approved for the period of 4 to 5 years. And as for the targeted support, no proposals of research programmes of adequate quality were prepared, which could be approved by the Government and notified to the European Commission.

In Czechia, the support from public funds is provided to R&D in principle by all ministries and central administration authorities. This large diversification of support brings also problems with coordination and management. Largest providers are the Ministry of Education, Youth and Sport (hereinafter referred to as “MEYS”), Academy of Sciences of the Czech Republic (hereinafter referred to as “AS CR”), Ministry of Industry and Trade (hereinafter referred to as “MIT”) and the Grant Agency of the Czech Republic (hereinafter referred to as “GA CR”). The trend of support with these providers is shown on Graph II.1.3. The share of MEYS as the largest provider in the overall support in the years 2001 and 2006 moderately exceeded 37%. The share of the above four providers in the overall support grew from 79.9% in 2001 to 82.8 % in 2006.

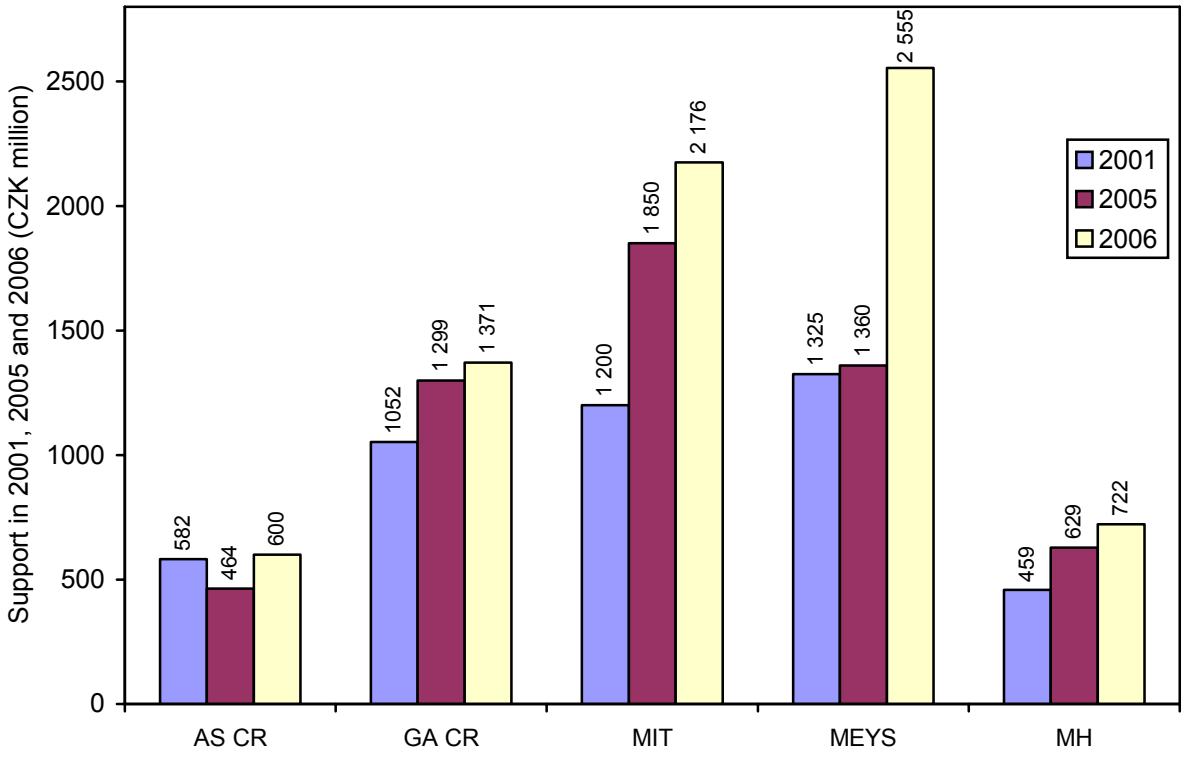
II.1.4 Trend of institutional support awarded to research by selected providers (CZK million)



Source: State budget of the Czech Republic, years 2001–2006

Note: AS CR – Academy of Sciences of the Czech Republic, MEYS – Ministry of Education, Youth and Sport.
Figures are reported in current prices in respective years.

II.1.5 Trend of targeted support awarded to research and development by selected providers (CZK million)



Source: State budget of the Czech Republic, years 2001–2006

Note: AS CR – Academy of Sciences of the Czech Republic, GA CR – Grant Agency of the Czech Republic, MIT – Ministry of Industry and Trade, MEYS – Ministry of Education, Youth and Sport, MH - Ministry of Health

Graphs II.1.4 and II.1.5 show the trends of institutional and targeted support for selected providers. The trend of institutional support is given only for MEYS and AS CR. The Ministry of Industry and Trade is not a founder of any institutionally supported research organisation, has no departmental research institution. GA CR uses the institutional support of only a minor scope to cover the costs of its administrative apparatus. The Ministry of Education, Youth and Sport provides institutional support to research plans of universities and legal entities meeting conditions for the institutional support award[2]. In addition, MEYS provides support to the so called specific research at universities, i.e. research, in which students participate.

Targeted support on Graph II.1.5 mentions in addition the Ministry of Health providing nearly three quarters of a billion crowns of targeted support to its research institutions in 2006. The largest providers of targeted support are MEYS, MIT and GA CR. These three providers provided 63.2 % of the overall targeted support in Czechia in 2001; in 2006, this share has already amounted to 71.4 %.

Graph II.1.6 on the following page illustrates the trend of institutional support awarded to research plans in individual regions of Czechia. It is based on data from R&D IS and therefore the figures do not include support awarded to specific research at higher education institutions. Considering the large differences in amounts of institutional support, the graph is divided into two parts with different scales of support amount. The institutional support concentrates into three regions: the capital of Prague, South Moravian Region and Central Bohemian Region.

The following table shows the trend of shares of institutional support for research plans in the capital of Prague and for all three largest beneficiaries on the overall institutional support awarded to research plans in Czechia.

Table II.1.2 Shares of selected regions in the overall institutional support awarded to research plans

Regions	Shares (%)		
	2001	2003	2005
The capital of Prague	68.3	69.0	67.1
The capital of Prague, South Moravian Region and Central Bohemian Region	90.2	90.1	87.9

In the monitored years, more than two thirds of institutional support for research plans was directed to the capital of Prague. Three regions with the largest support participate in the overall institutional support for research plans by more than 85%.

Next table gives data on targeted support shares.

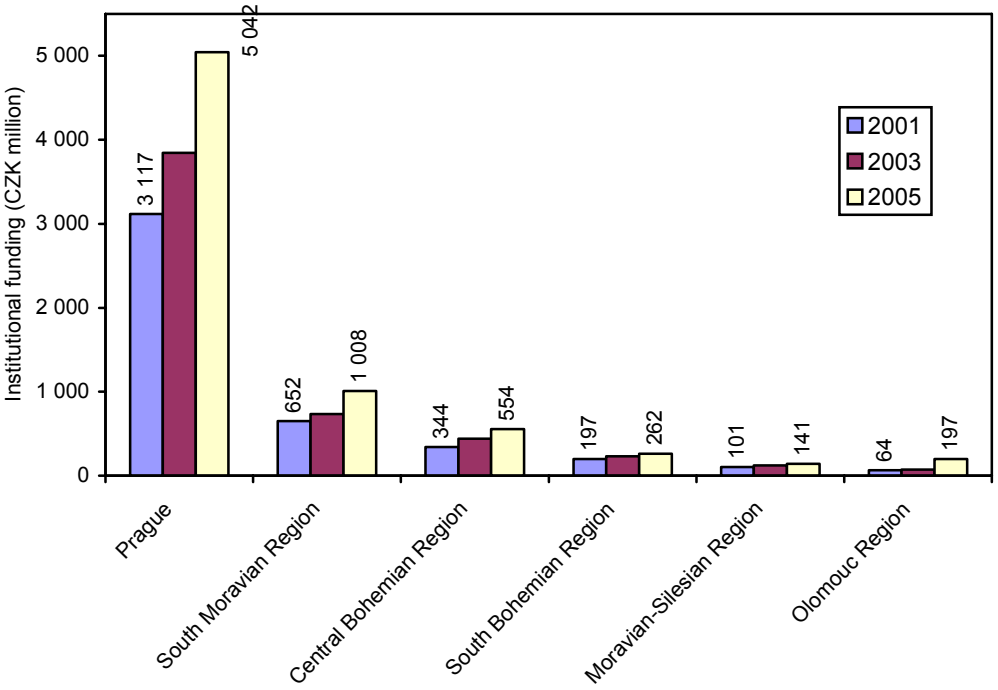
Table II.1.3 Shares of selected regions in the overall targeted support

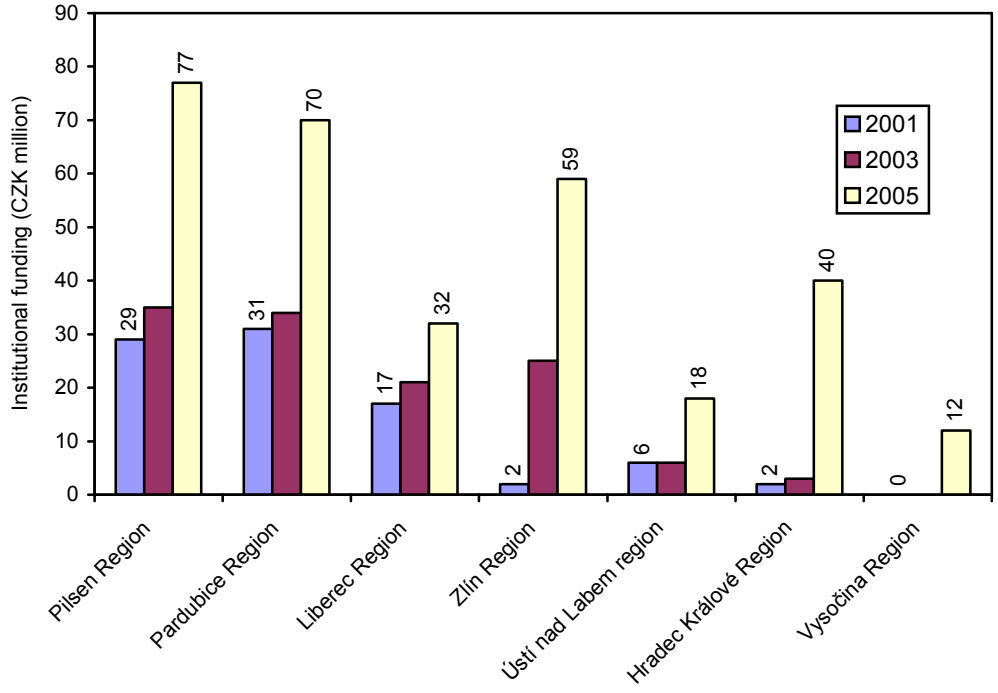
Regions	Shares (%)		
	2001	2003	2005
The capital of Prague	58,3	56,4	51,1
The capital of Prague, South Moravian Region and Central Bohemian Region	77,0	75,5	73,3

The shares of Prague and three selected regions in the overall targeted R&D support are lower than shares in the overall institutional support awarded to research plans. The share of the capital of Prague slightly exceeded 50% and the share of three evaluated regions 73%.

[2] According to Section 28 of Act No. 130/2002 Coll. as amended (Research and Development Support Act).

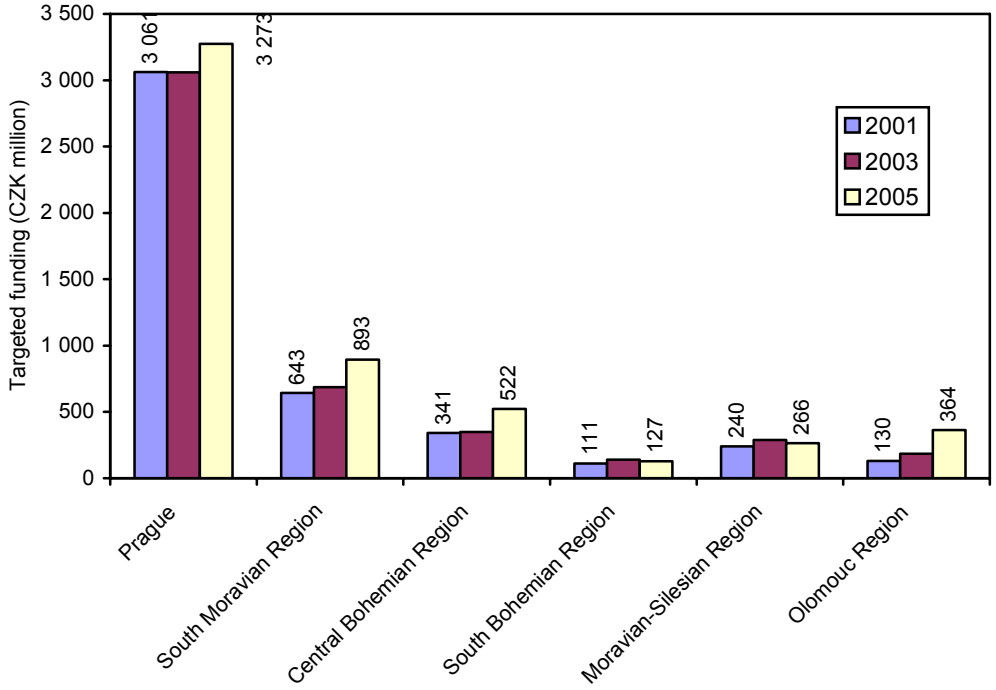
II.1.6 Trend of institutional support awarded to research plans by regions (CZK mil)

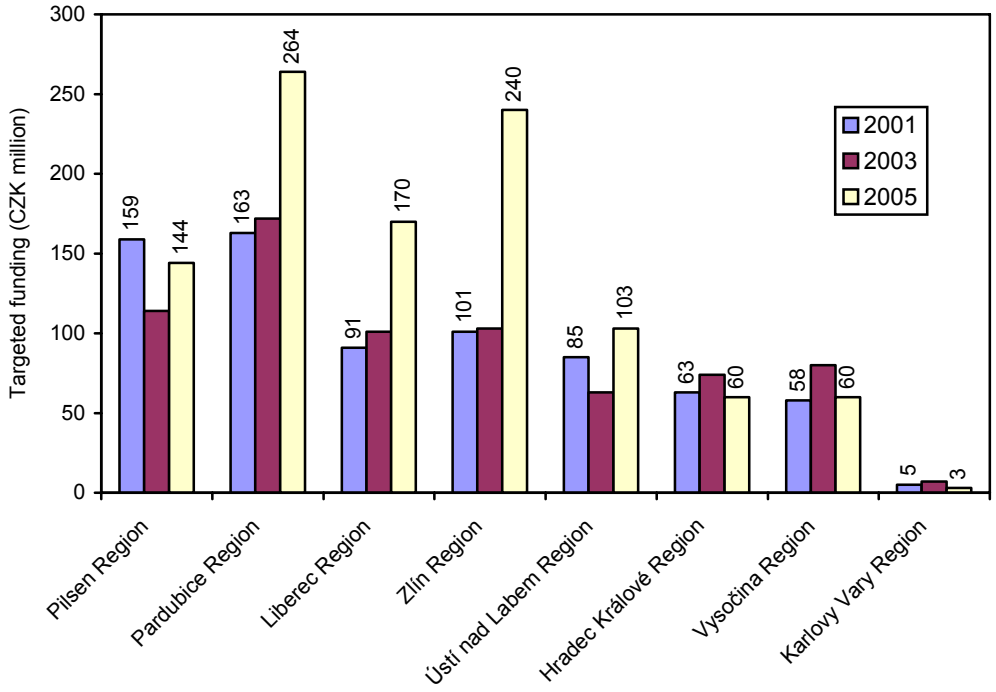




Source: R&D IS, Section – Central Register of Research Plans (CEZ)

II.1.7 Trend of targeted support awarded to research and development by regions (CZK mil)





Source: R&D IS, Section – Central Register of Research Projects (CEP)

Note: For some projects and plans the region is not given, because for concealed plans and projects the data on institutions are also subject of confidential treatment. Therefore, such projects and plans are not included in the tables.

The institutional support for research plans and the targeted support for research and development are concentrated in three regions: the capital of Prague, South Moravian Region and Central Bohemian Region. The following table shows shares of this R&D support in the above mentioned three regions in the sum of institutional support for research plans and targeted R&D support in Czechia.

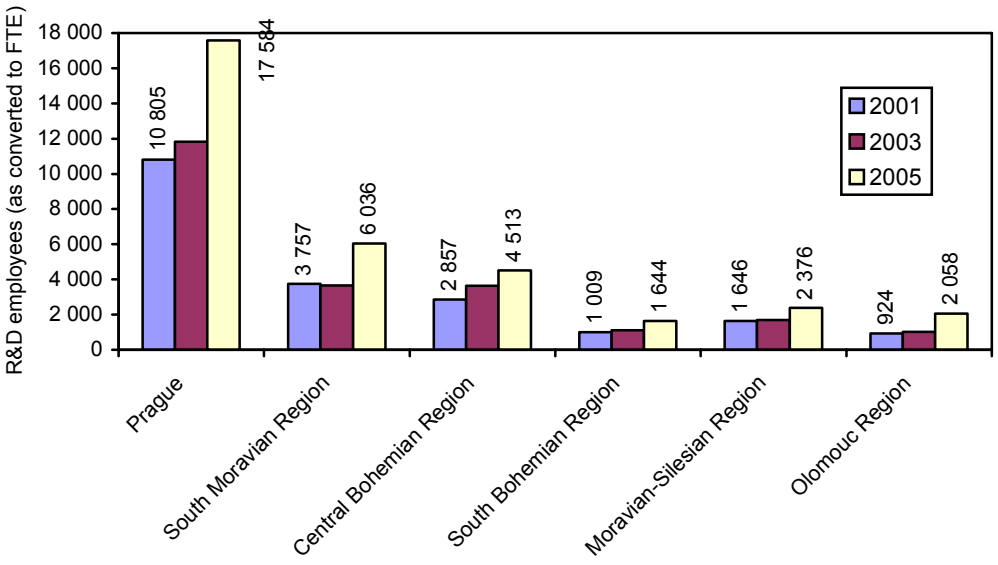
Table II.1.4 Shares of selected regions in institutional support for research plans and targeted R&D support

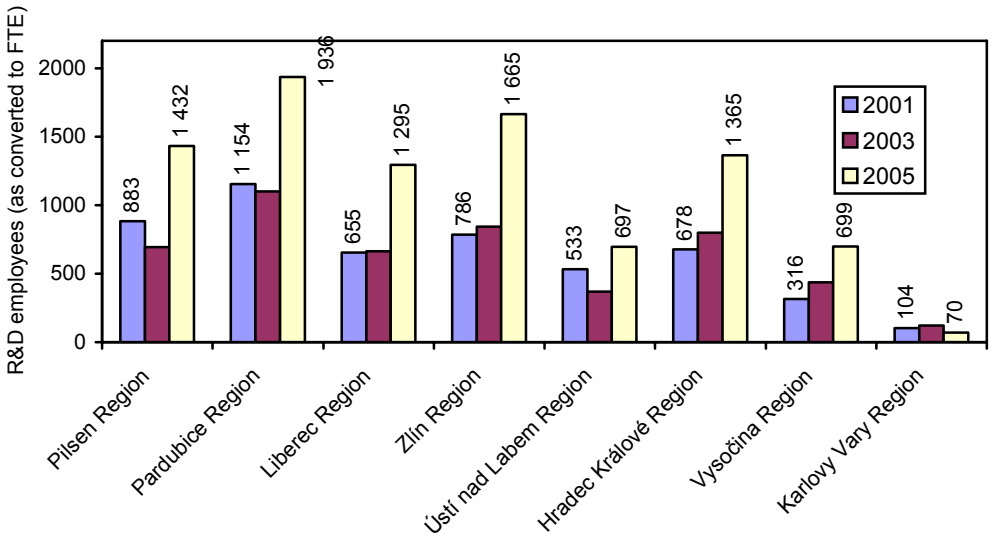
Region	Shares (%)		
	2001	2003	2005
The Capital of Prague	63.0	62.8	59.8
South Moravian Region	13.2	12.9	13.7
Central Bohemian Region	7.0	7.2	7.7

In 2001, 83.1 % of the overall public institutional support for research plans and targeted R&D support in Czechia flew to these three above-mentioned regions as a whole; 82.9 % in 2003 and 81.2 % in 2005.

An especially marked is the concentration of public support, both overall and of institutional support for research plans in the region of the capital of Prague.

II.1.8 Trend of number of R&D employees by regions (as converted to FTE)





Source: CSO (Czech Statistical Office): R&D Indicators 2002, 2003, 2005

The marked growth in the number of R&D employees in 2005 against 2003 is influenced by the revised methodology for conversion of the number of persons, who are not involved in R&D activities for the whole year or are concerned also with other activities (conversion to full time – FTE). The year 2005 means a break in the time series.

Likewise for R&D expenditures, also R&D employees are concentrated into three regions: the capital of Prague, South Moravian Region and Central Bohemian Region. The following table shows shares of R&D employees in these three regions in the overall number of R&D employees in Czechia.

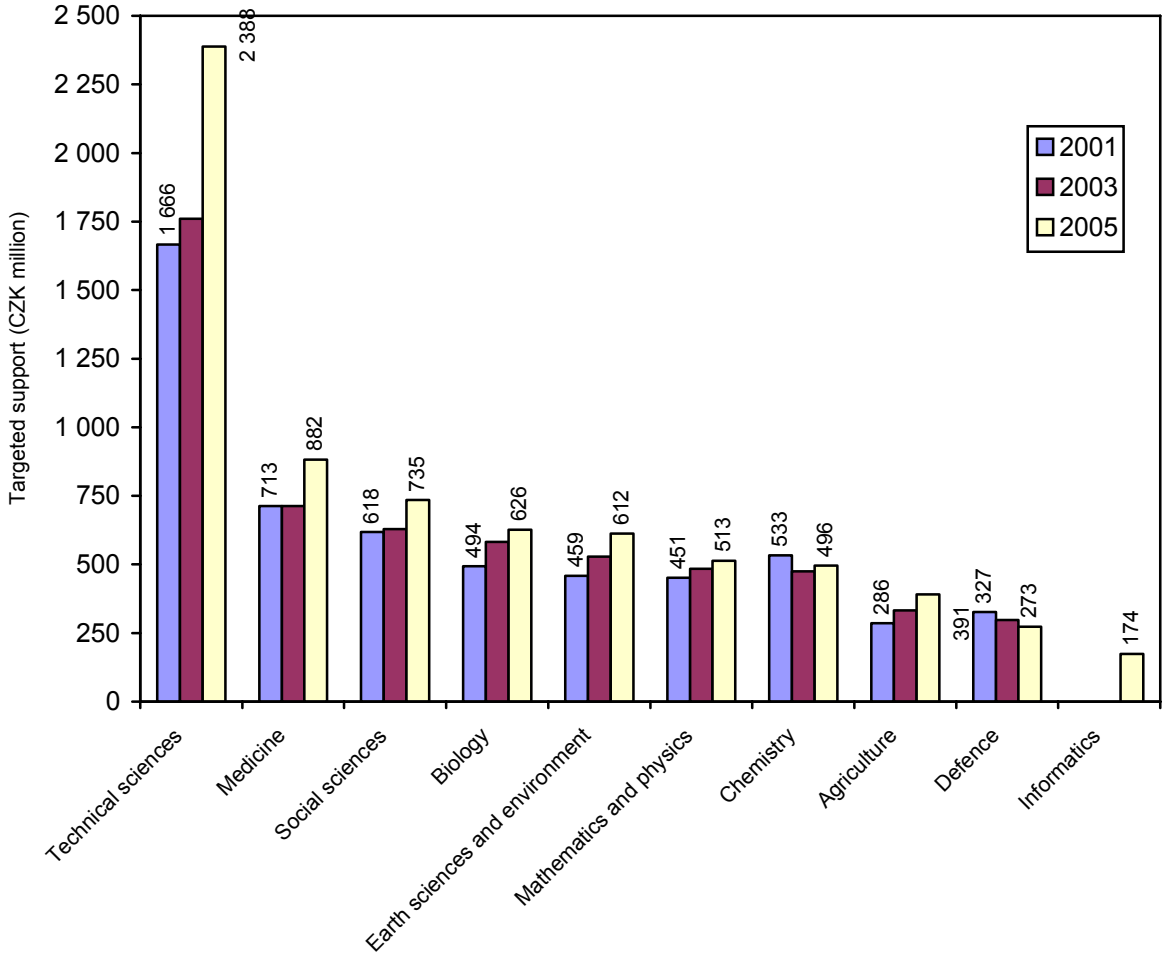
Table II.1.5 Shares of selected regions in the overall number of R&D employees

Region	Shares (%)		
	2001	2003	2005
The capital of Prague	41,4	42,3	40,5
South Moravian Region	14,4	13,1	13,9
Central Bohemian Region	10,9	13,0	10,4

Of the overall number of R&D employees in Czechia, 67.4 % worked in these three above mentioned regions in 2001, 68.4 % in 2003 and 64.9 % in 2005.

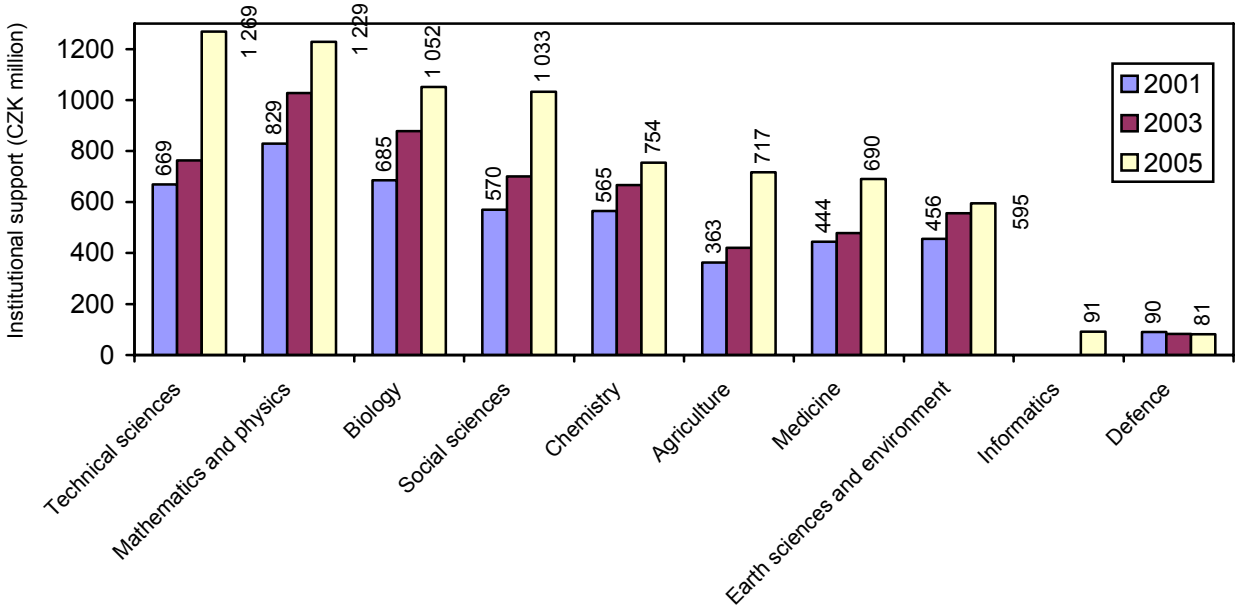
The problem of excessive concentration of research capacities and financial support in the region of the capital of Prague cannot be solved by “social engineering” measures. This will be solved by operational programme prepared for 2007-2013 - Research and Development for Innovation (OP R&DfI) aimed at strengthening the R&D capacities in other regions, which will be co-funded from EU, and the state budget of the Czech Republic.

II.1.9 Support for R&D projects by disciplines



Source: R&D IS, Central Register of Research Projects (CEP)
Note: Informatics has been monitored from 2004.
Certain data for 2001 differ from 2005 R&D Analysis. The older data were put more precisely in the fist half of 2006.

II.1.10 Institutional support for research plans by discipline



Source: R&D IS, Central Register of Research Plans (CEZ)

Note: Informatics has been monitored from 2004.

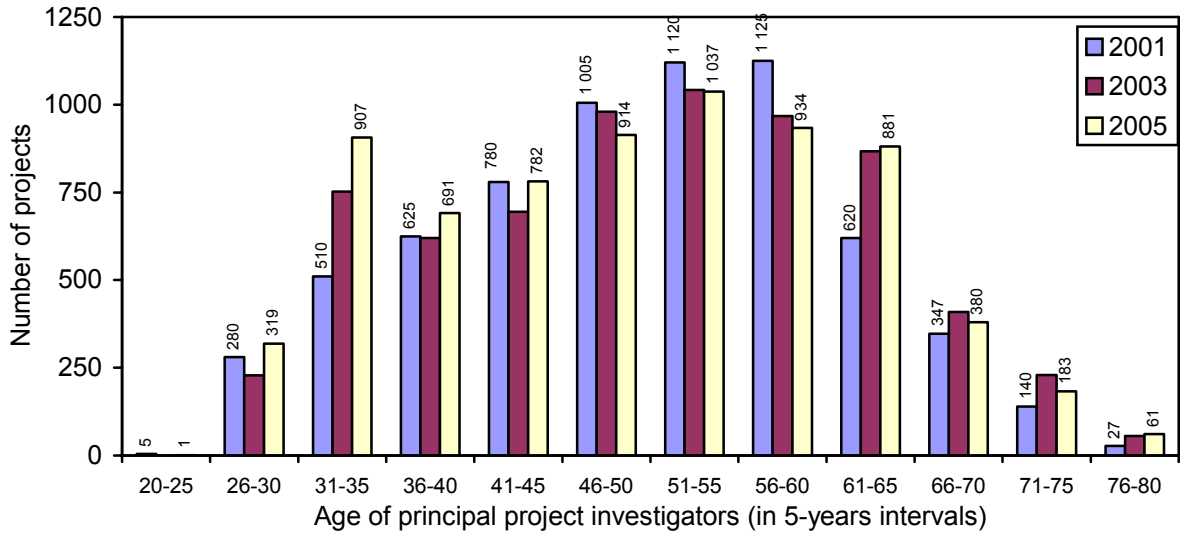
Previous Graphs II.1.9 and II.1.10 show data for targeted support and institutional support for research plans for main groups of disciplines monitored within R&D Information System. Evaluation is again done for years 2001, 2003 and 2005.

The amount of targeted support grows in all disciplines, with the exception of chemistry and defence. The highest targeted support is awarded to projects in technical sciences, with additional marked growth of support to nearly CZK 2.4 billion in 2005. From Graphs II.1.2 and II.1.9 it can be concluded that 33.7 % of the overall targeted R&D support in Czechia in 2005 was directed to technical sciences. Other disciplines have obtained targeted support mostly between CZK 0.45 and 0.65 billion a year.

As for the institutional support for research plans, the differences in the amounts between individual disciplines are not so high. The institutional support in 2005 grew most against 2003 in disciplines like agriculture (by 70.7 %), technical sciences (66.3 %) and medicine (44.4 %).

Social sciences in 2005 participated by 11 % in the overall institutional support (on the basis of research plans) which by no means can be marked as insufficient support or underestimation of social sciences.

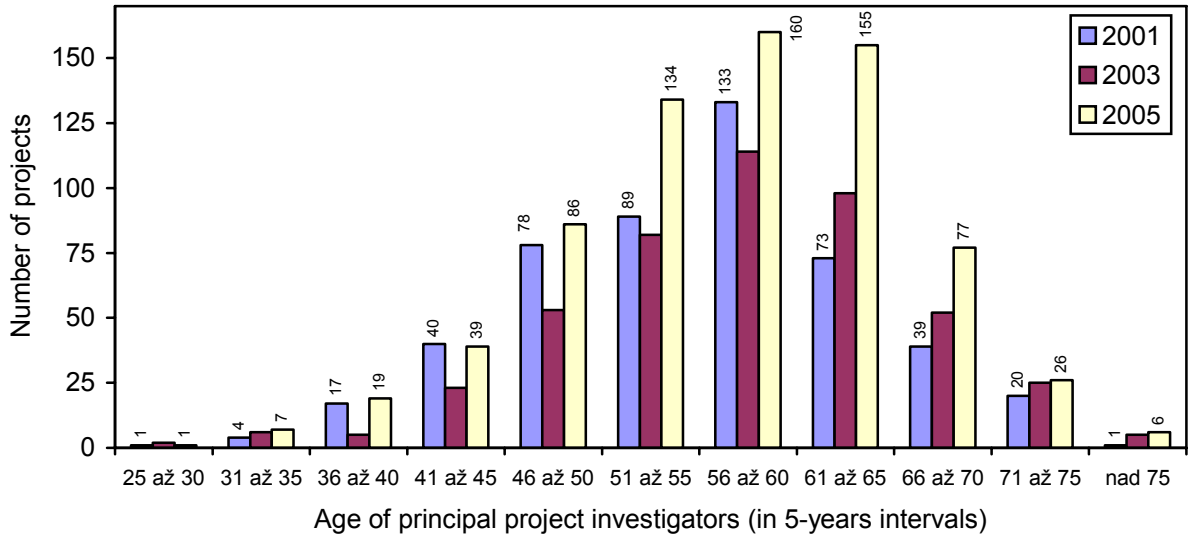
II.1.11 Number of R&D projects by age of principal investigators



Source: R&D IS, Central Register of Research Projects (CEP)

The age trend of principal investigators of R&D projects is a relatively positive one. The numbers of principal investigators in categories under 45 years have been growing, with a marked growth in the category 31–35 years. This improvement has been stimulated by programmes of support for young research workers being announced by several providers (AS CR, GA CR, MEYS, etc). However, the numbers of principal investigators in the categories 56 years and higher are still very high, even alarming in the categories 61 years and more.

II.1.12 Number of research plans by age of principal investigators



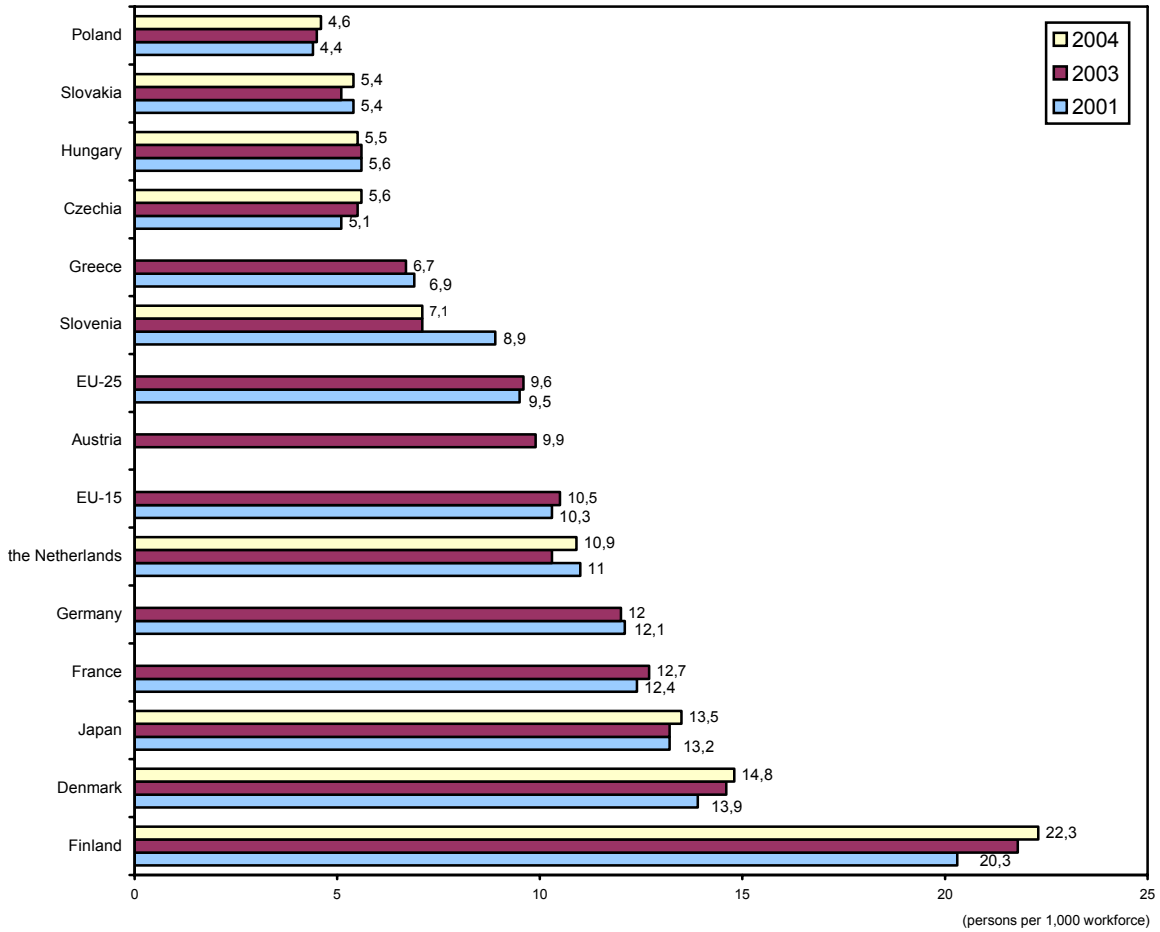
Source: R&D IS, Central Register of Research Plans (CEZ)

The age trend of principal investigators of research plans is not as favourable as the age trend in case of principal investigators of R&D projects. Even if management of often large research plans really requires a great deal more experiences that solution of R&D

projects, the numbers of principal investigators in the categories over 56 years can be marked as very high.

The problem is evidently influenced by the fact that numbers of younger research workers are low, and not only in Czechia, but basically in all EU Member States, as evidenced in Table II.2.1 below.

II.2.1 Number of R&D employees (FTE) (persons per 1,000 workforce)



Source: OECD, Main Science and Technology Indicators 2006/1
Austria – figure for 2002

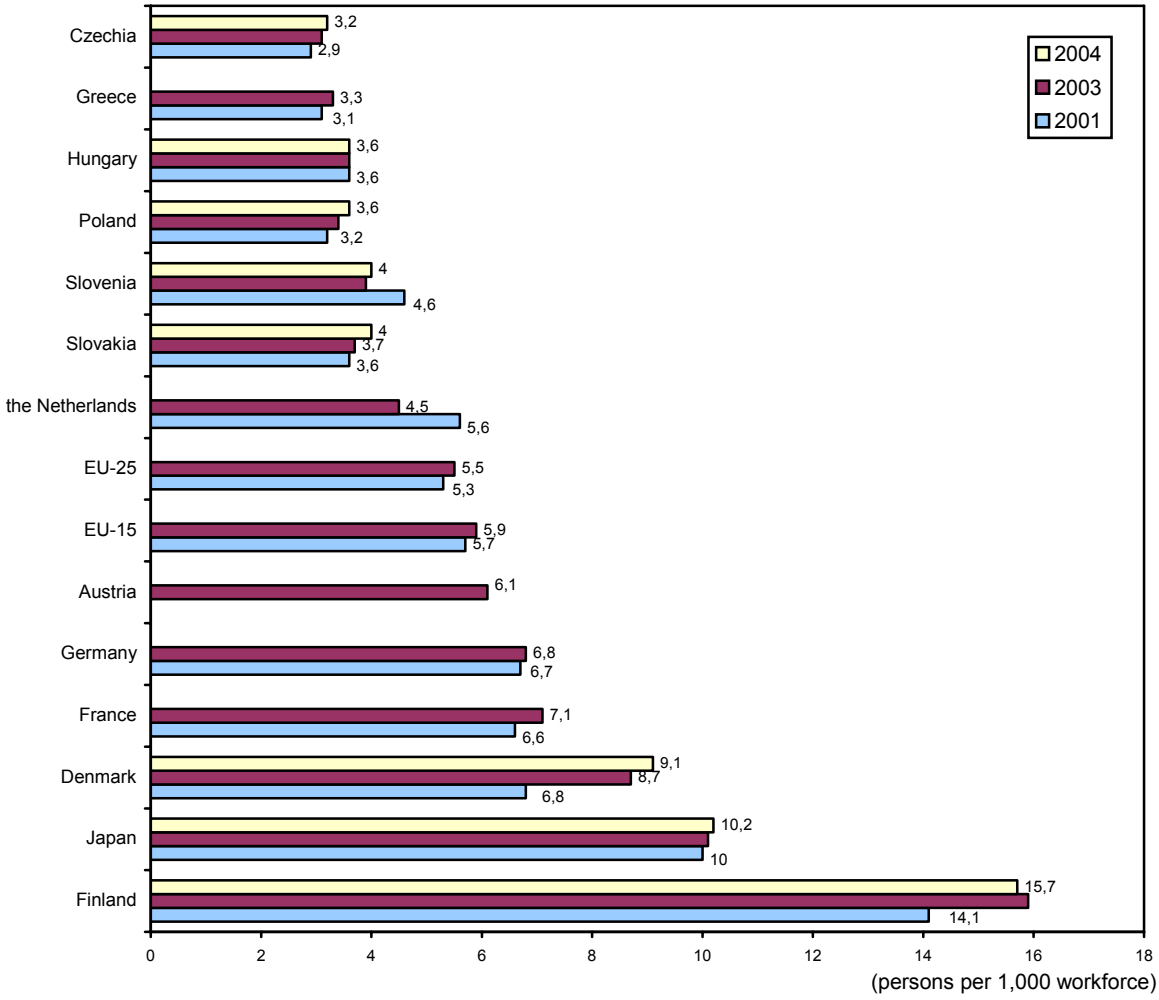
The R&D employees mean the research workers performing directly the research and development, together with auxiliary, technical, administrative and other employees at R&D workplaces. Among the R&D employees there belong also employees procuring direct services to research and development activities like R&D managers, clerks, secretaries, etc.

Two groups of countries can be separated from the graph: new Member States with Greece, and other monitored countries. In the first group, Slovenia is a little bit different; in the second group Finland differs very significantly from the rest. If we ignore these exceptions, we can say that new Member States report less than half numbers of R&D employees than other monitored countries.

In 2004, Finland reported 22.3 R&D employees per 1,000 workforce which is nearly fourfold the number of R&D employees in Czechia (5.6 persons per 1,000 workforce).

It is positive that the number of R&D employees is slowly but surely growing. In other new EU Member States, with the exception of Poland, and in Greece it is stagnating or going down.

II.2.2 Number of research workers (FTE) (persons per 1,000 workforce)



Source: OECD, Main Science and Technology Indicators 2006/1
Austria – figure for 2002

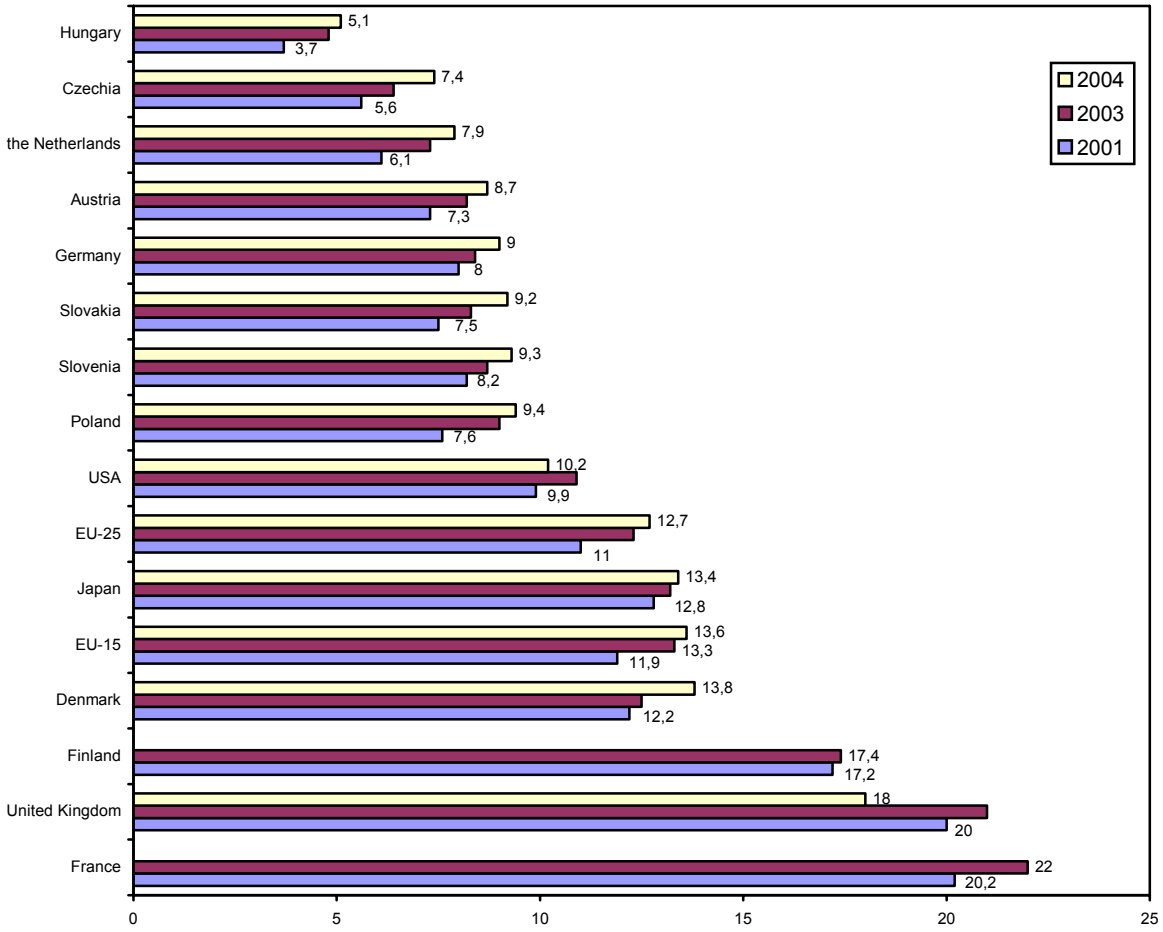
The number of research workers per 1,000 workforce is the most commonly used indicator for international comparisons of human resources in research and development. The category of research workers covers workers dealing with concept or creation of new knowledge, products, processes, methods and systems, and those who manage such projects. They form the most important component of R&D employees.

Likewise for the numbers of R&D employees, the new Member States, this time also with Slovenia and Greece, report substantially lower numbers of research workers than other monitored countries. Of the monitored countries, maximum numbers of research workers are reported by Finland (15.7 persons per 1,000 workforce in 2004), followed by Japan and Denmark.

By comparing figures in Graphs II.2.1 and II.2.2, it is possible to determine the shares of numbers of research workers in total number of R&D employees. High shares are attained by Japan (75.6 %), as well as Poland (78.3 %) and Slovakia (74.1 %). Czechia with its share 57.1 % slightly exceeds the EU-15 average (56.2 %). From these values, no conclusions can be drawn about the effectiveness of the R&D structure and management in individual

countries. Such consideration would need a more detailed analysis of the institutional and organisational arrangement of research and development in monitored countries.

II.2.3 Number of the Science&Engineering[3] graduates in the tertiary level of education per 1,000 population aged 20–29



Source: Eurostat, June 2005

This figure is a very frequently used indicator for evaluation and mutual comparison of research and innovation policies and the overall competitiveness (see documents of EU,

[3] In accordance with the International Standard Classification of Education ISCED 97 it covers following educational subjects: biological sciences 42, physical and chemical sciences 44, mathematical sciences and statistics 46, informatics and computing technology 48, technical sciences and technically oriented crafts 52, production and manufacturing industries 54, architecture and civil engineering 58.

USA and Japan, this indicator is contained in papers for the annual meetings of the World Economic Forum, it is reported in the European Innovation Scoreboard, etc.). The graduates in the Science&Engineering study programmes at universities are considered as basic potential for activity in that part of research and development that is able to influence the competitiveness most. Sometimes the indicator is used in the form of a share of the total number of university graduates of the same age category between 20 and 29 years.

For this indicator, the differences between new and old Member States of EU are not so marked. Poland, Slovakia and Slovenia by their shares overtook the countries with high competitiveness and advanced R&D – Germany, the Netherlands and Austria in 2004. Czechia took the last but one position among the monitored countries with its share of 7.4 persons per 1,000 population aged 20–29 in 2004. Only the Hungary's figure is worse (5.1).

The National Innovation Policy for the Czech Republic for 2005–2010 approved by the Government in July 2005 imposes in its part "Guarantee human sources for innovation" on the Ministry of Education, Youth and Sport to open development programmes in 2006 aimed at increasing the number of Science&Engineering study programme graduates, which will ensure improvement of material and technical conditions for learning and research in these disciplines (establishment of laboratories, contacts with practice, etc.)[4]. The natural market environment will stimulate such improvements as well. Private enterprises that feel this shortage of graduates ever stronger will have to pay these experts higher salaries and offer them more attractive career opportunities to overcome low interest in study of these demanding disciplines.

Large problem for most of the EU-25 Member States is the age of principal investigators. Graphs II.1.11 and II.1.12 show numbers of principal investigators of R&D projects and research plans for Czechia in individual age categories. The following table show shares of scientific workers and engineers in individual age categories for monitored countries. The group of scientific workers and engineers includes the Science&Engineering study programmes graduates working as physicists, mathematicians and engineers (ISCO ´88 COM, group 21), or biologists and physicians (ISCO ´88, group 22).

Table II.2.1 Age structure of scientists and engineers in selected countries in 2004; shares of overall number (%)

Country	Shares of scientists and engineers in individual age categories (%)			
	25 to 34 years	35 to 44 years	45 to 64 years	Others [a)]
Denmark	24.2	31.8	44.0	n/a
Finland	35.6	26.0	34.2	4.2
France	27.0	32.1	37.5	3.3
Germany	22.6	34.4	38.7	4.3
The Netherlands	32.2	31.7	31.8	4.5
Austria	29.9	34.3	30.5	5.3
United Kingdom	32.1	28.8	32.0	7.0
EU-25	29.2	30.5	35.5	4.8
EU-15	29.0	31.2	35.1	4.7
Czechia	29.4	26.5	38.3	5.8
Poland	34.3	23.5	38.0	4.3
Hungary	30.7	21.4	42.7	5.2
Slovakia	28.3	24.6	39.7	7.5
Slovenia	35.8	26.0	34.8	3.6

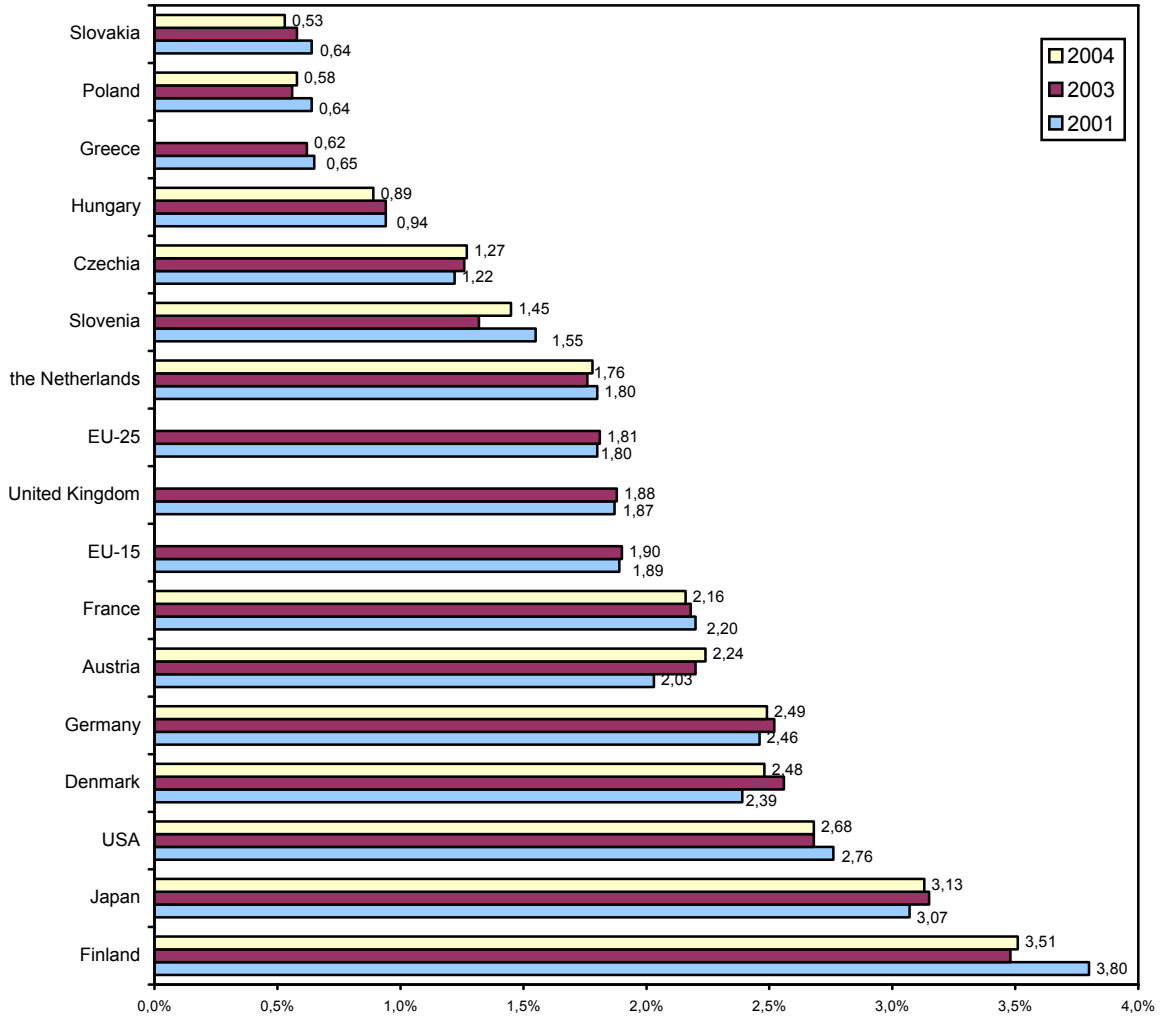
Source: Eurostat, Statistics in Focus 11/2006, Ageing work force
a) Under 24 years, or over 65 years

In the category 25–34 years, Czechia with its share 29.4 % conducts better than the EU-25 average (29.2 %) and EU-15 average (29.0 %), and better than Germany, Denmark,

[4] For details on fulfilment of the National Innovation Policy see Chapter VIII.

France and Slovakia. In the category 35–44 years, the situation in Czechia is somewhat worse (26.5 %). The share for EU-25 is 30.5 %; 31.2 % for EU-15. Lower values than Czechia are attained by Hungary, Poland, Slovakia, Slovenia and surprisingly also Finland with its share 26.2 %.

II.2.4 Total R&D expenditures (% of GDP)



Source: OECD, Main Science and Technology Indicators, 2006/1

Total R&D expenditures (GERD – gross expenditures on R&D)[5] are the most famous and most frequently used indicator for the international comparison of research and development. These expenditures represent the overall R&D expenditures funded by public, private (business or non-business) and foreign sources.

On the basis of reported values it is possible to say that the objective of the original Lisbon strategy from 2002 to secure the increase of overall R&D expenditures to 3 % of GDP by 2010, of this 1 % from public resources, will not be met. No data are available for EU-15 and EU-25 for 2004, but expenditures for both groupings rose between 2001 and 2003 only a little, by one one-hundredth of a percent of GDP.

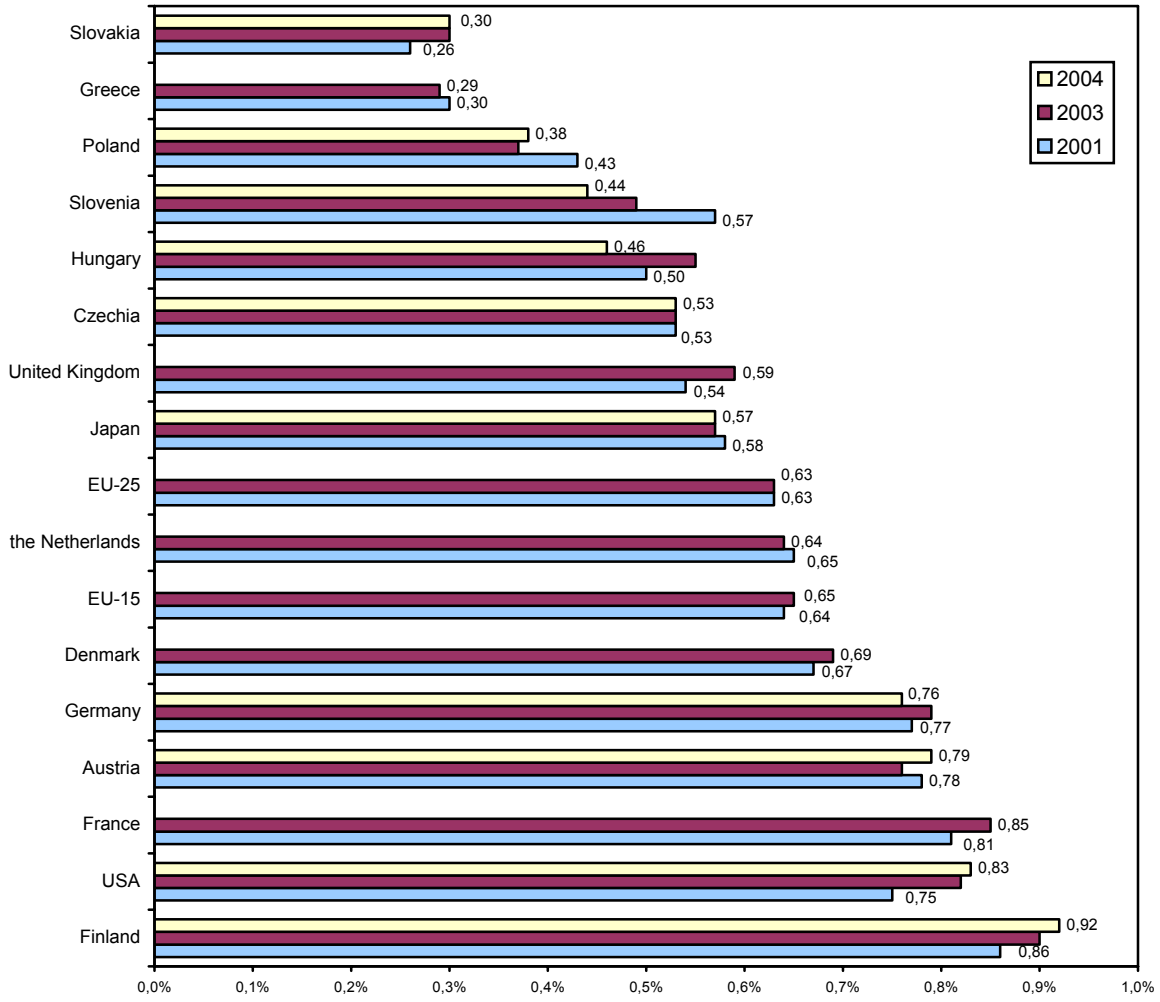
Nine out of 15 monitored countries experienced even decline in total R&D. expenditures in the monitored years. This decline occurred surprisingly also in Finland from 3.8 % of GDP in 2001 to still remarkably high value 3.51 % of GDP. Of the monitored countries, a relatively high growth in R&D expenditures is reported by Austria (from 2.03 % in 2001 to 2.24 % of GDP in 2004).

[5] The international OECD and Eurostat terminology knows total R&D expenditures under the abbreviation GERD (Gross Expenditure on R&D) representing the overall (gross) domestic expenditures on research and development in compliance with the Frascati Manual 2002 methodology.

In Czechia, R&D expenditures have been increasing during the monitored period, but not too quickly. Other details about R&D expenditures development in Czechia are given in Graph II.1.1 and attached commentary.

The cause of slower growth in R&D expenditures, in many cases even a decline, are the public budgets problems and slowing pace of economic growth in many EU-15 countries and in USA.

II.2.5 Public R&D expenditures (in % of GDP)

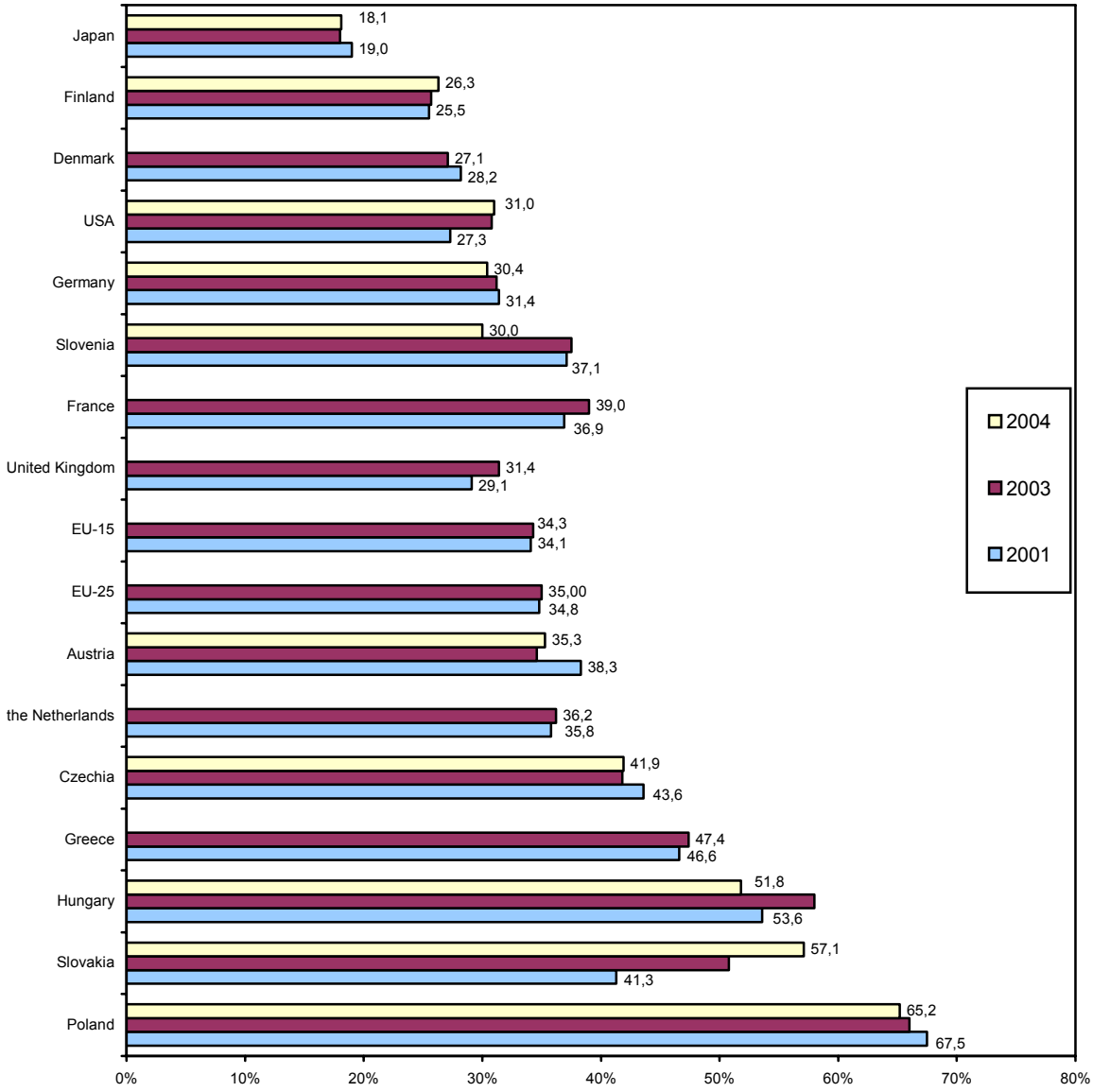


Source: OECD, Main Science and Technology Indicators, 2006/1

Figures for Czechia slightly differ from values given in Graph II.1.1. Figures in Graph II.2.5 are values provided by CSO statistical survey and delivered to OECD and Eurostat; values in Graph II.1.1 are data from the state budget.

In five out of 15 monitored countries the public R&D expenditures grew, especially quickly in USA, Finland and Austria. Of the monitored new EU Member States, Czechia reported the highest public R&D expenditures in 2004 (0.53 % of GDP).

II.2.6 Share of public funds in total R&D expenditures (in %)

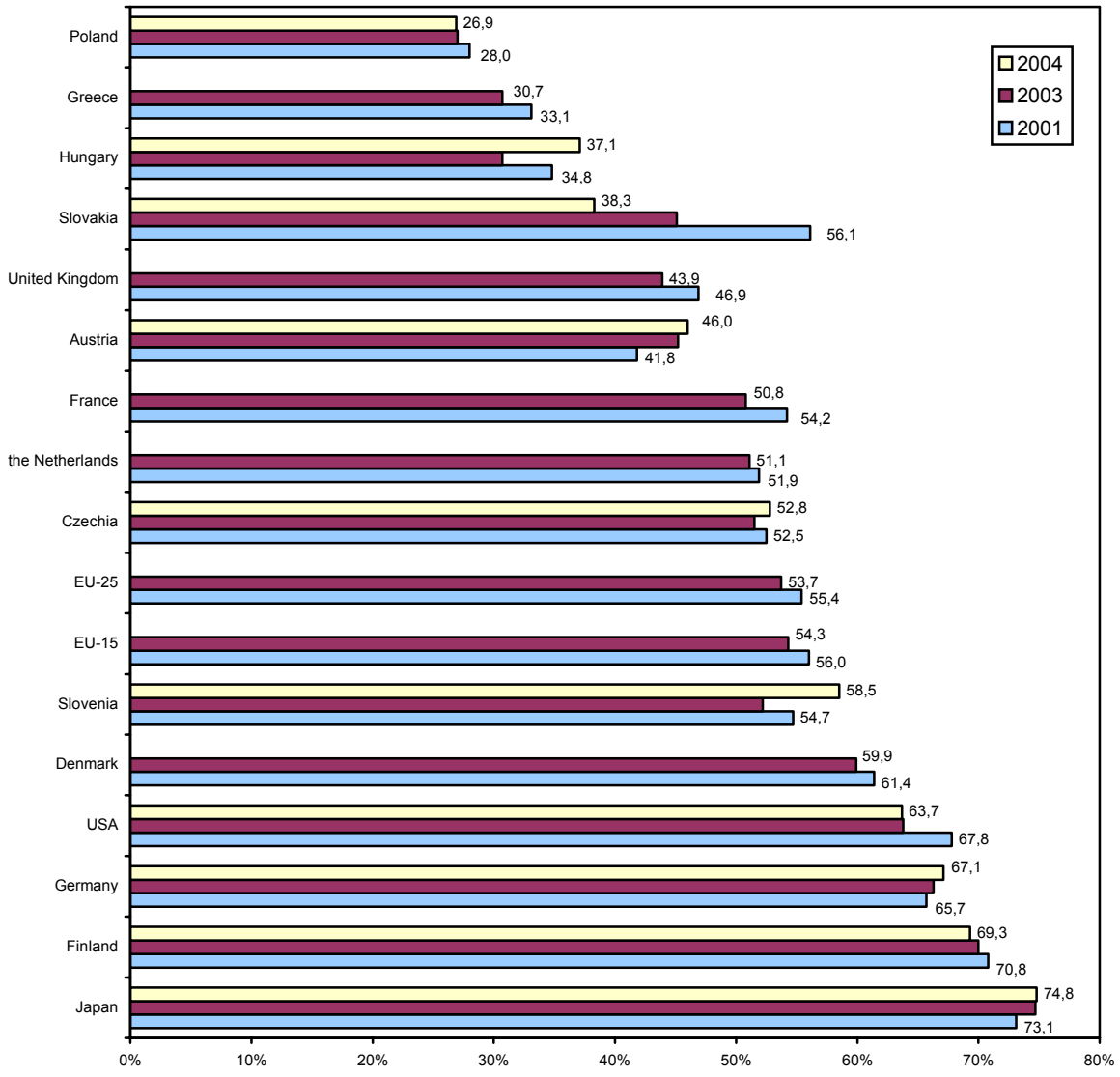


Source: OECD, Main Science and Technology Indicators, 2006/1

This indicator gives account on the degree of liberalism of the economy (scope of the private sector) and is influenced by the structure of economy, particularly the share of large enterprises, and structure of the research base. The concept materials on research and development in abroad often express the opinion that the optimum share of public funds moves in the range from 30 to 40 % of the total R&D expenditures. The already mentioned EU Lisbon Strategy anticipates the total R&D expenditures in the amount of 3 % of GDP, of this 1 % from public funds and 2 % from private funds.

Higher than 50 % share of public funds in total R&D expenditures in 2004 is reported by Poland and Slovakia. Czechia´s share 41.9 % in 2004 is lower than in other monitored new EU Member States, with the exception of Slovenia (30,0 %), and also lower than in Greece.

II.2.7 Share of private funds in total R&D expenditures (in %)



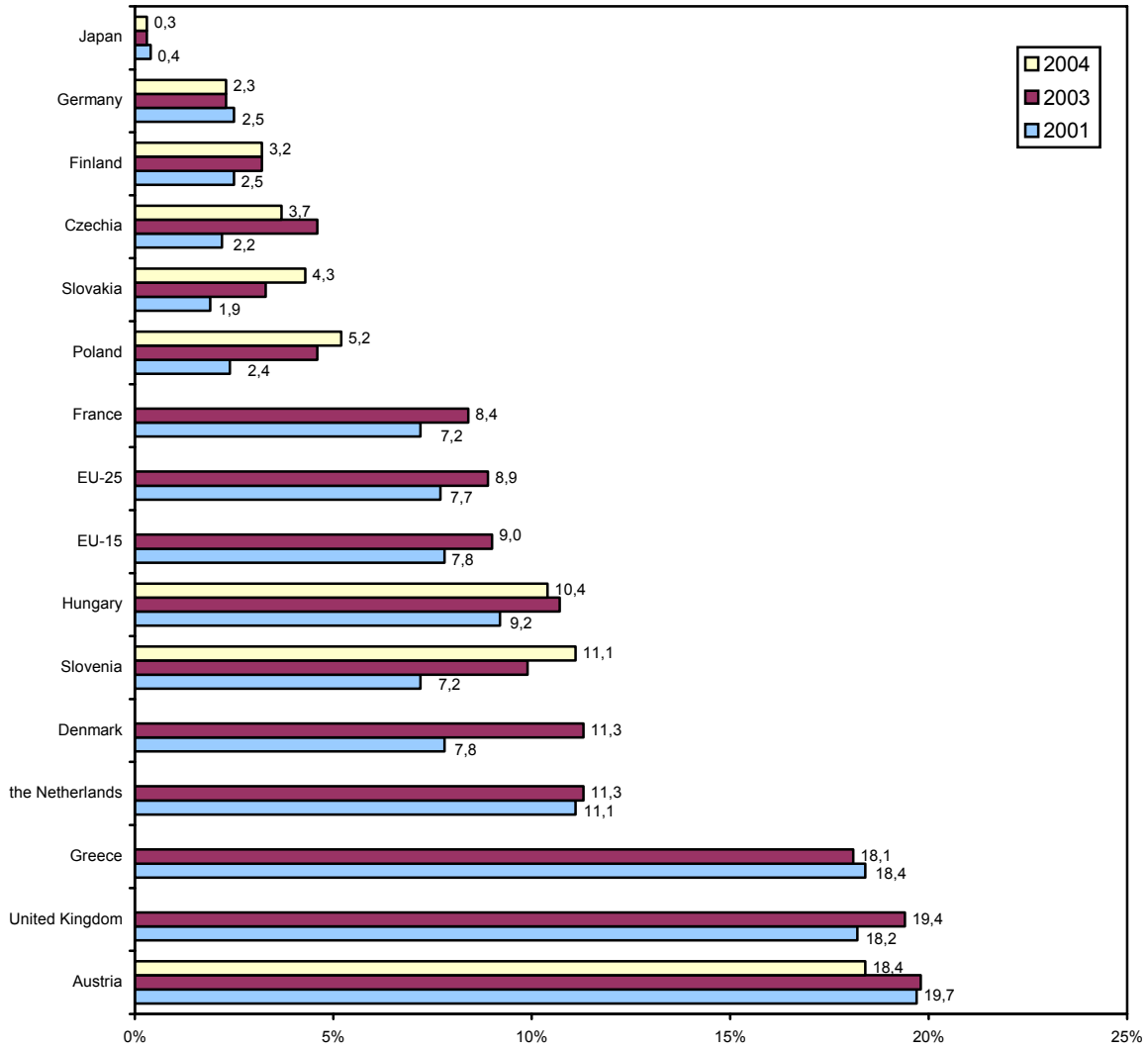
Source: OECD, Main Science and Technology Indicators, 2006/1

The values of shares of private funds in total R&D expenditures for most of the countries, or more exactly for countries with low R&D support of research and development from abroad, logically supplement the values given in Graph II.2.5.

The values of private fund shares in 8 out of 15 monitored countries have declined during the monitored period. This is evidently connected with the slowing pace of economic growth in most of EU countries and in USA.

The shares of private funds in Czechia were slightly below the EU-25 average in the monitored years.

II.2.8 Share of foreign funds in total R&D expenditures (in %)



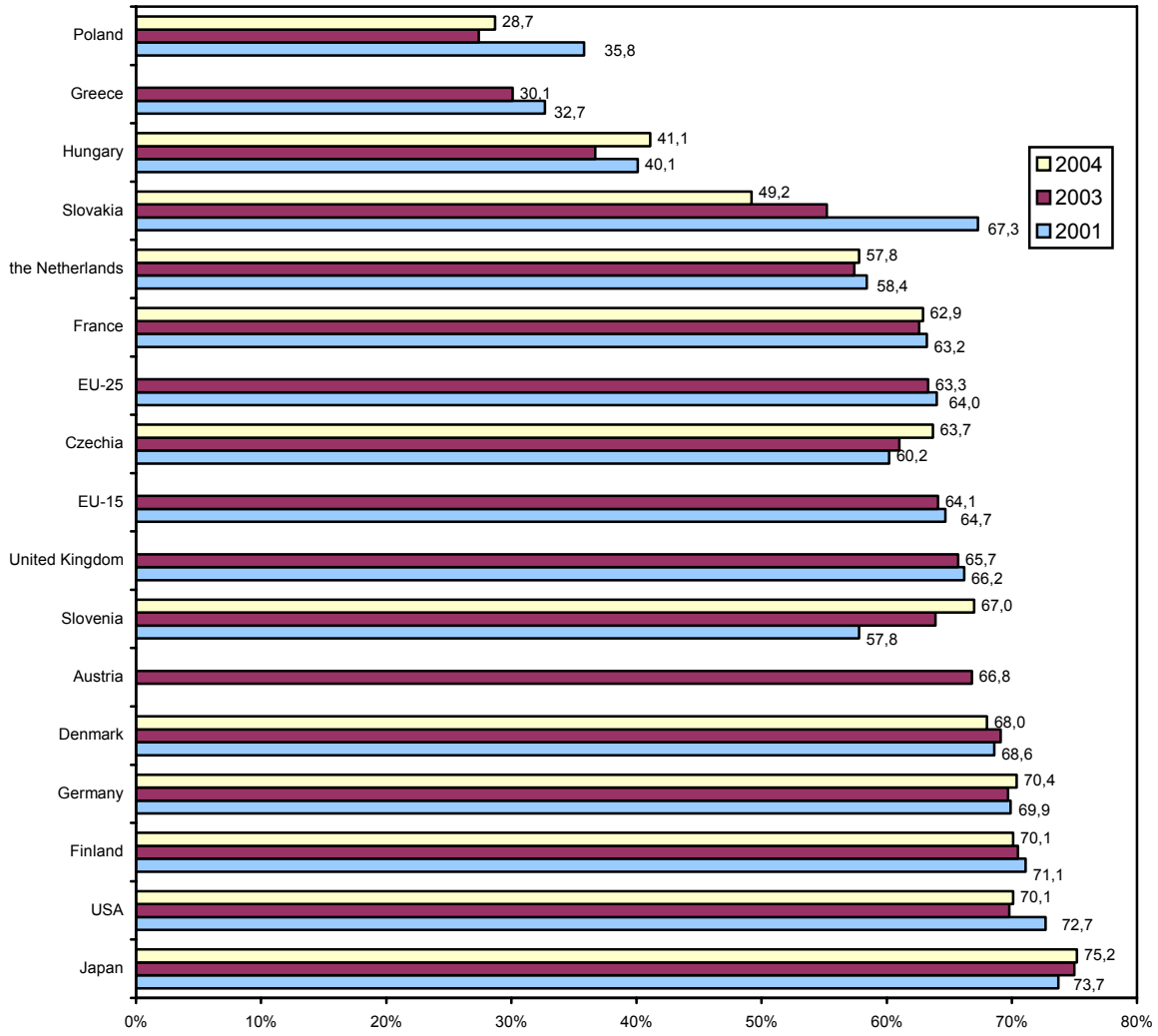
Source: OECD, Main Science and Technology Indicators, 2006/1

The share of foreign funds in total R&D expenditures is one of the main indicators of internationalization and globalization in research and development in individual countries. Foreign funds take various forms of R&D expenditures. They may take form of expenditures in branches of foreign firms having their registered offices in another country, or of a foreign research purchased from domestic R&D organisations. They may also take form of expenditures of branches of large research organisations (institutions) established for many reasons in other countries. The example may be the chain of branches of the German Fraunhofer company institutes, which were established in USA.

For this indicator, there are no substantial differences between the new EU Member States and EU-15 countries. Of the monitored countries, the highest shares of foreign funds in 2004 are reported from the United Kingdom, Austria, and surprisingly Greece. In Austria, this indicator exceeded 20 % in 2005. No comparable data for USA are available from the OECD source.

Of the monitored new Member States, the highest shares are reported from Slovenia and Hungary, where they exceed the average values both for EU-25 and EU-15. Czechia reports relatively low values; in 2003 the share was 4.6 %, next year it went down to 3.7 %. The share in 2005 will be surely higher and the growth will continue.

II.2.9 Share of R&D funds spent in private sector in total R&D expenditures (in %)

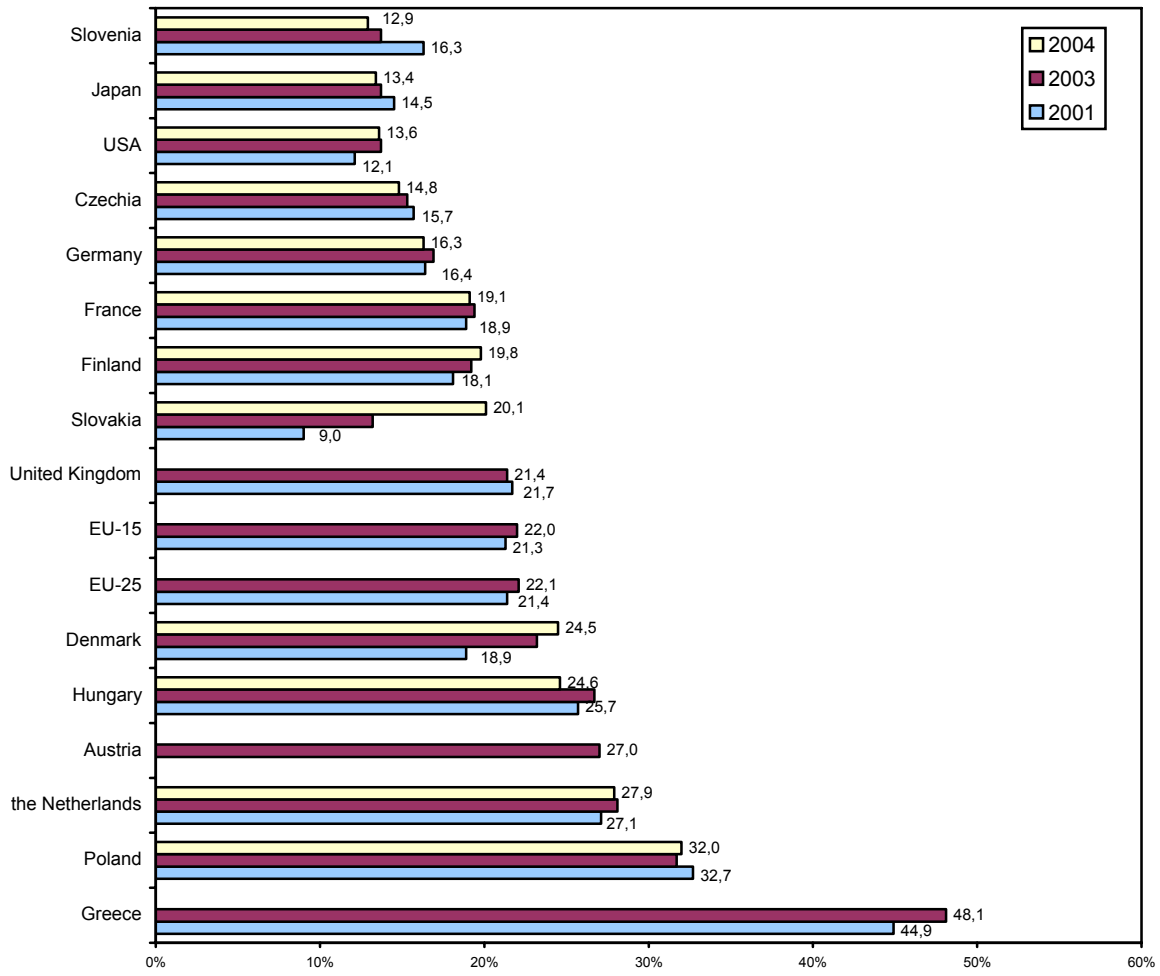


Source: OECD, Main Science and Technology Indicators, 2006/1
Austria – figure for 2002

In most of the monitored countries the majority of funds spent on research and development is directed into the private sphere. In ten out of fifteen monitored countries and for EU-25 and EU-15 this share exceeded 60 % in the last of the monitored years. Very low are these shares in Slovakia, Greece and Poland, where this share was only 28.7 % in 2004. In most of the countries this share basically stagnates; in Slovakia it has declined considerably during the monitored period.

Czechia experienced a positive growth from 60.2 % in 2001 to 63.7 % in 2004.

II.2.10 Share of R&D funds spent at universities in total R&D expenditures (in %)



Source: OECD, Main Science and Technology Indicators, 2006/1

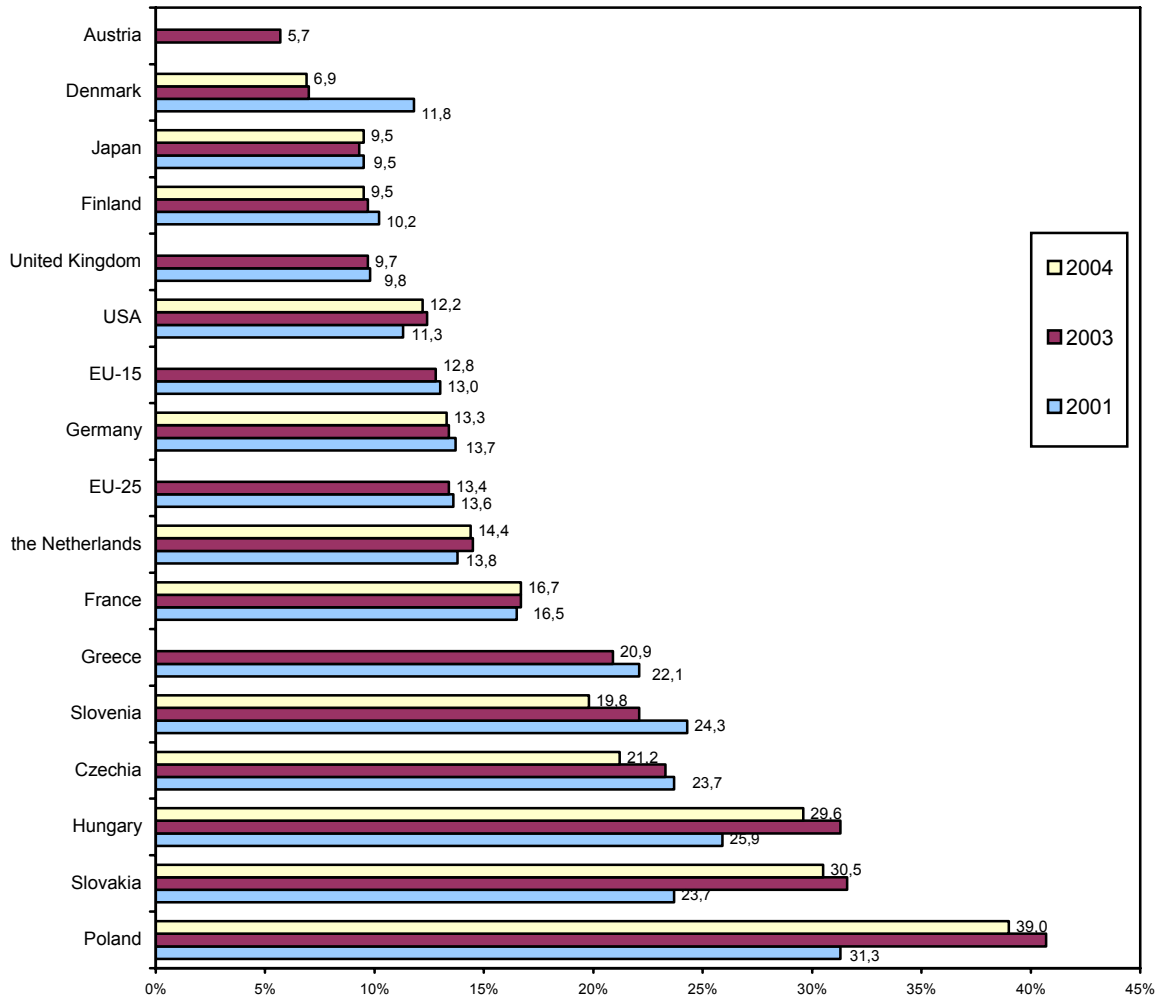
Austria – figure for 2002

The share of R&D funds used at universities in total R&D expenditures is another very frequently used indicator for international comparisons. Nevertheless its interpretation is not easy. It is not possible to say with a sufficient objectivity what is the optimum value of this indicator. The shares strongly depend on the history of R&D structure development and on roles of individual segments in the system of R&D support.

Of the monitored countries, the highest values are attained by Greece, Poland, the Netherlands and Austria. The first two countries, however, do not belong among countries with too flourishing research and development. In other countries the share of universities moves around 20 %, the EU-25 and EU-15 averages are also slightly above 20 %. Czechia with a low share of about 15 % still has higher share than e.g. Japan or USA.

But undoubtedly, it is not good that the share of R&D funds spent at universities in Czechia has been going down in the monitored period. Undoubtedly, it is not very positive fact that the share of R&D funds spent at Czech universities has fallen in the monitored period from 23.7 % in 2001 to 21.2 % in 2003.

II.2.11 Share of R&D funds spent in the public (government) sector in total R&D expenditures (in %)



Source: OECD, Main Science and Technology Indicators, 2006/1

Austria – figure for 2002

Likewise, the same apply for the share of R&D funds spent in public (government) sector as what was said in the commentary to the previous Graph II.2.10 for shares of funds spent at universities. The share depends on traditions and the history of development of research structures in individual countries. Again we cannot speak about any optimum value of this share.

With the exception of Greece, the shares of public (government) sector are below 15 %; France is slightly above this value. In the monitored new Member States, where the Academies of Sciences and state research organisations had played a great role until 1990, these shares are higher than 20 %. Slovenia got under 20 % in 2004.

Czechia reports the second lowest share of public (government) sector among the monitored new Member States (21.2 % in 2004), while this share has been declining since 2001.