ANALYSIS OF THE EXISTING STATE OF RESEARCH, DEVELOPMENT AND INNOVATION IN THE CZECH REPUBLIC AND A COMPARISON WITH THE SITUATION ABROAD IN 2012

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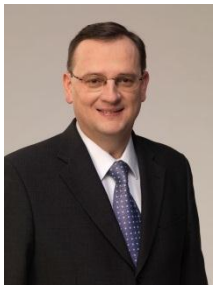
Introduction

***Motto**: "The necessary austerity policy of the government in the field of science and research will be accompanied by such growth supporting measures, which will not be in contradiction with the effort to reduce the state's debt."*



Research, development and innovation present traditionally indispensable development phenomena for the Czech Republic. One of the government's priorities is the improvement of elements of competitiveness, among which research, development and innovation play a key part. The government is aware of this despite measures, which it is forced to implement due to its budgetary responsibility.

In economically advanced countries an important factor for retaining their competitive advantage is the ability of enterprises to innovate. Investments in research and development bring internationally competitive knowledge, innovation and technologies, which are among the most important motivators of the social development. The government adopted measures to support economic growth in 2012 and one of the proposals with a high priority is the measure to implement a programme to support applied research and development for the industrial use in order to improve the Czech Republic's competitiveness. Research and development activities in the Czech Republic are mostly performed in the business sector, which invested 42.7 billion CZK into research and development in the Czech Republic in 2011 (i.e. more than 60% of the total expenditures on research and development). The significance of the business sector within the structure of the Czech Republic's research and development is comparable to other economically advanced European countries. After the year-on-year decrease of private expenditures on research and development in the Czech Republic in 2008 and 2009 these expenditures are increasing again. It is also typical for the focus of research and development in the public sector (government and universities) that the use of gained scientific knowledge in practice is getting to the forefront. Research in this area therefore focuses on gaining unique knowledge in frontier science, which contributes to the general growth of knowledge and to the improvement of the innovation performance of enterprises and growth sustainability.

The positive fact is that in the long-term the public expenditures on education, research and development do not decrease both in relation to GDP and in relation to the overall budgetary expenditures.

The preparation of annual Analyses of Research, Development and Innovation in the Czech Republic in International Comparison is a task given to the Council for Research, Development and Innovation by the Act No. 130/2002 Coll., on the Support of Research, Experimental Development and Innovation from Public Sources and Changes to Certain Related Acts (Act on the Support of Research, Experimental Development and Innovation), as amended. This is already the eleventh analysis. Its goal is to provide the broader expert public and other interested parties with a thorough and clear balance of inputs of research and development and their impact on the outputs, especially on innovation and competitiveness including international comparison.

I believe that the presented publication will provide necessary information to everybody, who is interested in the Czech research, development and innovation.

RNDr. Petr Nečas

Prime Minister
Chairman of the Research and Development Council

Contents

Abbreviations and acronyms

AS CR	Academy of Sciences of the Czech Republic
AIPCR	Association of Innovative Entrepreneurship of the Czech Republic
CA	coordination actions
CEP	Central R&D Project Register
CEZ	Central Register of Research Intentions
CIS 4	Community Innovation Survey
CBU	Czech Mining Office
Commission	European Commission
CZSO	Czech Statistical Office
CUZK	Czech Office for Surveying, Mapping and Cadaster
CZ-NACE	Classification of economic activities
EIS	European Innovation Scoreboard
EPO	European Patent Office
ERA	European Research Area
EU	European Union
EU-15	the following EU Member States: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom, Greece
EU-25	the EU-15 + the Czech Republic, Estonia, Cyprus, Lithuania, Latvia, Hungary, Malta, Poland, Slovakia and Slovenia
EU-27	all EU Member States (EU-25 + Bulgaria and Romania)
Eurostat	Statistical Office of the European Communities
FDI	foreign direct investments
Frascati	S&T classification (Frascati Manual, OECD 2002)
FP6	Sixth Framework Program of the European Union
FP7	Seventh Framework Program of the European Union
GACR	Czech Science Foundation
GBAORD	Government Budget Appropriations or Outlays for R&D by Socio-economic Objectives

GCI	Global Competitiveness Index
GERD	Gross Domestic Expenditure on R&D
Growth CI	Growth Competitiveness Index
GDP	gross domestic product
ICT	Information and communication technology
IMD	International Institute for Management Development, Lausanne, Switzerland
IEOP	Industry and Enterprise Operational Program
ISOP	MIT operating system information system
ITER	International Thermonuclear Experimental Reactor
JRC	Joint Research Centre
MoT	Ministry of Transport
MoD	Ministry of Defence
MoI	Ministry of Informatics
MIT	Ministry of Industry and Trade
MoLSA	Ministry of Labour and Social Affairs
MoJ	Ministry of Justice
MSTI	Main Science and Technology Indicators, OECD
MoEYS	Ministry of Education, Youth and Sports
MoI	Ministry of the Interior
MoH	Ministry of Health
MoA	Ministry of Agriculture
MoFA	Ministry of Foreign Affairs
MoEnv	Ministry of the Environment
NB	national budget of the Czech Republic
NBU	National Security Authority
NSI	National Science Indicators
NUTS-2	Nomenclature of Territorial Units for Statistics

OECD	Organization for Economic Cooperation and Development
OHIM	Office of Harmonization for the Internal Market
OON	other wages
OP	operational program
OSF	Structural Funds Department, MIT
OSS	organizational unit of the state
PCT	Patent Cooperation Treaty
PPP	purchasing power parity
RCI	relative citation impact of a country / region
RCIO	relative citation impact of a discipline of a country / region
R&D	research and development
R&D&I	research and development and innovation
R&DfI	research and development for innovation
R&D IS	Research and development information system
RIV	Results Information Register
RPC	relative production of citations
RPP	relative production of publications
RVV	Research and Development Council
SME	Small and medium-sized enterprises
SPO	state organizations partly funded from the public purse
SSA	specific support actions
SUJB	State Office for Nuclear Safety
TCAS CR	Technology Centre of the Academy of Sciences of the Czech Republic
UIV	Institute for Information on Education
UNCTAD	World Investment Report 2007
UPV	Industrial Property Office
USPTO	United States Patent and Trademark Office
VES	Register of Public Tenders in Research and Development

VK	training for competitiveness
VS	University (public, private)
VVI	public research institutions set up in accordance with Act No 341/2005
VZ	research intentions
WEF	World Economic Forum
WIPO	World Intellectual Property Organization

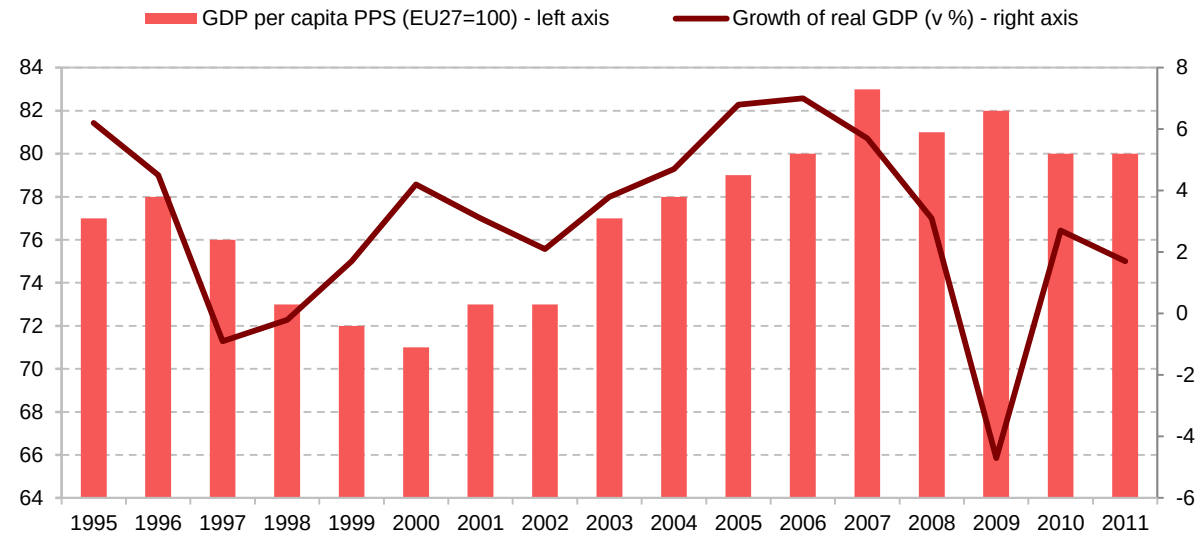
Macroeconomic framework of the analysis of research, development and innovation

Economic development

The development of the Czech economy has been influenced by the economic crisis in recent years, which affected the major part of the economically advanced world, i.e. Europe and the United States. On the contrary the fast developing South American and Southeast Asian countries maintain a relatively healthy economic growth rate. Measured by the GDP the Czech economy only slowly recovered in 2010 and 2011 from the crisis of 2008 and 2009. The most intensive impact of the recession on the Czech economy has been recorded in 2009, when the GDP decreased in real values by 4.7%. In comparison to the European average (GDP drop by 4.3%) this was only a slightly larger decrease. The crisis manifested in the Czech Republic with a certain delay due to the inertia in customer-supplier relations as in 2008 it still grew by 3% while the European economy stagnated (0.3%). The economic recovery in the Czech Republic in the post-crisis year 2010, when real GDP increased by 2.7% was not followed by a sharper increase in 2011. In this year the growth rate decreased to 1.7%.

In the long-term picture of the real convergence of the Czech Republic to the European average, measured by the GDP per capita indicator at PPS (purchase power standard) the most successful period was right after the accession to the EU. In 2004-2007 the socioeconomic level of the Czech Republic increased from 77% of the European average to 83% in 2007. This period may be assessed as successful also because the whole European economy grew relatively fast. On the contrary the economic crisis and the subsequent development had a negative influence on Czech economy's convergence as by 2011 the GDP per capita at PPS decreased to 80%.

Chart 1: GDP development and real convergence of the Czech Republic



Source: CZSO and Eurostat

Regarding the structure of expenditure on GDP the main reason for the weak growth in 2010 and 2011 was the stagnating domestic demand, which in 2011 didn't reach the real level of 2007. The weaker domestic demand is caused mainly by the lesser creation of gross fixed capital (investments), where the economic crisis caused a worldwide insecurity and a significant decrease in 2009 (year-on-year by almost 15%). In 2010 and 2011 the investment activity from the pre-crisis period failed to recover and the creation of gross

fixed capital stagnated. Unlike most of the EU states the Czech government's consumption expenditures stagnate as well, which reflects the significantly restrictive character of the Czech fiscal policy focused on decreasing the public budget deficit. In the short term this fiscal policy limits economic recovery as it further hinders current domestic supply (specifically the households' consumption and public investments), in the long term it limits conditions for improvement of non-price factors of competitiveness (such as investments in education, R&D, infrastructure etc.).

The economic structure

Regarding the structure of added value creation and employment the Czech economy is among the most industrial European countries. The share of industry in the creation of added value in 2011 exceeded 31%, which is significantly above the European average (19.6% in 2011). The only EU country with a higher share of industry in the creation of added value is Slovakia (32.5%). The Czech industry also has a more significant role in employment (25.9% in 2011) than the European average (16.8%). Foreign-owned enterprises play an important role in the manufacturing industry, which has a 24.3% share in the added value of the Czech economy and 23.8% in employment. These enterprises create 58% of the overall added value of the manufacturing industry (data from 2009). The foreign-owned enterprises have a dominant role in the automotive industry (90% of the total added value), which is the motor of business R&D investments in the Czech Republic. Also the industrial foreign-owned enterprises show a ca. 70% higher labour productivity than the private domestic enterprises in the manufacturing industry. This can be partially explained by the higher efficiency of production processes in these enterprises and from a historical point of view also by the fact that the foreign companies chose the highly productive parts of the domestic manufacturing industry for their massive acquisitions.

Regarding the long-term development the significance of the service sector in the economy is increasing in the Czech Republic as well as in the other European countries. While in 1995 the service sector participated in the creation of added value with 57% and in employment with 54.3%, by 2011 this share increased to 60% of added value and 56.1% of employment. However, in comparison to the European average the role of market services is less significant in the Czech Republic (42% added value, EU27 average 50%). Also in the market services sector the role of foreign-controlled enterprises is significant, particularly in financial, telecommunication and logistic services.

From the technological and knowledge intensity point of view measured by the share of R&D investments in the gross added value the branches of the manufacturing industry with a high share of knowledge-based activities are the automotive, electrical engineering and electronic and engineering industries, in the service sector then information and communication technologies services.

Table 1: Basic indicators of the macroeconomic development of the Czech Republic

	1995	2000	2005	2007	2008	2009	2010	2011	EU27 (2011)
GDP per capita at PPS (EU27=100)	77,0	71,0	79,0	83,0	81,0	82,0	80,0	80,0	100,0
Real GDP growth rate (%; previous year prices)	6,2	4,2	6,8	5,7	3,1	-4,5	2,5	1,9	1,5
Labour productivity per 1 employee (PPS; EU27=100)	64,4	65,6	73,0	76,2	74,0	75,0	73,4	73,5	100,0
Public debt (% GDP)	14,0	17,8	28,4	27,9	28,7	34,4	38,1	41,2	82,5
Inflation rate (%)	9,1	3,9	1,6	3,0	6,3	0,6	1,2	2,1	3,1
Comparative price level (EU27=100)	38,1	48,1	58,2	62,4	77,2	73,1	75,2	76,7	100,0
Employment rate (%)	69,4	65,0	64,8	66,1	66,6	65,4	65,0	65,7	64,3
Unemployment rate (%)	4,0	8,7	7,9	5,3	4,4	6,7	7,3	6,7	9,7
Long-term unemployment rate (%)	1,1	4,2	4,2	2,8	2,2	2,0	3,0	2,7	4,1
Public expenditures on education(% GDP)	4,7 (1996)	4,0	4,1	4,1	3,9	4,4	:	:	5,4 (2009)
Energetic demand of economy (Kgoe/thousand EUR)	533,4	481,9	432,7	390,9	370,8	364,0	374,6	:	152,1 (2010)

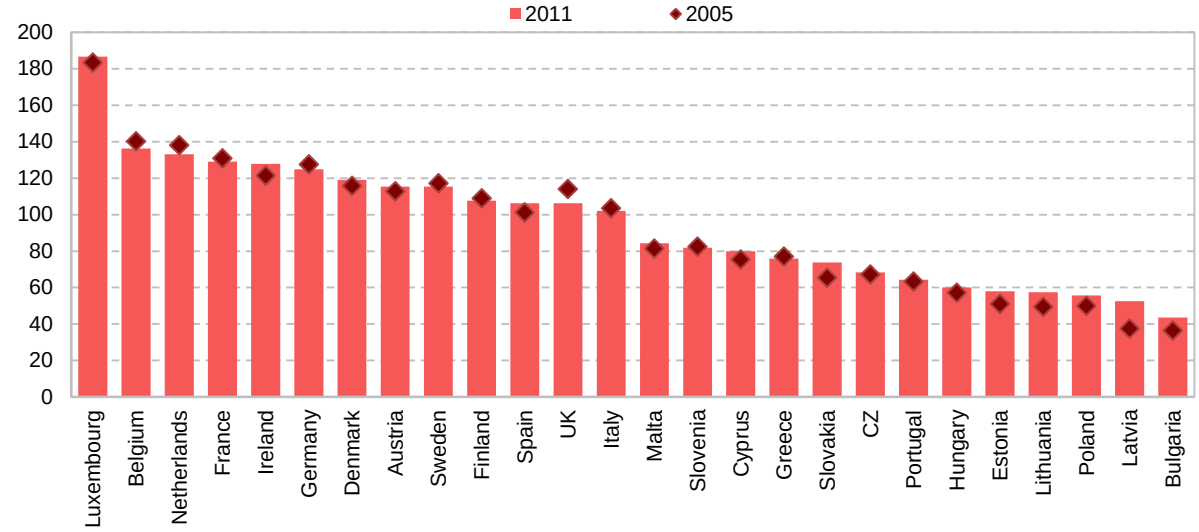
Note: indicator definitions are included in Appendix F.1
Source: CZSO

Labour productivity

An important indicator of the economic performance is the productivity of labour and its development in time. Since 1995 the real labour productivity per one working hour in the Czech Republic increased by more than 64%, which is significantly more than the average productivity growth in the EU27 (by 26%). To a large extent this is due to the lower starting position of the Czech Republic compared to the European average. Due to this increase the relative level of the real labour productivity per one working hour at PPS increased from 59.9% of the European average in 1995 to 68.4% of the EU27 average in 2011.The position of the Czech Republic improved the fastest between 2002 and 2007 when the productivity increased from 65.5% to 71.1%. However, since then the relative position related to the EU27 gradually worsened.

In comparison to the development of wage costs it is positive that the real productivity per one hour increased significantly faster than the unit wage costs, despite the negative influence of the economic recession, when there was a more significant drop in GDP. From the macroeconomic point of view the growth of labour costs in relation to the faster growth of labour productivity doesn't create excessive inflation pressures, which would prompt the central bank to apply a restrictive monetary policy.

Chart 2: Labour productivity per one working hour at PPS (EU27=100)



Note: Austria and Romania 2010, Belgium, GB and Malta 2009
Source: ČZSO and Eurostat

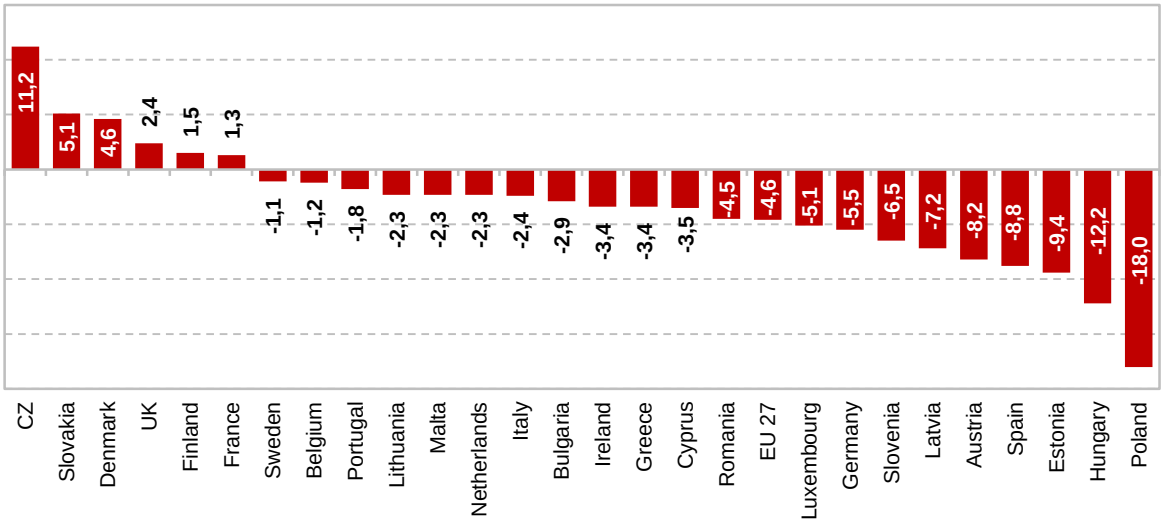
Competitiveness

The economic development at the micro and macro level is determined by a set of policies, institutions and other factors, which influence the productivity of production factors in the economy, generally characterized as the country's competitiveness[1]. Related to the economic growth of countries are gradual changes in the key competitiveness factors. The economically less advanced countries may achieve economic growth through investments into the development of production capacities connected to implementation of modern technologies developed in more advanced countries. In economically more developed countries the ability of enterprises to innovate, i.e. implement new products, processes, changes in labour organization and management or create new sales methods, becomes an important condition to retain a competitive advantage. According to its economic level the Czech Republic is among the countries whose main factor for ensuring a competitive advantage is the ability of enterprises to innovate.

As for the Czech Republic's ability to compete with relatively lower production price related to lower production costs, particularly labour costs, this advantage became gradually lower in the past years. In the long-term development point of view the Czech Republic even recorded the fastest growth of unit labour costs of all the EU27 countries. While in the EU27 the unit labour costs decreased by more than 5% between 1995 and 2011, in the Czech Republic they increased by 11%. When compared to the other EU countries it becomes apparent that this development isn't a phenomenon of post-communist countries, as e.g. Poland and Hungary recorded the highest decrease in unit labour costs in the same period (thus increasing their price competitiveness).

[1] This definition of competitiveness is used by the World Economic Forum, which regularly publishes the respected Global Competitiveness Report.

Chart 3: Development of real unit labour costs between 1995 and 2011 (% change)



Note: Malta, Greece, Romania: 1999 – 2011, Ireland: 1995 – 2010
Source: Eurostat

A more complex definition of a country's competitiveness (see above) also takes into account other non-price factors creating conditions for the growth of productivity of factors of production. One of the respected complex indicators of country's competitiveness used in international comparisons is the Global Competitiveness Index published by the World Economic Forum. In the ranking of countries by the level of competitiveness measure by this composite factor[2] the Czech Republic (39th) is together with Estonia (34th) and Poland (41st) one of the best among the post-communist countries of CEE. Regarding the individual factor groups the Czech Republic has a relatively good position in the category of factors, which characterize the technological readiness (31st), qualitative conditions for enterprises (35th) and innovation environment (34th). On the contrary the relative weaknesses can be seen in the quality of institutions (82nd) and labour market efficiency (75th)[3].

Public Research and Development

In the public R&D, which includes the government and university sectors, the total R&D expenditures reached 27.7 bn. CZK, which is almost 40% of the total R&D expenditures. Similar to the business sector R&D expenditures the public sector also recorded a high increase in R&D expenditures in 2011 (year-on-year more than 25%). However, while the structural, ownership and regional structure of the business sector research remains relatively stable in the Czech Republic, there have been significant changes in the public R&D regarding the sectorial expenditure structure of expenditures, work sites and employees.

Structural changes of the public R&D manifest by a fast growth of financial and personal capacities of the university sector with a relatively lower strengthening of the government sector R&D. While in 2005 50% of all (FTE) employees of the public R&D were in the university sector, in 2011 this number increased to 57%. Even more significant is the absolute and relative increase of R&D expenditures in the university sector, where in 2011 for the first time in modern history the R&D expenditures of the university sector exceeded those in government sector. While in 2005 the university R&D expenditures reached 45% of the public R&D expenditures, in 2011 their share exceeded 55%. An important factor of this growth was the university

[2] See World Economic Forum (2012): The Global Competitiveness Report 2012-2013. Geneva.
[3] This has been pointed out also in the Government's National Economic Council's report "Framework of the Competitiveness Strategy" published in March 2011

sector's investments into the construction and modernization of the research infrastructure funded by the EU structural funds. In the government sector, where almost 70% of employees and almost 80& of R&D expenditures are allotted to the CAS work sites, the growth was much slower than in the university sector. While in the university sector these expenditures grew by an average of 14% a year, in the government sector it was only less than 7%, which is also lower than in the business sector (more than 8% a year). This shows that the inputs of the government sector have been relatively weakened in the recent years.

The increase in the R&D expenditures in the public sector was accompanied not only by the absolute growth of the publication outputs of Czech authors, but also by the growth of their share in the world production. The number of publications per one R&D employee in the public sector exceeded the EU27 average in 2010. However, in case of the citation rate of the publications of Czech authors the situation is different as the publications by Czech authors per one R&D employee are cited less than the EU 27 average. In global comparison the citation rate of Czech authors is improving in time and field normalized citation rate of Czech authors exceeds the global average. Relatively large (measured by the amount of publications) and also highly cited fields of Czech science in the global context are nuclear physics, nuclear sciences and technology and spectroscopy.

Also the outputs of the public research in the form of granted patents increased quite fast in the recent years. While in 2005 the Industrial Property Authority granted only 37 patents to universities and public research institutions, by 2011 this number increased to 144. Despite that the patent activity of the public sector (but also the business sector) remains at a relatively low level compared to the European average. Also the volume of license income in the Czech Republic is relatively low in the public research. The exception in this regard is the Institute of Organic Chemistry and Biochemistry, where the income from license fees constitutes a significant part of budgetary income. As for other research institutions, which failed to replicate this unique success, the income from license fees is negligible.

The growth of R&D expenditures and the number of granted patents (i.e. one of the important applicable results) in public R&D hasn't been accompanied by an adequate increase in direct cooperation of universities and research institutions with businesses. In the financial expression the volume of private funding (domestic and foreign) used in public research at an average rate of 7% a year in 2005-2011m which in relation to the total increase of R&D expenditures in the public sector by more than 10% meant that the significance of private funding in public research funding structure decreased. While in 2005 its share was 8.2%, in 2011 it was only 6.4%. With regard to the internationally relatively low rate of cooperation of public research with businesses this trend is a negative signal of diminishing intensity of relations inside the national innovation system. Another interesting fact is that the volume of private funding spent in public R&D decreased in absolute values at an average rate of almost 6% a year. This significant decrease was partially compensated by a more significant increase of foreign private funding (average 20% a year), which in 2011 represented almost 70% of all private funding of public R&D.

Also the involvement of public R&D in international R&D projects shows certain reserves. Universities and public research institutions conduct less than 580 FP7 projects with total European Commission support in the amount of ca. 113 million EUR. It is possible to estimate that the FP7 funding represents only ca. 2% of all non-investment funds spent by the universities and public research institutions on R&D. The largest participants in FP7 projects were the Charles University, Czech Technical University and the Masaryk University.

Business sector research, development and innovation

The R&D activities in the Czech innovation system are mostly performed in the business sector, which in 2011 invested 42.7 bn. CZK into R&D in the Czech Republic (i.e. more than 60% of the total R&D expenditures). The significance of the business sector is comparable to the other advanced European countries. After a year-on-year decrease of business R&D spending in 2008 and 2009 the expenditures returned to the growth trajectory. Unlike in 2010 there has been a significant increase in business R&D expenditures (year-on-year by 16.5%), the volume of which significantly exceeded the pre-crisis level. A positive fact is that the R&D expenditures increased not only in foreign-owned businesses, which dominate in the structure of Czech business R&D (more than 60%) but also in domestic businesses, where the expenditures increased by 15%. From the long-term sustainability point of view the negative aspect is that the increase of domestic business R&D spending was funded mostly from public sources (both domestic and foreign). The public sources thus currently finance almost 1/3 of R&D expenditures of domestic businesses. In case of foreign-owned businesses the situation is quite different. Only 4% of the total foreign-owned businesses' R&D spending was funded from public sources.

The most important part of private R&D investments is done in the automotive sector, which is also the main motor of the added value production in the Czech economy. Almost 98% of automotive R&D expenditures are spent in foreign-owned enterprises. Fast growing areas with regard to R&D investments are information technology fields and also the R&D expenditures of businesses that have R&D as their main activity.

As for the regional aspect the private R&D is traditionally strongest in the Central Bohemia region and in Prague; more than half of the total private R&D expenditures is spent here. In 2011 the highest year-on-year increase in private R&D expenditures was recorded in the Pilsen, Moravia-Silesia and Olomouc Regions. In the long term (between 2005 and 2011) the business R&D expenditures grew in the Pilsen, South Moravia and Královéhradecký Regions.

Although the business sector R&D is performed at more than 2 200 sites, the private R&D expenditures are relatively concentrated to several large R&D sites. Almost 50% of R&D expenditures in the business sector are spent at sites with more than 100 R&D employees, which however represent only 2% of the total number of R&D sites of the business sector. On the contrary at over 1 700 sites with less than 10 employees realizes only less than 16% of the total business R&D expenditures.

The economic recession in 2008-209 affected not only the private R&D expenditures, but also other investments into innovations as well. The small enterprises (10-49 employees) were hit the hardest as the volume of investment into innovation activities dropped by almost one half in comparison to 2006-2008. As for the sectorial composition there has been a drop in innovation expenditures in almost all areas of the manufacturing industry, including the traditionally strong areas such as engineering, metallurgy as well as production of computers, electronic and optical devices and instruments. On the other hand the positive development of the R&D expenditure growth has been recorded in the automotive industry, which shows that this key export area of Czech industry focuses on strengthening its position within the global production networks.

As for the structure of innovation costs the long-term most important part are investments into acquisition of machinery, equipment and software, which represent more than half of the total innovation costs. This is to a certain degree indicated by the adaptive character of innovation, where the enterprises in the Czech Republic mostly adopt advanced technologies and production processes and implement them in their productions. A certain difference can be seen in the structure of innovation costs of foreign-owned

enterprises, which spend a significantly larger amount of funds to purchase external R&D (apparently from their parent companies or other companies within the group).

The difference between domestic enterprises and foreign-owned enterprises is also apparent in the case of revenue from innovated products, where foreign-owned enterprises report more than three times higher revenue from innovated products (with only 1.5 times higher innovation costs). The difference in revenues from innovated products between foreign-owned and domestic enterprises is continuously increasing.

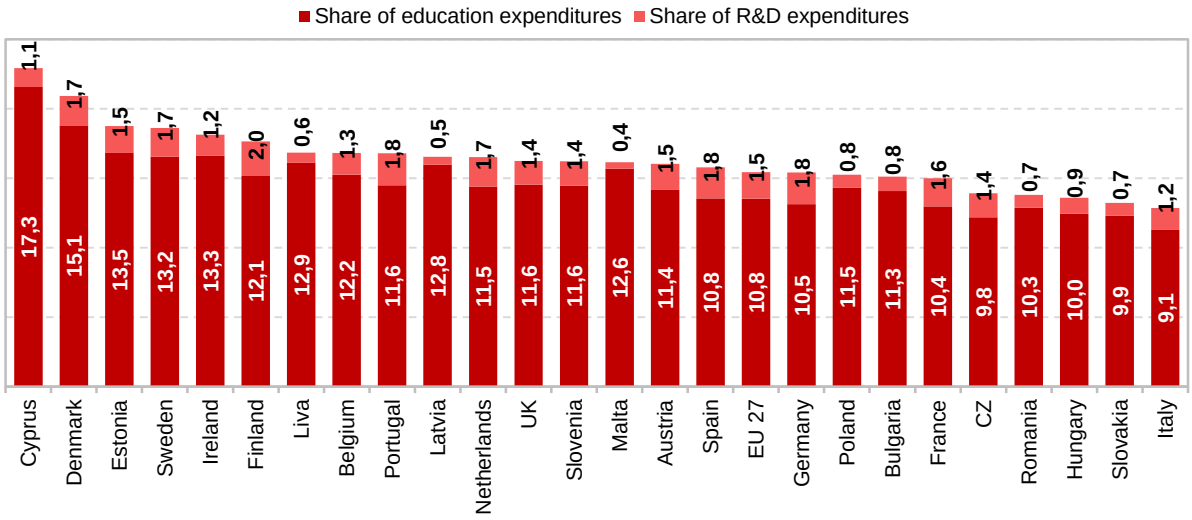
A positive fact regarding the competitive abilities of the Czech business sector is that both the total foreign high-tech trade balance and the share of high-tech exports on the total exports are increasing. In 2010 the turnover of the high-tech trade returned to positive values for the first time since the crisis years 2008 and 2009. As the Czech economy is strongly export-oriented, these optimistic trends indicate a relative stability in important branches of the Czech economy.

The openness of the Czech economy is apparent also in the relatively strong participation of the business sector in international R&D cooperation. In the FP7 alone the share of the private sector (particularly SME) exceeds 20% of all Czech participations and also the total volume of received funding, which is an above average figure within the EU (the aim of the European Commission is to achieve 15% share of the private sector). As for the sectorial composition the enterprises participate mostly in ICT and nanotechnology projects. The international cooperation of enterprises is also intensive within the other European programmes and initiatives, especially within the EUREKA programme.

Support of the long-term growth in government policies

After the crisis in 2009 the government's policy is characterized by a significantly restrictive character motivated by the effort to keep stable low public budget deficits. Due to the significant portion of mandatory expenses in the public budget this is reflected in the limitations or stagnation of investment and other facultative expenditures. In the context of this analysis this is mostly the case of expenditures on education and R&D. In 2009 the expenditures on education within the Czech public budgets represented 11.1% of the total public expenditures, which is a below-average figure in comparison to other European states. Only Romania, Hungary, Slovenia and Italy are behind us in this indicator. On the contrary, in the Northern countries as well as in Estonia and Ireland the education and R&D expenditures make up 14-17% of the total public expenditures. Also in relation to the GDP the investments into education and R&D are below the European average. While the EU27 average public expenditures on R&D and education in 2009 were 6.2% GDP, in the Czech Republic the share was only 5%. For comparison in Denmark the public budget expenditures on educational and R&D activities represent almost 10% GDP.

Chart 4: Share of the public expenditures on education and R&D in total public expenditures (2009; %)



Note: Data on Greece and Luxembourg for 2009 is not available
Source: Eurostat

As for the long-term development the public expenditures on education and R&D in the Czech Republic have increased both in relation to GDP and total public expenditures. Due to the fact that internationally comparable data are available only until 2009 it isn't possible to quantify the influence of restrictive fiscal measures, which were implemented due to the consolidation of public budget deficits, on the development of these expenditures.

Table 1: Key indicators – The Czech Republic in time

	1995	2000	2005	2007	2008	2009	2010	2011
Funding								
GERD (bn. CZK)	14,0	26,5	42,2	54,3	54,1	55,3	59,0	70,7
GERD (% GDP)	0,91	1,17	1,35	1,48	1,41	1,48	1,56	1,86
BERD (% GERD)	55,1	60,0	63,2	61,9	61,9	60,0	62,0	60,3
GOVERD (% GERD)	26,4	25,3	20,0	20,8	20,9	21,4	19,4	17,5
HERD (% GERD)	8,5	14,2	16,4	16,9	16,8	18,1	18,0	21,6
BERD funded from public sources (v %)	4,5	14,7	14,4	13,4	13,2	14,8	12,9	12,8
GOVERD funded from private sources (v %)	11,3	9,6	9,2	6,7	5,9	4,2	4,7	3,4
HERD funded from private sources (v %)	2,0	1,1	0,8	0,7	0,6	1,1	1,1	1,0
GBAORD (bn. CZK)	5,2[1]	11,9[1]	16,4	20,5	20,5	23,0	22,6	25,4
GBAORD share in state budget expenditures (v %)	1,3[1]	1,8	1,6	1,9	1,9	2,0	2,1	2,2
Human resources								
R&D employees (FTE)		.	43 370	49 192	50 808	50 961	52 290	55 697
R&D employees (FTE per 1000 inhabitants)		.	4,24	4,78	4,89	4,87	4,98	5,29
Researchers (FTE)		.	24 169	27 878	29 785	28 759	29 228	30 682
Researchers (FTE per 1000 inhabitants)		.	2,36	2,71	2,87	2,75	2,78	2,91
Share of women (FTE, v %)		.	26,3	25,4	25,4	26,0	25,4	25,1
Share of persons with tertiary education (% of population 25 - 64 years)		11,5	13,1	13,7	14,5	15,5	16,8	18,2
Results								
Publications per 1000 inhabitants	0,340	0,440	0,595	0,728	0,794	0,835	0,841	.
Field normalized citation rate of scientific publications (% of global average)	55,0	88,8	106,4	99,4	109,8	107,9	119,1	.
Number of patent applications at EPO (per 1 mil. inhabitants)	1,1	0,4	2,6	3,6	4,4	4,0	4,4	5,4
Income from patent and industrial pattern licences (mil. CZK)		.	538	1 257	1 160	1 332	1 509	1 745
Foreign income from licences (% of total income from service export)		1,1	0,6	0,3	0,4	0,8	0,6	0,6
Innovation								
Share of enterprises with technical innovations (% of total number of enterprises)		31,0	.	.	39,3	.	34,8	.
Share of revenue from innovated products (% of total revenues of technically innovating enterprises)		12,9	.	.	16,1	.	12,4	.
Export of high-tech goods (% of total export)	5,0	7,8	11,7	14,1	14,1	15,2	16,1	16,2
Employment in high-tech industry (% of employment in manufacturing industry)	3,6	4,0	4,7	5,2	5,2	5,2	5,0	4,8.
R&D expenditure in high-tech industry (% BERD)	13,7	10,0	11,8	13,2	12,4	12,9	11,7	10,2
Venture capital investments (% GDP)		0,025	0,000	0,002	0,003	0,001	0,008	0,005
International cooperation								
GERD funded from foreign sources (v %)	3,3	3,1	4,9	5,5	6,5	10,4	10,4	15,2
Share of publications with domestic and foreign researchers as co-authors (% of total number of Czech publications)	39,1	42,6	44,4	43,3	42,3	42,5	44,9	.
Share of technically innovating enterprises cooperating with a partner from the EU or EFTA on innovations (%)		.	.	.	19,8	.	20,9	.
Students studying in another EU27, EEA or a candidate country (% of all students)		1,3	1,8	2,1	2,6	2,7	2,9	.

Note: [1] year 1996; definitions of selected indicators in Appendix F.1
Source: Data used in individual chapters of this analysis

Table 2: Key indicators – The Czech Republic in international comparison

	Year	CZ	Germany	Austria	Slovakia	Poland
Funding						
GERD (million EUR)	2010	2 329	69 883	7 891	416	2 610
GERD (% GDP)	2010	1,56	2,82	2,76	0,63	0,74
BERD (% GERD)	2010	62,0	67,2	68,1	42,1	26,6
GOVERD (% GERD)	2010	19,4	14,8	5,3	30,0	35,9
HERD (% GERD)	2010	18,0	18,0	26,1	27,6	37,2
BERD funded from public sources (v %)	2010	12,9	4,5	11,0[1]	10,7	13,8
GOVERD funded from private sources (v %)	2010	4,7	9,8[1]	6,0[1]	13,0	6,2
HERD funded from private sources (v %)	2010	1,1	14,3[1]	5,2[1]	2,3	2,9
GBAORD (million EUR)	2010	894	23 016	2 280	195	1 475
GBAORD share in state budget expenditures (v %)	2010	2,1	1,9	1,5	0,7	0,9
Human resources						
R&D employees (FTE)	2010	52 290	549 042	58 519	18 188	81 843
R&D employees (FTE per 1000 inhabitants)	2010	10,1	13,6	14,2	8,5	5,1
Researchers (FTE)	2010	29 228	327 198	35 942	15 183	64 511
Researchers (FTE per 1000 inhabitants)	2010	6,0	8,1	8,7	7,1	4,1
Share of women (FTE, v %)	2010	28,1	24,9	28,4	42,4	39,0
Share of persons with tertiary education (% of population 25 - 64 years)	2010	16,8	26,3	19,3	17,3	22,9
Results						
Publications per 1000 inhabitants	2010	0,841	1,083	1,363	0,502	0,511
Publications from 2008 per 1000 inhabitants	2010	3,792	7,189	8,530	1,933	1,659
Number of patent applications at EPO (per 1 mil. inhabitants)	2010	4,4	153,1	82,7	2,2	1,2
Foreign income from licences (% of total income from service export)	2010	0,5	6,0	1,2	0,9	0,8
Innovation						
Share of enterprises with technical innovations (% of total number of enterprises)	2008	39,3	63,8	42,9	21,7	19,8
Share of revenue from innovated products (% of total revenues of technically innovating enterprises)	2008	16,1	3,8	7,5	14,8	8,2
Export of high-tech goods (% of total export)	2010	16,1	14,0	11,8	6,6	6,0
Employment in high-tech industry (% of employment in manufacturing industry)	2010	5,9	7,3	6,4	6,4	4,2
R&D expenditure in high-tech industry (% BERD)	2009	14,5	14,2	16,5	6,6	5,5
Venture capital investments (% GDP)	2011	0,005	0,030	0,008	.	0,006
International cooperation						
GERD funded from foreign sources (v %)	2010	10,4	3,9[1]	16,4	14,7	11,8
Share of publications with domestic and foreign researchers as co-authors (% of total number of Czech publications)	2010	44,9	58,7	60,0	45,3	32,7
Share of technically innovating enterprises cooperating with a partner from the EU or EFTA on innovations (%)	2008	19,8	7,21	23,87	25,81	18,76
Students studying in another EU27, EEA or a candidate country (% of all students)	2010	2,9	3,9	4,3	12,2	1,6

Note: [1] year 1996; definitions of selected indicators in Appendix F.1
Source: Data used in individual chapters of this analysis

A Investments into Research and Development

Investments into R&D bring internationally competitive findings, innovation and technologies, which are some of the most important factors for increasing productivity, employment, ensuring economic competitiveness, sustainable growth and social cohesion.

It is apparent that R&D becomes one of the central areas of both national and international politics (see e.g. Lisbon Strategy or Europe 2020) in recent years. Despite the above listed frequent declarations regarding science as well as education and a wide spectrum of innovation activities as basic factors of economic prosperity and stressing their importance the promises related to the support of their further development aren't supported by relevant facts and knowledge of reality.

The R&D concluded in the business sector, which is mainly related to innovation, plays an increasingly important role due to the on-going globalization, which brings new companies and products to the national markets and in so doing increases the competition in individual business areas.

The R&D concluded in the public sector (the government and universities) is mainly influenced by the science policies of individual countries. However, the priority, which is becoming increasingly important in this sector, is the interconnection of the gained scientific knowledge with its subsequent use in practice. Research in the government and university sectors is therefore focused on gaining unique knowledge in borderline areas, which benefit the general knowledge growth as well as the improving of innovation output of businesses and the maintaining of sustainable growth.

Main trends

- In 2011 the Gross Domestic Expenditure on R&D (GERD) in the Czech Republic reached 70.7 billion CZK, which represents 1.86% GDP. In this basic ratio we closed in on the EU27 average (1.9% in 2010).
- In comparison to 2010 the total expenditure on R7D increased by 11.7 billion CZK (20%). This is the highest year-on-year growth in the last decade, which constituted mainly of private domestic investments in R&D (year-on-year increase by 4.2 billion CZK; 15%) and public foreign investments (by 3.9 billion CZK; 150%). In 2011 we registered for the first time a significant share of the EU structural funds in Czech R&D funding (9%), particularly in the university sector (24%).
- The business sector in the Czech Republic, unlike in most EU member states, is not only the most important in funding of the R&D activities with a ca. 50% share in the last 10 years, but also in the amount of funding spent for conducted R&D with a ca. 60% share in the last 5 years. In the Czech Republic's business sector R&D the long-term dominant sector is the automotive industry with a 28% share in 2011. In the recent years there is a growing importance of businesses providing ICT services and programming.
- Regarding ownership of business conducting R&D in the Czech Republic the largest volume of funding is being spent by foreign-owned companies since 2003. In 2011 these businesses contributed 60% (second highest figure in the EU) of the total expenditures of the business sector, despite the fact that they constitute less than a quarter of the subjects conducting R&D and employ less than a half of research personnel.
- In 2011 the university R&D expenditures for the first time surpassed the expenditures of public institutions and other government subjects. The trend of strengthening the university sector at the expense of government sector R&D (dominantly represented by the Czech Academy of Science – CAS) could be observed for a longer period – the share of university R&D spending in total R&D expenditures has grown from 12% in 200 to 22% in 2011 and in the public R&D from 36% to 55%.
- The majority of the R&D expenditures in the government sector, unlike the university sector, flow into natural sciences, which are the domain of CAS facilities. The share of natural sciences in the government sector in the Czech Republic is the highest in EU according to available data. The same can be stated for the share of technical sciences in the university sector.
- The businesses spent almost 150 billion CZK on R&D in the Czech Republic; however only 2.5% (3.5 bn. CZK) were allocated to co-funding of R&D conducted in the university or government sectors.

- In 2011 after a year-on-year growth by 3.2 bn. CZK (14%) the total direct government support of R&D reached 25.8 bn. CZK (Source: Ministry of Finance – State Closing Budget), which equals 0.68% GDP and 2.23% of the overall expenditures of the Czech state budget. The share of government funding on the total R&D expenditures in the Czech Republic in 2011 reached 37%. The co-funding of EU projects from the state budget had a negligible influence on the stated increase.
- . If in 2005 the institutional support was higher by almost 2 bn. CZK than the directed support, then in 2011 the situation was the opposite. The largest provider of public R&D support in the Czech Republic since 1999 is the Ministry of Education, Youth and Sports. In 2011 10.6 bn. CZK from its budget chapter went to R&D, which represents a 41% share in the state budget R&D funding.
- In 2011 for the first time the public and state universities received the largest share of funds for R&D from the state budget (9.2 bn. CZK). The second largest beneficiaries are the public research institutions, which in 2011 received a total of 7.7 bn. CZK.
- In 2010 739 businesses in the Czech Republic used the tax deductible R&D item, which represents 35% of all businesses conducting R&D. Between 2005 and 2010 the state indirectly supported the R&D of businesses by an amount of 6.5 bn. CZK.
- The Czech Republic with its 0.03% share of GDP is among the states with the relatively lowest R&D indirect support.

The main aim of this analysis is to present relevant information about the development and structure of expenditures for R&D concluded in the Czech Republic and abroad according to the sources of funding and sectors of their use (chapter A.1) and direct (A.2) and indirect (A.3) support from the national budgets

A.1 Total R&D expenditures

Total R&D expenditures include all non-investment and investment expenditures for R&D concluded in the territory of the given state in the monitored year regardless of the source of their funding. The R&D expenditures can be determined by using two base indicators: in current prices: current prices of goods and services in the given year or in constant prices, which eliminate inflation. Because there is no special price index for R&D the GDP deflator has been used for the calculation of constant prices.

The source of the data for this chapter is the Annual Statistical Survey on Research and Development (VTR 5-01), which the CZSO sends to all subjects in the Czech Republic who perform R&D as their primary or secondary economic activity regardless of the number of employees, sector or branch in which they operate.

The table appendix includes detailed data for years 2005-2011 from the VTR 5-01 survey. The data for the international comparison come from the OECD publication „Main Science and Technology Indicators (MSTI 2012/1)“. Data on EU states, which are not OECD members, have been calculated by the CZSO from Eurostat data sources. In the table appendix with international comparison are also data available on 31st August 2012 on all states of the EU, OECD, Brazil, China, India, SAR and Russia (BRICS states). The charts include available data on EU states (except for Cyprus, Luxembourg and Malta) and China, Russia, Japan, South Korea, USA and Switzerland.

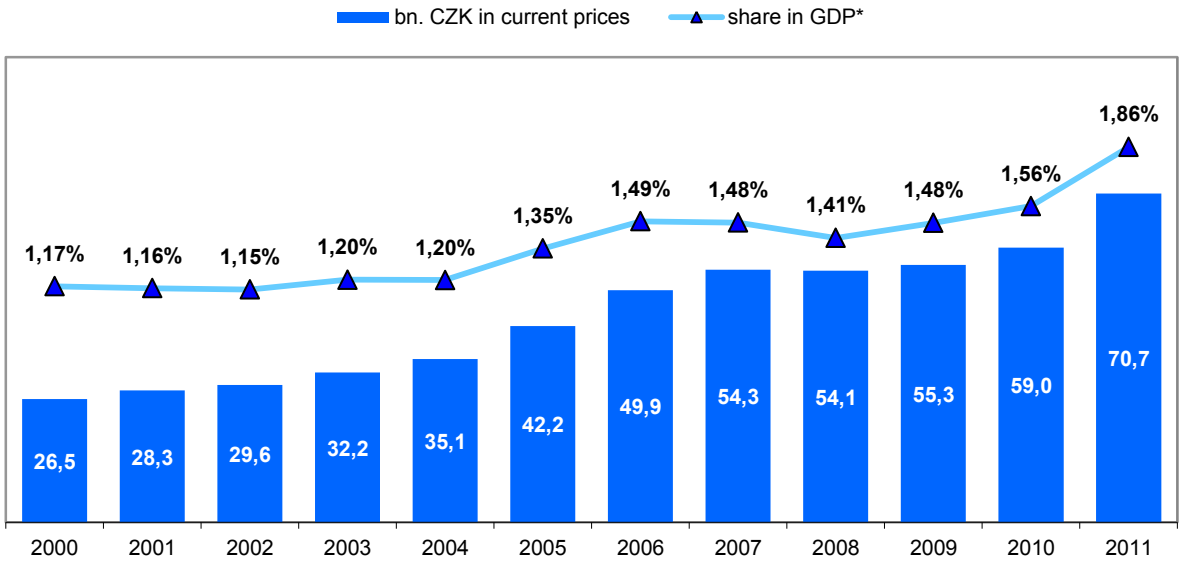
Basic indicators

In 2011 R&D in the Czech Republic was performed at 2 720 sites, 83% of which belong to the business sector. Only 1 in 20 sites surpassed 100 million CZK expenditures on R&D, specifically 137 sites. 57 of these sites belong to the business sector, 41 to the university sector and the remaining 33 to the government sector. On the contrary, at almost one quarter of the sites the R&D spending was less than one million CZK.

Detailed information in various sorting can be found in the table appendix of this analysis.

After a significant decrease in 1990 -1993 came the period of continuous increase of total investments into R&D (with the exception of 2008 with a slight year-on-year decrease). If in 1993 the R&D expenditures in the Czech Republic were 12.3 billion CZK, in 2000 it was 26.5 billion and seven years later even 54.1 billion CZK. In 2011 after a record 1/5 increase the total R&D expenditures in the Czech Republic reached 70.7 bn. CZK, which equals 1.86% of the GDP. In both cases these are the highest recorded values for the whole period.

Chart A.1: Total R&D expenditures in the Czech Republic (bn. CZK; % GDP)



*Note: * in this year an extraordinary revision of National Budgets was finished, which influenced the reverse calculation of the GDP value in the Czech Republic in the period 1995 – 2010. The R&D expenditures expressed as % GDP are slightly different from the data published in previous years or international publications. The figure for 2011 is based on the GDP estimate as of 31st August 2012.*

Source: CZSO 2011 Annual Statistical Survey on Research and Development VTR 5-01

After a significant decrease in 1990 -1993 came the period of continuous increase of total investments into R&D (with the exception of 2008 with a slight year-on-year decrease). If in 1993 the R&D expenditures in the Czech Republic were 12.3 billion CZK, in 2000 it was 26.5 billion and seven years later even 54.1 billion CZK. In 2011 after a record 1/5 increase the total R&D expenditures in the Czech Republic reached 70.7 bn. CZK, which equals 1.86% of the GDP. In both cases these are the highest recorded values for the whole period.

The annual VTR 5-01 survey gathers data on the total Czech R&D expenditures (GERD), which reached the already mentioned 70.7 bn. CZK in 2011 as well as on the external R&D expenditures. These expenditures, which include the purchase of R&D services from other subjects for own R&D (expenditures for R&D on order) reached 6.2 bn. CZK in 2011. More than a third of these (38%) were for the purchase of R&D services from abroad. Within the technological balance of payments another 4.7 bn. CZK were payments for import of R&D services form foreign subjects, which don't conduct their own R&D. In simple terms, the total expenditures for R&D in the Czech Republic, whether conducted domestically or abroad, were 77.7 bn. CZK.

As is apparent from the following table, after the decrease in 2008, caused mainly by the drop of private investments and a slight increase in 2009, which was mainly due to public and foreign investments we have recorded a significant increase of R&D investments in 2010 and especially in 2011. In the background of this

year-on-year increase by 11.7 billion CZK (19.8%) are R&D investments from domestic businesses, which have increased by 4.2 billion CZK (15%) and foreign public investments, which increased by 3.9 bn. CZK year-on-year. In 2011 we registered for the first time a significant share of the EU structural funds in Czech R&D funding, particularly in the university sector.

Table A.1: Year-on-year change of total R&D expenditures in the Czech Republic

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Billion CZK (current prices)	2,8	1,8	1,2	2,7	2,8	7,1	7,7	4,4	-0,2	1,2	3,7	11,7
% in current prices	12,0	7,0	4,3	9,1	8,8	20,3	18,3	8,8	-0,3	2,3	6,7	19,8
% in constant prices of 2005	10,5	2,2	1,6	8,1	4,6	20,7	17,6	5,3	-2,2	0,3	8,5	20,6

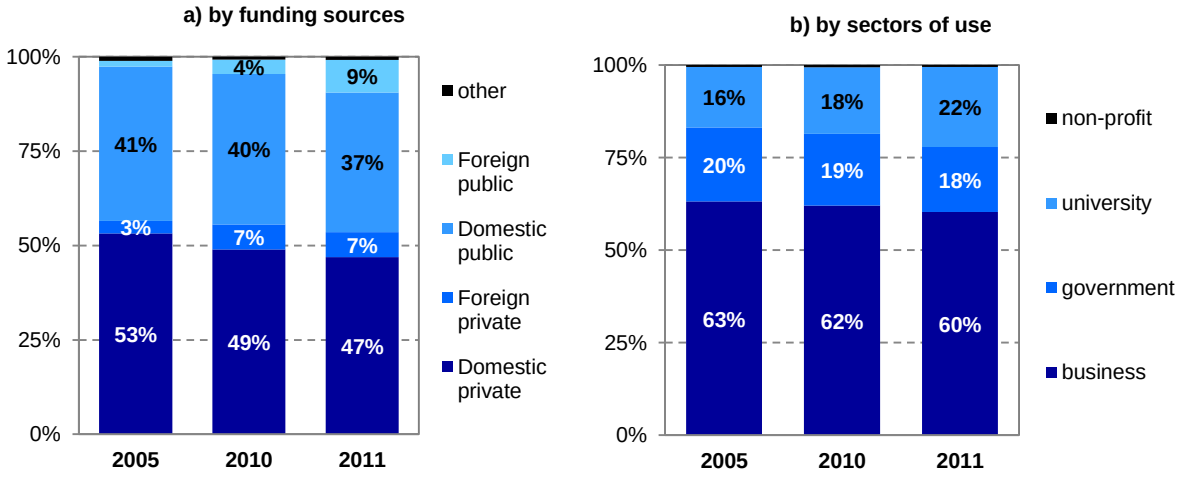
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

In 2011 more than a half (54%) of the total R&D expenditures came from private sources, both domestic and foreign. In time the share of foreign sources grows. If in 2005-2007 these sources made up ca. 5% of the private R&D funding, then in the last three years their share is between 12 – 15%. In 2011 we registered for the first time a significant share of the EU structural funds in Czech R&D funding, particularly in the university sector.

The business sector is the most important sector not only in the case of R&D funding, but also in the amount of funding spent for conducted R&D. In 2011 the expenditures on the university R&D were for the first time higher than expenditures on R&D conducted in public research institutions and other subjects of the government sector. The trend of strengthening the university sector at the expense of government sector R&D (dominantly represented by the Czech Academy of Science – CAS) could be observed for a longer period, which shows a gradual shift in the structure of the Czech public research.

More information about the structure of the expenditures on R&D according to the sources of funding and sectors of use can be found in the following two subchapters.

Chart A.2: Structure of total R&D expenditures in the Czech Republic (%) according to the sources of funding and sectors of use



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

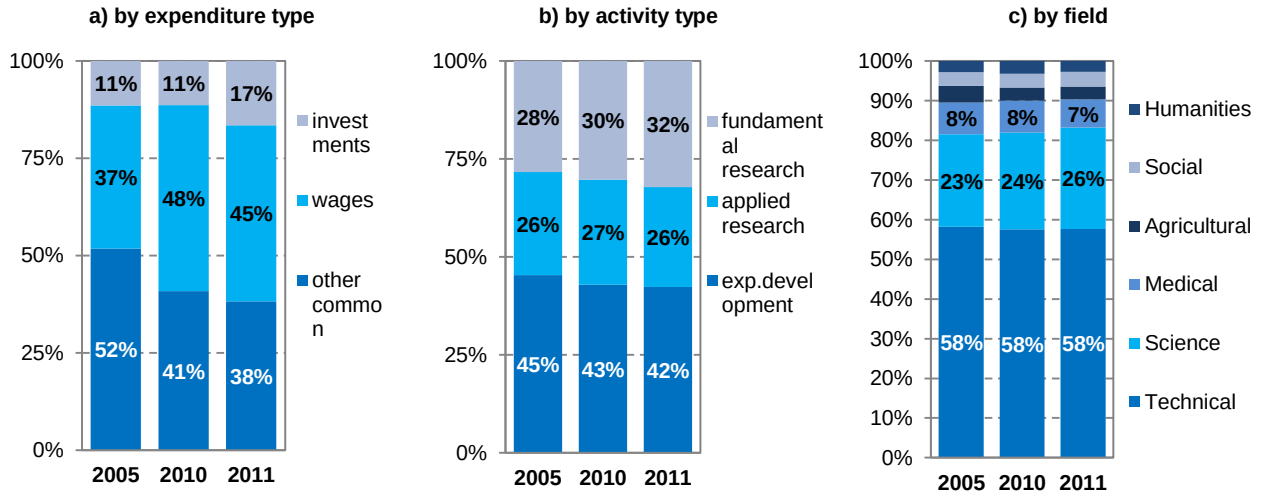
A significant part of the R&D expenditures in the Czech Republic comprises of wages and non-investment costs, which in 2011 together made up 83% of the total R&D expenditures. Wage costs have been the fastest growing cost item of R&D up to 2010. While they made up 29% (7.7 billion CZK) of the total R&D expenditures in 2000, in 2010 their share increased to 41% (24.1 billion CZK). In 2011 the wage costs

increased by 2.9 bn. CZK (12%), but due to the year-on-year increase of the investment costs by 5 bn. CZK (75%) their share of the total expenditures decreased by 3 percentage points. The significant increase of the investment costs is related mainly to the drawing of finances from the EU structural funds (particularly OP VaVpI), particularly in the university sector.

Most of the financial resources are being spent on experimental development (30 bn. CZK, 42%)., which is related to the fact that the business sector plays the most important part in the Czech R&D. In recent years the share of applied research is increasing at the expense of basic research, which is predominant in the government sector. In 2011 22.8 billion CZK were spent on applied research and 18 billion on basic research, which is a direct opposite to the year 2009 – 13.3 billion on applied research and 16.9 billion on basic research.

Regarding the scientific branches, within which the R&D is concluded, in 2011 the majority of financial resources were allocated to technical sciences and natural sciences (58.8 billion CZK, 84%). The technical sciences are mainly the focus of the business sector and the university sector. Natural sciences are developed by the government sector, mainly at the sites of the Academy of Sciences. Since 2005 the expenditures in humanities have relatively grown the most, by more than a half. In the same period the monetary increase has been the largest in technical sciences (16.2 billion CZK) and natural sciences (8.2 billion CZK). The structure of the Czech R&D according to investments into individual branches is more or less stable since 2005.

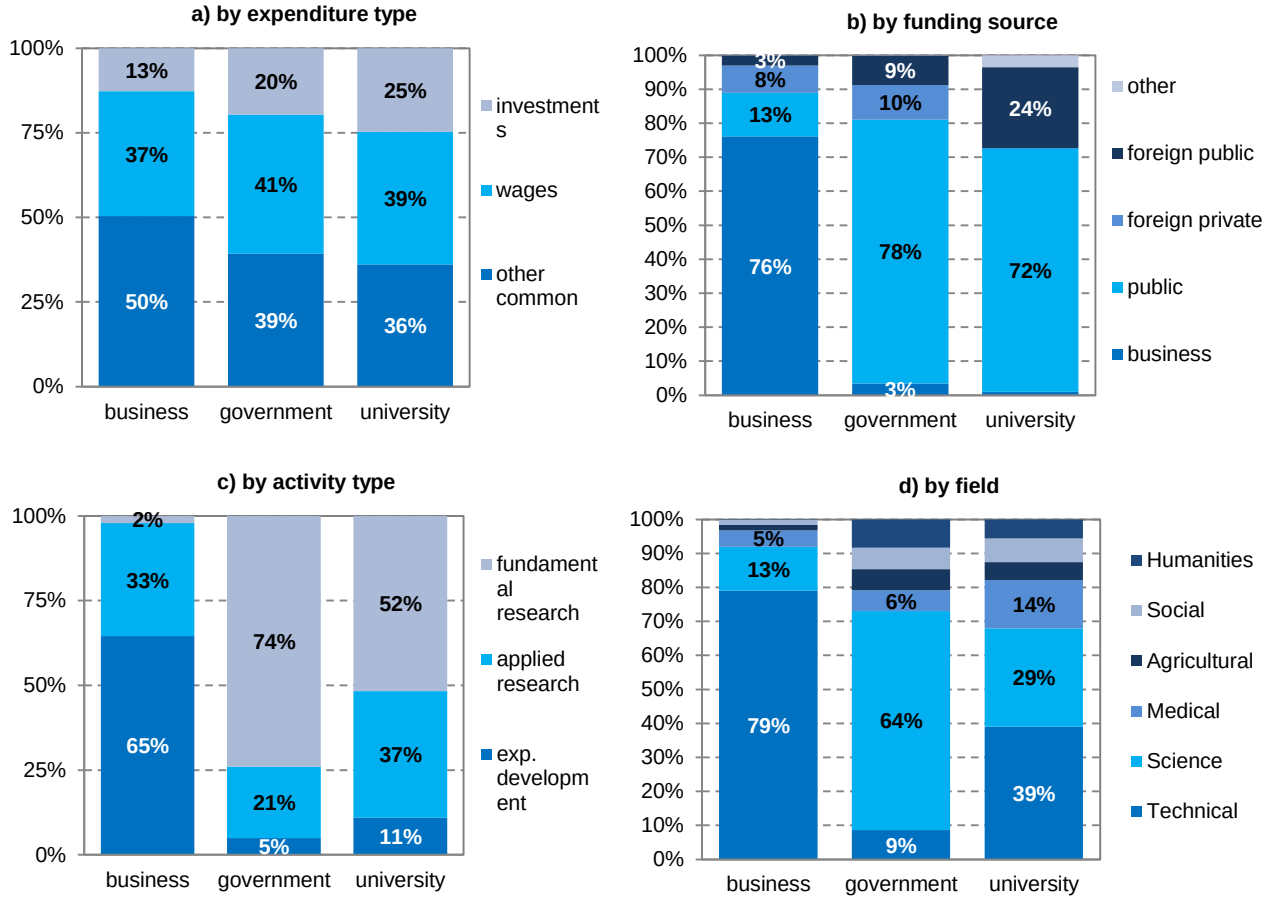
Chart A.3: Structure of total R&D expenditures in the Czech Republic by function (%)



Note: In 2005 1 % equalled 422 mil. CZK, in 2011 it was 707 mil. CZK
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Detailed data on the structure of R&D expenses in individual sectors according to their function are contained in individual subchapters as well as in the table appendix. Data on the expenditures according to scientific branches have a different information value in case of the government and university sector than those related to the business sector, which uses mainly classification by main economic activity. The same can be stated about the type of R&D activity.

Chart A.4: Structure of total R&D expenditures in the Czech Republic by function and sector, 2011 (%)



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

In 2011 the majority of R&D sites according to the regional classification were in Prague (670, 25%) and in the South Moravia Region (445, 16%). The majority of R&D funding has been spent in these two regions together with the Central Bohemia Region – 50.4% in 2011. The main reason for the dominance of these regions is the presence of important universities and public research institutions, in case of the Central Bohemia Region it is also the concentration of companies with significant R&D activities.

International comparison[4]

In 2010 the total R&D expenditures in the EU27 amounted to 234.7 billion EUR; in current prices 9.2 billion EUR (4.1%) more than in 2009. On the contrary in 2009 there has been a year-on-year decrease in total R&D investments for the first time since 1995, when the total EU27 data became available, from 239.7 billion EUR in 2008 to 236.8 billion EUR in 2009.

Germany, France and UK contributed 61% of the total EU expenditures. The Czech Republic with 2.3 billion EUR contributed to the EU27 spending with one percent. Despite the very low share of the total R&D expenditures in the EU27 it is together with Poland by far the highest value from the new member states. E.g. in comparison to Hungary the Czech spending is twice as high and seven times as high as in Slovakia. However, if we compare ourselves to long-term member states of similar size as e.g. Austria or Belgium, then the expenditures in the Czech Republic are still several times lower.

[4] International comparison should always be concluded in the context of development, size and focus of individual economies. Comparison then should be made with states that have similar population, geographic and economic conditions

The differences between the states in their expenditures on R&D are influenced apart from size, development and focus if individual economies also by the price levels of individual states. The following table includes amounts of R&D expenditures adjusted by purchasing power parity (PPP) in constant prices of 2005, which eliminates the differences in price levels of individual countries. In this case the position of the Czech Republic regarding the total EU27 expenditure would be approximately 50% better. The table shows a significant increase of China's importance. If in 2000 the Chinese R&D expenditures reached 15% of EU27, in 2010 it was 61% and China became the country with second largest R&D investments after the USA.

Table A.2: Total R&D expenditures in selected countries (million USD at PPP, constant prices of 2005; EU27 = 100)

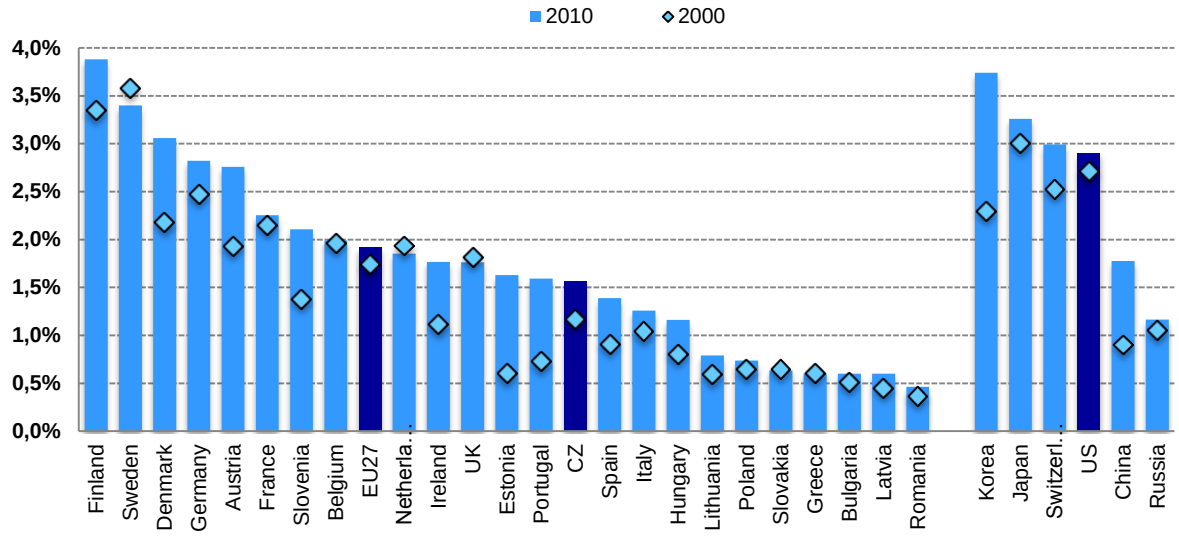
	EU27	USA	China	Jap.	Ger.	Kor.	Rus.	AUT.	Fin.	DK	Pol.	ČR	Hun.	SR
1995	170 189	225 613	12 766	100 960	49 717	15 757	9 910	3 369	2 530	2 670	2 196	1 483	869	536
2000	208 068	302 231	30 401	110 017	61 579	20 213	13 242	4 920	4 733	3 554	2 912	2 079	1 124	444
2005	229 931	325 936	71 055	128 695	64 299	30 618	18 121	6 803	5 601	4 419	2 982	2 948	1 616	440
2010	267 201	365 994	161 552	128 581	77 098	49 394	23 394	8 184	6 553	5 471	4 876	3 888	1 967	692
1995	100	132,6	7,5	59,3	29,2	9,3	5,8	2,0	1,5	1,6	1,3	0,9	0,5	0,3
2000	100	145,3	14,6	52,9	29,6	9,7	6,4	2,4	2,3	1,7	1,4	1,0	0,5	0,2
2005	100	141,8	30,9	56,0	28,0	13,3	7,9	3,0	2,4	1,9	1,3	1,3	0,7	0,2
2010	100	137,0	60,5	48,1	28,9	18,5	8,8	3,1	2,5	2,0	1,8	1,5	0,7	0,3

Note.: United States (US) – 2009; Total R&D spending is usually measured to GDP. This ratio is called T&D Intensity and belongs to the group of basic structural indicators evaluating the process of fulfilling Lisbon Treaty Strategy goals in individual EU countries. R&D Intensity was also placed among the indicators for evaluation of the Europe 2020 strategy evaluation.
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

In 2009 the highest intensity in R&D of EU27 states - more than 3% - has been reached in Scandinavian countries, particularly in Finland where the R&D expenditures share has been almost 4%. In the case of Denmark and Finland the intensity of R&D has grown particularly during the second half of the 90s. Sweden maintains the 3% and higher share since 1993. In the EU Germany and Austria also maintain high intensity values above 2.5%. The German share of total R&D expenditures was above 2.5% already through the second half of the 80s and in Austria the intensity has increased over the past 15 years. Apart from Germany and Sweden it was also France and the UK who belonged to the EU states with the highest R&D intensity, but the latter two states are slowly losing their position within the EU.

Within the OECD the highest R&D expenditures share of GDP is being achieved by Israel since 2000, in 2010 its expenditures equalled 4.4% GDP. Other OECD states with the R&D expenditures as a share of GDP higher than 3% are Japan, Korea and Switzerland. In the United States the R&D expenditures represent a 2.5 – 2.9% share of GDP since the first half of the 80s. Unlike the other states the expenditures in Israel don't include defence expenditures and in US capital R&D expenditures.

Chart A.5: Intensity of total R&D expenditures (GERD as % GDP)



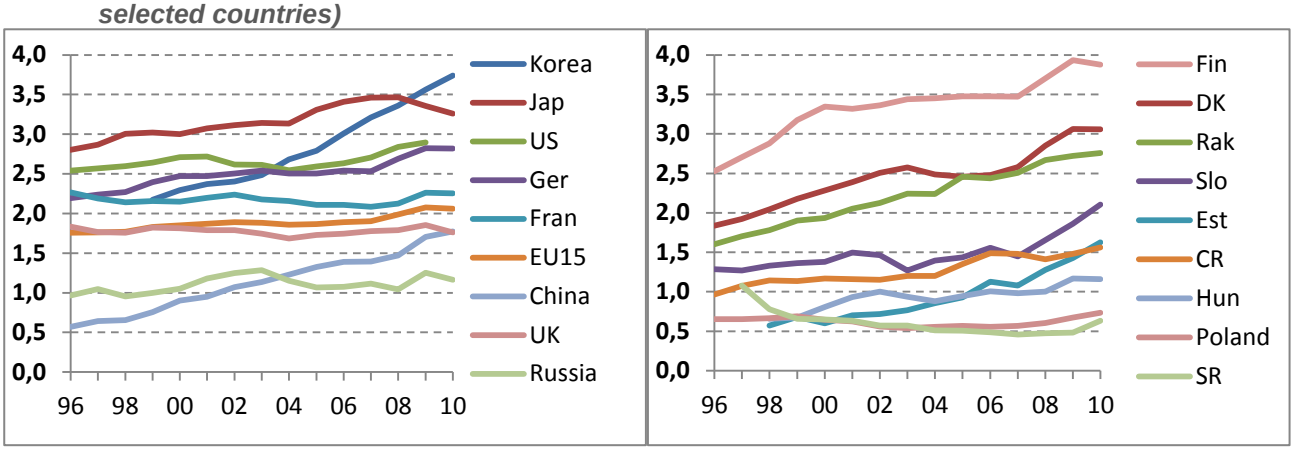
Note: Denmark and Sweden: 1999; Greece: 1999 and 2007; Switzerland: 2008; US: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

Among countries with a stable growth of R&D intensity in the last 15 years in the EU are apart from the above mentioned northern states and Austria also Ireland, Spain or Portugal. As for the new EU countries a very dynamic and stable growth can be seen in Estonia and partially also in the Czech Republic. Regarding non-EU countries stable growth of investment into R&D can be seen in the Asian countries, particularly Korea and China, where the R&D intensity grows even despite the large year-on-year GDP increases.

On the other hand France and the UK belong to states where the R&D intensity stagnates and decreases in the long term. Similar statement can be related also to the average of the original 15 EU states, where only in 2007 the R&D intensity reached the level of 1990.[5] As for the new states, stagnation or even decrease of R&D intensity is the case of Poland and Slovakia, where the local statistics show a significant decrease of R&D expenditures since the breakup of Czechoslovakia. Similar fate befell Russia after the dissolution of the Soviet Union, where in 1990 the R&D expenditures were approximately a 2% share of the GDP and only 0.7 – 1% of GDP in the period 1992 – 1999.

[5] The growth of R&D intensity is a long-term target, which is evidenced also by the mentioned development in Finland, Denmark or Austria. It's not only the case of increasing public investment, but mainly private investment, as we will see in the next chapter. Other crucial factors are qualified human resources and related education policy (chapter B.2) and the overall economic and political development of the society (chapter D).

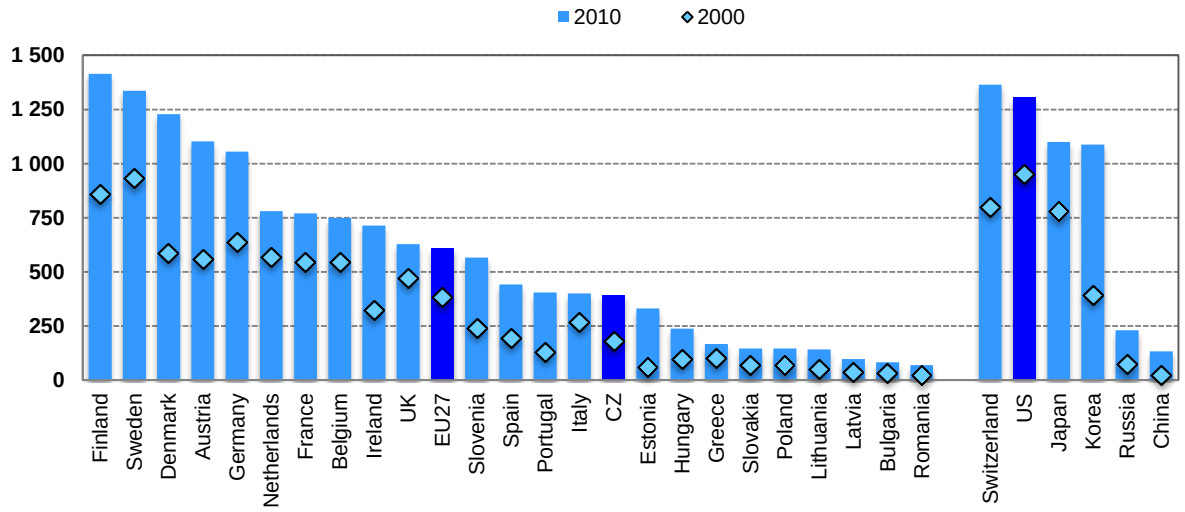
Chart A.6: The development of the intensity of total expenditure on R&D (GERD as % GDP) in selected countries)



Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

Apart from the R&D intensity, which is influenced by different GDP values in individual countries, the international comparison uses total R&D expenditures per capita at PPP. In the evaluation according to this indicator the Scandinavian countries (Finland and Sweden) dominate again together with Switzerland and the US with total R&D expenditures higher than 1300 USD per capita at PPP. The EU27 average in 2010 was 608 USD per capita at PPP, i.e. 1.6 times as much as 10 years ago. China achieved only 133 USD per capita in PPP; however this is six times as much as 10 years ago. The Czech Republic with R&D expenditures of 395 USD per capita at PPP (in 2000 it was 181 USD per capita at PPP) is 15th within the EU, however apart from Slovenia it belongs to the best new EU states. Nevertheless in this indicator we lag behind the EU27 average more than in the GERD/GDP ratio.

Chart A.7: Total R&D expenditures per capita (USD at PPP, current prices)



Note: Denmark and Sweden: 1999; Greece: 1999 and 2007; Switzerland: 2008; US: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

Total R&D expenditures according to main sources of their funding

The expenditures for R&D conducted in individual monitored subjects are observed by main sectors (sources) of their funding, which are primarily:

The domestic business sector (domestic private funding), which includes R&D funding from the monitored businesses' own sources allocated to their R&D and domestic business sources used for funding of R&D conducted mainly to order in other businesses or universities or public research institutions.

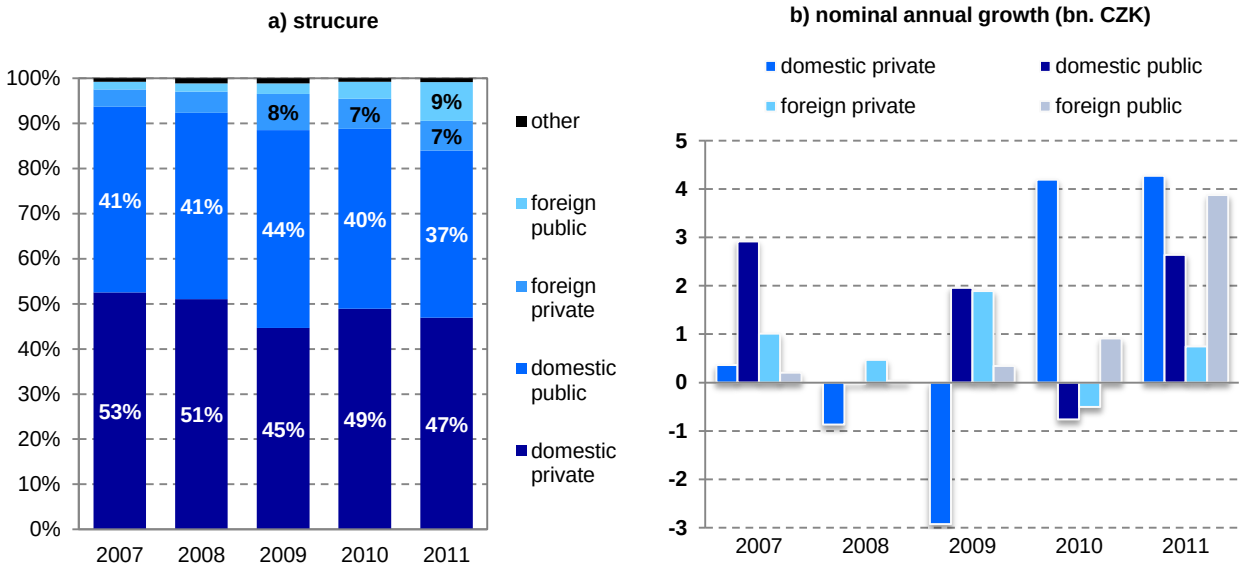
The government sector (domestic public funding), which includes R&D funding from the state budget

The foreign sector includes all funding from abroad used for R&D in a given state. In case of the Czech Republic and other EU member states this mainly includes EU funding through framework research programmes and structural funds (public sources) and funding from business sources particularly through parent companies in foreign affiliates (private sources)

Public and domestic business resources have a crucial role in R&D funding and not only in the Czech Republic. Until 2008 their share in R&D funding has always been higher than 90%. In 2009 this share dropped to 88% due to the decrease of funding from domestic business sources by 11% (2.9 bn. CZK) and primarily due to the significant increase in foreign investments into R&D in the Czech Republic.

Another decrease of the share of domestic sources of R&D funding occurred in 2011 down to 84%. This decrease wasn't caused by the decrease of domestic private and public funding, both sources increased year-on-year by more than 10%, but by the increase of R&D funding from foreign public sources. R&D funding from domestic sources is discussed in detail in chapter A.2 and R&D funding from foreign sources in chapter E. International Cooperation.

Chart A.8: Structure and growth of the total R&D expenditures in the Czech Republic according to the sources of their funding



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The businesses in the Czech Republic invested 150 billion CZK into either their own R&D or R&D in other sectors over the past 5 years, however only 2.5% (3.5 billion CZK) went to co-financing R&D in the university or government sectors. E.g. in 2011 the businesses invested 427 million CZK into government

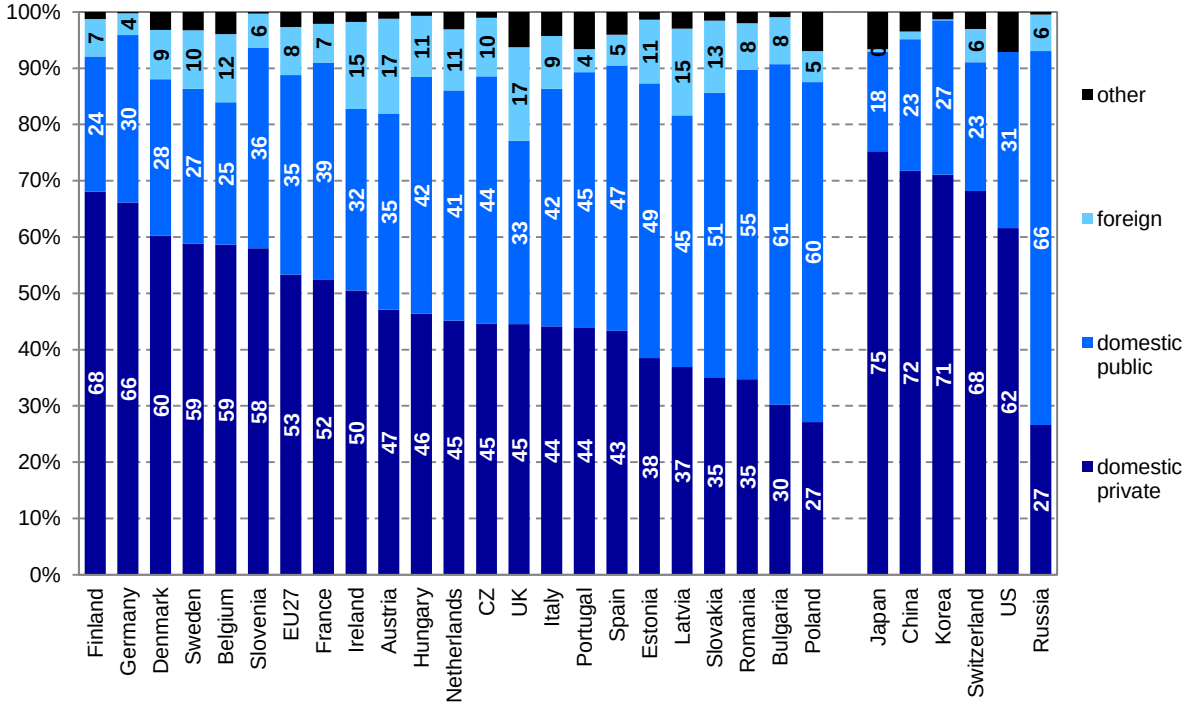
sector R&D and 156 million CZK into university sector R&D. Despite the fairly often mentioned framework cooperation between universities and businesses, e.g. in education etc., there is still no deeper cooperation in the field of R&D in the Czech Republic. Included in the appendix is a detailed schematic describing the funding of R&D in the Czech Republic in individual sectors in 2011.

International comparison

The European Commission in 2000 set a goal to reach a R&D expenditures/GDP ratio of 3% by 2010, whereas two thirds of these expenditures should be funded from business (private) sources. The second criterion is currently fulfilled by Finland and Germany and partially by Sweden. However the EU as a whole, including the Czech Republic, doesn't fulfill this target yet. However if we added to the business sources the foreign private sources as well, then the EU made significant steps to this target, although with significant differences between individual states.

The structure of R&D funding with low share of public sources and a major share of private sources is typical especially for Asian countries. In 2009 the domestic business sector contributed at least 70% of the R&D funding in Japan, Korea and China; more than 2/3 of the R&D funding in Switzerland and the US. The Czech Republic is at 13th place within the EU27 and is in front of countries such as the UK, Italy or Spain. On the other hand the large share of public and low share of private sources of R&D funding is typical particularly for the new EU member countries. For example in Poland in 2009 the public sources contributed 60% of the funding and in Russia as much as 67%. In the Czech Republic the share of public sources in total R&D funding is between 35 – 45% since 1998. In 2009 the share of public sources of R&D funding was 6 percentage points higher that the EU27 average.

Chart A.9: Total R&D expenditures according to the sources of their funding in 2009



Note: Switzerland: 2008
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

Despite the fact that the latest available data for international comparison are from 2009, it is possible to expect that especially in the new EU member states there will be an increase of the share of R&D funding

from foreign public sources in the following years, particularly from the EU structural funds – see situation in the Czech Republic in 2011.

Total R&D expenditures according to their use – sectors of performance

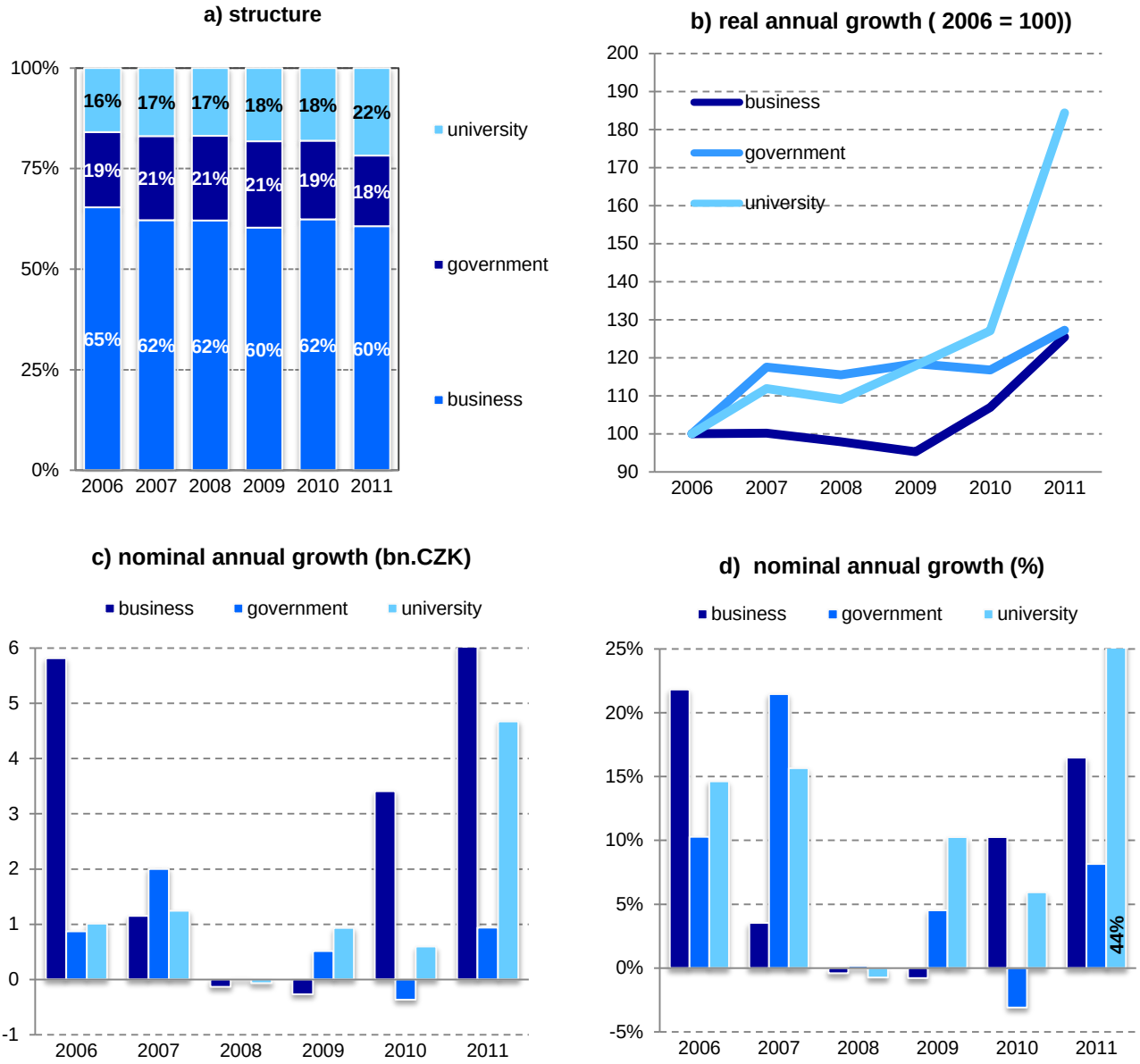
Apart from the sources of funding according to their use in individual sectors of performance, i.e. where the financial resources designated for R&D are really spent on performed R&D regardless of their source of funding. The sector of R&D performance is a basic category used in the R&D statistic, which gathers all institutional units performing R&D based on their main functions, behaviour and targets. The R&D indicators are standardly monitored and published, even on the international level, in four sectors: business, government, university and private non-profit (see the methodological appendix for more details). In the past 10 years the R&D expenditures in both the business and public sector increased by an average of 10% a year. As this is the average, it doesn't show the significant differences in individual years – see development in last 5 years in chart A.10.

The business sector in the Czech Republic, unlike most of the post-communist EU states, is a sector with the highest R&D expenditures. Its share in the use of financial resources designated for R&D activities on our territory was at least 60% during the whole monitored period.

The government sector, including mainly individual research organizations, represents the second most important R&D sector in the Czech Republic despite the fact that its share in total expenditures significantly decreased since 1993, mainly because of the universities. If in 1993 the government sector's share in R&D funding was almost 90%, then in 2005 it was only 55% and in 2011 even 45%.

Within the expenditures on public R&D it is possible to observe that until 2006 the expenditures for performed R&D in the university sector grew faster than in the government sector. A similar statement can be applied again since 2009 and also in the coming years a faster growth in the university sector than in research organizations can be expected, mainly due to the high R&D investments from the EU structural funds.

Chart A.10: Structure and growth of the total R&D expenditures in the Czech Republic according to the main sectors



*Note: * Data on the non-profit sector are not shown, because their role within the total R&D expenditures is negligible. 345 million CZK have been spent in this sector in 2011, which is 0.5% of the total R&D expenditures in the Czech Republic.*
Source: CZSO 2012, Annual Statistical Survey on Research and Development VTR 5-01

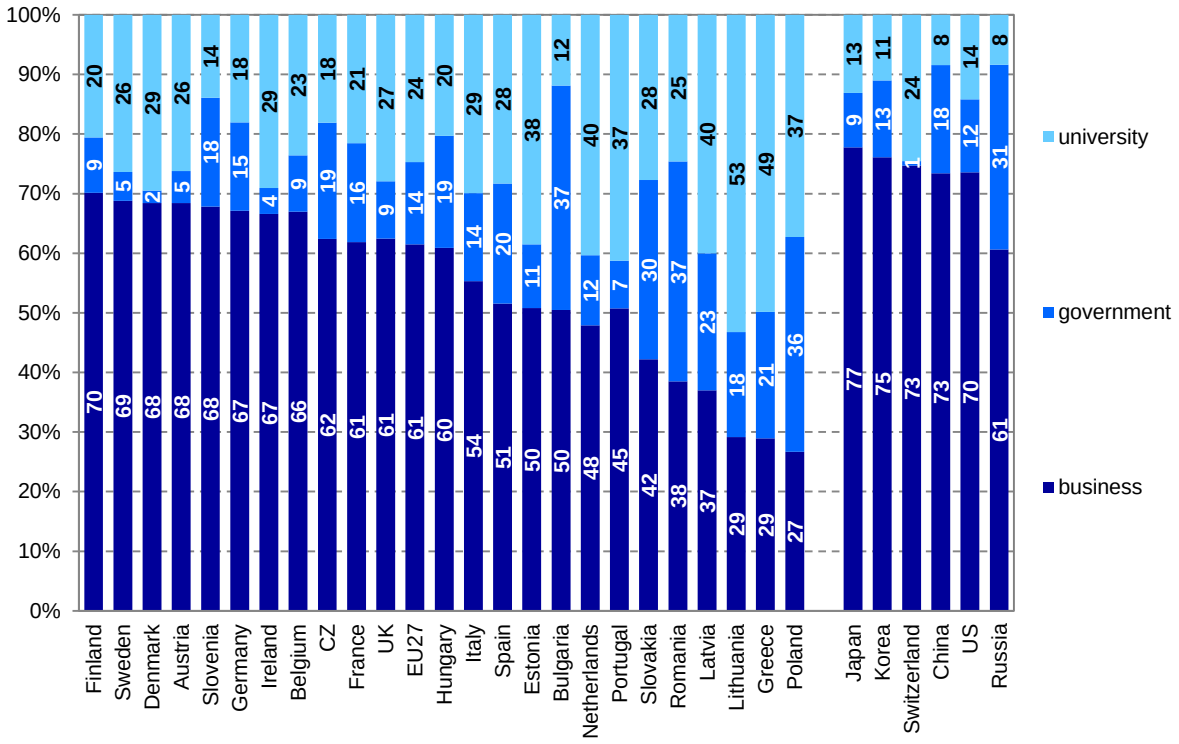
If we look at the structure of R&D expenditures according to the sectors of performance we will see that there are big differences between individual EU and OECD states. These differences reflect in a large part the structure of funding presented in the previous chapter. If we concentrate on the share of financial resources spent on R&D performed in the business sector in the total R&D expenditures, we will see that the Czech Republic is in the long-term at the average level of the EU27.

Among states with less than 2/3 of business sector share in the use of overall R&D expenditures are mainly Asian OECD countries, Scandinavian states, Switzerland, China, United States, Germany and Austria. To these states we can add the Benelux states and Germany. Slovenia also belongs to this group as the only representative of states that acceded to the EU in 2004.

The share of public R&D performed in the university and government sectors in the total R&D expenditure is at least 50% in all the new EU countries with the exception of Hungary, Czech Republic and Slovenia.

Apart from the new EU countries the role of public R&D within the overall R&D expenditures is important in states with relatively low R&D intensity, such as Spain or Portugal and in states with a significant role of the university sector (Netherlands).

Chart A.11: Total R&D expenditures according to the main sectors of their use in 2010 (%)*



Note: Greece 2007; Switzerland: 2008; US: 2009. The sum of the data for individual sectors doesn't have to be 100, as the chart doesn't include the private non-profit sector, the share of which is usually negligible with the exception of Portugal with 10,4 % GERD, USA (4,4 % GERD) and Italy (3,2 % GERD).
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

More detailed information on the R&D expenditures in individual sectors of performance is presented in the following chapter. However, due to better interpretation of data on the government and university sectors the rest of this subchapter will be dedicated to the data on the public R&D as a whole.

The EU as a whole spent more money on public research (unlike the total R&D spending) than the United States in 2009. If in 2009 the EU countries reported R&D expenditures in government and university sectors in the amount of 85.3 billion EUR, then in the US it was 85% of this amount (73.2 billion EUR). In 2010 Germany with public R&D expenditures of 23.0 bn. EUR, France with 16.4 bn. EUR and UK with 11.0 bn. EUR contributed 56% of the EU27. The Czech Republic with 0.9 bn. EUR again contributed with precisely 1%. The following table shows data on expenditures on the public R&D in selected countries in PPP in current prices. In this case the Czech Republic's position is improved by ca. 1/3.

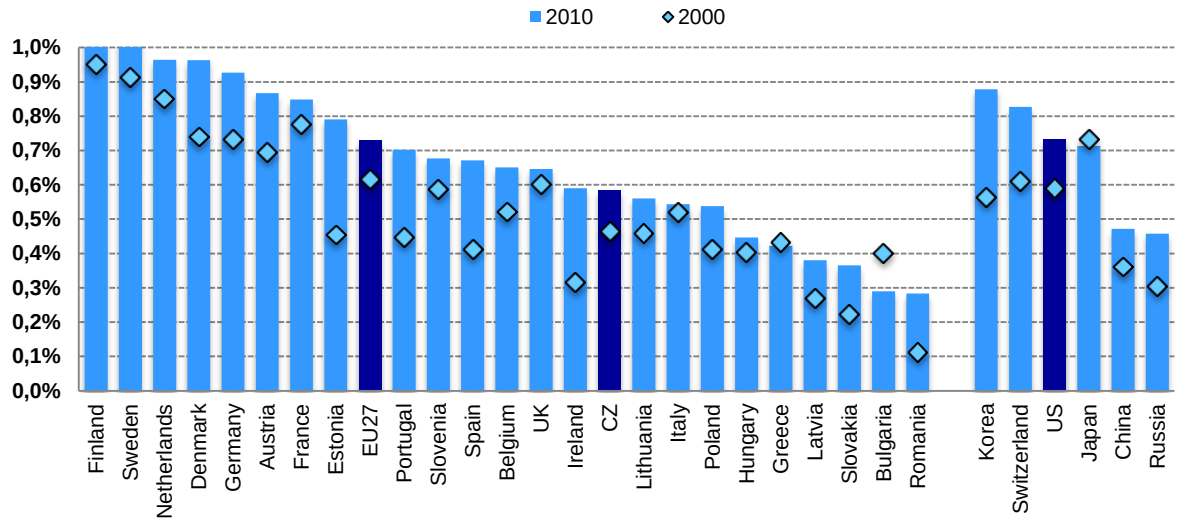
Table A.3: Total R&D expenditure in selected countries (mil. US$ in PPP , current prices.; EU27= 100)

	EU27	USA	China	Jap.	Ger.	Rus.	Pol.	AUT.	Fin.	DK.	CZ	Hun	SR
2000	65 216	58 378	10 894	24 149	15 535	3 043	1 662	1 711	1 264	1 059	737	490	131
2010	116 197	101 500	47 570	30 838	28 346	12 906	4 084	2 909	2 253	2 145	1 553	916	461
2000	100	89,5	16,7	37,0	23,8	4,7	2,5	2,6	1,9	1,6	1,1	0,8	0,2
2010	100	87,4	40,9	26,5	24,4	11,1	3,5	2,5	1,9	1,8	1,3	0,8	0,4

Note.: US - 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

In 2010 the share of expenditures of EU countries on public R&D was 0.73% GDP. The highest share in GDP, ca. 1%, has the public R&D in Sweden and Finland. Such a high share isn't caused by a significant share of the public R&D in the total R&D expenditures, because it is less than 30%, but by generally high expenditures on R&D in these countries. On the other hand a share lesser than 0.5% GDP has been reported in the majority of the new EU countries apart from Estonia, Slovenia and the Czech Republic despite the relatively strong share of the public R&D in the total R&D expenditures.

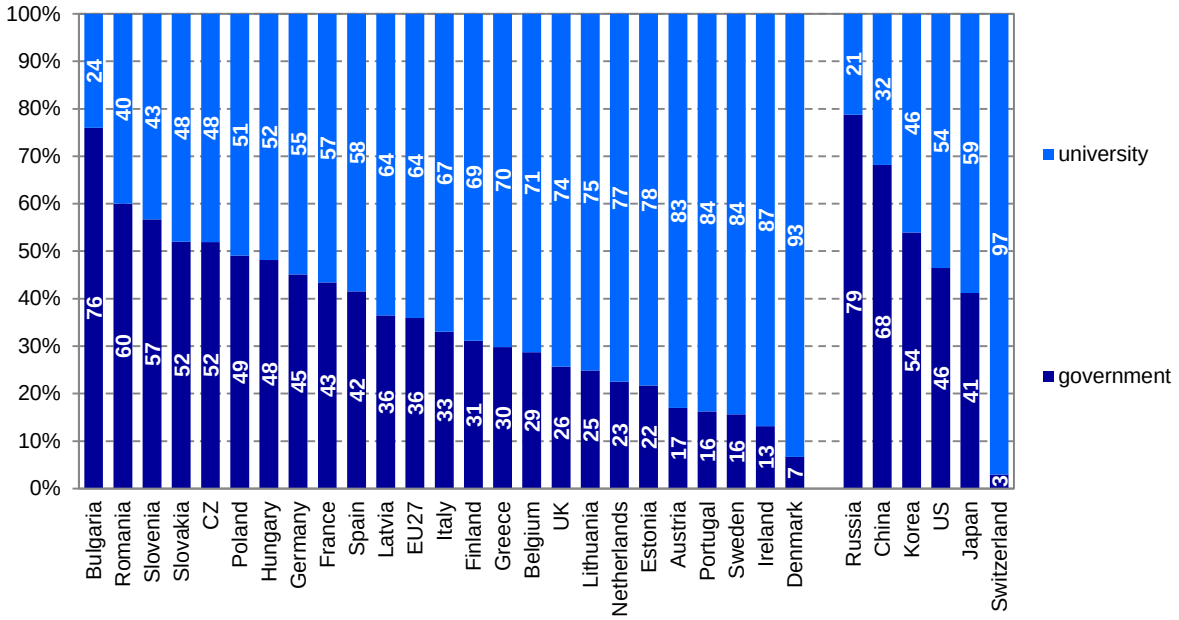
Chart A.12: Expenditures for university sector R&D (in % GDP)



Note: Denmark and Sweden: 1999; Austria: 2002; Greece: 1999 and 2007; Switzerland: 2008; US: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

The university sector in the EU is the strongest within the public R&D in Denmark, Sweden and Ireland. On the contrary in most of the new EU countries (apart from the Baltic states) the government sector plays a more important role in the public R&D, mainly due to the strong position of institutions such as the Academy of Sciences (e.g. in Poland or Hungary) and (or) very low R&D expenditures in the university sector (Bulgaria, Romania and Slovakia). Among states with a balanced share of the university and government sectors are France, United States and Korea with significant expenditures on defensive R&D and Germany with a strong position of four groups of research institutions (Max Planck, Leibniz, Helmoholtz and Fraunhofer societies). In almost all of the monitored countries, including the Czech Republic, there has been a lesser or greater growth of the importance of the university sector in the public research structure.

Chart A.13: Total public R&D expenditures according to the sector of use, 2010 (%)



Note: Greece: 2007; US: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

Governmental R&D – expenditures on R&D performed in the government sector

R&D sites in the government sector in the Czech Republic comprise mainly of individual AS CR[6] institutions and departmental research sites[7], which perform R&D as their main economic activity (CZ-NACE 72). Since 1st January 2007 most of these were granted the status of public research institutions (p. r. i.). Among the other sites of the government sector which perform R&D as their secondary activity are mainly public libraries, archives, museums and other cultural institutions (CZ-NACE 91) and sites active in the field of public administration, economic and social policy (CZ-NACE 841).

In 2011 the R&D in the Czech Republic has been performed at 185 government sector sites, only 33 (18%) of which spent more than 100 million CZK on the performed R&D. Those were mostly AS CR sites. As for the individual scientific areas, 30% (54) of the government R&D sites stated that their major operation belongs to the natural sciences; most of them are AS CR sites. The majority of the sites (68, i.e. 36.7%) stated that their major scientific activity belongs to the humanities group. These sites are mainly public libraries, archives, museums and other cultural institutions, which perform R&D as their secondary activity.

In 2011 the expenditures on R&D performed in the government sector (GOVERD) in the Czech Republic were 12.4 billion CZK. Since 2000 the expenditures on R&D in this sector almost doubled (1.9x in constant prices), however in relation to the GDP or the state budget there hasn't been any significant change – in 2000 as well as in 2011 these expenditures were 0.32% of the GDP and 1.1% of the state budget.

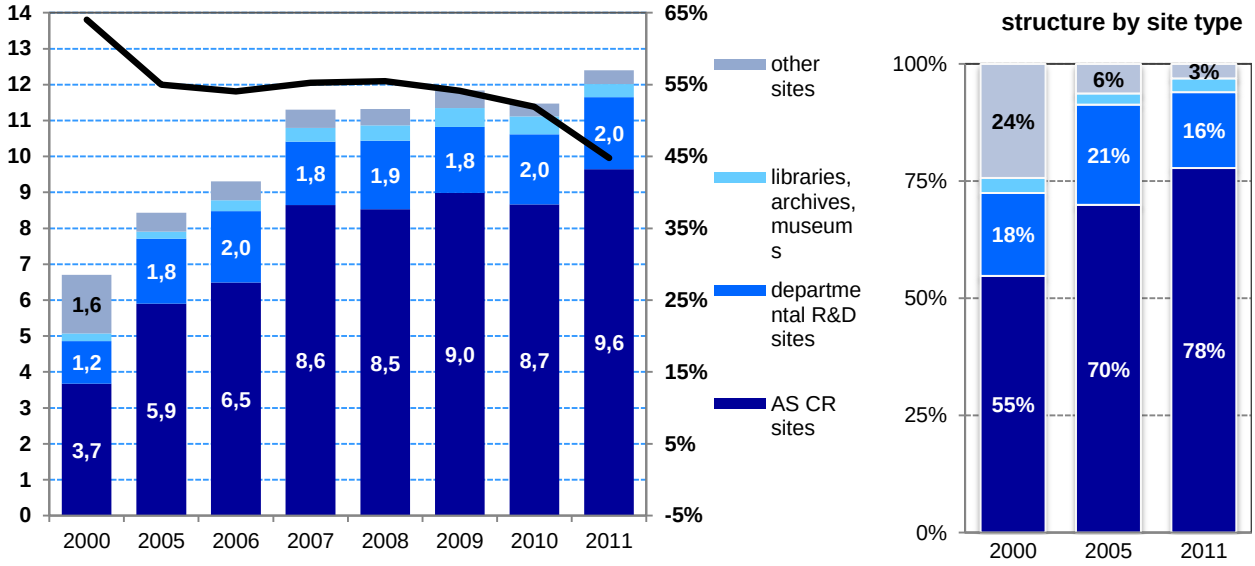
During the last eleven years the importance of governmental research changed significantly, be it within the overall R&D activities in the Czech Republic or public R&D. If the government sector contributed ¼ of

[6] AS CR institutions (54 institutions in 2010) with the main goal to perform fundamental research are organized into three scientific areas: Mathematics, Physics and Earth Sciences (18 institutions), Life and Chemical Sciences (18 institutions) and Humanities and Social Sciences (17 institutes) – for more information see the table included in the table appendix.

[7] These are mostly departmental public research institutions, which formerly fell directly under the individual ministries, e.g. Ministry of Agriculture or Transportation. Most of them were granted the status of public research institutions (e.g. Crop Research Institute, Institute of Animal Science etc.).

the total R&D expenditures performed in the Czech Republic in 2000, then eleven years later it was only 17.5%. In the same way the share of the government sector on the public R&D decreased from 64% in 2000 to 45% in 2011.

Chart A.14: Expenditure on R&D performed in the Czech government sector (billion CZK; %)



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The largest part of R&D expenditures in the government sector is long-term used at the sites of individual AS CR institutes; in 2011 this was 9.7 billion CZK (78% of the total R&D expenditures in the government sector). The spending at departmental sites in the same year was 2 billion CZK (17%) and 749 million (6%) were designated for R&D in other subjects of the government sector, whereas more than half (58%) of this amount has been spent in public cultural facilities

Within the various types of R&D sites in the government sector the importance of departmental research institutes and other sites (CZ-NACE 841), measured by their share in the total R&D expenditures in the government sector, is gradually decreasing since 1995. In the case of departmental research institutes there is stagnation in R&D expenditures even in absolute values since 2006; both in 2006 and 2011 the R&D expenditures reached 2 billion CZK.

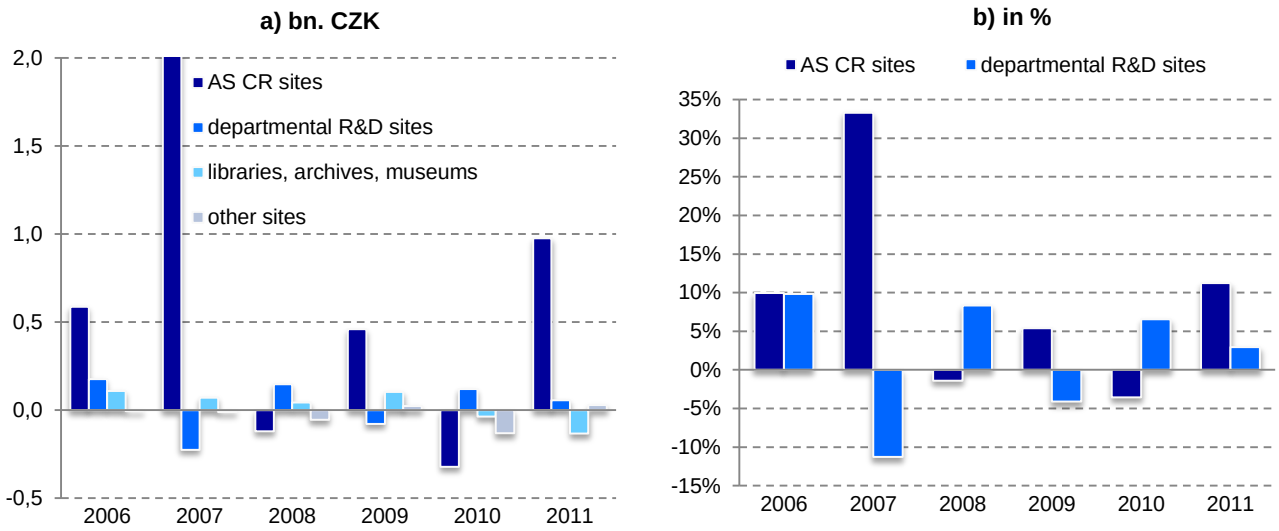
Between 2005 and 2011 the R&D expenditures in the government sector grew at an average 6% a year, i.e. significantly slower than e.g. expenditures on R&D performed in the university sector (see next chapter) and overall investments in the government sector R&D were 55 billion CZK. This growth was fastest in 2007, when the expenditures on government R&D increased by 17.5% or 2 billion CZK. After a period of stagnation between 2007 and 2010 there has been an increase by 1 bn. CZK in 2011.

Table A.4: Year-on-year change in R&D expenditures in the government sector in the Czech Republic

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Billion CZK (current prices)	1,0	0,0	0,1	0,7	0,3	0,6	0,9	2,0	0,0	0,5	-0,4	0,9
% in current prices	16,9	0,1	1,1	10,9	4,6	7,3	10,3	21,5	0,2	4,5	-3,1	8,1
% in constant prices of 2005	15,3	-4,3	-1,5	9,9	0,5	7,7	9,7	17,6	-1,7	2,5	-1,4	8,9

Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Chart A.15: Year-on-year change in R&D expenditures in the government sector in the Czech Republic by site type



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Most of the R&D activities in the government sector belong to the field of fundamental research. In 2010 the expenditures on fundamental research in this sector reached 9.1 billion CZK, which was 74% of the R&D expenditures in the government sector. Expenditures on applied research were in the amount of 2.6 billion CZK (23%) and the least part of expenditures were directed to experimental development with 611 million CZK (3%).

Due to the limited international comparison of the type of R&D activities performed in the government sector (data is available on ca. 20 EU countries from various years – see table appendix) it is possible to state that the role and significance of the public research institutions is quite different in individual countries, not only within the EU but also when analyzing the OECD countries.[8] As was already mentioned, in post-communist countries the government sector is dominated by institutions of the type of the AS CR, which are oriented mainly on the fundamental research. A completely different situation can be observed in some west European countries, USA, Japan or China, where these institutions focus on experimental R&D. These institutions have the goal to support the industrial development through services within the market-oriented R&D.[9]

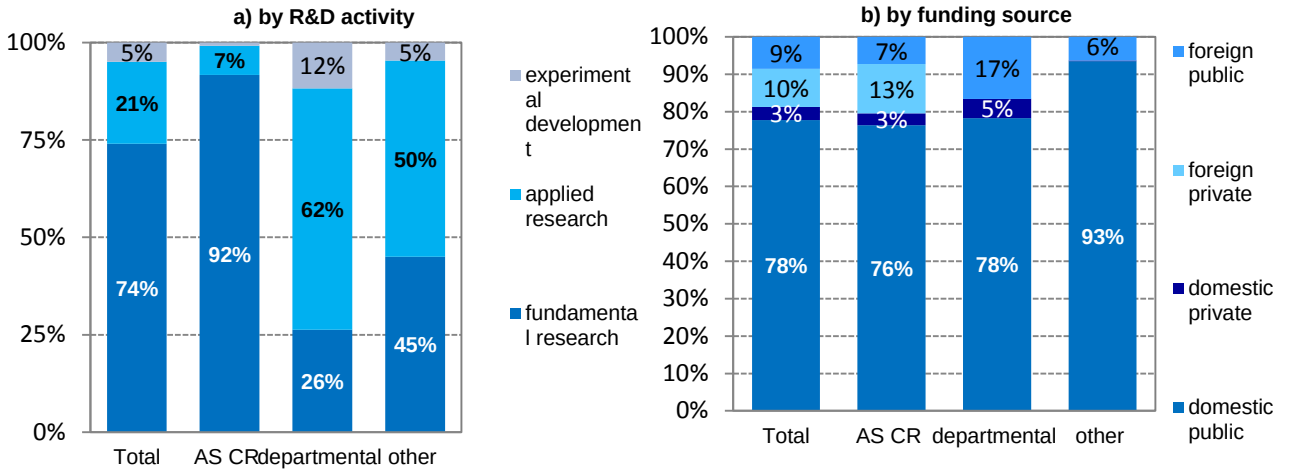
The governmental R&D in the Czech Republic is as expected funded mainly from the public sources; in 2011 78% of the governmental R&D expenditures came from the state budget. Unlike the university sector, private foreign sources play an important part in the funding of government R&D. Those are incomes from license payments gained for granting the rights to use inventions protected by patent law (more chapter C.3).

[8] Because there isn't always a clear border between the fundamental and applied research it is necessary to proceed with great caution when interpreting the gained data sorted by the type of R&D activity. The differentiation of fundamental and applied research is largely dependent on what designation the researchers themselves use and thus this differentiation shouldn't be used in order to make political decisions.

[9] In the Czech Republic this was the function of departmental research organizations. The majority of these institutions after their transformation or privatization now belong to the business sector. These are private and public businesses with major activity in R&D and a significant share I the business R&D, unlike in other states (see chapter A.1.6).

Even though 61 sites (33%) of the government sector declared that they performed R&D to order for the business sector, the total income from these orders were only 242 million CZK. The situation is similar to the university sector – funding of government sector R&D by domestic businesses is a negligible source for the government R&D. In 2011 the amount of funding from the domestic business sector was 427 million CZK (3%) – apart from R&D to order this includes also rental of buildings, license fees etc. It is the lowest amount since 2005, although even in the previous years the expenditures on government sector R&D funded by domestic businesses never exceeded 1 bn. CZK.

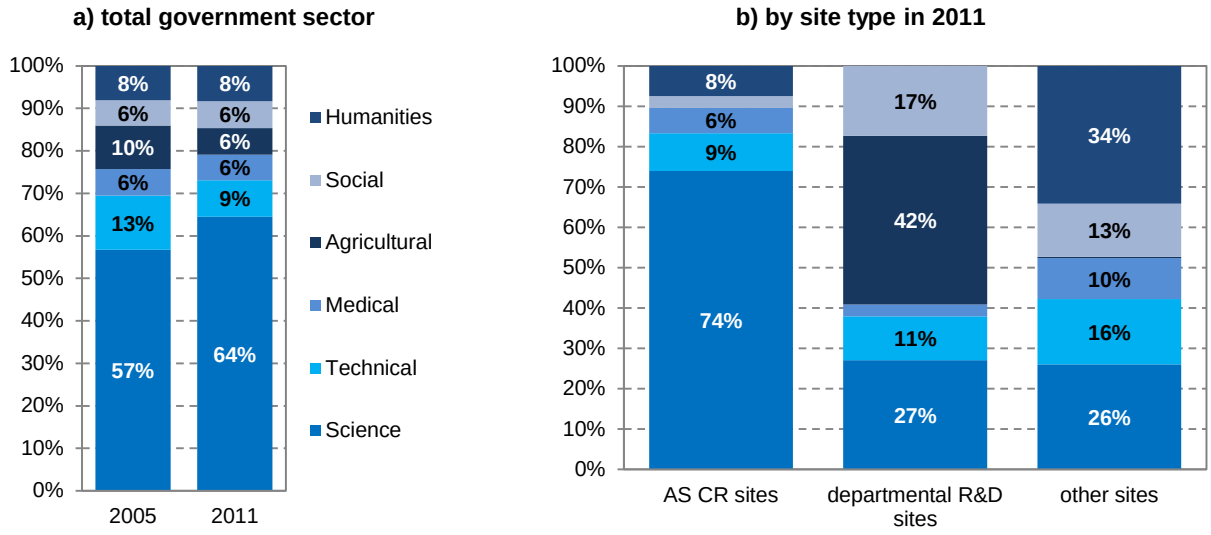
Chart A.16: Expenditures on R&D performed in the Czech government sector sorted by the R&D activity type and sources of their funding, 2011



Note.: In 2011 1 % in government sector equalled 124 mil. CZK, in ASČR sites 96.5 mil. CZK; in departmental R&D sites 20.1 mil. CZK and in other sites 7.5 mil. CZK
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The major part of R&D expenditures in the government sector, unlike in the university sector, is directed into natural sciences, which are the specialty of AS CR sites. In 2011 this was 8 billion CZK (65% of the total government R&D spending). Expenditures on technical sciences R&D were 1 billion CZK (9 %) in the same year. The same amount was directed to the humanities. Apart from the AS CR sites these are mainly public libraries, archives, museums and other cultural institutions, which perform R&D as their secondary activity in this field. Agricultural sciences are the main activity of applied R&D sites, agricultural R&D is performed only in a limited scope at the AS CR sites. Since 2005 the representation of natural sciences has increased in the government sector at the expense of agricultural sciences (decrease by 100 million CZK).

Chart A.17: Expenditures on R&D performed in the Czech government sector sorted by the prevalent scientific areas

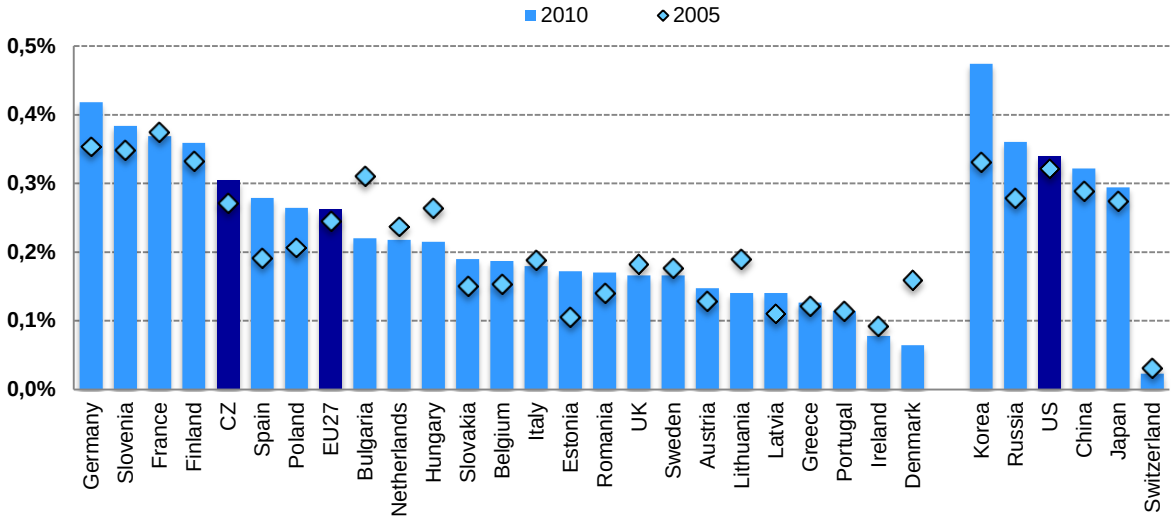


Note.: In 2011 1 % in the government sector equalled 124 mil. CZK, in ASČR sites 96.5 mil. CZK; in departmental R&D sites 20.1 mil. CZK and in other sites 7.5 mil. CZK. In 2005 1% in the government sector equalled 84.4 bn. CZK
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The expenditures on government sector's R&D in the EU were 32.1 bn. EUR in 2010. Germany contributed 32% and France 22%. The Czech Republic with 0.5 bn. EUR represents 5% of the EU27 figure, i.e. the highest by far from all the new member states with the exception of Poland. When sorting the EU countries by the share of the government sector in total R&D expenditures in 2010, the highest places belonged to the new member states. These were primarily Bulgaria, Romania, Poland and Slovakia, i.e. states that also show a very low overall R&D intensity. The Czech Republic is at the level of Spain, Hungary or Slovenia with a ca. 1/5 share of government sector in total R&D expenditures. Apart from new member states the government sector plays an important role in countries with significant expenditures on defensive R&D and at the same time with strong position of Academy of Sciences or similar institutions (e.g. France, Germany or Italy). On the contrary the government R&D plays a minimal role in Denmark or Switzerland, where the public R&D lies almost entirely with the universities.

If we express the R&D expenditures in government sector as % of the GDP of individual countries, we'll get a completely different picture about the significance of the government sector in R&D. The Czech Republic is after Germany, Slovenia, France and Finland the country with the highest R&D expenditures in the government sector related to GDP. The share of the Czech government sector in GDP is ¼ higher than the average of the EU27, which in 2010 as well as in 2000 was 0.26%.

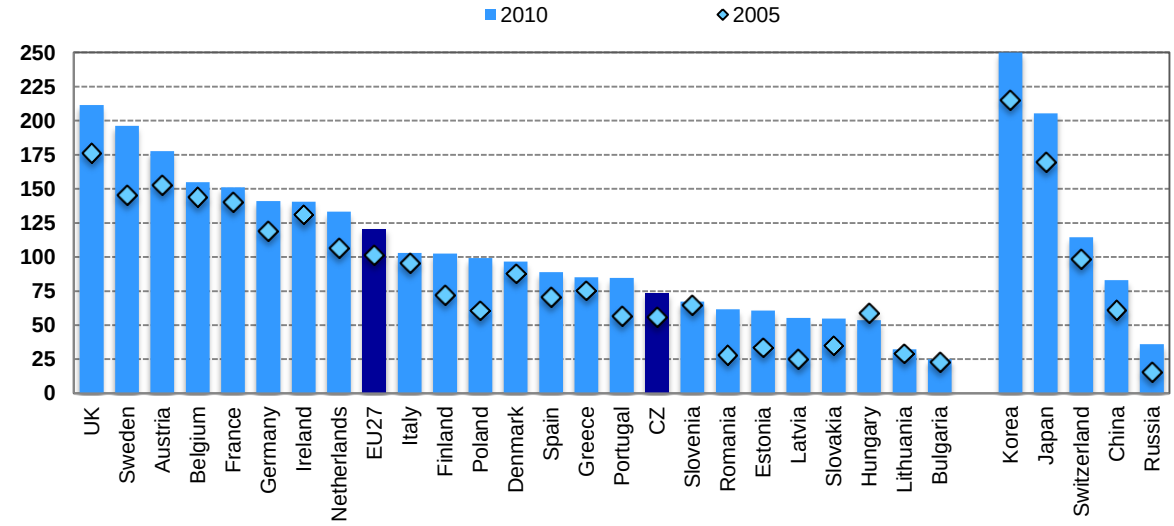
Chart A.18: Expenditures on R&D performed in the government sector (GOVERD as % GDP)



Note: Greece: 2007; US: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

Monthly wage costs per one adjusted (FTE) employee working in government R&D reached 1 400 EUR in the Czech Republic in 2009. This value is together with Poland and with the exception of Slovenia the highest among the new EU member states, but several times lower than in the majority of western and northern EU states.

Chart A.19: Monthly wage costs per employee (FTE) working in the government sector R&D 2009 (thousands EUR in current prices.)



Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

University research – expenditures on R&D in the university sector

R&D sites in the university sector in the Czech Republic are made up mostly of individual faculties of the public and private universities (167 faculties at 27 universities in 2011) and since 2005 in accordance with the OECD methodology also 11 faculty hospitals. Apart from the individual sites at the public universities

and faculty hospitals the R&D is also performed at 24 private colleges and other educational institutions of post-secondary education. However, the significance of private university R&D is negligible.

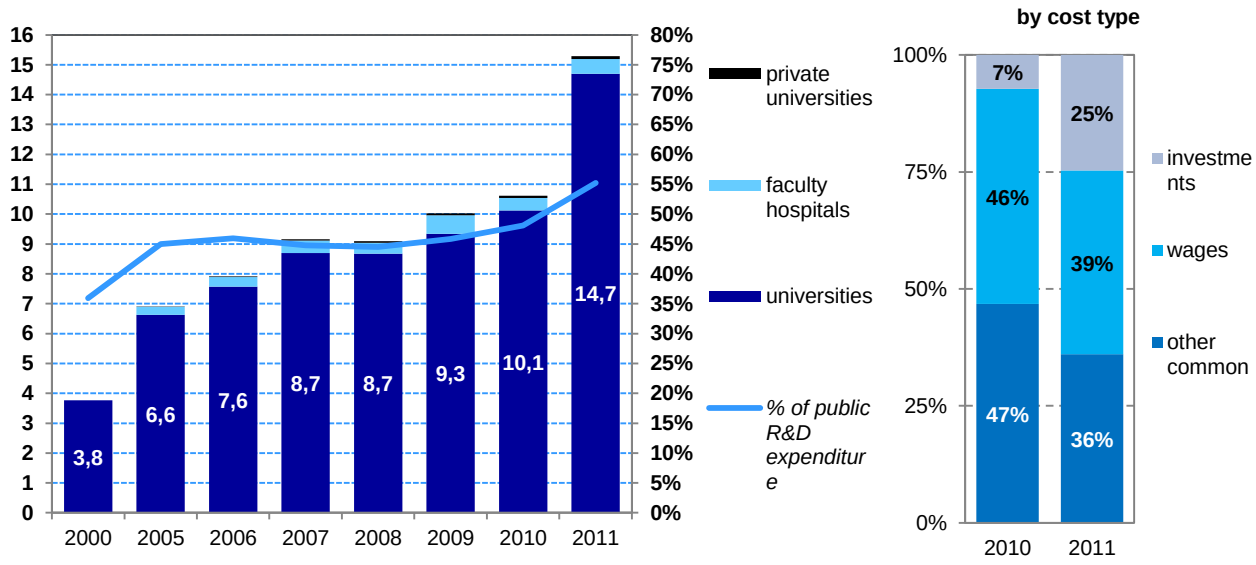
Only 46 of the above mentioned 202 sites of the university sector had R&D expenditures of more than 100 million CZK. Aside from on faculty hospital those were faculties of public universities. Only the Charles University (7), Technical University in Brno (6), Czech Technical University in Prague (4), Masaryk University in Brno (4) Technical University in Ostrava (4), Technical University in Liberec (3), Palacky University in Olomouc (3), South Bohemia University in České Budějovice (2) and the West Bohemia University in Pilsen (2) had more than one site with such high R&D expenditures.

Regarding the scientific disciplines the university R&D sites stated that in 2011 most of them had their major activity in the social sciences (64) and technical (39). All of them belonged to the public universities.

The share of the university sector in the total R&D expenditures increased from 12% in 2000 to 22% in 2011 and in public research from 36% to 55%.[10] These figures show that unlike the government sector the university R&D/GDP ratio grew significantly in this period from 0.17% in 2000 to 0.4% in 2011. Similarly the university R&D/state budget (which is the main source of its funding) ratio grew from 0.6% in 2010 to 1.3% in 2011.

In 2011 the expenditures in the Czech university sector were 15.2 billion CZK, i.e. almost 4 times as much as ten years ago and for the first time it surpassed the government sector in this indicator. If we compare the number of FTE employees working in R&D then in this indicator the university sector surpassed the government sector already in 2005 and now (2011) it employs one third more FTE employees than the government sector – see chapter B.

Chart A.20: R&D expenditures in the Czech university sector (billion CZK)



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

[10] Similar to other post-communist countries the Czech university sector started building its own research capacities only in the second half of the 90s. As the dominant part of the universities' operation was education, their share in R&D expenditures was negligible. E.g. in 1993 with 400 million CZK the universities' made up only 3 % of the total and ca. 10 % of the public R&D.

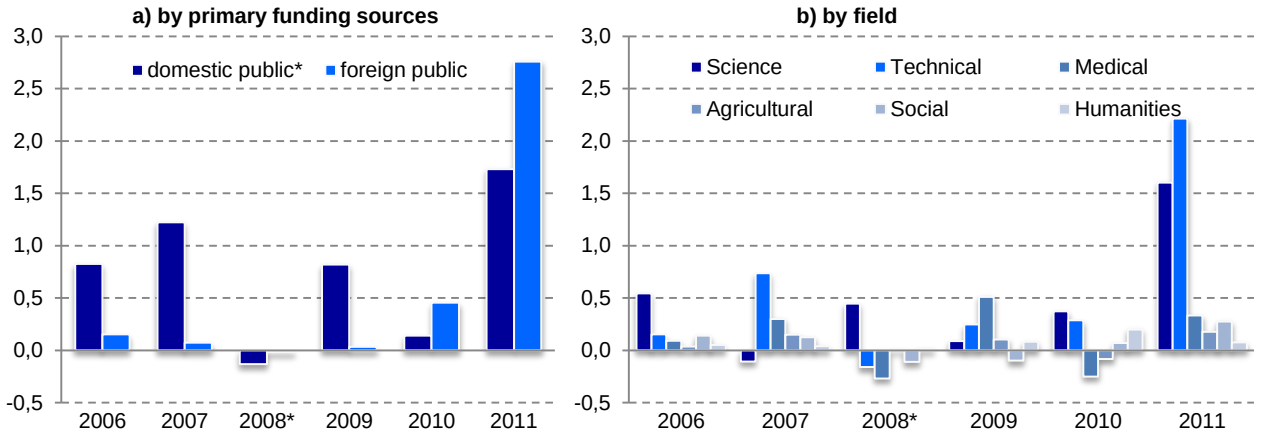
As stated above the majority of university R&D in the Czech Republic is performed at public universities; in 2011 96% of the expenditures went there, 3% to the faculty hospitals and the remaining 1% to the private universities.

Another very interesting indicator is the share of R&D expenditures in the total costs of the public universities, which grows significantly in time. If in 2009 it was 25%, then in 2011 it was 36%.

In 2011 unlike other R&D sectors there has been a significant increase in the share of investment costs in the total R&D costs. These expenditures increased 5 times year-on-year (from 765 million to 3.8 bn. CZK), mainly in the item of land and property purchase. This has been caused in a large part due to the funding of European Centres of Excellence and regional R&D centres within the OP VaVpI.

The university sector is the fastest growing sector of Czech R&D in the last 5 years regarding expenditures. Since 2006 the expenditures on R&D in the university sector grew by 13% a year, i.e. 2.5 times as fast as in the government sector. However it is necessary to stress that this growth is from a much smaller base and is strongly influenced by the record year-on-year increase in 2011 by 4.7 bn. CZK (45%).

Chart A.21: Year-on-year changes in R&D expenditures in the university sector (bn. CZK in current prices)



*Note: *The year-on-year decrease in 2008 was probably caused by the application of the Act No. 218/2000 on Budgetary Rules and on amendments of some related acts (budgetary rules), as amended, which stated that the unused expenditures will not be transferred into the reserve funds of the state organization units and therefore will not be included in 2008 resources, because as can be seen in the next two years the R&D expenditures in this sector increased again and quite significantly.*
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Table A.5: Year-on-year changes in R&D expenditures in the university sector in the Czech Republic

	2000	2001	2002	2003	2004	2005	2006	2007	2008*	2009	2010	2011
Billion CZK (current prices)	0,8	0,7	0,2	0,3	0,3	1,7	1,0	1,2	-0,1	0,9	0,6	4,7
% in current prices	29,0	17,9	4,1	6,6	5,3	33,3	14,6	15,7	-0,7	10,3	5,9	44,0
% in constant prices of 2005	27,3	12,7	1,4	5,6	1,2	33,8	14,0	11,9	-2,6	8,1	7,8	45,1

Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

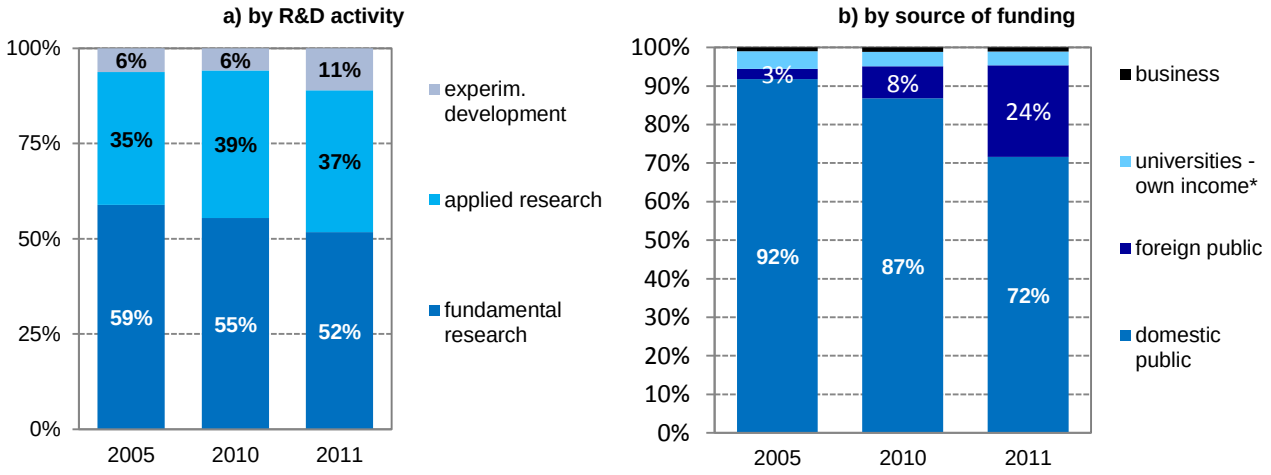
Similar to the government sector the majority of the R&D expenditures in the university sector are related to the field of fundamental research, but its dominance is not so strong and decreases in time. In 2011 the expenditures on fundamental research in this sector reached 7.9 billion CZK, on applied research 5.7 bn. CZK and 1.7 bn. CZK was spent on experimental development. Based on the available data on the international comparison it isn't possible to clearly determine a typical structure of R&D expenditures in

the university sector according to conducted activity across the EU states – for more detail see the table appendix.

Like the government R&D the university R&D in the Czech Republic is financed mostly from the public sources. In 2011 the state budget provided 72% of the R&D funding (11 bn. CZK). Despite the almost 1/5 year-on-year increase (by 1.7 bn. CZK) of state budget funding, the share of state funding of university R&D decreased by 14 percentage points. The cause of this decrease is the already mentioned sharp increase of university R&D funding from EU sources. If in 2005 the foreign public sources contributed 182 million CZK, in 2010 it was 881 million CZK and in 2011 3 636 million CZK. Similar or even higher volume of funding from foreign public sources can be expected in the coming years as well. Unlike in the government sector there are almost no foreign private funding sources of university R&D.

22 sites (10%) of the university sector declared that they performed R&D to order for the business sector. The total income from these orders was only 156 million CZK. This amount equals exactly 1% of the R&D expenditures in the university sector. We observe similar values since we started monitoring this indicator.

Chart A.22: R&D expenditures in the Czech university sector sorted by activity type and source of funding



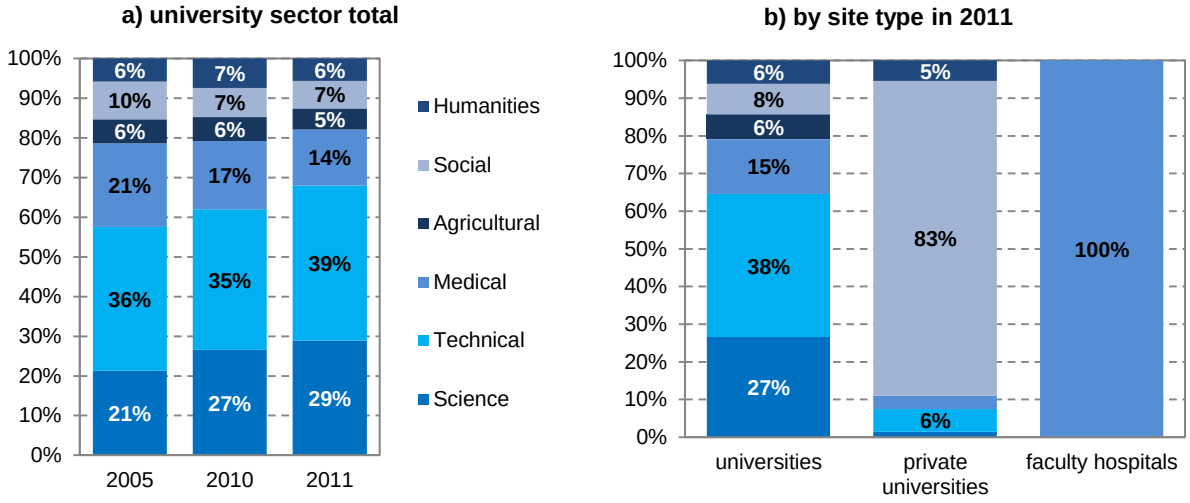
*Note: * Includes income not coming from the business sector (student fees, book sales, magazine subscriptions etc.)*
Note: in 2005 1 % equalled 69.1 mil. CZK, In 2010 106.2 mil. CZK and in 2011 152.9 mil. CZK
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

In case of the university sector the spread of R&D expenditures between various scientific disciplines is completely different than in the government sector. The university sector allocates most of the R&D resources into technical sciences (6 billion CZK in 2011) and apart from natural sciences (4.4 billion) a large share belongs also to the medical sciences (2.2 billion). Significant in case of medical sciences is the fact that faculty hospitals are included in the university sector.

The share of technical sciences in total R&D expenditures is crucial in the Czech university sector, also in the available international comparison.[11] Based on these data, it is possible to presume that the Czech university sector could play a significant role in research cooperation projects with businesses. However, when taking into account the share of business funding of the university R&D, the Czech university sector has one of the lowest figures from the monitored countries of the EU and OECD (EU27 average 6%).

[11] As was the case of life sciences in the government sector, the university sector is specific in that it has one of the biggest shares of technical sciences in its total expenditures in comparison with the 20 EU states on which data is available in this regard.

Chart A.23: R&D expenditures in the Czech university sector sorted by scientific disciplines



Note.: in 2011 1 % in the total university sector equalled 152.9 mil. CZK, at public universities VŠ 147.0 mil. CZK; at private colleges 0.09 mil. CZK and at faculty hospitals 5.0 mil. CZK.
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

International comparison

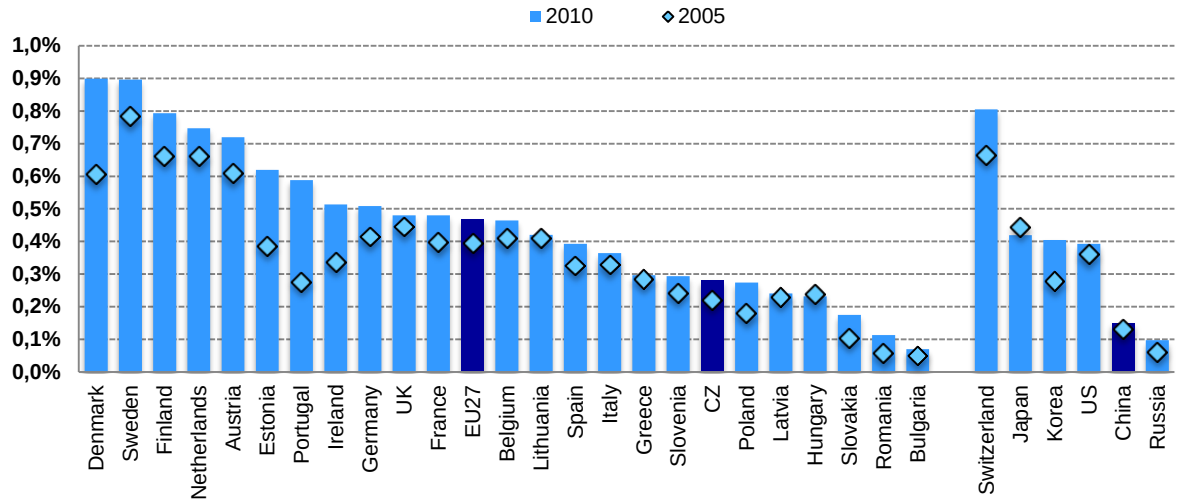
In absolute values the individual EU27 countries spent a total of 57 billion EUR in current prices on university R&D, i.e. 25 billion more than in the government sector. Most of this amount has been used by the universities in Germany (22%), France (16%) and the UK (14%). The Czech Republic's share in this figure was 1%.

Unlike the government sector R&D expenditures the university sector R&D expenditures increased in all monitored EU and OECD countries in the 2000-2010 period as well as in the past five years, albeit with a varying intensity. The average real increase for EU27 countries was 4% a year; however in the Czech Republic it was twice as fast in the given period.

Unlike the government sector the university sector's share on total R&D expenditures shows lower values than the average of EU27. In 2010 the EU27 average was 24% compared to 18% in the Czech Republic (in 2011 this increased to 21%). According to this ratio the highest values can be seen in the Baltic countries (Latvia, Lithuania, Estonia), the share of the university sector in total R&D expenditures is 40% and higher there, followed by Netherlands, Poland or Portugal.

In the EU the university sector has a completely dominant position in the public R&D in Denmark, of the remaining OECD countries in Switzerland, i.e. in countries with a high overall R&D intensity. It is interesting that tin the case of Denmark the expenditures in the government and university sectors were almost equal ten years ago.

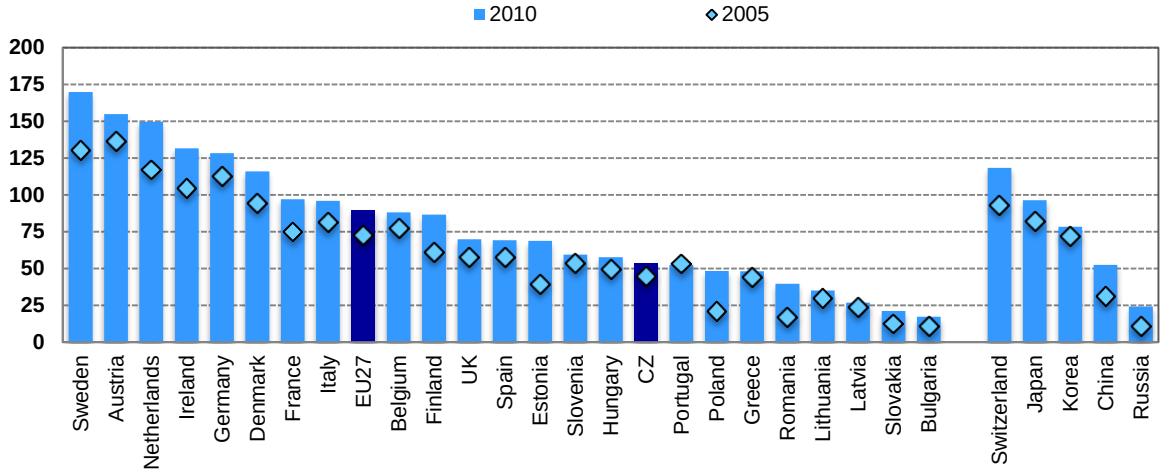
Chart A.24: R&D expenditures in the university sector (HERD as % GDP)



Note: Greece: 2007; USA: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

As with the government sector the monthly wage costs of one FTE researchers in the Czech Republic were several times lower than in western or northern EU countries.

Chart A.25: Monthly wage costs of 1 R&D employee (FTE) in the university sector, 2009 (thousands EUR, current prices)



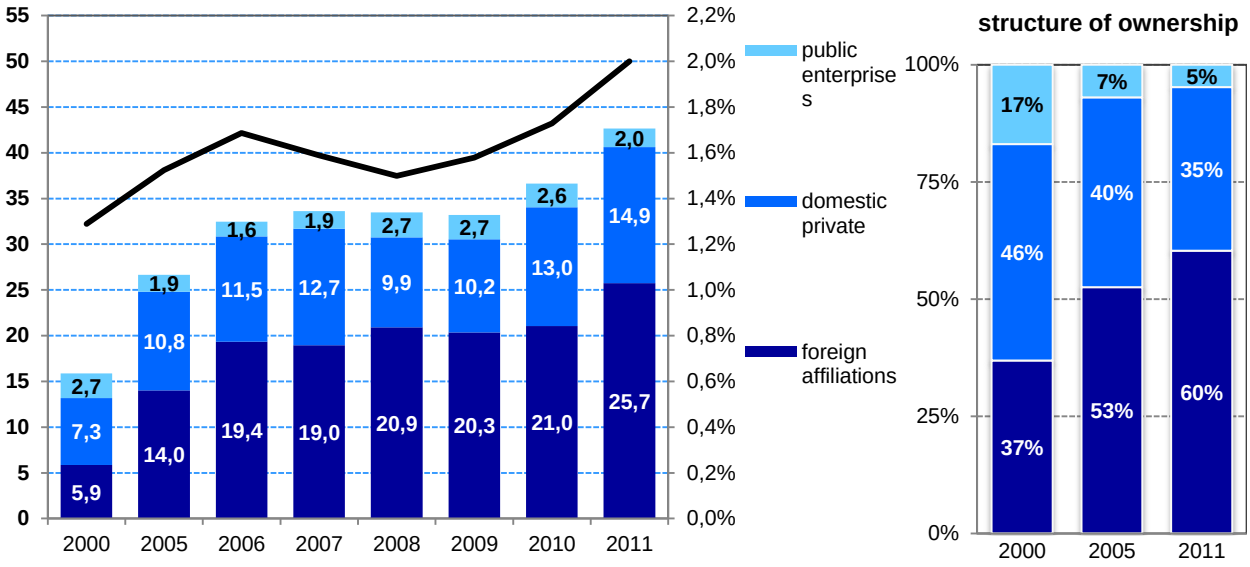
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

Business R&D – R&D expenditures in the business sector

In 2011 research was conducted in the Czech Republic at 2 261 sites in 1865 businesses. However, only ¼ of these reached yearly R&D expenditures of more than 10 million CZK and 1/20 R&D expenditures of more than 100 million CZK. On the other hand ¼ of the businesses that perform R&D had R&D expenditures of less than 1 million CZK.

In 2011 113 businesses performed R&D as their main economic activity (CZ NACE 72) at 153 sites. More than a half of the other businesses were in the manufacturing industry (1 216) and the largest part of them (266) belonged to the engineering industry. In services the majority of R&D sites were in IT (259).

Chart A.26: R&D expenditures in the Czech business sector (billion CZK; %)



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The Czech business sector is the most important R&D sector according to the R&D expenditures in the monitored period. Its share in total R&D expenditures never dropped below 60% since the half of the 90s. Until 2007 the R&D expenditures in this sector increased steadily. After two years of decline the businesses in the Czech Republic increased the investments in their own R&D in 2010 and especially in 2011. In 2011 the businesses spent 42.7 bn. CZK for their own research, which is almost 30% (9.2 billion) more than 10 years ago. Since 2005 their total expenditures for their own R&D were 239 bn. CZK.

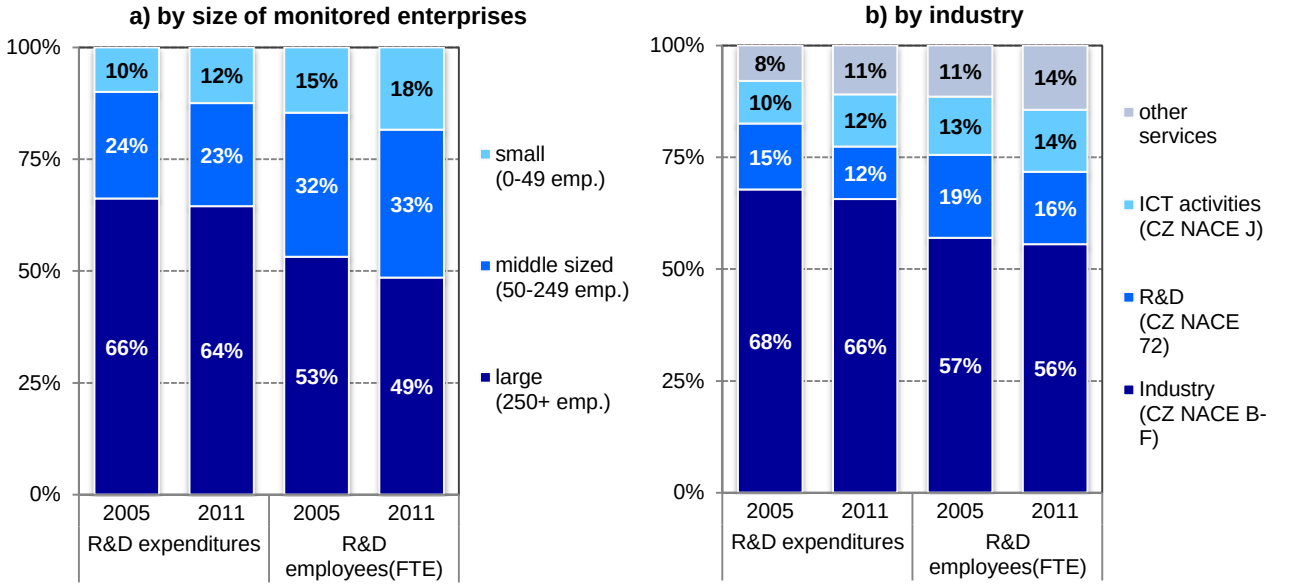
As for the business ownership since 2003 the biggest part of the business R&D expenditures was spent by foreign owned businesses. In 2011 these foreign affiliations had a 60% share in the total business R&D expenditures, although they make up less than ¼ of the R&D subjects in this sector and employ less than a half of R&D employees of the business sector. The R&D in businesses with foreign ownership more concentrated than in domestic businesses. While average annual R&D investments per one foreign-owned business reached almost 48 million CZK, the investments of domestically owned businesses averaged at 8 million CZK. If in foreign affiliations there were almost 2 million CZK per one R&D employee, in the domestic ones it was just one half of it.

Domestic businesses had a 35% share and public businesses the remaining 5% of business sector R&D investments[12]. However, during the monitored period the structure of the R&D expenditures changed significantly. In 1999 the domestic private businesses had a 50% share in the total business sector R&D expenditures and the public businesses almost ¼.

The largest part of R&D funding is in the long term spent in businesses with more than 250 employees. As for the prevalent economic activity of the monitored businesses, industrial businesses are dominating in the Czech Republic.

[12] Public businesses comprise mainly of former departmental research institutes.

Chart A.27: R&D expenditures and employees in the business sector according to size and industry (%)



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

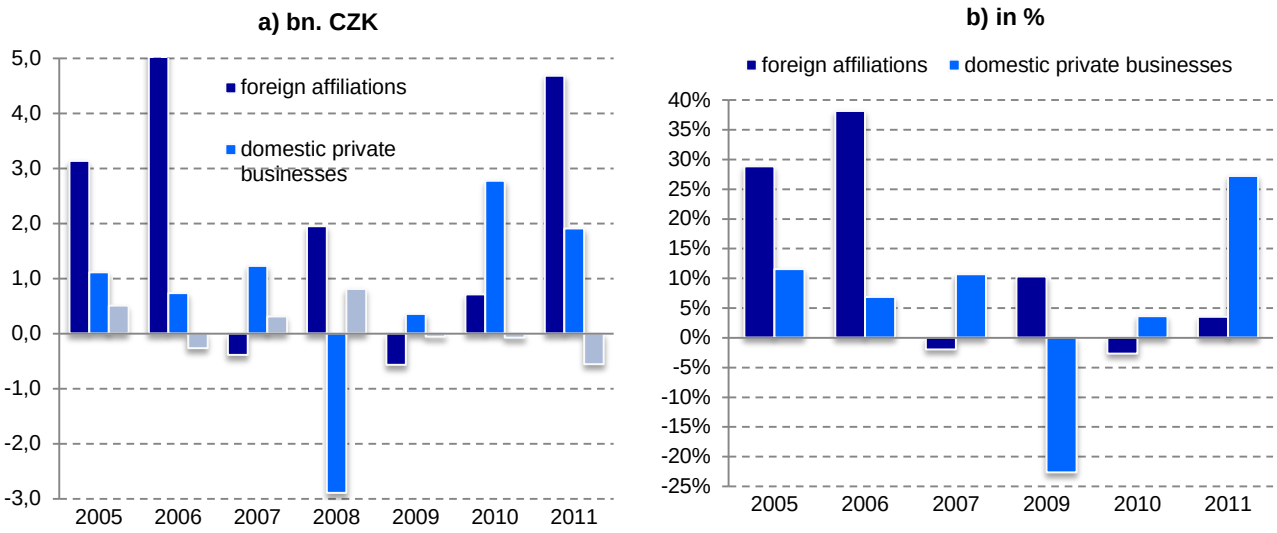
In the last ten years the R&D expenditures in the business sector grew by 8% a year in constant prices. The growth rate was the fastest in 2005 and 2006, each year by ca. 20%, especially in foreign affiliations. On the contrary in 2008 and 2009 there was a decrease in the R&D expenditure as stated above – 2.5% a year. The above listed data are related to the whole business sector. If we focus on its individual subsectors, then particularly in 2005 and 2006 the increase had been much more significant for foreign affiliations than for domestic businesses.

Table A.6: Year-on-year change in R&D expenditures in the business sector

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bn. CZK (current prices)	1,0	1,2	1,0	1,6	2,2	4,8	5,8	1,2	-0,1	-0,3	3,4	6,0
% in current prices	6,9	7,4	5,9	9,0	11,4	21,7	21,8	3,5	-0,4	-0,8	10,3	16,5
% in constant prices of 2005	5,4	2,6	3,1	8,0	7,0	22,1	21,2	0,2	-2,3	-2,7	12,2	17,3

Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

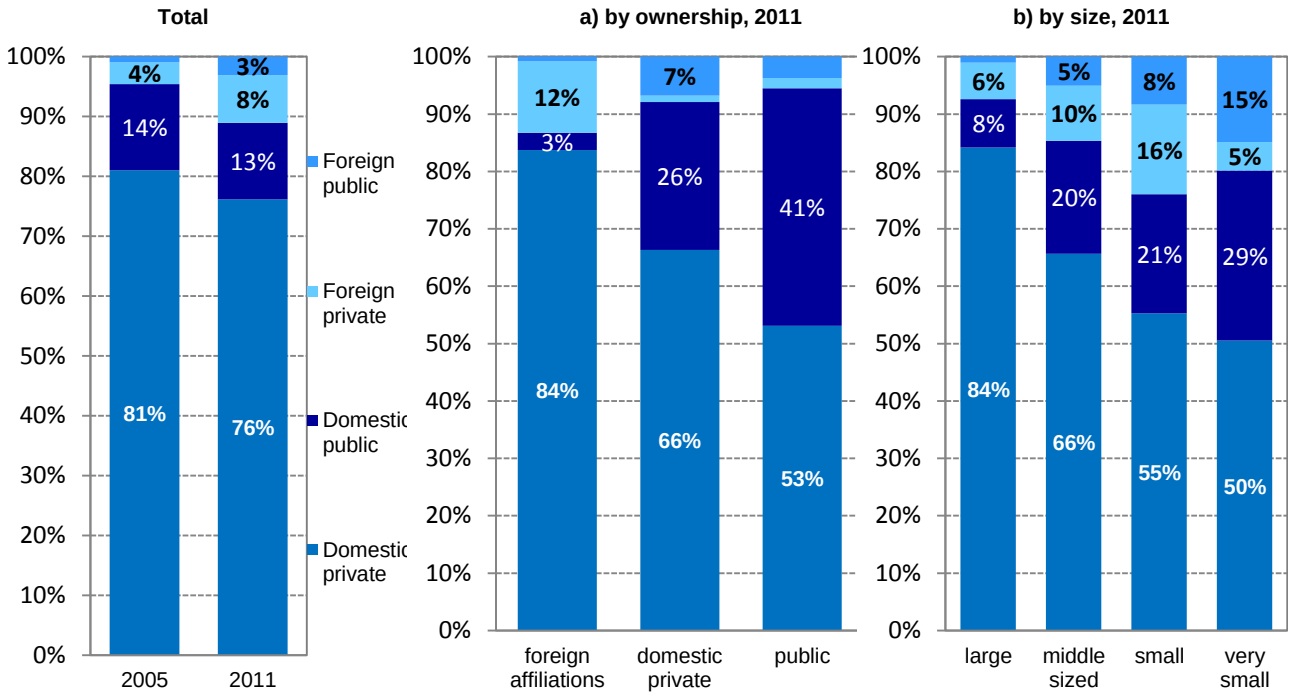
Chart A.28: Year-on-year change in R&D expenditures in the business sector by business type



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

R&D activities in the business sector are funded long-term mainly by domestic business sources. Until 2008 their share was more than 80% with 95% coming from the monitored businesses' own sources. The rest was funding of R&D on order for other domestic businesses. However, in 2009 there was a significant increase in funding from the state budget and foreign sources. In case of the foreign sources these were mainly private funds from the same ownership group. In 2009 the public sources had a 15% share and the foreign a 11% share in the business R&D funding. In 2011 the share of both decreased but the absolute values continued to grow. Public sources had a share of 3% in the funding of foreign owned businesses' R&D, 26% in domestic businesses' R&D and 41% in public businesses (data from 2011). Similar differences can be found in relation to the size of the monitored businesses. In case of foreign private sources we can see that e.g. in 2011 ca. 95% (3.4 bn. CZK) comes from foreign businesses, which invest into the R&D of their foreign affiliations.

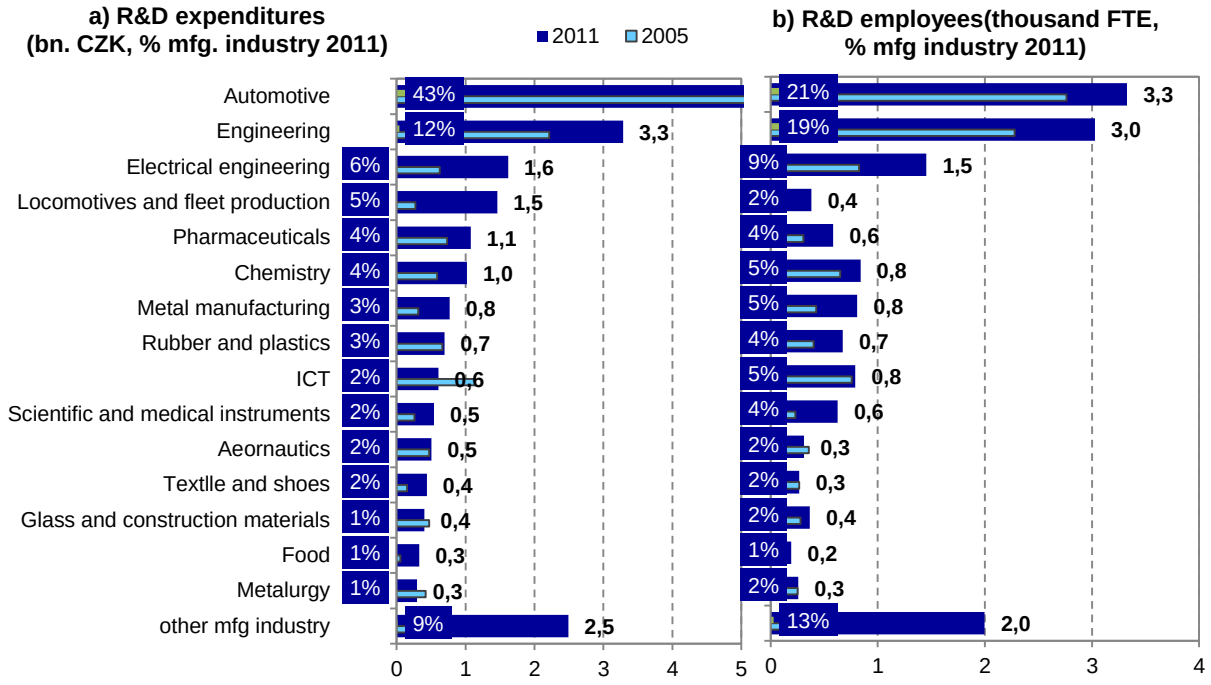
Chart A.29: R&D expenditures in the business sector according to the source of funding



Note: In 2011 1 % of R&D expenditures in foreign affiliations equalled 257 mil. CZK., in domestic private businesses 149 mil. CZK., in public businesses 20 mil. CZK., in large businesses with more than 250 employees 275 mil. CZK., in middle-sized (50-249 employees) 98 mil. CZK., in small (10-49 employees) 4 mil. CZK. and in very small with less than 9 employees1 mil. CZK.
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

From the economic activity point of view the largest part of resources in the business sector R&D (BERD) in 2011 was allocated to manufacturing industry – 27.5 billion CZK (BERD 64.4%). In businesses with R&D as their major activity (CZ-NACE 72) 5 billion CZK (12% BERD) was spent in the same period. Businesses with IT as their major activity (CZ-NACE 62) invested 4.4 billion CZK (10% BERD) in their own R&D.

Chart A.30: R&D in the Czech manufacturing industry sorted by branches

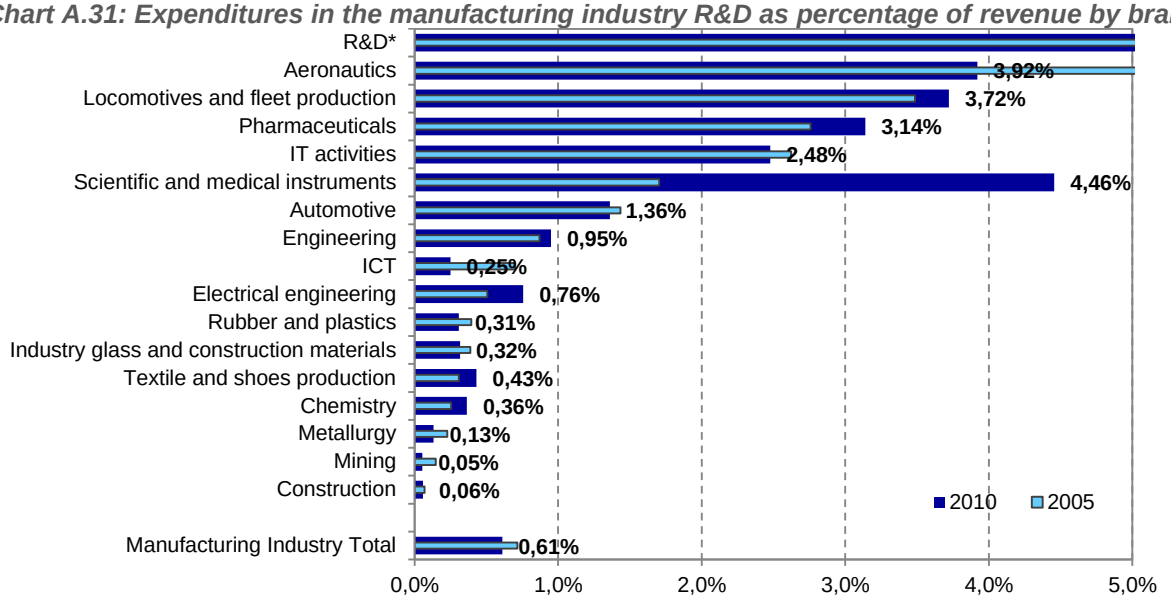


*Note: * Data for the automotive industry made up 11.9 bn. CZK in 2011 and 7.5 bn. CZK in 2005*
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

As for the individual manufacturing industry branches the majority of the financial resources have been traditionally invested in the automotive industry. In 2011 the R&D expenditures in this industry branch reached 11.9 billion CZK (almost 30% of the total R&D expenditures in the manufacturing industry). The engineering industry with 3.3 bn. CZK made up 12% of the manufacturing industry. An interesting comparison can be seen with the FTE employee indicator in individual branches of the manufacturing industry.

Regarding the intensity of R&D in individual branches, which is calculated as a ratio of R&D expenditures to the total revenue of the industry branch, the most intensive branches is the production of scientific and medical instruments (CZ NACE 265-266), where 4.5% of total revenue were invested into R&D. This branch had also seen a significant R&D intensity growth compared to 2005. Other branches with relatively high R&D intensity are aeronautics, locomotive and fleet production, pharmaceutics and IT activities. Automotive, where the largest part of business R&D expenditures is allocated, belongs to the above-average intensity branches, but this intensity decreased slightly between 2005 and 2010. The whole manufacturing industry's intensity R&D decreased; in 2010 0.6% of revenues were invested into R&D.

Chart A.31: Expenditures in the manufacturing industry R&D as percentage of revenue by branches



*Note: * The data for the businesses with R&D as their prevalent economic activity were 64% in 2010 and 65% in 2011*
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

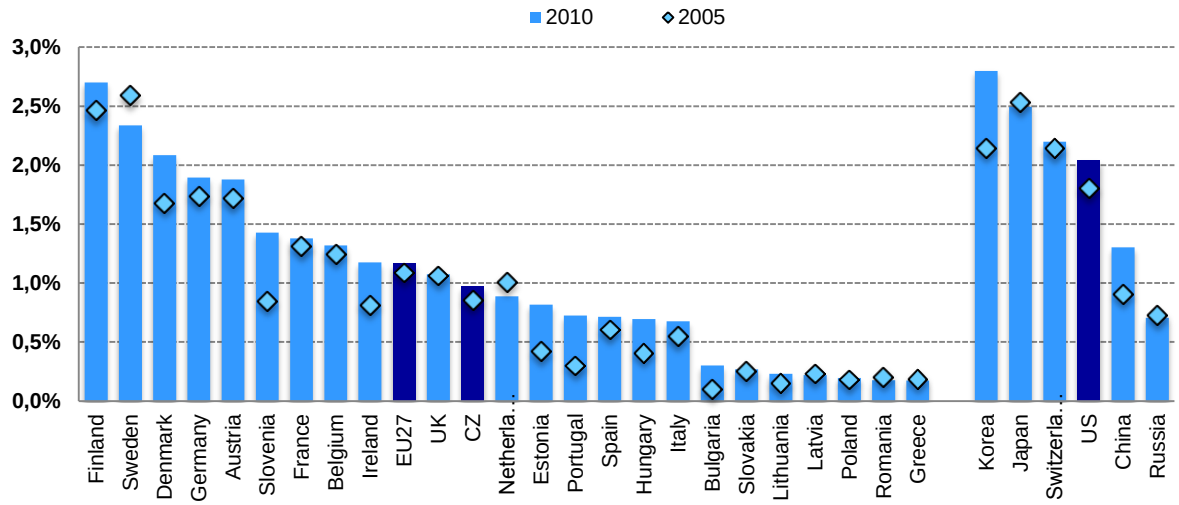
International comparison

The business sector has a dominant role in the R&D regarding the share in the total R&D expenditures in Asian OECD countries (Korea, Japan) with more than 75% share, in Scandinavian countries, China, USA, Switzerland, Austria and Germany with larger than 70% share (data for 2010 or 2009). Unlike the other new EU countries the business sector has a dominant role in the R&D in Slovenia and the Czech Republic. In the last five years the Czech Republic with a ca. 62% share is around the average of the EU27.

Measured in absolute values the businesses in the EU spent a total of 143 bn. EUR in current price on R&D. This only equals 70% of the amount the US businesses spent in 2009 (204 bn. EUR). The majority of investments in EU business sector go into R&D in Germany (47 bn. EUR in 2010), which is almost two times higher than France. Czech businesses invested into R&D the largest sum of all the new EU countries. Our standing in the central European region is therefore very good because businesses in Poland or Hungary invested only 50% of the sum invested by Czech businesses. Slovak businesses invested only 10% of this sum.

In the last two years for which relevant data is available (2009 and 2010) Sweden and Finland had the highest R&D intensity in the business sector (more than 2.5%), i.e. countries which had the highest overall R&D intensity. Very high R&D expenditures are also achieved in Denmark, Austria and Germany. Since 2000 the EU27 average value is around 1.1%. In the Czech Republic the ratio has grown from 0.7% in 200 to 0.97 in 2010, which is the same value as in Netherlands or the UK. With the exception of Slovenia this is the highest value of all the new EU states and better than the southern states (Spain, Italy and Greece).

Chart A.32: R&D in the manufacturing industry (% GDP)



Greece - 2007; US – 2009; Switzerland – 2004 a 2008
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations

A.2 Direct support of R&D from the state budget

Total direct support of R&D from the state budget includes all financial resources granted from state budgets including all resources allocated to R&D abroad. According to the international methodology R&D support provided through returnable loans, EU program pre-financing covered by income from the EU and support of innovation are not included in the direct support.

The source of data for this chapter is information contained in the Annual Statistical Survey on Government Budget Appropriations or Outlays on R&D (GBAORD), which is organized within the EU as a compulsory survey according to Regulation (EC) No. 753/2004 and methodology outlaid in the Frascati Manual (OECD, 2002) with the aim to identify the main areas of R&D, where the state support is directed, sorted by socioeconomic objectives (NABS classification). The GBAORD statistic in the Czech Republic is concluded by the CZSO in cooperation with the RVVI and the R&D&I information system (R&D&I IS)

Base for the determination of total direct support from the state budget is the state final account's expenditure area for R&D granted by the Finance Ministry, i.e. these are funds that were actually drawn from the state budget (not just planned, but approved)in the given year.

As the GBAORD statistics are based on the analysis and identification of all amounts allocated to R&D from the public budgets gained from administrative sources, they differ from the data gained directly from the beneficiaries of this support (chapter A.1). International comparability of the GBAORD data is generally lower than in case of data gathered directly from R&D subjects in the majority of the countries.

Table A.7: Total expenditures on R&D support from the Czech state budget (bn. CZK)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Approved exp.	11,6	12,6	12,5	13,9	14,7	16,5	18,2	21,5	23,0	24,8	25,4	25,9
Approved exp.*	.	.	.	.	.	.	.	25,1	23,1	32,4	29,4	28,9
Real exp.	**11,9**	**12,6**	**12,3**	**13,4**	**14,2**	**16,4**	**18,3**	**20,5**	**20,5**	**23,0**	**22,6**	**25,8**
Real exp.*	.	.	.	.	.	.	.	20,5	20,5	24,1	24,9	37,5

Note: including data for pre-funding of the EU programmes, covered by incomes from the EU*
Source: Ministry of Finance of the Czech Republic; State final account, chapter R&D

Total direct support of R&D from the state budget – basic indicators

The state budget represents the second most important source of R&D funding (after private business investments). During the whole monitored period its share in total R&D funding was between 37% and 45% with the peak of 45% in 2000, 2001 and 2009. In 2011 this share decreased to 37%.

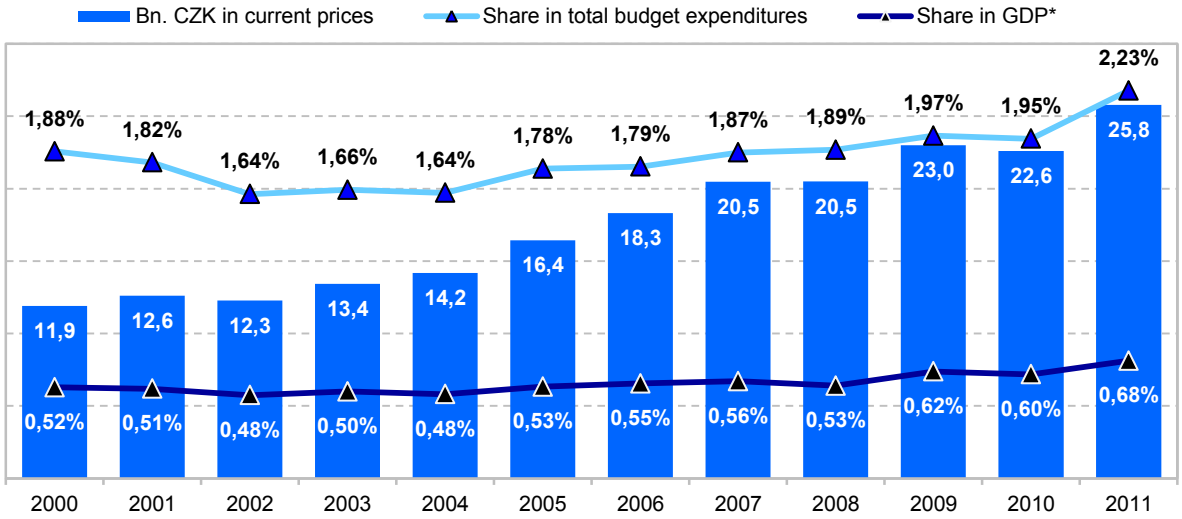
In 2011 after a year-on-year increase of 3.2 bn. CZK (14%) the total direct R&D support from the state budget reached 25.8 bn. CZK, which equals 0.68% share in GDP and 2.23 share in total budget expenditures. In all cases these are the highest values recorded since 2000. The share of state R&D expenditures on the public budget, which includes also the territorial budgets and is used for international comparisons, was 1.56% in 2011.

After a relatively significant decrease of the total R&D expenditures from the Czech state budget in 1992 and 1993, when these expenditures in current prices dropped from 4.5 bn. CZK in 1991 to 2.8 bn. CZK. In 1993 (in real prices the decrease was even larger – by 56%), these state budget expenditures are constantly growing (with the exception of 2002, 2008 and 2010) both in current and constant prices. In real prices (constant prices of 2005) the budgetary expenditures on R&D grew on average by 6.1% a year, however

with significant year-on-year differences. The significant increase in 2011 has been largely caused by the co-funding of EU projects from structural funds from the Czech state budget.

In 2011 the expenditures on R&D from the state budget in current prices were twice as high than 10 years ago (12.6 bn. CZK in 2001). During this period all three sector have drawn a total of 200 bn. CZK from the state budget – 112 billion in the past five years (2007-2011).

Chart A.33: Total expenditures on direct R&D support from the Czech state budget (bn. CZK; %)



*Note: * in this year an extraordinary revision of National Budgets was finished, which influenced the reverse calculation of the GDP value in the Czech Republic in the period 1995 – 2010. The figure for 2011 is based on the GDP estimate as of 31st August 2012.*

Source: CZSO according to data from the State final account, chapter R&D (MF CR 2012)

Table A.8: Year-on-year change of total expenditures on direct R&D support from the Czech state budget

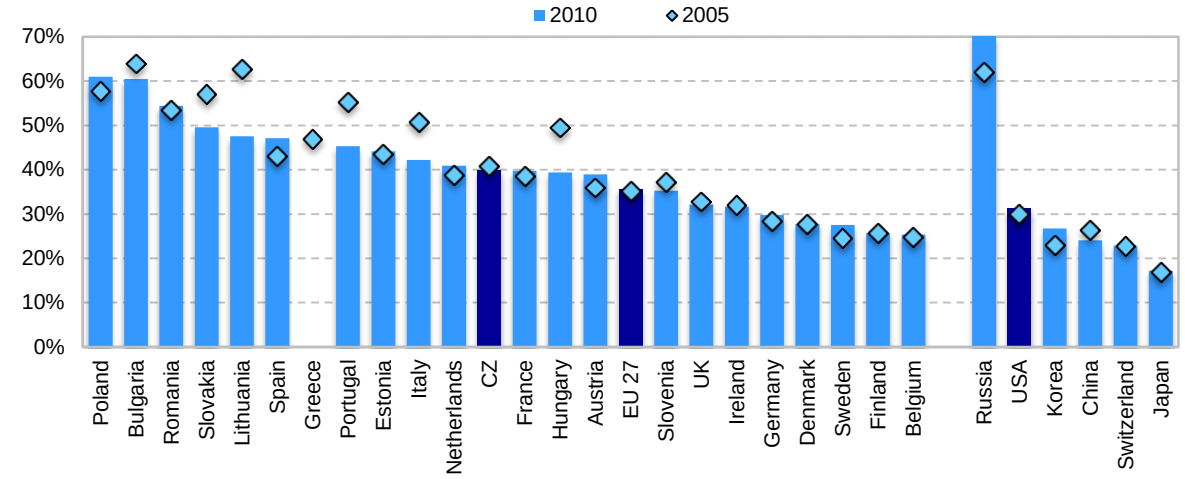
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bn. CZK (current prices)	**2,2**	**0,7**	**-0,3**	**1,1**	**0,7**	**2,3**	**1,9**	**2,2**	**0,0**	**2,5**	**-0,4**	**3,2**
% in current prices	23,0	6,0	-2,6	9,4	5,6	16,0	11,3	11,8	0,1	12,3	-1,8	14,1
% in constant prices of 2005	21,3	1,3	-5,2	8,4	1,5	16,4	10,8	8,2	-1,8	10,1	0,0	14,9

Source: CZSO according to data from the State final account, chapter R&D (MF CR 2012)

International Comparison

Within the EU countries apart from the Czech Republic and Slovenia R&D funding from the state budget plays an important role especially in the new and southern EU states. In Poland, Bulgaria and Romania the state budget R&D funding exceeded 50%. Only Russia had a higher value with more than 70%. On the other hand, in the Scandinavian EU countries, in Germany, Belgium, Asian OECD countries, China or Switzerland the share of public R&D funding is less than 1/3. Despite this lower share the R&D expenditures related to GDP are much higher than in the mentioned new or southern EU countries.

Chart A.34: The share of public funding on R&D funding in a given state (% GERD)

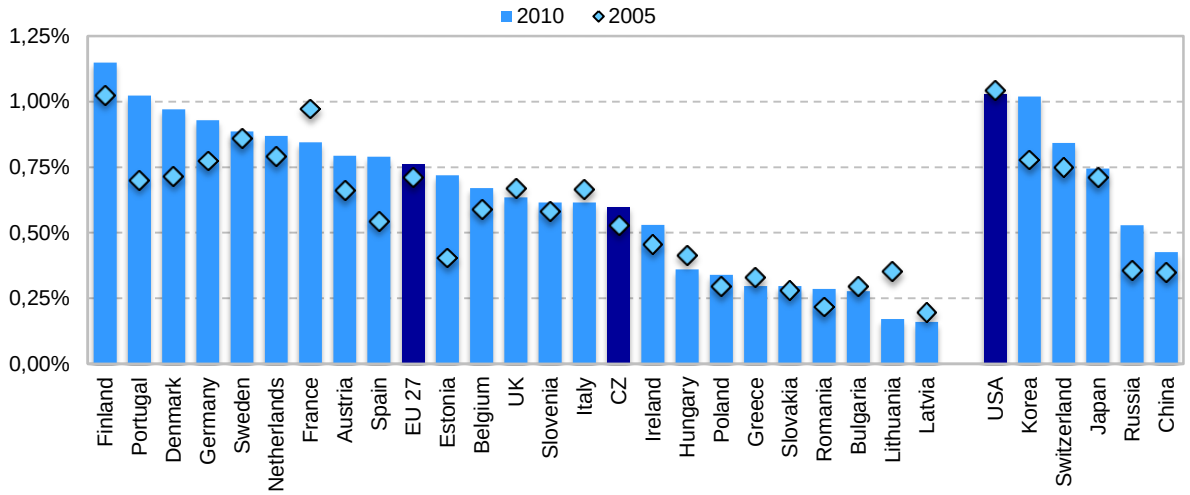


Note: Belgium, Italy, Germany, Netherlands, Portugal, Spain, Sweden, EU27, USA 2009, Switzerland 2008, current data on Greece not available
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

In 2010 the highest share of state budget R&D funding in GDP within the whole EU 27, despite the previously stated fact about their low share in the total R&D spending, in Scandinavian countries, Germany and surprisingly Portugal. In the EU27 the state budget R&D expenditures represented 0.8% GDP and the Czech Republic with 0.6% was below the European average. The USA spend significantly more from their national budget on R&D than the listed European average. In 2010 it was 1% - the same as in Korea.

In 2010 the total budgetary R&D support in the EU reached 92.7 bn. EUR, i.e. 1.8 bn. EUR more than in 2009. As with the total R&D spending also in the case of budgetary R&D spending the same three states (Germany, France, UK) contribute more than a half of EU27 (54%). The Czech Republic with 0.9 bn. EUR contributed almost one per cent (0.97%). This figure is 2.6 times higher than the Hungarian one, but only 40% of the amount contributed by Denmark or Austria.

Chart A.35: Intensity of public R&D expenditures (GBAORD as % GDP)

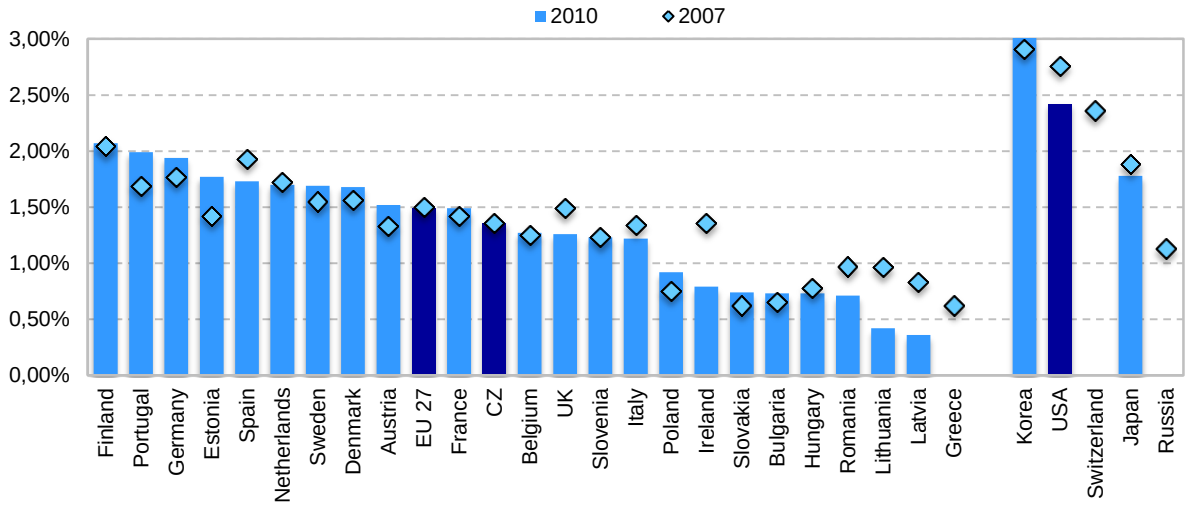


Note: Greece and Switzerland 2008
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

In 2010 the GBAORD share in total public expenditure in the EU27 was on average 1.52%. Within the EU27 the highest values were in Finland, Portugal and Germany– between 1.8 and 2%. The highest value of all

the monitored countries was achieved in Korea (3.4%) and the USA (2.4%). The Czech Republic was below the EU27 average with 1.4%. However, this value was the second highest among the new EU countries after Estonia.

Chart A.36: State budget R&D funding and support (GBAORD as % of total expenditure)

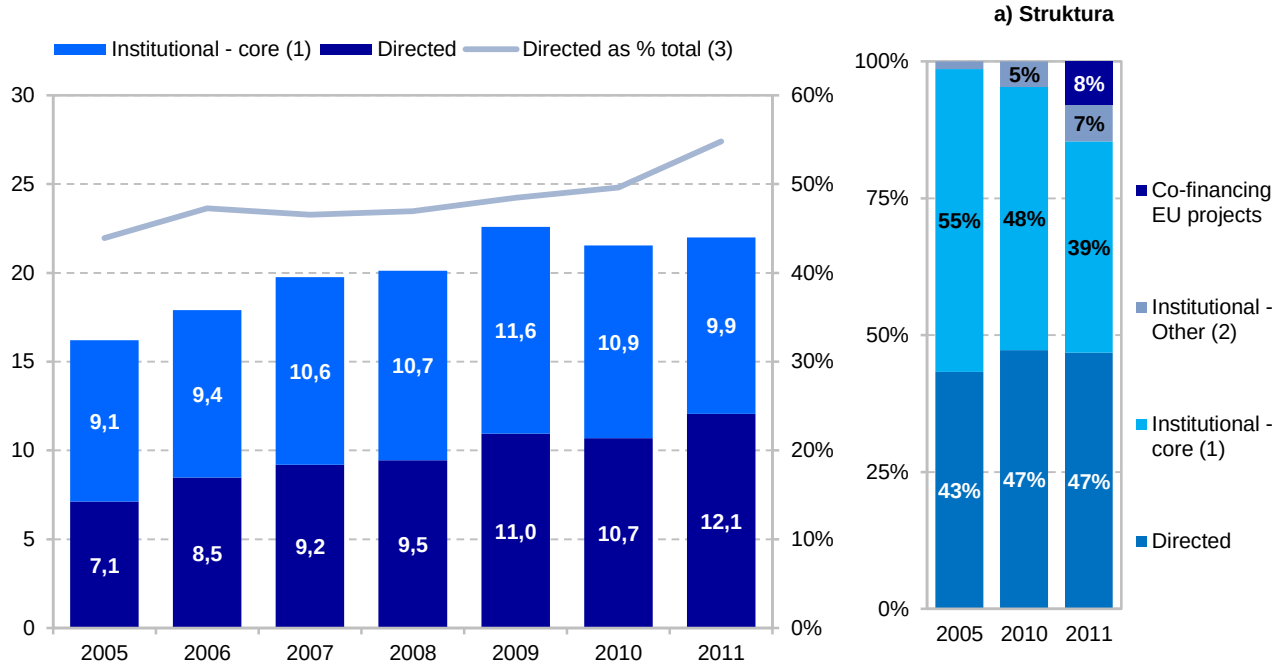


Note: Japan and Korea: 2009
Source: OECD MSTI 2012/1, Eurostat August 2012 and CZSO calculations.

State budget R&D support by type of funding, grantors and beneficiaries

Although the share of R&D project support in the total state budget expenditures haven't changed much in the past five years (it is between 45 and 48 per cent), particularly in the past two years the relation between project support and institutional support has changed significantly. If in 2005 the institutional support was almost 2 bn. CZK higher than the project support, in 2011 the institutional support reached only 82% of the project support – in absolute values it was 2.1 bn. less. A largely unknown factor as for the type of support is the co-funding of EU structural funds meant for R&D activities from the state budget. According to available information this item contributed an estimate of 8% of the total state budget R&D expenditures. A major part of it is institutional co-funding from the Operational Program R&D for Innovation (1.5 bn. CZK) from the budget of MoEYS.

Chart A.37: State budget R&D expenditures by type of support (billion CZK; %)



Note: in 2005 1% equalled 165 million CZK;, in 2010 254 million CZK and in 2011 259 million CZK
(1) Includes support of research intents, specific research on universities, AS CR infrastructure and since 2010 also the long-term support of development activities of research institutions
(2) Includes costs of the system of R&D support, especially organizing public tenders and project evaluations and costs related to the operation of the RVV, CGA, CTA and AS CR
(3) Doesn't include co-financing of EU projects and other institutional support –see note (2)
Source: CZSO according to the data from the State final account and R&D&I IS

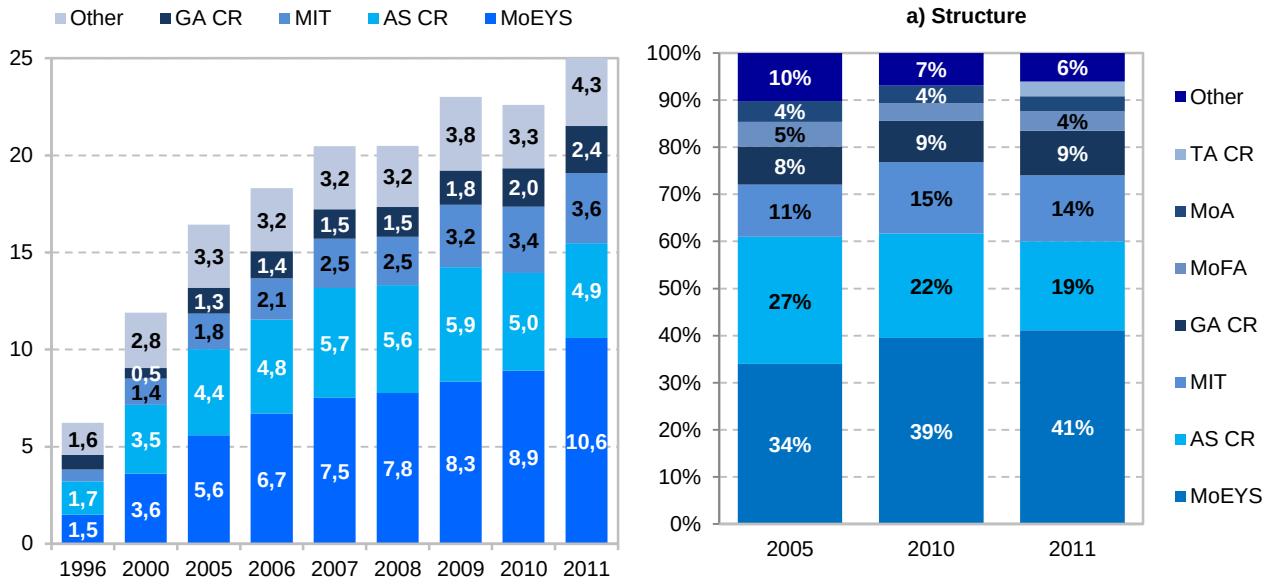
The two major providers of institutional support in the Czech Republic are MoEYS and AS CR. In 2011 these two institutions provided 87% of the institutional funding. While MoEYS supports mainly individual public universities, the AS CR supports its own institutes. Apart from these two the individual ministries support their own departmental research organizations. The MoEYS' share reached 54% (7.5 billion CZK) in 2011, which was 10 percentage points more than in 2005. The AS CR provided 33% (4.5 billion CZK), which was 10 percentage points less than in 2005.

Project support of the R&D in the Czech Republic is financed through 17 budget chapters (in the past there were as many as 22 chapters and their number was reduced based on the Reform of the System of R&D&I approved by the government in its resolution No. 287 of 26th March 2008). Main providers of the project funding are MIT, which supports mainly applied research through programs such as TIP, Continuous prosperity, or in the past Tandem or Impulse. Main beneficiaries are private domestic businesses. In 2011 the MIT's share in project funding was 27% (3.29 billion CZK). MoEYS is the guarantor of a number of research programmes, such as "Research Centres", "Centres of Fundamental Research", "Information Technologies for Knowledge Society" etc. The third major provider is the CGA, which supports grants for fundamental research. It grants funding to the best projects from all disciplines based on tenders in R&D. In 22011 the CGA provided 2.4 billion CZK (20% share). Apart from the three mentioned providers the funding comes also from MoH (700 million CZK, 6%), MoA (402 million CZK, 3.3%). Aside from MoEYS and MIT the cross-sectional applied research is also supported by the MoC and MoI. In 2011 for the first time the Technology Agency of the Czech Republic participated in project support with its support of applied R&D (777 million CZK, 6.4%)

Between 2000 and 2002 the main provider of project funding was the AS CR Grant Agency, which since then reduced its operation and since 2009 it doesn't provide funding for any new projects. Since 2005 the project funding increased the most at the MoEYS (2.1x) and MIT and CGA(both 1.8x), the absolute increase was by 1.7 billion CZK for MoEYS, 1.4 bn. CZK for MIT and 1.1 bn. CZK for CGA.

Regardless of whether it is the project or institutional funding, the MoEYS is the primary provider of public R&D funding in the Czech Republic. In 2011 more than 10 billion CZK (41% of the total public R&D funding) came from its budget chapters (7 percentage points more than in 2005). Since 2000 the MoEYS R&D budget chapter is the fastest growing one and increased almost three times. The second most important provider is the AS CR with 4.9 billion CZK (19%) in 2011 (in 2002 its share was 32%). The R&D budget chapter of the AS CR has been reduced by almost 1 billion CZK in 2011 in comparison to 2009. The MIT and CGA as main providers of project R&D support contributed with 3.6 billion CZK (14%) and 2.4 billion CZK (9%) respectively.

Chart A.38: State budget R&D funding by major providers (billion CZK, %)



Note: in 2005 1% equalled 165 million CZK;, in 2010 254 million CZK and in 2011 259 million CZK
Source: CZSO according to the data from the State final account and R&D&I IS

Among the main beneficiaries of the R&D support from the state budget are the public universities, private research institutions and private businesses. In 2011 for the first time the largest part of the funding went to the universities (9.2 billion CZK, 40% of budgetary expenditures without other institutional support). The long-term most important beneficiary within the university R&D funding is the Charles University, which receives almost 30% (2.6 billion CZK in 2011) of these resources. The Czech Technical University in Prague received 1.3 billion CZK (14%) in 2011 and the Masaryk University almost 1 billion CZK (10.7%). These three universities received more than half (54%) of the total financial resources allocated on public and private university R&D.

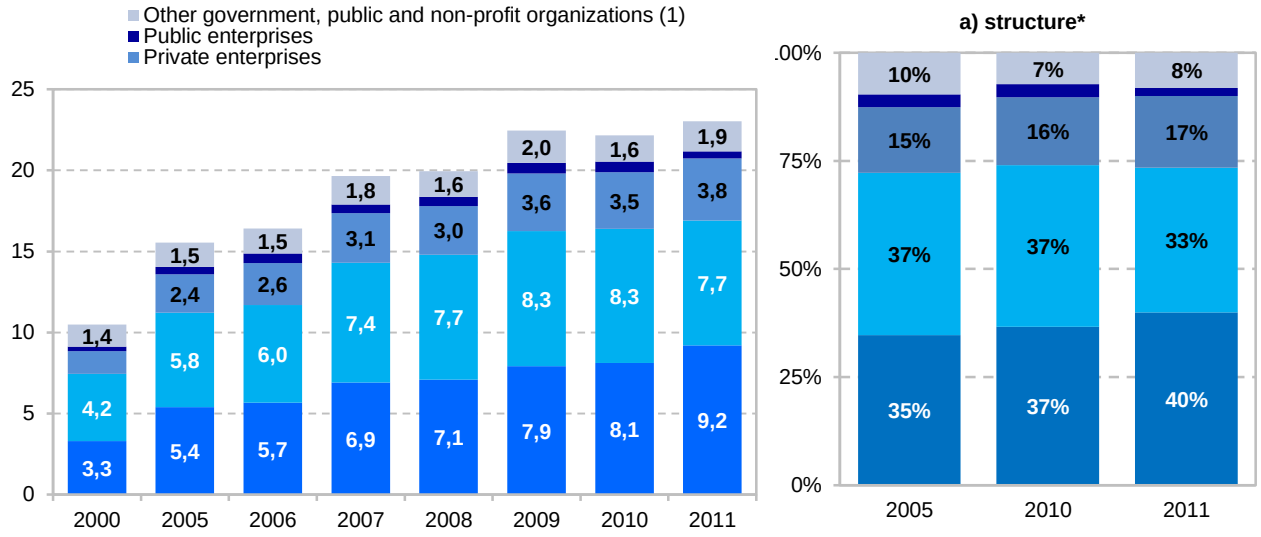
The second largest beneficiaries are the public research institutions, which in 2011 received 7.7 billion CZK (33%) in 2011. The most important within this group are the individual institutes of the AS CR. The most important beneficiary of this support among the AS CR institutes in 2011 was the Institute of Physics ASCR, v. v. i., which received 545 million CZK (8.1%). Other significant beneficiaries were the Microbiology Institute of the ASCR, v.v.i. (298 million CZK, 4.4%),the Institute of Molecular Genetics of the ASCR, v.v.i. (290 million CZK, 4.3%), Biology Centre of the Academy of Sciences of the Czech Republic, v. v. i. (258

million CZK, 4.4%), Institute of Organic Chemistry and Biochemistry AS CR, v.v.i. (254 million CZK, 3.7%) and the Institute of Physiology AS CR, v.v.i. (246 million CZK, 3.6%).[13]

The third largest beneficiaries are the private businesses, which in 2011 received a total of 3.8 billion CZK (17%). Private businesses also receive the largest part of the project funding and together with the universities they form the fastest growing group with 1.6x increase in the state budget funding during the last 6 years.

Within the public support of business sector R&D we can differentiate between the direct and indirect support. Aside from the direct R&D support since 2005 the businesses use also the indirect support by using tax deductible R&D items according to the Act No. 589/1992 Coll., on Income Tax – see chapter A.3.

Chart A.39: State budget expenditures on R&D sorted by main beneficiaries (bn. CZK, %)



*Note: In 2005 1% equalled 155 million CZK, in 2010 222 million CZK and in 2011 230 million CZK. * Doesn't include co-financing from EU projects and other institutional support (especially organizing public tenders and project evaluations and costs related to the operation of the RVV, CGA, CTA and AS CR) (1) Includes mainly faculty hospitals and other public medical facilities, libraries, archives and museums conducting R&D, associations and non-profit organizations etc. Source: CZSO according to the data from the State final account and R&D&I IS*

In 2011 there were ca. 1 200 beneficiaries of this support either as primary or secondary beneficiary. More than 70% went to private businesses and 84% of the beneficiaries received less than 10 million CZK and only 3.3% (40) of them received more than 100 million CZK. In the last three years approximately one third of the project funding went to fundamental research, one half to the applied and industrial research and the rest to experimental development.

Main beneficiaries of the project funding in the recent years were public universities. Their share in project funding increased from 25.8% (1.8 billion CZK) in 2005 to 32.3% (3.4 billion CZK) in 2011. The private businesses are the second largest group with 30.1% share in 2011. In absolute values the private businesses received 3 .2 billion CZK with 80% of that amount (2 914 million CZK) going to the domestic private businesses. In 2005 – 2007 the private businesses were the primary beneficiaries of the project funding. In 2011 the share of public research institutions on project funding increased to 23%; in absolute values this equals 2 748 million CZK with 85.% (2 327 million CZK) going into institutions established by the AS CR.

[13] Not including the amount which individual institutes received from the AS CR budget chapter meant for its infrastructure

The growth of state budget R&D support has been accompanied since 2009 by an increasing number of results registered in the Register or R&D Results, i.e. R&D results achieved with the support of public funding. The number of results increased both in the area of publication output in the form of articles in scientific journals as well as in applied outputs (see chapter C). To evaluate the efficiency of funds spent on R&D from the state budget it is necessary to take into account the characteristics of the achieved results.

A.2 Indirect support of R&D from the state budget

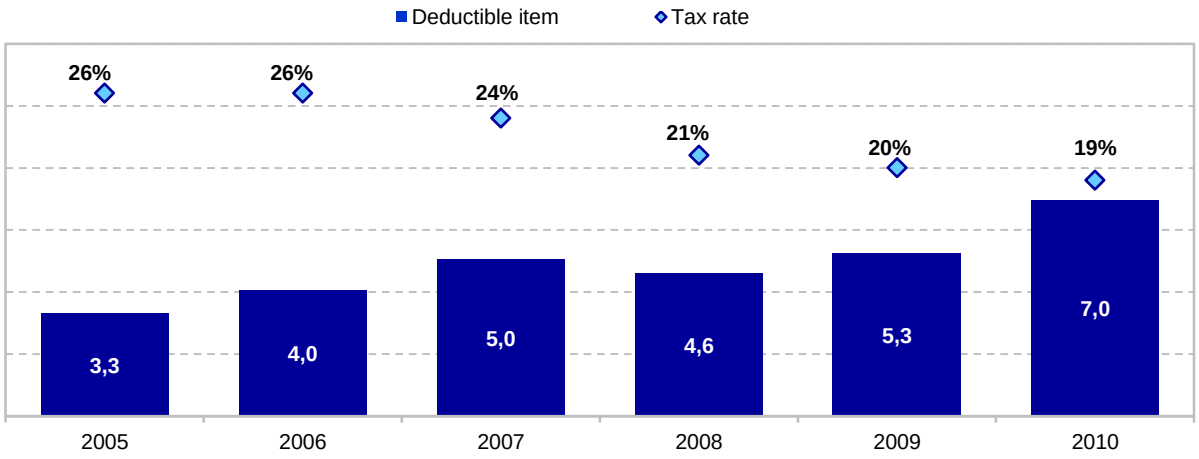
The indirect R&D support is currently becoming a more common tool for stimulating investments into R&D in the business sector in the advanced states. The most common forms of indirect support are various tax deductions and incentives, accelerated amortization of investments, reduction of social security payments, exemption from customs, advantageous credits, support of venture capital and advantageous rental of central and regional infrastructure.

The Czech Republic provides indirect support since 2005 in the form of deductible items from the base income tax, according to § 34 par. 4 and 5 of the Act No. 586/1992 Coll., on Income Tax. According to this provision the tax payers conducting R&D may deduct 100% of R&D expenditures, which they spent on R&D activities during the taxation period, from their base tax.

The data on the indirect R&D support are based on the administrative data provided by the MoF based on the information of individual Financial Authorities. This data includes information about the deductible amounts for R&D, from which it is possible (after multiplying them by the tax rate) to gather information about the reduction of the tax duty for economic subjects (indirect R&D support).

Although the tax rate gradually decreased by 7 percentage points between 2005 and 2010, the tax deductible item for R&D expenditures has increased by an average of 16% a year. A total of 7 bn. CZK for R&D was deducted from the businesses' base tax in 2010.

Chart A.40: R&D tax deductible item and the relevant tax rate in the Czech Republic (bn. CZK; %)

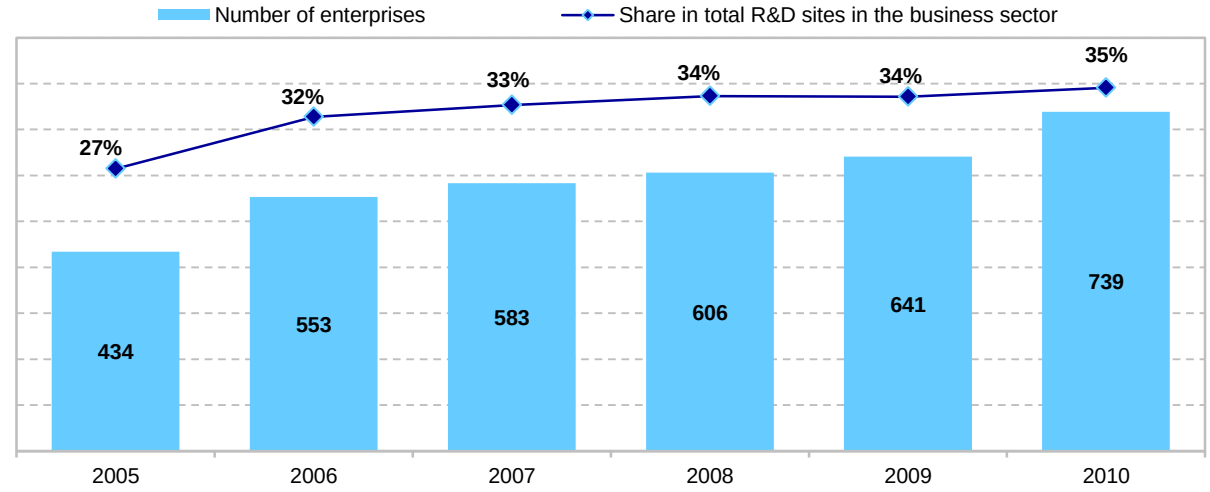


Source: CZSO and MF

In 2010 739 businesses used the tax deductible item for their R&D, which represents 35% of all businesses performing R&D. Compared to 2005, when the institute of indirect support was established, this shows both a relative (by 8 percentage points) and absolute (by 305 businesses) increase in the number of subjects that use this type of tax reduction.

Of the businesses that used their tax deduction for R&D 71% were domestic private businesses, 28% foreign-controlled private businesses and only 1% of public businesses. Regarding the size of the businesses in 2010 almost half of them had less than 50 employees, one third 50-249 employees and one fifth more than 250 employees. Also interesting is the structure of businesses that use their R&D tax deduction regarding the amount of the tax deduction (i.e. indirect R&D support). While ¾ of the businesses (563) received indirect support of up to 1 million CZK in 2010, indirect support of more than 10 million CZK went to only 17 businesses.

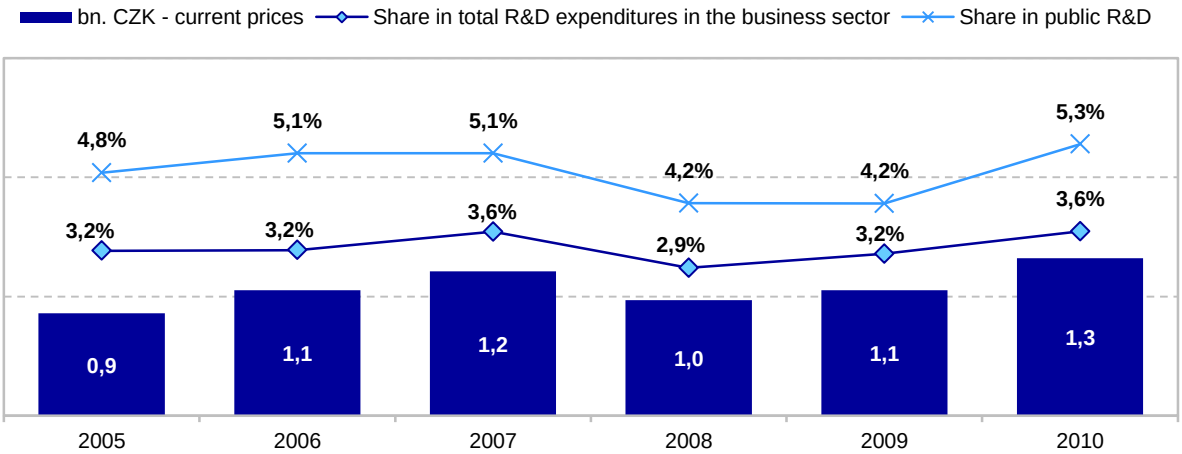
Chart A.41: Number of businesses in the Czech Republic with applied indirect support



Source: CZSO and MF

Between 2005 and 2010 the state indirectly supported the R&D activities of businesses by 6.5 bn. CZK. In 2010 this indirect support was 1.3 bn. CZK, which represented 3.6% of the total R&D expenditures spent in the business sector. In the total volume of direct and indirect support the indirect support had a 3.6% share in 2010. In comparison to previous years the indirect support was larger not only in absolute numbers, but also regarding its share in total public R&D support.

Chart A.42: Indirect public support of R&D in the Czech Republic (bn. CZK, %)

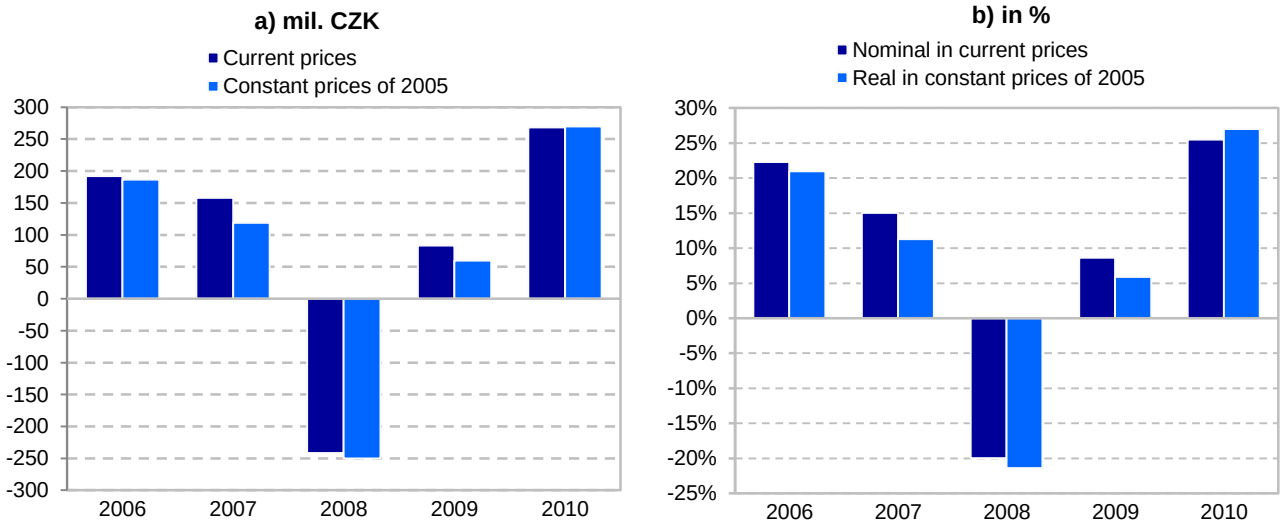


Source: CZSO and MF

Between the years 2005 and 2010 the indirect R&D support increased by an average of 7.7% a year. Despite another decrease of the tax rate the indirect support increased in the last year in current prices by 268 million CZK, which meant a 25.5% nominal increase. In the monitored period the only year when we recorded a year-on-year decrease of indirect support was in 2008 by 1/5. This decrease was caused not

only by the drop of the tax rate by 3 percentage points, but also by the decrease of the deductible item itself by 430 million CZK (i.e. by 8.5% in current prices).

Chart A.43: Year-on-year change of the indirect public R&D support in the Czech Republic

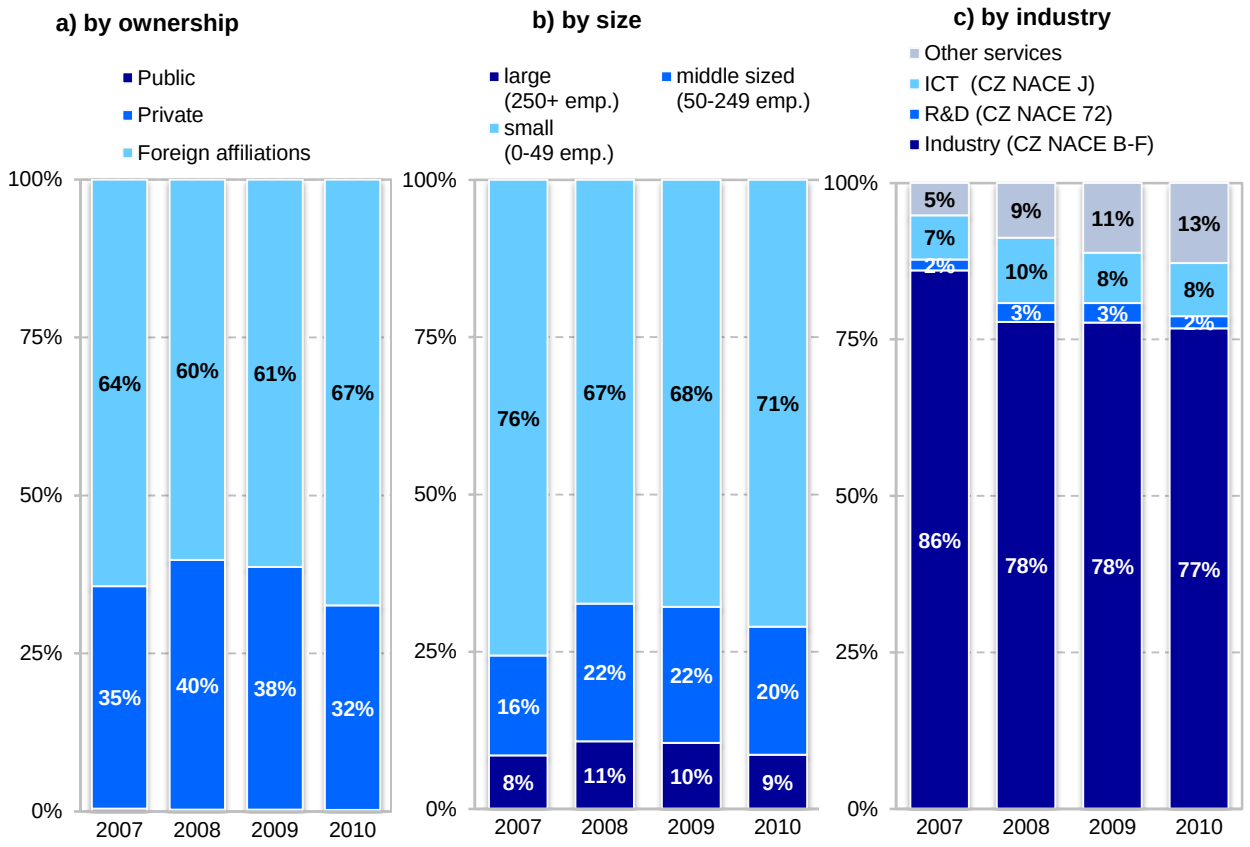


Source: CZSO and MF

The largest part of the indirect R&D support (always more than 60%) had been applied within the whole monitored period by foreign-controlled private businesses. In 2010 the indirect support of these businesses was 890 million CZK, which was more than 2/3 of the total indirect R&D support. Almost the whole remaining part of the indirect R&D support was allocated to domestic private businesses (32%, 427 million CZK). In comparison to the previous years this represented a relative increase of public R&D support of foreign affiliations at the expense of domestic private businesses.

Regarding the size of the businesses the major part of indirect support in 2010 went to businesses with more than 250 employees (71%, 938 million CZK), followed by middle-sized businesses (20%, 269 million CZK) and small businesses (9%, 114 million CZK).

Chart A.44: Structure of indirect public R&D support by ownership, size and industry

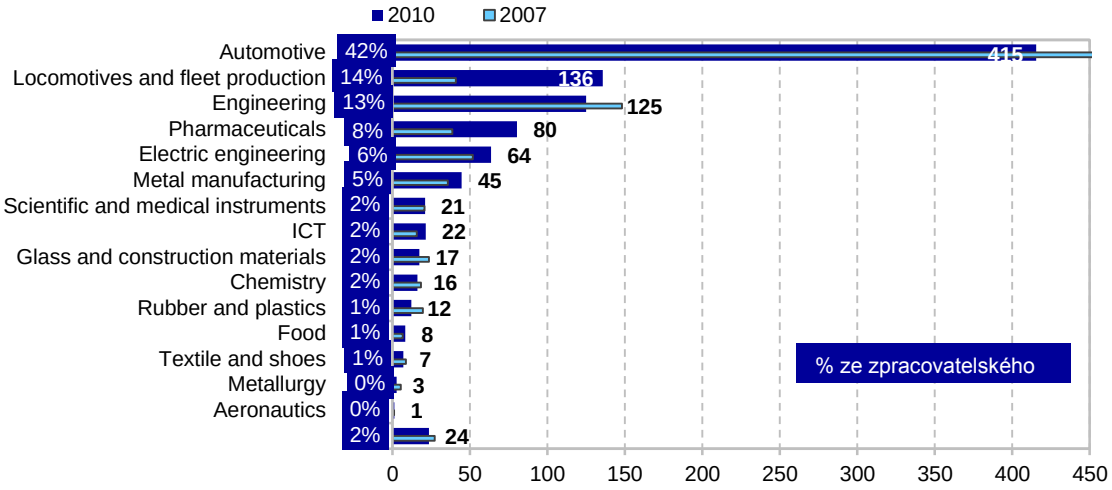


Source: CZSO and MF

It is of no surprise that the largest tax deduction for R&D has been recorded by industrial businesses during the whole period, due to the amount of their R&D expenditure. In 2010 the indirect R&D support in industry was 1014 million CZK (77%) and in services 307 million CZK (23%). In comparison to 2007 there has been a relative increase of the indirect R&D support in the area of services at the expense of industrial branches (by 9 percentage points). In services the indirect support has been applied mostly in the ICT sector (8%, 112 million CZK).

Regarding individual manufacturing industry branches, the largest part of the indirect support has been applied in the automotive industry (415 million CZK, 42%) in 2010. In the second place was the locomotive and fleet production (136 million CZK) and engineering (125 million CZK) with almost the same shares (14% and 13% respectively). When compared to 2007 it is interesting to observe the absolute decrease of the indirect R&D support in the automotive industry, which amounted to 138 million CZK (33.2% in current prices).

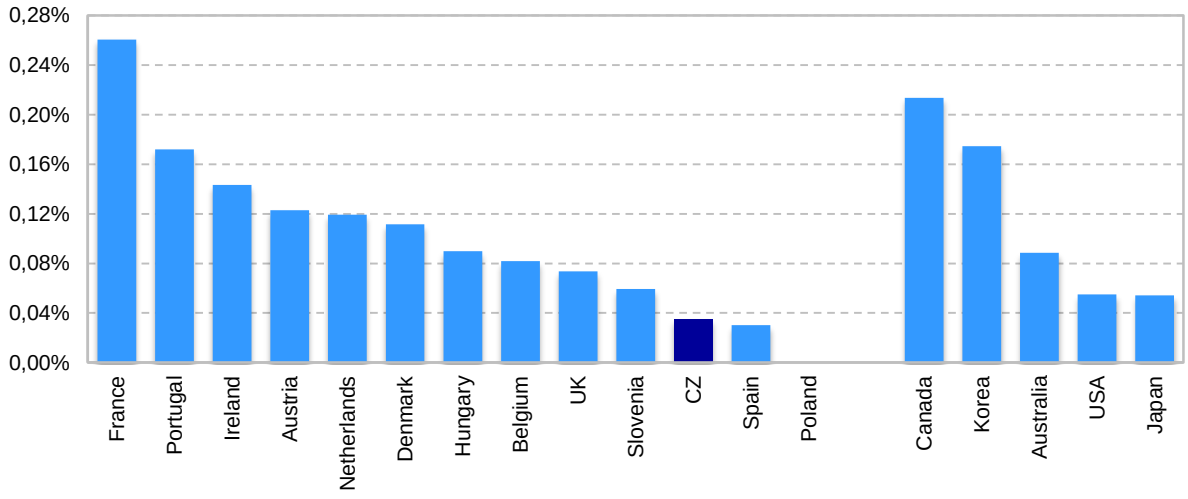
Chart A.45: Indirect R&D support in the manufacturing industry by branches



Source: CZSO and MF

International comparison of the indirect support isn't an easy task, because the indirect support isn't implemented in all states and also the statistical data isn't available for all states. The existing data shows that the indirect support measured as a share in GDP in 2010 was the highest in France (0.26%), Canada (0.21%), Portugal (0.17%) and Korea (0.17%). The Czech Republic with 0.03% GDP belongs to the countries with the lowest relative indirect R&D support. Also interesting is the comparison of direct and indirect R&D support in the business sector, which shows that indirect support is much higher than the direct one in Canada, Portugal, Netherlands, Ireland, Hungary, Denmark, France and Japan.

Chart A.46: Indirect R&D support as % GDP, 2010 or the last available year



Source: OECD

B Human Resources in R&D

The availability of high-quality human resources plays a key part in ensuring economic and technological development. An important part of the economic and technological development, which has a significant influence on an economy's competitiveness, is the creation and transfer of knowledge Providing an adequate human resource base for R&D&I activities doesn't depend only on the labour market but also on education trends. Universities have a crucial role in the creation of adequate human resources.

The aim of this analysis, divided into three main chapters, is to provide information about the number and structure of persons active in R&D, qualified human resources and university students in the Czech Republic and to outline their specifics and main trends in the international context. The contents of the following chapters are summarized in the following lines:

Main trends

- In 2011 there were 82 283 full- or part-time employees in the Czech R&D and this number increased more than 1.5 times since 2001. After converting the number to the full time equivalent (FTE) the number was 55 697 FTE employees in 2011. More than half of these persons are employed in the business sector.
- The most important group of employees are the researchers, without whom there would be no new knowledge. Researchers have varying representation in individual R&D sectors. The lowest number of researchers is among the business sector R&D (47%), in government sector R&D there is 56% of researchers and in the university sector the researchers are the dominant part of the workforce with 70%.
- There is a high percentage of persons with tertiary education among the R&D employees with only 29% having lesser education. The highest rate of tertiary educated persons is among the employees of the university sector R&D, which is naturally due to the primary function of the universities, which are education and science.
- A significant part of R&D employees focuses on technical and natural sciences. These two areas employ 75% of them with the technical sciences representing the larger part. In the business sector R&D the technical sciences are dominant with 72% employees focusing on them. More than half of the employees in the government sector R&D focus on natural sciences and only 9% on technical sciences.
- The number of persons with finished university education in the Czech Republic increases yearly. In 2011 there were almost 1 205 000 persons with such education within the population of 25 and older, which represents 15.5% of this age group. At the start of the monitored period in 200 there were ca. 714 000 persons with completed university education, which represented 10% of the population.
- During time the number of university students has increased with their number almost doubling since 2001 to almost 400 000 students in 2011. However, young people shift from the study of technical sciences and the increase of natural and medical science students isn't significant. On the other hand there has been strong interest in studies of social sciences, trade, law and humanities in the recent years

Chapter **B.1 Employees in R&D** contains basic information about the total number of employees in R&D and their structure according to available characteristics and about the number and structure of the R&D

workers and employees in individual sectors (business, government and university). Apart from the data for the Czech Republic there are basic indicators in international comparison as well.

Chapter B.2 Wages of specialists in science and technology contains information about the average monthly wage of persons in this group of employees. It contains not only total wages, but also wages sorted by gender, age and education. All values are compared to the average gross wage in the Czech Republic.

Chapter **B.3 University Education** contains information about the number and structure of persons with finished university education and also basic information about the university students (development of their number as well as how they are spread among the various disciplines and programs). Focus is on students of natural sciences and technical sciences in all university study programs and especially in doctoral programs. This chapter is put in the international context as well.

B.1 Employees in R&D

The source of data for the A1 chapter is the Annual Statistical Survey on Research and Development (VTR 5-01), which the CZSO sends to all subjects in the Czech Republic who perform R&D. The aim of this survey is to gain detailed data on human and financial resources allocated to R&D activities. The Survey fully respects OECD and EU principles provided in the Frascati manual and the relevant EU Regulation and therefore the results for the Czech Republic are fully internationally comparable. More information about the VTR 5-01 survey is available in the methodological appendix or at http://czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje.

The number of employees in R&D is ascertained by two basic indicators, which are the number of natural persons (HC) and the number of R&D full-time equivalents (FTE):

- The registration count of R&D employees as of 31st December in natural persons (HC) shows the number of persons active in R&D activities, full- or part-time working at monitored subjects as of the end of the given year.
- The converted number of R&D employees (FTE) shows the average count of R&D employees converted to full-time equivalent of R&D activities in the monitored year. One FTE equals one year of work of an employee, who focuses 100% on R&D.

If not stated otherwise, all data in this chapter are in FTE.

Total number of R&D employees

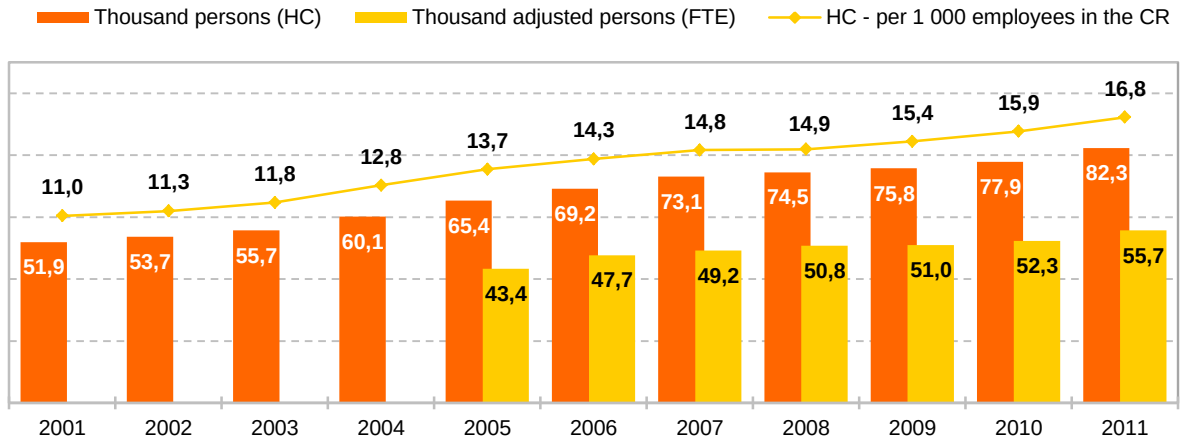
At the end of 2011 there were 82 283 R&D employees (HC) in the Czech Republic, regardless of whether part- or full-time workers. Since 2001, when the number of R&D workers (HC) was almost 52 thousand this number increased by 50%. The ratio of number of R&D workers per 1000 workers increased steadily as well – in 2001 there were 11 R&D workers per 1000 workers, in 2011 this number increased to 16.8 workers.

In the university and partially also in the government sector R&D a large number of persons working in R&D, especially researchers, work on several part-time assignments. Therefore the HC indicator doesn't reflect the real number of persons working in Czech R&D and the HC count is overrated. When adjusted to the full time equivalent of R&D activities (FTE), the number of R&D activities reaches 55 697 persons.

One third of all R&D employees are women, both in the HC and FTE counts.

Regarding the allocation of employees in R&D according to their workplace it is possible to state that Czech R&D is relatively fragmented. Of the total count of 2 720 R&D facilities more than 1 310 (48%) of R&D sites employed less than 5 employees (FTE). 5-9.9 employees were employed at 466 sites (17%). On the other hand the smallest number of R&D workplaces have 50-99 (4%) or more than 100.(5%).

Chart B.1: R&D employees



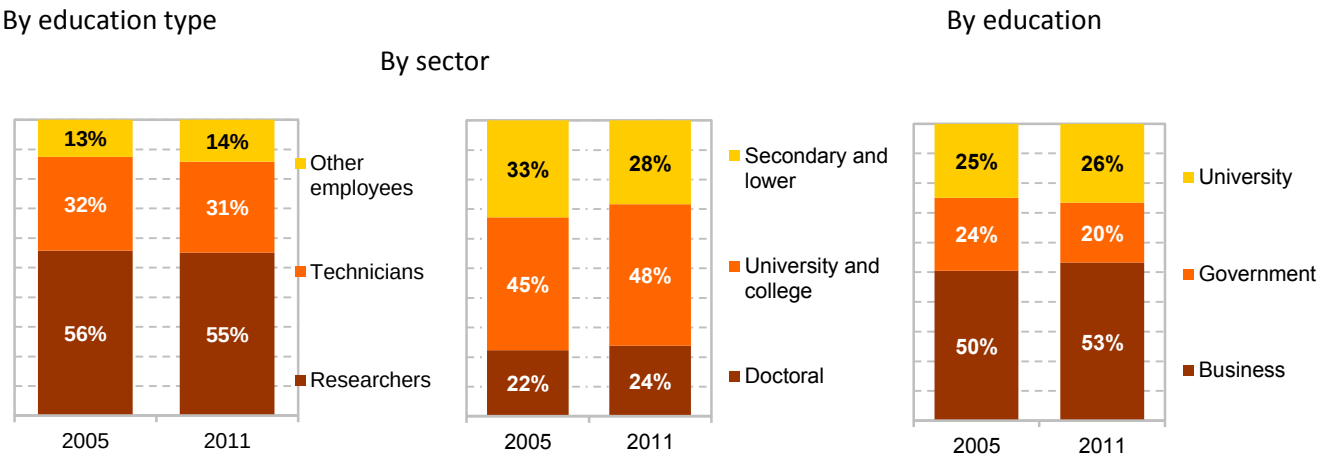
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

In 2011 as well as in the previous years the major part of R&D employees worked in the business sector, namely almost 29 500 persons (FTE) which equals 53% of all R&D employees. Almost 15 000 (26%) worked in the university sector and 11 000 (20%) in the government sector. In comparison to 2005 the number of business sector R&D employees increased from 22 000 to 29 500. The university sector recorded a significant increase as well – from 11 thousand in 2005 to 14 000 in 2010. The government sector more or less stagnated.

As expected, dominant among the R&D employees are researchers. In 2011 they made up almost 30 000 FTE employees, which equals 55%of all R&D employees. Technicians are the second most numerous group with 17 000 (31%) and the remaining 8 000 are other employees.

Since 2005 there is a slight shift in the educational structure of R&D employees with the share of employees with finished tertiary education growing. While in 2005 there was 67% of employees with completed tertiary education, in 2011 their share was 72%. More than 13 000 R&D employees had doctoral education.

Chart B.2: R&D employees structure (FTE)



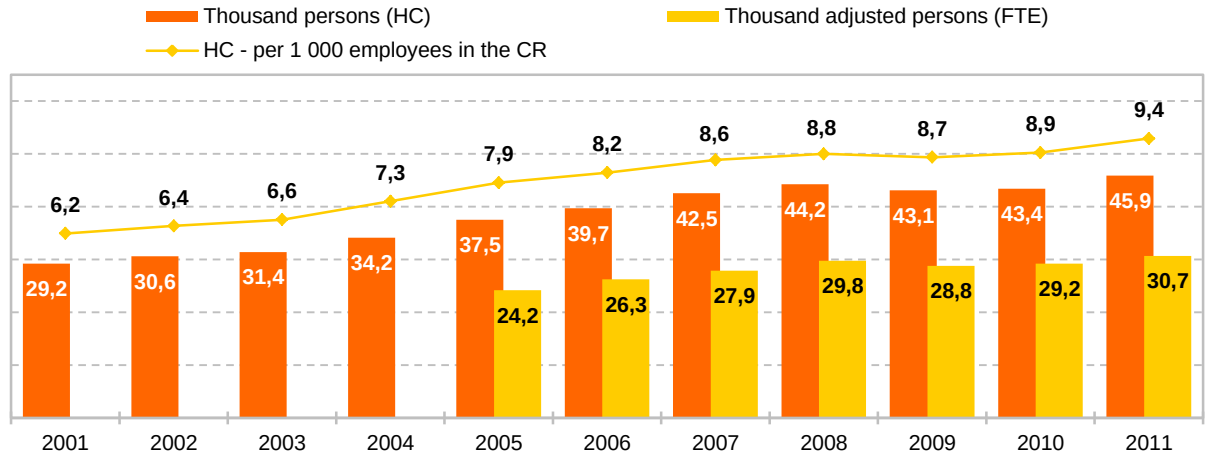
Note: The remaining part to complete 100 % comprises of the non-profit sector, which is not shown due to negligible values
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Research employees

As stated above a significant part - 55% of all R%D employees (FTE) are researchers. In 2011 there were 46 000 researchers (HC), which equals 31 000 (FTE). Their number increased steadily until 2008, between 2008 and 2009 their number decreased mainly due to the fact that AS CR institutes moved some of the researchers to technical staff because of methodological reasons. The number slightly increased again between 2009 and 2010 and since 2010 their number is growing more significantly again.

The data for 2011 also provide information about the number of newly employed researchers. These are not solely brand new persons in R&D, but also persons who changed employer within R&D. In the given year there were 5 105 newly employed persons (HC), therefore we can state that 11% of researchers found new employment in 2011. The largest part of new researchers went to the university sector (46%) followed by the business sector (35%) and government sector (18%).

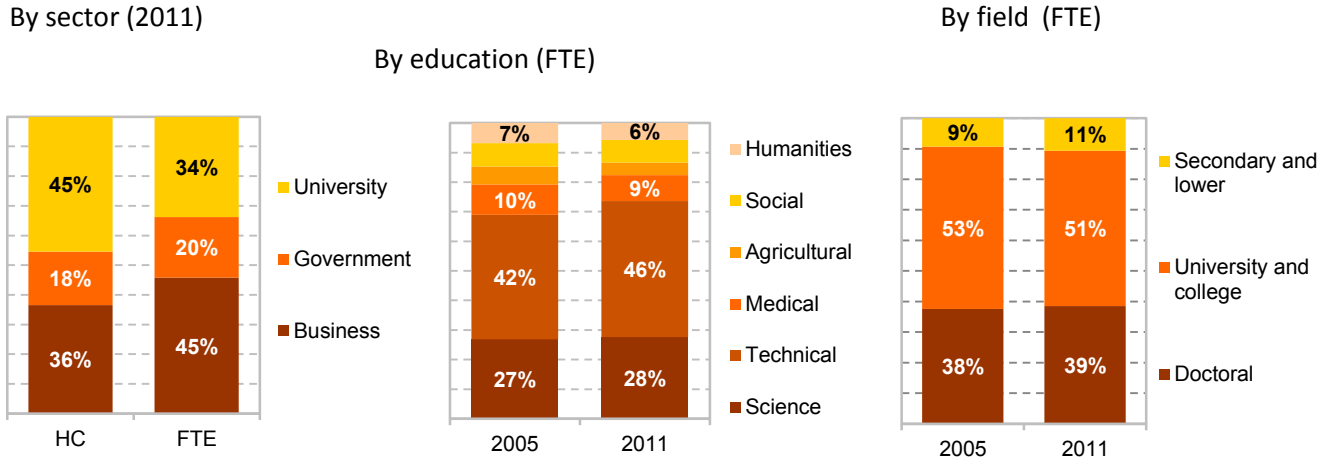
Chart B.3: R&D employees



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

The spread of researchers among individual sectors is very different for each indicator. Therefore we will use both the FTE and HC indicators. In the case of the HC indicator the most researchers were in the university sector (21 000, 45%), followed by the business sector (17 000, 36%) and government sector (8 000, 18 %). As for the FTE indicator the leading sector was the business sector (ca. 14 000, 45%) followed by the university sector (10 289, 34%) and government sector (6235, 20%). It is clear that the university sector uses the most part-time researchers.

Chart B.4: Structure of R&D employees



Note: The remaining part to complete 100 % comprises of the non-profit sector, which is not shown due to negligible values
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

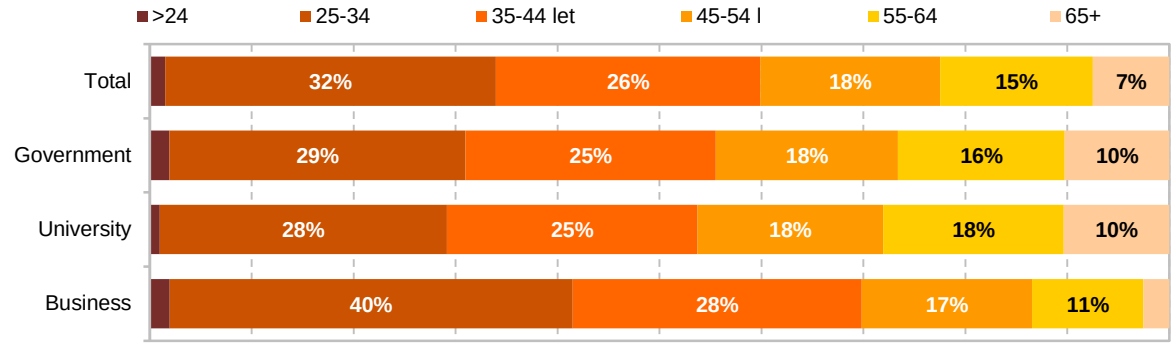
Most of the researchers (70%) are working in technical and natural sciences, 10 % in the medical sciences 8% in humanities, 6% in social sciences and only 5% in agriculture sciences.

Researchers have higher overall education than other R&D workers, more than 90% of them have some type of university education; the share of persons with such education in total number of R&D employees was 72%.

In 2011 there were 3 500 foreign researchers. Dominant among them were Slovak citizens with almost 1 500 of them working in Czech R&D in 2011 (41%). Other notable nationalities are citizens of Ukraine (5%), Russia (4%) and Germany (2%). The remaining 1 700 persons (47% of foreigners) come from various countries.

If we focus on the age structure of researchers, we will see that almost 1/3 of them is in the 25-34 age group, 26% in the 35-44 age group and their representation diminishes with increasing age. The age structure of researchers is completely different in individual sectors; a significant difference is between the public and business sectors. In the government and university sectors there are 29% in the 25-34 age group, 25% in the 35-44 age group and 10% exceeds 65 years. On the contrary the researchers in the business sector are significantly younger. Only 3% of researchers are older than 65 years.

Chart B.5: Structure of R&D employees by sector and age (HC), 2011

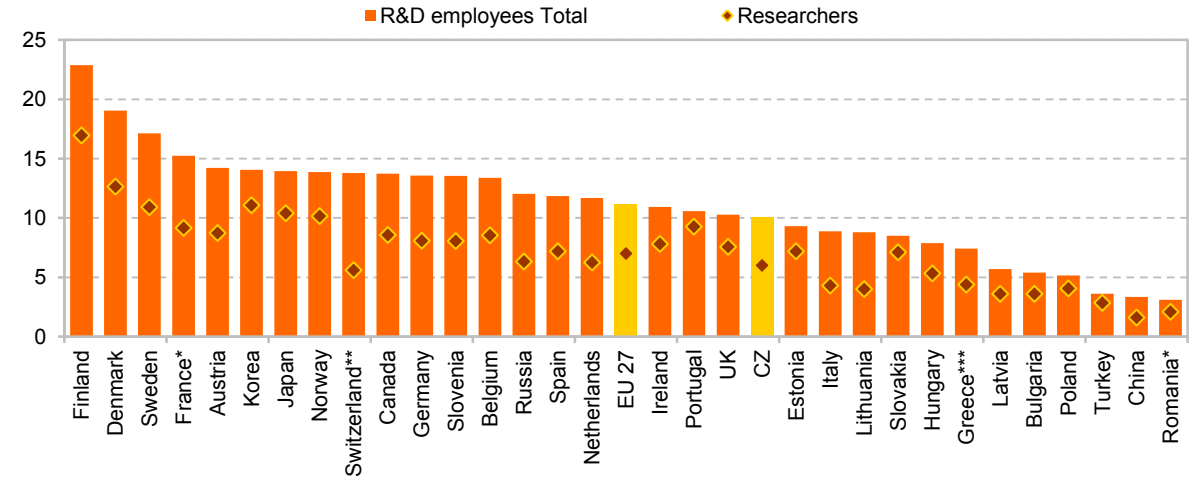


Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

International Comparison

In 2010 the Czech Republic was slightly below EU average (11.1) with almost 10 R&D employees (FTE) per 1000 employees. Similar ratios can be observed in Portugal, United Kingdom, Estonia or Italy. Highest values (over 20) were in Finland and Denmark. Lowest values were in Turkey (3.6), China (3.4) and Romania (3.1). To have an idea about the absolute values of R&D employees, let's add that China employed 2.6 million R&D workers in 2010 and the EU27 with population only one third of China's size employed 2.5 million R&D employees in the same year.

Chart B.6: R&D employees (FTE), 2010 (per 1 000 employees)

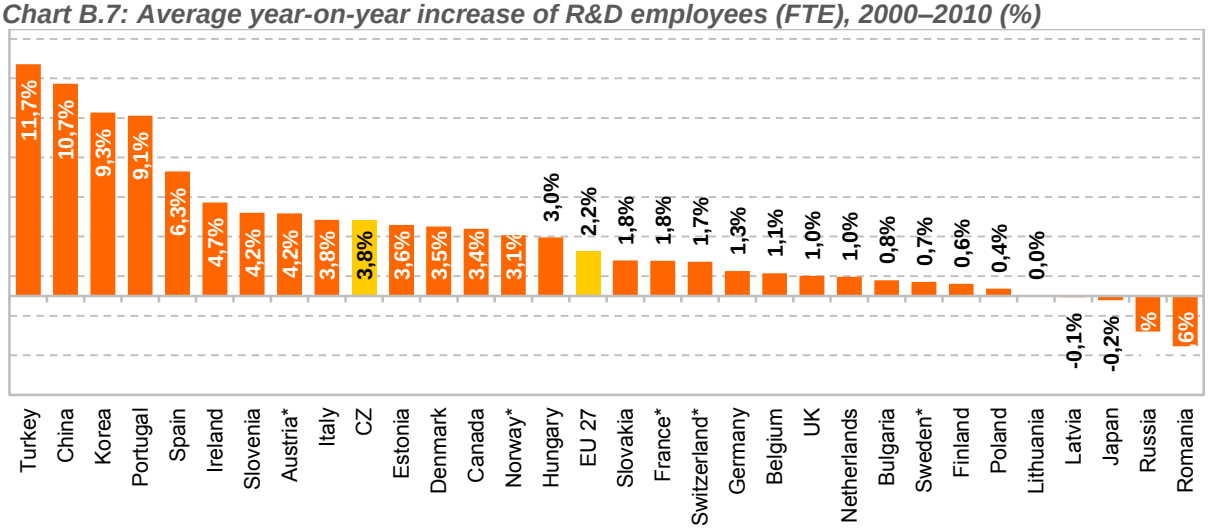


*Note: * data for 2009; ** data for 2008; *** data for 2007*
Source: OECD MSTI 2012/1, Eurostat 2012

The Czech Republic was below EU average in the case of researchers as well. In 2010 there were 6 researchers per 1000 employees (FTE) compared to the EU27 average of 7. Similar values as in the Czech Republic were in Switzerland, Netherlands and Russia. Countries with values over 10 were Norway, Japan, Sweden, Korea, Denmark and Finland, which reached the value of 17. On the other hand the values in Turkey, Romania and China are below 3.

The most significant increase of R&D employees has been recorded in Turkey, China, Portugal and Korea where their number increased by an average of 10% in the period 2000-2010. The average increase in EU27 was 2.2 %. Poland and Lithuania recorded only minimal increases and Latvia, Japan, Romania and Russia recorded an average annual decrease.

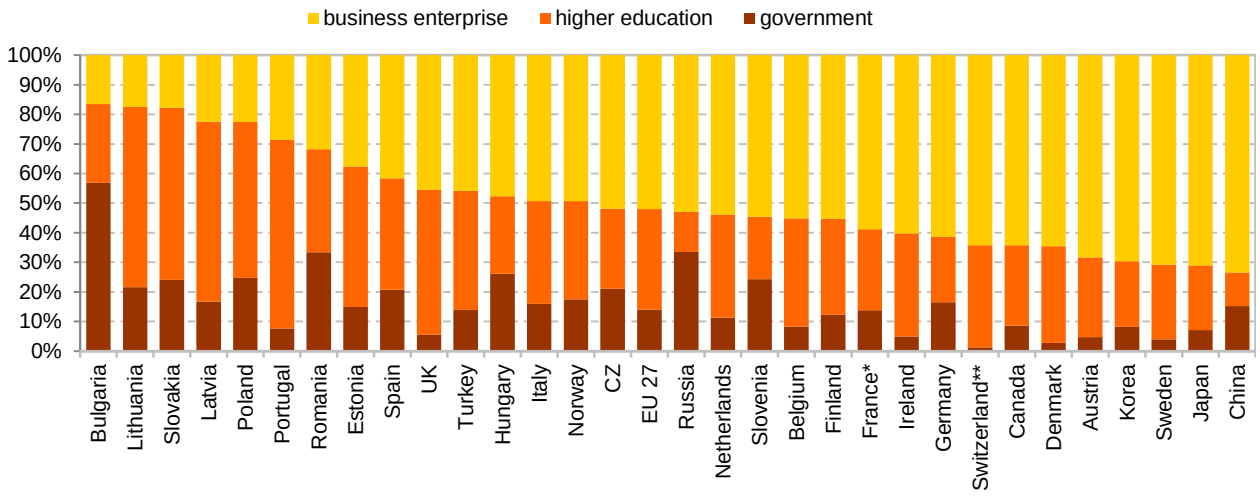
Chart B.7: Average year-on-year increase of R&D employees (FTE), 2000–2010 (%)



Note: in the Czech Republic the annual increase is calculated from the natural person count (HC) due to the change in FTE methodology, which significantly overrates the annual increase in FTE.
Source: OECD MSTI 2012/1, Eurostat 2012

The public sector in Lithuania, Slovakia, Bulgaria, Poland, Latvia, Romania and Portugal employs more than 2/3 of R&D employees, in Bulgaria 57% of those are employed in the government sector. The Czech Republic together with Italy, Norway and Russia belongs to states where the number of R&D employees in the public and private sectors is more or less equal, which is also the case of the EU27 average. On the other hand the private sector is dominant in Austria, Sweden, Japan, China and Korea with 70% of all R&D employees.

Chart B.8: R&D employees by sector of activity, 2010



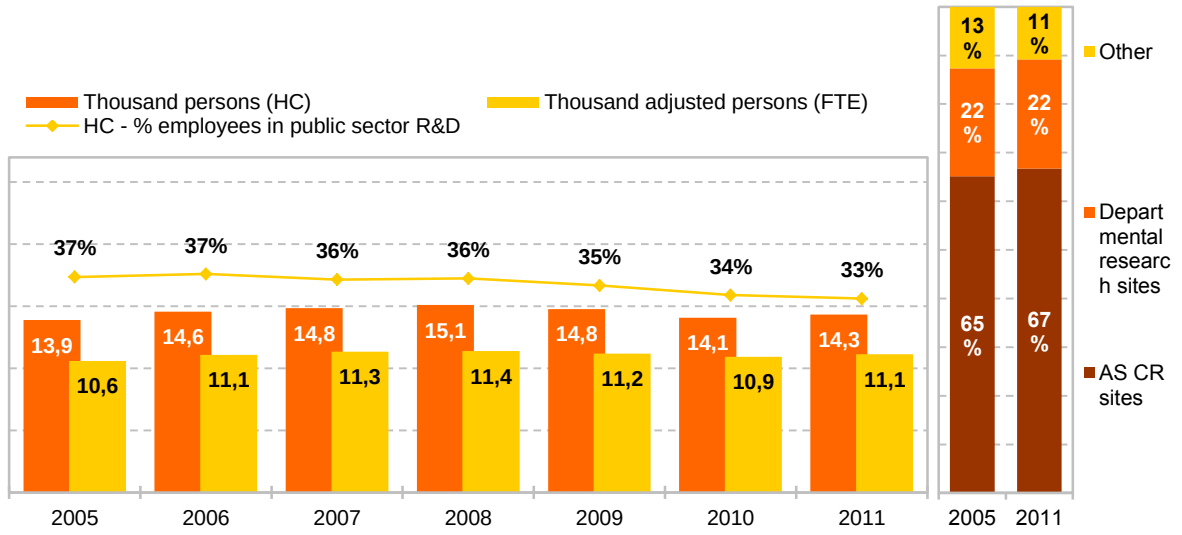
*Note: * data for 2009; ** data for 2008*
Source: OECD MSTI 2012/1, Eurostat 2012

R&D employees in the government sector

Between 2001 and 2005 the number of R&D employees in the government sector was ca. 13 500 persons (HC). Since 2005 there had been a slight increase which stopped in 2008 at 15 100. Since then the number is decreasing. In the last monitored year (2011) the number was 14 300 (HC). Within the public sector there has been a steady decrease in the share of government sector employees from 44% in 2001 to 33% in 2011. When converted to FTE the number drops to 11 000. On the contrary the number of R&D employees in the university sector increased both in absolute and relative values (see chapter B.1.3).

The development of the number of R&D employees copies the development of R&D expenditures in this sector – stagnation since 2007 with a small change in 2009 and a slight recovery between 2010 and 2011 (see chapter A.1.4).

Chart B.9: Government sector R&D employees



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

As has already been mentioned, the majority of R&D workers are researchers and the government sector is no exception. In 2011 it employed 6 000 researchers, who had a 56% share in the total number of employees. 2 500 FTE people were employed as technicians (23%) and 2 000 as other employees (21%).

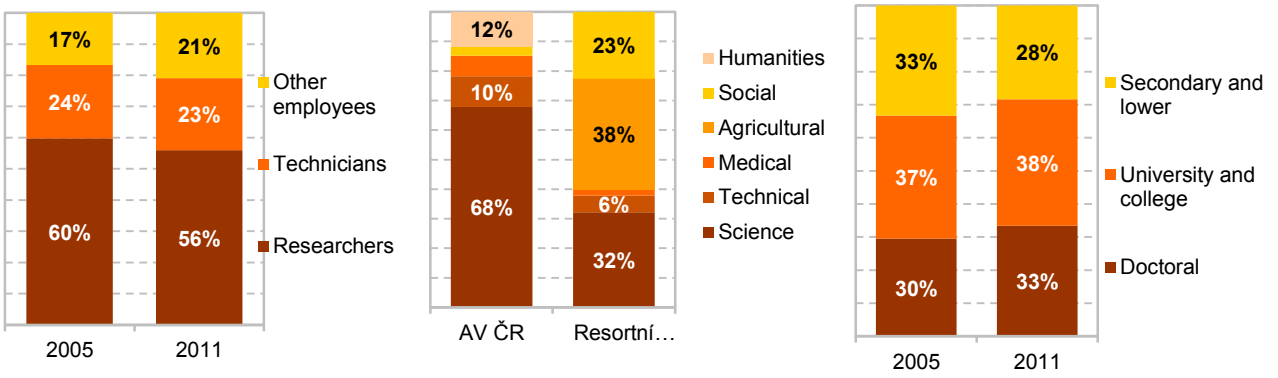
During the whole period more than half of all R&D employees in the government sector were employed in the AS CR institutes, in 2011 this was already 2/3 (7 400) of all sector R&D FTE employees, 2 500 (22%) employees worked in the departmental research sites and 1 200 (11%) in other government sector sites.

Chart B.10: Structure of employees in the government sector R&D (FTE)

By employment type

By education type

By field



Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

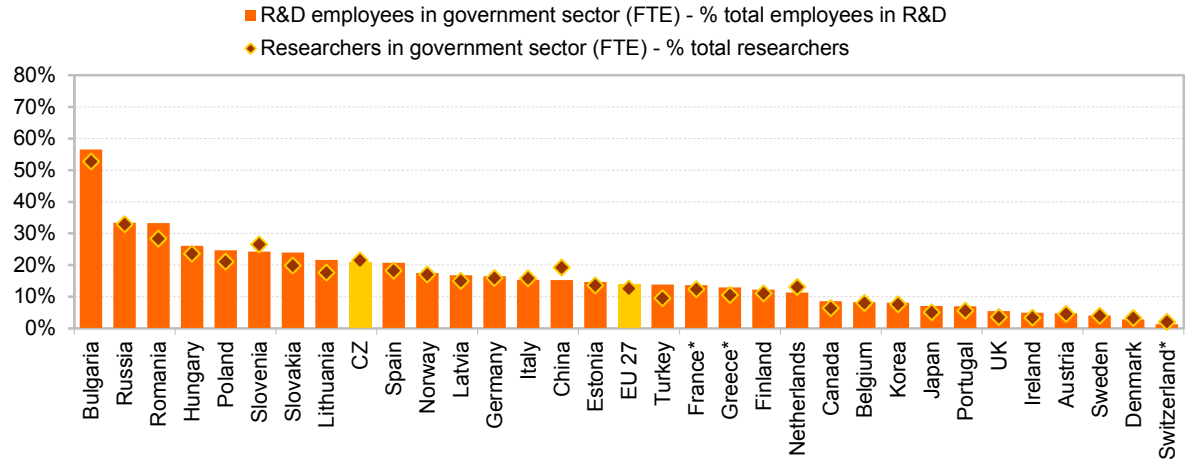
In 2011 most of the government sector R&D employees worked in natural sciences (54%, more than 6 000 FTE employees), 9 % worked in technical sciences and 14% in humanities. A total of 2 500 employees worked in medical, agricultural and social sciences. If we focus on individual types of research sites, we'll see that they vary greatly in their scientific focus. In the AS CR institutes the natural sciences dominate with 68% employees (5 000), followed by humanities (12%) and technical sciences (10%). On the other hand in the departmental research sites agricultural sciences are the dominant field of study (38%, ca. 950 employees), followed by natural sciences (32%) and social sciences (23%). Unlike in the AS CR the departmental research doesn't focus on humanities.

In the government sector R&D the majority of employees have some kind of tertiary level education. In 2011 there were 72% (8 000) of such persons; 3 700 had doctoral education, 4 300 college or higher education.

International comparison

The highest share of government sector R&D employees in total R&D employees among the monitored countries in 2010 was in Bulgaria with more than 50%. High values were reached in Russia and Romania, but the ratio was just above 30%. It can be stated that the post-communist countries in general have a high share of government sector R&D employees. The EU average is 14%; low values were recorded in Austria (5%), Sweden (4%), Denmark (4%) and Switzerland (1%).

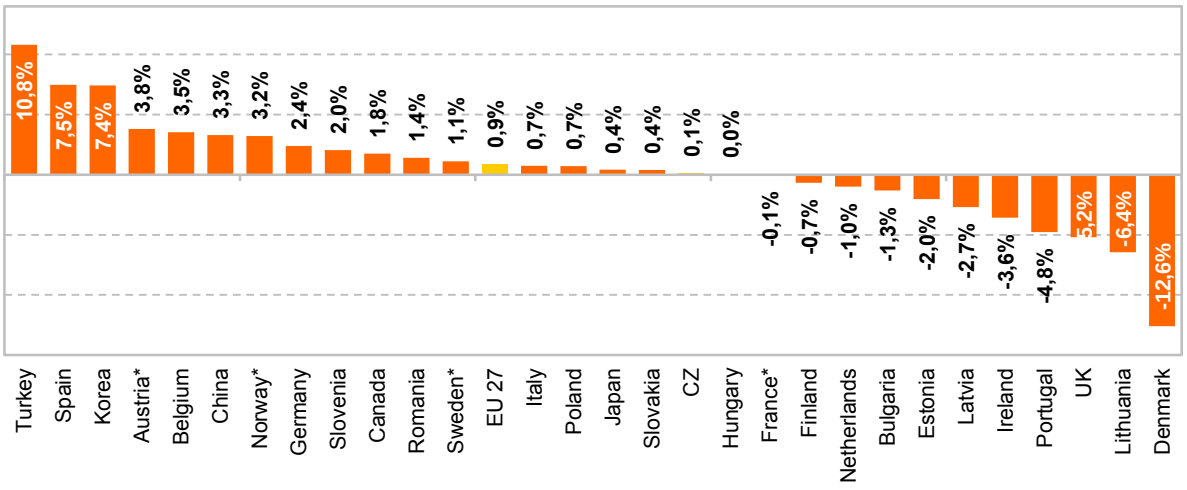
Chart B.11: Government sector R&D employees (FTE), 2010



*Note: * data for 2009; ** data for 2008; *** data for 2007*
Source: OECD MSTI 2012/1, Eurostat 2012

The highest increase between 2000 and 2010 was recorded in Turkey, Spain and Korea. In the Czech Republic the amount of government sector R&D employees increased in average by 0.1 % a year, i.e. slightly slower than in EU27 (0.9 %). In many of the EU countries there had been a decrease in this amount; the number of government sector R&D employees decreased the most in Denmark with an annual average of 12.6 %.

Chart B.12: Average year-on-year increase of employees in government sector R&D (FTE), 2000–2010 (%)



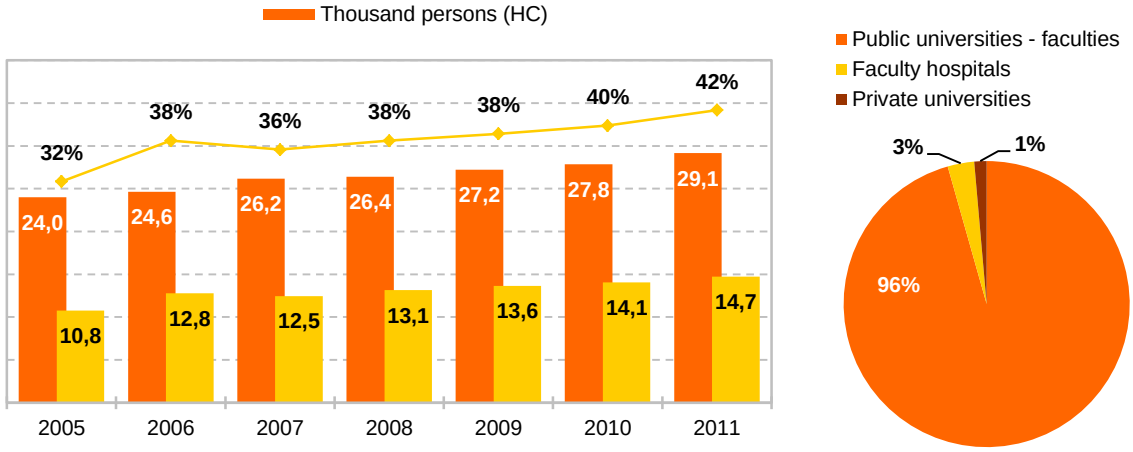
Note: in the Czech Republic the annual increase is calculated from the natural person count (HC) due to the change in FTE methodology, which significantly overrates the annual increase in FTE.
Source: OECD MSTI 2012/1, Eurostat 2012

Employees in the university sector R&D

In 2011 there were almost 29 000 R&D employees (HC) in the university sector, which represents a large increase since 2001 (by more than 10 000 persons). After the conversion to FTE the number drops to a half. In comparison to other sectors the university sector has the most part-time workers. These are mostly employees, who also perform pedagogical activities. In 2010 the university sector had 15 000 employees

(FTE), i.e. 42% of all employees in this sector. As stated above the number of male and female employees is almost equal, as for university R&D employees the share of women is 39%.

Chart B.13: Employees in the university sector R&D

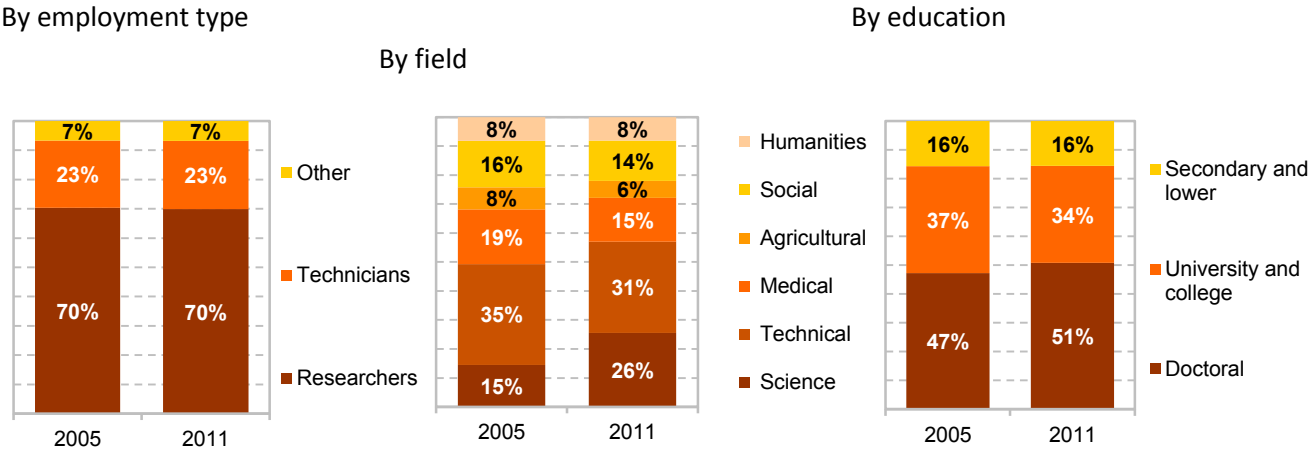


Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

In 2010 the university sector R&D employees comprised of 70% researchers (10 000 FTE), 23 % technicians (3 500) and 7% other employees (1 000). The category structure of R&D employees in the university sector doesn't change in a significant way.

Unlike the government sector, where more than half of the R&D employees focus on natural science research, the employees in university R&D are more evenly spread across all disciplines. Also the natural sciences don't dominate here as in the government sector. Most people are employed in technical sciences (31%, 4 600 FTE), followed by natural sciences (both 26%, 3 800), and medical sciences (15%, 2 200). However there is a shift in the structure of R&D employees by scientific fields, where the number of employees in natural sciences significantly grows at the expense of other areas (mainly technical sciences). The weakening of technical sciences in public research is an important trend, with both relative and absolute decrease in the number of R&D employees in technical sciences in the public sector.

Chart B.14: Structure of employees in the university sector R&D (FTE)



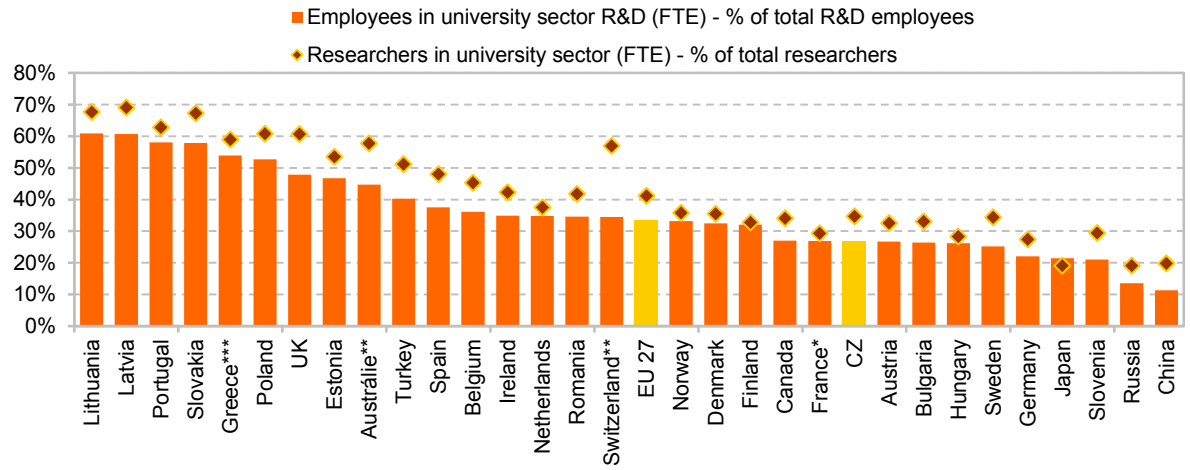
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Employees in the university R&D reach a higher average education level than in other sectors. In 2011 84% of the R&D employees in the university sector had some form of university education; more than half (51%) had doctoral education and 34% either master or bachelor education.

International comparison

Latvia, Lithuania, Portugal and Slovakia had the highest share of university sector R&D employees in all R&D employees with values around 60%. The EU27 average was 33%, the lowest values were in Slovenia (21%), Russia (13%) and China (11%).

Chart B.15: R&D employees in the university sector (FTE), 2010

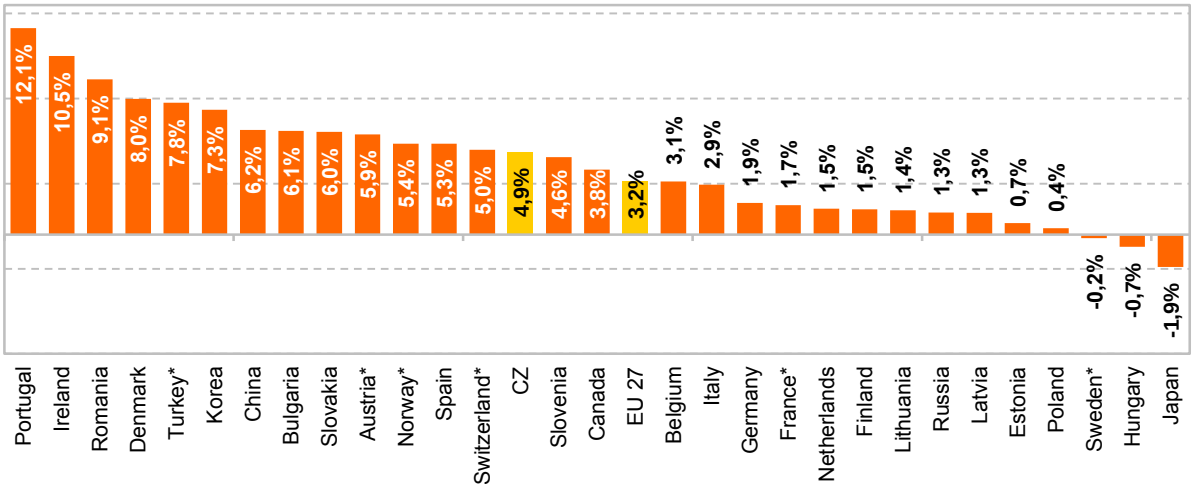


*Note: * data for 2009; ** data for 2008; *** data for 2007*
Source: OECD MSTI 2012/1, Eurostat 2012

In Switzerland there were 35% of R&D employees in the university sector in the last available year. If we focus on researchers we'll see that in their case the university sector has a large share, namely 57%. Similar situation is in most of the monitored countries, i.e. there is larger share of university employees among researchers than among all R&D employees. The EU27 average is 41%, the value in the Czech Republic is 35%.

With the exception of Japan, Hungary and Sweden the number of R&D employees in the university sector increased between 2000 and 2010. Highest values were recorded in Portugal, Ireland and Romania. The EU average increase was 3.2% a year.

Chart B.16: Average year-on-year growth of employees in the university sector R&D (FTE),2000–2010 (%)



Note: in the Czech Republic the annual increase is calculated from the natural person count (HC) due to the change in FTE methodology, which significantly overrates the annual increase in FTE.
Source: OECD MSTI 2012/1, Eurostat 2012

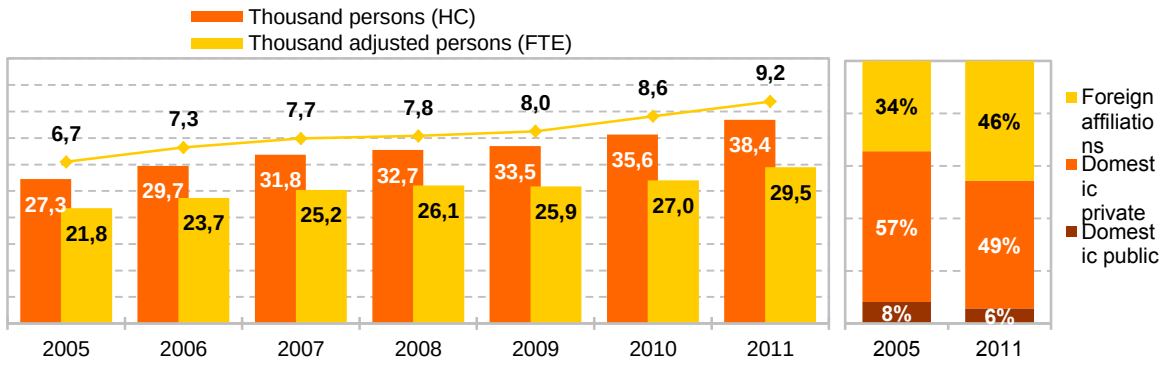
R&D employees in the business sector

In 2011 there were more than 38 000 natural persons (HC) employed in the business sector R&D; this number increased by 18 000 since 2001. After conversion to the FTE indicator the number is 29 500 (FTE). In the same year there were 9.2 R&D workers per 1000 employees (HC) in the business sector; in 2001 this number was only 5.3. Unlike the previous two sectors, the business sector has only a small share of women (19%) which is a trend that has been observed in the past as well.

The structure of the business sector R&D employees is completely different to the previous two sectors; in 2010 there were 47% researchers, 37% technicians and 15% other employees.

Unlike the previous two sectors the business sector has only 65% R&D employees with university education and only 7% of employees with doctoral education.

Chart B.17: R&D employees in the business sector

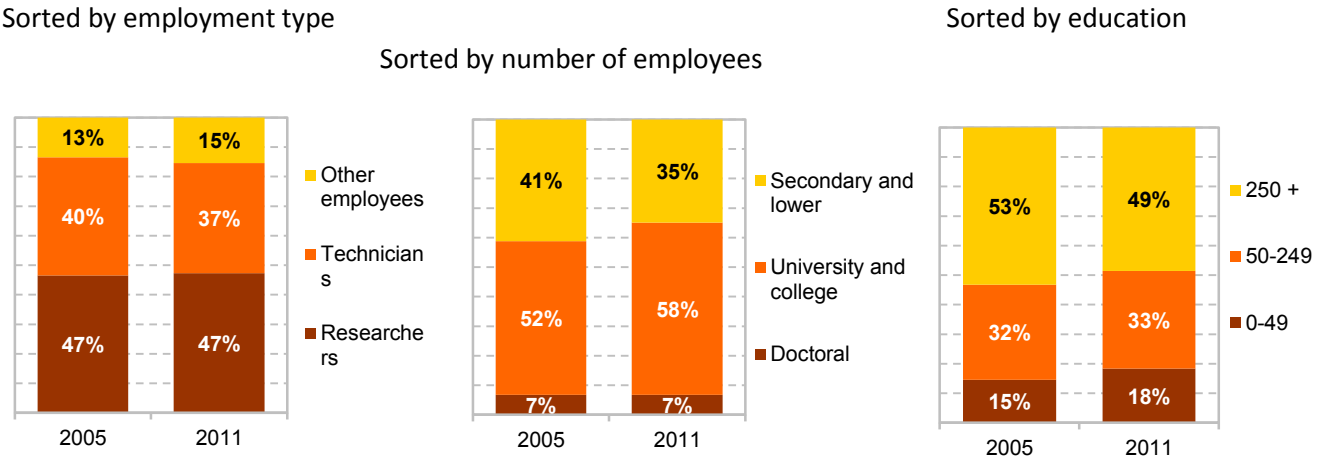


Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

Almost half of the business sector R&D employees worked in companies with more than 250 employees (14 500, 49%), 33% were employed in companies with 50 -249 employees and 18% in companies with 10-49 employees.

In 2011 there were more than 14 300 such persons and their share in all FTE R&D employees was 49%. In this year 13 400 R&D employees (46%) worked in the foreign affiliations and the remaining 1 700 in domestic public businesses. Since 2005 there has been a significant absolute increase of the number of employees in R&D in foreign-owned companies, which was reflected in the change of R&D employees' structure by ownership of companies, which employ them. While in 2005 there were 34% of employees in foreign affiliations, by 2011 this share increased to 49%.

Chart B 18: Structure of R&D employees in the business sector (FTE)



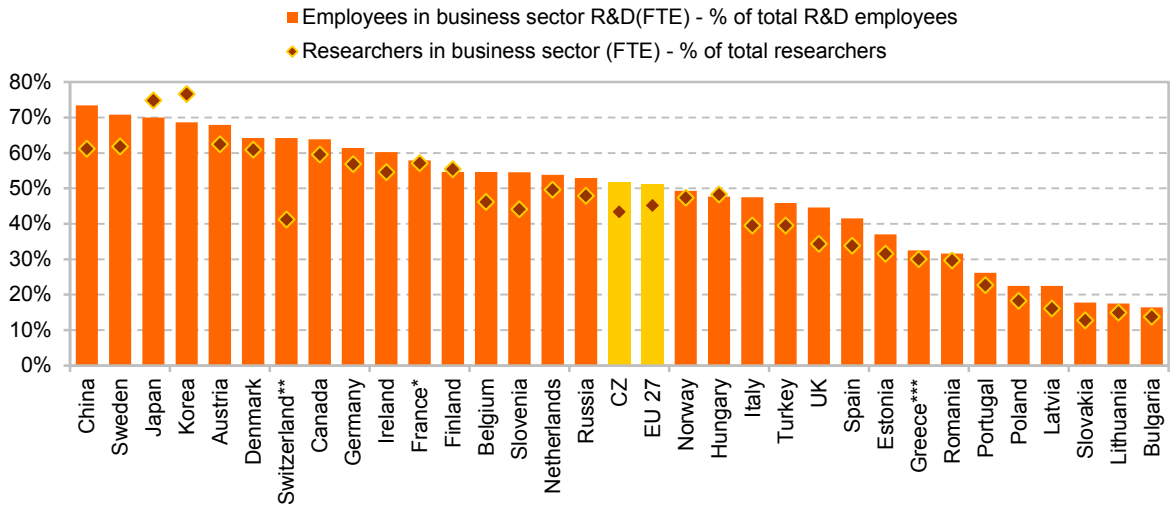
Source: CZSO 2012 Annual Statistical Survey on Research and Development VTR 5-01

As for the economic activities in 2011 the major part of R&D employees worked in the manufacturing industry (16 000, 54%), primarily in automotive (3 300, 11%) and engineering (3 000, 10%). Almost 13 000 employees worked in the services, 4 800 of them in R&D.

International comparison

In 2010 the highest share of business sector R&D employees in all R&D employees was recorded in Sweden, China and Korea with values over 70%. The value in the Czech Republic (50%) was almost the same as in Norway or the EU27 average. Very low values of less than 20% have been recorded in Slovakia, Lithuania and Bulgaria.

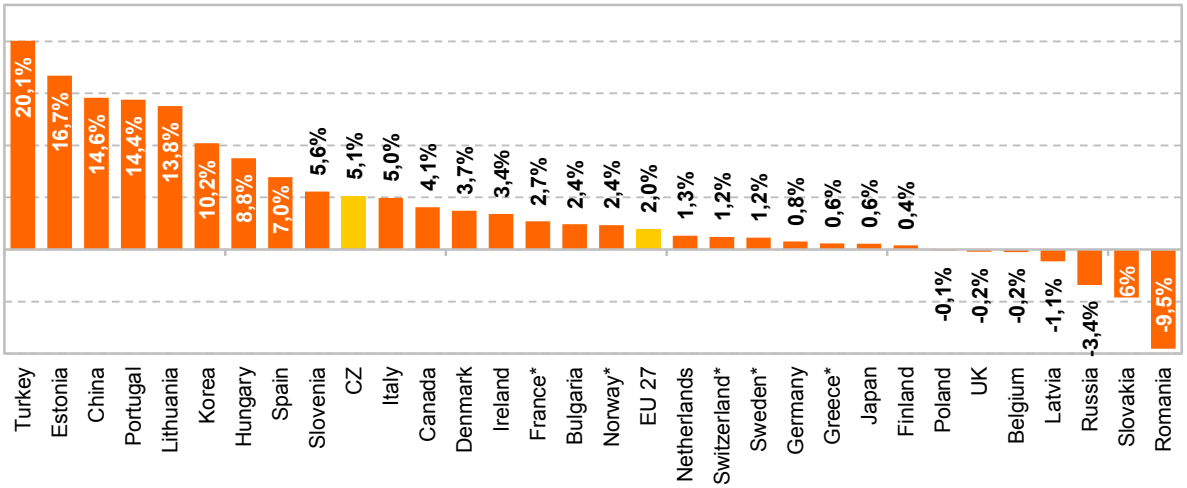
Chart B.19: R&D employees in the business sector (FTE), 2010



Note: data for 2009; ** data for 2008; *** data for 2007*
Source: OECD MSTI 2012/1, Eurostat 2012

The number of R&D employees in the business sector grew the sharpest in Turkey and Estonia, with an average annual growth above 16% between 2000 and 2010. The number of business sector R&D employees also grew significantly in China, Portugal, Lithuania and Korea. The EU27 average number of employees in the business sector R&D grew by 2% a year. On the other hand Latvia, Russia, Slovakia and Romania recorded a decrease in the number of employees in the business sector R&D.

Chart B 20: Average annual increase in the number of R&D employees in the business sector (FTE), 2000-2010(%)



Note: in the Czech Republic the annual increase is calculated from the natural person count (HC) due to the change in FTE methodology, which significantly overrates the annual increase in FTE.
Source: OECD MSTI 2012/1, Eurostat 2012

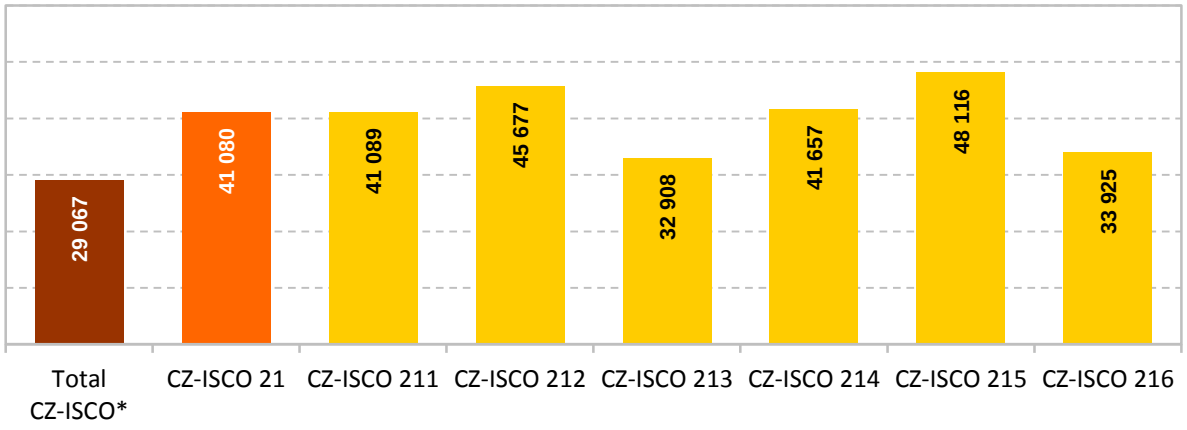
B. 2 Wages of specialists in science and technology

Data for this chapter come from the results of the structural statistics of the income of employees, which is published by the CZSO in cooperation with Ministry of Labour and Social Affairs. More information at: http://www.czso.cz/csu/redakce.nsf/i/lidske_Sourcee_ve_vede_a_technologiich.

In case of R&D employees it is possible to expect above-average wages due to their higher overall qualification, Information about wages of R&D employees isn't available from any statistics; however we know the distribution of wages according to the individual employment groups (CZ-ISCO). The closest to the definition of a scientist is the category Specialists in science and technology (CZ-ISCO 21). Persons in this category had an average gross monthly wage of 41 080 CZK in 2011, which in comparison th the average gross monthly wage in the Czech Republic, which is slightly above 29 000 CZK, represents 141% of the average Czech wage.

Specialists in science and technology consist of many different professions and wage levels. On one side are Specialists in electric engineering, electronics and electronic communication with an average gross monthly wage of 48 000 CZK and on the other there are Specialists in biology and related fields, who earn less than 33 000 CZK.

Chart B.17: Average monthly wage in the Czech Republic (CZK), 2011

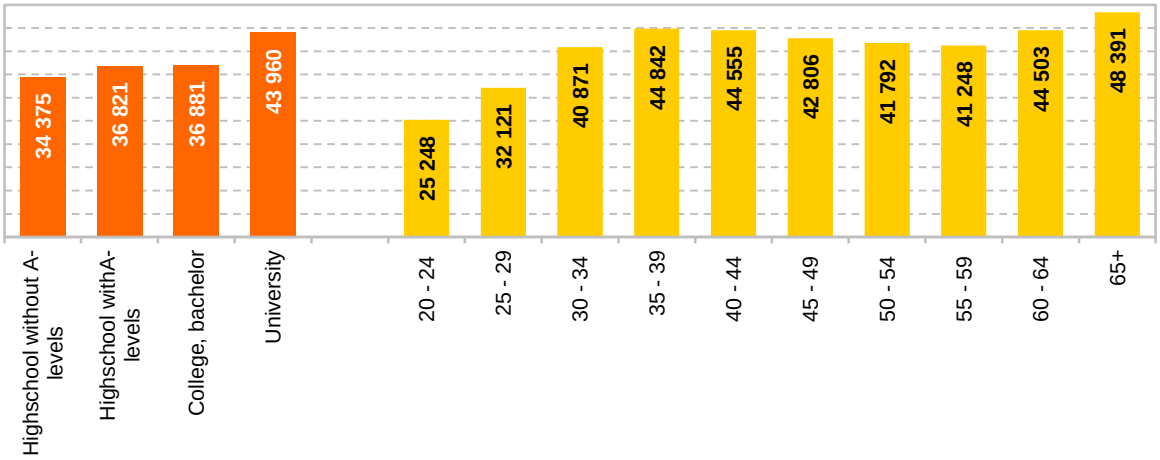


*Note: CZ-ISCO 21 – Specialist in science and technology, CZ- ISCO 211 Specialists in physics, chemistry and related fields; CZ-ISCO 212 – Specialist in mathematics, statistics and insurance mathematics; CZ-ISCO 213 – Specialists in biology in related fields; CZ-ISCO 214 – Specialists in manufacturing, construction and related fields; CZ-ISCO 215 – Specialists in electric engineering, electronics and electronic communication; CZ-ISCO 216 – Architects, specialists in urban planning, designers and related fields. * Average gross monthly wage in the Czech Republic in this analysis differs slightly from average gross monthly wage published in other documents due to the use of analytical (not completed) data relevant to the survey sample (ca. 1.7 million persons)*
Source: Structural income statistics 2011

The distribution of the wages among age groups copies the distribution of total wages in the Czech Republic. This means that wages don't increase proportionally to age, but achieve their maximum at 35-39 years and then they decrease. In general the youngest employees have the lowest wages, followed by a sharp increase with the peak between 35-39 years. The average gross monthly wage in this age group reaches almost 45 000 CZK. The average wage the increases again after the 60th year of age and exceeds 48 000 CZK for persons older than 65. This is probably due to the fact that employees in higher, better paid positions stay longer employed (postpone their retirement).

It is of no surprise that the wages of scientists and engineers increase with the higher education level. This is true for all jobs so the specialists in science and technology aren't an exception. There is only a several hundred CZK difference between the wages of high-school educated specialists and bachelor degree educated specialists (36 800 CZK and 36 900 CZK). The wages grow significantly in case of R&D specialists with university education with an average wage of almost 44 000 CZK.

Chart B.18: Average gross monthly wage of specialists in science and technology sorted by education and age (CZK), 2011



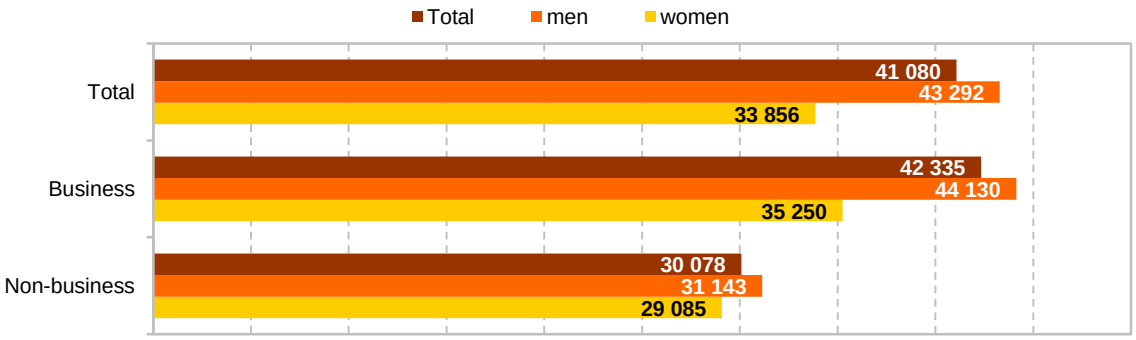
Source: Structural income statistics 2011

There are differences in average wages of men and women as is the case of total average wages in the Czech Republic. In 2011 the average wage of men in these positions exceeded 43 000 CZK and wages of women were less than 34 000 CZK. The average wage of female specialists in science and technology is therefore 78% of the male wages. The difference in total Czech wages is slightly higher with the average wage of women being 73% of the average wage of men.

The wages also vary significantly depending on whether the specialist is employed in the private or public sector. It is of no surprise that the wages in the business sector are significantly higher than in the public sector. The wage difference in 2011 was more than 12 000 CZK, which could also be interpreted as that the specialist in public sector had 71% of the wage of the specialist in the business sector.

In case of those two mentioned spheres there is also a difference between the average wages of men and women. In the public sector female R&D specialists earn 93% of the men's' wages, in the business sector it is only 80%. These differences are caused by table wages in the public sector, which make it impossible to differentiate between men and women in a more significant manner.

Chart B.19: Average gross monthly wage of specialists in the field of science and technology by sphere of activity and gender



Source: Structural income statistics 2011

B.3 University education

The source of the data regarding persons with finished university education is the Human Resources Survey and the basic unit are individuals and households. Data are presented as annual averages and if their value is below 3 000 persons, they are considered to be data with low reliability.

Data for university students and graduates have been taken from the data sources of the MoEYS, namely from the SIMS database (Aggregated Information from Student Matrices). Inclusion into a study programme is made with the use of the programme's code, which in some cases doesn't reflect the fact that some programmes belong to main programme groups. Due to the problematic classification of students into appropriate programme groups qualified estimates are provided in the classification by programmes (MoEYS).

Detailed information (data, definitions, methodology) can be found at

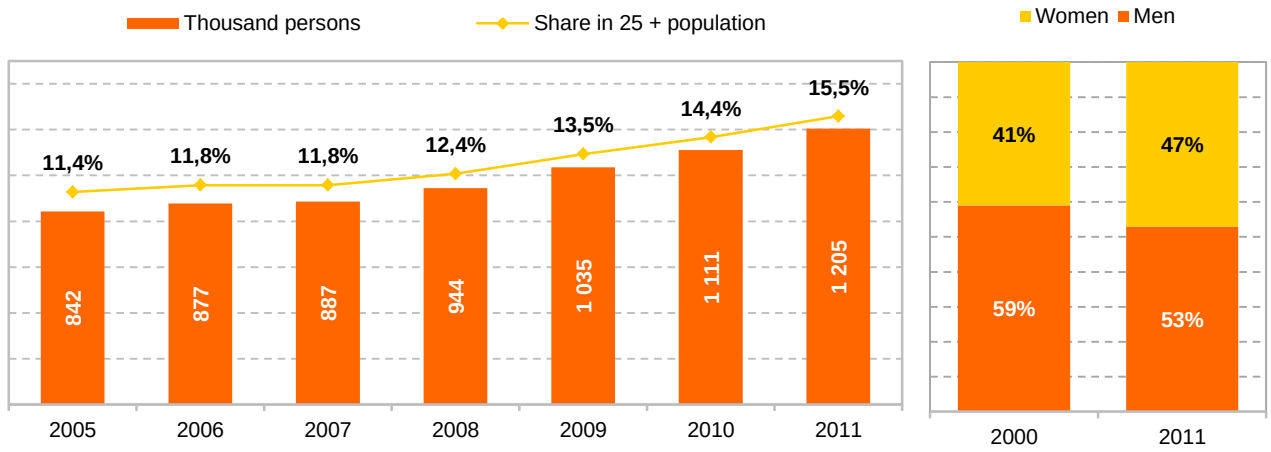
http://www.czso.cz/csu/redakce.nsf/i/lidske_Sourcee_pro_vedu_a_technologie.

As mentioned in the chapters above, there are 72 % of university educated persons in the R&D employees and there are 89 % of such educated people among research employees. All university educated people of course cannot be expected to work currently or in the future in R&D, but they are potential sources for this field and they do participate substantially in the creation of the new knowledge and technologies. This chapter contains information about current numbers of people with university level education as well as about students and graduates of tertiary education. It will have look in detail at natural and technical sciences which may be regarded as the key domains for R&D (demonstrated by 76 % of employees of R&D working in these domains in 2011).

Persons with finished university education

The amount of university educated people increases every year. In 2011 there were almost 1 million 205 thousand people with a university degree in a population older than 25 years, that means 15.5 % of population of this age (which was chosen for a probability of a completed education). In the beginning of the monitored period, in the year 2000, approximately 714 thousand persons - 10 % of the population - had a university degree. The overbalance of the male over female among university educated people was more significant in 2000 than today. In 2000 the ratio was 59 % of male to 41 % of female. In 2011 the ratio was more balanced - 53 men and 47 women in 100 university educated people.

Chart B.24: Persons with finished university education aged 25 and above

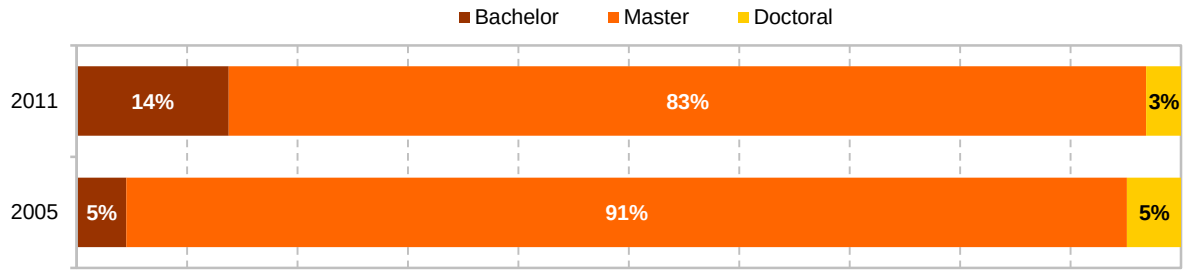


Source: CZSO 2012, Selective survey of the workforce

In a long term there is a majority of people with a master degree in a university educated population. In 2011 there were 83 % of people with a master degree, 14 % of people with a bachelor degree and the rest of 3 % of the university educated population with doctoral education. During years there were changes in the structure of the university educated population - in the favor of the bachelor degree. This drift was caused by the changes of the structure of the offered study programs. Even before 10 years the bachelor study programs were exceptional and the university study was possible mostly in 5-years master programs.

In the university educated population is the majority of people educated in the fields of social science, commerce and law (26 %) and technical science, technology and civil engineering (23 %), pedagogy education has 17 % of university educated people and 9 % is educated in natural science.

Chart B.25: Persons with university education by type of study programme

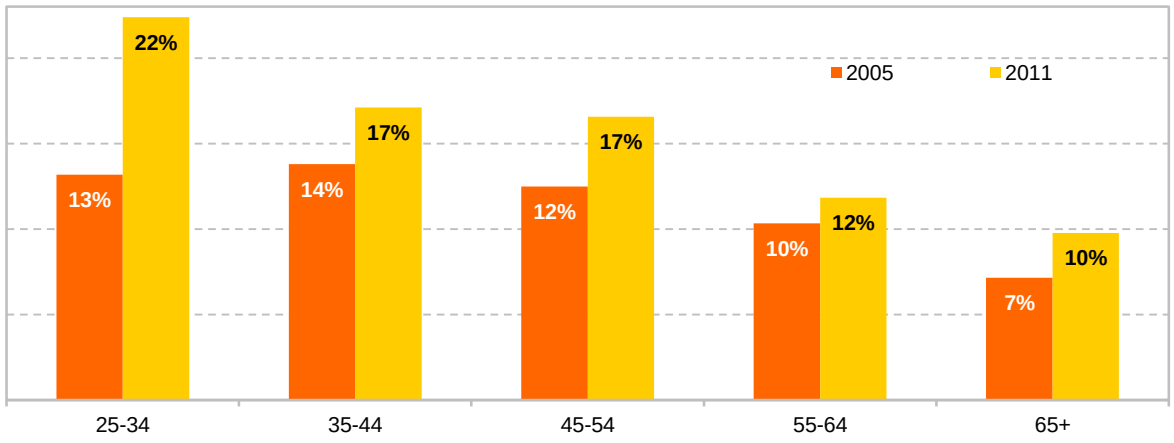


Source: CZSO 2012, Selective survey of the workforce

In 2011 the highest ratio of the university educated people was in the population of the age 25-34 years where people with such education comprised 22 % and the increase of 9 percent points was recorded in comparison with the year 2005. The increase of the university educated people in the population was

noted also in other age groups. In 2011 the university educated people occupied app. 17 % of the persons in the age of 35-54 years and 10 % of the persons in post-productive age.

Chart B.26: University educated persons by age (% of persons in a given age group)



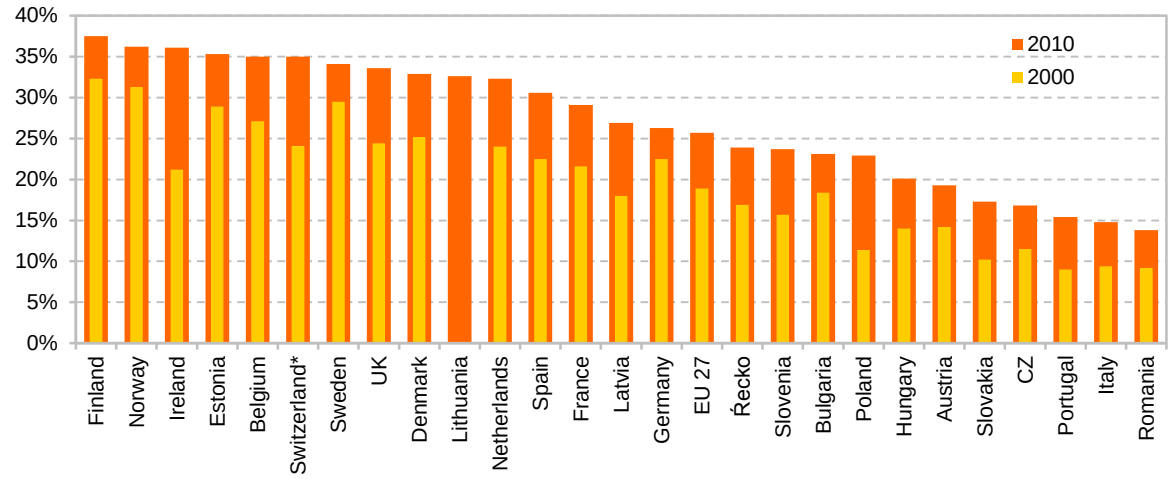
Source: CZSO 2012, Selective survey of the workforce

International comparison

The rate of university educated people in the population of Czech Republic is in the long term deep below the European average. In 2010 there was 16.8 % of the population with obtained university level education. The EU27 average was 26 % in the same year - the highest proportion was reached in Finland, Norway, Ireland and Estonia where more than 35 % of the population was university educated. Since 2000 the abovementioned ratio has increased in all watched countries. The highest growth was recorded in the case of Ireland where the ratio of university educated persons in the population has increased by almost 15 percentage points.

The Czech Republic is one of the countries with the lowest rate of university educated persons in the population; however the situation is totally different regarding people with at least secondary education. In 2010 92 % of the population had at least secondary education. Same rate was obtained in the Lithuania and in the Slovakia. The EU27 average is 73 % of people with at least secondary education in the population. The lowest ratios of people with at least secondary education have the Spain (53 %), Italy (55 %), Portugal (32 %) and Turkey (28 %) whereas the last three of them have also very low representation of university educated people in their populations (less than 15 %).

Chart B.27: Persons with finished tertiary education aged 25-64 years (% of 25-64 population)



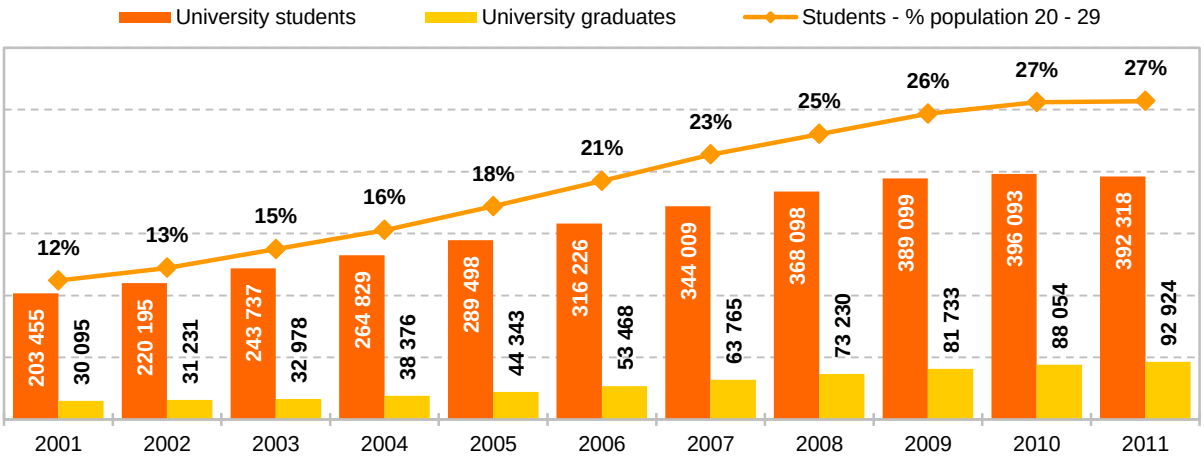
Source: Eurostat 2012

University students and graduates

In last ten years the number of university students (bachelor, master and doctoral level) in the Czech Republic has been increasing constantly - from 2001 the number of university students almost doubled to almost 400 thousand students in 2011. We can call abrupt not only the increase of absolute value, but also ratio indicator - the representation of university students in the population of 20-29 years old. Since 2001 until now the number of students increased significantly; however their number decreased between 2010 and 2011. In 2011 there were 4 000 students less than the year before. More significant than the number of students was the increase of female students in absolute numbers. There were 90 thousand of them in the beginning of watched period in the year 2001 and more than 220 thousand in 2011 (representing 56 % of all university students). Since 2001, when there were 48 % of female students between university students, their representation among university students has increased considerably.

While the number of university students almost doubled between years 2001-2011, the number of graduates in the same period increased almost three times. In 2001 more than 30 thousand students has graduated university in the Czech Republic, in 2011 there were almost 93 thousand of the graduates. Such a distinct increase of graduates may be partly due to split up of the master level to two levels and a majority of bachelor level graduates continues their studies in the follow-up master level program. Representation of women among the university graduates was more than 50 % for whole watched period (in 2001 women constitute 51 % of all graduates and after 10 years, in 2011, even 61 %). From the fact of higher representation of female graduates than female students may be deducted their higher success at finishing university studies.

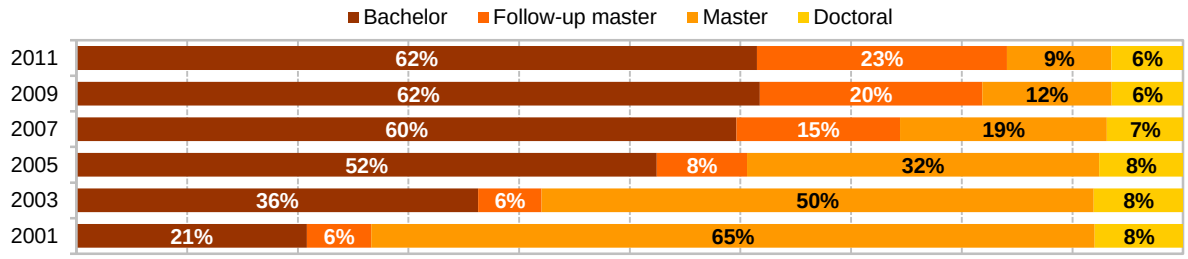
Chart B.28: University students and graduates in the Czech Republic



Source: Institute for Information in Education 2012

The three-stage structure of university level education has been strictly appointed in 2001 when previously characteristic 4-6years university education has been transformed to usually triennial bachelor level study programs and to master level study programs. There are two types of the master level programs – the follow-up master programs, which enable the bachelor level graduates to continue in their education and so called long master programs, where it was impossible to divide the program in two parts (f.e. study of medicine, zoopharmacy and architecture). The implementation of the three-level model is shown in the following chart, which clearly shows how the representation of students shifted from long master programmes to bachelor or follow-up master programmes. In 2011 there were 62% bachelor level and 23% follow-up master level students. Only 9% were in the long master programmes.

Chart B.29: University students by study program type

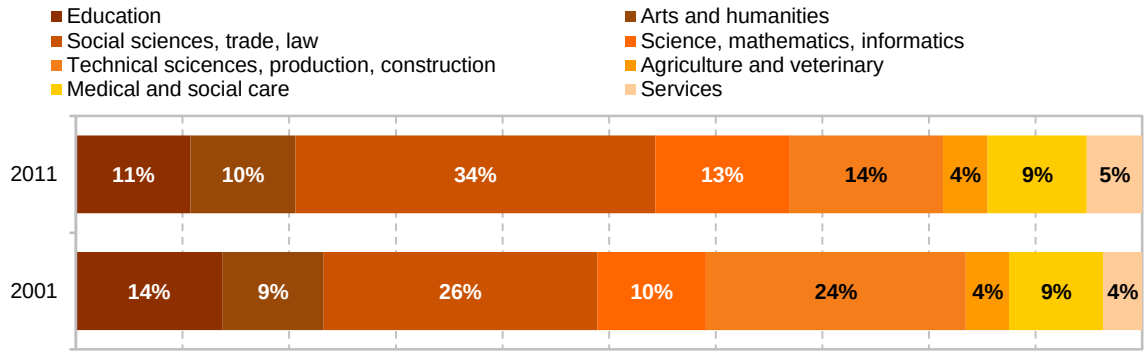


Source: Institute for Information in Education 2012

In the long term most students are interested in social sciences, economy and law; in 2011 there were 135 000 students in these programs, which was 34% of the total number of students. Compared to 2001 there has been a 150% increase in the number of persons studying these programs as well as natural sciences and services. On the other hand the increase in the number of technical sciences students has been negligible, as the number increased by mere 13% and even decreased by 10 percentage points within the structure. The number of technical sciences students then decreased between 2010 and 2011. A decrease has been recorded in other fields as well - education, humanities, trade and law. In all years the

largest number of students studied in humanities, in 2011 these students represented a 26% share in the total number, followed by technical sciences with 24%. However, in 2011 the share of technical sciences was only 14% (57 000). The relatively decreasing interest in the study of technical fields is a very negative signal for the future ability to satisfy the demand of the business sector for highly qualified labour.

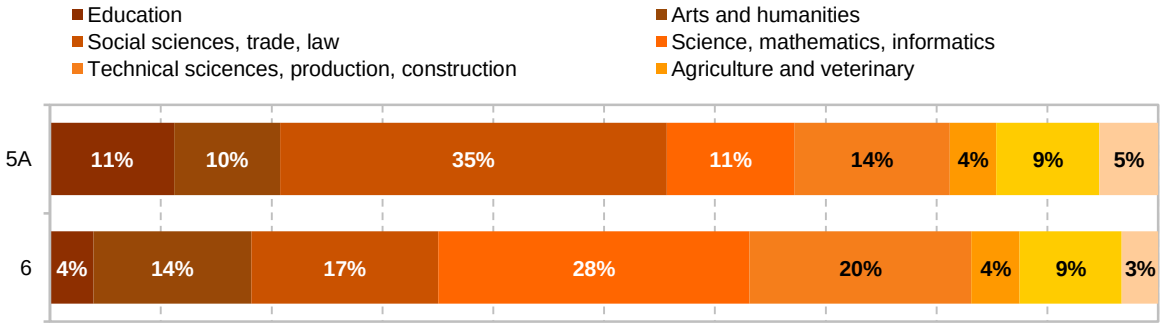
Chart B.20: Structure of university students by field and level of education, 2011



Source: Institute for Information in Education 2012

As has already been mentioned, in 2011 there have been 6.5% of students of the doctoral level. The distribution of these students among individual fields was very different to the students of the 5A level, i.e. bachelor and master levels. In case of the 5A level the largest group of students was in the fields "humanities, trade and law" with 35% of all students in 2011. Second place belonged to "technical sciences, manufacturing and construction" with 14%. On the contrary doctoral students were most numerous in "technical sciences, manufacturing and construction" together with "science, mathematics and informatics" with 28% (7 000) doctoral students in science and 20% (5 000) technical sciences. The "humanities, trade and law", most frequent among 5A students, were third with 17%.

Chart B.31: University students by study program type, 2011

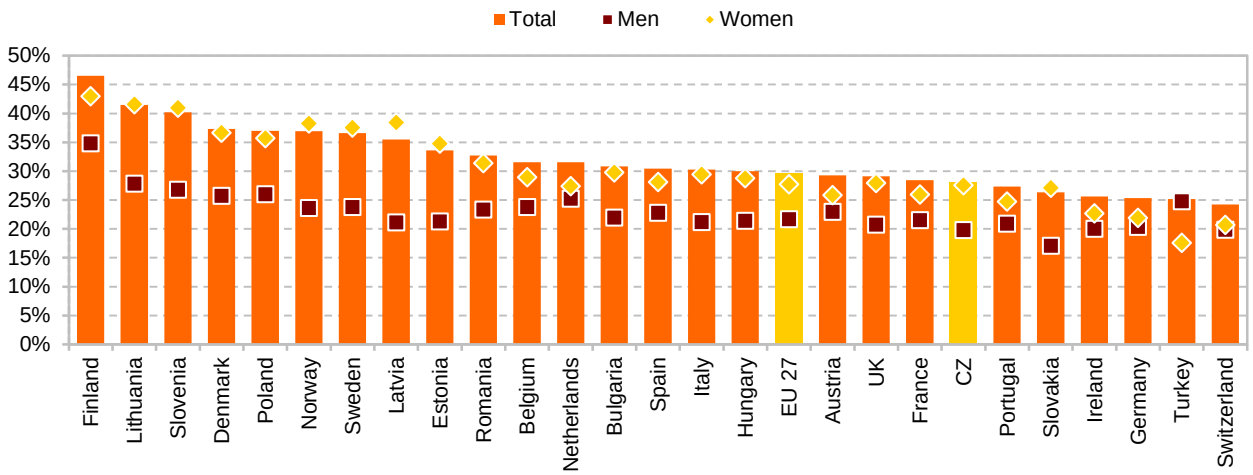


Source: Institute for Information in Education 2012

International comparison

Due to the availability the data for international comparison are presented for tertiary level students, i.e. not only university students, but also students at colleges. The countries with the highest share of university educated persons in population in 2009 were Finland (47%), Lithuania (41%) or Slovenia (40%). The Czech Republic with its 28% was below the EU average of 30%. In the monitored states there are in general more students of tertiary education among women of 20-29 years than among men of the same age. In Latvia there is a 46% share of students among women and only 25% among men. The only exceptions are Germany and Switzerland where the shares are equal and Turkey, which has 30% students among men and only 21% among women.

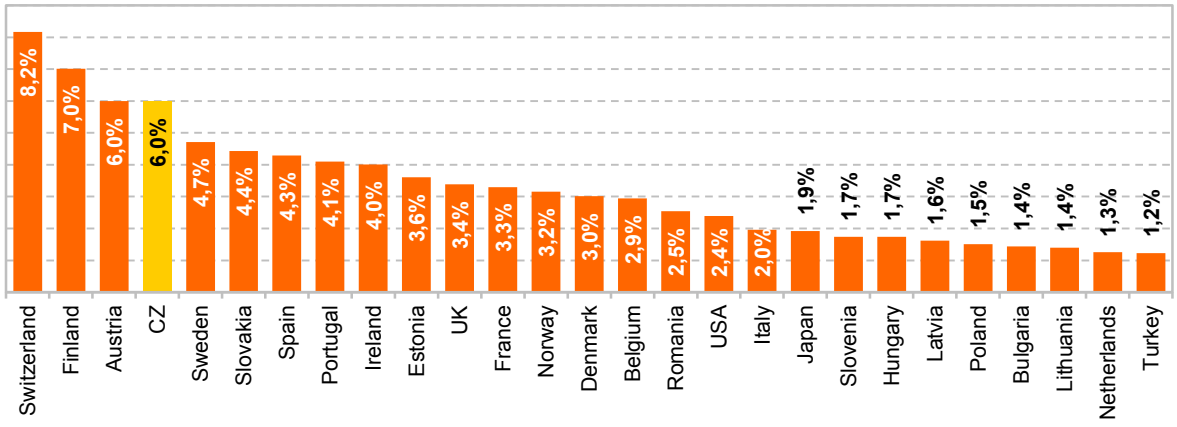
Chart B.32: Tertiary education students, 2009 (% of population 20-29 years)



Source: Eurostat 2012

Students of the doctoral programs made up 6 % of all tertiary education students in the Czech Republic in 2008. Only Switzerland and Finland have higher values. On the other hand low values were recorded in Lithuania, Turkey, Netherlands and Bulgaria, where they are below 1.5%.

Chart B.33: Students in doctoral programs, 2009 (% of all tertiary level students)



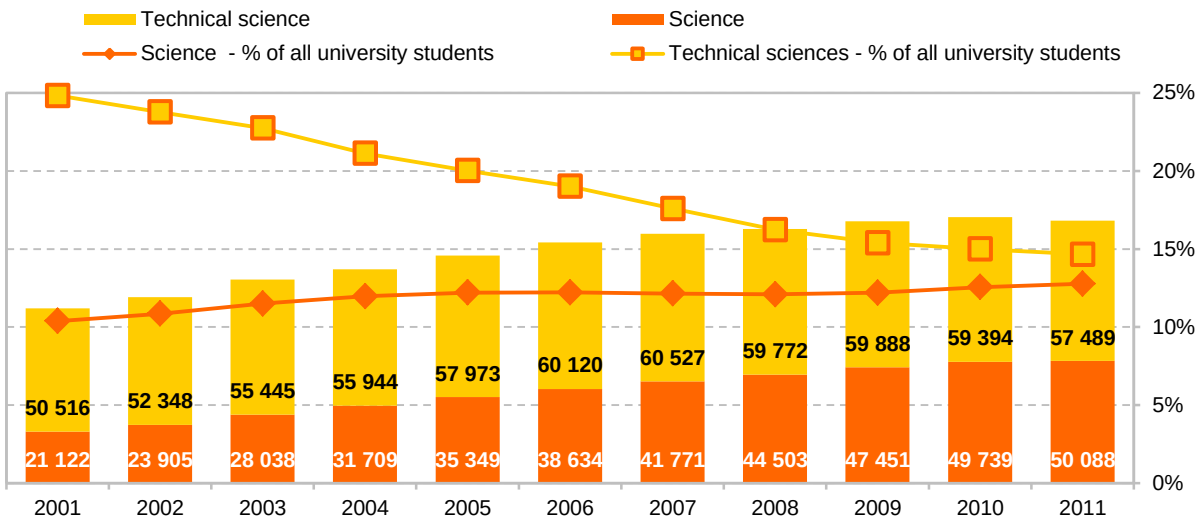
Source: Eurostat 2012

University students and graduates in natural and technical sciences

The narrowest base in human resources measurements comprises of university educated persons in natural and technical sciences, therefore we shall concentrate on them.

In 2011 there were ca. 108 000 students of natural and technical sciences. Since 2001, where there were 72 000 we have seen a steady increase in their number. However, the natural sciences have shown a significantly higher growth rate. The number of technical sciences students more or less stagnated. Since 2001 the number of natural sciences students increased from 21 000 to 50 000 (137%) and the number of technical sciences students increased from 51 000 to 57 000 (14%) in 2010.

Chart B.34: Students in natural and technical sciences programmes

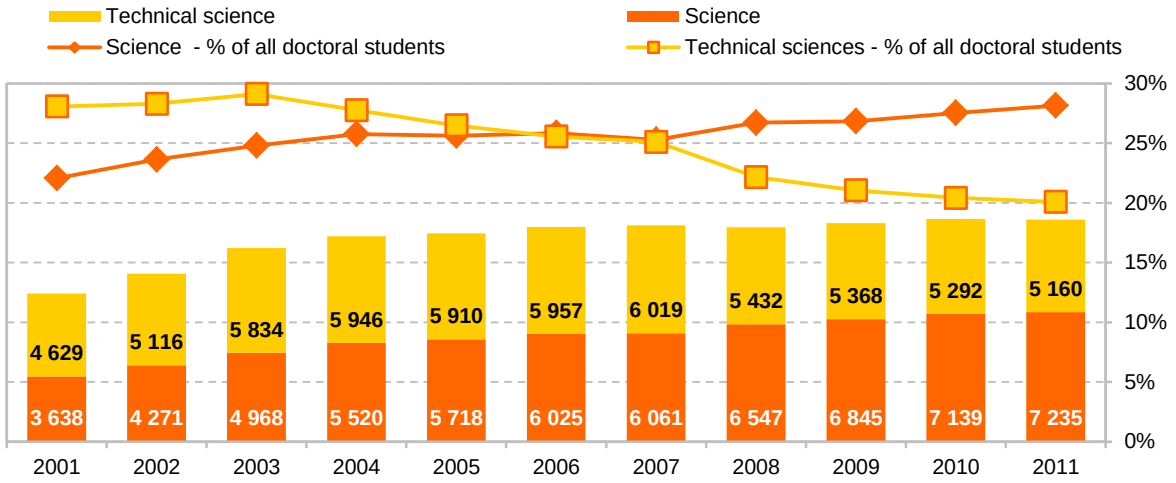


Source: Institute for Information in Education 2012

In 2011 there were more than 50 000 students in mathematics, informatics and natural sciences programs with the majority of men with 64%. In 2011 there also were 12% of foreign students. Among this group of students the most popular program is informatics with 45% students, 26% studied inorganic sciences and 21 organic sciences. The smallest number of students studies mathematics and statistics - only 8%.

More than 57 000 people studied technical sciences in 2011, with the majority of them being men (74%); foreign students made up 7%. The most popular program is engineering (55%), followed by architecture and construction (33%) and manufacturing (12%).

Chart B.35: Doctoral students in natural and technical sciences programmes



Source: Institute for Information in Education 2012

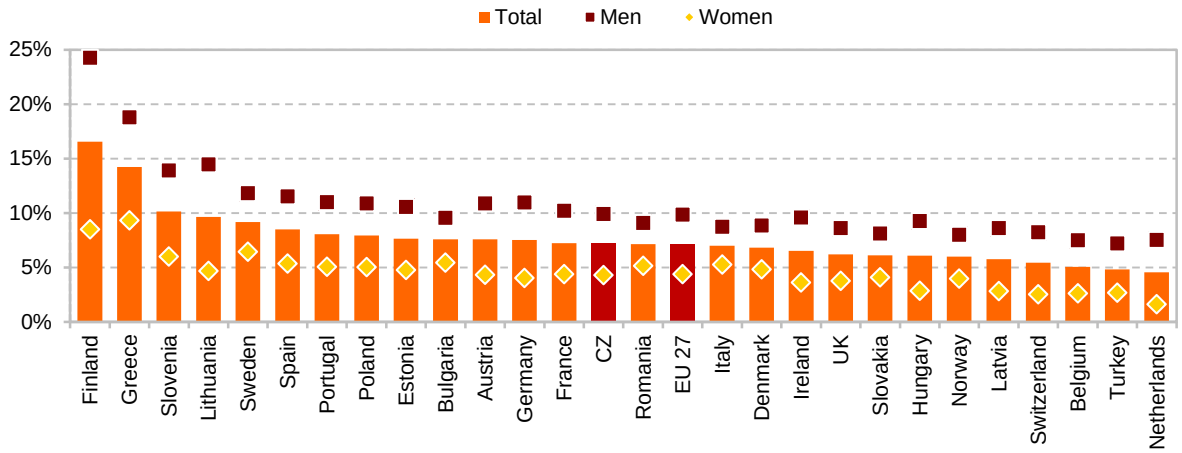
In 2010 there were more than 12 000 doctoral students in these programs, which is 48% of all doctoral students. Since 2001 the share of doctoral students in these programs in the number of all doctoral students decreased by 2 percentage points. In natural sciences there were 43% of female doctoral

students, in technical sciences 23%. In the case of natural science doctoral students this ratio is above the average of all study programs.

International comparison

In Finland in 2009 the students in natural and technical sciences made up 17% of the population aged 20-29, which was the highest value of all monitored states. Relatively high values were recorded in Greece (14%), Lithuania (10%) and Slovenia (10%). The EU27 average of 20-29 population studying natural and technical sciences is 7%. As was already stated above, the share of students is higher among women than among men. This is not true in the case of technical sciences. In all the monitored states the share of students was higher among men than among women. The highest gender difference was in Finland, where there were 24% of students among men and only 9% among women.

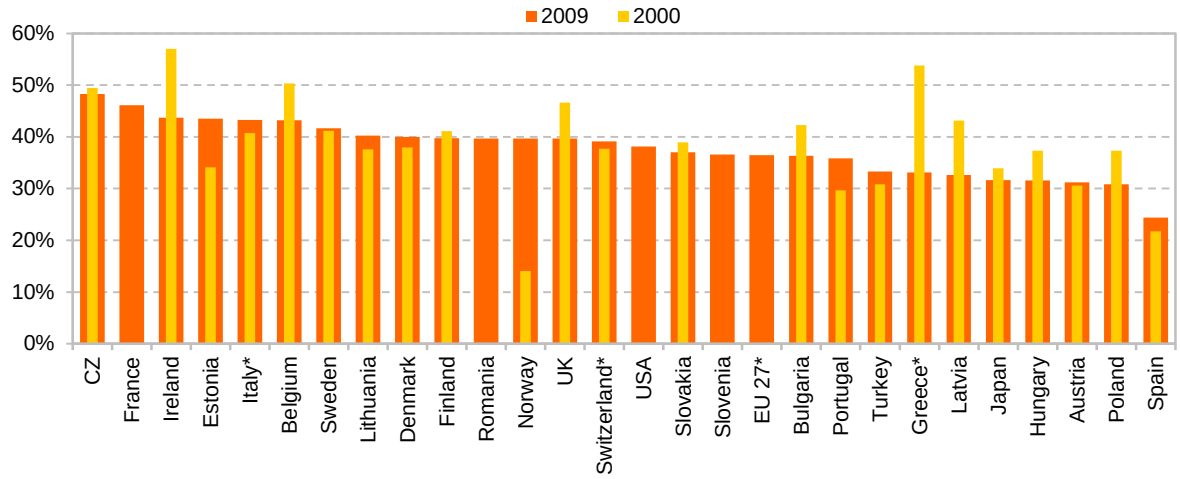
Chart B.36: Students of tertiary level education in technical and natural sciences, 2009 (% population aged 20-29)



Source: Eurostat 2012

In 2009 the share of doctoral students of technical and natural sciences in the total number of doctoral students was the highest in the Czech Republic (48%), France (46%) and Ireland (47%). On the other hand low values were recorded in Austria (31%), Poland (31%) and Spain (24%). The EU27 average was 36%. The highest increase in this value compared to 2000 was recorded in Norway, where this share increased from 22% to 40% in nine years. On the other hand the highest decrease was recorded in Greece – from 54% in 2000 to 33% in 2009.

Chart B.37: Doctoral students of technical and natural sciences (% of all doctoral students)



Source: Eurostat 2012

C R&D outputs

This chapter includes a summary of results generated within the Czech R&D IS. The source of data is the Information Register of R&D Results (RIV), which gathers information about the outputs of R&D programs and projects funded by public sources. The Register includes mainly data on the output and the project which led to this result, the source of its funding, beneficiary, authors, type of result, its name and description, year and confidentiality level of the data. The R&D IS is operated by the RVVI.

The overviews of R&D outputs are sorted by a number of criteria: disciplines, result types, authors and funding providers. Time series are also presented to indicate the dynamic of R&D in a wider scope. To evaluate the total value and structure of Czech R&D at the international level we will use the Thomson Reuters Web of Science (WoS database *Science Citation Index*, *Social Sciences Citation* Index and *Arts & Humanities Citation Index*) and the TR InCites analytical tool. TR Essential Science Indicators (ESI), which defines 22 R&D branches and the departmental classification into 249 more detailed Subject Categories were used to describe the R&D outputs sorted by departmental structure.

The source of data on patent activity was the Industrial Property Office (UPV), which ensures patent protection in the Czech Republic. The CZSO in cooperation with UPV publishes detailed statistic data in various classifications according to the OECD Patent Manual OECD. Data used in international comparisons come from Eurostat and OECD. Detailed information (data, definitions, methodology) are available at CZSU website. Information about granted licenses is monitored by the CZSO since 2004 through the annual survey on licenses (LIC 5-01). The aim of this survey is to determine the amount of license agreements on the provision or acquisition of a right to some type of industrial right protection valid in the Czech Republic and the value of received or paid license fees for the provision or acquisition of such right. Detailed information (data, definitions, methodology) are available at CZSU website.

Main trends

- The number of publications by Czech authors, which meet the Thomson Reuters' Web of Science criteria, increased by 37% from 2006 to 9 421 in 2010.
- The Czech Republic's share in the global production of publications between 2006 and 2010 increased from 0.64% to 0.74%.
- The citation score of Czech publications is above the global average since 2005.
- The Slavic literature, Nuclear physics and Nuclear sciences and technologies fields achieve bots above-average citation rate (140 – 180% of global average) and relatively high share in total global publication output.
- The number of publications relative to the number of inhabitants and FTE R&D employees is at the EU27 average level.
- Old member states reach 2 – 4 times better values in the number of publications and citations per million inhabitants than the Czech Republic.
- The RIV registers the highest number of results in humanities and technical sciences.
- The highest increase in the number of results registered in the RIV was recorded between 2007 and 2011 in mathematics and information sciences, Earth sciences and arts and humanities. Decrease was recorded in chemistry and agricultural sciences.
- Publishing activities of Czech authors are shifting to periodicals with global reach, registered at Web of Science.
- The share of publications by Czech authors registered at Web of Science in the field of economy and trade doubled between 2007 and 2011. The number of granted patents registered in RIV tripled between 2007 and 2011, the amount of utility and industrial models increased thirteen times.
- Although the number of patent applications filed to IPO by domestic subjects grows significantly in time, this growth isn't reflected by the number of patents granted in high-tech fields.

- In recent years there have been significant changes in the structure of patent applicants at IPO, with the number of patent applications from universities and public research institutions increasing significantly.
- Similar changes in structure are apparent in the registered utility models. While in 2005 universities registered only 10 utility models, in 2011 it was already 381. The share of universities in the number of registered utility models increased from 1% to 26%. Significant, albeit lower, increase can be seen in the case of public research institutions as well.
- Although the number of patent applications submitted by Czech subjects to EPO has increased in recent years, the share of filed applications per one million inhabitants is still way below the EU27 average.
- Of almost 2 000 patents valid as of 31st December 2011 for the Czech Republic's territory and belonging to applicants from the Czech Republic only 147 were further licensed. Most of these licenses were related to patents owned by the public research institutions. In 2011 the license fee income from inventions protected by patents amounted to 1.5 bn. CZK, but 96% of this income belonged to the Institute of Organic Chemistry and Biochemistry of the ASCR.

The C chapter is divided into three parts according to the source of primary data. Part C.1 includes overviews and analyses based on RIV data. The following C.2 part presents scientometric evaluation and field structure of Czech publishing activities, their impact and international comparison. Part C.3 includes overviews and field representation of patent applications and patents granted by three patent offices: the Industrial Property Office of the Czech Republic (IPO), the European Patent Office (EPO) and the United States Patent and Trademark Office (USPTO).

C.1 Overview of results recorded in the Information Register of R&D Results

As of the end of 2011 the RIV contained more than 56 000 results. This means a 2.1% increase compared to the previous years, which is a bit slower compared to the more than 5% growth in 2010. On the other hand, between 2007 and 2009 the total number of results decreased by 3-4% (table C.1). It is apparent that the main result types are publication outputs. These make up 80% of the total number of records with the majority being articles in specialist periodicals (J category), which make up more than 55% of all publication results and more than 44% of all registered results. The number of the J type results increased almost by 13% since 2007, which reflected in the increase of the share of these results in the overall registered results. This growth is accompanied by a significant increase in impact publications (TR WoS) and a robust increase in citations of Czech authors (see C.2), which indicates that the publishing strategy of authors is shifting towards presentation of results in more globally relevant periodicals.

On the other hand there has been a significant drop in publication results group (B, C, D, J) in the D category (published presentations and articles in proceedings) in the past five years, with their number decreasing from 22 000 in 2007 to 13 500 in 2011. A possible reason of this decrease is the condition of the minimum size of the article being 2 pages, implemented since 2009, which may collide with often strict requirements of conference organizers regarding the size of texts in proceedings. Another reason might be the shift in the publishing strategy of conference organizers and publishers, who publish conference presentations in special issues of the proceedings.

The patent-type results (P) increased relatively quickly between 2007 and 2011. While in 2007 there were 55 registered patents in the RIV, in 2011 it was already 185 patents. The fastest growth (160%) occurred between 2007 and 2009. In the following years the number of P results increased by 13-14% a year, which is slightly quicker than the publication results. The dynamics of the P group can be seen as result of the registration of the already existing patentable results caused by the change in the methodology in 2009 and the subsequent growth as part of the overall growth of the efficiency of R&D activities, which can be seen in the dynamics of most of the result types. To assess to what extent this significantly improved intellectual property care reflected in the financial profit related to applied research would need a detailed ex-post evaluation (know-how sales, active licensing, sales of industrial patterns etc.).

Similar situation is in the group of in the application result types, where after a significant growth of registered results until 2009 the pace slowed down. The total number of these applied results almost doubled since 2007, particularly due to the industrial patterns (F), the number of which increased from 52 in 2007 to 658 in 2011, certified methodologies, medical and memorial procedures and specialized maps with scientific content (N), which grew from 117 to 1 615 and software (R), where the number of registered results grew from 90 to 774. However, in the case of software there has been a year-on-year decrease by almost 40%.

Unlike the previous group of applied results, the results, which are significant due to their potential for direct application in innovation, such as prototypes, functional samples (G) trial operations, verified technology, variety and breed (Z) more or less stagnated or even decreased since 2007. The most significant year-on-year decrease by more than 42% was recorded in 2008 in the category of technically applied results (G)

Table C.1: Number of R&D results by main categories of the RIV database in 2007 – 2011

Result type	2007	2008	2009	2010	2011
Total number of results in RIV	**55 472**	**53 277**	**51 927**	**54 868**	**56 016**
Total publication outputs (B + C + D + J)	**48 651**	**45 732**	**42 834**	**44 619**	**44 393**
Breakdown:					
Specialist book (B)	1 493	1 622	1 445	1 596	1 752
Chapter in specialist book (C)	3 594	4 009	4 177	4 523	4 662
Article in proceedings (D)	21 912	18 506	15 819	14 800	13 548
Article in specialist periodical (J)	21 652	21 595	21 393	23 700	24 431
Patents (P)	**55**	**85**	**144**	**162**	**185**
Trial operation, verified technology, variety, breed, medical treatment (Z)	**303**	**437**	**568**	**445**	**401**
Total applied outputs (F + G + N + R)	**2 409**	**2 665**	**3 797**	**4 286**	**4 735**
Breakdown:					
Results with legal protection (utility model, industrial model) (F)	52	217	359	368	658
Technically applied results (prototype, functional sample) (G)	2 151	1 246	1 444	1 649	1 688
Certified methodologies (N)	117	499	920	999	1 615
Software (R)	90	704	1 075	1 270	774
Total other outputs (A + E + H + M + O + V + W)	**4 054**	**4 358**	**4 584**	**5 356**	**6 302**
Breakdown:					
Audiovisual production (A)	1 081	816	576	464	670
Exhibition organization (E)	104	145	176	189	145
Results implemented by provider(Results reflected in legal acts and norms, results reflected in directives of non-legislative nature within the competencies of the relevant provider), (H)	24	49	74	72	134
Conference organization (M)	582	679	523	514	532
Other results (O)	1 814	2 159	2 820	3 495	4 127
Research report containing classified information (V)	3	7	3	3	11
Workshop organization (W)	446	503	412	619	683

Note: the result type "Technically applied results (prototype, functional sample)" was classified as category S in the RIV until 2008. In the table and following overviews this category is combined with the current category G. Similar goes for the result type "Trial operation, verified technology, variety, breed, medical treatment" which was classified as category T until 2006 and now is combined with the current category Z

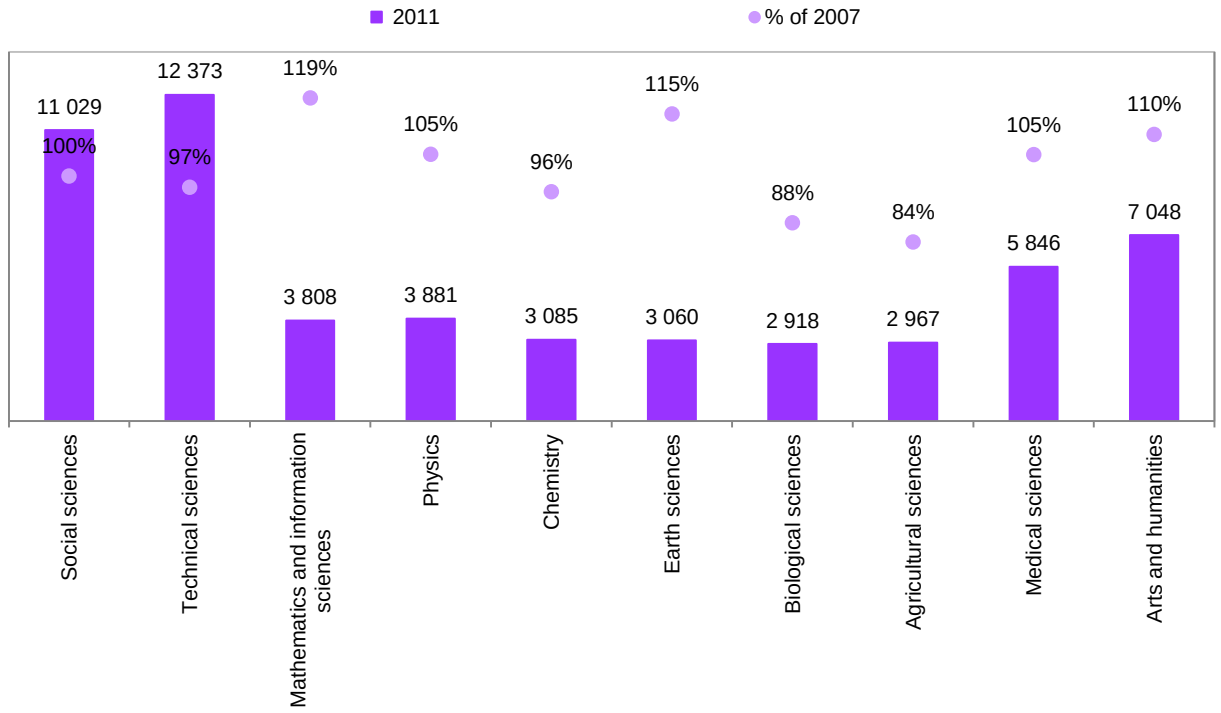
Source: R&D IS, Results Information Index (RIV) dated 31. 12. 2011

Disciplinary structure of the results recorded in the RIV database

The R&D IS divides the results into a total of 123 disciplines. For the presentation purposes these are aggregated into ten wider discipline groups according to the 2010 Evaluation Methodology: social sciences, technical sciences, mathematical and information sciences, physics, chemistry, Earth sciences, biology, agricultural sciences, medical sciences and art and humanities.

The most results are generated in the technical sciences and social sciences (see Table C.1), the number of results in mathematical and information sciences, Earth sciences and art and humanities grew by 0.1-0.2 in the past five years. A very significant decrease has been recorded in agricultural sciences and in the past year also in biological sciences.

Chart C.1: Results registered in RIV by broader scientific disciplines in 2011, related to 2007



Source: R&D IS, Results Information Index (RIV) dated 31. 12. 2011

Institutional structure of results registered in the RIV database

The CZSO divides R&D sites into four sectors: business, government, university and private non-profit sectors, which are further divided into 11 groups[14]. In some cases these groups are very narrow or on the other hand in the government sector the ASCR sites are merger with departmental sites, whose primary focus isn't R&D (e.g. museums). The authors of results are therefore in this chapter aggregated into groups, which are slightly different. The groups are sorted according to their function, establishing bodies and funding type so that it would be possible to compare the roles and structure of the two main R&D system actors – public universities and ASCR public research institutions:

- Academy of Sciences (AS CR)
- Public universities (PU)
- State organizational units, state allowance organization, public research institutions outside the AS CR (other institutions with public funding) (PFI)
- Other legal and natural persons (LNP)

When interpreting the data it is necessary to reflect the different discipline structures and field-specific differences when using various means for R&D results dissemination.

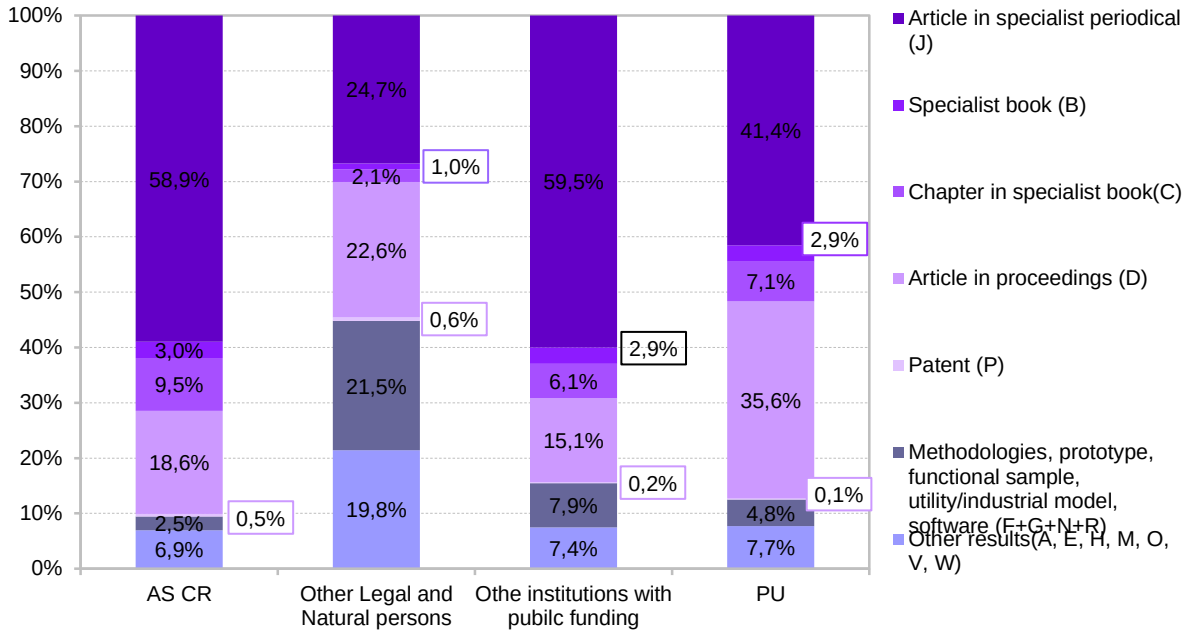
The dominant type of results in all the three research institution groups is publication in specialist periodicals (59%). Compared to the ASCR the PFI sites produce relatively more applied results (F, G, H, N, R, Z,V); however the academic institutions have ca. twice as many awarded patents(chart C.2). As for the

[14] E.g. http://www.czso.cz/csu/2011edicniplan.nsf/t/59001FFA8D/$File/96011105.pdf

universities, the largest groups of results are publications in specialist periodicals (41%) and proceedings (36%). The universities have by far the largest share of results published in proceedings in the total number of results. Although the technical, engineering and applied fields are mostly the domain of universities, the share of their applied results is relatively low compared to the AS CR and other PFI institutions. Applied results make up the largest share of LNP's results (mostly commercial subjects). Despite that the publication results make up a significant part of their results as well.

The comparison of the growth dynamics of the individual result group shows that in the last five years the publishing activity of PU and PFI increased significantly. All groups of public support beneficiaries recorded a decrease in conference proceedings results. In the PU group there has been an extreme increase in the number of patents and other applied results. This increase coincides with the changes in the evaluation methodology in 2009. The (F+G+R+N) result types also increased in the university sector. On the other hand these results more or less stagnated within the LNP group.

Chart C.2: Total number of results in categories between 2007and 2011



Source: R&D IS, Results Information Index (RIV) dated 31. 12. 2011

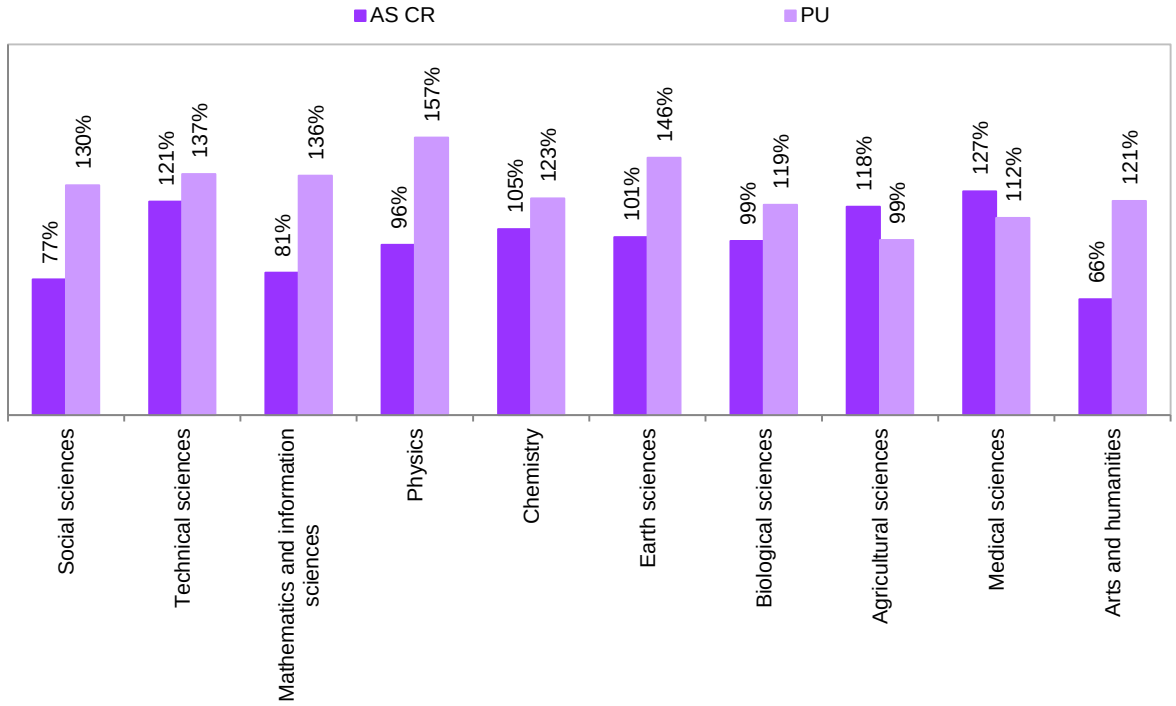
In the AS CR group there has been a significant increase of publications in medical, agricultural and technical sciences, which indicates increased research activity in these fields. Surprisingly the number of both the mathematic and information sciences publications decreased. The systematic decline of the number of publication results of arts and humanities shows a certain slow-down in research activities in these fields (chart C.3).

The university group on the other hand shows a long-term increase in the number of publications in arts and humanities. The agriculture sciences are the only group, which stagnated over the past 5 years. The largest increase of publications has been recorded in physics (60%) and Earth sciences (almost 50%). Publications in the medical sciences are the slowest growing (12%).

The annual count of publications in the PFI group is several hundred at most, with the exception of medical sciences. This is reflected in a large year-on-year result number fluctuation. The fastest growing are physics publications (almost 5x), however from the base number of just 17 publications in 2007.

In the LNP group the most growing areas were biological and agricultural sciences. The technical sciences, which make up ca. 4/10 of all results in the long term, have stagnated and decreased. The largest decrease has been in humanities to just 17%.

Chart C.3: Publications in specialist periodicals results created by AS CR and PU groups in 2011, related to 2007, sorted by disciplines



Source: R&D IS, Results Information Index (RIV) dated 31. 12. 2011

Classification of results registered in the Result Information Index of R&D IS according to providers of funding

The highest number of results comes from the MoEYS support, followed by GA CR, AS CR and Ministry of Health (table C.2). The publication results (B, C, D and J) make up more than a half of all results of all 23 funding bodies (with the exception of the Czech Office for Surveying, Mapping and Cadastre – COSMC, MFA and the Office of the Government). When comparing the funding providers it is necessary to bear in mind that some of the institutions strongly support secret research, the results of which aren't published in the RIV. Patents have the largest share in the results of R&D supported by MIT (0.8%), MoA (0.6%) and AS CR (0.4%). The largest share in Trial operation, verified technology, variety, breed, medical treatment has been recorded at COSMC (21%) and the MIT (8.8%). As for the share of applied results the leading institutions are the Security Information Service (BIS) with 50% and the National Security Authority (94%). The statistics in these two cases are skewed due to the amount of secret research. The share of applied results is also significant in case of Ministry of Transport (21%), Ministry of Industry and Trade (24%), Ministry of Environment (30%), State Office for Nuclear Safety (27%) and the Technology Agency (24%).

Table C.2: Total numbers of results in 2007-2011 sorted by providers of public funding

Provider	Total number of entries in RIV	Publication results (B+C+D+J)	Patents (P)	Trial operation, variety, breed (Z)	Applied results (F + G + N + R)	Other results (A+E+H+M +O+V+W)
AS CR	40 880	36 092	179	103	1 242	3 265
BIS	18				9	9
Czech Mining Authority	118	72		2	31	13
Czech Office for Surveying, Mapping and Cadastre	355	106		75	63	112
Czech Grant Agency	54 756	49 686	92	34	1 715	3 228
Czech regions	82	79				3
Ministry of Transport	1 466	911	2	11	313	229
Ministry of Culture	3 384	2 743		21	83	538
Ministry for Local Development	837	719			50	69
Ministry of Defence	4 411	3 589	1	7	320	494
Ministry of Industry and Trade	10 501	5 659	88	920	2 507	1 327
Ministry of Social Affairs	1 018	900			15	103
Ministry of Justice	153	153				
Ministry of Education, Youth and Sports	192 147	162 279	327	893	10 943	17 705
Ministry of Interior	1 385	1 050		6	174	155
Ministry of Health	12 065	11 686	7	19	12	343
Ministry of Agriculture	9 767	7 521	56	178	1 123	890
Ministry of Environment	6 265	3 653	1	77	1 919	616
Ministry of Foreign Affairs	539	208				331
National Security Authority	50				47	3
State Office for Nuclear Safety	325	217	1		89	19
Czech Technology Agency	417	239	1	8	102	67
Office of the Government	7	3			4	

Source: R&D IS, Results Information Index (RIV) dated 31. 12. 2011

C.2 Bibliometric results

The scientometric evaluation of Czech publishing activities and the assessment of the quality of the national R&D in global context are performed with the use of the research database platform Thomson Reuters (TR) Web of Science, which records outputs in ca. 11 000 periodicals, conference proceedings and books together with the data about their citations by other authors. The comparison of the Czech Republic with other countries uses global citation indexes and field publications frequencies, provided by the analytical tool TR InCItes, which provided field- and territory-aggregated scientometric data. The basic indicator is the Relative Citation Index (RCI), which is generally defined as a ratio of the citation rate of publications of a defined author group (e.g. a single institution, group of institutions or territory) and the average global citation rate. The RCI value of 1 indicates that the citation rate of the defined group is the same as the global average. Values smaller than 1 indicate below-average citation response, while values larger than one an above-average relevance of the given group within the global context. The scientific field have specific citation habits and due to this the average citation counts per publication vary significantly. To adjust for this the field-normalized citation index is used, which compares the citation score within one scientific field. Field normalization eliminates different citation habits across fields. However, the uneven representation of individual fields in the TR database remains a significant obstacle for cross-field comparisons. Although the number of titles included in the Web of Science increases yearly by ca. 10% and WoS now includes books as well, the coverage of individual fields remains uneven in TR. The coverage of natural and biomedicine sciences is 80-100% and mathematics and technical fields ca. 60-80%. On the contrary, the WoS covers only a third of publications in humanities.[15] Large inequalities exist also within this group of fields. For example economic fields are represented similarly to technical fields; however fields such as history and literature have only 1/10 of coverage.

Citation indexes are an objective indicator of relevance of the national research in the global context. Average values at the field level cannot indicate with certainty the presence of cutting edge research groups and individuals. They don't provide evidence of the efficiency of R&D funding or its productivity.

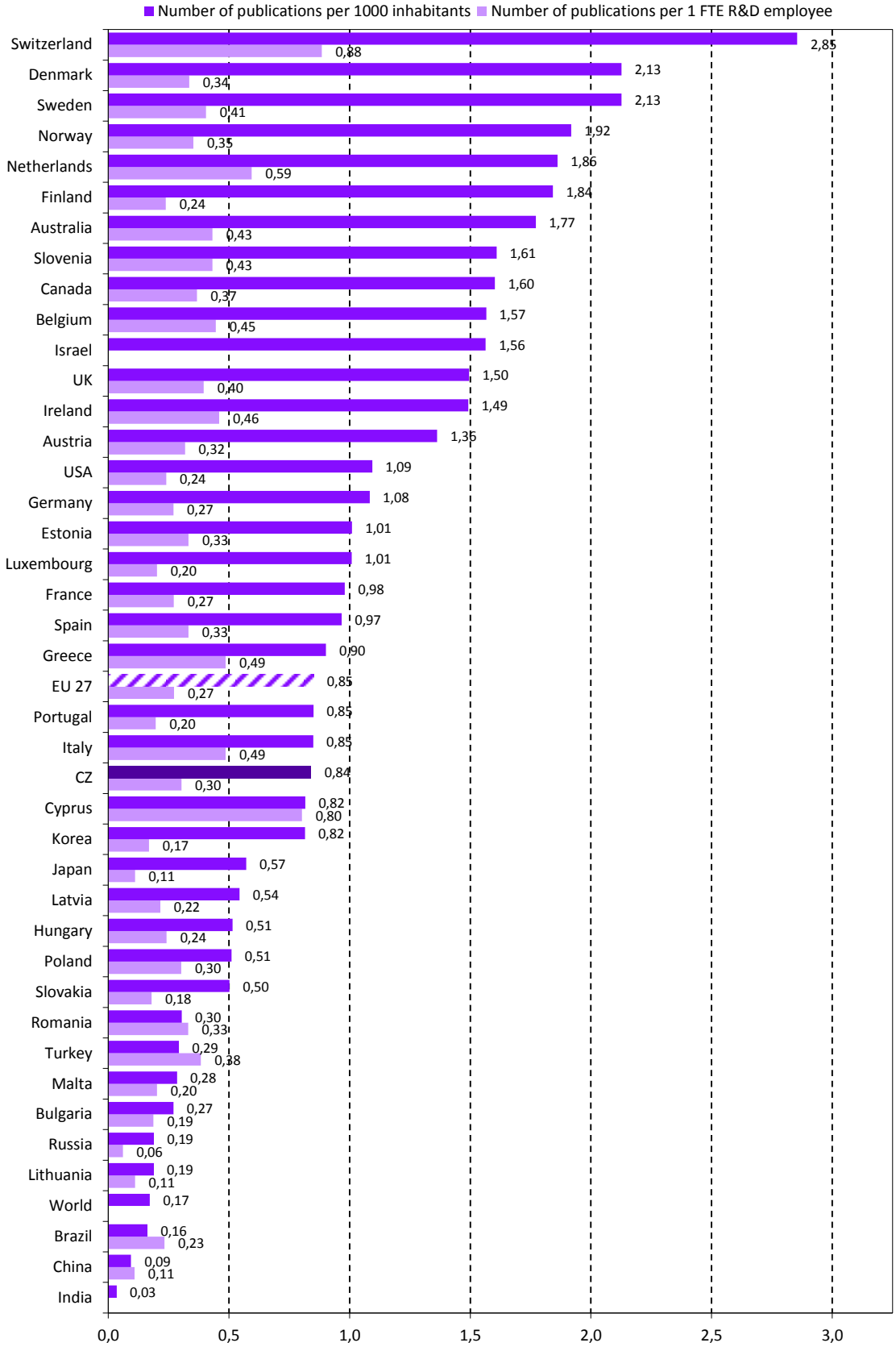
International comparison

In the international comparison of publishing activity relative to population the Czech Republic reached values comparable to the EU27 average, Italy , Cyprus and Portugal in 2010 (Chart C.4). In comparison to the EU15 countries the Czech Republic with its 0.85 publications per 100 inhabitants is approximately at one half of their value. When compared to the new EU countries higher values can be found in Estonia (1.01) and Slovenia (1.61). When comparing the publishing activity relative to the number of FTE workers the position of the Czech Republic is similar, albeit slightly above the EU27 average and at the same level as e.g. the Great Britain. EU15 countries comparable to the Czech Republic in size have 50-100% higher values.

However, when comparing the impact of Czech publication the situation is less favorable. There are much bigger differences between the Czech Republic and the original EU member states in the relative number of citations (chart C.5) again relative to population and the number of FTE R&D workers. In number of citations relative to population we are at 80% of the EU27 average, adjusted for FTE it reaches 85% of EU27 average. In the relative production of scientific publications the Czech Republic reached the EU27 average; however their impact measured by citation rate remains relatively low.

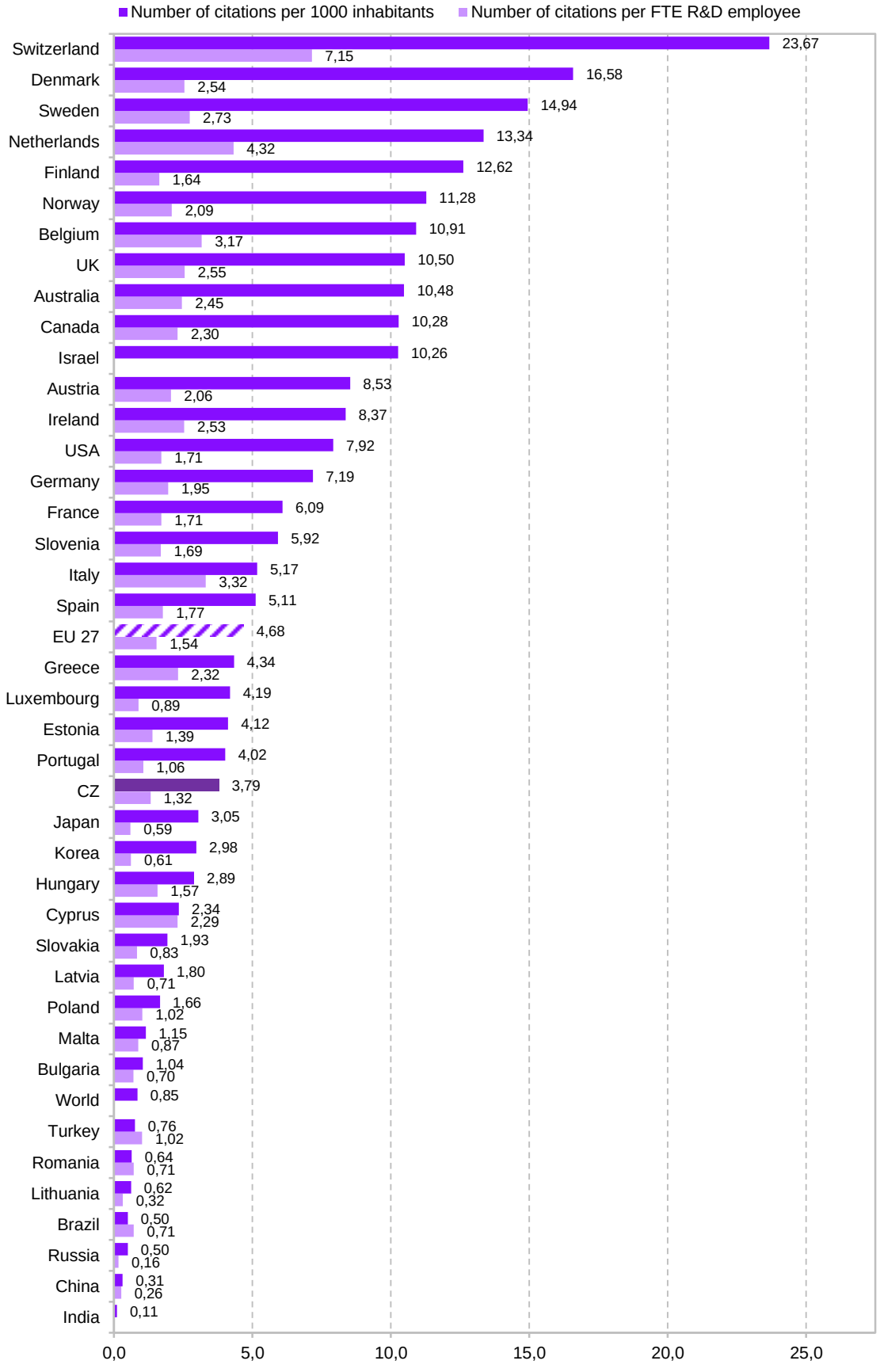
[15] However, the Garfield analysis of significance of periodicals shows that the core titles in terms of citation rate and relevance in scientific knowledge consists of ca. 103 periodicals. Garfield, E. Citation analysis as a tool in journal evaluation. Science, 178 (4060), 471-479 (1972), Garfield, E. Which journals attract the most frequently cited articles? Current Contents, No. 39, 5-6. (1973)

Chart C.4: Number of publications of selected countries relative to population and the number of FTE R&D workers in 2010



Note: FTE of R&D workers in government and university sector
Source: Thomson Reuters InCites

Chart C.5: Citation score of publications from 2008 relative to 1000 inhabitants and FTE R&D employees

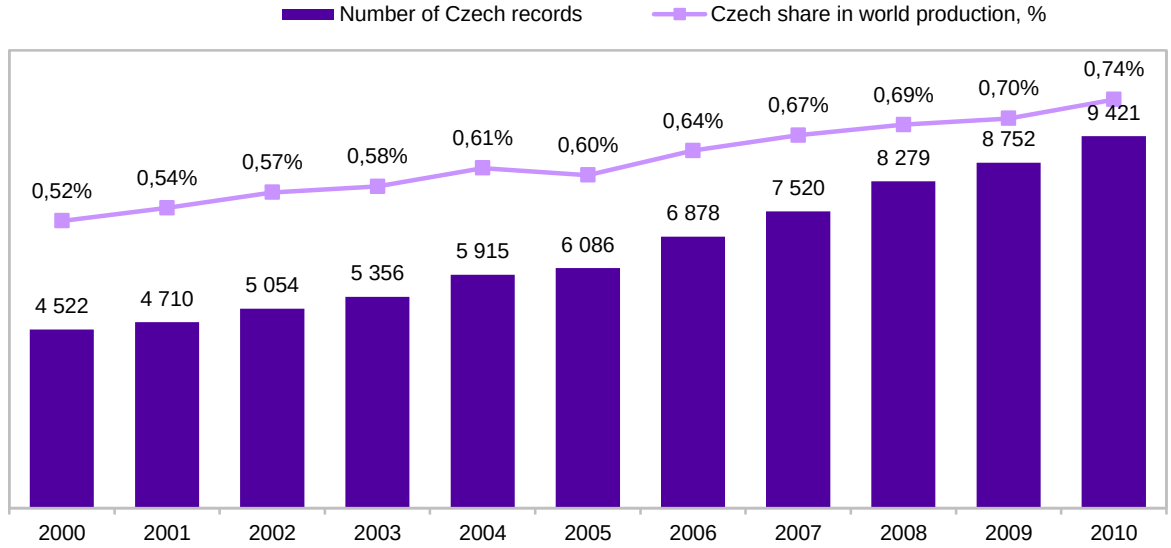


Note: FTE of R&D workers in government and university sector

The Czech Republic's share in the global production of publication results

The number of publication with at least one author from the Czech Republic[16] and are registered in WoS increased in 2010 to 9 241 (chart C.6) In the past five years the year-on-year increase of Czech publications has been between 6-13%. The Czech Republic's share in the global production increased by 1/10 of a percentage point to 0.7% during the past five years. Although the total global amount of publications grows significantly due to the development of R&D in developing economies (BRICS countries etc.), the share of the Czech R&D in the global volume of knowledge is successfully increasing.

Chart C.6: Total numbers of Czech authors' publications in 2000-2011 and their share in total global production



Source: Thomson Reuters Web of Science, InCites

The significance of the published knowledge is reflected by the number of references to the given work[17]. The citation frequency depends on the field citation habits and the speed of publication of new results – dynamically developing fields show higher citation rates. The total citations of a field-heterogeneous set of works are therefore convolutions of the field structure and field-independent citation rate. Field-independent citation rate can be calculated by normalizing the number of citations to global averages within individual fields. The average field-normalized citation rate of a heterogeneous set of works can therefore be calculated by two methods: as a ratio of the sum of citations and the sum of global field averages[18] or as a ratio of the citation rate of individual works and the relevant field citation rate[19]. This Analysis uses the second approach (item-oriented). The chart C.7 shows field normalized citations of Czech works published between 2000 and 2010. The citation rate of Czech publications grew from below-average

[16] Records in databases WoS *Science Citation Index*, *Social Sciences Citation Index and Arts & Humanities Citation Index* with the suffix CU='CZECH REPUBLIC'. In accordance with the bibliometric part of the „International Audit of Czech R&D and implementation of its results into strategic documents " performed by Technopolis consortium (*Bibliometric Analysis of the Czech Republic Research Output in an International Context -Institutional Analysis*, Annex 8 to the Second Interim Report) only documents of the type 'Article', 'Letter', 'Note' a 'Review' are counted

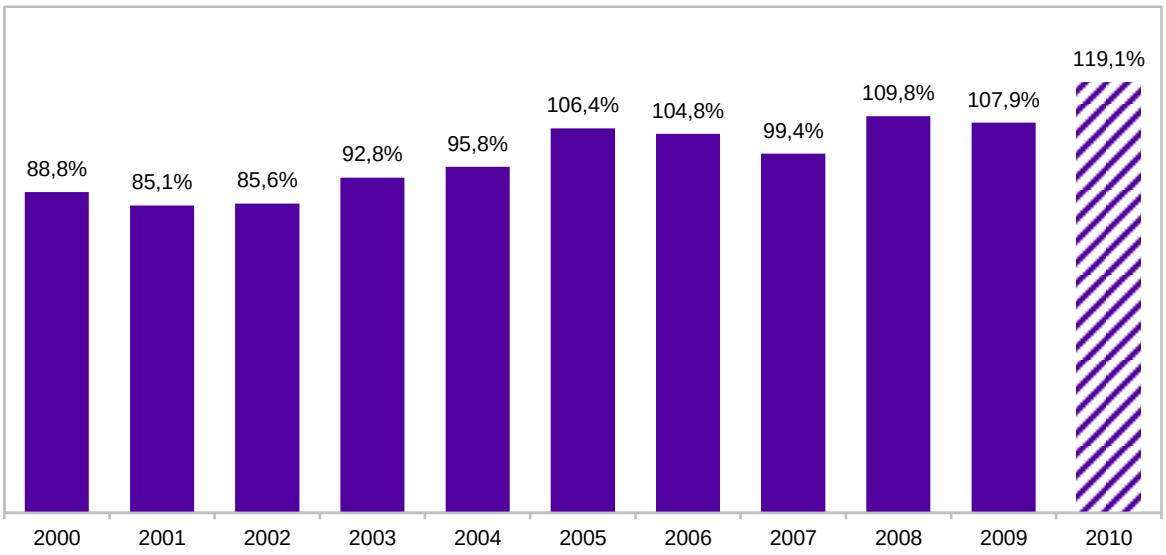
[17] E. Garfield, Citation Indexing. Its theory and application in science, technology, and humanities, Wiley New York 1979.

[18] So called Crown indicator used by the Centre for Science and Technology Studies, University Leiden

[19] So called item-oriented indicator used by the *Karolinska Institutet, Sweden, For indicator comparison see http://kib.ki.se/sites/kib.ki.se/files/Bibliometric_indicators_definitions_1.0.pdf*

values above the global average during the past decade. The conspicuously high value of 119% in the last year (2010) cannot be taken as conclusive due to the short time since the publishing of the works[20].

Chart C.7: Field-normalized citation rate of the Czech authors in 2000-2010

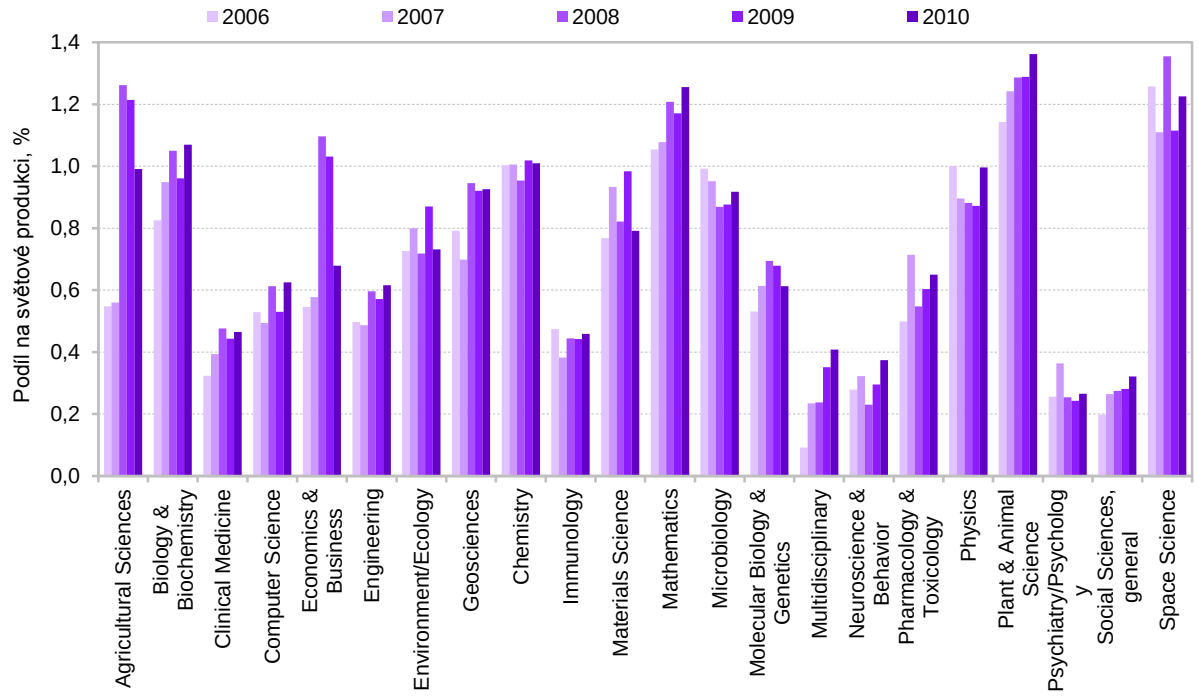


Note: The 100% value is the global field normalized average
Source: Thomson Reuters Web of Science, InCites

The share of Czech publications in the broader scientific fields (ESI classification) lies between 0.3 and 1.3% (Chart C.8). The highest share in global results has been recorded in cosmic sciences, botany and zoology, mathematics and agricultural sciences, the share of which doubled between 2007 and 2008. In 2010 there has been a significant drop in the agricultural sciences by 0.2 [percentage point. Similarly sharp growth has been in the economy and trade field. Stagnation is apparent in chemistry, immunology, microbiology and physics. The lowest share has been recorded in humanities, psychiatry and psychology and neurosciences.

[20] The minimum time interval being two years.

Chart C.*8: Share of Czech publications in the global production in broader scientific fields between 2006-2010*



Note: the multidisciplinary category includes publications in periodicals, which have a broad or general character and cover a wide spectrum of scientific fields. This category also includes periodicals publishing works of a multidisciplinary character, studying e.g. particular regions, ecosystems or biological systems and interdisciplinary journals, the goal of wihich is to shed light on significant links between fields (TR definition)

Source: Thomson Reuters Web of Science, InCites

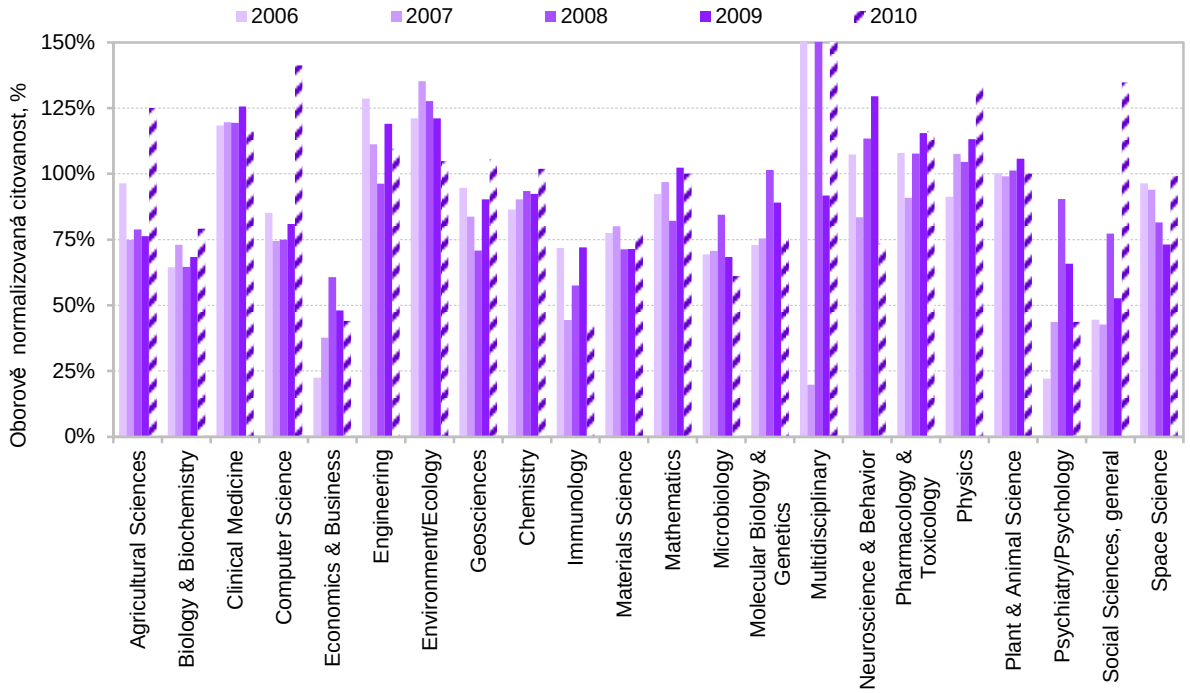
Field relative citation indexes (RCIO) for the Czech Republic

Field normalized citations of Czech publication in 2006-2010 are shown in the chart C.9. Only several fields surpass the global average in the long-term: clinical medicine, technical sciences, environment-ecology, neurosciences and behaviour, pharmacology and toxicology and physics[21]. The significant increase in the quality of Czech publications in the given period has been most apparent in neurosciences, psychiatry/psychology, humanities, physics, economy and trade[22]. The above-average cited fields classified by detailed Subject Categories are summarized in chart C.10. The TR puts publications in highly cited prestigious periodicals such as Science or Nature into the most cited multidisciplinary category. The high citation rate and the share in the global production comparable to other fields show that the level of the Czech top R&D is comparable with the global top. Among the most cited fields are two medical fields: Rheumatology and General Medicine, which however belong to fields with a rather smaller share in the global scene. An absolutely extraordinary position in Czech R&D belongs to nuclear research: Nuclear Physics and Nuclear Sciences and Technology achieve both a high citation rate and a large share in the global scene. Publications in these fields are also included in the above-average cited category Instruments and Instrumentation. Fields with a relativelt high representation of Czech publications with high citation rate include Spectroscopy, where several fields overlap – analytical chemistry, physical chemistry and nuclear chemistry and high energy physics. The highest citation rate of humanities and arts has been achieved by Slavic Literature (1.411), where Czech authors represented 14% of global publications.

[21] The amount of publications within multidisciplinary groups is 10 a year at most. The only highly cited publication in a prestigious periodical such as Science or Nature could cause high year-on-year fluctuation.

[22] The field classification Essential Science Indicators defines an independent field economy and trade, although economy belongs to the humanities group.

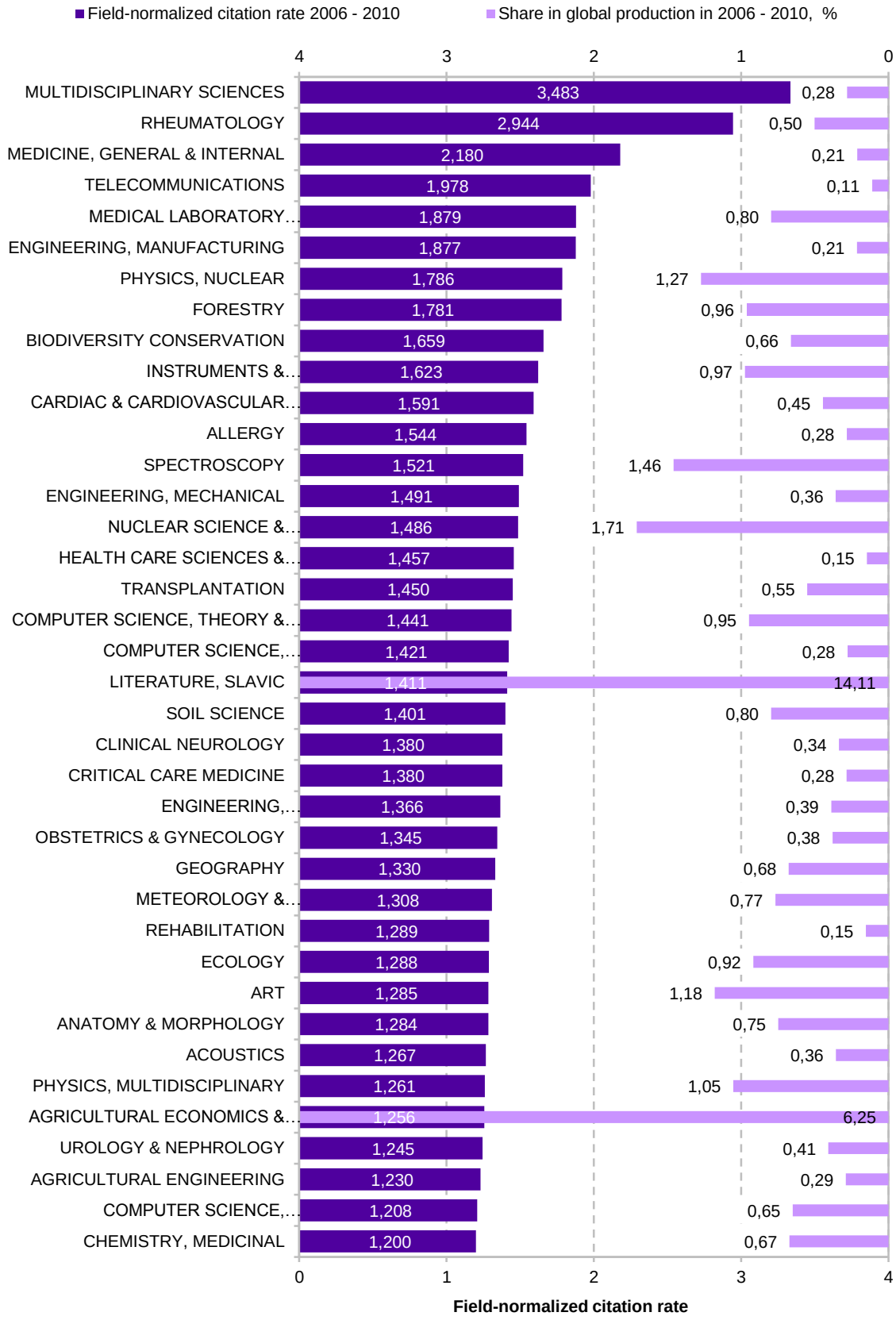
Chart C.9: Field-normalized citation rate of Czech publications in 2006-2010



Note definition of Multidisciplinary fields see note for Chart C.8
Source: Thomson Reuters Web of Science, InCites

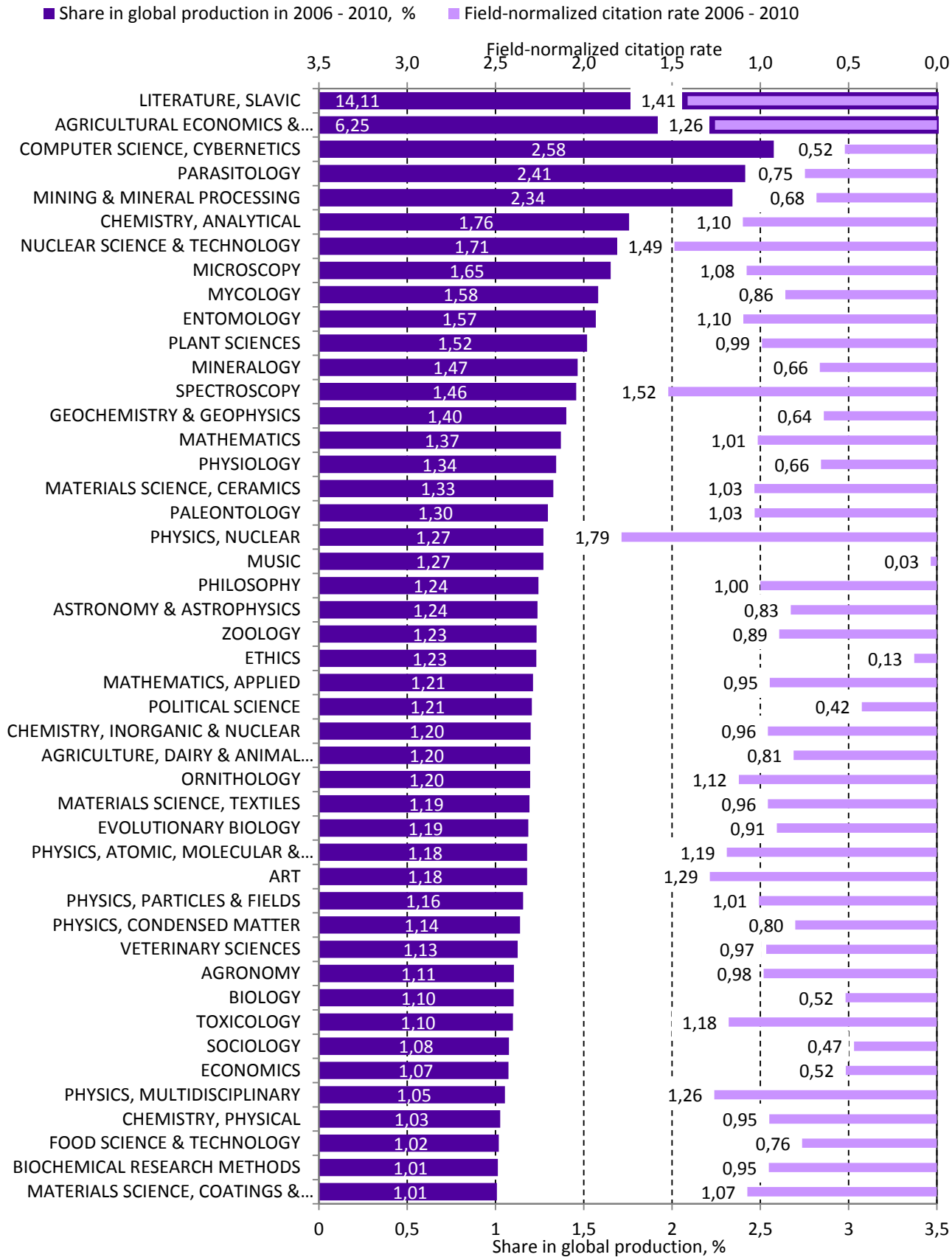
With the exception of entomology, geography and agricultural economy and politics the fields, the publication activity of which increased by 10% and more a year, belong to average and below-average cited fields (chart C.11). A completely exceptional field is General Medicine, which achieves an above-average citation rate and share in Czech publications and it also belongs to rapidly growing fields.

Chart C.10: Fields with above-average citations in 2006 – 2010 and the Czech share in the global production



Note: selection criteria: average field-normalized citation rate equal or greater than 1.2 and the number of records at least 25. Definition of Multidisciplinary fields see note for Chart C.8
Source: Thomson Reuters Web of Science, InCites

Chart C.11: Fields with the fastest growing share in the total number of Czech publications



Note: Selection criteria: Minimum number of records 25 and average annual growth 4 %
Source: Thomson Reuters Web of Science, InCites

Relative citation indexes and the publishing activity by author groups

Since the start of the previous decade there has been a significant increase in the number of specialist publications of authors outside the AS CR. The number of publications with at least one co-author from universities increased 3.5 times. The number of publications created outside AS CR and universities[23], registered in WoS, increased at almost the same rate (3.3x). When assessing the dynamics of publishing activities of this heterogeneous group it is necessary to bear in mind the relatively low base value of the year 2000, which was a mere one third of the number of publications created by universities. The development of the number of publications in periodicals, which meet the WoS selection criteria[24] indicate a significant improvement of R&D activities in the university sector. The growth of the publication activities has been accompanied by an increase in the citation rate, which in 2008 exceeded the global average by 5%. The publishing dynamics and field-normalized citation indexes are summarized in the chart C.12. The publishing activity of the AS CR doubled during the last decade and since the half of this decade the average citation rate reaches almost 120% of the global average.

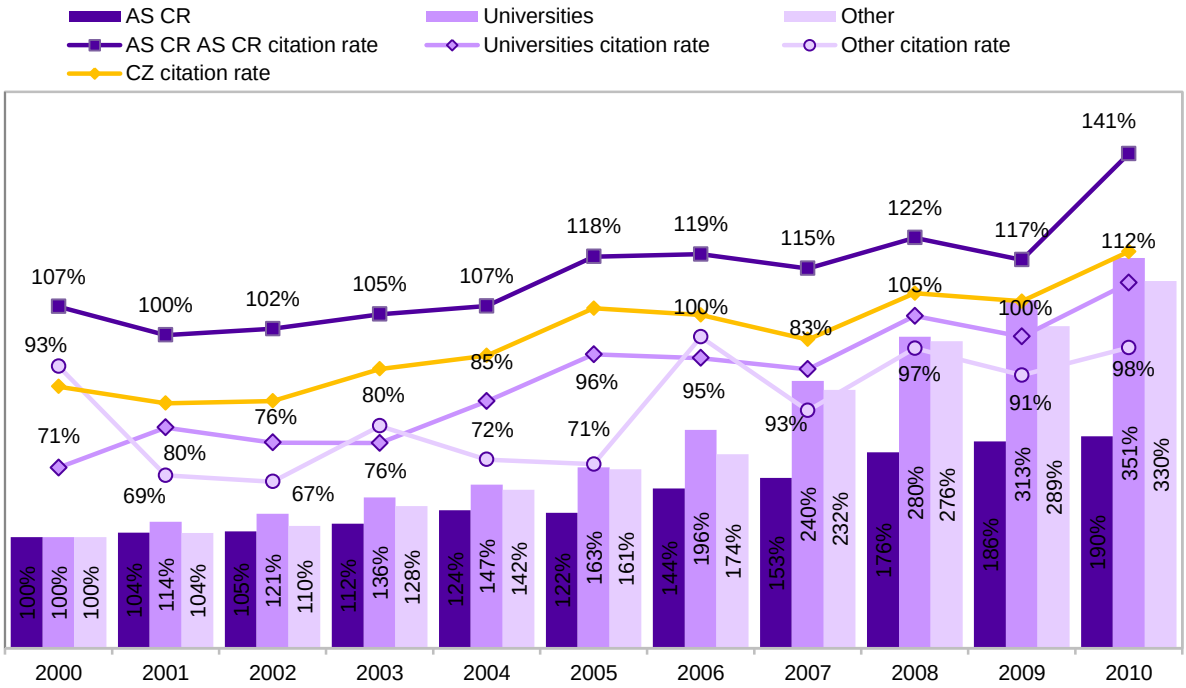
If we compare the relative stagnation of the overall number of records in RIV in the J category with a significant increase of the publications registered in the WoS, it is apparent that the publishing of Czech R&D results increasingly shifts to periodicals with global reach.

Comparison of citation rates between the listed groups demands considerable care. The number of impact publications could be too low, which might cause fluctuation of the citation rate in the group of other authors. Field normalization of the citation rate removes the interdisciplinary differences in citation frequencies and habits, but generally in scientometric comparison it isn't possible to reflect e.g. the higher focus of university R&D on application sphere and issues related to the national environment, which, regardless of the R&D quality, brings lower citation rate by the global community. Inclusion of Czech specialist periodicals into WoS due to them meeting selection criteria could paradoxically lead to a decrease of the citation rate as a result of their stronger focus on national environment.

[23] The group Other includes organizational units of the state, state contributory organizations, public research institutions outside AS CR (PFI) and other legal and natural persons (LNP), see chapter C.1.2

[24] http://thomsonreuters.com/products_services/science/free/essays/journal_selection_process/

Chart C.12: Number of publications relative to the year 2000 and field-normalized citation indexes of the author groups



Note: Joint publications by authors from different groups are counted as full publications in each group. Medical facilities with the "faculty" status are included among other authors. Due to the fact that the co-authors of publications by authors from faculty medical facilities are usually parent universities, this classification didn't influence the final citation rate nor the number of publications by universities.
Source: Thomson Reuters Web of Science, InCites

C.3 Patents, utility models and their licensing

As well as statistics measuring the inputs of science and technology (funds and human resources in R&D) there are also indicators of the production of new knowledge in the form of outputs usable in practical applications such as innovation or patents and utility models. Patent data provide information about the results and success of the R&D activities in selected areas of technology, dissemination of scientific knowledge and economic attractiveness of the monitored territory. In the Czech Republic the patent protection is ensured by the Industrial Property Office (IPO). Statistical data about patents in various classifications according to the OECD Patent Manual are published by the CZSO in cooperation with IPO (more on methodology in appendix F.1).

Industrial law protection isn't usually the goal by itself, but only a method to gain financial income or other form of benefit from the results of the R&D activities or items of industrial property (patent, utility model etc.). To realize this commercialization of industrial law and intellectual property a license agreement is used. Other method of commercialization of results is own production and sale of innovative products. The CZSO monitors data on provided and granted licenses since 2005 via the annual survey on licenses (Lic 5-01). The aim of this survey is to discover the number of license agreements that grant the rights for one of the industrial property protections (patent, utility models, know-how, industrial patterns, new varieties and breeds) valid in the Czech Republic and the value of received license fees for granting such right. The most important in terms of dissemination of R&D results and their financial value (commercialization) are licenses for patents or utility models, which are also the focus of the CZSO survey.

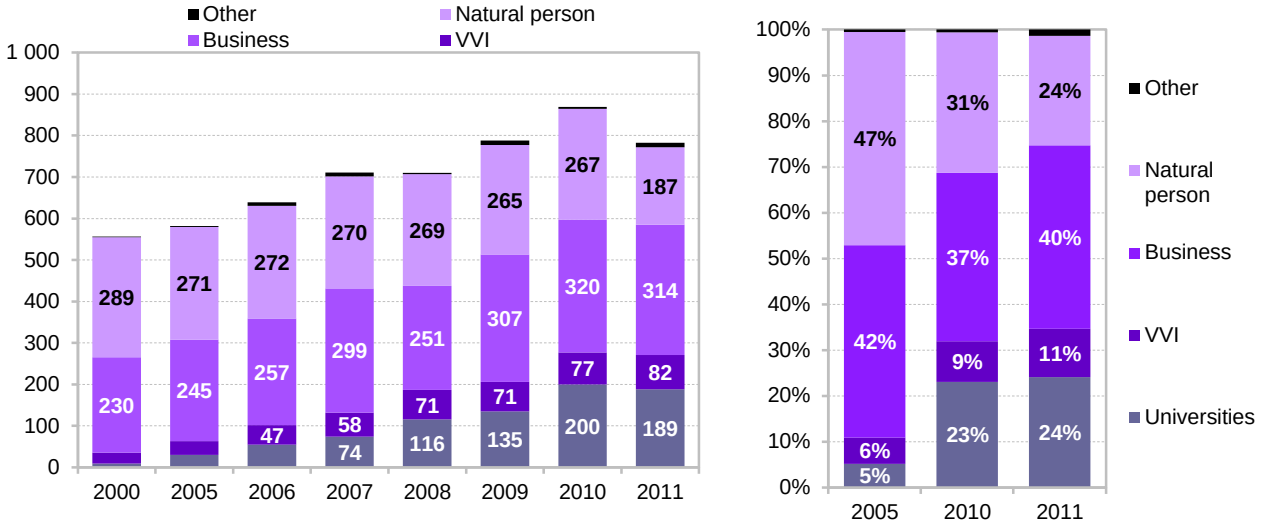
Patent applications submitted in the Czech Republic by domestic applicants to IPO [25]

In 2011 there were a total of 782 applications filed by domestic applicants with the UPV, i.e. 200 more than in 2000 but 87 less than in 2010. The increase in the number of application has been steady from 2005 until 2010. In 2011 there has been a year-on-year decrease by 10%. In total there have been 5 082 patent applications filed by domestic applicants between 2005 and 2011.

Not only did the number of applications grow since 2005, but also the structure of submitted patent applications by applicant type changed significantly. Individual groups of applicants contributed with various amounts. While in 2005 there have been a 30 (5%) applications from universities and 34(6%) from public research organizations, in 2011 the public research organizations filed 82 (11%) and universities 189 (24%) applications with the IPO. This was probably caused by the changes in evaluation methodology for allocation of funds to these institutions.

[25] Since 2002 the foreign applicants have an option to file the patent application with the European Patent Office with the option of subsequent validation for the Czech Republic territory through the UPV. This is the reason why the number of application filed by foreign applicants directly in the Czech Republic decreased significantly (from 4 400 in 2001 to 100 in 2011). Therefore the CZSO doesn't monitor data on the number of submitted patent applications by country of the applicant anymore.

Chart C.13: Patent applications at IPO submitted by domestic applicants



Source: IPO and CZSO calculations

Of the total 314 applications filed by businesses in 2011 to IPO more than two thirds came from domestic businesses and less than one third came from foreign-owned companies. 187 patent applications were filed by natural persons, which is 82 less than in 2005.

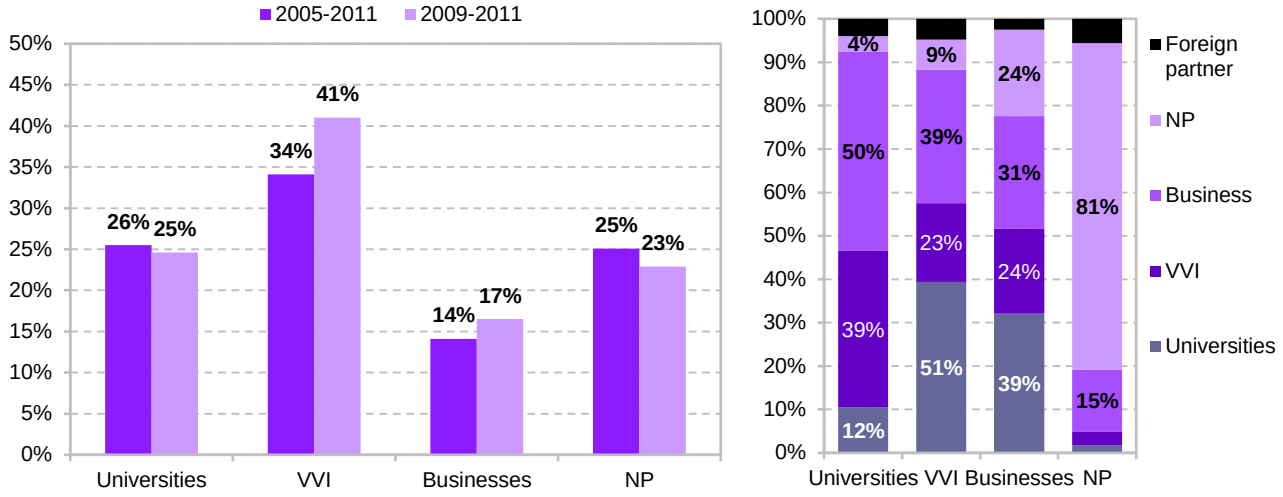
Within the public research institutions in the same year half of the submissions came from AS CR sites and half from departmental research institutions. As for individual institutions, within the university sector the largest part (1/4) of patent applications in the monitored period 2005-2011 came from the Czech Technical University in Prague and 10% each from Technical University in Liberec, Technical University of Ostrava, Institute of Chemical Technology in Prague and Technical University in Brno. 17 of 26 universities submitted an application in 2011 (in 2005 it was 11). In the public research institutions group the highest share of applications came from the Institute of Animal Science (14.5%) and in total 33 institutions out of 73 submitted an application (19 in 2005).

Although the number of granted patents (see below) is considered the primary indicator of industrial property protection, it describes the situation in R&D with a 3-5 year delay. Therefore detailed information about patent activities of domestic subjects regarding their cooperation, high-tech branches or participation of women will be examined only within patent applications. Similar information for granted patents and utility models can be found in the table appendix.

Cooperation in the area of patent protection

Most of the patent applications by domestic applicants are submitted independently. The share of applications submitted in cooperation with another subject was 15% in the 2005-2011 period and didn't significantly change in time. Although with the increasing total number of applications the number of those submitted in cooperation with other subjects increases as well. The share of applications submitted by more than one applicant for individual applicant types from the Czech Republic is shown in the following chart C.14. Particularly apparent is the high ratio of cooperation in the public research institution group. Also interesting is the higher cooperation rate of natural persons than of universities. Also not surprising is the low share of cooperation of businesses. The share of cooperative applications submitted in the monitored period almost doesn't change. Both between 2005 and 2008 and in the following 3 years their share was around 15%, although it increased in absolute values.

Chart C.14: Patent applications filed to IPO between 2005 and 2011 by cooperating domestic applicants



Source: CZSO 2012 according to IPO and CZSO calculations

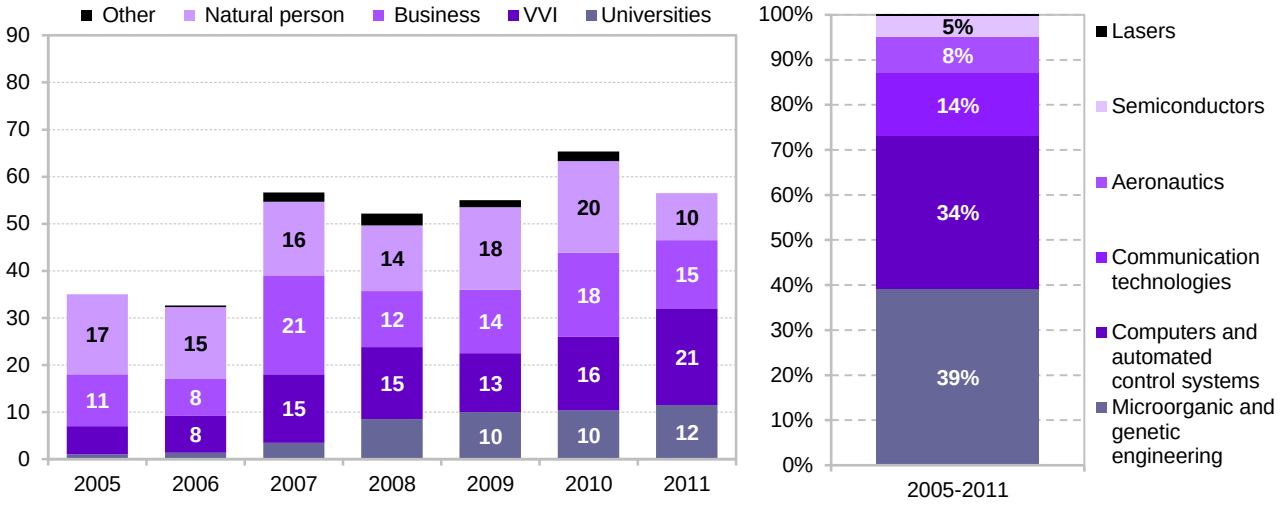
Partners according to the applicant type are shown in the second part of the chart above, which again contains data for 2005-2011. As is apparent from the chart, there were significant differences between individual types of applicants. Cooperation of natural persons has been very narrowly focused within the monitored period. Cooperating subjects were mostly other natural persons. A common phenomenon for other applicant types was the relatively high cooperation with businesses, which was more significant at universities than public institutions. Another notable fact is that the universities cooperated more often with public institutions than with other universities. Similar fact is valid for public research institutions, which cooperated more with universities than with each other.

Patent protection in high-tech

One of the ways how to deduce the quality of patent protection apart from the license fees or patent citations (sources Eutostat and OECD) is the information about the share of patent applications that belong to the so-called advanced (high-tech) technologies. These dada were processed by the CZSO based on the international patent classification and definitions liseted in the above mentioned OECD Patent Manual. Apart from the so-called high-tech patents group, which is further divided into six sub-groups (communication technologies, lasers, aeronautics, micro organic and genetic engineering, computers and automated control systems and semiconductors), the CZSO processed data for the following technical groups: ICT, biotechnology and renewable sources.

Czech applicants submitted a total of 353 patent applications in high-tech fields (7% of all patent applications) to IPO within the 2005-2011 period. The number of high-tech applications hasn't changed much in the past five years and oscillates around 60 applications a year. As in the case of the total amount of submitted patent applications the high-tech patents show a growing importance of universities and public research institutions. In 2011 these two types of applicants contributed 56% of all high-tech applications. While the universities filed a total of 46 applications since 2005, the public research institutions submitted twice as many (92). If the share of high-tech applications in the total number of patent applications has been around 20% for public research institutions since 2005, for other applicant types it has been only 5%.

Chart C.15: Patent applications filed to IPO by domestic applicants in the high-tech field



Source: CZSO 2012 according to IPO and CZSO calculations

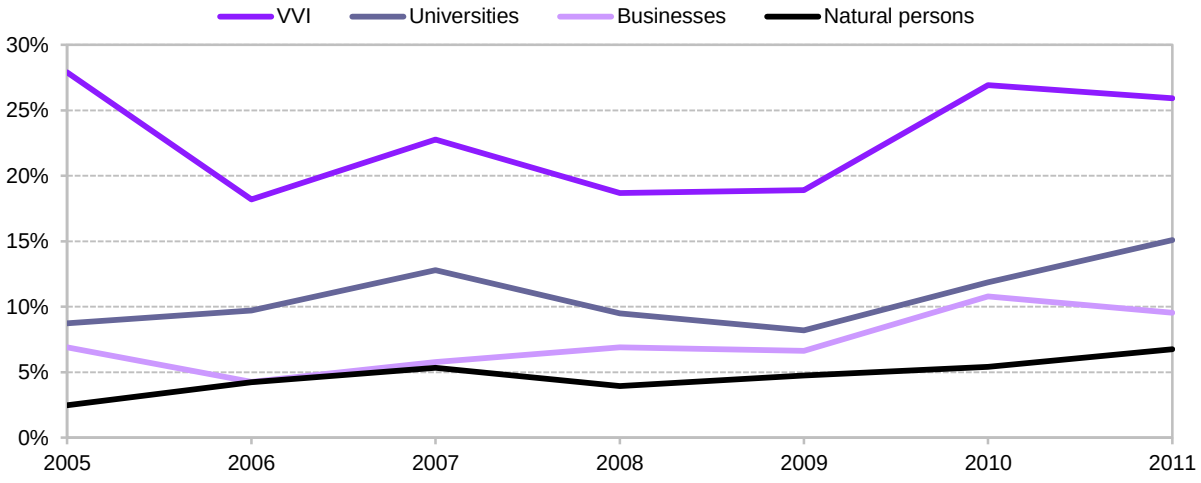
As for individual fields monitored within the high-tech category the data show that in the Czech Republic the dominating fields are Micro-organic and Genetic Engineering and Computer and Automated Control Systems. While the Computer and Automated Control Systems field is prevalent for businesses and natural persons, the Micro-organic and Genetic Engineering field is more significant at public research institutions.

In 2005-2011 the domestic applicants submitted a total of 731 patents from the ICT field, most of which (475) belonging to the "other ICT" category including mostly measuring and testing. Other 129 applications were from the biotechnology field and only 32 from the renewable sources field.

Women as owners of patent protection

The author of a discovery, which is registered in the patent proceedings, is always a natural person who created it by its creative work. The share of women as authors of discoveries in submitted patent applications is very low in the Czech Republic in the long term. Women submitted only 8.4% of all applications submitted by Czech applicants in the 2005-2011 period. In time the share increased to 12% in 2011. Similar to other indicators there are apparent differences between individual applicant types. In the business group the share of women was 7.4%. It was even lower for natural persons (4.6%). The situation was slightly better in public research with 11.5% of university applications submitted by women. The highest share of women, almost ¼ (22.7%) was in the public research institutions group.

Chart C.16: Share of women in the number of patent applications at IPO by domestic applicants



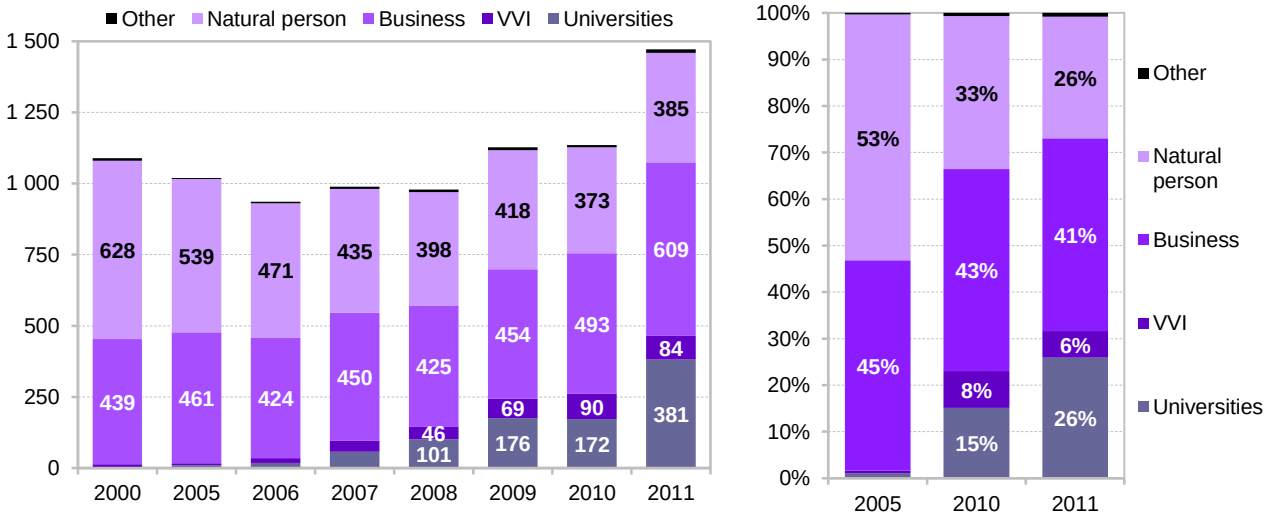
Source: CZSO 2012 according to IPO and CZSO calculations

Utility models recorded in the Czech Republic for domestic applicants

Despite patents being the traditional and at the same time the most important legal protection of technical solutions and discoveries, a relatively large part of technical solutions in the Czech Republic is protected by a utility model[26]. This type of protection is popular among individual applicants, mainly due to the lower prices and faster proceedings. This type of protection has been increasingly used also by the other applicant groups in recent years.

In 2011 there has been a significant increase in the number of recorded utility models at IPO. While in 2010 there were 1 136 recorded utility models, in 2011 there were 1 472, which represents almost 25% increase. The largest contributors were universities and businesses. In 2010 there were 172 utility models recorded for universities, a year later it was 381. This number also represented more than one quarter of all recorded utility models in 2011 by domestic applicants. A total number of 7 658 utility models were recorded during the monitored period, i.e. 2005-2011.

Chart C.17: Utility models registered at IPO to domestic applicants



Source: CZSO 2012 according to IPO and CZSO calculations

Even more apparent than in the case of filed patent application is the structural change in of registered utility models according to applicant type. In 2005 there have been only 10 utility models registered for universities compared to 381 in 2011. The share of universities thus increased from 1 to 26%. A significant increase can be seen in the public research institutions, where the number of registered utility models increased from 7 in 2005 to 84 in 2011[27]. In 2011 the highest number of utility models were registered for the Czech Technical University (74) followed by the Czech University of Life Sciences (67). Similar to patent

[26] While in the case of patent application the discovery is examined whether it matches the required criteria (novelty, research work and industrial use) the registration of a utility model is performed based on a registration principle, on average within 2-3 months after application submission. A large difference between patents and utility models is the amount of financial costs of receiving and maintaining the protection. The costs of utility model's registration is 1 000 CZK, which includes maintenance costs for the first 4 years. Costs of patent proceedings are much higher (ca. six times).

[27] One of the reasons for this increase might be (similar to patent applications) the system of allocation of R&D funding, which is mostly based on the evaluation of its results (the sum of points awarded for created publications, patents, prototypes, software etc.). The above mentioned system is very advantageous particularly for utility models applicants. Although the proceedings is much faster and cheaper than the patent one, the owner of the registered utility model receives the same amount of points (40) as in the case of an awarded patent.

applications the number of universities submitting applications increased from 2 in 2005 to 17 in 2011. Similar characteristic is valid for public institutions, whose count increased from 3 to 25.

Despite the outlined changes the utility models remain mainly the domain of businesses, which registered 610 models in 2011 (42% of all registered utility models). The natural persons group registered an absolute decrease of registered utility models. In 2005 this group was the main type of applicant with 53%, however in 2011 their share was only 26%.

Both in cooperation and high-tech fields the shares of utility models were lower than those of patent applications. E.g. the share of high-tech utility models registered between 2005 and 2011 didn't reach even 5% of all registered models. The highest share of high-tech utility models has been registered by public research institutions (6.9%) in comparison to 4% by universities or businesses. The share of female authors was similar to patent applications.

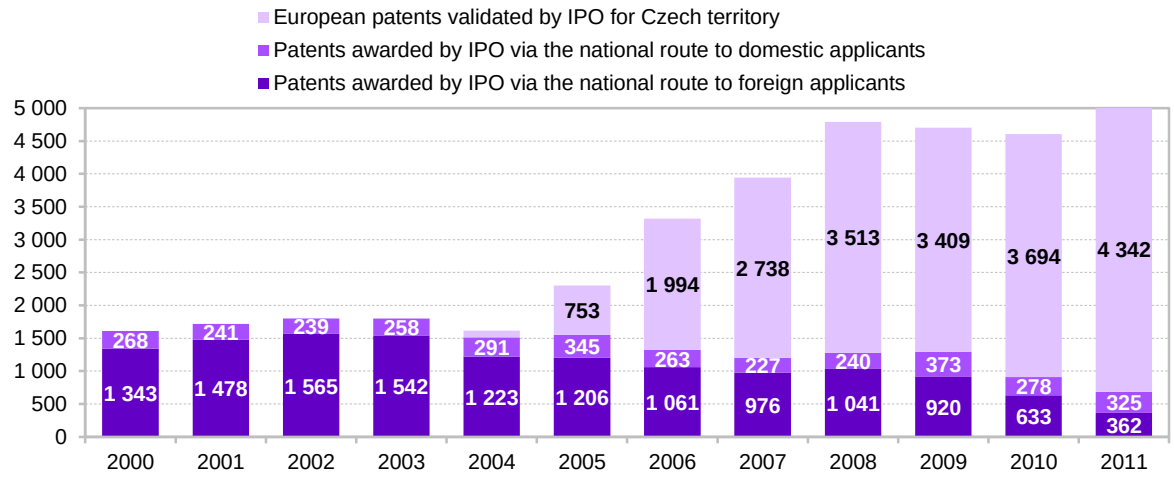
Patents awarded or validated by the IPO for the Czech Republic

Unlike the patent application or utility patterns in the case of awarded or validated patents the IPO should also monitor the number of patents awarded to foreign applicants and thus provide one of the indicators showing the economic attractiveness of the Czech Republic.

Methods of awarding patents valid for the Czech Republic territory

There are two ways a patent valid for the Czech Republic can be granted – by the IPO via the national route or by validating the patent applications for Czech territory (also done by the IPO). The possibility of validation exists since 2002 but came fully into practice after 2005 as is apparent from the following chart. In 2011 the patents validated for the Czech Republic made up 86% of all patents granted in this year. Apart from 15 patents all of the European patents were validated by the IPO to foreign applicants. Of the 687 patents granted via the national route 53% came from foreign applicants and only 47% were filed by Czech applicants.

Chart C.18: Patents granted (validated) by IPO sorted by method



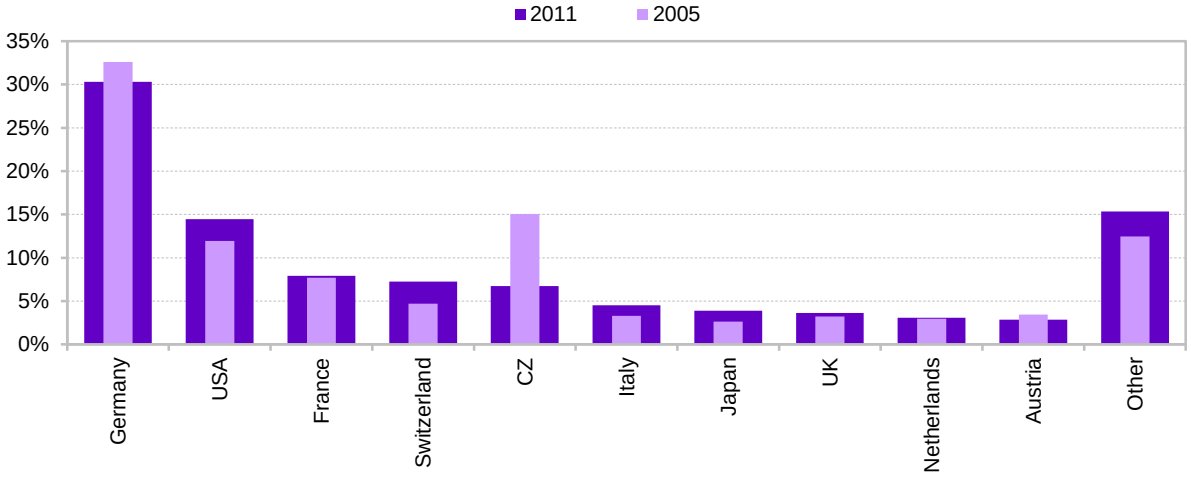
Source: CZSO 2012 according to IPO and CZSO calculations

Patents awarded by the IPO to foreign applicants

Almost 1/3 of all patents granted or validated in the Czech Republic in 2011 belonged to German applicants (1 542). After all, Germany has a long-term high share in patents granted in the Czech Republic. The second largest share belonged to the United States (14 %, 727); other significant participants were France (399)

and Switzerland (365). If in 2005 the domestic applicants had a 15% share in the granted patents, then in 2011 this share decreased to only 7%. [28]

Chart C.19: Structure of patents granted in the Czech Republic by country of the applicant



Source: CZSO 2012 according to IPO and CZSO calculations

Patents granted (validated) by the IPO to domestic applicants

Applicants from the Czech Republic were granted 340 patents by the IPO in 2011. During the last ten years no trend has been observed in the development of their number. In 2011 there has been an increase in the number of patents granted to domestic applicant by 15% (46), however this number doesn't reach the values achieved in 2009 or 2005[29].

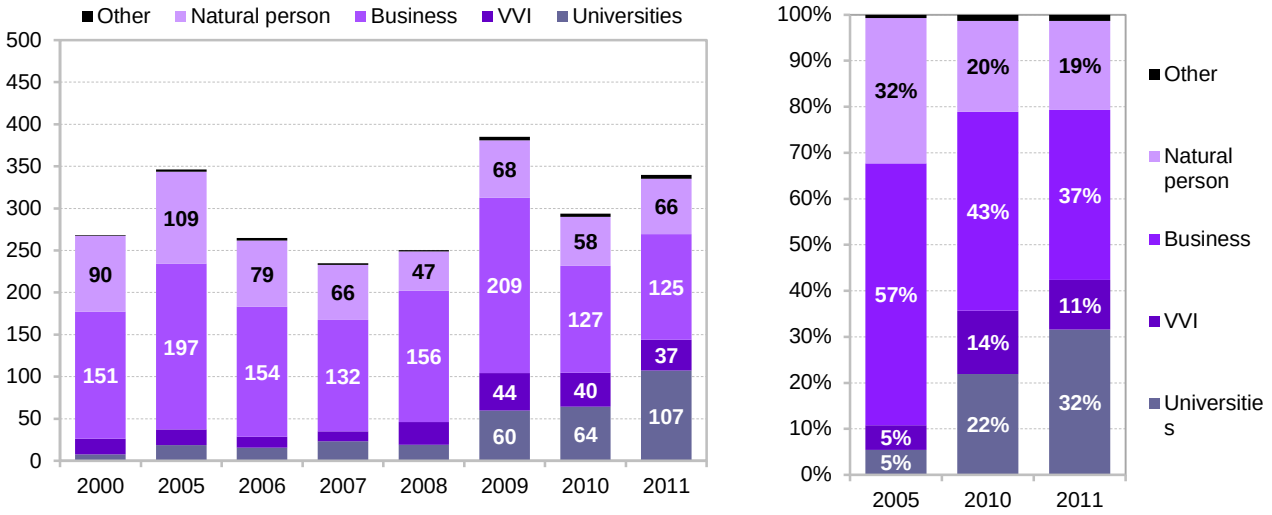
The structure of patents granted to applicants from the Czech Republic and their development in time are similar to patent applications. If in 2005 the natural persons had 1/3 share and businesses 57%, then in 2011 their share dropped to 19% and 37% respectively. Particularly in the last three years the number of patents granted to universities has increased and the share of patents coming from AS CR institutes increased as well. The highest number of patents in 2011 has been granted to businesses (125) but universities came second with 107 patents and a 32% share.

In the 2005-2011 period the domestic applicants received 110 patents (5.2%) out of the total of 2 116 patents in high-tech fields, particularly in micro-organic and genetic engineering (73). In the same period 228 patents from the ICT field have been granted to domestic applicants; however 173 of those were from the "other ICT" group, 64 in the field of biotechnology and 24 in renewable sources.

[28] The decrease in the number of domestic applicants between 2005 and 2010 was caused to some extent by the already mentioned possibility of validation of European patent applications.

[29] Based on the data on the number of patent applications submitted to IPO, the average period from filing an application to granting the patent and the success rate of individual applicant types it is possible to estimate the development of the number of patents granted to domestic applicants within the next three years. In 2012 and 2013 it is possible to expect an increase of awarded patents in the Czech Republic to domestic applicants, particularly to universities.

Chart C.20: Patents granted to domestic applicants in the Czech Republic



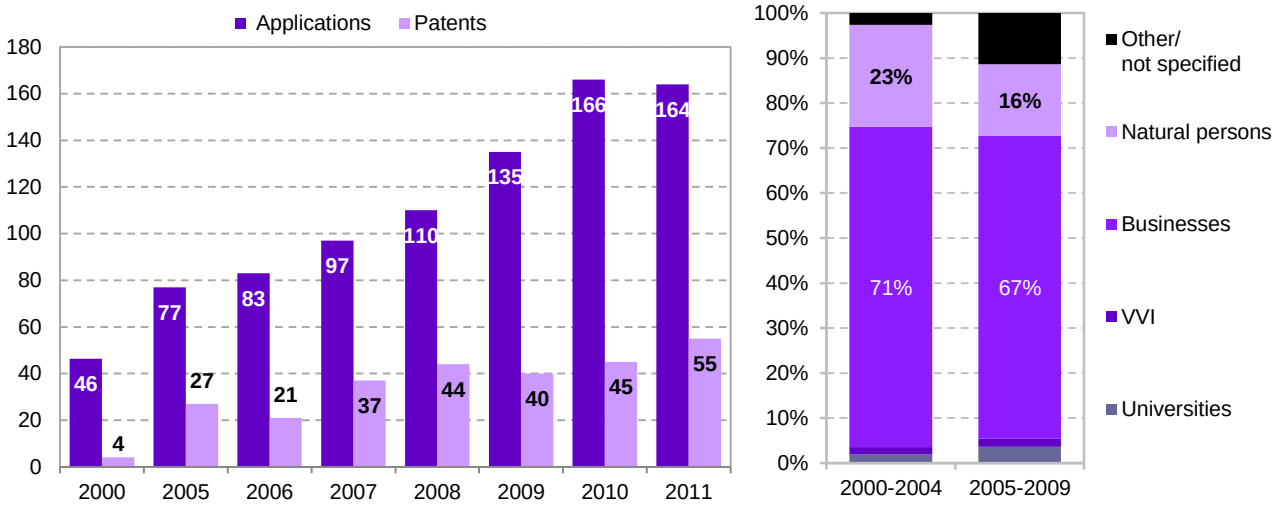
Source: CZSO 2012 according to IPO and CZSO calculations

Czech applicants at international patent offices

Apart from the information provided by the UPV there is information available on the patent applications granted by the EPO. EPO grants "European patents", which are valid in all its member states in which the holder has validated his rights. European patents grant their holders the same rights as he would gain via the national route.

Between 2005 and 2011 Czech subject filed 832 patent applications with the EPO; however this number made up only 0.08% of all applications filed with EPO in this period. E.g. Austrian or Danish applicants filed 10 000 applications, the Dutch filed almost 50 000 and the German applicants almost 180 000 applications. In 2011 Czech subjects filed 164 applications with EPO, which equals 16 per one million inhabitants. This value is still way below the EU27 average (128 applications/million inhabitants in 2011); however the number of applications filed by Czech subjects with EPO has been growing over the recent years. Together with the number of applications there has been an increase in the number of patents granted by the EPO as well. While in 2005 Czech applicants were granted only 27 patents, in 2011 it was 55 patents.

Chart C.21: Patent applications and patents granted by EPO to Czech applicants



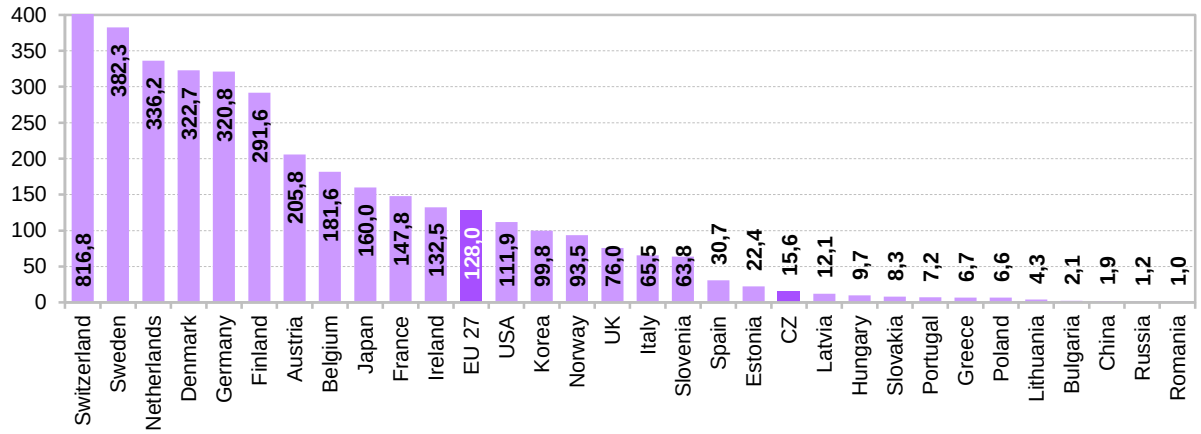
Source: EPO

During the whole monitored period most of the applications filed by Czech applicants with EPO came from the business sector - 280 applications between 2004 and 2007. Natural persons filed 84 applications (22%), 9 applications came from the government sector and 5 from the university sector.

International comparison

As stated above, Czech applicants filed 164 applications with EPO in 2011, which was less than 0.1% of all applications and equaled 16 applications per million inhabitants. Within EU27 there were 64 000 patent applications, which equals 45% of all applications filed with the EPO (128 applications/million inhabitants). In 2011 the USA had a 25% share in all applications filed with EPO (same as in 2005) and Japan almost 14% (17% in 2005). As for the European states highest number of applications came from Germany (18%), followed by France (6.8%) and Switzerland (4.5%). If we relate the applications to the number of inhabitants, we'll see that Switzerland has the highest value with more than 800 patents per million inhabitants. High values of more than 250 applications per million inhabitants were recorded in Denmark, Luxembourg, Germany, Finland and Sweden.

Chart C.22: Patent applications filed to EPO, 2011 (number per million inhabitants)



Source: EPO

As well as in the case of applications the highest number of granted patents goes to European applicants. 48 % of patents granted by the EPO have their origin within the EU27. USA was granted 22% of the patents and Japan 19%. Germany is again dominant within the European states with a 22% share.

Within the EU27 there were 59 patents granted by EPO per million inhabitants, which is more than twelve times as much as in the Czech Republic. Similar to patent applications, the highest number of patents were granted to Switzerland (323),), Germany (166) and Sweden (158).

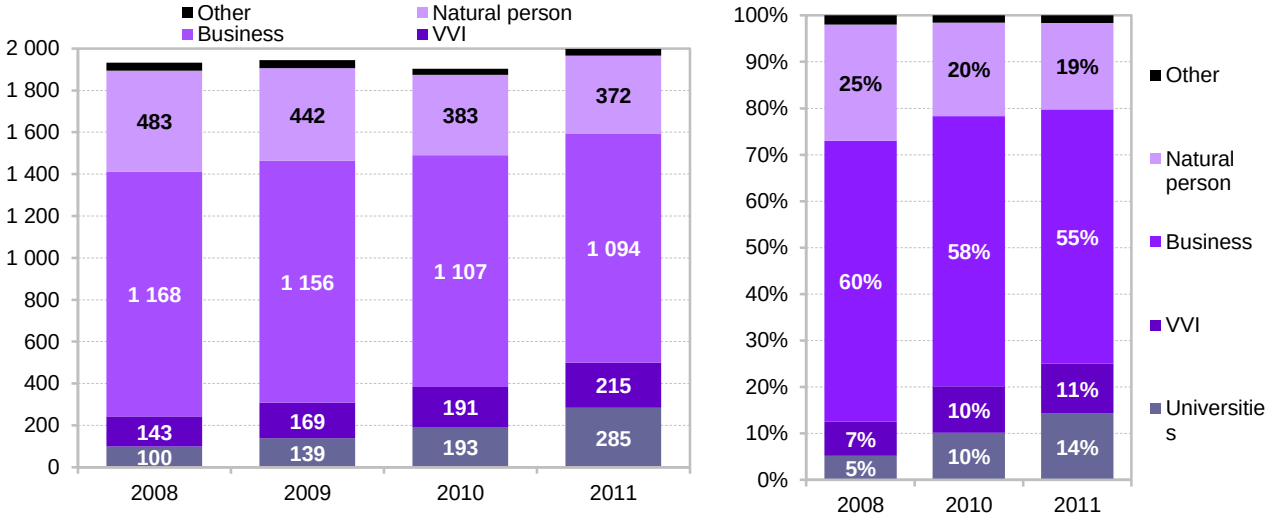
Patents valid in the Czech Republic as of 31.12.2011

Before we focus on the licenses themselves, we need to deal with the patents valid in the Czech Republic granted to Czech applicants. That's because the license can be granted only for valid patents and the survey on patents is being sent also only to patent holders. Since 2000 there have been 37 000 patents granted or validated for the Czech territory.

As mentioned above, patent grants legal protection of the invention for 20 years, however only if the fees are paid. Apart from patents granted the number of valid patents is also an important indicator. By 31st December 2011 there were almost 26 000 valid patents. Domestic applicants had a 7.7% share[30].

At the end of 2011 Czech applicants held 1 998 valid patents. Even though the amount of valid patents held by Czech applicants didn't change much, the structure according to applicant type changed similarly to other indicators. While at the end of 2008 the share of public universities and research institutions was 5% and 7% respectively, at the end of 2011 their shares were 14% and 11%. On the other hand the shares of natural persons and businesses dropped from 25% and 60% in 2008 to 19% and 55% at the end of 2011.Most of the 215 patents in public research institutions belonged to the AS CR institutions (165).

Chart C.23: Patents valid as of 31.12. of the monitored year in the Czech Republic belonging to domestic applicants



Source: CZSO 2012 according to IPO and CZSO calculations

In the case of public research institutions 13% of valid patents were owned by the ASCR Microbiology Institute, followed by three institutions with 10% each: ASCR Institute of Organic Chemistry and Biochemistry, ASCR Institute of Macromolecular Chemistry and the Research Institute of Animal Science. As for universities one third of valid patents belongs to the Czech Technical University in Prague and 14% to the Institute of Chemical Technology in Prague.

As mentioned above, patent grants legal protection of the invention for 20 years, however only if the fees are paid. The amount of the fees is scaling to the length of patent duration. In case of domestic applicants only 10% of the valid patents in 2011 were older than 10 years. In case of universities these patents made up only 1%. On the other hand, almost one half (45%) of patents were registered less than 3 years ago, in case of universities it was even 80%. This is due to the fact that the patent activity of universities increased only in the recent years – see previous chapter.

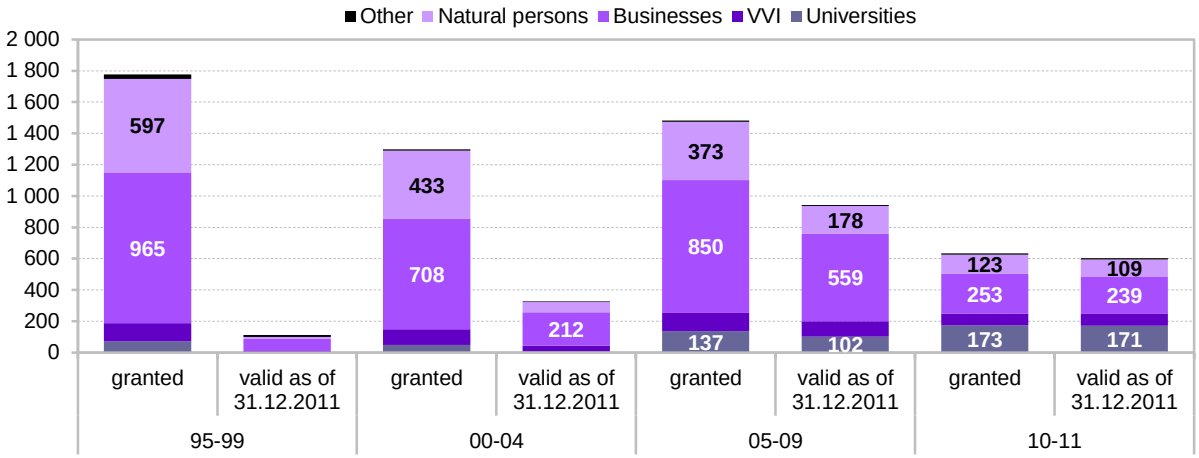
It is logical that all patents granted in 2011 were valid at the end of the year; however the situation is quite different in the case of patents granted in earlier years. As we go further in the past the fewer patents are still valid. If at the end of 2011 3/4 of the patents granted in 2008 were still valid, then only 47.5% of those granted in 2005 and 13.2% of those granted in 2000 were still valid[31]. Based on the number contained in

[30] Almost 1/3 (32%, 8 200) of valid patents are owned by German applicants. Applicants from USA hold 12.2%, France 8.8% and Switzerland 7.8%.

[31] It is interesting that these values are much higher for foreign applicants. E.g. as of the end of 2011 ¼ of patents granted in 200 were still valid.

the following chart it is possible to state that the lowest probability of long-term payment of patent fees exists for natural persons. Only 7.6% of patents granted to natural persons between 1995 and 2004 were still valid (79/1030). Percentages of valid patents from the same period are 9.3% (11/121) for universities, 17.4% (291/1674) for businesses and 19.7% (42/214) for public research institutions.

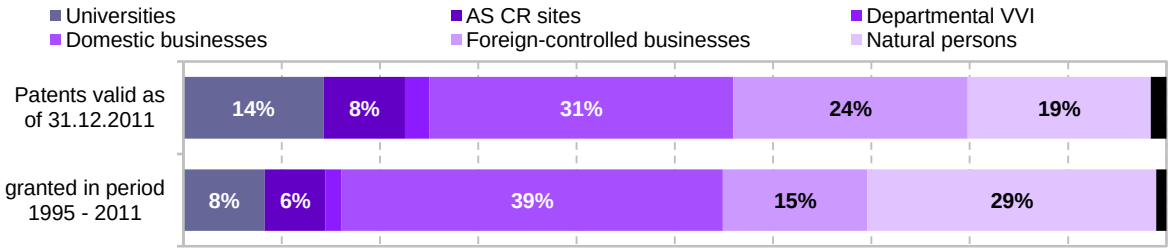
Chart C.24: Patents valid in the Czech Republic as of 31.12.2011 granted to Czech applicants by date of granting



Source: CZSO 2012 according to IPO and CZSO calculations

If we compare patents valid by 31.12.2010 and patents granted between 1995 and 2010 by applicant type, we can see that while 29% of the patents were granted to natural persons, they had only a 19% share in valid patents. The share of domestic companies also decreased from 39% and had only a 31% share in valid patents. On the other hand the foreign affiliations who received only 15% of all patents during 1995-2011 had a 24% share in 2011. The above mentioned statement is due to the higher patent activity of natural persons and domestic companies prior to 2005 than in the last years. On the other hand the increase of the foreign affiliations and universities is due to their higher patent activity in recent years.

Chart C.25: Patents valid in the Czech Republic as of 31.12.2011 granted to Czech applicants by applicant type



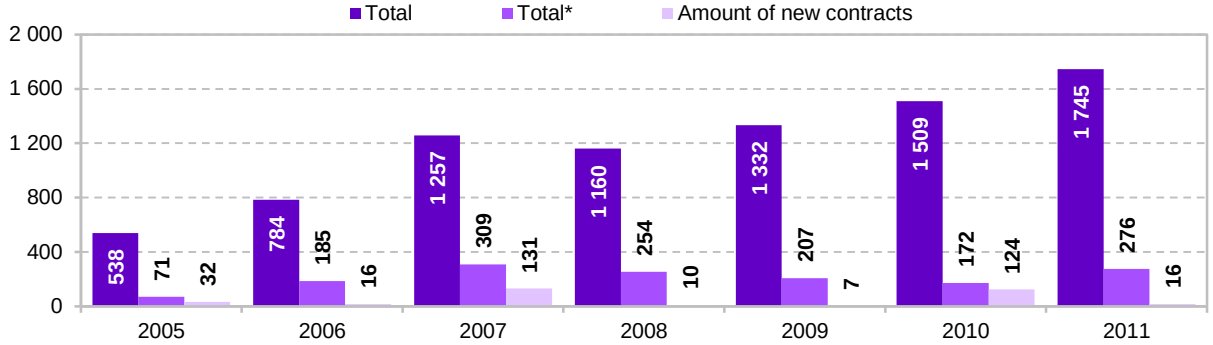
Source: CZSO 2012 according to IPO and CZSO calculations

Licenses for patents and utility models

By signing a license agreement the provider (owner of the rights of the given industrial property) entitles the acquirer within agreed scope and territory to enjoy the rights of the patent, utility or industrial model or from a trade mark that he owns. On the other hand the acquirer is bound to provide financial or other pecuniary consideration. The license therefore provides the acquirer the right to enjoy industrial rights, i.e. for example to produce an invention protected by a patent and trade with produced goods. This right doesn't sell the license but remains in the ownership of the licensor.

In 2011 there were a total of 536 valid licenses in the Czech Republic granting the right to use an invention protected by a patent of utility model. These 538 licenses were provided by 107 subjects, half of which were businesses. In the same year the income from these licenses reached 1 745 million CZK. However, it is necessary to point out that according to publicly available information 84% of this amount belonged to the ASCR Institute of Organic Chemistry and Biochemistry[32]. This institute reached similar shares also in the recent years. 99 (18%) of the total number of licenses were provided in 2011. The average license fee per one license was 166 000 CZK.

Chart C.26: License fee income of subjects active in the Czech Republic from provided rights to use inventions/technical solutions protected by patents of utility patterns (mil. CZK)



*Note: * excluding license fees of the Institute of Organic Chemistry and Biochemistry*
Source: CZSO 2012, Annual license survey Lic 5-01

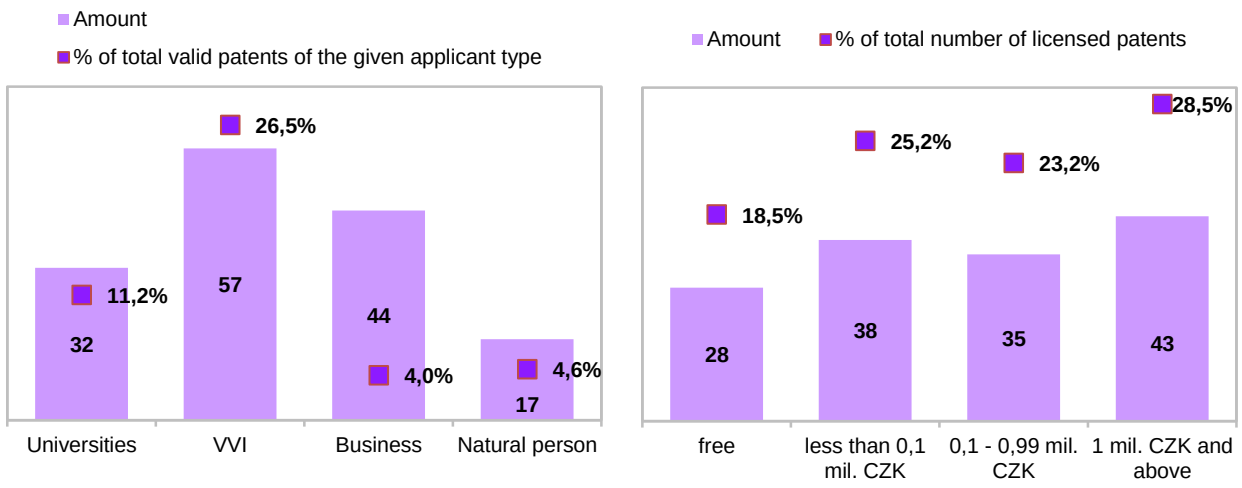
Also interesting are the numbers of providers of licenses to patents and utility patterns sorted by the amount of annual fees. In 2011 only 1/10 of the subjects received more than one million CZK and almost 40% of them provided their licenses without any fees. The next part of the chapter focuses on patent licenses.

Patent licenses

Out of 1 998 patents valid as of 31st December 2011 there were 151 (7.5%) licensed ones. The largest part of these licenses was related to patents, which were owned by public institutions, namely 57 licensed patents (38% of all licensed patents of Czech applicants in 2011), 47 of which were owned by ASCR institutes. 32 licenses were granted for patents owned by universities, 14 for patents owned by domestic companies, 16 by foreign affiliations and 17 by natural persons. Interesting is that while in case of public research institutions in 2011 every fourth patent has been licensed, in case of universities it was every 10th and in case of businesses and natural persons approximately every 20th. Even though the number of license patent reached 151 in the Czech Republic, only less than one third (43,29%) of those brought their owners more than one million CZK in license fees and one fifth was licensed without any fees.

[32] http://www.uochb.cz/web/structure/573.html?lang=cz

Chart C.27: Licensed patents in 2011 sorted by provider type and the amount of license fees

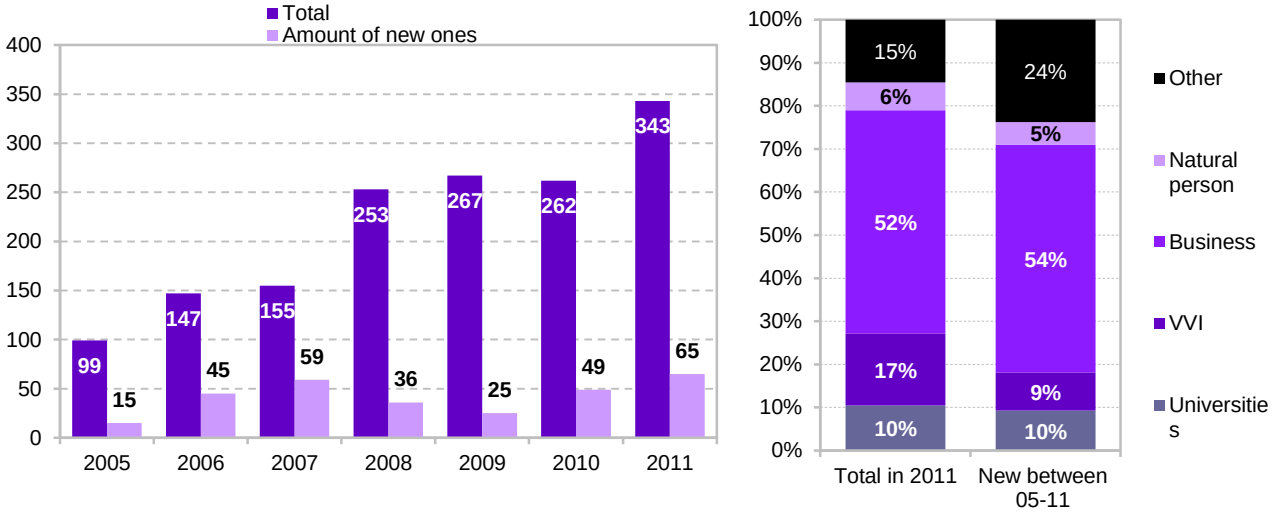


Source: CZSO 2012, Annual license survey Lic 5-01

As for patents with license agreement concluded for the first time in 2011 (newly licensed patents), their number reached 39 and these patents came from 24 various subjects. 9 of those were universities, 5 each public research institutions, businesses and natural persons. None of these patent's fees reached more than one million CZK. The following lines will focus on the number of licenses provided by subjects operating in the Czech Republic's territory and fees received from them since 2005.

In 2011 there were 60 subjects in the Czech Republic, which had a valid license agreement granting them the right to use an invention or technical solution protected by a patent. In total there were 343 provided patent licenses, 65 of those were newly concluded. The majority of provided patent licenses in the long term come from businesses; in 2011 it was 178 licenses (52%). The public research institutions provided 57 licenses (17%) in the same year. Within this group 47 licenses were provided by the ASCR institutes, 36 by universities and 22 by natural persons.

Chart C.28: Patent licenses granted by subjects from the Czech Republic

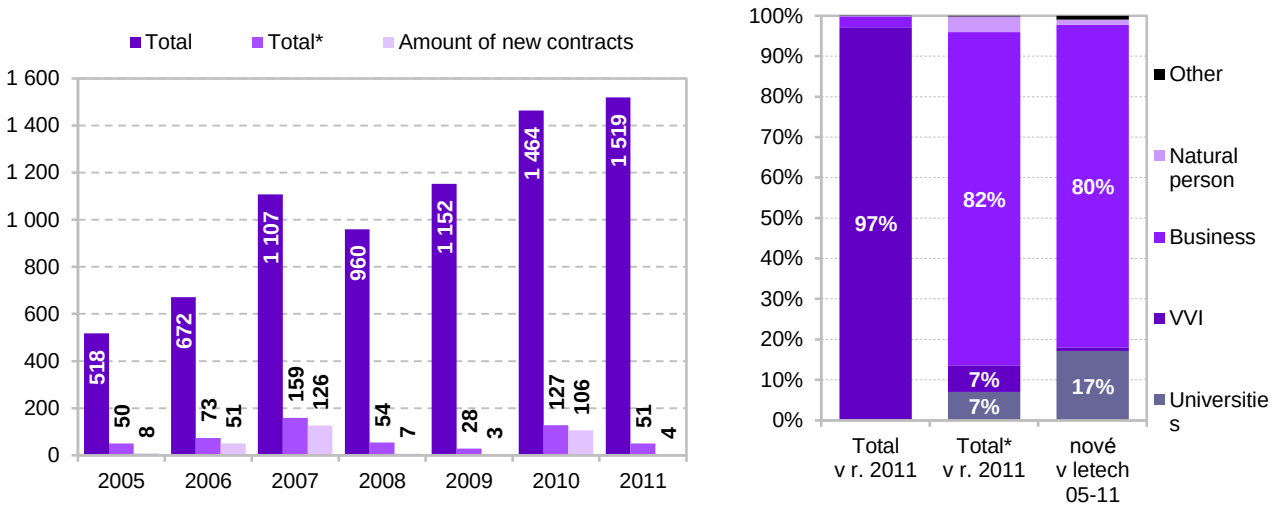


Source: CZSO 2012, Annual license survey Lic 5-01

In 2010 Czech subjects received almost 1.5 billion CZK from license fees; only 4 million were for new licenses. As stated above, most of the licenses are granted by the business sector, but the beneficiary of most of the license fees is the government sector, namely the AS CR and its institutes. In 2011 the business

sector received only 42 million CZK, which is less than 3% of all license fees in that year. The AS CR institutes received almost 1.5 billion CZK (97% of all received license fees).

Chart C.29: Income of Czech subjects from license fees for rights to use inventions/technical solutions protected by patents (mil. CZK)



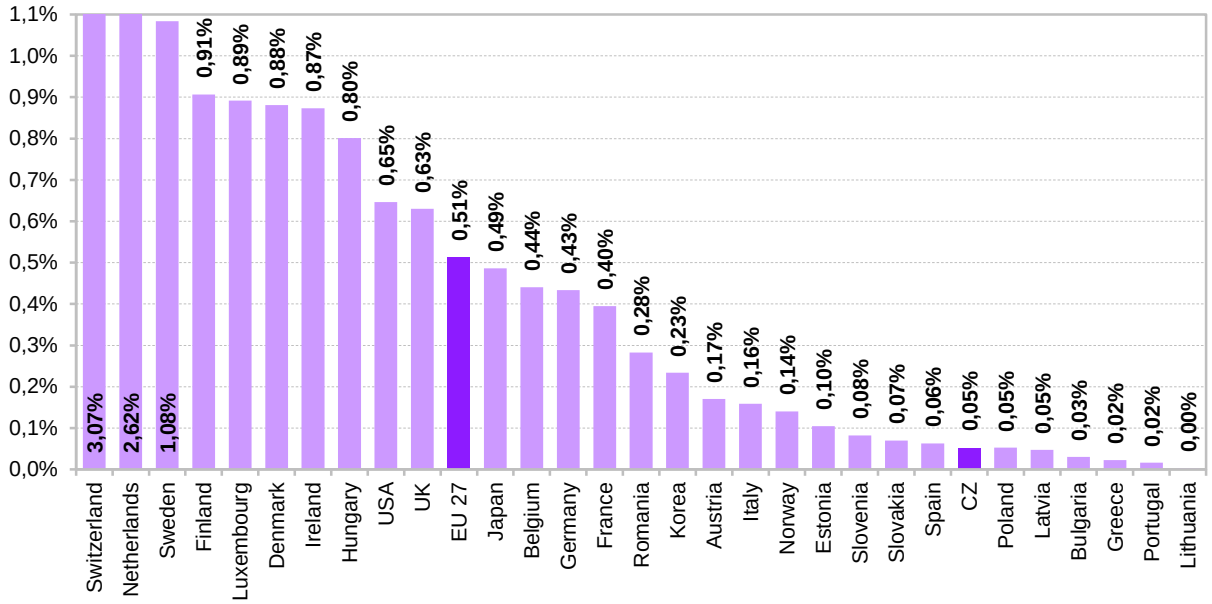
*Note: * excluding license fees of the Institute of Organic Chemistry and Biochemistry*
Source: CZSO 2012, Annual license survey Lic 5-01

International comparison

International comparisons of incomes, economic transactions with foreign countries, in the area of license fees and trademarks come from the data sources of Eurostat, gathered within the statistics of the balance of payments. The definition of services in the area of license fees and royalties comes from the extended classification of services EBOPS (Extended Balance of Payments Services) code 266, which also includes income related to the use of copyrights and therefore the data aren't comparable with the Lic 5-01 results, which focus on the value of received license fees for provided or acquired industrial rights.

Highest income for export of services within the area of license fees and royalties (in USD at PPP) were achieved by EU and OECD member states, USA (89.7 bn. In 2009), Japan (21 bn. in 2010) and Netherlands (17.8 bn. in 2009). In 2010 the Czech Republic with its 140 million USD at PPP contributed 0.2% of the total EU27 income in this area. If we express the income for the export of services within the area of license fees and royalties as GDP then the highest values were achieved by Switzerland with 3.1% and Netherlands with 2.6%.

Chart C.30: Patent applications filed to EPO, 2011 (number per million inhabitants)



Source: EPO

D Innovation

This part presents the analysis of the industries' innovation output and innovation ability of the Czech businesses with the emphasis on technologically demanding branches of the Czech economy and individual business size categories (i.e. small, middle and large companies according to the number of employees).

Main trends

- The international comparison shows that despite the relatively favourable economic situation and the ability to utilize the benefits from produced innovations (especially within the Central and Eastern Europe) the overall innovation output of the Czech Republic (0.4363) doesn't reach the EU27 average (0.539).
- The main shortcomings of the innovation environment in the country are the lack of invested venture capital (average 0.015% GDP in 2007-2011), which supports the fast growing innovating businesses and the general attitude of companies towards cooperation in innovative activities, which so far prefer internal development of innovation.
- The fact that foreign-owned companies gain much higher (5x) revenue for innovated products shows to a certain extent the reluctance of Czech companies to enter the innovation process. To achieve a higher level of innovation output in the Czech Republic it is necessary for the companies to understand the innovation process as an indispensable part of a successful business.
- As many as 30.9% of companies perceive the lack of internal finances as a very important obstacle for implementing innovation activities. There are other barriers as well, which influence the convergence of the Czech Republic to the most advanced economies. These are e.g. the slow growth of labour productivity and economy in general.
- The most important sector, which continuously improves the competitiveness of the Czech economy, is still the manufacturing industry. The costs of technical innovations and business R&D in the manufacturing industry are the highest by far and the income for new products makes up a significant part of revenue of companies in this industry (36.5%). However, the main part of revenue still consists of the sales of non-innovated products. The knowledge-intensive branches of the manufacturing industry are also the most active in their own R&D and are able to export their products to foreign markets.
- The growth of the share of high-tech exports in the total export is not significant; however the continuous growth in high-tech turnover and the growing balance of high-tech trade shows that the economic crisis didn't have hit the high-tech market as hard.

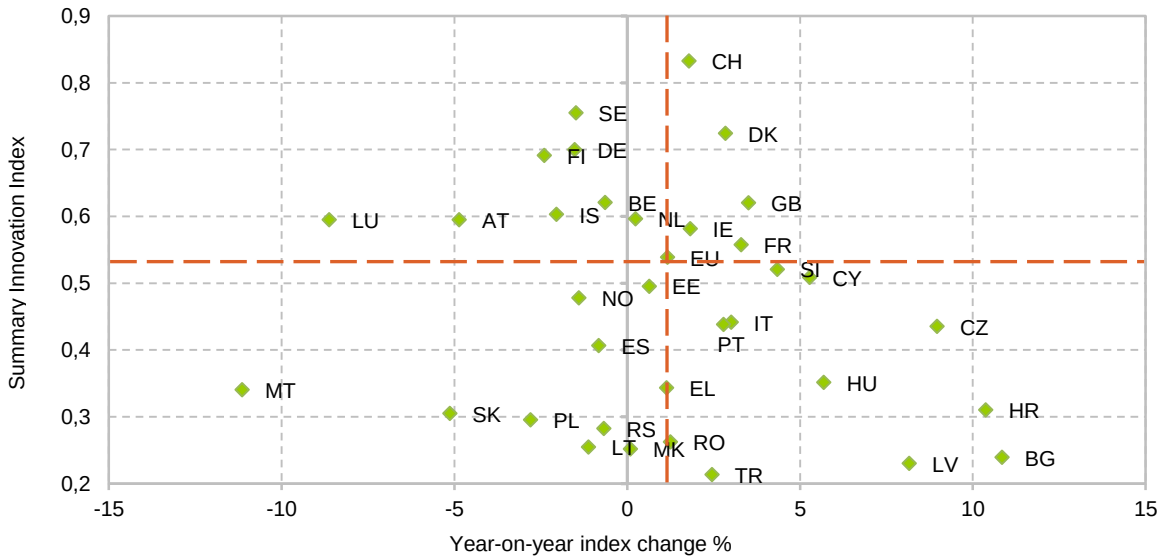
The first part of this chapter focuses on the innovation performance of the Czech Republic in comparison to other European countries via the Summary Innovation Index (SII), innovation activities of small and medium enterprises (SME), innovation revenue and the venture capital investments. This section uses the current data from the Innovation Union Scoreboard (IUS)[33] and Eurostat. Other parts of this chapter contain the analysis of the business sector's innovation activities, particularly regarding the innovation process inputs. The analysis covers innovation activities of companies, costs and outputs of the innovation activities, support from public sources, cooperation in the innovation process and factors influencing innovation activities. These aspects are analysed with respect to the size of the companies (number of employees), innovation and innovation activities type and company ownership. Special attention is given to the principal industries, which are the branches of the manufacturing industry and the development of the international high-tech market.

[33] IUS is a tool, which based on the amount of data on various factors of the innovation process helps to assess the innovation abilities of the EU by analysing the individual national innovation systems. The detailed methodology of the calculation is available at http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf

D.1 Innovation performance of the Czech Republic in the European context

The competitiveness of companies and whole economies in advanced countries is based on the ability to create and utilize innovations. The technological change has been considered one of the strongest long-term competitiveness motivators (Porter 1993)[34]. The ability to commercialize new discoveries and quickly adapt new technologies and processes in own activity sector is decisive for the economic growth in the strong competition of the globalized world (Boschma, Frenken 2011)[35]. The EU is aware of the role of knowledge in the overall productivity growth and advancement and informs regularly via the IUS about the situation of individual countries and the EU as a whole in comparison with world leaders in innovation. The main tool for comparing innovation environment and innovation performance of the European countries is the Summary Innovation Index comprising of 24 IUS indicators, which measure the creation of knowledge, innovation activities of companies, application and economic value of knowledge, results of know-how application etc. (together with Poland, Hungary, Slovakia and Italy) with the SII value below the EU27 average (see chart D.1). The innovation leaders of the EU are Finland, Germany, Denmark and Sweden. Their SII is at least 20% higher than the EU27 average. However, the year-on-year change of the SII indicates that higher growth was achieved by countries with average or below-average innovation performance. Although the EU set high goals for R&D&I already in 2000 in the Lisbon Strategy, the SII shows continuous strong disparities in innovation performance of individual states across the EU. Convergence in this area remains slow and the Czech Republic remains still far behind advanced countries in terms of activities, which influence innovation performance, although the year-on-year SII growth is apparent. The chart D.1, which shows the EU27 average with the red dashed line, shows the positions of the individual European countries. The Czech Republic, together with several other CEE states, is in the position of a country with low innovation performance, but whose SII value increased. States such as Poland, Malta and Slovakia are in the worst position as their SII is far below the average and it also decreased by several percent in the past year. The best ranked states regarding innovation performance in 2011 are Switzerland, GB and Ireland.

Chart D.1: Innovation performance according to the Summary Innovation index 2011[36]



[34] Porter, M. (1993): Comparative Advantage Victoria Publishing, p. 626

[35] Boschma, R., Frenken, K. (2011): The emerging empirics of evolutionary economic geography. Journal of Economic Geography, Issue 11, p. 295-307.

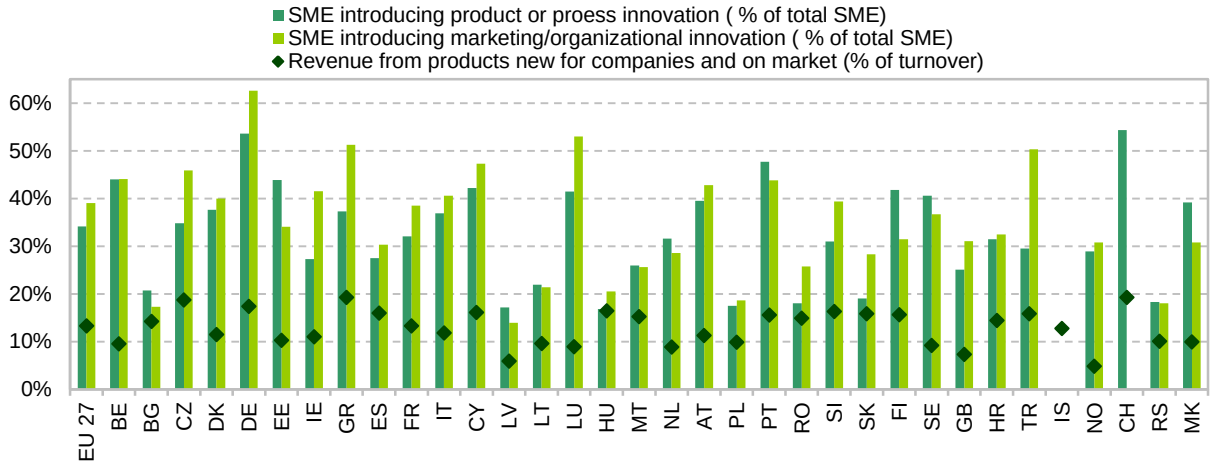
[36] The Summary Innovation Index evaluates the innovation performance of the EU countries; the calculation is made based on the statistical analysis of many partial separate indicators in the innovation activity area, divided into several blocks. Using the method of weighted aggregation of partial indicators and a robust analysis the SII is derived.

Note: Dashed line marks EU27 average position
Source: Innovation Union Scoreboard 2011

Companies introducing innovation to the market are an important factor, which forms the innovation performance of a country. It is generally easier for larger companies to invest in R&D. They have more disposable funds, better access to information and know-how and in case of failure they are likely to recover from the loss and non-recoverability of the investment than SME, for whom a mistake in the innovation process could prove to be fatal. Innovating SME are a crucial indicator of the economy's innovation performance. The factor that significantly influences the innovation performance of the SME is the overall quality of the business environment.

The chart D.2 provides a detailed overview of the European SME that are able to introduce innovation to the market. The share of SME, which introduce a product or process innovation usually doesn't reach 50% in the monitored countries. When compared to other countries the Czech Republic achieves a slightly above-average value. The revenue for innovation new for the company and market makes up ca. 13% of the total innovation revenue in the EU27 and in the Czech Republic it is 18.7%, which is above average also within the IUS monitored countries.

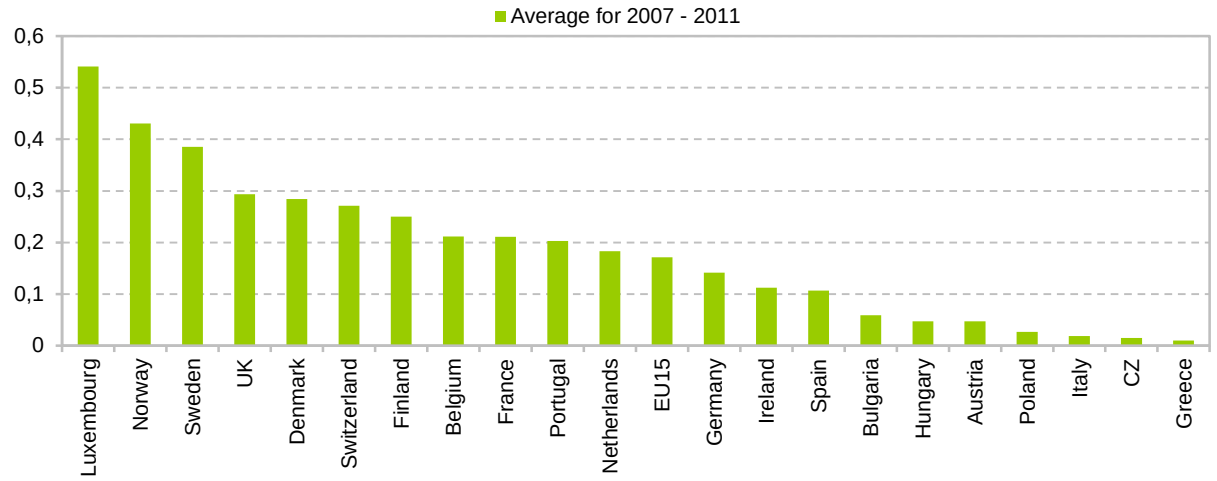
Chart D.2: Innovation activity of SME (2006 – 2008)



Source: Innovation Union Scoreboard 2011

The innovation performance is also influenced by the amount of new projects. New innovative enterprises are therefore a potentially important source of new ideas, technologies and innovation in the economy and thus also a source of competitiveness. The projects of starting innovation companies are too risky for common financial institutions, therefore they are supported via venture capital funds with the participation of private and public sources, which are an alternative source of funding for establishing and developing innovative SME with high growth potential. In comparison to other states the Czech Republic occupies the bottom positions regarding the share of venture capital investments in GDP (chart D.3). The Czech Republic also significantly lags behind all European leaders in the area of innovation; although in the past two years the amount of investments increased significantly (chart D.4).

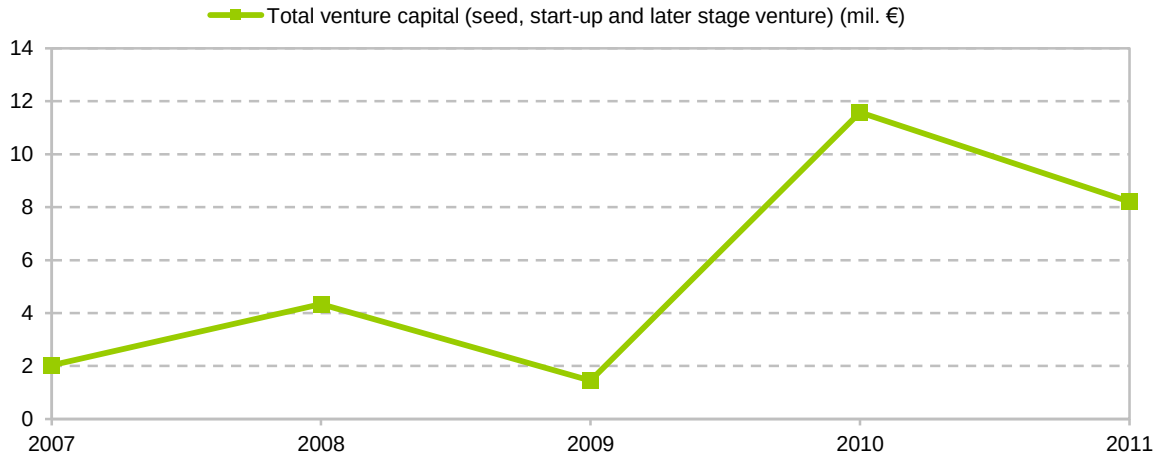
Chart D.3: International comparison of venture capital investments as % GDP



Source: Eurostat 2012

The conditions for development of this type of funding are still not ideal in the Czech Republic (the EU provides larger support for the SME innovation activities through its OP than the Czech government) and the attitude of the companies themselves isn't overly positive. However, it is apparent that due to the successful development of innovative SME through this type of funding abroad the development of financial tools for the support of start-up projects is a way how to partially increase the innovation performance of the Czech Republic and improve its position in the international comparison.

Chart D.4: Venture capital investments in the Czech Republic 2007 – 2011 (mil. EUR)



Source: Eurostat 2012

D.2 Innovation performance in business sector

Analysis of innovation activities is based on available data (Innovation Survey of Businesses 2008-2010). This survey was conducted based on the harmonized questionnaire of the EU member states within the common innovation survey CIS2010 (Community Innovation Survey 2010). The focus will be only on innovative businesses. According to the CZSO (or Eurostat methodology) innovative businesses are those, which either implemented one of the four innovation types or performed continuous or interrupted innovation activities during the monitored period (i.e. product, organizational, marketing or process innovation). The survey was conducted according to the Commission Regulation (EC) No 1450/2004 of 13 August 2004 implementing Decision No 1608/2003/EC of the European Parliament and of the Council

concerning the production and development of Community statistics on innovation. Within this Regulation a statistical survey TI2010 was conducted in the Czech Republic monitoring the period 2008-2010 with the reference year 2010. The TI2010 survey factored in the regional dimension and the questionnaire was sent to 6 229 enterprises from the selected industry and services branches (financial and non-financial) with at least 10 employees.

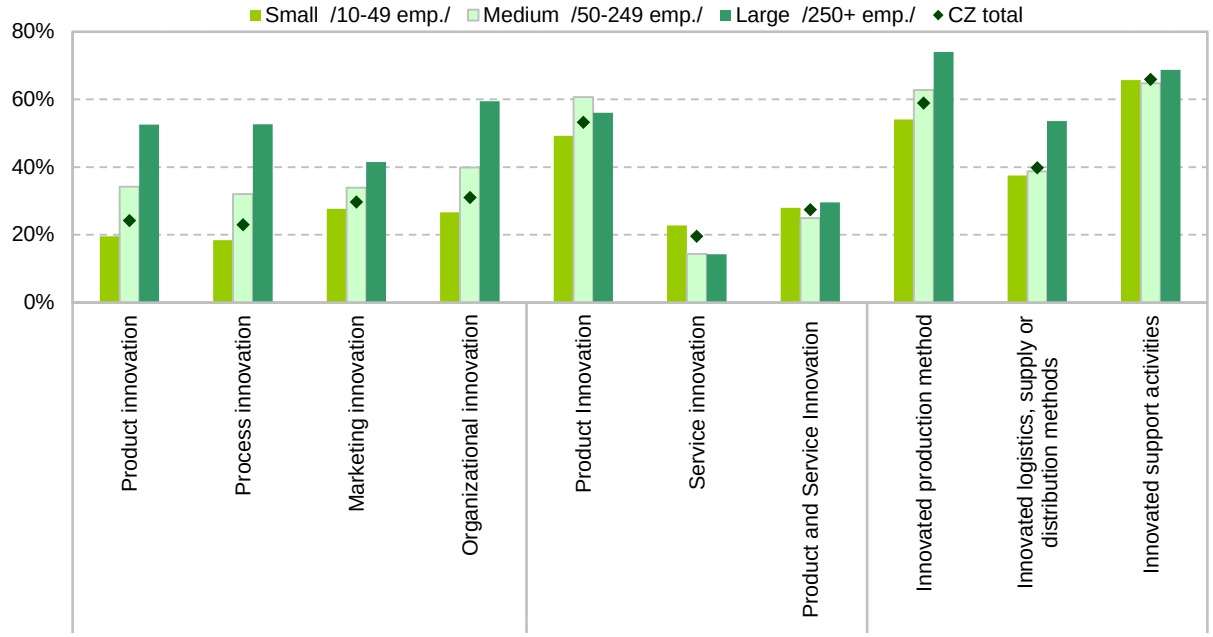
Innovativeness of enterprises and innovation types

All types of innovation activities are done mainly by large companies with 250 and more employees (chart D.5). The chart shows that the large companies much more frequently use organizational changes to improve and develop their activities with 60% of businesses in this category making them. Organizational innovations are important for the company's development and can be intended to increase a firm's performance by reducing administrative costs or transaction costs; however they usually don't represent any technological change or creation of new products and contribute more to better management or business practice of the company.

Technological innovation – i.e. product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This type of innovation is conducted by more than half of the large companies; however the share of SME conducting technical innovation is much lower. This type of innovation activity is relatively expensive for the SME and requires very good information and a thorough implementation plan with necessary know-how, which ensures that the investment will benefit the company. The innovation of services had the lowest share of all the innovation types. Within the technical innovation category the majority of companies conduct product innovation. This result doesn't necessarily mean that Czech companies don't innovate services, but rather that innovation in services is harder to define and measure and they change quickly. Their novelty doesn't last long as the costs of copying them by other companies aren't very high (as is the case of new technologies in product innovation). It is interesting that a larger share of small companies conduct service innovation than in case of middle-sized or large companies. Small-scale service innovation can be implemented relatively faster in small flexible companies.

It is the general opinion that the majority of implemented innovations are process innovations**,** which present new or significantly improved production or delivery methods. This is due to the fact that even relatively small investments in process changes can bring significant improvement of efficiency and cost reduction. However, this presumption isn't completely validated in the Czech Republic and the larger part of companies conducts rather organizational innovations. The majority of process innovations implemented by companies of all sizes is focused on activities that support the company's main activity, less attention is given to innovations in logistics, supplies or distribution (chart D.5).

Chart D.5: Innovation activities of businesses according to innovation type and company size

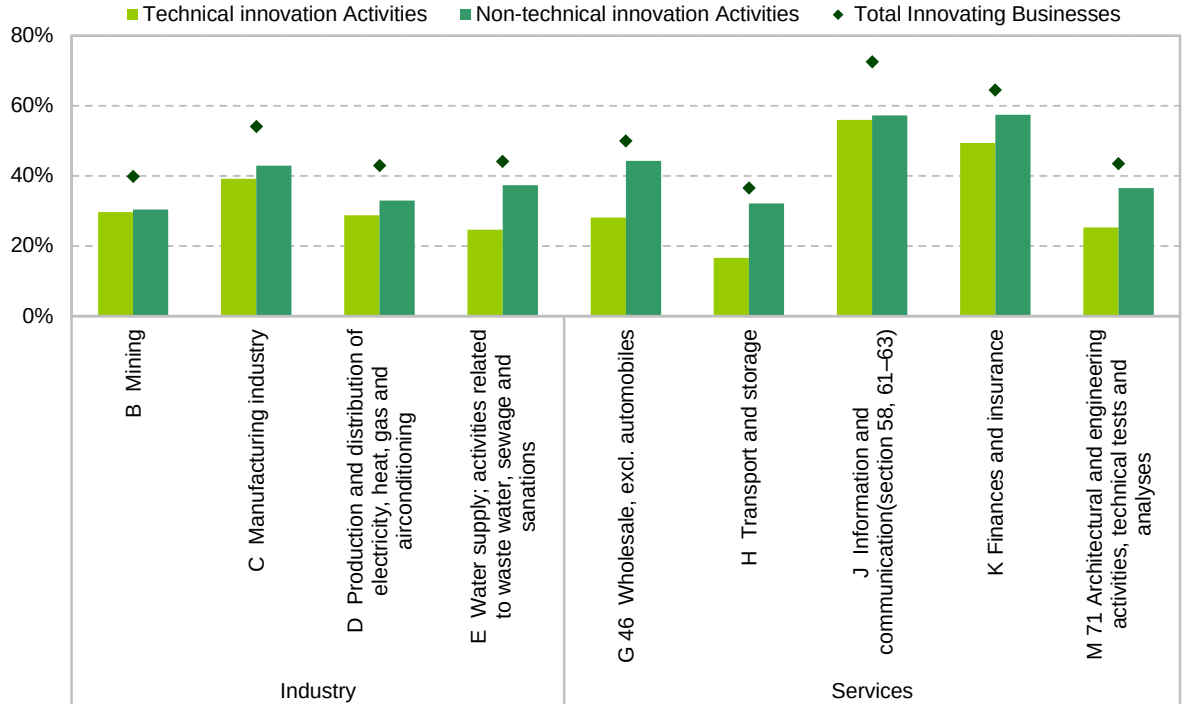


Source: CZSO, TI 2010

Taking a closer look at the innovation activities of companies in the main industry or services branches the typical specialization of the Czech economy becomes apparent. The largest share of all innovation activities within the industry sector is performed by the manufacturing industry. In services the highest percentage of innovating businesses are active in the ITC sector, both in technical and non-technical innovations (chart D.6). The total share of innovating businesses in all listed branches is relatively high. In all cases the share is higher for non-technical innovations.

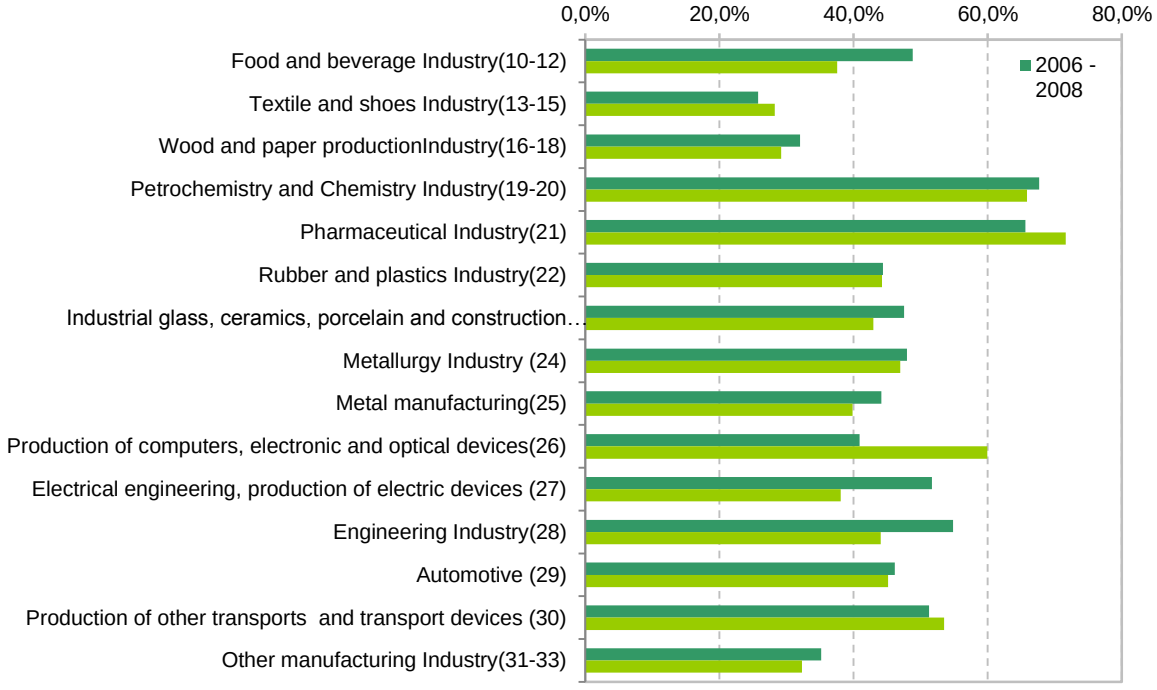
The manufacturing industry, which is traditionally considered to be a very significant source of competitiveness in the export-oriented Czech economy, represents a whole range of various branches, which are usually technology-heavy. Technical innovation should therefore be an indispensable part of the manufacturing industry's development and be a crucial aspect for increasing the competitiveness of the Czech Republic's industry. The ability to innovate in the manufacturing industry to a certain degree determines what place Czech businesses have in the global production network. The largest share of companies, which are capable of innovating technologies, products etc. used in the manufacturing industry is from the chemical technology branches, i.e. pharmaceutical, petrochemical and chemical industries (chart D.7). In both referential periods 2006-2008 and 2008-2010 these industries show the highest shares of companies with innovation activities. A considerable increase between these two periods has been recorded in the production of computers, electronic and optical instruments and devices – almost by 20 percentage points. Also interesting is the decrease in the share of technically innovating companies in the engineering and electrical engineering industry.

Chart D.5: Share of businesses with innovation activities by main CZ-NACE fields in services and industry



Source: CZSO, TI 2010

Chart D.6: Businesses with technical innovation activity in manufacturing industry in monitored periods



Source: CZSO, TI 2008, TI 2010

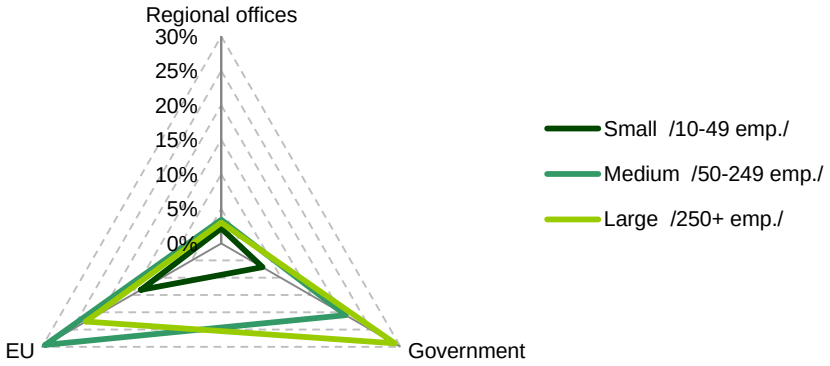
Innovation costs and results

The total Czech R&D expenditures in 2010 were 1.59% GDP. The EU27 expenditures in the same period were 1.91% EU GDP (Eurostat 2012). Both these values don't meet the targets and ideas which the EU set

in the Lisbon Strategy. It shows that to catch the world innovation leaders is a long-term task for the EU, which requires a complex and strategic approach. Therefore the R&D activities continue to be supported from public budgets. The chart D.8 presents an overview of how the Czech companies use the resources provided by public institutions via various programs for innovation activity support.

While a high percentage of large companies is supported by the government in their innovation activities, middle-sized companies with 50-249 employees use more the support from European funds. It is relatively easy to obtain support from EU funds for middle-sized companies, because these programs are tailor-made to their needs. Small companies represent a low share of public innovation support use, despite there being a variety of programs aimed at them. Usually they lack the necessary capacity to take interest in available forms of support and prepare the specific project. Local and regional authorities support almost no companies at all. This is probably due to the fact that the regional budgets don't have the means to finance such programs.

Chart D.7: Support of technical innovation of companies from public sources by support provider 2008 - 2010



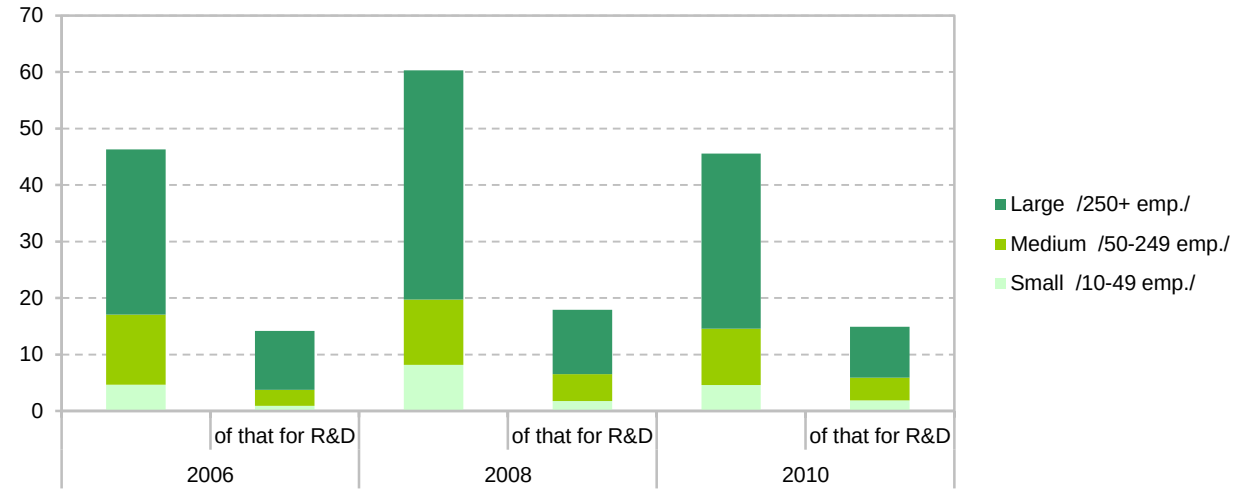
Source: CZSO, TI 2010

The innovation performance is directly influenced by the amount of investment into innovation activities. Understandably it is the large companies who invest the most into technical innovations (chart D.9). The total investments into these activities, including R&D expenditures were higher before the crisis in 2006 and particularly in 2008 than in 2010. The decrease in expenditures of large companies isn't relatively as high as in the case of small companies, where the amount of investments in technical innovations dropped almost by one half. However, a positive fact is that the decrease in the amount of finances in innovation activities in small companies didn't influence business R&D in 2010.

Although the chart D.7 indicates that the largest share of companies of the manufacturing sector implements technical innovations in the pharmaceutical, petrochemical and chemical industries, clearly the highest expenditures on these activities in the same sector are recorded in the automotive industry (chart D.10). Costs of technical innovation activities in this branch also increased significantly, almost by 26% compared to 2008. This shows that one of the crucial areas of the Czech industry still strives to improve its position within the production networks. In all key areas of the manufacturing industry the expenditures on technical innovation decreased in comparison to 2008. This decrease is particularly significant in the engineering and metallurgy industries and in the production of metal constructions and products, computers, electronic and optical instruments and devices. The economic recession thus demonstrably

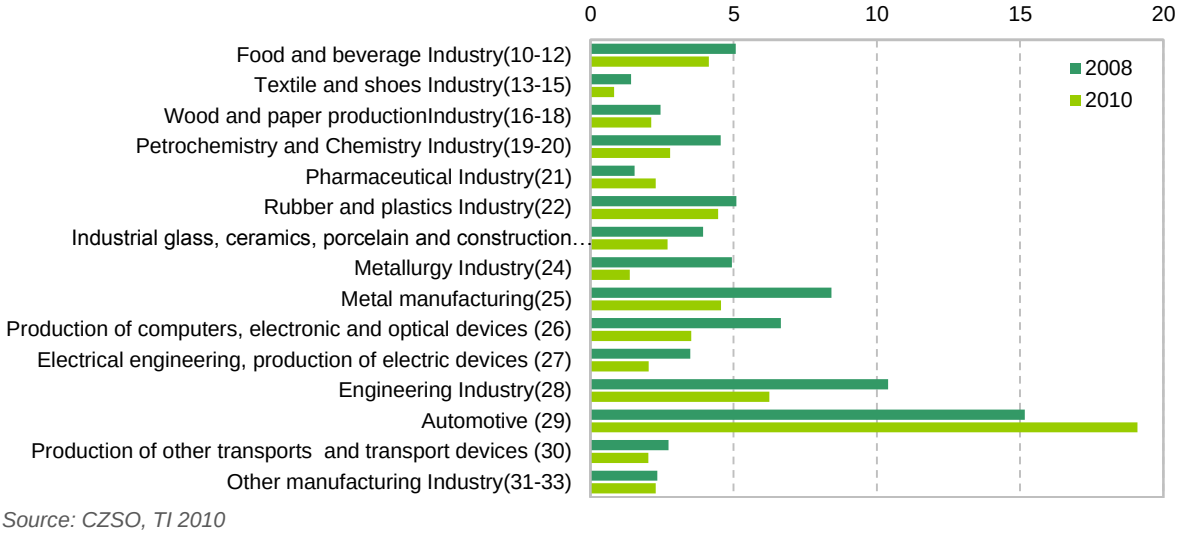
affected investments into innovation activities of even the traditionally strong Czech industries. The only exception is the automotive industry. The production of automobiles is the strongest industry and also the one most investing into technical innovation. Although the automotive industry was the only one to increase the technical innovation investments, it invested relatively less into its own R&D than in 2008.

Chart D.8: Costs of technical innovation activities in monitored years (bn. CZK)



Source: CZSO, TI 2008, TI 2010

Chart D.9: Costs of technical innovation activities in manufacturing industry in monitored years (bn. CZK)



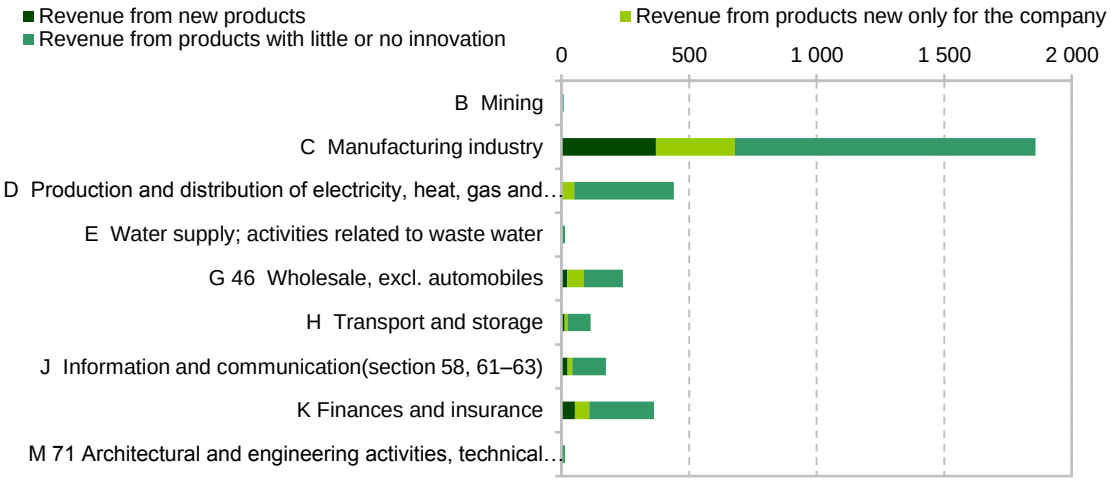
Source: CZSO, TI 2010

Despite the decrease in the total investments into technical innovations in 2010 in key manufacturing industry areas, this sector remains the most successful regarding revenue from new products in the Czech Republic (chart D.11). The revenue from new products also represents a significant part of the total revenue in the whole manufacturing industry. This again proves that innovation activities are necessary for these branches and make up a large part of their competitiveness; however the majority of the revenue is generated from non-innovated products. A relatively high share of revenue from new products has been also recorded in sectors such as finance and insurance and usually innovation-wise less substantial wholesale.

Due to the high expenditures of large companies on innovations and their high production it isn't surprising that also the revenues of companies with product innovation are many times higher than those of small and middle-sized ones in all monitored years (chart D.12). There is only an insignificant decrease in revenue between 2008 and 2010 due to the recession. Interesting, however, is the significant difference in the amount of revenue of companies with product innovation between foreign-owned companies and domestic ones, whereas the difference between these two groups is increasing.

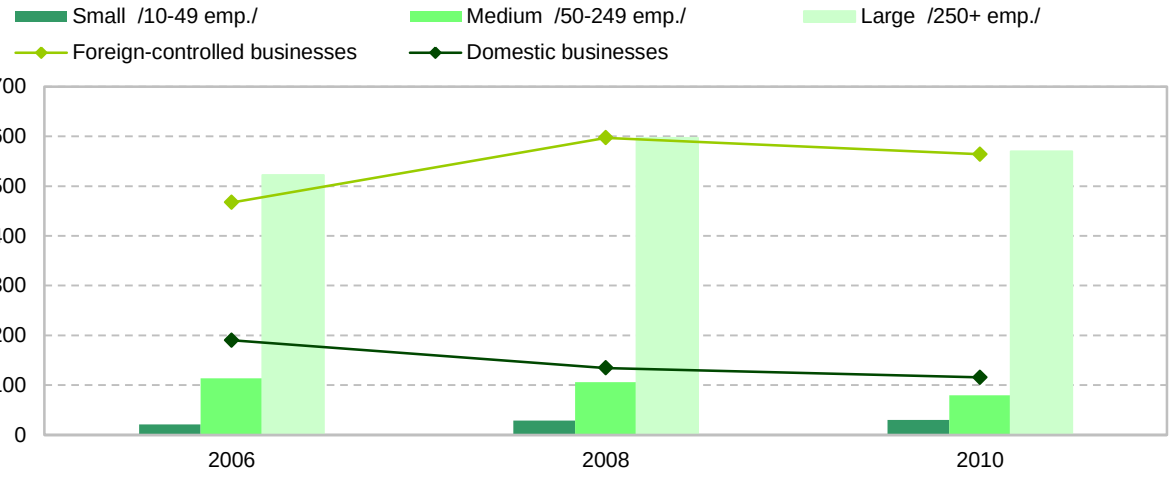
The innovation potential and possibilities lie also outside the technical innovation and the key areas and innovation activities of companies of all sizes show that in the current economic environment the other innovation types play a significant role as well. By focussing on the other innovation types it may be also possible to significantly improve the position of sectors outside the manufacturing industry.

Chart D.10: Revenues of businesses with product innovation in main branches (CZ-NACE)[37] by product type in 2010 (bn. CZK)



Source: CZSO, TI 2010

Chart D.11: Revenues of businesses with product innovation in monitored years from innovated products (bn. CZK)



Source: CZSO, TI 2008, TI 2010

[37] CZ-NACE is the standard classification of economic activities, which was created according to the international classification of economic activities NACE Revision 2 of the EU. The classification sorts economic activities (or their areas) so that each statistical unit, which performs some sort of economic activity, can be assigned a NACE code.

Innovation cooperation

It is common for a number of subjects from different sectors to cooperate in order to be more successful in creating and disseminating new knowledge and findings, which can be applied in new technologies and innovations. With the exception of some branches the most significant partners seem to be the businesses' suppliers, clients and customers (chart D.1). In the case of large businesses with a strong concentration of knowledge and resources in often geographically scattered companies, the partners are often other companies within the group. The government and public institutions are partners in a low share of companies of all sizes – this is due to several reasons. Firstly there is only a weak tradition of cooperation between the corporate and university sector, low amount of spin-off companies and continuous skepticism towards this cooperation. The second reason lies in the often differing priorities of the public and private sector. The creation of innovations in order to create profit often doesn't correspond with the academic interests of university researchers. Other reasons include the overall contractual difficulty of such a cooperation including the solution of the issue of intellectual property between companies and universities.

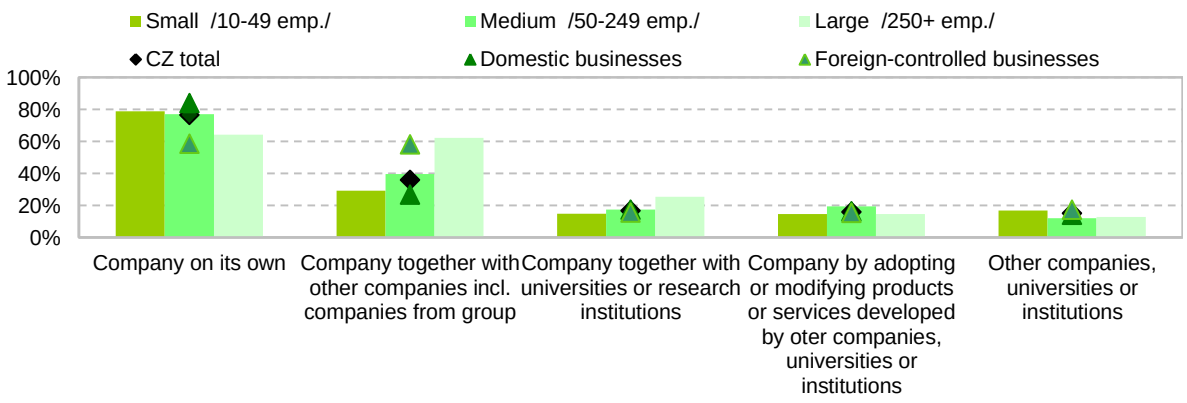
Table D.1: Most valuable cooperation partner in technical innovations (2008 – 2010)

	Other companies within group	Suppliers of equipment or materials	Clients or customers	Competitors and other companies from the same industry	Consultants commercial labs or private research institutions	Universities or other higher education facilities	Government or public R&D
Czech Republic total	**20,9%**	**26,4%**	**27,7%**	**4,0%**	**6,9%**	**12,2%**	**1,9%**
By company size							
small /10-49 emp./	18,1%	28,6%	28,3%	6,2%	4,8%	12,2%	1,8%
middle /50-249 emp./	16,4%	26,2%	29,9%	1,8%	10,6%	12,8%	2,3%
large /250+ emp./	37,1%	21,0%	21,9%	2,5%	5,3%	11,1%	1,2%

Source: CZSO, TI 2010

The development of the product innovation is however still mostly under the control of the company (chart D.13). The small businesses due to their limitations (financial and human resources) most often participate in the cooperation with other businesses. It is also these businesses who cooperate more often with universities and R&D institutions. Even when sorting companies by ownership there are no big differences in cooperation trends. A higher percentage of domestic companies conduct their own innovation development and on the other hand a larger share of foreign-owned companies performs these activities in cooperation with other businesses.

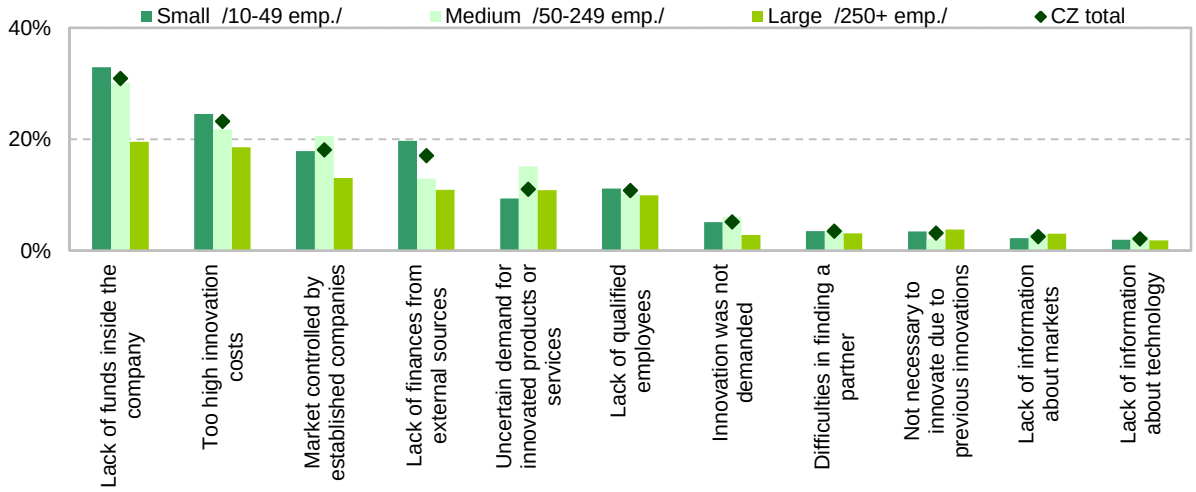
Chart D.12: Development of product innovations by developing subject 2008 – 2010



Source: CZSO, TI 2010

The results of innovation and an overall low innovation performance of the Czech Republic in comparison to the EU innovation leaders can be also related to the subjective perception of factors, which according to the companies themselves limit their innovation activities. According to the answers of the entrepreneurs the most limiting factor is the amount of financial resources in the company (for technical innovations). This factor is very significant especially for small and middle-sized companies; the share of the large companies perceiving this as a strong influence is smaller. The high innovation costs represent another limiting factor. It is interesting to point out that another significant factor according to the entrepreneurs is the market, which is dominated by established companies. This largely psychological barrier contributes to the reluctance of businesses in the Czech Republic to start the innovation process. On the other hand the lack of information about the technology and markets represents a significant barrier for only a small percentage of the companies.

Chart D.13: Influence of factors restricting innovation activities related to product or process innovation by their significance for technically innovating businesses 2008 – 2010



Source: CZSO, TI 2010

Knowledge-intensive branches are also progressively represented in the innovation characteristics. Businesses in these branches are more active in gaining knowledge (internal or external) and spent a larger part of their R&D expenditure on their own R&D. Because of this these businesses have also a higher share in the patent applications and higher revenue from innovative products. As a result innovation enables these businesses to succeed on new product markets and increase their competitiveness. Apart from the production of automobiles (OKEČ 34) the knowledge-intensive branches don't have a significant share in GVA. On the other hand there are also branches, which are not so demanding regarding the utilization of knowledge, but allocate a larger part of their resources on acquiring new machines and equipment.

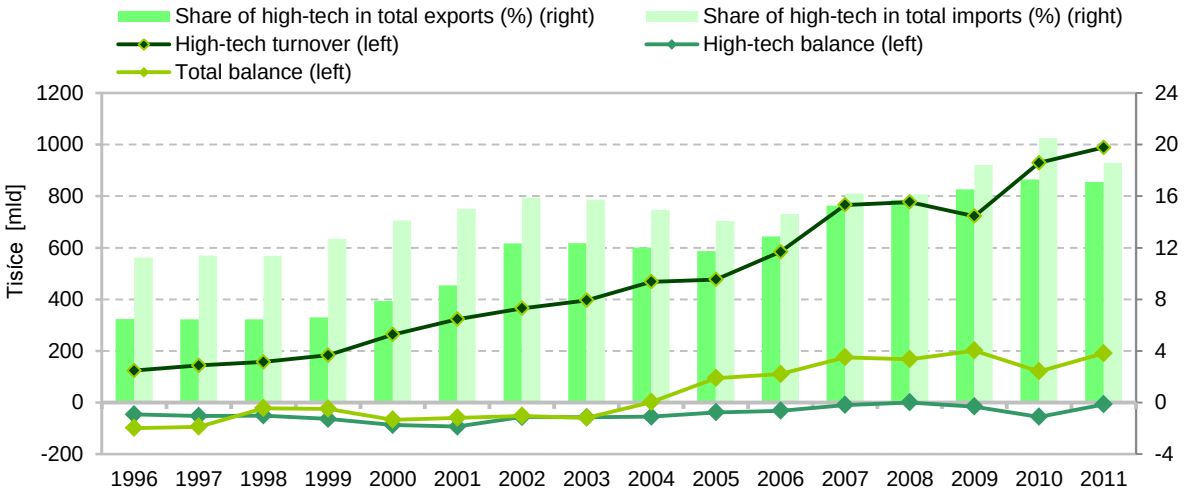
The foreign trade income is an important part of the GDP of the open Czech economy. The positive factor is that the high-tech sector shows a higher growth rate than the total Czech foreign trade and therefore its share in both exports and imports increases continuously. Another trend is the decrease of the until recently significantly negative high-tech foreign trade balance; in 2010 there was a surplus in this trade for the first time. As for the structure of goods the most important item over the long-term have been computers and electronic and telecommunication equipment, which together make up ca. 80% of high-tech exports and imports.

D.3 Foreign high-tech trade

For a small open economy such as the Czech Republic the foreign trade is very important. The ability to succeed on foreign markets is also considered as another indicator of the economy's competitiveness.

The long-term most important export items are machines and automobiles. The chart D.15 shows the development in the foreign high-tech trade in recent years. The foreign trade balance is long-term positive, even though there was a decrease in 2010. The high-tech foreign trade balance is slightly negative, although in 2008, before the recession hit the economic results, it was slightly positive. The share of high-tech exports grew in the recent years and over the years increases its share in the total Czech exports; however in 2011 there was a slight drop to 17.1%. A similar trend can be seen in the high-tech imports. The important fact is that the foreign high-tech trade didn't record such a large loss during the crisis year as the turnover of the total Czech foreign trade. 2011 with its positive figures indicates a possible return to the pre-crisis trends and the high-tech turnover is consistently increasing again.

Chart 0.14: Change in the turnover of foreign trade and share of high-tech (%) and the balance of foreign trade (bn. CZK) in 1996-2011



Source ČZSO 2012

E international research and cooperation

International cooperation in R&D activities continuously gains in significance, which is aided by the deepening integration of the European Research Area –ERA. For a number of years the Czech Republic has drawn funds from framework and operational programs and maintained bilateral and multilateral cooperation with foreign partners. Therefore the activities of the Czech R&D exceed the national borders.

Main trends

- The share of R&D expenditures coming from foreign sources has been increasing in the long term in the Czech Republic (currently 15.2% ~10.8 bn. CZK) – significant increase was apparent especially in 2011, when the year-on-year change reached 75% due to the triple amount of funding from public sources.
- The increase in the volume of foreign R&D sources is accompanied by the increase in the number of sites, which use these sources – the highest increase was between 2006 and 2011 among foreign-owned businesses.
- The volume of R&D expenditures covered by public funding reached almost 6.1 bn. CZK in 2011 with a dominant representation of EU sources (98% ~ 5.9 bn. CZK) – 5.2 bn. CZK went to Czech R&D through the structural funds.
- Although the FP7 is particularly attractive for smaller countries, the Czech Republic lags significantly behind in the relative amount of submitted proposals and the number of teams (23rd position among EU countries), on the other hand its financial success rate (17.2%) is the highest of all new member countries – the Czech Republic received an average of 17 million EUR from the FP7 for every billion of total R&D expenditures.
- During the six years of FP7's functioning the Czech institutions recorded a total of 940 project participations, which is a number that is close to the final count of Czech participations within the FP6 (1068) – the Charles University being the largest supplier of project participations together with the Czech Technical University and Masaryk University.
- Countries with similar number of inhabitants (Austria, Belgium, Portugal and Hungary) usually receive larger amounts from the FP7 – so far the Czech teams received financial support in the amount of 177 million EUR and invested another 64 million EUR from their own sources.
- The Czech Republic allocated a total of 595.1 million CZK for international cooperation support from the state budget through the MoEYS chapter in 2011, which represented almost 94% of the total amount.
- The Ministry of Foreign Affairs (MFA) allocated further support to international organizations – in 2011 the main beneficiaries were the CERN organization (233.6 million CZK), the Joint Institute for Nuclear Research in Dubna (52.7 million CZK) and the European South Observatory ESO (39.5 million CZK)

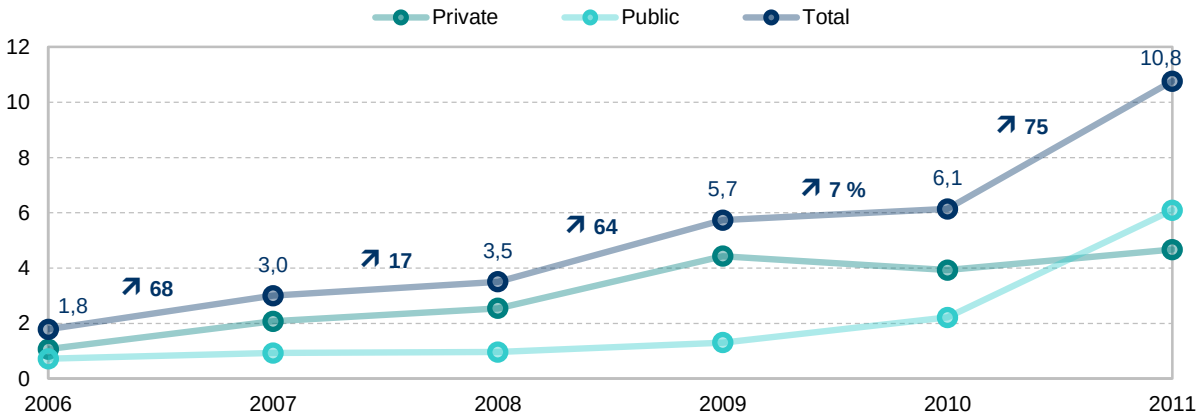
The financial indicator in the subchapter E.1 show the total amount of funding coming to the Czech Republic and the structure of target subjects. A more detailed overview of the activities and success rate of Czech beneficiaries, including the topical focus of the R&D, can be gained from data on framework programs for R&D (FP) from the E-CORDA database. The amount of funding coming from the FP is higher than form any other source and therefore the major part of this chapter focuses on it (subchapter E.2). The funds invested into the FP by the Czech Republic from the national budget are allocated through a number of specific programs described in the E.3 subchapter. The main data sources are information given by relevant ministries, especially MoEYS, and transferred to the R&D IS.

E.1 Foreign sources of R&D funding

The funding sources are monitored in the surveys as one of the R&D expenditures characteristics. The foreign funding category includes resources from foreign businesses, various forms of payments from the EU and international organizations and foreign governments. The share of foreign R&D is increasing, especially in 2011 when the year-on-year change reached 75% due to the triple amount of public funding (chart E.1). This increase can be explained as a result of improved drawing from EU structural funds, particularly via the R&D&I OP, where the implementation of project within its first two axes started. On the other hand the amount of private sources, which was the motor of the growth until 2009, decreased probably due to the recession and in 2011 for the first time the foreign private sector invested less than public institutions into Czech R&D.

The growth of the volume of foreign R&D funding is accompanied by an increasing number of sites using these sources. This can be seen as positive, because it causes an increase of the base of those, who have sufficient quality or experience to reach foreign public[38] funding. The highest increase during the 2006-2011 period has been recorded in foreign-owned businesses. The data indicates that an increasing number of activities with high added value are being performed in the Czech Republic. This is confirmed by the data on foreign affiliations, which shows that the highest relative increase in R&D funding is in specialist, scientific and technical activities. In plain number however the amount of domestic companies drawing from foreign sources is three times larger than the number of foreign-owned businesses. The number of beneficiaries among universities is also increasing, while in the case of AS CR sites the number of beneficiaries stays the same.

Chart 0.1: R&D expenditures from foreign sources (CZ; 2006-2011; bn. CZK)



Source: CZSO 2011 – Annual R&D survey VTR 5-01

The volume of R&D expenditures covered by public funding reached almost 6.1 bn. CZK in 2011 with a dominant representation of EU sources (5.9 bn. CZK including pre-financing from own sources) – which amounts to almost 98% (in 2010 the share was "only" 90%). There has also been a change in the internal structure of R&D funding from EU sources. While in 2010 64% of the funding came through structural funds, in 2011 it was 85% (5.2 bn. CZK). Apart from this unprecedented growth of the volume of funding allocated through structural funds, other types of funding (framework programs etc.) increased as well, albeit at a slower pace. As the EU funds represent the majority part of foreign public R&D funding, their sectorial, topical and geographical allocation basically copies the data provided in table E.1.

[38] No data available on the target subject of foreign private sources

The funding from structural funds represents significant opportunities to develop and improve the R&D infrastructure, (especially OP R&D&I), modernization of the education system and improvement of conditions for the development of human resources in R&D (OP Education for Competitiveness) and support of R&D activities in the business sector (OP Enterprise and Innovation). Programs aimed specifically at the capital are the OP Prague – Competitiveness and Prague – Adaptability aimed among others at the support of innovation in business or knowledge economy development projects. Until October 2012 the managing authority of the OP R&D&I issued Decisions on Providing a Grant in the amount of 55.9 bn. CZK, which is 92.3% of the total allocation for the program for the period 2007-2013 (the funds in the first two priority axes are completely allocated); however certified expenditures make up only 5.0 bn. CZK (8.2% of the allocation). Similar situation is within the OP Education for Competitiveness (projects with issued Decisions represent 86.5%, certified 8.5%), 98.7% of funds are allocated within the priority axis focusing on tertiary education, research and development. Almost 1/3 (30.9%) of the reserved funds has already been certified by the EU in the OP Enterprise and Innovation, whereas the volume of the projects with Decisions reaches 85.4% of the allocation[39].

A closer look at the allocation of foreign sources drawn by Czech subjects (table E.1) shows interesting comparisons. While the university sector presents the primary and growing target of public resources, it is almost untouched by private subjects – unlike the government sector, which also due to the successful applications of results of selected sites receives equal volume from private and public sources. The privileged position of financially demanding (but also attractive for investment) technical and natural sciences is in the case of public sources complemented by social sciences while medical science is more attractive for private sources.

The unprecedented position of Prague among Czech regions is apparent when comparing the volume of private funding, on the other hand regarding public funding Prague is gradually losing its position in favour of South Moravia and Moravia-Silesia regions. However, this trend is largely artificial, as the capital doesn't belong to the regions eligible for drawing support from Target 1 of the EU cohesion policy. The other two mentioned regions perform a large number of OP R&D&I infrastructure projects.

[39] Current information about the status of drawing from structural funds is available at http://www.strukturalni-fondy.cz/cs/Informace-o-cerpani

Table E.1: Structure of R&D expenditures from foreign sources (CZ; 2007-2011; bn. CZK)

Foreign public sources

		2007	2008	2009	2010	2011
Total		925	964	1 305	2 216	6 093
Sector	Business	170	232	441	877	1 306
	Government	324	319	397	422	1 072
	University	406	391	425	881	3 636
Field	Science	371	365	440	532	1 623
	Technical	313	403	549	1 114	3 351
	Social	82	64	103	178	428
Region	Prague	538	553	698	823	1 485
	South Moravia	165	169	174	481	1 947
	Moravia-Silesia	30	22	47	119	1 092

Foreign private sources

		2007	2008	2009	2010	2011
Total		2 074	2 542	4 431	3 926	4 671
Sector	Business	1 233	1 911	3 740	2 828	3 399
	Government	836	628	691	1 076	1 267
	University	5	3	1	6	5
Field	Science	920	791	996	1 454	1 928
	Technical	1 041	1 500	3 174	2 186	2 345
	Social	91	251	260	282	323
Region	Prague	1 587	2 014	1 850	2 413	2 714
	South Bohemia	0	2	500	427	520
	Pilsen	14	20	13	23	241

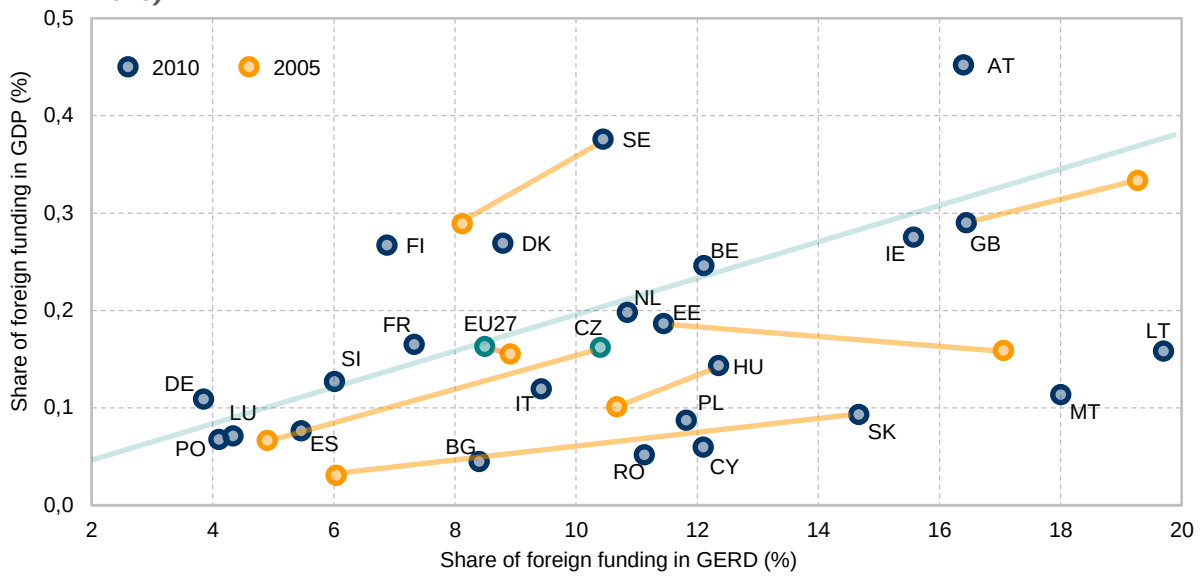
Note: colour stripe shows the share of the given sector/region in total expenditures (three largest items are always displayed).
Source: CZSO 2011 – Annual R&D survey VTR 5-01

The rate in which the domestic sources are complemented from foreign sources differs greatly between individual states and identification of trends is very difficult. Due to the varying size of the states and the volume of R&D funding it is necessary to use relative indicators – either related to the GDP of the given state or the total expenditures on GDP in its territory (GERD)

The European countries have a far larger share of foreign R&D funding that the Asian countries, where R&D funding has mostly national character. A significant factor within the EU is the economy size. Large economies such as Germany or France have a lower ratio of foreign R&D funding (share in GERD) and contribute more to the European reallocation mechanism – in chart E.2 they are to the left of the EU27 value. GB is an exception in this regard. The amount of funding from foreign sources in the Czech Republic quadrupled between 2005 and 2010, which resulted in the doubling of the share on)also increasing) GERD – the Czech Republic managed to get above the EU27 average. However, there has been no relative change between 2009 and 2010.

The second axis of the chart E.2 shows the share of foreign funding in GDP, which removes the influence of the total R&D expenditures. High above the EU average are the Northern countries, Ireland or GB; all of the new member states remain below the EU27 value with the exception of Estonia followed by the Czech Republic with the figure almost identical to the EU27 average. The third dimension of the chart is the development trend between 2005 and 2010 (shown only for selected states). In case of the Czech Republic both indicators have increased in this period and it didn't deviate much from the light blue curve showing the ratio of the two indicators for EU27. Estonia went through a different development with the volume of foreign funding growing both relatively to GDP and absolutely, albeit significantly slower than the total R&D expenditures (the share in GERD decreased).

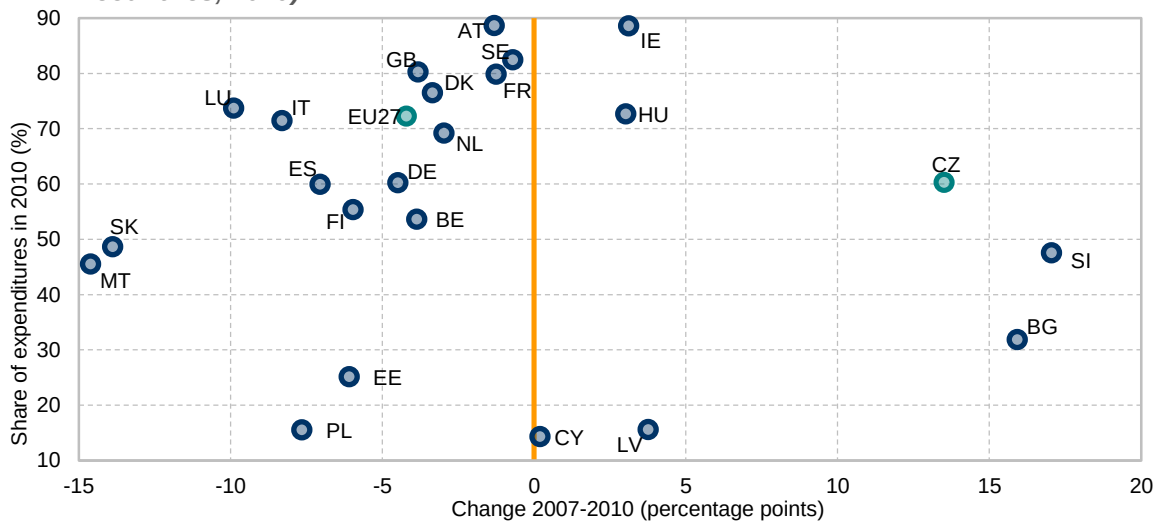
Chart E.2: Share of R&D expenditures from foreign sources in GDP and GERD (EU countries; 2005-2010)



Note: Excluding Greece and Latvia; Belgium, Bulgaria, Italy, Cyprus, Germany, Netherlands, Portugal, Spain, Sweden, EU27 - 2009.
Source: Eurostat, CZSO 2011 – Annual R&D survey VTR 5-01

The often discussed effect of the economic crisis on the R&D activities in the business sector is to some extent documented in chart E.3. The growth of the share of the business sector in R&D funded from foreign sources can be explained by the interest of foreign businesses to invest in R&D activities in the target group (funds from abroad allocated in the business sector usually originate from private sources) and by the improvement of R&D activities of domestic businesses, which apart from private sources also succeed in drawing public funds, especially from the EU. Slovenia has a similar position to the Czech Republic in the chart; however most of the member countries (including the EU27 average) can be found in the negative part of the spectrum – the amount of foreign funding used by the business sector decreased there between 2007 and 2010. In the Czech Republic 60% of the R&D funding from foreign sources goes to the businesses, which is a value below the EU27 average, which exceeds 72%.

Chart E.3: Share of R&D expenditures from foreign sources used in the business sector (EU countries; 2010)



Note: Excluding Greece and Latvia; Belgium, Bulgaria, Italy, Cyprus, Germany, Netherlands, Portugal, Spain, Sweden, EU27 - 2009.
Source: Eurostat, CZSO 2011 – Annual R&D survey VTR 5-01

E.2 Framework programs for R&D support

From the very beginning, which dates to 1984, EU framework programs have been focused mainly on target-oriented research, whose goals are formulated in working programs issued by the European Commission. However the 7th Framework Program for research, technological development and demonstration (2007-2013)(FP7) represents an important change, since for the first time it contains a substantial portion of the overall budget for the support of fundamental research, where the projects' contents are decided by the research teams themselves. As before, the 7th EURATOM Framework Programme**,** which is focused on special areas of the peaceful use of atomic energy, runs in parallel with FP7.

Although the fiscal periods of the 7th FP and EURATOM are different, the rules for participation in this program are the same as those for FP7. The budget of FP7 is 50.5 billion EUR for the fiscal period 2007-2010; the EURATOM budget is 2.8 billion EUR for 2007-2011 (for additional period 2012 -2013 there is a proposed budget of 2.5 billion EUR). The unusually large increase in the budget: FP7 will have at its disposal annually a budget which is some 40% higher than for FP6, is unprecedented.

The FP7 consists of four specific programs: Cooperation, Ideas, People and Capacity.

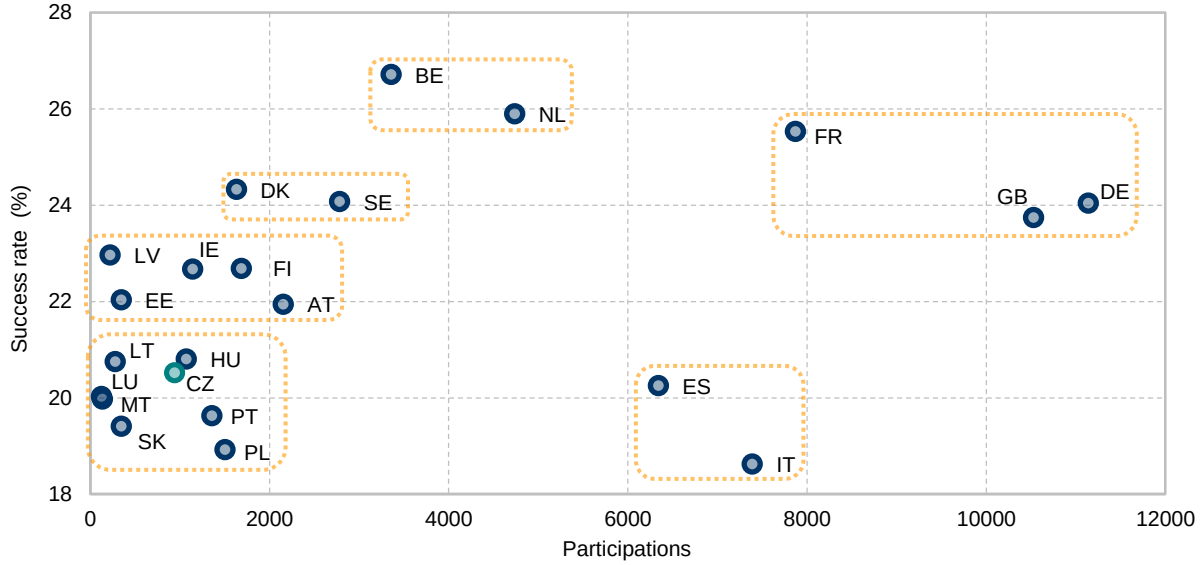
- The specific program SP1 "Cooperation" supports target-oriented research, that is, research based on the needs of society. This program is divided into ten thematic priorities which follow on clearly from the range of themes of the preceding FP6. Just as in previous framework programs each priority has its own detailed work program, referred to in European Commission calls for submission of project proposals.
- The specific program SP2 "Ideas" supports blue-sky research work. For this program no research targets are set, but the areas and disciplines for research are defined. Project proposals may be submitted by researchers from throughout the world, but projects must be implemented in EU locations or countries associated to the FP7. The ERC sets up commission, which on the basis of peer review select and recommend submitted project proposals for financing. A proposal's worth is decided exclusively by its scientific excellence assessed by two criteria: the professional capability of the proposer and the proposal itself, i.e. the manner in which it exceeds the bounds of current knowledge in the given area.
- The specific program SPS "People" support lifetime learning for researchers and is a direct continuation of the "Marie Cure Events" which already have an established tradition from earlier framework program. The range of these events is of course adapted to current and newly anticipated needs.
- The specific program SP4 "Capacity**"** has as its goal the strengthening of the research capacity within the European research space. It supports the development of research infrastructures, research on behalf of small- and medium-sized enterprises, the linking-up of knowledge regions, the development of research potential, the activities of "science in society" and international cooperation with third countries.

The 7th FP EURATOM includes two research areas - "Fusion energy research" and "Nuclear fission and radiation protection". The program includes activities within R&D, technological development, international cooperation, spreading of technical knowledge and its use in specialist education.

Participation in FP7 and EURATOM projects[40]

The FP7 is in its sixth year and so the cumulative indicators of participation show relatively high values. Chart E.4 shows the number of teams from individual EU countries, which participate in any of the FP7 projects – orange boxes define clusters of countries with similar results. In case of the number of participation these are absolute values and therefore the larger states have naturally more participations than the small ones. The relative success rate divides also the groups of similarly large countries – large southern states are separated from the EU core or the only two new members who achieve similar levels to the original members (Estonia, Latvia). Czech teams reached a success ratio of 20.5%, which places them in 15th place. Teams from the Czech Republic participated in 940 projects, which is close to the final number of Czech participations in FP6 (1068). The projects for participation are selected in a process based on the independent review method. The ratio of total submitted projects and executed projects shows the success rate of individual countries.

Chart E.4: Number of participations and success rate EU in FP7

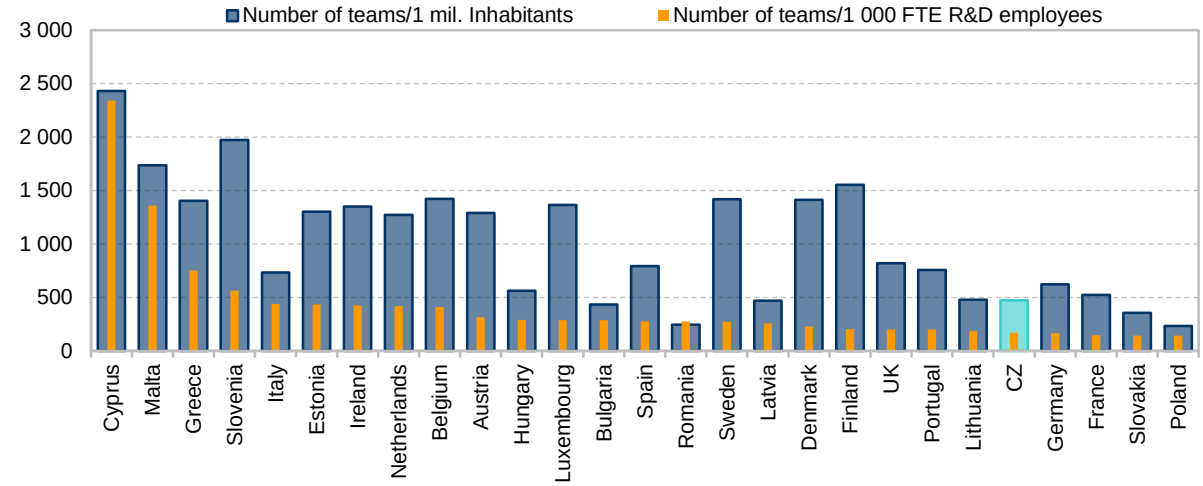


Source: E-CORDA

Individual member states differ in the proposal submission activity. Their reaction to calls within the FP7 depends strongly on the R&D sites capacity, which in turn strongly depends on the population size, availability of financial resources and other R&D characteristics. Chart E.5 compares the number of teams participating in the FP7 per 1 000 FTE researchers in the given country to the number of teams per million inhabitants. It is apparent that the FP7 is more attractive for smaller member states (with the exception of Italy). On the other hand states such as France, Germany or the UK are at the bottom of this ranking. Countries with similar size as the Czech Republic (Greece, Sweden, Belgium, Austria, Portugal and Hungary) have significantly higher intensity of proposal submission than the Czech Republic. According to the number of teams/1000 researchers (FTE) ratio the Czech Republic is in the 23rd place, only Slovenia and Poland ranked worse among the new member states. According to the number of teams/million inhabitants ratio the Czech Republic showed lower values than all the older member states and was 7th among the new member states, which shows a low rate of participation of Czech teams in FP7.

[40] The following text will use the abbreviation FP7 for both FP7 ad EURATOM

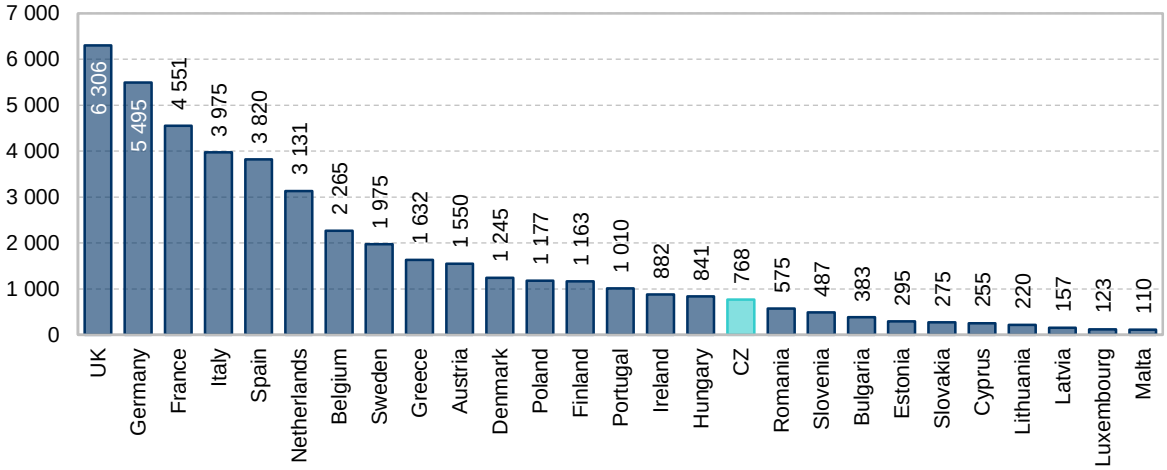
Chart E.5: Relative activity of EU countries in FP7 participation



Source: E-CORDA;, Eurostat

The chart E.6 shows the numbers of realized FP7 projects in the individual member states. The mentioned 940 teams from the Czech Republic participate in 768 projects with a signed grant agreement and secured funding from the FP7 sources. The total number of projects in which Czech researchers participate is relatively low in comparison to other states (Austria 1550, Hungary 841). The large states naturally receive the most projects – GB, Germany, France or Italy, while the small ones such as Luxembourg or Malta receive the least amount of projects.

Chart 0.6: Number of projects within FP7 in the EU



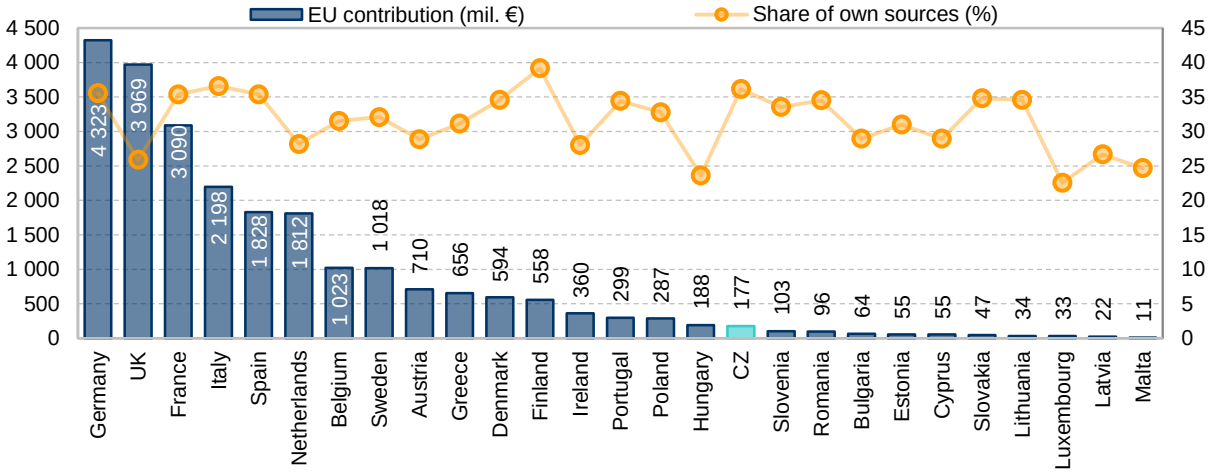
Source: E-CORDA

Financial indicators

The contribution of the team participating in FP7 depends on the activity type and the nature of the applicant. The contribution is between 50% of the total costs in the case of demonstrational activities to 50-75% in the case of research activities to 100% contribution for coordination of research projects, research of coordination and support activities and also for fundamental research projects. Higher contributions go to non-profit public subjects, higher education institutions, non-profit research organizations and SME. Chart E.7 shows the amount of funding the teams from individual countries received for their project's operation complemented by sources provided by the participants themselves. The rankings are again influenced by the size of individual countries. Teams from the Czech Republic received a pledge of funds in the amount of 177 million EUR from the EU and another 64 million EUR were contributed by the

participants themselves. The total amount is 241 million EUR, which is comparable to Hungary, which however manages to secure a much larger share of funding from the EU sources. Other states with similar size receive multiple times higher funding from FP7.

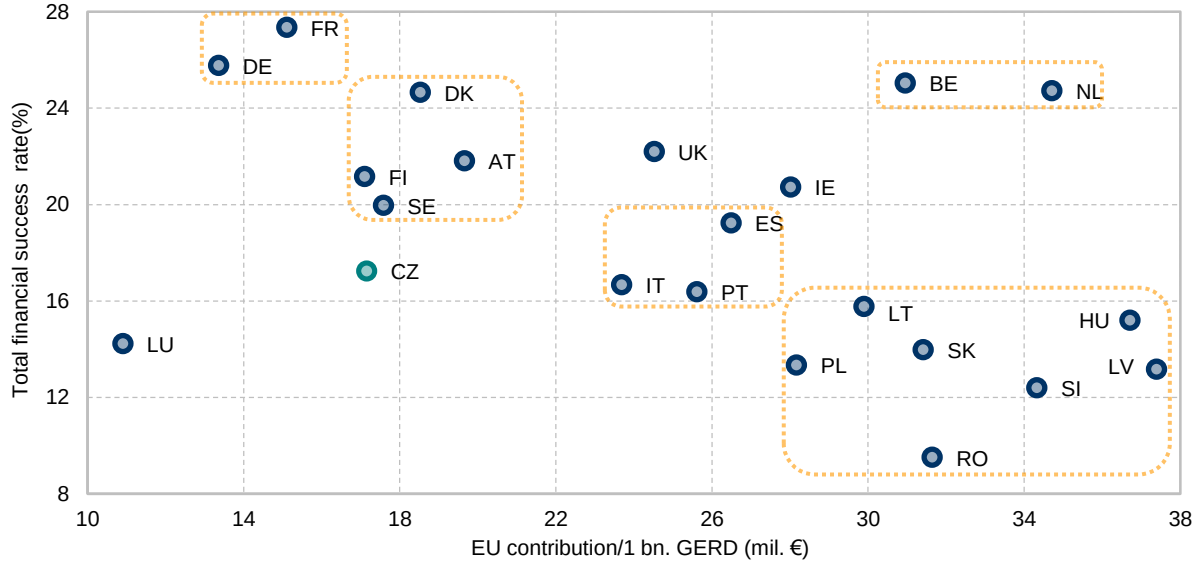
Chart E.7: Financial indicators of FP7 by EU countries



Source: E-CORDA

It is necessary to view the financial indicators in relation to the amount of R&D investment in the given country by relating the amount of requested resources to the GERD expenditures. The monitored period includes years 2007-2012. Chart E.8 shows the total amount of EU contributions to 7FP projects converted to 1 million EUR GERD. The Czech Republic therefore received ca. 17 million EUR per 1 billion EUR GERD and this value places it 5th from the bottom. The Czech Republic is thus among the advanced countries; however their contribution from FP7 is weighted by significantly higher GERD. To better express financial success rate it is therefore better to use the requested/received funding ratio. In this regard the Czech position is relatively good, the financial success rate (17.2%) is the highest of all new member countries and surpasses even some old member states such as Italy, Portugal or Luxembourg. Countries, which typically have a strong R&D, such as France, Belgium, Netherlands and others have a much higher success rate with values over 25%.

Chart E.8: Required contribution and success rate of EU member states



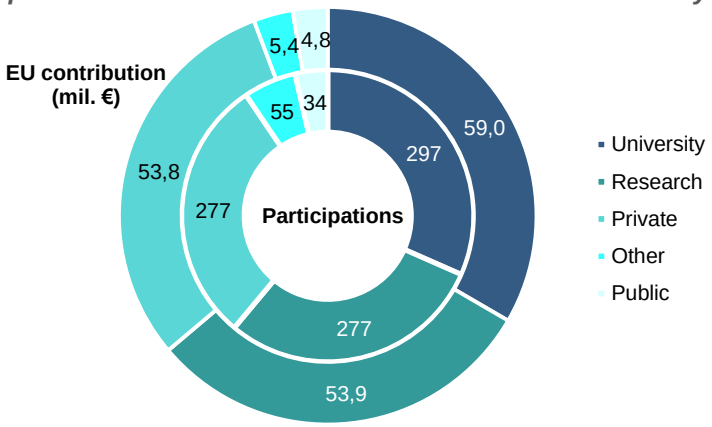
Note: As the analysed period of the FP7 includes mostly years 2007 - 2011, (and a very small part of 2012), we use the sum of R&D expenditures from 2006 – 2010, which are available via Eurostat; Excluding Greece for which there are no available data.

Source: E-CORDA

Structure of FP7 participants

FP7 enables the participation of universities and research organizations, private businesses, government institutions and other subjects. The participation of SME is particularly supported; the long-term target is to reach a 15% share. The participation of the private sector in the FP7 is decreasing compared to previous programs and effort is made to turn this trend around. In the Czech Republic 188 of the 940 participating subjects come from SME, which is ca. 20% (in case of the EU contribution the share is 20.8%). The value of both indicators therefore exceeds the quota set by the EC. The Czech Republic always belonged to countries with a high share of the private sector, which continues to be true even today. In comparison to other countries it is in 10th place in the share of private sector. The sector structure of participants is shown in chart E.9. The shares of university, research and private sectors are almost equal in the Czech Republic. A large part of the research sector is made up by the AS CR institutes (59% participants and 63% EU contribution). There is a very low participation of the government sector; its share is low also when compared to other EU states (22nd place).

Chart E.9: Participation of Czech teams and EU contribution to teams by sector



Note: E-CORDA classification is different from CZSO classification – public sector includes public institutions outside of R&D and education.
Source: E-CORDA

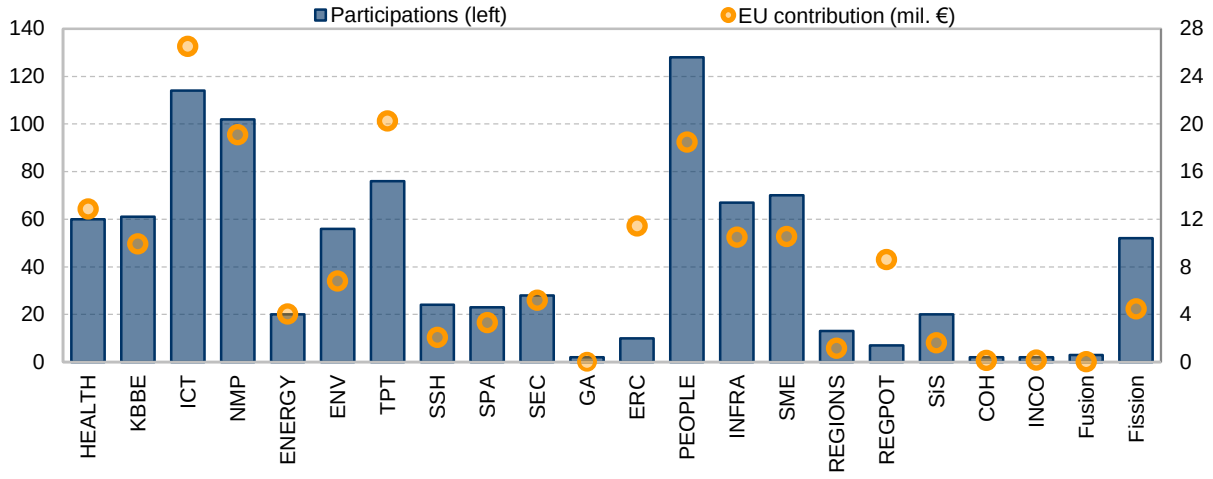
FP7 priorities

The FP7 is divided into four specific programs and each of these programs includes a number of topical or horizontal priorities. Topical priorities monitor research goals in a given field (e.g. Health), horizontal goals target aspects which go across ERA (blue-sky research, mobility, participation of SME etc.). Chart E.8 shows the number of participating Czech teams in individual priorities and the contribution they received from the EU. The values are influenced by the size of budgets of individual priorities; the largest priorities are ICT and HEALTH. The Ideas programme also has a sizeable budget with only one priority (ERC); however compared to other priorities there is a larger contribution per participant. Slightly less sizeable budgets are in priorities Nano science, materials and new technologies (NMP), transport (TPT) or program People (PEOPLE).

The largest part of teams from the Czech Republic participates in PEOPLE, ICT, NMP and slightly less in HEALTH. Other priorities with significant Czech participation are Agriculture, food and biotechnology (KBBE), Environment (ENV), Transport (TPT), Infrastructure (INFRA), R&D in SME (SME) and nuclear fission and protection (Fission) of the EURATOM programme. On the other hand only two of the Czech teams participated in the INCO priority, which focuses on international cooperation with third world countries.

The received contribution strongly correlates with the number of participations – the larger the number, the higher the total contribution for the given priority. The Czech teams received the most resources in ICT, NMP and PEOPLE; an above average contribution related to the number of projects was achieved in the research potential priority (REGPOT).

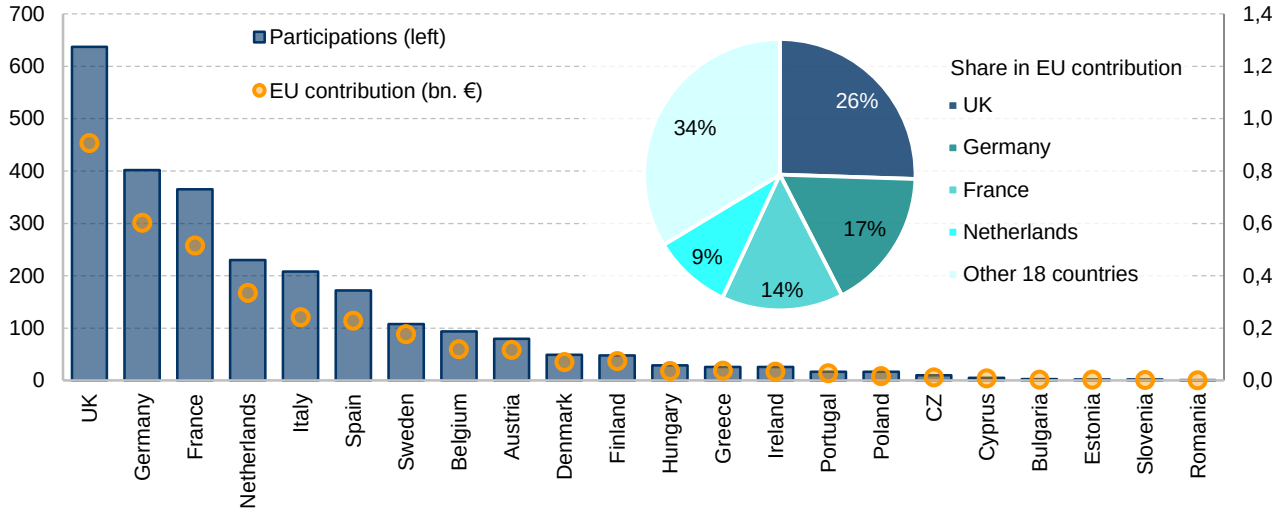
Chart E.10: Participation of Czech teams and EU contribution in individual priorities of FP7



Source: E-CORDA

The highest average contribution per participant is in the Ideas (ERC) program. These are projects that are solved by only one solver. They are aimed at fundamental research and have a goal to surpass the limits of human knowledge. Although they were first implemented in FP7, they are considered as one of the indicators of scientific excellence and prestige. Most represented country is the UK with 26% of the whole EU, followed by France, Germany, Italy, Spain and Netherlands. Czech teams acquired 10 ERC projects with the total contribution of more than 11 million EUR. In the group of new member states only Hungary has higher participation, however its value is thrice as high as the Czech one (29 projects and 36 million EUR).

Chart E.11: Participation of EU teams in ERC grants (specific programme Ideas)



Source: E-CORDA

The leaderboard of the most frequent FP7 participants within the EU is shown in table E.2. A notable fact is that the leading European research institution Centre National de la Recherche Scientifique (CNRS) has a higher number of participations than the whole Czech Republic. The most successful institutions in terms of the number of teams are located in advanced and large EU states (which are able to develop a wide

knowledge base in the given field) – in France, Germany and GB. In the Czech Republic the institutions with the largest number of participations are the Charles University followed by the Czech Technical University, Masaryk University and the Institute of Nuclear Research in Řež, which has the bulk of its activities in the EURATOM programme.

Table E.2: Most frequent participants in FP7 from the EU and the Czech Republic

Institution name	State	Participations
Centre National de la Recherche Scientifique (CNRS)	FR	1 020
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V.	DE	708
The Chancellor, Masters and Scholars of the University of Cambridge	GB	486
Commissariat A L' Energie Atomique	FR	475
Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	DE	466
Institution name	**State**	**Participations**
Univerzita Karlova v Praze	CZ	86
České vysoké učení technické v Praze	CZ	60
Masarykova univerzita	CZ	38
Ústav jaderného výzkumu Řež, a.s.	CZ	28
Vysoké učení technické v Brně	CZ	26
Technologické centrum AV ČR	CZ	24
Vysoká škola chemicko-technologická v Praze	CZ	21
Fyzikální ústav AV ČR, v.v.i.	CZ	19
Výzkumný a zkušební letecký ústav, a.s.	CZ	12
Centrum dopravního výzkumu, v.v.i.	CZ	12
Biologické centrum AV ČR, v.v.i.	CZ	12
Mikrobiologický ústav AV ČR, v.v.i.	CZ	11

Source: E-CORDA

New Framework Programme HORIZON 2020

In July 2012 the EC issued the largest and last batch of calls for proposal for research within FP7. The calls for 2013 serve among others as a transition to the new FP Horizon 2020 (H2020), which will fund R&D in the EU in the years 2014-2020. One of the main problems of Europe in the field of R&D is the limited ability to transfer R&D results into practice. This fact is reflected by the low competitiveness, insufficient growth and lack of jobs. H2020 is one of the basic tools for implementing the Europe 2020 Strategy and also a key tool for funding the initiative of the Research and Innovation Union in the EU. Similarly to the FP7 it should support the economic growth and creation of jobs through its implementation tools.

Contrary to the current period the H2020 will include all current European R&D funding tools – FP for Research and Technological Development, FP Competitiveness and Innovation and the European Technological and Innovation Institute. H2020 is constructed so that it would enable the funding of not only the fundamental research, but also the commercial use of its results. The H2020 budget for 2014-2020 operates with the amount of almost 88 billion EUR, which it divides among three main interdependent priorities – Excellent Science (28 bn. EUR), Competitive Industries (20 bn. EUR) and Better Society (36 bn. EUR). The development of scientific base and competitiveness at the global level should be achieved by increasing the cooperation within the EU and the consolidation of ERA.

Although the proposed structure of H2020 is slightly different than that of the FP7m the main areas of research activities remain the same in H2020. The table E.3 serves for quick orientation in the topical priorities of both FPs. Its form, particularly regarding E.3 isn't final yet.

Table E.3: Topical overlap of Horizon 2020 and FP7

Horizon 2020		FP7
Excellent Science	European Research Council	SP Ideas
	Future and Emerging Technologies - FET	SP Cooperation (ICT, NMP)
	Marie Sklodowska Curie Actions	SP People
	Research Infrastructures	SP Capacity (INFRA)
Competitive Industries	Industrial and breakthrough technologies (Leadership in industrial technologies - ICT, NMP, advanced materials, biotechnology, space, advanced manufacturing and processing	SP Cooperation (ICT, NMP, KBBE, ...)
	Access to risk finance - emerging and innovating enterprises	x
	Innovation in SMEs	SP Capacity (SME)
Better Society	Health, demographic change and wellbeing	SP Cooperation (HEALTH)
	Food security, sustainable agriculture, marine and maritime research, and the bio-economy	SP Cooperation (KBBE)
	Secure, clean and efficient energy	SP Cooperation (ENERGY, SEC)
	Smart, green and integrated transpor	SP Cooperation (TPT)
	Climate action, resource efficiency and raw materials	SP Cooperation (ENV)
	Inclusive, innovative and secure societies	SP Cooperation (SSH, SEC)
	Secure society – protection of freedom and security of Europe and its citizens	SP Cooperation (SEC)
Other priorities	European Institute of Innovation and Technology (EIT)	x
	Joint Research Centre – JRC	JRC
	Euratom	Euratom

Source: Technologic centre of ASCR with the use of EC documents

The Czech Republic supports international cooperation through various mechanisms, be it program schematics or various forms of partnership agreements. The major part of funding from the state budget is allocated through the MoEYS chapter and to a lesser degree through the chapter of Ministry of Foreign Affairs (MFA), which allocated support to international organizations – in 2011 the main beneficiaries were the CERN organization (233.6 million CZK), the Joint Institute for Nuclear Research in Dubna (52.7 million CZK) and the European South Observatory ESO (39.5 million CZK)

In the same year MoEYS allocated a total of 595.1 million CZK for international cooperation support from the state budget, which represented almost 94% of the total amount[41]. This sum covered apart from the contributions to several international organizations (e.g. the European Space Agency ESA) the funding of the EUROSTARS programme, activities Mobility, Metrology etc. The funding from state budget is directed to programs COST CZ, EUPRO II, EUREKA CZ, INGO II and KONTAKT II[42]. For completion it is necessary to add the Installation Grants EMBO, GESHER/MOST programme, Norway/EEA financial mechanism and other tools. A significant prerequisite for the development of the international cooperation in R&D is the development of large infrastructures for research, experimental development and innovations, which are also supported from the MoEYS budget chapter. So far the government approved the funding of 33 projects of large infrastructures, which count with support in the amount of 785 million CZK in 2012[43]. 14 of these projects are connected with the Czech part of the strategic infrastructure network for research included in the ESFRI Roadmap.

Programme **COST CZ**, which is a successor of the proven initiative COST, is aimed at the support of multilateral international cooperation in fundamental research especially when establishing new contacts. Each member state choses its individual form of support of its research organizations' participation and

[41] The closing statement of the MoEYS chapter for 2011 (http://www.msmt.cz/file/22278)

[42] Starting with public tenders announced in 2011 the MoEYS implements new names for former programs COST, EUPRO, EUREKA, INGO and KONTAKT. This will lead to the overlapping of old and new names, whereas during the transition period both names shall be used.

[43] R&D IS

therefore it is impossible to perform international comparison. Disciplinary focus is set in individual calls for proposals. In 2011 one of the high-quality results was the development of a new generation of metalopharmaceuticals, improvement of computer chip-aided diagnostics or the completion of the Phenology Atlas of the Czech Republic

Programme **EUPRO II** is aimed at the support of the participation of Czech institutions in coordination of European research, in FP EU and bilateral activities. EUPRO II helps to provide the scientific community with information about the rules of international programs and to provide sufficient information for successful participation of Czech research sites in the above mentioned activities. In 2011 this goal has been fulfilled by the national information infrastructure, which is composed of the National Information Center for European Research III (NICER), regional and departmental contact organizations. In 2011 NICER organized 48 informational and educational events where the team members presented more than 110 contributions and prepared seven issues of the 7FP Journal, which provided regular information to 390 registered subjects.

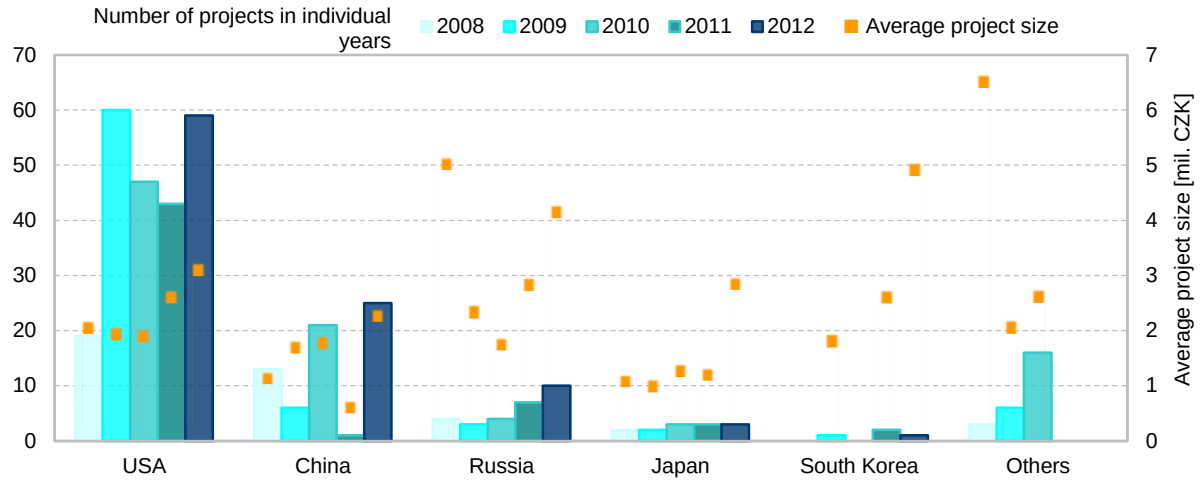
Programme **EUREKA CZ** is an intergovernmental initiative independent on EU activities, which is aimed at the support of applied research in industrial companies, research institutes and universities across the technological sectors. EUREKA currently associates 39 countries; the Czech Republic is a member since 1995. EUREKA differentiates three categories of projects: individual, Eurostars and cluster projects. The Eurostars initiative focuses solely on SME, stimulates their research activities and lowers the risk connected with their innovation process. According to reports the programme helped to create 5 new jobs, install 14 new functional devices, 10 prototypes and 19 new technologies. 11 new licenses were offered for sale. Apart from that two patents and four industrial patterns were registered.

The aim of the **INGO II** programme is to enable the participation of Czech research sites in research programs or managing bodies of cutting-edge non-governmental organizations. Without such a program it would be impossible to e.g. participate in the CERN or Laue-Langevin Institute (Grenoble) research projects. The projects in the field of nuclear and neutron research or nanotechnology are the most prestigious in its evaluation.

Program **KONTAKT II** supports the bilateral or multilateral international cooperation of R&D institutions. While in the previous years it focused primarily on the cooperation with EU member states (e.g. created prerequisites for participation in FP), now it focuses on strengthening connections to non-member countries. Currently the focus is on cooperation with China, Japan, Korea, Russia and USA. Chart E.11 shows that the long-term highest number of cooperation projects is performed with partners from the USA (59 projects in the already closed 2012 competition). The growing trend, valid for all the monitored countries, shows average project budgets in recent years, although there are significant year-on-year fluctuations.

The setting of all the listed programmes is similar in many regards – the solution period is limited to a maximum of four years (three for INGO), all expect measurable and assessable results in the form of publications, applied outputs, patents, research reports etc. The projects are assessed according to their goals, international cooperation rate, necessity and practical use of their results. The support can be as high as 100% of certified costs; in case of applied research this amount is limited to 50%.

Chart E.12: Allocation of funding within the KONTAKT programme by target countries (2008-2012)



Source: R&D IS

Varying goals of individual programmes become apparent in the prevalent topical focus of supported projects (table E.4). A clear situation is in the programme EUREKA/EUREKA CZ, which focuses on the support of applied R&D and industrial applications dominate among branches (according to R&D IS classification). EUPRO/EUPRO II and INGO/INGO II programmes show relatively high participation of social sciences, probably because a number of projects are of a facilitation or organizational nature. The Czech Republic has a traditionally strong position and therefore high attractiveness for foreign partners in the fields of physics, mathematics, chemistry or bioscience.

Table E.4: Topical focus of project within international cooperation (1996-2012)

Field group	COST/COST CZ	EUPRO/EUPRO II	EUREKA/EUREKA CZ	INGO/INGO II	KONTAKT/KONTAKT II
Not specified	7	11			1
Social sciences	35	77	15	64	96
Physics and Math.	145	51	10	114	414
Chemistry	120	31	13	54	244
Earth sciences	86	33	39	20	118
Biosciences	96	32	11	13	263
Medical sciences	61	22	26	7	72
Agriculture	75	24	10	25	117
Informatics	3		9	3	21
Industry	183	92	157	97	270
Total	**811**	**373**	**290**	**397**	**1616**

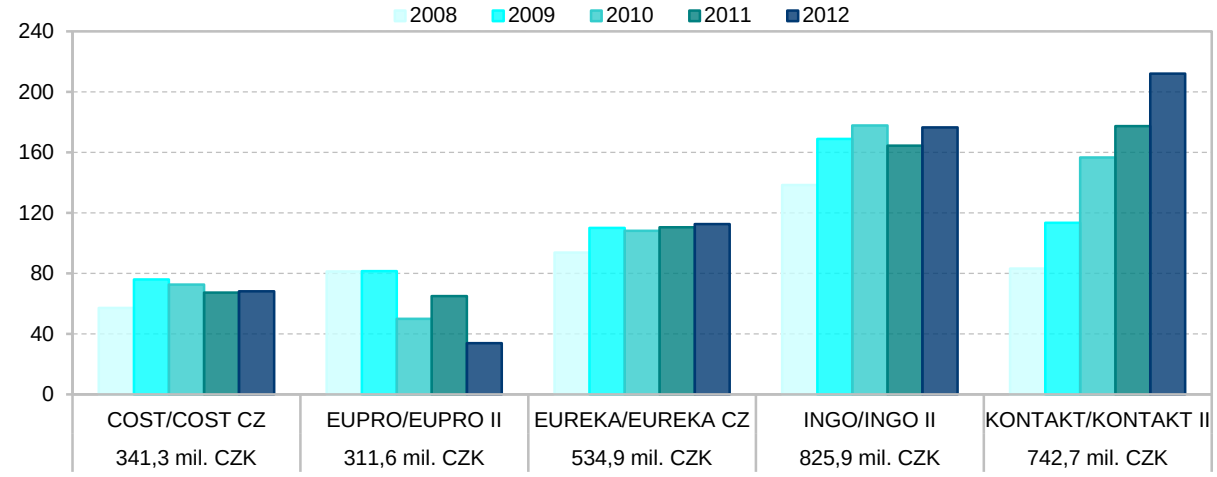
Source: R&D IS

Although the Czech Republic participates in these programs since the half of the 90s, the following statistics show only data for the last five years. Chart E.13 shows the volume of financial support, which is provided from the state budget to individual programs. Target subjects receive the most funding from INGO and KONTAKT programs, which focus on prestigious, cutting-edge projects and bilateral cooperation. The growing trend in drawing funding from KONTAKT is probably caused by the reorientation on non-European countries with high R&D potential.

The volume of funding designated for public tenders within the COST/COST programmes hasn't always been fully drawn, but not because of a supply overhang. During the creation of budgets it is expected for the projects to last four years. However, the applicants can apply for one-, two- or three-yea projects. A number of these shorter projects are successful in the competition, which means that in the following years

the allocation may not be fully drawn. The same goes for the EUREKA/EUREKA CZ and INGO/INGO II programmes. Another aspect contributing to this phenomenon is the non-linear planning of project expenditures by the applicants, which is based on the nature of the project solution. In recent years the success rate of drawing from EUPRO/EUPRO II has increased. The KONTAKT/KONTAKT II programme oriented on cooperation with non-EU countries is repeatedly in high demand and last year the provided funding significantly exceeded the original allocation – this is only possible by shifting resources between individual years within the budget chapter.

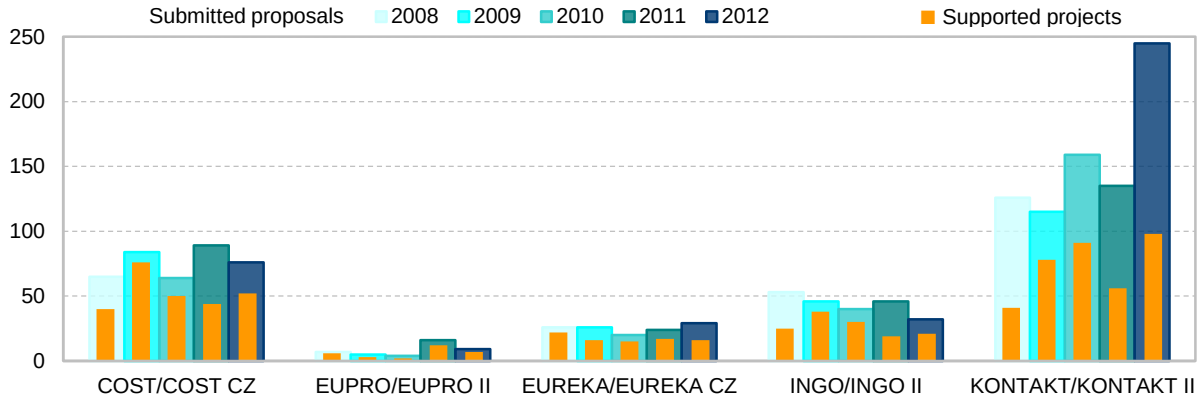
Chart E.13: State budget funding of international cooperation (2008-2012; mil. CZK)



Note: Programme designation refers to the current and previous programme. Sum shows the sum of support allocated to the programme in 2008 - 2012.
Source: R&D IS

Relative success rate of individual proposals depends on the evaluation criteria. Lowest success rate was recorded in the KONTAKT/ KONTAKT II programme, where only one half of all proposals receive funding (chart E.14 shows the number of applications). On the other hand EUPRO and EUREKA programs, where there is a lower number of projects (but these projects are larger), have a success rate of almost 70%.

Chart E.14: Comparison of the number of received proposals and supported projects (2008-2012)



Source: R&D IS

F Appendices

F.1 Survey methodology and definitions of indicators

Methodological notes to the macroeconomic framework

GDP per capita in PPS (Purchasing Power Standard)

The GDP is a measurement of economic performance. It represents the added value of all goods and services (it is necessary to deduct intermediate products). The GDP volume index per capita average, expressed in the Purchasing Power Parity is related to the EU 27 average, which is equal to 100. If the index per a certain country is higher than 100, it means that the GDP per capita is higher than the EU 27 average and vice versa. The data are presented in the PPS – a common currency, which removes the price level differences between countries and enables comparison between individual countries rather than in time.

GDP growth rate

The calculation of the annual GDP growth rate enables to compare economic comparison in time and between countries of various sizes regardless of price changes. The GDP growth is calculated based on data on prices of the previous year. To calculate the real GDP growth rate we use GDP in current prices valued at prices of the past year. These volume changes, adjusted to the level of the reference year (so-called chain data), show the growth rate free of price fluctuations.

Purchasing Power Standard (PPS)

The PPS is a currency unit, which is used to balance the differences between the purchasing power of currency units of EU member states based on the status after its enlargement to EU 27 as of 1.1.2007. The sum of all GDP data of all 27 countries converted to EUR (formerly ECU) equals the same amount in PPS.

Productivity of labour per capita

Labour productivity per capita is calculated as a share of the GDP (in PPS) and the total employment according to national accounts. GDP per employed person is actually the productivity of the national economy and is designed as an index related to the EU 27 average. If this index is higher than 100 for a country it means that the GDP per employed person in this state is higher than the EU 27 average and vice versa. The basic indicators are shown in PPS – a common currency, which removes the differences in price levels of countries and enables the comparison of GDP between individual countries. It doesn't distinguish part-time or full-time employees.

Government (public) debt

Government debt is defined in the Maastricht Treaty as the total consolidated debt of the government institutions (in nominal value as of the end of the year) in the following categories of the government's liabilities (as defined in ESA95): currency and deposits (AF.2) securities other than shares (AF.3) with the exception of financial derivatives (AF.34) and loans (AF.4). The sector of government institutions includes central government institutions, national government institutions and social security funds. The time series are expressed as GDP percentage (GDP in current prices) and millions of EUR. The fundamental data are displayed in the national currency and the ECB converts them to EUR according to the exchange rate valid as of the end of the given year.

Foreign Direct Investments

The foreign direct investment (FDI) of the international investment category is made by a domestic subject (direct investor) by buying a subject in a foreign economy in order to achieve continuous profit (interest), while the direct investor controls at least 10% of the foreign subject. For comparison of economies of various sizes it is expressed as a share in GDP.

Inflation rate

Inflation is generally defined as the growth of the price level, i.e. it characterizes the rate of currency depreciation in a strictly defined time period. The inflation rate is measured by an increase of the consumer price index. Here the inflation rate shows the percentage change of the average price level during 12 months of a year compared to the average price level of the 12 months of the previous year. The price level is measured using the harmonized indexes of consumer prices (HICP), which are created for international comparisons of consumer prices. HICP is used e.g. by the ECB to monitor inflation within the Economic and Monetary Union and to estimate the inflation convergence, as requested by the Article 121 of the Amsterdam Treaty.

Comparative price levels

Comparative price levels are relations between purchase power parities and exchange rates od each country. The purchase power parity is established by the monetary convergence rate, which converts the values of economic indicators, expressed in the national currency, to a common currency, which is called the Purchase Power Standard (PPS). By equalizing the purchase powers of individual national currencies this standard enables comparison of indicators of individual states. The rate is designed in relation to the average (EU 27 = 100). If this rate is higher/lower than 100 for a given country, it means that the country is relatively more/less expensive that the EU 27 average.

Employment rate

The employment rate is calculated as a ration of all employed persons aged 20-64 to all persons in this age group. The indicator is based on the EU Labour Force Survey. The survey targets all persons living in households and doesn't apply to persons living in collective accommodations such as pensions, dormitories and hospitals. Employed population consists of persons, who worked at least one hour in a reference week for wage, salary or other reward or, while not being at work, they had a formal relation to employment.

Unemployment rate

The unemployment rate shows unemployed persons as a percentage of the labour force = active population. The labour force is the total number of employed and unemployed persons. Unemployed persons consist of persons aged 15-74, who a) were without employment during the reference week; b) are available for employment, i.e. are ready to begin paid or freelance work (employment in their own company) before the end of two weeks after the reference week; c) actively seeking employment, i.e. taking steps to find paid work or freelance work within a four-week period ending with the reference week, or those who found employment with postponed start (maximum three months).

Long-term unemployment rate

Long-term (more than 12 months) unemployed are persons older than 15, not living in collective facilities, who aren't employed within a period of 14 days after the survey, are available immediately or within a maximum of 14 days for paid work or freelance work and are searching for employment (actively searched for work during the past 4 weeks or don't search for work, because they already found it and are available

to start working within 14 days). The total workforce is the total amount of persons with a single or primary employment plus the total amount of unemployed persons. The unemployment duration is defined as the period of searching for work or as a period since the last employment (if this is shorter than the period of employment searching).

Public expenditures on education

This indicator is defined as total public expenditures on education expressed as GDP percentage. The public sector finances education by covering the operating and capital costs of education institutions or by supporting students or their families via stipends and public loans or by providing grants for educational activities to private companies and NGOs. Both expenditure types together form the public expenditure on education.

Energy intensity of the economy

Energy intensity of the economy describes the relation between the gross energy consumption in a country and the GDP for the given calendar year. It measures the energy consumption of an economy and its energy efficiency. Gross energy consumption is calculated as a sum of the gross consumption of five types of fuel: coal, electricity, liquid fuels, natural gas and renewable sources. GDP values are in chain volumes with the reference year 2000. The energy intensity is a ratio of the gross energy consumption and GDP. As the gross energy consumption is measured in kgoe (kilogram of oil equivalent) and GPD in 1 000 EUR, this ratio is presented in kgoe/1000 EUR.

Methodological notes to chapter A

F.1 Total R&D expenditures

The CZSO monitors the R&D characteristics via its Annual R&D Survey (VTR 5-01), which includes questions about human and financial resources for R&D activities performed in the Czech Republic in the individual R&D sectors. This survey has been conducted since 1995 and fully respects the OECS and EU principles included in the Frascati Manual (OECD< 2002) and the Commission Regulation (EC) No.753/2004.

Reporting units – the annual R&D report is sent to all natural and legal persons performing R&D in the Czech Republic regardless of the number of the number of employees, major economic activity, legal form or institutional sector. Since 2001 the Annual Statistical Survey on Research and Development (VTR 5-01) is being sent to all R&D departments of the monitored subjects, which enables a more precise classification of the data and corresponds with the necessary requirements for regional classification.

The basic characteristics in this survey are:

- Number of persons employed in R&D sorted by activity, education and gender
- The amount of R&D expenditures sorted by sources of funding and functional aspect

Detailed information can be found in the Annual Statistical Survey on Research and Development (VTR 5-01) published on the CZSO website.

The above mentioned characteristics are available in the following classification:

- By sector of performance of R&D (business, government, university and private non-profit),
- By prevailing group of scientific disciplines,
- By regions (CZ-NUTS 3) and in the case of the business sector even by districts (CZ-NUTS 4),

- In the business sector also by ownership type, size and prevailing economic activity,
- In the university and government sectors also by site type.

The above mentioned classifications are also available in combinations.

Important definitions of the R&D survey

R&D is a systematic creative activity performed in order to broaden the current knowledge, including the knowledge of man, culture and society, gaining of new knowledge or its practical use through methods, which enable confirmation, complementation or refutation of gained knowledge. We differentiate three types of R&D activities:

- Fundamental research – theoretical or experimental activity performed in order to gain new knowledge on the basic principles of phenomena or observed facts, which isn't directly aimed at practical use.
- Applied research – theoretical and experimental work aimed at gaining new knowledge or skills for development of new or substantially improved products, methods or services.
- Experimental development – includes gaining, connecting, forming or using current scientific or technological, commercial and other relevant knowledge and skills to develop new or substantially improved products, methods or services.

As the line between fundamental and applied research isn't always clear it is necessary to always proceed with caution when interpreting data sorted by R&D activity.

Sector of performance of R&D is the basic category used in the R&D statistics, which groups all institutional units performing R&D based on their main function, behavior and goals. The R&D indicators are standardly monitored and published even at the international level in four sectors of performance of R&D (hereinafter only sectors) - business, government, university and private non-profit. These sectors were defined based on the Code-list of institutional sectors and subsectors (ISEKTOR) used in National accounts (ESA system) and definitions provided in the Frascati manual.

- The business sector includes all economic subjects with the main activity of production of market goods or services for the public at an economically significant price. Economic subjects belonging to this sector are included in one of these ISEKTORs:
  - Non-financial companies (ISEKTOR 11)
  - Financial institutions (ISEKTOR 12)
  - Employers (ISEKTOR 141)
  - Self-employed persons (ISEKTOR 142)

The CZSO didn't have a complete list of subjects with prevailing activities in the area of services until 2004. Due to this the monitored R&D characteristics in the area of services are undervalued until 2003.

- The government sector includes all administrative bodies at all levels (ISEKTOR 13) with the exception of publicly administrated higher education (OKEČ 803)
  The R&D sites in the Czech government sector comprise mainly of individual AS CR sites (54 subjects with 60 sites in 2010) and departmental research sites (24 subjects with 38 sites) with R&D as their main activity (OKEČ 73/CZ-NACE 72). Since 1st January 2007 most of these subjects received a new status of public research organizations. Among the other sites of the government sector which perform R&D as their secondary activity are mainly hospitals, public libraries, archives,

museums and other cultural institutions with R&D as their secondary activity (80 subjects with 98 sites in 2010).

- The university sector includes all public and private universities and other institutions of higher education (OKEČ 803) and also all research institutes, experimental facilities and clinics operating under direct control or managed or connected to organizations of higher education.
  R&D sites in the university sector in the Czech Republic are made up mostly of individual faculties of the public and private universities (156 faculties at 28 universities in 2010) and since 2005 in accordance with the OECD methodology also 11 faculty hospitals.
- The private non-profit sector includes private institutions, including private persons and households, whose primary objective isn't the generation of profit, but to provide non-commercial services to households. These are for example associations of research organizations, associations, communities, clubs, movements or foundations. Subject belonging to this sector are included in of these ISEKTORs:
  - Households (ISEKTOR 14 except for 141 and 142)
  - Non-profit institutions providing services to households (ISEKTOR 15)

  The non-profit private sector is negligible in terms of R&D – 2010 it had only 0.5% share in total R&D expenditures in the Czech Republic

Detailed information about the number of economic subjects and their R&D sites in all mentioned classifications can be found on the CZSO webpages.

R&D expenditures include all expenditures meant for R&D performed within the monitored subject regardless of their funding source. As for the **cost types** the R&D expenditures consist of:

- Current expenditures, which include:
  - Wages of persons employed in R&D, including health and social insurance and bonuses
  - Other non-investment costs, such as stock, supplies and equipment meant for R&D, including costs of services rented or bought for R&D, administrative costs, wages of persons not included in the R&D staff etc.
- Investments, which include:
  - Purchase of long-lived intangible assets (intangible results of R&D activities, software…)
  - Purchase of property and buildings for R&D
  - Purchase of other long-lived tangible assets (technical and other equipment)

The amount of R&D expenditures is measured:

- In current prices – prices of goods and service in the current year
- In constant prices, which eliminate inflation depreciation

The amount of own R&D expenditures of individual monitored subjects is monitored according to these characteristics:

- Sources of R&D funding – we differentiate between three main sectors of R&D funding:
  - Business sector – private business sources, which form the own sources of monitored companies meant for the R&D activities performed by them and business sources of subjects operating in the territory of a given state meant for R&D in other subjects or universities or public research organizations.

- Government sector without universities – public resources (institutional or project) coming from the state or regional budgets meant for R&D activities in the Czech Republic.
- Foreign countries – foreign resources including all R&D resources coming from abroad. In the case of the Czech Republic this includes resource from international organizations including their facilities within the Czech territory and the resources from parent companies directed to their affiliations.

Apart from the above mentioned sources there are also other national sources, such as incomes of universities or private NGOs not coming from the state budget, business sector or abroad. These sources are negligible – in 2010 they had a 0.8% share in Czech R&D funding.

- Functional aspect of resources allocated to own R&D, which includes:
  - Type of R&D costs (wages, investments and other)
  - Type of R&D activity (fundamental, applied and experimental R&D)
  - Prevalent group of scientific disciplines

Detailed information about this statistic is available at: http://www.czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje

The Czech version of the Frascati Manual is available at: http://www.czso.cz/csu/redakce.nsf/i/frascati_manual_2002_v_ceske_verzi/$File/frascati_manual_2002.pdf

F.2 Direct R&D support from the state budget

The annual GBAORD statistics is being prepared in the Czech Republic since 2002 by the CZSO. The aim of this statistics is to provide data on state support of R&D from public budgets in the classification according to socioeconomic targets, i.e. identification of key R&D areas, to which the state support is directed. This data serves also as a support tool for EU countries to decide which R&D areas should receive investments in the coming years.

The GBAORD statistic is being compiled within the EU as a compulsory report according to the Commission Regulation (EC) No. 753/2004, implementing the decision of the European Parliament and Council No. 1608/2003/EC regulating the area of science and technology, particularly R&D. The valid methodology related to this statistic is described in detail in the Frascati Manual (OECD, 2002 – 6th issue). The code list of the socioeconomic goals can be found in the NABS classification (Eurostat 1992, 2007): Nomenclature for the Analysis and Comparison of Science Budgets and Programmes.

Implementation of the GBAORD statistic in the Czech Republic

The GBAORD statistic is prepared annually by the CZSO in cooperation with the Council for Research, Development and Innovation (RVVI) via the Information System of Research, Experimental Development and Innovations (R&D IS) and its integrated databases. The two integrated databases used for the GBAORD statistic are the CEP (Central Registry of Projects) and CEZ (Central Registry of Research Intents). Data from the RVVI budget preparation department are used as complementary. More information about R&D IS available at http://www.isvav.cz/ and http://www.vyzkum.cz/FrontClanek.aspx?idsekce=610

As the R&D IS doesn't contains all financial amounts provided from state budget to R&D, the detailed data on fees and contributions to international programmes must be gathered from the CZSO in cooperation with MoEYS and data on specific R&D at universities in classification by scientific fields directly from the individual universities.

The processing of the data and allocation of socio-economic objectives codes (SEO) according to the NASB code list is performed by CZSO personnel at the level of three-figure SEO classification. The processing is performed systematically for running projects, which continue in the following year and for newly registered programmes manually based on a previously prepared classification key, created from the basic structure of CEP and CEZ databases.

When determining the total direct R&D support from public budgets, the basic data are the expenditures approved by the Act on National Budget for the given fiscal period (preliminary data) and R&D expenditures in the State Final Account (final data), provided by the MoF. The public budgets in this case are the state budget and regional budgets. The state budget is always included, regional budgets only if their contribution is significant. The local level budgets (towns and municipalities) are always excluded. According to the valid international methodology the R&D support via returnable loans, pre-financing of EU programmes covered by EU funds and innovation support are excluded from the public R&D funds.

As the GBAORD statistic is based on the analysis and identification of all funds transferred to R&D from public budgets obtained from administrative sources, it differs from the data gained directly from the beneficiaries of this support (VTR 5-01 survey). International comparability or GBAORD statistical data is generally lower than that of data gathered directly from the subjects performing R&D in the majority of countries.

Monitored characteristics

Main socio-economic objectives defined in the NABS classification (rev. 1992) include:

- SEO01 Exploration and exploitation of the earth
- SEO02 Infrastructure and general planning of land-use
- SEO03 Control and care of the environment
- SEO04 Protection and improvement of human health
- SEO05 Production, distribution and rational utilization of energy
- SEO06 Agricultural production and technology
- SEO07 Industrial production and technology
- SEO08 Social structures and relationships
- SEO09 Exploration and exploitation of space
- SEO10 Research financed from general university funds (GUF)
- SEO11 Non-oriented research
- SEO12 Other civil research
- SEO13 Defence

The complete list of all objectives can be found in the methodological appendix. NABS classification available at http://czso.cz/csu/redakce.nsf/i/metodika_ulohy_gbaord

Data on the direct R&D support from the state budget in the Czech Republic are available also sorteb by the support form (institutional or targeted), main providers, supported fields and the type and domicile of the beneficiaries.

Data on the total institutional support sorted by groups of supported fields for the public universities and AS CR institutions include also data on specific research at universities and the support of AS CR infrastructure, which aren't part of the R&D IS, but have been obtained by the CZSO from these institutions.

The above listed characteristics of state budgetary R&D expenditures and support from the R&D IS and data on the socio-economic objectives processed within the GBAORD statistic were further interconnected with the Registry of Economic Subjects (RES). Based on the following code lists included in the RES: legal organization form, institutional sector (ISEKTOR) and prevailing economic activity (OKEČ/CZ-NACE), the following main types of R&D support beneficiaries were identified:

Public university (ISEKTOR 13 Governmental institution and legal form 601 Universities); Public research institution (legal form 661), which is further divided into AS CR institutes and Departmental research institutes; Other government and public organizations (ISEKTOR 13 Government institutions without legal form 601 and 661, legal form 331 regardless of ISEKTOR), which is further divided according to legal form (contributory organization, state organization unit, public benefit institutions and other legal forms) and prevailing economic activity/industry (OKEČ/CZ-NACE classification); Enterprise (SEKTOR 11 and 12 non-financial enterprises and financial institutions without legal form 102, 116, 141, 331, 601, 661, 701, 731, 745 and 751), which is further divided by ownership (public enterprises: ISEKTOR 11001, 12201, 12301, 12401, 12501; domestic private enterprises: ISEKTOR 11002, 12202, 12302, 12402, 12502, foreign-controlled enterprises: ISEKTOR 11003, 12203, 12303, 12403, 12503), legal form (joint-stock company, private limited company, state company and other legal forms), size (number of employees) and prevailing economic activity (OKEČ/CZ-NACE classification); Associations and NGOs (ISEKTOR 145 Other households, 15 NGOs providing services to households, 21 EU, 22 Other countries and international institutions or legal form 116 Interest associations, 141 Public benefit institution, 701 Association, 745 Chamber and 751 Interest association of legal entities); Natural person (ISEKTOR 14100 Employers and 14200 Other self-employments and legal form 102 Natural person registered in the Commercial Register).

The above listed classifications might be provided based on the data on monitored subjects included in RES both current and those valid at the time the support was provided.

All data on the total direct R&D support from the state budget is based on the data included in the final state account for R&D, unless specified otherwise. This means these expenditures have been really drawn from the budget and not just planned.

Important definitions used in the GBAORD statistic

Government budget appropriations or outlays for research and development include all financial resources (common and capital) provided from the public budgets to support R&D, including funding directed to R&D abroad.

The state budget expenditures on R&D are provided in two basic forms:

- Targeted support (information available in the CEP database) is awarded based on public competition or tenders for R&D to proposed R&D project applying for support within research programmes with accurately defined goals and focus (programme projects) or within a broader spectrum of scientific fields with prevailing fundamental research (grant projects).
- Institutional support (information available in the CEZ database), which is provided especially for the long-term conceptual development of research organizations based on the evaluation of achieved results.
- Note: the institutional support in GBOARD outputs includes the following R&D items, which are not part of the R&D IS:

- Specific research at universities, which includes research done by students within their accredited master or doctoral programs and which is directly connected to their education; Support of the AS CR infrastructure
- Support of the international R&D, which includes fees for Czech Republic's participation in international R&D programmes, membership in international R&D organizations or financial contributions to international cooperation projects, if this contribution can be paid from public sources or if the projects are supported from other states' budgets or from EU budgets or from funds of international organizations.
- Other items connected to administration and awards: costs of the R&D support system for organizing public competitions and project evaluation, evaluation of R&D results, costs related to the operation of RVVI, GA CR, TA CR and AS CR.

The beneficiaries of public R&D support - all legal and natural persons, organizational units of the state and ministries, which received support for their R&D activities.

Providers of R&D support are organizational units of the state or a territorial unit, which decides whether to grant the support and which provides it. In 2011 there were 19 providers of public support in the Czech Republic (Ministry of Education, Youth and Sports, AS CR, Ministry of Industry and Trade, GA CR, Ministry of Health, Ministry of Agriculture, Ministry of Defence, Ministry of Environment, Ministry of Transport, Ministry of Culture, Ministry of Labour and Social Affairs, Ministry of Interior, Ministry of Local Development, Ministry of Foreign Affairs, Ministry of Justice, Office of the Government, State Nuclear Safety Office, COSMC and TA CR). 18 of them provided institutional support and 17 provided targeted support in the same year.

Detailed information available at: http://www.czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje

Methodological notes to Chapter B

B.1 R&D employees

Information about the VTR 5-01 survey, which contains the base data on R&D employees, can be found in chapter F.1

Employees in R&D consist of these types:

- Researchers, who manage or work in projects including concepts or creation of new knowledge, products, processes, methods and systems. Researchers are considered the most important group of R&D employees.
- Researchers consist mostly of employees belonging to the main class 2 (Scientific and specialist intellectual workers) and subclass 1237 (Heads of R&D units) according to the valid employment classification (KZAM-R).
- Technical and equivalent employees, who perform scientific and technical tasks, apply concepts and methods, usually under supervision by researchers.
- Technical and equivalent employees consist of employees from class 31 (technicians in physics, technical and related fields) and 32 (technicians in biology, medical and agricultural workers and workers in related fields) according to KZAM-R.
- Other R&D personnel, who participate in R&D activities (craftsmen, secretaries and clerks). This also includes managers and administrative workers, whose activities are direct services to R&D.

Number of R&D employees is measured as:

- Headcount (HC), which shows the number of persons working part-time or full-time in R&D activities, employed as of the end of the given year.
  Particularly in the university and also in the government sector there are a large number of persons working part-time in several subjects. Therefore this indicator is overvalued in these sectors and doesn't show the real number of R&D employees.
- Full Time Equivalent – (FTE), which is the best indicator for showing the real amount of time dedicated to R&D by R&D employees. This indicator counts only the working time dedicated to R&D. One FTE equals one year of full-time work in R&D.
  In 2005 the method of calculation of this indicator has changed in line with the OECD requirements in order to make it more accurate and more suitable for international comparisons. Due to different methods of FTE calculation particularly in the university sector of individual countries the data on the converted amount of R&D employees aren't fully internationally comparable.

Apart from the data on the number of R&D employees in HC and FTE since 2005 the CZSO monitors also the number of persons working in R&D based on a contract on work. This data, converted by the FTE methodology, is part of the converted number of R&D employees.

Number of persons employed in R&D is monitored according these characteristics:

- Gender
- Activity type (researchers, technicians or other)
- Highest achieved level of education according to ISCED 97 classification divided into tertiary (doctoral – ISCED 6, master or bachelor – ISCED 5A and college ISCED 5B) and secondary and lower (ISCED 1-4).

The number of researchers for 2011 is also available sorted by age and nationality.

The listed characteristics of R&D employees are available in mutual combinations.

Detailed information available at http://www.czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje

B.2 Wages of R&D specialists

Specialists in R&D are defined based on the CZ-ISCO classification as employment group CZ-ISCO 21.

The data concerning wages of R&D specialists come from the structural statistics of employee wages, which is published by the CZSO in cooperation with the Ministry of Labour and Social Affairs.

The amount of the average monthly wage in the Czech Republic used in this analysis differs slightly from the average wage in the Czech Republic published in other documents due to the use of analytical data, which are relevant to the survey sample (ca. 1.7 million employees).

More information available at http://www.czso.cz/csu/redakce.nsf/i/lidske_zdroje_ve_vede_a_technologiich

B.3 University education

B.3.1 Persons with finished university education

For the purpose of this analysis this category includes persons older than 25 years, who successfully finished their university studies (bachelor – ISCED 5A, master – ISCED 5A and doctoral - ISCED 6) in all study programmes.

The source of data related to people with finished university education is the Labour Force Survey with households and individuals being the basic reference units. The data is presented as annual averages and if its value is less than 3 000, then it is considered low-reliability data.

Detailed information available at http://www.czso.cz/csu/redakce.nsf/i/lidske_zdroje_pro_vedu_a_technologie

B.3.2 University students and graduates

A law from 1998 changed the statue of the existing universities to public institutions. The only exceptions are the Military and Police universities, which are still state schools under the Ministries of Defence and Interior. This law also enabled the establishment of private universities. It also established an obligation to maintain student registers, the data from which are being centrally united in SIMS (United Information of Student Registers). Only the two above mentioned state schools operate in a different mode and don't have the obligation to submit data to the SIMS register. Therefore they aren't included in the presented data.

In 2001 the three-layer structure of university studies has been strictly implemented, with the former characteristic four- to six-year study at universities had been transformed to usually three-year bachelor programmes and master programmes. The master programmes are of two types – the follow-up master programme, which enables the bachelor graduates to continue their studies, and the so-called long master programmes, where the division wasn't possible. The long master programmes are e.g. medical, veterinary or architectural studies. After successful completion of the master programme the students may continue in doctoral programmes (three to four years) and after their completion they receive the title PhD and their study is focused more on scientific activity. The PhD title has been established in the Czech Republic in 1998 by the Act No. 111/1998 Coll., on universities.

Methodological notes

The published data come from data sources of the Institute for Information in Education (IIE), which is a contributory organization directly controlled by the MoEYS. The data are specifically from the SIMS database. Due to the methodological time comparability and the availability of data from the SIMS database the data are presented in a time series starting in 2002.

Inclusion in a study programme is based on the code of the study programme group, which in some cases doesn't reflect the affiliation of individual study programmes to the main programme groups. Due to the problematic classification of students into the relevant programme groups there are qualified estimates of the IIE used in the case of classification by programmes.

Due to the increase of the number of students studying at more than one university or faculty at the same time the numbers of students are presented in physical persons in summary indicators. In case of programme classification the data show the number of studies, i.e. one student may be counted in several programmes. Due to this the number of students by programmes doesn't correspond to the summary values presented in the time series. Our primary target was to show, which programmes are studied with the highest intensity and the numbers of students in natural and technical sciences, which are crucial for the development of qualified human resources.

The number of students is presented as of 31st December of the given year.

The number of graduates – the presented numbers are relevant for the calendar year, i.e. numbers of students, who successfully finished their studies at a university between 1.1 – 31.12. of the given year.

Note: Date of the completion of the studies is the date of the successful last state examination. It is necessary to bear in mind thatn not all graduates are going directly to employment. Some continue in master or doctoral programmes. Therefore the number of graduates significantly increases over time as e.g. a student, who was registered as a graduate in a bachelor programme, is registered as a master graduate two years later.

The education programmes are defined based on the ISCED 97 classification.

University study programmes

The bachelor study programme focuses mainly on job preparation, whereas it uses current tools and methods; it also contains selected theoretical knowledge. The standard length is three to four years.

The master study programme focuses on gaining theoretical knowledge based on the current state on scientific knowledge, research and development, mastering its application and developing creative activities; in art it focuses on demanding artistic preparation and talent development. The standard length is four to six years.

The doctoral study programme focuses on scientific research and individual creative activity in research and development or individual theoretical and creative work in art. Standard duration is four years.

Students by nationality:

Student with Czech nationality is a Czech citizen registered at a Czech university in a bachelor, master, follow-up master or doctoral study programme as of 31.12. of the given year. All students are included (whether they already completed a study programme in the past or not) with the exception of students, who interrupted all their studies as of 31.12.

Student with foreign nationality is a citizen of a foreign nation registered at a Czech university in a bachelor, master, follow-up master or doctoral study programme as of 31.12. of the given year. All students are included (whether they already completed a study programme in the past or not) with the exception of students, who interrupted all their studies as of 31.12.

Detailed information available at http://www.czso.cz/csu/redakce.nsf/i/lidske_zdroje_pro_vedu_a_technologie

Methodological notes to Chapter C

C.3 Patents, utility models and their licensing

Patent statistics

The patent statistics brings information about the results and success rate of the R&D activities in the selected areas of technology. The patent protection in the Czech Republic territory is provided by the Industrial Property Office of the Czech Republic (IPO).

The CZSO in cooperation with IPO gathers and publishes detailed patent data in various classifications according to the OECD Patent Manual (OECD, Paris 2009) with the aim to make the patent activities of subjects active in the Czech Republic available to the general public through statistical data.

The CZSO processes detailed data on the number of awarded patents for the Czech Republic territory, the number of patent applications filed at the IPO and patents valid as of 31.12. for the Czech Republic territory. Similar data was processed for utility models.

The following is the key information gathered from the IPO patent documentation:

- The year of the patent application, patent award or patent priority – time aspect
- The domicile of the inventor and/or the applicant – territorial aspect. Basic classification consists of patents awarded for the Czech Republic territory to domestic and foreign applicants. In case of domestic applicants there is further information available in the regional classification by regions (CZ-NUTS 3) and for foreign applicants by countries.
  Patent data sorted by the territorial aspect are calculated by the so-called fraction method, i.e. if for example four inventors with different nationalities file an application together, one quarter of this patent is counted for each country.
- How the patent is awarded. Basic classification has two groups. The first one consists of patents awarded via the national route by IPO, the second of validated European patent applications for the Czech territory by IPO. The second option exists in the Czech Republic since 2002, but has been put to practice in a significant manner since 2004. In 2011 86% were awarded via this route, mainly to foreign applicants.
- The field of technology, which is the subject of the claim in the awarded patent, is defined according to the International Patent Classification (IPC). The CZSO, according to the OECD methodology apart from the basic classification by main IPC sections, processed also data on selected technology areas such as high-tech, ICT, biotechnology and renewable resources (see appendix Classification – International Patent Classification).

If the patent covers more technology areas, it is counted according the IPC class specified in the first position. The listed characteristics are available in mutual combinations.

Data on the number of patents belonging to domestic subjects are further available in the following classification:

- By applicant type (universities, public research institutions, businesses, natural persons etc.) defined based on the legal form of the organization, institutional sector (ISEKTOR) and prevailing economic activity (CZ-NACE).
- Legal and natural persons registered in RES, belonging to the business sector, also by ownership (public companies, private companies and foreign-controlled companies), size (number of employees) and field/prevailing economic activity (OKEČ/CZ-NACE).
- In the government and university sector also by facility type.

The above listed classifications were performed based on the data from RES valid as of 31st December 2008, i.e. it doesn't have to match the reality at the time of the patent award. Patent data in these classifications are calculated by the above mentioned fraction method. Aggregated patent data processed by CZSO in the above listed classification may slightly differ from the data published by IPO in its annual reports, due to methodological reasons.

Important definitions used in patent statistics

Patent – a public certificate issued by the relevant patent office, which provides legal protection of the invention for up to 20 years (if the fees are paid) on the territory, for which it had been issued by the patent office (e.g. IPO awards patents via the national route valid for the Czech Republic). The patent is requested

via a patent application at the appropriate patent office. Patents are awarded for inventions that are new, are a result of scientific activity and are industrially usable. Patents can be provided not only for products and technologies, but also for chemically produced substances, pharmaceuticals, industrial production microorganisms as well as microbiological methods and products created by these methods. Patents cannot be awarded to discoveries or scientific theories, computer programs, new varieties or breeds or methods of surgical or therapeutic treatment of the human or animal body and diagnostic methods used on the human or animal body.

Technical solution of a utility model, which forms its core and is protected by it after registration, doesn't have to reach the creative level of a patentable invention. However, it is required that it would surpass the framework of expert skill, wasn't just an external alteration of the product and was industrially usable. In case of the utility model the protection eligibility isn't examined, i.e. the utility model is always registered, provided it meets the legal requirements. The utility model cannot protect production processes. Utility model protection is provided by ca. 40 states.

The author of the patented invention is the person who created it through his creative work. Only a natural person can be the author. This person has the right to authorship (personal right, not transferable to third persons). The author is stated in the patent application and in the patent certificate and the information about the author is entered into the patent register.

The patent applicant could be either the author or his legal representative. The patent applicant is also stated in the patent application and certificate and the information about the applicant are entered into the patent register. The patent owner has an exclusive right to use the invention, provide consent with its use by other persons (licenses) or transfer the patent by a written agreement. The priority year is the year of the first filing of the application in any country.

The European patent provides its owner in all contractual state, for which it was designed, after its validation by the national patent office, with the same right as he would obtain from the national patent granted via the national route. The European patent application can be filed by any person at the European Patent Office (EPO) and if the law of the contractual state allows, even at the central industrial property office or other appropriate body of the contractual state. Since 1st July 2002 it is possible to file a European patent application also at the IPO.

By filing an international application according to the Patent Cooperation Treaty (PCT) it is possible to receive protection in as many as 141 contractual states and four regional patents, including the European one. The core of this system is that the applicant, who requests a patent in several countries, files only one application. Before this application is submitted to the national patent offices, an international proceeding takes place with these main parts: international recherché, preliminary international investigation and international publication of the application. The second phase takes place at the national offices. The benefit of this system is proved by the ever increasing number of applications submitted via the PCT route domestically and abroad.

The International Patent Classification (IPC) is the key for storing and searching patent documents according to fields. It was established in 1968 by merging the national classification systems for patent documents. It contains ca. 60 000 field groups and subgroups and is being continuously updated since 2006 – new groups or subgroups are added while others are removed or merged. Currently there is the 8th version since 2006. The IPC classifications can be found at the IPO website.

Detailed information about this statistic can be found at http://www.czso.cz/csu/redakce.nsf/i/patentova_statistika

Statistical survey on licences within industrial property protection LIC 5-01

The CZSO monitors data on licences valid in the Czech Republic within the industrial property protection since 2005 via the Annual Survey on Licenses (Lic 5-01)

The aim of this survey is to determine the number of active licenses on one of the industrial property protections and the value of license fees received by economic subjects active in the Czech Republic in the monitored year.

Regarding the dissemination of R&D results and their financial appreciation the most important license agreement subjects are licenses for patents or utility model, which are also the focus of the CZSO survey.

Reporting units – the annual survey is sent to all legal entities registered in the Register of Economic Activities, which are known to have or expected to have a license agreement for some kind of industrial property protection, regardless of size, economic activity, legal form or institutional sector. Between 2008 and 2010 the Lic 5-01 had been sent only to legal entities, therefore the results aren't fully compatible with other years (since 2011 the reporting units include natural persons again).

The basic characteristics investigated by this survey are:

The number of licenses valid in the Czech Republic in the monitored year, further characterized by:

- Whether it is a new license or a license from a previous period
  - Type of license according to the type of industrial property protection (patent, utility model, know-how, new varieties and breeds)
  - Country of the contractual partners
  - Code of production, which is the subject of the license agreement defined by the classification CZ-CPA
- Financial value of the license fees received by economic subjects in the Czech Republic in the monitored year in the same classification as with the number of licenses.

The listed characteristics are available in mutual combinations. Detailed information is available at the CZSO website.

The above listed characteristics are available in the following classifications:

- By applicant type (universities, public research institutions, businesses, natural persons etc.) defined based on the legal form of the organization, institutional sector (ISEKTOR) and prevailing economic activity (CZ-NACE).
- By regions (CZ-NUTS 3)
- In the business sector also by ownership (public companies, private companies and foreign-controlled companies), size (number of employees) and field/prevailing economic activity (OKEČ/CZ-NACE).
- In the government and university sector also by facility type.

Additional survey has been conducted for subjects with patent licenses, which identified patents, which are the subject of the license. This made it possible to determine the number of patents for which a license agreement was concluded.

There are several criteria for license differentiation. The basic classification is based on whether the license subject is provided (active) or obtained (passive).

Based on the license subject we differentiate:

- Patent licenses; their subject is the provision of the right to use the valid patent in the licensee's country or in countries, where the licensee is planning to export the licensed product.
- Model licenses; their subject is an industrial or utility model.
- Licenses on know-how; their subject is the provision of unprotected production-technological knowledge, experience or skills. The transfer of the appropriate knowledge is the prerequisite and guarantee of the mastery of practically any licensed production, therefore a large part of the license agreements concluded at this time contains some degree of the appropriate know-how. This license is also called the false license.
- Trademark licenses; their subject is the use of trademarks.

The license agreement is defined as provision of a right to a type of industrial property protection in the agreed scope and in the agreed territory. License agreements are concluded in writing for patented inventions or registered utility models, industrial models, semiconductor product topography, new varieties and breeds or trademarks. The licensor grants the licensee the right to enjoy industrial property rights in the agreed scope and in the agreed territory and the licensee undertakes to provide some sort of payment (license fee) or other pecuniary value. License fees can be paid in regular instalments (e.g. annual) or the payment can be made in a lump sum after the conclusion of the license agreement. There are also cases, when the license is granted for free.

International comparison

The LIC 5-01 survey isn't conducted in other countries, therefore the base for international comparison are the data sources of Eurostat, obtained within the Balance of Payments statistic, which is based on the International Monetary Fund Balance of Payments Manual (BPM5, 5th issue). The definition of services in the area of license fees and royalties is based on the EBOPS (Extended Balance of Payments Services) classification.

The EBOPS code 266 includes international payments and incomes for authorized patent use, copyrights, technological processes, industrial models or prototypes based on license contracts. Note: doesn't include purchase and sale of these rights (EBOPS code 640).

In the case of international comparison the code 266 includes also data for incomes and payments related to the use of license rights, therefore the data for international comparison aren't compatible with the Lic 5-01 results, as it only focuses on the value of received or paid license fees for provided or received industrial rights.

Detailed data available at http://www.czso.cz/csu/redakce.nsf/i/licence

Methodological notes to Chapter D

The statistical survey on innovation activities of enterprises (TI200X) is conducted by the CZSO in order to gather internationally comparable information to determine the quantitative and qualitative characteristics of the innovation environment in the business sector of the Czech Republic. In the Czech Republic this survey was for the first time conducted in 2001, then in 2003, 2005, 2006, 2008 and 2010. Currently the periodicity of this survey is set to two years with a three-year reference period. The last survey conducted in 2010 (TI2010) monitored the 2008-2010 period and was conducted via the harmonized questionnaire of the EU member countries CIS 2010 (Community Innovation Survey 2010).

This survey is conducted according to the Commission Regulation (EC) No. 1450/2004 of 13th August 2004, implementing Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on innovation. The survey fully respects the principles of the EU and OECD listed in the Oslo Manual (OECD 2005). The national legislation framework for the area of innovation support from public resources is stated in Act No. 211/2009 Coll., on Support of R&D&I, which defines technical innovation. The document Innovation Strategy of the Czech Republic 2004 includes all basic definitions of innovation and appreciation of the Czech Republic's innovation environment.

The characteristics gathered from this survey include:

- General information about the monitored enterprise
- Product innovation
- Process innovation
- Marketing innovation
- Organizational innovation
- Source of funding of innovation projects
- Innovation cooperation
- Barriers of innovation activities
- Other information regarding e.g. knowledge management, ecological innovation, human resources in innovation, purchase and sale of licenses, registration of utility models etc.

The investigated characteristics are classified as follows:

- According to CZ-NACE (two figures)
- According to company size (number of employees)
- According to regional classification (CZ-NUTS 3)

Important definitions of the TI survey

Reporting units – economic subjects from the business sector from selected areas of industry and services (financial and non-financial) with at least 10 employees, which have been selected from all economic subjects registered in RES by a combination of global and stratified random sampling in appropriate areas with adjustment for the CZ-NUTS 2 regional dimension.

Within the TI2010 survey a total of 6229 questionnaires have been sent with a 83% return rate. The data gathered by the survey were calculated to the whole basic set with the application of mathematical-statistical methods.

Innovation – represents implementation of a new or a significantly improved product (goods or services) or process, new marketing method or a new organizational method into business practice, workplace organization or external relations.

Innovation has to meet the following criteria:

- To be designated as innovation, a product, process, marketing or organizational method must be new or significantly improved for the enterprise. This includes products, processes and methods, which the companies are the first to develop and those that were adopted from other businesses or organizations.
- The common trait of any innovation is that it had to be implemented. New or improved product is considered implemented if it was introduced to the market. New processes, marketing methods or organizational methods are considered implemented at the time when they are really used in company operations.

Innovating enterprise – according to the updated Eurostat methodology of 2010 innovating enterprises are those, which in the selected period implemented a product or process innovation or had running or interrupted innovation activities (technical innovations) or implemented a marketing or organizational innovation (non-technical innovations). Starting with CIS 2008 survey the non-technical innovations have been made equal to technical innovations.

- Chart of innovating enterprises:
  - Enterprises with technical innovation
  - Product innovation
  - Process innovation
  - On-going or interrupted innovation activities
- Enterprises with non-technical innovation
  - Marketing innovation
  - Organizational innovation

A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilize new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies.

A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products.

A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm’s product on the market, with the objective of increasing the firm’s sales.

An organizational innovation is the implementation of a new organizational method in the firm’s business practices, workplace organization or external relations. Organizational innovations can be intended to increase a firm’s performance by reducing administrative costs or transaction costs, improving workplace

satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies.

Detailed information available at http://www.czso.cz/csu/redakce.nsf/i/statistika_inovaci

F.2 Manuals, metadata, regulations and classification of the statistics on Science, Technology and innovation

The Organisation for Economic Co-operation and Development (OECD) - manuals:

Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development

http://www.oecd.org/document/6/0,3343,en_2649_34451_33828550_1_1_1_1,00.html

Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition

http://www.oecd.org/document/23/0,3343,en_2649_34273_35595607_1_1_1_37417,00.html

OECD Patent Statistics Manual (2009)

http://www.oecd.org/document/29/0,3343,en_2649_34409_42168029_1_1_1_1,00.html

Canberra Manual 1995: The Manual on the Measurement of Human Resources devoted to S&T

http://www.oecd.org/dataoecd/34/0/2096025.pdf

TBP Manual 1990: Proposed standard method of compiling and interpreting. Technology Balance of Payments data

www.oecd.org/dataoecd/35/13/2347115.pdf

OECD Handbook on Economic Globalisation Indicators

http://www.oecd.org/document/44/0,3343,en_2649_34443_34957420_1_1_1_1,00.html

Eurostat - metadata:

Statistics on research and development

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/rd_esms.htm

Government budget appropriations or outlays on R&D statistics

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/gba_esms.htm

Community innovation survey

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/inn_esms.htm

High-tech industry and knowledge-intensive services statistics

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/htec_esms.htm

Patent statistics

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/pat_esms.htm

Statistics on Human Resources in Science & Technology

http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/hrst_st_esms.htm

Regulations (EU):

Decision No 1608/2003/EC of the European Parliament and of the Council of 22 July 2003 concerning the production and development of Community statistics on science and technology

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003D1608:EN:HTML

Commission Regulation (EC) No 753/2004 of 22 April 2004 implementing Decision No 1608/2003/EC concerning the production and development of Community statistics on research and development

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R0753:EN:HTML

Commission Regulation (EC) No 1450/2004 of 13 August 2004 implementing Decision No 1608/2003/EC concerning the production and development of Community statistics on innovation

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R1450:EN:HTML

Classification:

FOS (Field of Science and Technology Classification, 2002 version)

http://www.oecd.org/dataoecd/36/44/38235147.pdf

NABS – Nomenclature for the analysis and comparison of scientific programmes and budgets

http://www.czso.cz/csu/redakce.nsf/i/metodika_ulohy_gbaord

IPC (International Patent Classification)

http://www.wipo.int/classifications/fulltext/new_ipc/

http://www.upv.cz/cs/publikace/tridniky/tridnik-vynalezy.html

ISCED 97 (International Standard Classification of Education)
http://www.uis.unesco.org/ev.php?ID=7433_201&ID2=DO_TOPIC

http://www.czso.cz/csu/klasifik.nsf/i/mezinarodni_standardni_klasifikace_vzdelavani_isced_

ISCO-88 (International Standard Classification of Occupations)
http://www.ilo.org/public/english/bureau/stat/isco/index.htm

http://www.czso.cz/csu/klasifik.nsf/i/klasifikace_zamestnani_(kzam_r)

ISIC (International Standard Industrial Classification)

http://unstats.un.org/unsd/cr/registry/regct.asp?Lg=1

http://www.czso.cz/csu/klasifik.nsf/i/odvetvova_klasifikace_ekonomickych_cinnosti_(okec)

F.3 Outcomes of CZSU in the area of the Science, Technology and Innovation statistics

Web sites:

Research and development

http://www.czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje

Government Budget Appropriations or Outlays for R&D
http://www.czso.cz/csu/redakce.nsf/i/statni_rozpoctove_vydaje_a_dotace_na_vyzkum_a_vyvoj_gbaord

Human resources in science and technology

http://www.czso.cz/csu/redakce.nsf/i/lidske_zdroje_ve_vede_a_technologiich

Students and graduates of tertiary education

http://www.czso.cz/csu/redakce.nsf/i/studenti_a_absolventi_terciarniho_stupne_vzdelavani

Innovation

http://www.czso.cz/csu/redakce.nsf/i/statistika_inovaci

Patents

http://www.czso.cz/csu/redakce.nsf/i/patentova_statistika

Licences

http://www.czso.cz/csu/redakce.nsf/i/licence

Bibliometrics

http://www.czso.cz/csu/redakce.nsf/i/bibliometrie

Technological balance of payments

www.czso.cz/csu/redakce.nsf/i/technologicke_platebni_bilance_zahranicni_obchod_s_technologickymi_sluzbami

Studies:

Public support of R&D

http://www.czso.cz/csu/redakce.nsf/i/verejna_podpora_vyzkumu_a_vyvoje_pdf/$File/v3_final.pdf

University R&D

http://www.czso.cz/csu/redakce.nsf/i/vysokoskolsky_vyzkum_a_vyvoj

Publications:

Publications of CZSO are accesible for free via relevant links, or purchesable in the CZSU shop or via address objednavky@czso.cz.

Statistic Yearbook of Science, Technology and Innovation, code 1005-10

http://www.czso.cz/csu/2010edicniplan.nsf/p/1005-10

Research and Development Indicators in 2010; code 9601-11

http://www.czso.cz/csu/2011edicniplan.nsf/publ/9601-11-r_2011

Innovations of enterprises in the Czech Republiv in 2008 - 2010; code 9605-12

http://www.czso.cz/csu/2012edicniplan.nsf/publ/9605-12-n_2012

Licences in the Czech Republic in 2010; code 9607-11

http://www.czso.cz/csu/2011edicniplan.nsf/publ/9607-11-r_2011

Government Budget Appropriations or Outlays for R&D (GBAORD) in the Czech Republic in 2010; code 9611-11

http://www.czso.cz/csu/2011edicniplan.nsf/publ/9611-11-r_2011

Other publications concerning Research, Technology and Innovation:

Statictic Yearbook of the Czech Republic 2011 - Chapter 22. Science and Research; code 0001-11

http://www.czso.cz/csu/2011edicniplan.nsf/publ/0001-11-2010

Regional Yearbooks - Chapter 19. Science and Technology

http://www.czso.cz/csu/edicniplan.nsf/aktual/ep-1#10a

Focus of Women and Men 2011 - Chapter 8. Science and Technology; code 1413-11

http://www.czso.cz/csu/2011edicniplan.nsf/publ/1413-11-r_2011

F.4 Table appendix

The complete table appendix is available at the website www.vyzkum.cz in the section Documents.

Tab. 0.1. Main macroeconomic indicators of the Czech Republic - Population, GDP, public budgets, foreign trade and prices

Source: unless stated otherwise, CZSO, September 2012

Indicator	Measurement unit	1993	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
		Population 1)													
Population (mean)	**1000 pers.**	**10 331**	**10 331**	**10 272**	**10 224**	**10 201**	**10 202**	**10 207**	**10 234**	**10 267**	**10 323**	**10 430**	**10 491**	**10 517**	**10 497**
age group: 0–14	1000 pers.	2 037	1 921	1 685	1 643	1 605	1 571	1 539	1 514	1 490	1 476	1 480	1 488	1 506	1 532
15–64	1000 pers.	6 957	7 044	7 165	7 168	7 180	7 211	7 240	7 275	7 308	7 351	7 414	7 425	7 394	7 296
65+	1000 pers.	1 337	1 366	1 422	1 413	1 416	1 420	1 428	1 445	1 469	1 496	1 536	1 578	1 617	1 669
women	1000 pers.	5 314	5 311	5 273	5 245	5 236	5 233	5 235	5 243	5 254	5 275	5 316	5 341	5 356	5 344
foreigners	1000 pers.	78	159	201	211	232	240	254	278	321	392	439	435	426	436
Ageing Index (65+ / 0 -14 v %)	%	*65,6*	*71,1*	*84,4*	*86,0*	*88,2*	*90,4*	*92,8*	*95,4*	*98,6*	*101,4*	*103,8*	*106,0*	*107,4*	*108,9*
Overall fertility	*index*	*1,67*	*1,28*	*1,14*	*1,15*	*1,17*	*1,18*	*1,23*	*1,28*	*1,33*	*1,44*	*1,50*	*1,49*	*1,49*	*1,43*
		GDP [2]													
GDP	**bn. CZK, c.p.**	**1 144,6**	**1 533,7**	**2 269,7**	**2 448,6**	**2 567,5**	**2 688,1**	**2 929,2**	**3 116,1**	**3 352,6**	**3 662,6**	**3 848,4**	**3 759,0**	**3 799,5**	**3 841,4**
(previous year= 100)	%, const. p.			104,2	103,1	102,1	103,8	104,7	106,8	107,0	105,7	103,1	95,5	102,5	101,9
Expenditures on final household consumption	bn. CZK, c.p.	597,6	776,7	1 162,8	1 246,1	1 301,2	1 367,3	1 460,7	1 515,7	1 604,5	1 719,7	1 856,7	1 874,4	1 899,0	1 921,7
(previous year= 100)	%, const. p.			100,9	103,3	103,1	105,3	103,2	102,9	104,3	104,1	103,0	100,2	101,0	100,7
Creation of Gross fixed capital	bn. CZK, c.p.	297,6	482,6	652,3	695,1	707,0	720,7	759,3	804,6	860,2	989,6	1 031,2	926,1	932,5	917,3
(previous year= 100)	%, const. p.			106,5	104,5	103,8	100,6	103,0	106,0	105,8	113,2	104,1	89,0	101,0	99,3
GDP deflator (2005 = 1)	*index*	*0,54*	*0,66*	*0,89*	*0,93*	*0,96*	*0,96*	*1,00*	*1,00*	*1,01*	*1,04*	*1,06*	*1,08*	*1,07*	*1,06*
		Public budgets [3]													
Total income	bn. CZK			804,3	876,7	931,7	1 009,8	1 089,0	1 190,1	1 248,5	1 391,5	1 478,2	1 383,9	1 422,8	1 429,6
state budget	bn. CZK	358,0	440,0	586,2	626,2	705,0	699,7	769,2	866,5	923,3	1 025,9	1 063,9	974,6	1 000,4	1 012,8
Total expenditures	bn. CZK			891,4	984,4	1 084,8	1 138,5	1 185,6	1 293,9	1 389,1	1 435,8	1 517,3	1 631,5	1 602,3	1 601,0
state budget	bn. CZK	356,9	432,7	632,3	693,9	750,8	808,7	862,9	922,9	1 020,6	1 092,3	1 083,9	1 167,0	1 156,8	1 155,5
Total Czech national debt	bn. CZK	158,8	154,4	289,3	345,0	395,9	493,2	592,9	691,2	802,5	892,3	999,8	1 178,2	1 344,1	1 499,4
foreign		72,4	53,1	19,7	8,8	9,2	13,3	70,3	109,4	121,6	123,0	185,5	251,5	307,8	317,2
		Foreign trade [4]													
Total exports	bn. CZK	421,6	566,2	1 121,1	1 268,1	1 254,9	1 370,9	1 722,7	1 868,6	2 144,6	2 479,2	2 473,7	2 138,6	2 532,8	2 869,8
Total imports	bn. CZK	426,1	665,7	1 241,9	1 385,6	1 325,7	1 440,7	1 733,8	1 804,6	2 075,9	2 355,1	2 366,8	1 924,1	2 330,1	2 593,8
		Prices [5]													
Infaltion rate	%	**20,8**	**9,1**	**3,9**	**4,7**	**1,8**	**0,1**	**2,8**	**1,9**	**2,5**	**2,8**	**6,3**	**1,0**	**1,5**	**1,9**
Producer price index (2005 = 100)															
Industrial producer price index	%			90,4	92,9	92,4	91,9	97,0	100,0	101,6	105,8	110,5	107,0	108,3	114,3
construction work price index	%			86,0	89,4	91,8	93,8	97,3	100,0	103,1	107,2	111,9	113,3	113,0	112,5
commercial services price index	%			90,0	93,5	96,6	98,1	100,4	100,0	103,4	105,1	109,1	110,7	109,3	110,3

1) Source: Population statistics, more information at: http://www.czso.cz/csu/redakce.nsf/i/Population_lide

2) Source: Database of Annual national accounts, more infromation at: http://apl.czso.cz/pll/rocenka/rocenka.indexnu

3) Source: MoF, Closing Account, more infromation at: http://www.mfcr.cz/cps/rde/xchg/mfcr/xsl/stat_rozp.html

4) Source: Foreign trade database, more infromation at: http://apl.czso.cz/pll/stazo/STAZO.STAZO

5) Source: Prices and inflation, more infromation at: http://www.czso.cz/csu/redakce.nsf/i/inflace_spotrebitelske_ceny

Tab. 0.1.Main macroeconomic indicators of the Czech Republic - Labour market

1st cont.

Indicator	Measurement unit	1993	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
		Employment [6]													
Total number of employed persons	**1000 pers.**	**4 874**	**4 963**	**4 732**	**4 728**	**4 765**	**4 733**	**4 707**	**4 764**	**4 828**	**4 922**	**5 002**	**4 934**	**4 885**	**4 872**
women	*1000 pers.*	*2 138*	*2 178*	*2 056*	*2 054*	*2 065*	*2 047*	*2 044*	*2 059*	*2 086*	*2 116*	*2 139*	*2 111*	*2 087*	*2 095*
foreigners	*1000 pers.*	.	.	*165*	*168*	*162*	*168*	*173*	*219*	*251*	*309*	*362*	*318*	*306*	.
age groups:															
15-34	%	38,1	39,0	36,1	35,5	35,3	34,9	34,3	34,5	34,7	35,3	35,1	33,6	32,3	30,8
35–55	%	53,9	54,3	51,7	51,8	51,3	50,1	49,7	49,7	50,2	50,8	51,8	51,9	52,2	52,9
55+	%	8,0	8,5	9,3	9,8	11,2	12,1	12,6	13,6	14,2	14,9	15,7	15,8	15,8	16,2
by education:															
Elementary	%	13,4	11,9	8,1	7,6	7,3	6,8	6,3	5,7	5,9	6,0	5,8	5,3	4,9	4,5
Secondary w/o A levels	%	45,6	45,6	44,2	43,5	43,4	43,9	43,3	42,5	41,9	41,0	40,2	39,5	38,6	38,2
Secondary with A levels	%	30,4	31,8	35,1	35,9	36,0	35,8	36,3	37,2	37,3	38,0	38,2	38,0	38,1	37,5
Tertiary	%	10,6	10,7	12,6	13,0	13,2	13,5	14,0	14,6	14,9	15,0	15,8	17,1	18,4	19,8
Employment rate of 15-64 years old	%	69,0	69,4	65,2	65,2	65,6	64,9	64,2	64,8	65,3	66,1	66,6	65,4	65,0	65,7
Unemployment rate of 15-64 years old	%	4,3	4,0	8,8	8,2	7,3	7,8	8,4	8,0	7,2	5,4	4,4	6,8	7,4	6,8
Unemployed job applicants[7]	1000 pers.	185,2	153,0	457,4	461,9	514,4	542,4	541,7	510,4	448,5	354,9	352,3	539,1	561,6	508,5
Available jobs[7]	1000 jobs	53,94	88,05	52,1	52,1	40,7	40,2	51,2	52,2	93,4	141,1	91,2	30,9	30,8	35,8
		Wages [8]													
Average wages in economy	**1000 CZK**	**.**	**8,0**	**13,2**	**14,4**	**15,5**	**16,4**	**17,5**	**18,3**	**19,5**	**21,0**	**22,6**	**23,3**	**23,9**	**24,4**
(previous year= 100)	%, const. p.	.	.	.	103,9	106,1	105,7	103,4	103,0	104,0	104,3	101,4	102,3	100,7	100,5
by spheres		.	.												
Business sphere	1000 CZK	.	.	13,2	14,3	15,4	16,1	17,2	18,0	19,2	20,7	22,4	23,1	23,7	24,4
Non-business sphere	1000 CZK	.	.	13,5	14,7	16,2	17,7	18,7	19,9	21,0	22,4	23,3	24,4	24,5	24,5
in selected industries (sections of CZ-NACE)		.	.												
B-E Industry	1000 CZK	.	.	13,2	14,2	15,1	15,9	17,0	17,8	19,0	20,3	22,1	22,6	23,6	24,4
J Information and communication activities	1000 CZK	.	.	22,1	25,4	27,4	29,5	31,3	33,4	35,8	38,2	41,8	43,1	43,8	45,0
K Finance and Insurance	1000 CZK	.	.	25,1	28,6	31,3	32,9	35,2	37,3	40,0	42,4	45,7	46,1	46,2	47,3
M Specialist, scientific and technical act.	1000 CZK	.	.	16,0	17,4	19,6	20,7	21,8	23,5	24,7	26,9	30,2	31,8	31,6	31,2
O Government and defense	1000 CZK	.	.	15,5	16,9	18,5	19,9	20,9	22,2	23,3	25,0	26,2	27,0	26,9	26,3
P Education	1000 CZK	.	.	12,2	13,5	14,8	16,5	17,7	18,8	20,0	21,3	22,1	23,4	23,0	23,7
Q Health and social care	1000 CZK	.	.	12,0	13,4	15,2	16,5	16,9	17,6	19,0	20,2	21,2	23,0	23,6	24,8

6) Source: Workforce survey, more infromation at: http://www.czso.cz/csu/redakce.nsf/i/zamestnanost_nezamestnanost_prace

7) Source: MoSA; status as of 31. 12.

8) Source: Wage statistics, more infromation at: http://www.czso.cz/csu/redakce.nsf/i/pmz_cr

Tab. 0.1. Main macroeconomic indicators of the Czech Republic - education, R&D

2nd cont.

Indicator	Measurement unit	1993	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
		Education [9]													
Universities total	**number**	**23**	**23**	**36**	**45**	**55**	**56**	**63**	**66**	**65**	**70**	**73**	**73**	**72**	**73**
PU	number	23	23	24	24	24	24	25	25	25	26	26	26	26	26
Faculties of PU	number	105	110	111	113	117	117	117	120	125	131	135	.	.	.
University students total	**1000 pers.**	**122,5**	**148,4**	**190,2**	**203,5**	**220,2**	**243,7**	**264,8**	**289,5**	**316,2**	**344,0**	**368,7**	**389,1**	**396,1**	**392,4**
foreign nationality	*1000 pers.*	*3,6*	*3,3*	*7,0*	*8,8*	*11,1*	*13,1*	*17,1*	*20,9*	*23,9*	*27,1*	*30,2*	*34,5*	*37,6*	*38,9*
at PU	*1000 pers.*	*122,5*	*148,4*	.	*198,8*	*211,9*	*231,0*	*247,0*	*265,4*	*285,2*	*303,2*	*319,2*	*333,1*	*339,4*	*339,3*
in doctoral programmes	*1000 pers.*	*4,7*	*8,3*	*16,2*	*17,7*	*19,2*	*20,0*	*21,4*	*22,3*	*23,3*	*24,0*	*24,5*	*25,5*	*26,0*	*25,8*
by study type															
daily	1000 pers.	111,5	129,4	159,4	168,1	179,4	195,6	208,0	223,2	238,2	252,0	263,9	277,1	283,6	284,6
distance and combined	1000 pers.	11,0	19,0	31,9	36,7	42,4	49,9	58,8	68,7	80,8	95,3	107,9	116,3	116,7	112,0
Teachers at PU total	**1000 pers.**	**13 463**	**12 892**	**12 791**	**13 641**	**14 242**	**14 221**	**14 623**	**15 016**	**15 524**	**16 526**	**16 977**	**16 763**	**16 504**	**16 320**
Professors and associate professors	1000 pers.	4 437	4 177	4 203	4 537	4 750	4 757	4 873	4 980	5 110	5 188	5 275	5 431	5 422	5 318
other academic personnel	1000 pers.	9 026	8 715	8 588	9 104	9 492	9 464	9 750	10 036	10 414	11 338	11 702	11 332	11 082	11 002
Public expenditure on education total	**bn.CZK, c.p.**	**53,6**	**71,9**	**87,4**	**97,9**	**108,5**	**115,9**	**123,0**	**130,3**	**142,8**	**153,0**	**151,0**	**163,9**	**163,0**	**173,7**
allocated to PU incl. R&D expenditures	bn. CZK, c.p.	.	.	.	.	.	20,5	22,8	26,4	29,0	34,6	31,2	33,7	32,3	34,2
		R&D													
Total R&D expenditures (GERD) [10]	**bn. CZK, c.p.**	**12,3**	**14,0**	**26,5**	**28,3**	**29,6**	**32,2**	**35,1**	**42,2**	**49,9**	**54,3**	**54,1**	**55,3**	**59,0**	**70,7**
by sectors of their use:															
business (BERD)	bn. CZK, c.p.	9,0	9,1	15,9	17,1	18,1	19,7	21,9	26,7	32,5	33,6	33,5	33,2	36,6	42,7
government (GOVERD)	bn. CZK, c.p.	2,9	3,7	6,7	6,7	6,8	7,5	7,9	8,4	9,3	11,3	11,3	11,8	11,5	12,4
university (HERD)	bn. CZK, c.p.	0,4	1,2	3,8	4,4	4,6	4,9	5,2	6,9	7,9	9,2	9,1	10,0	10,6	15,3
Total R&D expenditures from the state budget (GBAORD) [11]	**bn. CZK, c.p.**	**4,6**	**4,9**	**11,9**	**12,6**	**12,3**	**13,4**	**14,2**	**16,4**	**18,3**	**20,5**	**20,5**	**23,0**	**22,6**	**25,8**
by main providers															
MoEYS	bn. CZK, c.p.	0,7	.	3,6	4,3	4,2	4,6	4,5	5,6	6,7	7,5	7,8	8,3	8,9	10,6
AS CR	bn. CZK, c.p.	1,3		3,5	3,9	3,9	3,6	4,0	4,4	4,8	5,7	5,6	5,9	5,0	4,9
MIT	bn. CZK, c.p.	0,5	.	1,4	1,2	1,1	1,2	1,5	1,8	2,1	2,5	2,5	3,2	3,4	3,6
GA CR	bn. CZK, c.p.	0,2	.	0,5	0,6	0,6	1,2	1,2	1,3	1,4	1,5	1,5	1,8	2,0	2,4
by main beneficiaries															
PU	bn. CZK, c.p.	.	.	3,3	4,0	4,1	4,2	4,3	5,4	5,7	6,9	7,1	7,9	8,1	9,2
Public research institutions	bn. CZK, c.p.	.		4,4	4,5	4,4	5,1	5,5	5,8	6,0	7,4	7,7	8,3	8,3	7,7
Businesses	bn. CZK, c.p.	.	.	1,3	1,2	1,1	1,3	1,9	2,4	2,6	3,1	3,0	3,6	3,5	3,8

9) Source: MoEYS, more information at: http://www.msmt.cz/folder/1041/display/

10) Source: Annual R&D survey VTR 5-01, more information at : http://www.czso.cz/csu/redakce.nsf/i/statistika_vyzkumu_a_vyvoje

11) Source: MoF, Closing Statement and CZSO, Government budgetary expenditures and grants for R&D (GBAORD)

Tab. 0.2 GDP per capita at PPS

Source: Eurostat 1. 8. 2012

in %, EU 27 = 100

Countries	2000	2005	2006	2007	2008	2009	2010	2011
EU 27	**100**	[1] **100**	**100**	**100**	**100**	**100**	**100**	**100**
breakdown:								
Belgium	126	[1] 120	118	116	116	118	119	118
Bulgaria	28	[1] 37	38	40	44	44	44	45
Czech Republic	**71**	[1] **79**	**80**	**83**	**81**	**82**	**80**	**80**
Denmark	132	[1] 124	124	123	125	123	127	125
Estonia	45	[1] 62	66	70	69	64	64	67
Finland	117	[1] 114	114	118	119	115	115	116
France	115	[1] 110	108	108	107	108	108	107
Ireland	132	[1] 145	146	148	133	128	127	127
Italy	118	[1] 105	105	104	104	104	100	101
Cyprus	88	[1] 92	92	93	98	98	95	92
Lithuania	40	[1] 53	56	59	61	55	57	62
Latvia	36	[1] 48	51	56	56	51	55	[1] 58
Luxebourg	245	[1] 255	270	275	279	266	271	274
Hungary	54	[1] 63	63	62	64	65	65	66
Malta	85	[1] 78	76	76	79	82	82	83
Germany	118	[1] 116	115	116	116	116	118	120
Netherlands	134	[1] 131	131	132	134	132	133	131
Poland	48	[1] 51	52	54	56	61	63	65
Portugal	81	[1] 80	79	79	78	80	80	77
Austria	132	[1] 125	126	124	124	125	126	129
Romania	26	[1] 35	38	42	47	47	47	49
Greece	[3] 84	[1,3] 91	[3] 92	[3] 90	[3] 92	[3] 94	[3] 90	[3] 82
Slovakia	50	[1] 60	63	68	73	73	73	73
Slovenia	80	[1] 87	88	88	91	87	85	84
UK	119	[1] 122	120	116	112	111	112	108
Spain	97	[1] 102	105	105	104	103	100	99
Sweden	128	[1] 122	123	125	124	120	124	126
Others								
Island	132	[1] 130	123	121	124	118	111	110
Japan	118	113	109	108	105	103	106	105
Norway	165	[1] 177	185	182	192	176	181	189
USA	161	159	154	151	147	146	147	148
Switzerland	144	[1] 132	134	139	143	144	147	151
Turkey	42	[1] 42	44	45	47	46	49	52

[1] data not fully comparable to previous years (change in methodology)

[2] estimate

[3] preliminary data

Note: the GDP is a measurement of economic performance. It is defined as the value of all produced goods and services minus the value of any goods and servics used in its production. The GDP per capita index expressed in PPS is related to the EU 27, which equals 100. If the index for a given country is higher than 100, it means that the GDP per capita of this country is higher than the EU27 average and vice versa. The values are in PPS - a common currency, which removes differences in price levels of individual countries and enables comparison of the GDP of individual countries. Caution: the index is suitable for comparing countries but not for time comparisons

Tab.0.3 Real GDP growth rate

Source: Eurostat 1. 8. 2012

in %, prices of previous year

Countries	2000	2005	2006	2007	2008	2009	2010	2011
EU 27	**3,9**	**2,1**	**3,3**	**3,2**	**0,3**	**-4,3**	**2,0**	**1,5**
breakdown:								
Belgium	3,7	1,8	2,7	2,9	1,0	-2,8	2,2	1,9
Bulgaria	5,7	6,4	6,5	6,4	6,2	-5,5	0,4	1,7
Czech Republic	**4,2**	**6,8**	**7,0**	**5,7**	**3,1**	**-4,5**	**2,5**	**1,9**
Denmark	3,5	2,4	3,4	1,6	-0,8	-5,8	1,3	0,8
Estonia	9,7	8,9	10,1	7,5	-3,7	-14,3	2,3	7,6
Finland	5,3	2,9	4,4	5,3	0,3	-8,5	3,3	2,7
France	3,7	1,8	2,5	2,3	-0,1	-3,1	1,7	1,7
Ireland	9,3	5,3	5,3	5,2	-3,0	-7,0	-0,4	0,7
Italy	3,7	0,9	2,2	1,7	-1,2	-5,5	1,8	0,4
Cyprus	5,0	3,9	4,1	5,1	3,6	-1,9	1,1	0,5
Lithuania	12,3	7,8	7,8	9,8	2,9	-14,8	1,4	5,9
Latvia	6,1	10,1	11,2	9,6	-3,3	-17,7	-0,3	5,5
Luxebourg	8,4	5,4	5,0	6,6	0,8	-5,3	2,7	1,6
Hungary	4,2	4,0	3,9	0,1	0,9	-6,8	1,3	1,6
Malta	.	3,7	3,1	4,4	4,1	-2,6	2,5	2,1
Germany	3,1	0,7	3,7	3,3	1,1	-5,1	3,7	3,0
Netherlands	3,9	2,0	3,4	3,9	1,8	-3,5	1,7	1,2
Poland	4,3	3,6	6,2	6,8	5,1	1,6	3,9	4,3
Portugal	3,9	0,8	1,4	2,4	0,0	-2,9	1,4	-1,6
Austria	3,7	2,4	3,7	3,7	1,4	-3,8	2,1	2,7
Romania	2,4	4,2	7,9	6,3	7,3	-6,6	-1,6	2,5
Greece	[1] 3,5	[2] 2,3	[1] 5,5	[1] 3,0	[1] -0,2	[1] -3,3	[1] -3,5	[1] -6,9
Slovakia	1,4	6,7	8,3	10,5	5,8	-4,9	4,2	3,3
Slovenia	4,3	4,0	5,8	6,9	3,6	-8,0	1,4	-0,2
UK	4,2	2,8	2,6	3,6	-1,0	-4,0	1,8	0,8
Spain	5,0	3,6	4,1	3,5	0,9	-3,7	-0,1	0,7
Sweden	4,5	3,2	4,3	3,3	-0,6	-5,0	6,2	3,9
Others								
Island	4,3	7,2	4,7	6,0	1,3	-6,8	-4,0	3,1
Japan	2,3	1,3	1,7	2,2	-1,0	-5,5	4,4	-0,7
Norway	3,3	2,6	2,5	2,7	0,0	-1,7	0,7	1,4
USA	4,1	3,1	2,7	1,9	-0,3	-3,1	2,4	1,8
Switzerland	3,7	2,7	3,8	3,8	2,2	-1,9	3,0	2,1
Turkey	6,8	8,4	6,9	4,7	0,7	-4,8	9,0	8,5

[1] preliminary data

[2] data not fully comparable to rpevious years (change in methodology)

Note: the calculation of the real GDP annual growth rate enables the comparison of economic growth dynamics in time as well as between countries of different sizes. The measure the GDP growth rate the GDP in current prices is expresses in the prices of the previous year and such calculated volume changes are related to the reference year level, which is called the chained volume series. This means that the price levels won't increase the growth rate.

Tab. A.1 Total Gross domestic expenditure on R&D in the Czech Republic (GERD)

mil. CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**42 198**	**49 900**	**54 284**	**54 108**	**55 350**	**59 033**	**70 695**
by sector							
Business total	**26 657**	**32 470**	**33 620**	**33 486**	**33 218**	**36 623**	**42 658**
public enterprises	1 866	1 601	1 913	2 724	2 670	2 594	2 039
domestic private enterprises	10 784	11 518	12 747	9 853	10 207	12 981	14 888
foreign-controlled domestic enterprises	14 007	19 351	18 960	20 909	20 340	21 049	25 731
Government total	**8 441**	**9 309**	**11 306**	**11 325**	**11 836**	**11 469**	**12 403**
AS CR institutes	5 901	6 489	8 649	8 530	8 990	8 669	9 646
departmental research organizations	1 807	1 985	1 761	1 908	1 830	1 950	2 008
other governmental sites	733	835	896	887	1 016	850	749
University total	**6 907**	**7 918**	**9 158**	**9 090**	**10 022**	**10 616**	**15 288**
public universities	6 617	7 554	8 687	8 664	9 324	10 110	14 702
faculty hospitals	267	325	423	362	620	419	495
private colleges	24	40	48	64	78	87	92
Private non-profit total	**194**	**204**	**199**	**208**	**274**	**324**	**345**
by source of funds							
Business (domestic private)	22 437	28 142	28 500	27 628	24 701	28 891	33 161
Government (public budget)	17 248	19 445	22 362	22 342	24 301	23 539	26 179
Foreign private	1 392	1 065	2 074	2 542	4 431	3 926	4 671
Foreign public (EU etc.)	666	721	925	964	1 305	2 216	6 093
Other domestic	456	528	423	631	612	461	591
by expenditure type							
Non-investment total	**37 369**	**40 692**	**47 100**	**48 154**	**49 762**	**52 345**	**59 017**
wages	15 499	17 199	20 287	21 895	22 846	24 116	27 017
other costs (material, equipment, energy)	21 871	23 493	26 813	26 260	26 916	28 228	31 999
Capital expenditure total	**4 829**	**9 208**	**7 184**	**5 954**	**5 588**	**6 688**	**11 678**
land and property	864	748	2 079	1 463	1 360	1 717	4 756
other (machines, equipment and devices)	3 965	8 460	5 104	4 492	4 228	4 972	6 923
by R&D activity							
Fundamental research	11 952	14 630	16 152	16 288	16 918	15 860	18 050
Applied research	11 123	12 011	13 803	14 350	13 310	17 870	22 759
Experimental development	19 123	23 259	24 329	23 470	25 122	25 303	29 886
by prevailing scientific field							
Natural	9 845	10 991	13 755	12 788	13 512	14 398	18 055
Technical	24 566	27 240	31 022	31 368	31 276	33 994	40 782
Medical	3 374	6 894	4 303	4 343	4 996	4 758	4 999
Agricultural	1 757	1 867	1 988	2 014	2 124	1 941	2 288
Social	1 457	1 683	1 781	2 033	1 684	2 068	2 625
Humanities	1 199	1 225	1 434	1 563	1 758	1 874	1 946
in selected areas							
ICT	4 492	5 017	6 170	7 055	6 630	6 811	7 626
Biotechnology	1 438	2 101	2 341	1 814	2 033	2 131	3 169
Nanotechnology and nanomaterials	203	210	542	1 032	954	1 033	1 328
by regions							
Praha	15 835	19 186	22 914	22 481	20 906	20 998	23 180
Středočeský	8 561	8 525	10 560	9 782	10 051	11 900	14 082
Jihočeský	1 610	1 713	1 787	1 967	2 123	2 116	2 169
Plzeňský	1 130	1 334	1 394	1 767	1 599	2 295	3 130
Karlovarský	76	71	78	98	92	106	124
Ústecký	589	588	692	808	652	696	784
Liberecký	1 110	1 483	1 312	1 517	1 329	1 449	1 861
Královéhradecký	1 169	985	1 268	1 213	1 651	1 568	1 675
Pardubický	1 632	1 932	2 018	2 002	1 939	2 228	2 564
Vysočina	707	517	538	698	646	743	780
Jihomoravský	4 654	5 057	5 726	6 047	8 127	8 411	11 170
Olomoucký	1 372	1 328	1 511	1 433	1 620	1 599	2 126
Zlínský	1 571	1 646	1 721	1 633	1 583	1 809	2 109
Moravskoslezský	2 182	5 535	2 765	2 661	3 030	3 114	4 941

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. A.4a Total expenditure on government sector R&D in the Czech Republic (GOVERD)

mil. CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**8 441**	**9 309**	**11 306**	**11 325**	**11 836**	**11 469**	**12 403**
by site type							
Research sites (CZ-NACE 72)	**7 708**	**8 474**	**10 430**	**10 438**	**10 820**	**10 619**	**11 654**
AS CR sites	5 901	6 489	8 649	8 530	8 990	8 669	9 646
departmental research organizations	1 807	1 985	1 781	1 908	1 830	1 950	2 008
Other government sector sites	**733**	**835**	**877**	**887**	**1 016**	**850**	**749**
libraries, museums, archives (CZ-NACE 91)	199	309	381	426	530	494	362
other	534	526	496	461	486	356	387
by R&D size (number of FTE employees)							
only contracts on work	0	0	3	4	3	8	9
less than 5	112	193	141	142	199	181	67
5 - 9,9	50	54	60	74	73	58	48
10 - 19,9	166	161	205	152	145	171	160
20 - 49,9	768	673	642	759	654	669	803
50 - 99,9	1 279	1 253	1 280	1 556	2 071	1 817	1 494
100 +	6 066	6 975	8 976	8 637	8 690	8 567	9 823
by source of funds							
Business (domestic private)	778	717	755	666	492	544	427
Government (public budget)	6 909	7 886	9 312	9 513	10 117	9 406	9 622
Foreign private	417	314	836	628	691	1 076	1 267
Foreign public (EU etc.)	225	258	324	319	397	422	1 072
Other domestic	112	134	79	198	139	21	15
by expenditure type							
Non-investment total	**7 227**	**8 030**	**8 905**	**9 467**	**10 146**	**9 906**	**9 973**
wages	3 637	3 929	4 237	4 658	4 841	4 879	5 093
other costs (material, equipment, energy)	3 590	4 101	4 668	4 808	5 305	5 027	4 880
Capital expenditure total	**1 214**	**1 279**	**2 401**	**1 858**	**1 690**	**1 563**	**2 430**
land and property	354	250	1 194	946	712	795	1 325
other (machines, equipment and devices)	860	1 028	1 207	912	978	767	1 105
by R&D activity							
Fundamental research	6 443	7 042	8 855	9 065	9 197	8 513	9 176
Applied research	1 675	1 889	2 212	2 039	2 444	2 600	2 615
Experimental development	323	378	240	221	194	356	611
by prevailing scientific field							
Natural	4 789	5 393	7 334	6 999	7 428	7 266	7 995
Technical	1 073	1 135	1 108	1 021	1 237	1 090	1 065
Medical	532	511	651	684	770	665	755
Agricultural	861	877	768	794	775	717	776
Social	502	656	565	883	598	728	783
Humanities	684	737	880	944	1 028	1 003	1 030
in selected areas							
ICT	189	243	161	263	209	180	204
Biotechnology	752	799	253	406	743	743	1 336
Nanotechnology and nanomaterials	75	60	129	277	310	280	297
by regions							
Praha	5 431	6 430	8 501	8 371	8 546	8 351	9 180
Středočeský	1 120	1 072	982	1 014	1 078	1 044	1 054
Jihočeský	451	504	550	596	629	630	465
Plzeňský	10	15	16	25	31	67	66
Karlovarský	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Ústecký	9	18	14	23	26	11	13
Liberecký	12	11	8	15	15	19	40
Královéhradecký	331	88	73	63	126	53	26
Pardubický	0	38	36	15	29	14	51
Vysočina	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Jihomoravský	979	1 030	1 011	1 058	1 235	1 174	1 323
Olomoucký	8	11	17	17	19	10	12
Zlínský	1	2	5	6	4	3	4
Moravskoslezský	70	73	74	105	86	80	155

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. A.4b Expenditure on R&D in the university sector (HERD)

mil. CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**6 907**	**7 918**	**9 158**	**9 090**	**10 022**	**10 616**	**15 288**
by site type							
Public universities	6 617	7 554	8 687	8 664	9 324	10 110	14 702
Faculty hospitals	267	325	423	362	620	419	495
Private colleges	24	40	48	64	78	87	92
by R&D size (number of FTE employees)							
only contracts on work	0	1	2	2	3	2	3
less than 5	48	82	97	149	115	205	59
5 - 9,9	67	125	80	100	92	140	163
10 - 19,9	185	127	278	207	268	299	1 520
20 - 49,9	851	929	1 165	931	1 212	1 348	1 455
50 - 99,9	1 299	1 756	1 569	1 419	1 397	1 437	1 775
100 +	4 457	4 898	5 967	6 283	6 935	7 185	10 314
by source of funds							
Business (domestic private)	58	55	67	57	106	113	156
Government (public budget)	6 341	7 166	8 387	8 256	9 076	9 216	10 947
Foreign private	9	21	5	3	1	6	5
Foreign public (EU etc.)	182	333	406	391	425	881	3 636
Other domestic	318	344	294	383	415	400	545
by expenditure type							
Non-investment total	**6 214**	**7 016**	**8 214**	**8 409**	**9 363**	**9 851**	**11 512**
wages	2 990	3 382	4 259	4 438	4 760	4 882	5 997
other costs (material, equipment, energy)	3 224	3 634	3 955	3 971	4 603	4 969	5 515
Capital expenditure total	**694**	**902**	**945**	**681**	**659**	**765**	**3 776**
land and property	39	3	201	27	37	210	2 692
other (machines, equipment and devices)	654	899	744	654	623	555	1 085
by R&D activity							
Fundamental research	4 068	4 875	5 619	5 208	6 032	5 886	7 905
Applied research	2 409	2 547	3 059	3 364	3 624	4 112	5 704
Experimental development	431	496	480	519	366	618	1 679
by prevailing scientific field							
Natural	1 476	2 020	1 911	2 357	2 446	2 819	4 420
Technical	2 502	2 653	3 388	3 228	3 474	3 761	5 974
Medical	1 453	1 543	1 843	1 573	2 084	1 833	2 164
Agricultural	421	458	606	613	717	634	812
Social	658	796	922	812	713	784	1 058
Humanities	398	448	488	506	588	786	860
in selected areas							
ICT	264	234	435	561	603	667	749
Biotechnology	314	318	954	615	543	624	709
Nanotechnology and nanomaterials	92	84	147	240	223	222	356
by regions							
Praha	3 349	3 739	4 180	4 213	4 639	4 634	5 334
Středočeský	.	1	12	17	2	12	12
Jihočeský	283	285	310	382	383	410	435
Plzeňský	302	403	435	466	398	448	686
Karlovarský	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Ústecký	48	76	99	108	115	154	142
Liberecký	147	169	233	181	220	247	662
Královéhradecký	281	273	377	286	353	332	412
Pardubický	185	189	190	194	213	235	304
Vysočina	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Jihomoravský	1 398	1 676	1 918	1 888	2 264	2 627	4 366
Olomoucký	393	456	559	570	622	712	1 041
Zlínský	97	106	139	183	179	141	188
Moravskoslezský	424	545	706	602	633	661	1 704

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. A.5 Total expenditure on business sector R&D in the Czech Republic (BERD)

mil. CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**26 657**	**32 470**	**33 620**	**33 486**	**33 218**	**36 623**	**42 658**
podle druhu pracoviště (vlastnictví)							
Public enterprises	1 866	1 601	1 913	2 724	2 670	2 594	2 039
Domestic private enterprises	10 784	11 518	12 747	9 853	10 207	12 981	14 888
Foreign-controlled enterprises	14 007	19 351	18 960	20 909	20 340	21 049	25 731
by R&D size (number of FTE employees)							
only contracts on work	28	30	15	29	55	57	73
less than 5	1 729	1 649	1 815	1 950	2 240	2 627	3 339
5 - 9,9	1 963	2 108	2 774	2 682	2 573	2 921	3 210
10 - 19,9	2 183	2 516	2 748	3 179	3 577	3 619	4 124
20 - 49,9	5 049	8 893	6 273	6 280	6 339	5 674	6 205
50 - 99,9	3 150	4 534	3 830	3 924	3 869	5 040	5 279
100 +	12 554	12 740	16 164	15 443	14 566	16 686	20 428
by source of funds							
Business total	**21 581**	**27 357**	**27 669**	**26 887**	**24 079**	**28 176**	**32 485**
own sources	21 018	26 741	27 055	26 273	23 501	26 261	30 263
sources of other enterprises	563	616	614	614	578	1 916	2 222
Public (state budget) total	**3 840**	**4 226**	**4 502**	**4 411**	**4 911**	**4 712**	**5 451**
Foreign private total	**965**	**729**	**1 233**	**1 911**	**3 740**	**2 828**	**3 399**
from companies in the same group			*1 167*	*1 772*	*2 518*	*2 620*	*3 190*
Foreign public (EU etc.) total	**249**	**115**	**170**	**232**	**441**	**877**	**1 306**
Other domestic	21	43	45	45	46	30	18
by expenditure type							
Non-investment total	**23 741**	**25 447**	**29 784**	**30 073**	**29 982**	**32 287**	**37 218**
wages	8 794	9 813	11 705	12 680	13 106	14 186	15 745
other costs (material, equipment, energy)	14 947	15 635	18 079	17 393	16 876	18 101	21 473
Capital expenditure total	**2 915**	**7 022**	**3 836**	**3 413**	**3 236**	**4 336**	**5 441**
land and property	467	491	684	490	611	711	739
other (machines, equipment and devices)	2 448	6 531	3 152	2 923	2 625	3 625	4 702
by R&D activity							
Fundamental research	1 407	2 692	1 654	1 976	1 632	1 392	913
Applied research	6 929	7 458	8 365	8 786	7 044	10 935	14 214
Experimental development	18 321	22 320	23 601	22 724	24 542	24 297	27 532
by prevailing scientific field							
Natural	3 551	3 557	4 503	3 419	3 600	4 227	5 518
Technical	20 974	23 376	26 496	27 086	26 529	29 089	33 710
Medical	1 387	4 837	1 803	2 081	2 137	2 243	2 047
Agricultural	471	526	600	594	617	582	693
Social	170	136	154	207	204	409	642
Humanities	104	38	64	99	130	74	48
in selected areas							
ICT	4 034	4 528	5 557	6 216	5 801	5 956	6 607
Biotechnology	367	981	1 133	789	741	762	1 119
Nanotechnology and nanomaterials	36	66	265	514	419	531	674
by regions							
Praha	6 899	8 855	10 069	9 733	7 520	7 812	8 502
Středočeský	7 438	7 450	9 565	8 751	8 970	10 843	13 012
Jihočeský	867	906	924	984	1 074	1 039	1 250
Plzeňský	812	915	942	1 276	1 170	1 780	2 378
Karlovarský	72	67	74	96	91	104	123
Ústecký	532	495	574	677	511	531	629
Liberecký	949	1 301	1 070	1 319	1 091	1 181	1 155
Královéhradecký	557	622	817	865	1 173	1 167	1 205
Pardubický	1 445	1 705	1 792	1 792	1 698	1 979	2 206
Vysočina	691	504	522	680	634	731	765
Jihomoravský	2 271	2 346	2 791	3 087	4 610	4 565	5 429
Olomoucký	966	853	923	833	966	854	1 061
Zlínský	1 473	1 538	1 576	1 443	1 400	1 665	1 917
Moravskoslezsky	1 683	4 911	1 981	1 950	2 309	2 371	3 025

Source: CZSO, Annual R&D survey (VTR 5-01)

Cooperation of R&D sectors in 2011

Cooperation of sectors in R&D can be characterized by financial flows targeted on R&D performed in different sectors
Sectors in R&D can be specified from two points of view:

a) **R&D performing sectors** – sectors, where R&D activities are carried out (Business enterprise, Government, Higher education and Private non-profit);
b) **R&D financing sectors (sources of R&D funds)** – sectors (sources) financing R&D activities (Business enterprise: own funds, Funds from other enterprises;

Table and scheme below describe flows of funds among these sectors in R&D in 2011

Tab. 1: Cooperation between sectors, 2011 (mil. CZK)

mil. CZK		Sektor provádění				
		Business (BERD)	Government (GOVERD)	Higher education (HERD)	Private Non-profit	Total
Financující sektor	**Business**	**32 485**	**427**	**156**	**93**	**33 161**
	Own funds	30 263	.	.	56	30 318
	Funds from other companies in the same group	343	.	.	0	343
	Funds from other enterprises	1 879	.	.	37	1 916
	Revenue from sale of R&D services	.	242	139	.	382
	Revenue from license fees	.	4	0	.	5
	Other revenues from business sourc	.	180	16	.	197
	Government	**5 451**	**9 622**	**10 947**	**160**	**26 179**
	Other national sources*	**18**	**15**	**545**	**14**	**591**
	Foreign sources	**4 705**	**2 339**	**3 641**	**79**	**10 764**
	Foreign private	3 399	1 267	5	0	4 671
	Foreign public	1 306	1 072	3 636	79	6 093
	Total	**42 658**	**12 403**	**15 288**	**345**	**70 695**

Tab. 2: Strucutre of R&D funding sources by sectors, 2011 (%)

		Sector				Share of funding sources on total R&D expenditures
		Business (BERD)	Government (GOVERD)	Higher education (HERD)	Private Non-profit	
Funding sector	**Business**	98,0 %	1,3 %	0,5 %	0,3 %	**46,9 %**
	Government	20,8 %	36,8 %	41,8 %	0,6 %	**37,0 %**
	Other national sources*	3,0 %	2,6 %	92,1 %	2,3 %	**0,8 %**
	Foreign	43,7 %	21,7 %	33,8 %	0,7 %	**15,2 %**
	– foreign private	72,8 %	27,1 %	0,1 %	0,0 %	**6,6 %**
	– foreign public	21,4 %	17,6 %	59,7 %	1,3 %	**8,6 %**

Tab. 3: Strucutre f R&D expenditures in sectors by sources of funding, 2011 (%)

		Sektor provádění			
		Business (BERD)	**Government (GOVERD)**	**Higher education (HERD)**	**Private Non-profit**
Funding sector	Business	76,2 %	3,4 %	1,0 %	27,0 %
	Government	12,8 %	77,6 %	71,6 %	46,2 %
	Other national sources*	0,0 %	0,1 %	3,6 %	4,0 %
	Foreign	11,0 %	18,9 %	23,8 %	22,8 %
	– foreign private	8,0 %	10,2 %	0,0 %	0,0 %
	– foreign public	3,1 %	8,6 %	23,8 %	22,8 %
Share of sectors on total R&D		**60,3 %**	**17,5 %**	**21,6 %**	**0,5 %**

Notes:

- **GERD** (Gross domestic expenditure on R&D)
- **BERD** (Business Enterprise expenditure on R&D)
- **GOVERD** (Government Expenditure on R&D)
- **HERD** (Expenditure on R&D in Higher Education Sector)
- **Foreign private sources** represent R&D funding coming from private foreign enterprises (sources from parent companies or subsidiaries, sources from other
- **Foreign public sources** represent R&D funding coming from EU Structural Funds, grants and public tenders of the European Commission including Framework
- . shows that entry is not possible due to technical reasons

* **Other national sources** represent mainly own incomes of universities (99.3% of other national R&D sources in 2011)

Tab. A.14 Total R&D expenditures (GERD) - basic indicators

	absolute values												basic indicators (R&D intensity)											
	mil. EUR current prices						mil. US$ PPP current prices						%GDP						per capita in US$ PPP cur.p.					
	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010
Belgium	4 964	5 552	6 357	6 813	6 904	7 047	5 572	6 171	7 172	7 799	8 031	8 154	1,97	1,83	1,89	1,97	2,03	1,99	544	589	675	728	744	749
Bulgaria	72	107	138	167	185	216	259	349	426	499	551	630	0,51	0,46	0,45	0,47	0,53	0,60	32	45	56	65	73	83
Czech Republic	**746**	**1 412**	**1 952**	**2 175**	**2 093**	**2 329**	**1 864**	**2 948**	**3 895**	**3 794**	**3 978**	**4 152**	**1,17**	**1,35**	**1,48**	**1,41**	**1,48**	**1,56**	**181**	**288**	**377**	**364**	**379**	**395**
Denmark	3 553	5 094	5 871	6 701	6 861	7 208	3 119	4 419	5 314	6 236	6 479	6 816	2,18	2,46	2,58	2,85	3,06	3,06	586	815	973	1 135	1 173	1 229
Estonia	37	104	174	208	197	233	81	207	313	379	378	444	0,60	0,93	1,08	1,28	1,43	1,63	59	154	233	283	282	332
Finland	4 423	5 474	6 243	6 871	6 786	6 971	4 446	5 601	6 640	7 488	7 496	7 589	3,35	3,48	3,47	3,70	3,93	3,88	859	1 068	1 256	1 409	1 404	1 415
France	30 954	36 228	39 303	41 066	42 685	43 633	32 967	39 236	44 035	46 548	49 143	49 991	2,15	2,11	2,08	2,12	2,26	2,25	543	623	690	726	762	771
Ireland	1 176	2 030	2 434	2 616	2 838	2 755	1 223	2 009	2 541	2 750	3 138	3 198	1,11	1,24	1,28	1,45	1,77	1,77	321	483	582	619	702	714
Italy	12 460	15 599	18 231	18 993	19 209	19 539	15 251	17 999	22 327	24 076	24 534	24 269	1,04	1,09	1,17	1,21	1,26	1,26	268	307	376	402	408	401
Cyprus	25	56	70	74	83	87	34	76	98	108	123	127	0,25	0,41	0,44	0,43	0,49	0,50	49	101	126	137	154	159
Lithuania	73	157	233	256	221	218	178	364	497	519	469	471	0,59	0,75	0,81	0,79	0,83	0,79	51	106	147	154	140	142
Latvia	38	72	126	142	85	108	86	168	235	254	166	219	0,45	0,56	0,60	0,62	0,46	0,60	36	73	103	112	73	97
Luxebourg	364	472	592	619	620	658	387	495	640	683	684	713	1,65	1,56	1,58	1,57	1,66	1,63	888	1 066	1 334	1 399	1 376	1 408
Hungary	405	838	977	1 059	1 067	1 126	977	1 616	1 872	2 058	2 358	2 383	0,81	0,94	0,98	1,00	1,17	1,16	96	160	186	205	235	238
Malta	12	27	32	33	31	39	..	48	56	58	57	69	:	0,57	0,58	0,56	0,54	0,63	..	120	137	142	139	167
Germany	50 619	55 739	61 482	66 532	67 015	69 883	52 358	64 299	74 056	81 971	83 297	86 299	2,47	2,51	2,53	2,69	2,82	2,82	637	780	900	998	1 017	1 056
Netherlands	8 090	9 772	10 342	10 502	10 408	10 892	9 065	10 904	12 067	12 468	12 374	12 969	1,94	1,90	1,81	1,77	1,82	1,85	569	668	737	758	749	781
Poland	1 197	1 386	1 764	2 194	2 097	2 610	2 605	2 982	3 622	4 151	4 871	5 588	0,64	0,57	0,57	0,60	0,68	0,74	68	78	95	109	128	146
Portugal	927	1 201	1 973	2 585	2 764	2 748	1 325	1 755	2 991	3 982	4 349	4 305	0,73	0,78	1,17	1,50	1,64	1,59	130	166	282	375	409	405
Austria	4 029	6 030	6 868	7 548	7 480	7 891	4 476	6 803	7 921	8 854	8 839	9 254	1,93	2,46	2,51	2,67	2,72	2,76	559	827	954	1 062	1 057	1 103
Romania	149	327	653	809	556	573	468	832	1 440	1 867	1 480	1 463	0,37	0,41	0,52	0,58	0,47	0,46	21	38	67	87	70	69
Greece	760	1 154	1 342	..	..	..	1 117	1 615	1 868	..	..	..	0,61	0,60	0,60	..	..	..	103	145	167	..	..	..
Slovakia	202	249	283	316	303	416	384	440	518	594	590	800	0,65	0,51	0,46	0,47	0,48	0,63	71	82	96	110	109	147
Slovenia	256	413	501	617	657	746	482	675	796	973	1 031	1 162	1,38	1,44	1,45	1,65	1,86	2,11	242	337	394	481	505	567
UK	29 041	31 920	36 691	32 360	29 196	30 129	27 863	34 081	38 752	39 397	39 538	39 138	1,81	1,73	1,78	1,79	1,86	1,76	473	566	635	642	640	629
Spain	5 719	10 197	13 342	14 701	14 582	14 588	7 792	13 331	18 325	20 415	20 547	20 386	0,91	1,12	1,27	1,35	1,39	1,39	194	307	408	448	447	442
Sweden	8 694	10 619	11 481	12 314	10 521	11 870	8 239	10 510	11 958	13 496	12 489	12 536	3,58	3,56	3,40	3,70	3,60	3,40	930	1 164	1 307	1 464	1 343	1 337
EU27	**160 191**	**192 689**	**219 600**	**229 550**	**225 519**	**234 674**	**184 181**	**229 931**	**270 379**	**293 393**	**298 966**	**305 036**	**1,74**	**1,74**	**1,77**	**1,84**	**1,92**	**1,91**	**382**	**467**	**545**	**589**	**598**	**608**
Australia	6 039	11 744	16 399	23 608	..	..	7 942	11 695	15 449	19 029	..	..	1,47	1,72	1,99	2,24	..	..	412	578	740	876	..	..
Chile	..	..	537	674	..	..	..	..	754	964	..	..	..	..	0,31	0,37	..	..	..	..	45	57	..	..
Iceland	251	364	401	272	..	..	216	287	311	334	..	..	2,67	2,77	2,68	2,64	..	..	770	970	998	1 045	..	..
Israel	5 328	5 919	8 082	9 615	8 682	9 567	6 314	7 146	9 214	9 615	9 157	9 589	4,27	4,42	4,84	4,77	4,46	4,40	1 002	1 027	1 278	1 309	1 224	1 258
Japan	153 860	121 831	110 116	113 986	121 357	135 038	98 896	128 695	147 585	148 719	137 314	140 833	3,00	3,31	3,46	3,47	3,36	3,26	779	1 007	1 155	1 165	1 077	1 100
Canada	13 841	23 126	27 960	28 600	25 746	28 481	16 690	23 090	24 795	24 722	24 568	24 067	1,91	2,04	1,96	1,90	1,92	1,81	544	716	753	742	729	706
Korea	12 245	23 587	33 684	31 304	29 703	37 935	18 559	30 618	40 723	43 906	47 169	53 185	2,30	2,79	3,21	3,36	3,56	3,74	395	636	840	903	968	1 088
Mexico	2 167	3 496	3 835	..	..	..	3 360	5 346	5 682	..	..	..	0,34	0,41	0,37	..	..	..	34	51	54	..	..	..
Norway	2 445	3 683	4 587	4 928	4 799	5 342	2 178	3 316	4 192	4 631	4 693	4 742	1,64	1,51	1,59	1,58	1,78	1,69	488	717	891	971	972	970
New Zealand	578	1 285	1 588	..	1 527	..	761	1 189	1 438	..	1 646	..	0,98	1,14	1,19	..	1,30	..	198	287	339	..	380	..
USA	291 845	263 209	276 836	275 848	289 475	..	268 121	325 936	377 594	403 668	401 576	..	2,71	2,59	2,70	2,84	2,90	..	949	1 100	1 250	1 324	1 306	..
Switzerland	7 020	8 748	..	10 698	..	..	5 767	7 469	..	10 525	..	..	2,53	2,90	..	2,99	..	..	800	1 002	..	1 365	..	..
Turkey	1 389	2 287	3 410	3 616	3 739	4 621	2 824	4 617	7 052	7 744	8 816	9 582	0,48	0,59	0,72	0,73	0,85	0,84	44	67	100	109	123	132
OECD	**656 844**	**661 249**	**705 815**	**731 251**	**760 505**	**..**	**615 141**	**779 529**	**914 024**	**971 359**	**968 395**	**..**	**2,20**	**2,22**	**2,28**	**2,35**	**2,40**	**..**	**541**	**662**	**756**	**798**	**790**	**..**
Brazil							**12 451**	**15 373**	**20 317**	**22 217**	**23 933**	**26 017**	**1,02**	**0,97**	**1,10**	**1,11**	**1,19**	**1,19**	**71**	**83**	**107**	**116**	**124**	**133**
China	10 819	29 898	48 771	66 430	84 933	104 318	27 207	71 055	102 436	120 807	154 147	178 981	0,90	1,32	1,40	1,47	1,70	1,77	21	54	78	91	115	133
India							12 276	19 618	24 325	..	..	..	0,77	0,78	0,76	..	..	..	12	17	21	..	..	..
SAR	870	2 225	2 643	2 547	..	..	2 280	3 654	4 442	4 708	..	..	0,73	0,90	0,92	0,93	..	..	50	76	90	95	..	..
Russia	2 727	8 159	14 506	17 345	15 306	17 235	10 495	18 121	26 554	30 058	33 562	32 838	1,05	1,07	1,12	1,04	1,25	1,16	71	126	187	212	237	231

Note: instead of 2000: Denmark (1999),Norway (1999), New Zealand (1999), Greece (1999), Sweden (1999), Malta (2002)
instead of 2005: Australia (2004), Switzerland (2004)
instead of 2007: Australia (2006)

Source: CZSO according to MSTI2012/1 (OECD, May2012), Research and Development Database (Eurostat, August 2012) and own calculations

Tab. A.14a Total R&D expenditures by sources of funding

% GERD

	domestic private						domestic public						total foreign					
	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010
Belgium	62,4	59,7	61,4	61,0	58,6	..	22,9	24,7	22,2	23,2	25,3	..	12,2	12,4	13,0	12,3	12,1	..
Bulgaria	24,4	27,8	34,2	30,6	30,2	:	69,2	63,9	56,7	61,2	60,5	:	5,3	7,6	7,6	6,8	8,4	:
Czech Republic	**51,2**	**53,2**	**52,5**	**51,1**	**44,6**	**48,9**	**44,5**	**40,9**	**41,2**	**41,3**	**43,9**	**39,9**	**3,1**	**4,9**	**5,5**	**6,5**	**10,4**	**10,4**
Denmark	59,0	59,5	61,0	..	60,2	60,3	31,2	27,6	25,9	..	27,8	27,7	5,4	10,1	9,5	..	8,8	8,8
Estonia	24,2	38,5	41,6	39,8	38,5	43,6	59,2	43,5	45,6	50,0	48,8	44,1	12,7	17,1	11,7	9,4	11,3	11,4
Finland	70,2	66,9	68,2	70,3	68,1	66,1	26,2	25,7	24,1	21,8	24,0	25,7	2,7	6,3	6,5	6,6	6,6	6,9
France	52,5	51,9	52,3	50,8	52,4	51,0	38,7	38,6	38,1	38,9	38,6	39,7	7,2	7,5	7,5	8,0	6,9	7,3
Ireland	65,8	57,4	49,6	48,6	50,5	51,0	23,4	32,0	32,2	33,9	32,3	31,6	8,9	8,6	15,9	15,5	15,4	15,6
Italy	..	39,7	42,0	45,9	44,2	..	..	50,7	44,3	42,0	42,1	..	..	8,0	9,5	7,9	9,4	..
Cyprus	17,5	16,8	16,4	17,8	15,7	:	66,5	67,0	64,6	64,1	69,0	:	9,4	10,9	14,5	14,7	12,1	:
Lithuania	31,6	20,8	24,5	21,4	21,0	24,1	61,7	62,7	47,9	55,6	53,9	47,5	6,7	10,5	19,6	15,5	13,1	20,0
Latvia	29,4	34,3	36,4	27,0	36,9	38,8	41,5	46,0	49,9	47,3	44,7	26,4	29,1	18,5	12,7	23,1	15,4	33,4
Luxebourg	90,7	79,7	76,0	..	70,3	65,9	7,7	16,6	18,2	..	24,3	29,7	1,6	3,6	5,7	..	5,4	4,3
Hungary	37,8	39,4	43,9	48,3	46,4	47,4	49,5	49,4	44,4	41,8	42,0	39,3	10,6	10,7	11,1	9,3	10,9	12,4
Malta	18,6	46,8	51,9	56,5	51,6	51,5	59,8	25,9	25,7	27,4	30,0	30,5	21,6	26,9	22,4	16,0	18,4	18,0
Germany	66,0	67,6	68,1	67,3	66,1	..	31,4	28,4	27,5	28,4	29,7	..	2,1	3,7	4,0	4,0	3,8	..
Netherlands	49,1	46,3	48,8	..	45,1	..	36,9	38,8	38,0	..	40,9	..	11,0	12,0	10,7	..	10,8	..
Poland	29,5	33,4	34,3	30,5	27,1	24,4	66,5	57,7	58,6	59,8	60,4	60,9	1,8	5,7	6,7	5,4	5,5	11,8
Portugal	27,0	36,3	47,0	48,1	44,0	..	64,8	55,2	44,6	43,7	45,3	..	5,2	4,7	5,4	3,0	4,1	..
Austria	41,8	45,6	48,7	46,1	47,1	44,3	38,0	35,9	32,3	37,0	34,9	38,9	19,9	18,0	17,9	16,4	16,8	16,4
Romania	49,0	37,2	26,9	23,3	34,8	32,3	40,8	53,5	67,1	70,1	54,9	54,4	4,9	5,3	4,5	4,0	8,3	11,1
Greece	24,2	31,1	..	..	..	..	48,9	46,8	..	..	..	..	24,5	19,0	..	..	..	..
Slovakia	54,4	36,6	35,6	34,7	35,1	35,1	42,6	57,0	53,9	52,3	50,6	49,6	2,3	6,0	10,2	12,3	12,8	14,7
Slovenia	53,3	54,8	58,3	62,8	58,0	58,4	40,0	37,2	35,6	31,3	35,7	35,3	6,2	7,3	5,8	5,6	6,0	6,0
UK	48,3	42,1	46,0	45,4	44,5	45,1	30,2	32,7	30,9	30,7	32,6	32,1	16,0	19,3	17,3	17,7	16,6	16,4
Spain	49,7	46,3	45,5	45,0	43,4	..	38,6	43,0	43,7	45,6	47,1	..	4,9	5,7	7,0	5,7	5,5	..
Sweden	67,1	63,9	62,3	..	58,8	..	26,2	24,5	24,9	..	27,5	..	3,5	8,1	9,7	..	10,4	..
EU27	**55,3**	**53,8**	**54,6**	**54,4**	**53,3**	**..**	**35,5**	**35,1**	**34,0**	**34,5**	**35,5**	**..**	**7,1**	**8,9**	**9,0**	**8,7**	**8,5**	**..**
Australia	47,9	54,6	58,1	62,0	..	..	45,5	40,3	37,6	34,5	..	..	3,5	2,9	2,4	1,6	..	..
Chile	..	..	38,9	43,7	..	..	..	..	35,6	33,8	..	..	..	..	4,2	3,3	..	..
Iceland	43,4	48,0	50,3	50,3	..	..	41,2	40,5	38,8	38,8	..	..	13,9	11,2	10,0	10,0	..	..
Israel	51,2	54,7	55,3	51,6	..	..	23,9	16,0	13,8	14,0	..	..	22,2	24,9	26,6	29,6	..	..
Japan	72,4	76,1	77,7	78,2	75,3	75,9	19,6	16,8	15,6	15,6	17,7	17,2	0,4	0,3	0,3	0,4	0,4	0,4
Canada	44,9	49,3	49,2	49,3	46,5	45,7	29,3	31,8	32,0	34,2	34,3	..	17,4	8,8	9,3	7,1	7,3	7,4
Korea	72,4	75,0	73,7	72,9	71,1	71,8	23,9	23,0	24,8	25,4	27,4	26,7	0,1	0,7	0,2	0,3	0,2	0,2
Mexico	29,5	41,5	45,1	..	..	..	63,0	49,2	50,2	..	..	..	0,9	1,1	1,4	..	..	..
Norway	49,5	46,8	45,0	..	43,6	..	42,5	43,6	44,9	..	46,8	..	6,3	8,1	8,5	..	8,2	..
New Zealand	34,1	41,1	40,7	..	38,5	..	50,6	43,2	42,2	..	45,7	..	4,3	..	..	..	..	..
USA	69,4	63,7	65,3	64,1	61,6	..	25,8	29,8	28,2	29,3	31,3	..	..	..	..	..	..	..
Switzerland	69,1	69,7	..	68,2	..	..	23,2	22,7	..	22,8	..	..	4,3	5,2	..	6,0	..	..
Turkey	42,9	43,3	48,4	47,3	41,0	45,1	50,6	50,1	47,1	31,6	34,0	30,8	1,2	0,8	0,5	1,3	1,1	0,8
OECD	**64,2**	**62,4**	**63,6**	**62,9**	**60,7**	**..**	**28,3**	**29,2**	**28,0**	**28,7**	**30,5**	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Brazil	**44,7**	**48,3**	**45,6**	**45,5**	**46,3**	**45,4**	**54,1**	**49,7**	**52,1**	**52,3**	**51,6**	**52,7**	**..**	**..**	**..**	**..**	**..**	**..**
China	57,6	67,0	70,4	71,7	71,7	71,7	33,4	26,3	24,6	23,6	23,4	24,0	2,7	0,9	1,3	1,2	1,3	1,3
India	18,0	30,4	33,9	..	..	..	82,0	69,6	66,1	..	..	..	..	..	..	..	..	..
SAR	55,8	43,9	42,7	42,6	..	..	36,4	38,2	45,7	45,1	..	..	6,1	13,6	10,7	11,4	..	..
Russia	32,9	30,0	29,4	28,7	26,6	25,5	54,8	61,9	62,6	64,7	66,5	70,3	12,0	7,6	7,2	5,9	6,5	3,5

Note: instead of 2000: Denmark (1999), Island (1999),Norway (1999), Netherlands (1999), Greece (1999), Sweden (1999), Malta (2002), SAR (2001)
instead of 2005: Australia (2004), Switzerland (2004)
instead of 2007: Australia (2006)

Source: CZSO according to MSTI2012/1 (OECD, May2012), Research and Development Database (Eurostat, August 2012) and own calculations

Tab. A.14b Total R&D expenditures by sectors of use

% GERD

	business (BERD)						government(GOVERD)						university (HERD)					
	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010
Belgium	72,3	68,0	69,5	68,3	66,3	66,3	6,3	8,4	8,1	8,9	8,9	9,4	20,2	22,3	21,1	21,8	23,8	23,3
Bulgaria	21,4	21,5	31,2	31,0	30,0	50,1	68,6	66,8	58,5	58,3	55,2	37,4	9,9	10,5	9,7	9,6	14,0	11,8
Czech Republic	**60,0**	**63,2**	**61,9**	**61,9**	**60,0**	**62,0**	**25,3**	**20,0**	**20,8**	**20,9**	**21,4**	**19,4**	**14,2**	**16,4**	**16,9**	**16,8**	**18,1**	**18,0**
Denmark	64,9	68,3	69,9	69,9	68,0	68,1	14,5	6,5	3,2	2,6	2,1	2,1	19,4	24,6	26,4	27,2	29,5	29,4
Estonia	22,5	45,1	47,2	43,2	44,7	50,2	23,1	11,3	8,7	11,8	11,0	10,6	52,4	41,4	41,8	42,9	42,2	38,0
Finland	70,9	70,8	72,3	74,3	71,4	69,6	10,6	9,6	8,5	8,0	9,1	9,2	17,8	19,0	18,7	17,2	18,9	20,4
France	62,5	62,1	63,0	62,7	61,7	61,2	17,3	17,8	16,4	16,0	16,4	16,4	18,8	18,8	19,5	20,0	20,7	21,3
Ireland	71,6	65,5	65,9	64,5	65,8	66,6	8,1	7,4	7,0	6,9	4,9	4,4	20,2	27,1	27,1	28,7	29,2	29,0
Italy	50,1	50,4	51,9	53,6	53,3	53,6	18,9	17,3	14,5	12,7	13,1	14,3	31,0	30,2	30,1	30,5	30,3	29,0
Cyprus	21,3	22,0	22,9	22,8	19,8	17,5	46,6	31,8	24,1	22,9	20,4	19,5	24,8	38,9	45,3	43,7	46,1	49,6
Lithuania	21,5	20,4	28,5	23,8	23,7	29,2	42,0	25,0	20,8	23,1	23,6	17,6	36,5	54,6	50,6	53,1	52,7	53,2
Latvia	40,3	40,7	32,6	25,0	36,4	37,0	22,1	18,7	24,3	27,5	24,7	23,0	37,6	40,6	43,2	47,4	38,9	40,0
Luxebourg	92,6	86,4	83,7	77,9	75,9	70,9	7,1	12,1	13,4	16,0	16,1	17,7	0,2	1,5	3,0	6,1	8,0	11,4
Hungary	44,3	43,2	50,3	52,6	57,2	59,8	26,1	28,0	24,2	23,4	20,1	18,5	24,0	25,1	23,3	22,0	20,9	19,9
Malta	24,7	66,5	66,2	65,6	63,4	59,3	16,5	4,7	1,8	4,0	4,7	3,7	58,8	28,8	32,0	30,4	31,9	37,0
Germany	70,3	69,3	70,0	69,2	67,6	67,2	13,6	14,1	13,9	14,0	14,8	14,8	16,1	16,5	16,1	16,7	17,6	18,0
Netherlands	55,1	52,9	53,1	50,1	47,1	47,9	12,0	12,4	12,2	12,0	12,7	11,7	31,9	34,7	34,7	37,9	40,2	40,4
Poland	36,1	31,8	30,4	30,9	28,5	26,6	32,2	36,4	35,4	35,3	34,3	35,9	31,5	31,6	33,9	33,6	37,1	37,2
Portugal	27,8	38,5	51,2	50,1	47,4	45,5	23,9	14,6	9,4	7,3	7,3	7,2	37,5	35,4	29,8	34,5	36,4	37,0
Austria	66,8	69,8	70,6	69,3	68,1	68,1	5,7	5,2	5,3	5,3	5,3	5,3	27,0	24,7	23,8	25,0	26,1	26,1
Romania	69,4	49,7	41,6	30,0	40,2	38,3	18,8	34,2	33,9	41,0	34,9	36,8	11,8	13,7	24,1	28,9	24,7	24,5
Greece	28,5	31,0	28,6	..	..	..	21,7	20,3	20,9	..	..	..	..	47,5	49,2	..	..	..
Slovakia	65,8	49,8	39,6	42,9	41,0	42,1	24,7	29,7	35,4	32,8	33,9	30,0	9,5	20,4	25,0	24,3	25,0	27,6
Slovenia	56,3	58,8	59,8	64,6	64,6	67,8	25,9	24,2	24,5	21,9	20,8	18,2	16,6	16,7	15,6	13,4	14,6	13,9
UK	65,0	61,4	62,5	62,0	60,4	60,9	12,6	10,6	9,2	9,2	9,2	9,4	20,6	25,7	26,1	26,5	27,9	27,2
Spain	53,7	53,8	55,9	54,9	51,9	51,5	15,8	17,0	17,6	18,2	20,1	20,1	29,6	29,0	26,4	26,7	27,8	28,3
Sweden	74,4	72,7	72,7	74,1	70,4	68,7	3,3	5,0	5,0	4,4	4,4	4,9	22,2	22,0	22,2	21,3	25,1	26,3
EU27	**63,7**	**62,4**	**63,0**	**62,7**	**61,0**	**60,8**	**14,2**	**14,1**	**13,2**	**13,1**	**13,5**	**13,7**	**21,2**	**22,6**	**22,6**	**23,2**	**24,3**	**24,4**
Australia	47,8	54,3	58,0	61,3	..	..	22,6	15,6	14,2	12,2	..	..	26,8	27,1	25,0	23,9	..	..
Chile	..	..	34,7	40,4	..	..	..	..	9,9	9,7	..	..	..	..	43,0	40,8	..	..
Iceland	56,4	51,5	54,6	54,6	..	..	25,5	23,5	17,8	17,8	..	..	16,2	22,0	25,1	25,1	..	..
Israel	76,8	77,7	80,7	79,7	79,6	79,8	5,2	4,8	3,7	3,8	4,0	3,9	15,2	14,5	12,7	13,5	13,2	13,2
Japan	71,0	76,4	77,9	78,5	75,8	76,5	9,9	8,3	7,8	8,3	9,2	9,0	14,5	13,4	12,6	11,6	13,4	12,9
Canada	60,3	55,8	55,8	53,8	51,3	50,8	11,2	9,7	9,7	9,8	10,8	10,9	28,2	34,0	33,9	35,8	37,4	38,0
Korea	74,0	76,9	76,2	75,4	74,3	74,8	13,3	11,9	11,7	12,1	13,0	12,7	11,3	9,9	10,7	11,1	11,1	10,8
Mexico	29,8	46,9	47,4	..	..	..	41,7	23,2	25,2	..	..	..	28,3	28,7	26,1	..	..	..
Norway	56,0	53,5	52,5	53,2	51,6	51,2	15,4	15,7	15,6	14,8	16,4	16,4	28,6	30,8	31,9	32,0	32,0	32,3
New Zealand	29,7	41,6	42,7	..	41,4	..	36,0	25,9	27,0	..	25,7	..	34,3	32,5	30,2	..	32,8	..
USA	74,6	69,4	71,3	72,0	70,3	..	10,3	12,4	11,8	11,2	11,7	..	11,4	13,9	13,0	12,8	13,5	..
Switzerland	73,9	73,7	..	73,5	..	..	1,3	1,1	..	0,7	..	..	22,9	22,9	..	24,2	..	..
Turkey	33,4	33,8	41,3	44,2	40,0	42,5	6,2	11,6	10,6	11,9	12,6	11,4	60,4	54,6	48,2	43,8	47,4	46,0
OECD	**69,5**	**67,9**	**69,2**	**69,4**	**67,3**	**..**	**11,7**	**12,0**	**11,4**	**11,2**	**11,9**	**..**	**16,1**	**17,5**	**17,0**	**17,0**	**18,2**	**..**
Brazil	**40,1**	**40,2**	**..**	**..**	**..**	**..**	**35,1**	**21,3**	**..**	**..**	**..**	**..**	**24,8**	**38,4**	**..**	**..**	**..**	**..**
China	60,0	68,3	72,3	73,3	73,2	73,4	31,5	21,8	19,2	18,3	18,7	18,1	8,6	9,9	8,5	8,5	8,1	8,5
India	18,0	30,4	33,9	..	..	..	77,9	65,2	61,7	..	..	..	4,0	4,4	4,4	..	..	..
SAR	53,7	58,3	57,7	58,6	..	..	20,0	20,8	21,7	20,3	..	..	25,3	19,3	19,4	19,9	..	..
Russia	70,8	68,0	64,2	62,9	62,4	60,5	24,4	26,1	29,1	30,1	30,3	31,0	4,5	5,8	6,3	6,7	7,1	8,4

Note: instead of 2000: Denmark (1999),Norway (1999), Greece (1999), Sweden (1999), Malta (2002), Austria (2002), SAR (2001)
instead of 2005: Australia (2004), Brazil (2004), Switzerland (2004)
instead of 2007: Australia (2006)

Source: CZSO according to MSTI2012/1 (OECD, May2012), Research and Development Database (Eurostat, August 2012) and own calculations

Tab. A.15 R&D expenditures funded from public sources - basic indicators

	absolute values												basic indicators (R&D intensity)											
	mil. EUR current prices						mil. US$ PPP current prices						%GDP						per capita in US$ PPP cur.p.					
	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010	2000	2005	2007	2008	2009	2010
Belgium	1 138	1 369	1 408	1 583	1 747	..	1 278	1 521	1 589	1 813	2 033	..	0,45	0,45	0,42	0,46	0,51	..	125	145	150	169	188	..
Bulgaria	50	68	79	102	112	..	180	223	242	305	334	..	0,35	0,29	0,26	0,29	0,32	:	22	29	31	40	44	..
Czech Republic	**332**	**577**	**804**	**898**	**919**	**929**	**830**	**1 205**	**1 604**	**1 567**	**1 746**	**1 655**	**0,52**	**0,55**	**0,61**	**0,58**	**0,65**	**0,62**	**81**	**118**	**155**	**150**	**166**	**157**
Denmark	1 109	1 405	1 521	..	1 909	2 000	973	1 219	1 377	..	1 803	1 891	0,68	0,68	0,67	..	0,85	0,85	183	225	252	..	326	341
Estonia	22	45	79	104	96	103	48	90	143	190	185	196	0,36	0,40	0,49	0,64	0,70	0,72	35	67	106	141	138	146
Finland	1 160	1 404	1 501	1 500	1 629	1 791	1 166	1 437	1 597	1 635	1 799	1 949	0,88	0,89	0,83	0,81	0,94	1,00	225	274	302	308	337	363
France	11 967	13 996	14 993	15 983	16 496	17 332	12 746	15 158	16 799	18 116	18 992	19 857	0,83	0,81	0,79	0,83	0,87	0,89	210	241	263	282	295	306
Ireland	276	650	783	888	916	871	287	643	817	933	1 013	1 011	0,26	0,40	0,41	0,49	0,57	0,56	75	155	187	210	227	226
Italy	..	7 905	8 071	7 977	8 096	..	..	9 121	9 884	10 112	10 341	..	..	0,55	0,52	0,51	0,53	..	..	156	166	169	172	..
Cyprus	17	37	45	47	57	..	22	51	64	70	85	..	0,16	0,27	0,29	0,27	0,34	:	32	68	82	88	106	..
Lithuania	45	99	112	143	119	103	110	228	238	289	253	224	0,36	0,47	0,39	0,44	0,45	0,38	31	67	70	86	75	67
Latvia	16	33	63	67	38	28	36	77	117	120	74	58	0,18	0,26	0,30	0,29	0,21	0,16	15	34	51	53	33	26
Luxebourg	28	78	108	..	150	195	30	82	117	..	166	211	0,13	0,26	0,29	..	0,40	0,48	68	177	243	..	334	418
Hungary	201	414	434	443	448	443	484	798	831	861	990	937	0,40	0,47	0,44	0,42	0,49	0,46	47	79	83	86	99	94
Malta	7	7	8	9	9	12	12	13	14	16	17	21	0,16	0,15	0,15	0,15	0,16	0,19	30	31	35	39	42	51
Germany	15 893	15 821	16 915	18 897	19 933	..	16 439	18 251	20 375	23 282	24 776	..	0,78	0,71	0,70	0,76	0,84	..	200	221	248	284	303	..
Netherlands	2 818	3 796	3 933	..	4 256	..	..	4 236	4 589	..	5 060	..	..	0,74	0,69	..	0,75	..	..	260	280	..	306	..
Poland	796	800	1 034	1 312	1 268	1 590	1 734	1 721	2 123	2 482	2 944	3 405	0,43	0,33	0,33	0,36	0,41	0,45	45	45	56	65	77	89
Portugal	600	663	879	1 130	1 253	..	858	969	1 333	1 741	1 971	..	0,47	0,43	0,52	0,66	0,74	..	84	92	126	164	185	..
Austria	1 531	2 165	2 218	2 793	2 612	3 071	1 701	2 443	2 558	3 277	3 086	3 602	0,73	0,88	0,81	0,99	0,95	1,07	212	297	308	393	369	429
Romania	61	175	438	567	305	312	191	445	967	1 308	813	796	0,15	0,22	0,35	0,41	0,26	0,25	9	21	45	61	38	38
Greece	372	540	..	..	..	..	546	756	..	..	..	..	0,30	0,28	..	..	..	..	50	68	..	..	..	..
Slovakia	86	142	152	166	153	206	164	251	279	311	298	396	0,28	0,29	0,25	0,25	0,24	0,31	30	47	52	58	55	73
Slovenia	103	154	178	193	234	263	193	251	283	304	368	410	0,55	0,53	0,52	0,52	0,66	0,74	97	125	140	151	180	200
UK	8 779	10 447	11 346	9 923	9 505	9 683	8 423	11 154	11 983	12 081	12 871	12 578	0,55	0,57	0,55	0,55	0,60	0,57	143	185	196	197	208	202
Spain	2 210	4 384	5 825	6 699	6 869	..	3 011	5 731	8 000	9 303	9 678	..	0,35	0,48	0,55	0,62	0,66	..	75	132	178	204	211	..
Sweden	2 274	2 598	2 860	..	2 892	..	2 155	2 571	2 978	..	3 433	..	0,94	0,87	0,85	..	0,99	..	243	285	326	..	369	..
EU27	**56 798**	**67 637**	**74 559**	**79 215**	**80 004**	**..**	**65 304**	**80 709**	**91 800**	**101 246**	**106 060**	**..**	**0,62**	**0,61**	**0,60**	**0,63**	**0,68**	**..**	**135**	**164**	**185**	**203**	**212**	**..**
Australia	2 749	4 729	6 165	8 135	..	..	3 615	4 710	5 808	6 557	..	..	0,67	0,69	0,75	0,77	..	..	188	233	278	302	..	..
Chile	..	..	191	227	..	..	..	..	268	325	..	..	..	..	0,11	0,13	..	..	..	..	16	19	..	..
Iceland	77	147	156	106	..	..	75	116	121	129	..	..	0,95	1,12	1,04	1,03	..	..	271	393	387	405	..	..
Israel	1 274	948	1 113	1 347	..	..	1 510	1 144	1 269	1 347	..	..	1,02	0,71	0,67	0,67	..	..	240	165	176	183	..	..
Japan	30 129	20 418	17 211	17 804	21 439	23 190	19 366	21 569	23 068	23 230	24 258	24 185	0,59	0,55	0,54	0,54	0,59	0,56	153	169	181	182	190	189
Canada	4 054	7 351	8 939	9 795	8 826	..	4 889	7 340	7 927	8 467	8 422	..	0,56	0,65	0,63	0,65	0,66	..	159	228	241	254	250	..
Korea	2 932	5 431	8 352	7 954	8 137	10 146	4 443	7 050	10 098	11 156	12 922	14 225	0,55	0,64	0,80	0,85	0,98	1,00	95	146	208	230	265	291
Mexico	1 366	1 720	1 924	..	..	..	2 117	2 629	2 851	..	..	..	0,21	0,20	0,19	..	..	..	22	25	27	..	..	..
Norway	1 040	1 605	2 062	..	2 244	..	927	1 445	1 884	..	2 195	..	0,70	0,66	0,72	..	0,83	..	208	313	400	..	455	..
New Zealand	292	555	670	..	698	..	385	514	607	..	752	..	0,50	0,49	0,50	..	0,59	..	100	124	143	..	174	..
USA	75 336	78 509	78 049	80 799	90 502	..	69 212	97 219	106 456	118 239	125 550	..	0,70	0,77	0,76	0,83	0,91	..	245	328	352	388	408	..
Switzerland	1 628	1 987	..	2 444	..	..	1 337	1 696	..	2 404	..	..	0,59	0,66	..	0,68	..	..	185	228	..	312	..	..
Turkey	703	1 147	1 605	1 143	1 270	1 424	1 429	2 315	3 319	2 449	2 993	2 953	0,24	0,30	0,34	0,23	0,29	0,26	22	34	47	34	42	41
OECD	**178 189**	**191 771**	**200 260**	**208 043**	**228 325**	**..**	**174 154**	**227 951**	**256 355**	**278 966**	**295 828**	**..**	**0,62**	**0,65**	**0,64**	**0,68**	**0,73**	**..**	**153**	**194**	**212**	**229**	**241**	**..**
Brazil							**6 732**	**7 644**	**10 585**	**11 626**	**12 346**	**13 701**							**39**	**41**	**56**	**61**	**64**	**70**
China	3 614	7 877	12 008	15 671	19 883	25 055	9 089	18 719	25 221	28 498	36 086	42 988	0,30	0,35	0,34	0,35	0,40	0,43	7	14	19	21	27	32
India							10 060	13 654	16 073	..	..	..							10	12	14	..	..	..
SAR	316	850	1 208	1 150	..	..	830	1 396	2 030	2 125	..	..	0,27	0,34	0,42	0,42	..	..	18	29	41	43	..	..
Russia	1 494	5 054	9 084	11 226	10 173	12 124	5 752	11 225	16 628	19 454	22 305	23 101	0,58	0,66	0,70	0,68	0,83	0,82	39	78	117	137	157	163

Note: instead of 2000: Denmark (1999), Island (1999),Norway (1999), Netherlands (1999), Greece (1999), Sweden (1999), Malta (2002), SAR (2001)
instead of 2005: Australia (2004), Switzerland (2004)
instead of 2007: Australia (2006)

Source: CZSO according to MSTI2012/1 (OECD, May2012), Research and Development Database (Eurostat, August 2012) and own calculations

Tab. A.21 Total direct R&D support from the state budget

mil.CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**16 443**	**18 308**	**20 476**	**20 490**	**23 005**	**22 602**	**25 778**
by main providers							
Ministry of Education, Youth and Sports	5 587	6 703	7 509	7 771	8 341	8 925	10 604
AS CR	4 439	4 835	5 656	5 552	5 904	5 018	4 875
Ministry of Industry and Trade	1 820	2 125	2 545	2 479	3 204	3 413	3 613
GA CR	1 335	1 407	1 520	1 538	1 780	1 989	2 428
Ministry of Health	859	880	965	728	1 261	843	1 075
TA CR	0	0	0	0	1	14	815
Ministry of Agriculture	727	767	827	841	912	832	808
Ministry of Defence	480	532	429	491	491	500	428
Ministry of Interior + Ministry of Informatics	47	52	88	45	53	124	425
Ministry of Environment	562	410	406	482	483	505	333
other providers	*588*	*597*	*531*	*563*	*575*	*439*	*375*
by support form							
targeted (CEP)	7 121	8 467	9 200	9 451	10 952	10 688	12 059
institutional (CEZ a CEA)	7 512	7 805	8 783	8 958	9 790	9 081	8 603
institutional support of specific research at universities	1 044	1 044	1 044	1 044	1 116	1 044	644
support of AS CR infrastructure	538	595	732	678	741	732	699
international cooperation (fees)	33	37	303	219	58	273	306
other institutional support(1)	194	360	414	140	347	784	1 435
co-financing of projects from EU Structural Funds							2 032
by prevailing scientific fields*							
Natural	6 734	7 770	8 656	8 911	9 791	9 364	9 832
Technical	4 652	5 149	5 638	5 643	6 569	6 471	7 156
Medical	1 706	1 875	2 047	1 762	2 330	2 400	2 123
Agricultural	1 278	1 369	1 509	1 518	1 634	1 520	1 469
Social	1 095	1 143	1 235	1 307	1 442	1 371	1 268
Humanities	917	942	1 054	1 036	1 138	1 202	1 237
by groups of beneficaries*							
Public universities	**5 387**	**5 679**	**6 918**	**7 085**	**7 922**	**8 116**	**9 210**
Public research institutions	**5 835**	**6 024**	**7 390**	**7 718**	**8 337**	**8 281**	**7 699**
AS CR sites	4 955	5 128	6 337	6 645	7 231	7 283	6 736
Departmental public research institutions	880	897	1 053	1 072	1 106	998	964
Faculty hospitals and other medical facilities	**572**	**651**	**845**	**681**	**1 029**	**746**	**945**
Other public research organizations	**452**	**437**	**457**	**423**	**493**	**495**	**465**
Departmental research and testing sites	223	204	218	220	234	223	245
Libraries, archives and museums	122	130	145	128	176	192	133
Other	106	102	94	75	82	81	86
Public enterprises	**458**	**588**	**539**	**577**	**657**	**662**	**427**
Public research and testing sites	230	242	253	285	316	318	160
Other	228	347	286	292	341	344	266
Businesses	**2 364**	**2 583**	**3 058**	**2 992**	**3 551**	**3 489**	**3 834**
domestic	2 001	2 183	2 579	2 538	3 017	2 971	3 130
foreign-controlled	363	400	478	454	534	517	705
Associations and NGOs	**467**	**459**	**448**	**470**	**477**	**370**	**459**
Natural persons	**49**	**39**	**44**	**53**	**57**	**39**	**28**
Private colleges	**5**	**6**	**7**	**15**	**16**	**14**	**12**
Foreign (fees)	**33**	**37**	**303**	**219**	**58**	**273**	**306**
by regions of beneficaries							
Praha	9 526	9 778	11 882	11 824	13 231	12 795	13 045
Středočeský	1 193	1 271	1 449	1 494	1 654	1 630	1 535
Jihočeský	394	469	604	649	721	681	695
Plzeňský	239	310	316	305	397	448	483
Karlovarský	3	7	9	5	5	8	5
Ústecký	120	139	147	144	164	156	154
Liberecký	209	214	223	238	351	382	432
Královéhradecký	106	155	217	189	224	201	235
Pardubický	362	373	400	385	473	477	518
Vysočina	65	72	104	118	125	133	134
Jihomoravský	2 205	2 383	3 045	3 064	3 523	3 519	3 672
Olomoucký	608	790	823	799	904	842	703
Zlínský	313	346	352	308	351	305	357
Moravskoslezský	441	518	550	634	763	743	941

(1) items related to administration in R&D are costs of the system of R&D support for organizing public tenders and evaluation of projects, evaluation of R&D results, costs related to the operation of RVVI, GA CR, TA CR and AS CR

* due to the fact that not all items of the system of direct R&D support from state budget are registered or specified in appropriate databases of R&D IS, the sum of individual items of the given classification doesn't equal the total value in the first row

Source: CZSO according to the Final State Account (MoF CR), R&D IS (RVVI secretariat) and own calculations

Tab. A.22 Total support of public universities R&D from the state budget

mil.CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**5 387**	**5 679**	**6 918**	**7 085**	**7 922**	**8 116**	**9 210**
by support form							
institutional	2 502	2 561	3 180	3 182	3 520	3 711	4 687
targeted	1 841	2 073	2 694	2 859	3 286	3 361	3 879
specific research	1 044	1 044	1 044	1 044	1 116	1 044	644
by main providers							
Ministry of Education, Youth and Sports	4 110	4 430	5 221	5 300	5 664	5 845	6 458
GA CR	711	764	774	817	946	1 027	1 182
Ministry of Industry and Trade	25	37	252	285	395	477	551
TA CR	0	0	0	0	0	0	250
Ministry of Health	234	203	161	109	280	190	222
Ministry of Agriculture	16	21	81	99	141	137	128
AS CR	86	34	217	247	248	163	111
Ministry of Interior + Ministry of Informatics	3	3	16	10	11	50	110
Ministry of Defence	85	77	80	78	95	114	95
other providers	*119*	*108*	*116*	*140*	*141*	*112*	*102*
by R&D category							
Fundamental research	789	894	1 511	1 707	1 915	1 932	1 930
Applied research	3 441	3 603	4 025	3 945	4 398	3 512	2 878
Experimental development	17	42	108	123	159	197	269
R&D&I infrastructure	84	82	90	95	87	95	169
Industrial research	12	14	141	171	248	..	..
Specific research	1 044	1 044	1 044	1 044	1 116	937	942
Development of research institutions	..	..	..	..	..	1 442	3 022
by prevailing scientific fields							
Natural	1 727	1 915	2 547	2 672	2 923	3 093	3 650
Technical	1 608	1 709	1 970	2 017	2 272	2 473	2 844
Medical	934	890	922	843	1 078	931	911
Agricultural	384	397	503	534	584	549	609
Social	426	467	571	607	620	618	691
Humanities	309	301	405	412	445	451	505
by individual public universities							
Univerzita Karlova v Praze	1 589	1 591	1 964	1 974	2 223	2 312	2 691
České vysoké učení Technical v Praze	796	828	940	964	1 036	1 060	1 285
Masarykova univerzita	603	643	815	823	902	876	981
Vysoké učení Technical v Brně	392	405	566	574	641	723	860
Univerzita Palackého v Olomouci	321	395	435	436	504	475	524
Vysoká škola chemicko-technologická v Praze	307	303	412	432	481	470	502
Vysoká škola báňská - Technická univerzita Ostrava	197	218	263	279	314	274	293
Západočeská univerzita v Plzni	147	205	192	201	241	266	300
Jihočeská univerzita v Českých Budějovicích	164	169	212	243	275	258	286
Mendelova univerzita v Brně	123	148	170	177	191	192	201
Česká zemědělská univerzita v Praze	118	121	177	187	209	189	203
Univerzita Pardubice	117	116	149	151	170	187	238
Technická univerzita v Liberci	122	127	127	142	166	177	215
Ministry of Defence	87	78	81	82	102	133	115
Vysoká škola ekonomická v Praze	78	78	104	106	116	125	126
Veterinární a farmaceutická univerzita Brno	60	73	82	83	94	84	79
Univerzita Tomáše Bati ve Zlíně	61	70	83	84	94	79	83
Univerzita Jana Evangelisty Purkyně v Ústí nad Labem	13	14	25	23	30	60	52
Ostravská univerzita v Ostravě	30	31	39	43	46	51	63
Slezská univerzita v Opavě	28	29	41	40	45	45	50
Akademie múzických umění v Praze	22	22	23	23	20	31	24
Univerzita Hradec Králové	6	8	7	8	11	24	24
Janáčkova akademie múzických umění v Brně	1	2	1	1	2	14	5
Akademie výtvarných umění v Praze	3	3	6	6	6	7	6
Policejní akademie České republiky v Praze	2	2	5	3	4	3	0
Vysoká škola umělecko-průmyslová v Praze	0	0	0	0	1	1	3

Source: CZSO according to R&D IS (RVVI) and own calculations for specific research

Tab. A.23 Total support of public institution R&D from the state budget

mil.CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**5 835**	**6 024**	**7 390**	**7 718**	**8 337**	**8 281**	**7 699**
by support form							
targeted	1 316	1 295	2 173	2 318	2 475	2 482	2 748
institutional (CEZ a CEA)	3 772	4 132	4 387	4 603	5 025	4 217	3 477
*Other institutional costs**	*747*	*597*	*830*	*796*	*837*	*1 581*	*1 475*
by main provders							
AS CR	4 135	4 175	4 995	5 201	5 584	5 456	4 604
GA CR	486	509	575	568	660	783	1 061
Ministry of Education, Youth and Sports	316	417	723	843	921	979	920
Ministry of Agriculture	449	478	615	622	648	581	517
Ministry of Environment	227	199	204	211	218	217	158
Ministry of Interior + Ministry of Informatics	0	0	0	0	0	17	110
TA CR	0	0	0	0	0	0	103
other providers	*222*	*245*	*277*	*271*	*307*	*248*	*225*
by main beneficiaries							
AS CR Total	***4 955***	***5 128***	***6 337***	***6 645***	***7 231***	***7 283***	***6 736***
Departmental p.r.i. total	***880***	***897***	***1 053***	***1 072***	***1 106***	***998***	***964***
RI Crop Research Institute	121	140	234	255	256	207	191
RI of Animal Science	132	135	155	157	156	135	121
RI Veterinary Research Institute	103	106	127	133	128	126	114
RI Water Research Institute	125	113	97	110	126	122	114
RI for Landscape and Ornamental Gardening	76	71	93	91	85	74	83
Transport Research Centre	64	61	63	74	68	44	55
RI of Geodesy, Topography and Cartography	34	30	41	39	42	29	43
RI of Forestry and Game Management	41	42	45	46	48	46	42
RI of Soil and Water Conservation	33	37	46	47	57	48	41
RI of Agricultural technology	21	23	50	40	40	34	31
RI of Food Industry in Prague,	19	15	40	38	47	35	28
RI for Labour and Social Affairs	37	41	41	41	40	33	12
Other departmental p.r.i.	*74*	*82*	*20*	*0*	*13*	*64*	*88*

RI- research institute; SI - state institute

* support of AS CR sites' infrastructure and administrative costs of AS CR operation - these items cannot be further differentiated

Source: CZSO 2012 according to R&D IS (RVVI) and own calculations

Tab. A.25 Total R&D support of other public institutions from the state budget

mil.CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**1 024**	**1 088**	**1 302**	**1 104**	**1 522**	**1 241**	**1 409**
Faculty hospitals and other medical facilities	572	651	845	681	1 029	746	945
Other public research organizations	452	437	457	423	493	495	465
by support form							
institutional	437	499	510	402	396	378	537
targeted	586	589	793	702	1 126	863	872
by main providers							
Ministry of Health	587	645	763	572	919	615	811
Ministry of Education, Youth and Sports	108	117	141	154	203	209	142
Ministry of Environment	148	116	118	124	125	128	123
Ministry of Culture	84	90	91	83	84	90	108
GA CR	34	38	57	53	58	67	67
Ministry of Interior + Ministry of Informatics	25	36	36	19	23	28	59
Ministry of Industry and Trade	0	3	19	15	25	35	44
other providers	*37*	*44*	*77*	*83*	*86*	*69*	*55*
by prevailing economic activity of beneficiaries							
Health and social care (86-88)	572	651	845	681	1 029	746	945
R&D in natural and technical fields (721)	211	194	196	189	189	187	212
Cultural, entertainment and rehabilitation activities (90-93)	126	135	151	134	183	198	142
Other	115	107	111	100	120	110	111
by prevailing scientific fields							
Natural	258	245	327	287	333	286	317
Technical	33	39	54	54	62	58	77
Medical	568	625	734	575	894	665	853
Agricultural	18	14	19	29	31	23	18
Social	68	77	81	84	128	140	65
Humanities	80	87	86	75	74	69	78
by main beneficiaries							
Insitute for Clinical and Experimental Medicine	96	129	158	121	149	133	183
General Universtity Hospital in Prague	112	110	119	122	118	121	148
Czech Geological Service	93	95	122	92	126	106	154
Motol University Hospital	64	67	96	68	80	58	90
Institute of Hematology and Blood Transfusion	79	66	99	79	80	60	75
Masaryk Cancer Institute	35	44	46	28	40	32	64
University Hospital Brno	30	25	45	43	95	63	63
Psychiatric Centre Prague	76	62	53	45	54	54	56
University Hospital Hradec Králové	32	63	67	52	80	47	55
Ministry of Interior	14	29	34	17	22	25	49
National Institute of Public Health			21	24	39	31	33
National Heritage Institute	39	43	41	35	33	34	33
University Hospital u sv.Anny in Brno	7	7	13	13	72	30	31
Czech National Library	18	21	23	23	14	24	28
University Hospital Na Bulovce	19	17	27	21	24	18	26
University Hospital Olomouc	6	4	15	13	37	24	24
Institute of Endokrinology	30	32	26	23	35	20	22
National Museum	9	9	14	13	14	14	18
Czech Hydrometeorological Institute	12	10	14	20	32	23	17
Other	254	254	271	251	376	326	242

Source: CZSO 2012 according to R&D IS (RVVI) and own calculations

Tab. A.26 Total R&D support of private enterprises from the state budget

mil.CZK - current prices

	2005	2006	2007	2008	2009	2010	2011
Total	**2 364**	**2 583**	**3 058**	**2 992**	**3 551**	**3 489**	**3 834**
by support form							
institutional	313	318	330	328	382	333	219
targeted	2 051	2 265	2 728	2 664	3 168	3 156	3 615
by owership							
domestic businesses	2 001	2 183	2 579	2 538	3 017	2 971	3 130
foreign-controlled businesses	363	400	478	454	534	517	705
by R&D site size (R&D employees in FTE)							
only contracts on w ork	2	3	2	15	14	22	17
less than 5	252	229	338	377	532	539	544
5 - 9,9	267	359	449	447	432	451	494
10 - 19,9	319	425	503	447	647	638	699
20 - 49,9	563	587	691	684	819	678	724
50 - 99,9	276	274	296	405	467	418	416
100 +	443	405	532	369	432	569	770
Not differentiated	*241*	*301*	*245*	*248*	*208*	*173*	*170*
by R&D category							
Fundamental research	367	401	385	306	279	194	141
Applied research	601	575	841	835	844	2 109	2 229
Experimental development	767	815	904	899	1 178	1 108	1 101
R&D&I infrastructure	5	6	12	19	13	78	363
Industrial research	623	785	915	932	1 237	.	.
by prevailing scientific fields*							
Natural	313	347	523	533	595	575	711
Technical	1 768	1 948	2 140	2 050	2 513	2 539	2 754
Medical	58	76	89	97	107	78	69
Agricultural	144	143	246	232	252	222	234
Social	80	68	59	79	84	73	61
Humanities	1	1	0	0	0	2	5
by regions							
Praha	705	711	907	860	987	977	1 032
Středočeský	180	227	270	274	318	349	451
Jihočeský	23	23	51	50	73	63	77
Plzeňský	104	111	127	107	144	168	171
Karlovarský	3	6	6	2	4	6	4
Ústecký	104	119	111	109	124	90	100
Liberecký	97	100	105	105	191	197	214
Královéhradecký	56	64	128	119	120	117	152
Pardubický	220	228	222	214	278	257	258
Vysočina	62	70	100	114	120	129	133
Jihomoravský	302	364	462	489	548	550	549
Olomoucký	110	134	156	134	145	117	148
Zlínský	243	264	263	220	253	217	270
Moravskoslezský	154	162	149	195	245	252	276

Source: CZSO 2012 according to R&D IS (RVVI) and own calculations

Tab. A.29 Total indirect support of business R&D from the state budget

mil. CZK - current prices

	2005	2006	2007	2008	2009	2010
Total	**861**	**1 053**	**1 211**	**969**	**1 053**	**1 321**
by ownership						
Domestic public	.	.	6	3	3	4
Domestic private	.	.	426	383	404	427
Foreign-controlled private	.	.	779	583	646	890
by branch sections (CZ-NACE)						
Agriculture(section A)	.	.	6	1	1	1
Industry and construction total (sections B-F)	**.**	**.**	**1 036**	**753**	**817**	**1 013**
manufacturing industry (section C)	.	.	*1 016*	*734*	*800*	*993*
Services total (sections G-U)	**.**	**.**	**169**	**215**	**235**	**307**
R&D (NACE 72)	.	.	*21*	*29*	*33*	*26*
by company size (number of employees)						
small (0 - 49)	.	.	103	104	110	114
medium (50 - 249)	.	.	192	212	228	269
large (250 +)	.	.	916	653	715	938
by R&D size (number of FTE employees)						
less than 5	.	.	56	42	37	68
5 - 9,9	.	.	46	57	69	90
10 - 19,9	.	.	62	60	67	79
20 - 49,9	.	.	195	130	178	207
50 - 99,9	.	.	41	62	76	126
100 +	.	.	515	451	457	556
Unknown	.	.	296	168	168	196
by amount of indirect R&D support (mil. CZK)						
less than 1	.	.	125	132	147	161
1-4,9	.	.	252	240	248	290
5-9,9	.	.	102	121	92	111
10-24,9	.	.	102	52	80	170
25 +	.	.	630	424	486	588
by regions						
Praha	.	.	199	215	221	284
Středočeský	.	.	425	315	314	472
Jihočeský	.	.	4	8	8	11
Plzeňský	.	.	135	98	162	153
Karlovarský	.	.	1	2	1	4
Ústecký	.	.	10	7	9	16
Liberecký	.	.	162	22	76	47
Královéhradecký	.	.	23	29	20	22
Pardubický	.	.	84	60	44	54
Vysočina	.	.	23	18	10	25
Jihomoravský	.	.	58	60	75	84
Olomoucký	.	.	23	27	26	27
Zlínský	.	.	17	28	24	31
Moravskoslezský	.	.	46	82	62	91

Source: CZSO 2012 according to MoF and own calculations

Tab. B.1 Total R&D employees in the Czech Republic

	Full-time Equivalent R&D employees (FTE)						
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Head count (HC)	65 379	69 162	73 081	74 508	75 788	77 903	82 283
Full-time Equivalent (FTE)	**43 370**	**47 729**	**49 192**	**50 808**	**50 961**	**52 290**	**55 697**
perons with contract on work (HC)	34 025	41 149	43 758	43 993	44 237	51 470	52 421
persons with contract on work (FTE)	1 296	1 740	1 502	1 548	1 618	1 860	2 052
by sector							
Business	**21 782**	**23 713**	**25 217**	**26 069**	**25 884**	**26 998**	**29 509**
Public enterprises	1 788	1 488	1 550	2 295	2 079	2 115	1 696
Private domesti	12 502	12 993	13 117	10 993	11 140	13 364	14 357
Private foreign-owned	7 492	9 232	10 550	12 781	12 665	11 519	13 456
Government	**10 584**	**11 086**	**11 341**	**11 386**	**11 180**	**10 926**	**11 133**
AS CR sites	6 893	7 188	7 395	7 496	7 396	7 261	7 429
Departmental research sites	2 354	2 411	2 390	2 328	2 308	2 415	2 502
Other government sector sites	1 337	1 487	1 556	1 562	1 477	1 250	1 201
University	**10 776**	**12 776**	**12 465**	**13 147**	**13 648**	**14 056**	**14 724**
Public universities	10 295	12 411	11 946	12 654	12 960	13 446	14 077
University Hospitals	431	281	357	335	499	430	442
Private colleges	49	84	162	158	189	180	205
Private non-profit	**229**	**154**	**168**	**206**	**249**	**310**	**332**
by gender							
men	29 235	32 673	33 542	35 101	35 138	36 352	38 925
women	14 135	15 056	15 650	15 707	15 822	15 939	16 772
by employment type							
Researchers	24 169	26 267	27 878	29 785	28 759	29 228	30 682
Technicians	13 773	15 840	15 430	15 133	16 005	15 971	17 109
Other employees	5 429	5 622	5 883	5 890	6 197	7 092	7 907
by education level							
Total tertiary	29 169	32 980	34 043	36 012	36 260	37 128	39 911
doctoral	9 708	10 692	11 187	11 999	12 290	12 442	13 267
university and college	19 461	22 288	22 856	24 013	23 970	24 686	26 644
Secondary and lower	14 201	14 746	15 148	14 797	14 701	15 162	15 786
by prevailing field							
Natural	11 163	12 102	11 448	12 004	11 925	12 754	15 158
Technical	20 570	23 092	25 113	26 271	26 300	26 379	26 932
Medical	3 800	4 008	4 126	4 072	4 293	4 456	4 386
Agricultural	2 505	2 631	2 849	2 758	2 765	2 848	2 741
Social	2 787	3 219	3 023	2 904	2 604	2 558	3 608
Huanities	2 546	2 678	2 632	2 800	3 074	3 295	2 872
by regions							
Praha	17 584	19 889	21 176	20 943	19 747	19 963	21 151
Středočeský	4 513	4 924	5 056	5 176	5 230	5 325	5 448
Jihočeský	1 644	1 815	1 813	1 898	2 050	2 121	2 104
Plzeňský	1 432	1 799	1 953	1 793	1 951	1 933	2 196
Karlovarský	70	94	70	136	107	94	102
Ústecký	697	793	842	798	736	769	856
Liberecký	1 295	1 857	1 432	1 423	1 270	1 338	1 756
Královéhradecký	1 365	1 198	1 453	1 447	1 750	1 807	1 867
Pardubický	1 936	2 145	2 193	2 218	2 092	2 160	2 404
Vysočina	699	605	605	683	648	692	725
Jihomoravský	6 036	6 200	6 205	7 501	8 387	8 732	8 941
Olomoucký	2 058	2 049	2 011	2 025	1 996	2 110	2 310
Zlínský	1 665	1 775	1 625	1 837	1 807	1 785	1 874
Moravskoslezský	2 376	2 585	2 759	2 931	3 191	3 459	3 965

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. B.2a Total R&D employees in the Czech government sector

Full-time Equivalent R&D employees (FTE)

	2005	2006	2007	2008	2009	2010	2011
Head count (HC)	13 880	14 560	14 836	15 091	14 776	14 058	14 335
Full-time Equivalent (FTE)	**10 584**	**11 086**	**11 341**	**11 386**	**11 180**	**10 926**	**11 133**
perons with contract on work (HC)	9 704	13 543	13 978	15 228	12 003	14 620	15 636
persons with contract on work (FTE)	392	460	481	447	444	534	616
by site type							
Research sites (CZ-NACE 72)	**9 247**	**9 599**	**9 750**	**9 823**	**9 704**	**9 677**	**9 932**
AS CR sites	6 893	7 188	7 395	7 496	7 396	7 261	7 429
departmental research sites	2 354	2 411	2 355	2 328	2 308	2 415	2 502
Other government sector sites	1 337	1 487	1 591	1 562	1 477	1 250	1 201
libraries, archives, museums	**479**	**705**	**905**	**870**	**832**	**708**	**692**
other	858	781	686	692	645	542	510
by employment type							
Researchers	6 323	6 800	6 915	7 084	6 270	6 244	6 235
Technicians	2 488	2 552	2 624	2 522	3 006	2 666	2 569
Other employees	1 773	1 734	1 802	1 780	1 905	2 016	2 328
by gender							
men	5 718	6 003	5 985	6 088	5 984	5 909	5 945
women	4 866	5 083	5 356	5 298	5 197	5 018	5 188
by education level							
Total tertiary	7 064	7 496	7 807	8 111	7 979	7 754	7 976
doctoral	3 126	3 274	3 485	3 668	3 590	3 456	3 724
university and college	3 938	4 222	4 321	4 443	4 390	4 298	4 252
Secondary and lower	3 520	3 590	3 535	3 275	3 201	3 172	3 157
by prevailing field							
Natural	5 478	5 616	5 955	6 192	6 201	6 003	6 041
Technical	1 320	1 327	1 291	1 269	1 227	1 059	978
Medical	712	733	694	734	735	680	730
Agricultural	951	964	952	853	757	899	945
Social	762	884	852	771	726	839	868
Huanities	1 360	1 561	1 598	1 566	1 534	1 446	1 572
by regions							
Praha	7 113	7 582	7 830	7 759	7 666	7 656	7 766
Středočeský	1 077	1 135	1 128	1 141	1 112	1 049	1 066
Jihočeský	514	566	603	587	596	585	473
Plzeňský	53	59	78	93	95	95	97
Karlovarský	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Ústecký	13	26	26	56	54	28	49
Liberecký	9	24	10	30	29	30	40
Královéhradecký	349	107	60	68	111	52	47
Pardubický	.	53	56	54	60	18	63
Vysočina	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Jihomoravský	1 272	1 339	1 358	1 416	1 297	1 215	1 361
Olomoucký	5	14	17	17	16	20	22
Zlínský	2	3	6	6	7	6	8
Moravskoslezský	145	146	145	145	118	153	115

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. B.2b Total R&D employees in the Czech university sector

	Full-time Equivalent R&D employees (FTE)						
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Head count (HC)	23 998	24 634	26 162	26 376	27 215	27 844	29 149
Full-time Equivalent (FTE)	**10 776**	**12 776**	**12 465**	**13 147**	**13 648**	**14 056**	**14 724**
perons with contract on work (HC)	16 952	20 825	23 082	22 976	25 661	29 569	29 338
persons with contract on work (FTE)	502	950	609	693	773	837	875
by site type							
Public universities - faculties	**10 295**	**12 411**	**11 946**	**12 654**	**12 960**	**13 446**	**14 077**
University Hospitals	431	281	357	335	499	430	442
Private colleges	49	84	162	158	189	180	205
by employment type							
Researchers	7 575	8 352	8 664	9 358	9 664	10 115	10 289
Technicians	2 477	3 535	2 962	2 971	3 105	2 947	3 428
Other employees	723	888	840	818	878	994	1 006
by gender							
men	6 495	7 841	7 686	8 162	8 395	8 557	9 021
women	4 281	4 935	4 779	4 985	5 253	5 499	5 703
by education level							
Total tertiary	9 096	10 943	10 660	11 462	11 895	12 248	12 434
doctoral	5 088	5 970	6 081	6 700	6 944	7 145	7 481
university and college	4 008	4 973	4 579	4 762	4 951	5 103	4 953
Secondary and lower	1 680	1 833	1 806	1 685	1 753	1 807	2 290
by prevailing field							
Natural	1 564	2 548	1 669	2 398	2 221	2 406	3 760
Technical	3 747	4 269	4 757	4 644	4 970	5 091	4 637
Medical	2 031	2 041	2 287	2 201	2 435	2 407	2 229
Agricultural	824	760	969	930	1 069	1 045	863
Social	1 730	2 093	1 827	1 862	1 517	1 364	2 041
Huanities	880	1 064	957	1 112	1 436	1 743	1 193
by regions							
Praha	4 453	5 189	5 588	5 560	5 874	5 832	6 041
Středočeský	.	3	47	62	9	17	20
Jihočeský	422	429	397	457	510	515	566
Plzeňský	641	1 051	1 096	926	810	701	804
Karlovarský	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Ústecký	140	204	191	179	183	193	175
Liberecký	429	811	531	383	280	317	691
Královéhradecký	206	231	262	250	242	276	331
Pardubický	229	240	238	237	249	256	273
Vysočina	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.	i.d.
Jihomoravský	2 065	2 247	2 141	2 978	3 222	3 412	3 011
Olomoucký	920	900	817	843	820	981	1 107
Zlínský	415	478	109	187	193	193	199
Moravskoslezský	856	992	1 048	1 084	1 254	1 361	1 505

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. B.3 Total R&D employees in the Czech business sector

	Full-time Equivalent R&D employees (FTE)						
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Head count (HC)	27 278	29 740	31 847	32 745	33 480	35 629	38 415
Full-time Equivalent (FTE)	**21 782**	**23 713**	**25 217**	**26 069**	**25 884**	**26 998**	**29 509**
perons with contract on work (HC)	6 650	6 221	5 940	5 077	5 700	5 678	5 702
persons with contract on work (FTE)	326	313	383	374	359	417	465
by site type							
Public enterprises	**1 788**	**1 488**	**1 550**	**2 295**	**2 079**	**2 115**	**1 696**
Private domestic	12 502	12 993	13 117	10 993	11 140	13 364	14 357
Private foreign-controlled	7 492	9 232	10 550	12 781	12 665	11 519	13 456
by employment type							
Researchers	10 143	11 053	12 230	13 253	12 657	12 661	13 958
Technicians	8 717	9 671	9 807	9 541	9 838	10 299	11 021
Other employees	2 922	2 989	3 180	3 275	3 388	4 038	4 531
by gender							
men	16 927	18 738	19 775	20 733	20 617	21 722	23 769
women	4 855	4 975	5 442	5 336	5 266	5 276	5 740
by education level							
Total tertiary	12 816	14 407	15 431	16 266	16 177	16 871	19 218
doctoral	1 462	1 404	1 595	1 596	1 715	1 790	2 005
university and college	11 353	13 003	13 836	14 669	14 463	15 081	17 213
Secondary and lower	8 966	9 306	9 786	9 804	9 706	10 127	10 291
by prevailing field							
Natural	4 082	3 913	3 811	3 394	3 451	4 271	5 271
Technical	15 487	17 429	19 038	20 322	20 073	20 190	21 282
Medical	1 055	1 231	1 141	1 127	1 118	1 344	1 396
Agricultural	728	898	918	964	927	892	922
Social	206	193	235	167	228	220	556
Huanities	224	49	75	95	87	82	82
by regions							
Praha	5 845	7 010	7 627	7 475	6 050	6 304	7 185
Středočeský	3 434	3 780	3 879	3 972	4 107	4 260	4 357
Jihočeský	693	796	808	847	899	970	1 043
Plzeňský	717	689	777	771	1 047	1 138	1 294
Karlovarský	63	86	67	133	102	91	99
Ústecký	544	562	622	563	498	548	632
Liberecký	856	1 021	890	1 008	953	989	1 022
Královéhradecký	809	860	1 130	1 130	1 397	1 454	1 460
Pardubický	1 704	1 851	1 899	1 927	1 783	1 886	2 067
Vysočina	675	583	582	668	630	672	700
Jihomoravský	2 694	2 611	2 701	3 080	3 848	4 068	4 516
Olomoucký	1 129	1 127	1 163	1 152	1 144	1 090	1 164
Zlínský	1 248	1 294	1 508	1 642	1 607	1 586	1 667
Moravskoslezský	1 370	1 443	1 564	1 701	1 819	1 944	2 304

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. B.4 Total R&D employees in the Czech Republic in 2011 - basic indicators

Full-time Equivalent R&D employees (FTE)

	Head count (HC)			Full-time Equivalent (FTE)		
	Total	Men	Women	Total	Men	Women
Total	**45 902**	**32 966**	**12 936**	**30 682**	**22 985**	**7 696**
by sector						
Business	**16 698**	**14 157**	**2 541**	**13 958**	**11 913**	**2 045**
Public enterprises	1 392	952	440	867	573	294
Private domesti	7 917	6 717	1 200	6 394	5 454	940
Private foreign-ow ned	7 390	6 488	902	6 696	5 886	811
Government	8 220	5 088	3 132	6 235	3 964	2 272
AS CR sites	**5 251**	**3 559**	**1 692**	**4 015**	**2 739**	**1 275**
Departmental research sites	**1 668**	**853**	**814**	**1 571**	**831**	**740**
Other government sector sites	**1 301**	**676**	**626**	**649**	**393**	**256**
University	**20 732**	**13 548**	**7 184**	**10 289**	**6 986**	**3 303**
Public universities	**18 307**	**12 205**	**6 102**	**9 841**	**6 737**	**3 104**
University Hospitals	**1 912**	**1 020**	**892**	**279**	**145**	**134**
Private colleges	**513**	**323**	**190**	**169**	**104**	**66**
Private non-profit	251	172	79	199	123	77
by education level						
Total tertiary	41 636	29 929	11 708	27 397	20 554	6 842
doctoral	20 149	14 450	5 699	11 832	8 657	3 176
university and college	21 488	15 479	6 009	15 565	11 898	3 667
Secondary and low er	4 266	3 037	1 229	3 285	2 431	854
by prevailing field						
Natural	11 850	8 522	3 329	8 478	6 119	2 359
Technical	17 461	15 180	2 281	14 099	12 320	1 779
Medical	6 535	3 356	3 179	2 703	1 345	1 358
Agricultural	2 266	1 352	914	1 306	754	553
Social	4 711	2 720	1 991	2 350	1 379	971
Huanities	3 078	1 835	1 243	1 746	1 068	678
by age						
>24	685	464	221	.	.	.
25-34	14 898	10 613	4 285	.	.	.
35-44	11 907	8 627	3 281	.	.	.
45-54	8 092	5 546	2 546	.	.	.
55-64	6 881	4 919	1 962	.	.	.
64+	3 439	2 798	641	.	.	.
by nationality						
Czech Republic	43 368	30 370	12 003	.	.	.
Slovakia	1 453	950	503	.	.	.
Ukraine	178	112	66	.	.	.
Russia	158	98	60	.	.	.
Germany	76	57	19	.	.	.
Poland	68	0	0	0	0	0
USA	62	0	0	0	0	0
UK	55	0	0	0	0	0
France	49	0	0	0	0	0
India	44	0	0	.	.	.
Other	391	0	0	0	0	0
by regions						
Praha	18 774	12 686	6 088	12 523	8 713	3 810
Středočeský	3 374	2 739	635	2 976	2 428	548
Jihočeský	1 298	883	414	793	572	221
Plzeňský	2 291	1 778	513	1 276	1 090	187
Karlovarský	62	46	16	55	40	15
Ústecký	656	478	179	374	270	104
Liberecký	1 139	893	247	991	787	204
Královéhradecký	1 391	992	399	839	622	217
Pardubický	1 717	1 345	372	1 166	964	202
Vysočina	441	383	58	368	321	48
Jihomoravský	8 620	6 197	2 423	5 205	3 996	1 209
Olomoucký	1 790	1 274	516	1 205	872	334
Zlínský	1 085	886	198	853	717	136
Moravskoslezský	3 263	2 385	878	2 057	1 595	462

Source: CZSO, Annual R&D survey (VTR 5-01)

Tab. B.5 R&D employees

Full-Time Equivalent (FTE)

	total			per 1000 employed persons			z toho v sektorech zaměstnání:					
							business		government		university	
	2000	2009	2010	2000	2009	2010	2000	2010	2000	2010	2000	2010
Belgium	53 391	59 756	59 851	13	**13**	**13**	33 493	32 691	3 493	4 942	15 884	21 633
Bulgaria	15 259	18 230	16 509	6	6	5	2 137	2 713	10 662	9 346	2 414	4 362
Czech Republic	**24 198**	**50 961**	**52 290**	**5**	**10**	**10**	**11 527**	**26 998**	**7 148**	**10 926**	**5 331**	**14 056**
Denmark	37 693	54 391	53 191	14	19	19	23 725	34 174	5 658	1 474	8 015	17 278
Estonia	3 710	5 430	5 277	6	9	9	417	1 955	948	772	2 305	2 465
Finland	52 604	56 069	55 897	23	23	23	29 384	30 559	7 314	6 836	15 459	17 924
France	327 466	390 374	..	13	15	..	177 688	..	53 388	..	90 051	..
Ireland	12 762	20 331	20 253	8	11	11	8 724	12 194	1 436	998	2 602	7 061
Italy	150 066	226 285	218 837	7	9	9	63 998	103 858	31 231	33 574	54 837	73 287
Cyprus	680	1 266	1 300	2	3	3	144	300	348	265	137	595
Lithuania	11 791	12 094	11 822	8	9	9	569	2 069	4 974	2 555	6 248	7 198
Latvia	5 449	5 485	5 409	6	6	6	1 366	1 217	1 192	907	2 890	3 285
Luxebourg	3 663	4 711	4 889	14	13	14	3 337	3 289	303	1 006	23	594
Hungary	23 534	29 795	31 480	6	7	8	6 471	14 999	8 204	8 225	8 859	8 256
Malta	:	911	1 039	:	6	6	:	669	:	59	:	311
Germany	484 734	534 565	549 042	12	13	14	312 490	337 211	71 454	90 531	100 790	121 300
Netherlands	91 313	87 874	100 544	11	10	12	47 509	54 139	12 627	11 424	30 078	34 981
Poland	78 925	73 581	81 843	5	5	5	18 586	18 424	18 823	20 180	41 499	43 111
Portugal	21 888	51 347	52 378	4	10	11	3 567	13 695	5 936	3 639	9 680	30 429
Austria	..	56 438	58 519	..	14	14	..	39 716	..	2 778	..	15 614
Romania	33 892	28 398	26 171	3	3	..	22 541	8 271	7 571	8 704	3 780	9 054
Greece	..	..	..	..	..	..	9 764	..	..	..	..	..
Slovakia	15 221	15 952	18 188	8	7	9	5 172	3 230	4 189	4 359	5 860	10 535
Slovenia	8 568	12 410	12 940	9	13	14	4 110	7 056	2 565	3 141	1 746	2 727
UK	288 599	347 486	319 487	10	11	10	145 499	142 374	29 686	17 410	..	152 999
Spain	120 618	220 777	222 022	7	12	12	47 055	92 221	22 400	46 008	49 470	83 300
Sweden	..	75 849	77 418	..	17	17	..	54 797	..	3 110	..	19 471
EU27	**2 000 349**	**2 477 627**	**2 492 256**	**9**	**11**	**11**	**1 049 343**	**1 278 812**	**317 630**	**346 345**	**610 046**	**832 560**
Australia	95 621	..	..	11	..	..	28 391	..	18 151	..	46 287	..
Israel	..	..	..	..	..	..	41 144	..	..	..	9 405	9 180
Japan	896 847	878 418	878 018	14	14	14	581 721	614 862	59 254	61 830	227 882	188 324
Canada	167 940	234 660	..	11	14	..	104 707	..	17 240	..	45 150	..
Korea	138 077	309 063	335 228	7	13	14	87 113	230 221	13 182	26 939	36 209	73 511
Norway	..	36 091	36 123	..	14	14	..	17 821	..	6 332	..	11 970
USA	..	..	..	..	..	..	..	..	..	..	..	..
Switzerland	52 285	..	..	13	..	..	36 190	..	895	719	15 200	24 719
Turkey	27 003	73 521	81 792	1	3	4	6 032	37 522	4 069	11 357	..	32 913
OECD	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**
China	922 131	2 291 252	2 553 829	1	3	3	480 791	1 873 913	282 094	390 245	159 246	289 670
Russia	1 007 257	845 942	839 992	15	12	12	628 858	444 111	276 373	280 506	99 552	113 353

Pozn.: FTE - instead of 2000: Israel (1999), Norway (2001), Malta (2002), Austria (2002), Greece (2001), Sweden (2001); emp. pers. - instead of 2000: Norway (1999), Austria (1998), Greece (1999), Sweden (1999); instead of 2009: Australia (2008), France (2008), Canada (2008), Korea (2008), Greece (2007), Switzerland (2008); Sectors - instead of 2000: EU27 (1999 - HES), Norway (1999), Malta (2002), Austria (1999), Greece (1999), Sweden (1999); instead of 2009: Australia (2008), France (2008), Israel (2008), Canada (2008), Korea (2008), Greece (2007), Switzerland (2008)

Zdroj: CZSO according to MSTI 2012/1 (OECD, May 2012), Research and Development Database (Eurostat, August 2012) and own calcualtions

Tab. B.7 Total university students

	2005	2006	2007	2008	2009	2010	2011
Total	**289 498**	**316 226**	**344 009**	**368 098**	**389 099**	**396 093**	**392 318**
by gender							
men	138 873	148 413	158 177	165 603	172 838	174 653	172 764
women	150 625	167 813	185 832	202 495	216 261	221 440	219 554
by field							
Education	36 962	38 859	41 923	43 897	44 949	44 638	42 783
Humanities	26 931	29 581	32 346	35 183	37 722	38 844	39 239
Social sciences, trade, law	85 096	96 862	111 844	125 303	136 251	137 393	134 541
Natural sciences, math., informatics	**35 349**	**38 634**	**41 771**	**44 503**	**47 451**	**49 739**	**50 088**
Technical sc., construction, mfg.	**57 973**	**60 120**	**60 527**	**59 772**	**59 888**	**59 394**	**57 489**
Agriculture, veterinary	11 852	12 877	13 677	15 132	15 855	16 182	16 736
Health and social care	26 457	29 262	30 984	32 740	34 328	35 945	37 066
Services	13 754	15 374	16 825	18 313	19 553	20 652	20 709
by programme							
Bachelor and master (ISCED 5A)	267 791	293 564	320 692	344 318	364 339	370 953	367 339
bachelor	153 983	181 856	207 840	228 930	243 453	248 125	244 223
master	117 150	115 098	116 331	119 230	124 901	126 523	126 699
Doctoral(ISCED 6)	22 308	23 304	23 968	24 506	25 496	25 920	25 697

Tab. B.8 University students in technical and natural sciences

	2005	2006	2007	2008	2009	2010	2011
Natural sc., mathematics, informatics							
Total	**35 349**	**38 634**	**41 771**	**44 503**	**47 451**	**49 739**	**50 088**
by programme							
Bachelor and master (ISCED 5A)	29 654	32 637	35 737	37 985	40 647	42 645	42 897
bachelor	22 045	25 160	27 597	29 009	30 834	31 904	31 738
master	7 689	7 562	8 205	9 050	9 892	10 808	11 221
Doctoral(ISCED 6)	5 718	6 025	6 061	6 547	6 845	7 139	7 235
by field							
Life sciences	7 756	8 488	9 204	9 815	10 183	10 312	10 473
Earth sciences	9 458	10 508	11 116	11 834	12 048	12 792	12 825
Mathematics and statistics	3 138	3 209	3 316	3 575	3 894	4 297	4 234
Informatics	15 142	16 572	18 287	19 472	21 508	22 497	22 693
Technical, construction, mfg.							
Total	**57 973**	**60 120**	**60 527**	**59 772**	**59 888**	**59 394**	**57 489**
by programme							
Bachelor and master (ISCED 5A)	52 081	54 181	54 543	54 371	54 551	54 142	52 361
bachelor	32 221	37 608	39 018	39 608	38 450	38 586	37 752
master	19 906	16 615	15 556	14 801	16 137	15 586	14 635
Doctoral(ISCED 6)	5 910	5 957	6 019	5 432	5 368	5 292	5 160
by field							
Technical sciences and fields	36 040	36 877	36 467	34 809	33 844	32 929	31 440
Production and manufacture	6 405	7 196	7 541	7 879	8 061	7 632	6 888
Architecture and construction	15 603	16 127	16 561	17 114	18 038	18 890	19 207

Source: MoEYS

Note: Due to the increase of the number of students studying at more than one university or faculty at the same time the numbers of students are presented in HC in summary indicators. Due to this the number doesn't correspond to the summary values presented in the time series

Tab. B.9 Tertiary level students

1 000 persons

	total		% of 20-29 population		by gender				in natural and technical sciences					
					men		women		total		natural sciences		technical sciences	
	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010
Belgium	356	445	27	**33**	170	200	186	246	75	73	33	26	42	47
Bulgaria	261	287	23	33	112	128	150	159	65	68	12	15	52	54
Czech Republic	**254**	**437**	**15**	**30**	**129**	**189**	**124**	**249**	**75**	**110**	**34**	**48**	**41**	**62**
Denmark	189	241	27	38	82	101	108	140	38	45	19	21	19	24
Estonia	54	69	29	34	22	27	31	42	11	16	4	7	7	9
Finland	270	304	43	48	125	140	145	163	98	107	29	31	69	76
France	:	2 245	:	29	:	1 011	:	1 234	:	573	:	276	:	296
Ireland	161	194	27	29	74	92	87	102	45	51	27	27	18	24
Italy	1 770	1 980	22	30	787	839	983	1 141	433	462	135	152	298	310
Cyprus	10	32	12	27	4	17	6	15	2	6	1	3	1	3
Lithuania	122	201	25	41	49	82	73	120	33	45	6	10	27	34
Latvia	91	113	28	32	33	42	58	71	15	20	6	6	9	14
Luxebourg	2	5	4	8	:	3	:	3	0	1	0	1	0	0
Hungary	306	389	19	30	138	169	168	220	66	82	11	28	54	55
Malta	6	11	12	18	3	5	3	6	1	3	0	2	0	1
Germany	2 055	2 556	23	26	1 066	1 243	989	1 312	587	782	262	362	326	420
Netherlands	488	651	23	33	244	314	244	337	81	92	29	40	52	52
Poland	1 580	2 149	27	37	671	877	909	1 271	285	456	67	173	218	283
Portugal	374	384	24	29	163	179	211	204	102	113	35	28	67	85
Austria	290	350	29	33	149	164	141	186	74	90	33	38	40	51
Romania	453	1 000	14	30	218	436	235	564	124	227	25	49	99	179
Greece	:	642	:	49	:	322	:	320	:	201	:	86	:	115
Slovakia	136	235	15	27	67	94	68	140	38	55	10	20	28	35
Slovenia	84	115	28	41	37	48	47	66	20	29	4	8	15	22
UK	2 024	2 479	28	30	932	1 077	1 092	1 402	477	541	299	330	178	210
Spain	1 829	1 879	28	34	861	866	968	1 013	525	497	230	171	295	326
Sweden	347	455	31	38	145	185	202	270	106	115	40	39	66	76
EU27	**14 040**	**19 847**	**22**	**32**	**6 539**	**8 850**	**7 498**	**10 997**	**3 534**	**4 860**	**1 436**	**1 996**	**2 098**	**2 864**
Australia														
Israel														
Japan														
Canada	3 982	3 836	:	:	2 195	2 074	1 787	1 762	819	699	112	113	707	586
Korea														
Norway	191	225	32	36	79	88	112	137	27	36	14	18	13	18
USA	13 203	20 428	:	:	5 841	8 770	7 362	11 658	:	3 225	:	1 747	:	1 477
Switzerland	:	249	:	25	:	126	:	122	:	57	:	24	:	33
Turkey	1 015	3 529	:	31	611	1 963	404	1 567	301	612	104	229	197	384
OECD														
China														
Russia														

Source: Eurostat 2011

Tab. C.7 Patents awarded by the IPO to domestic applicants - total

count*

	2005	2006	2007	2008	2009	2010	2011
Total	**347**	**265**	**235**	**251**	**385**	**294**	**340**
by award method							
National route at IPO	346	263	227	240	373	278	325
European patnes validated for Czech Republic by IPO	1	2	8	11	12	16	15
by applicant type							
Public university	**19**	**16**	**23**	**19**	**60**	**65**	**107**
Public research institutions	**19**	**13**	**12**	**28**	**44**	**40**	**37**
AS CR sites	16	10	7	19	32	33	23
departmental research institutions	3	3	5	9	13	8	14
Business total	**197**	**154**	**132**	**156**	**209**	**127**	**125**
public	3	2	-	3	4	1	-
domestic	118	98	80	71	118	70	77
foreign-controlled	77	55	52	83	87	56	49
Natural persons total	**109**	**80**	**68**	**47**	**69**	**57**	**66**
enterpreneur	48	41	43	22	40	34	34
non-enterpreneur	62	40	25	25	29	23	32
Other domestic applicants	3	2	0	1	3	4	5
by gender of author							
man	323	243	218	224	343	265	296
w oman	18	20	15	20	35	22	39
not specified	6	2	2	6	8	6	5
by main IPC sections							
A Human necessities	51	32	30	44	78	37	40
B Performing operations, transporting	91	58	60	58	60	69	62
C Chemistry, metallurgy	79	70	52	53	94	79	98
D Textiles, paper	11	12	11	21	27	9	10
E Fixed constructions	21	17	22	15	23	13	25
F Mechanical engineering, lighting, heating, w eapons, blasting	41	39	23	21	31	33	39
G Physics	37	24	26	25	45	36	54
H Electricity	16	13	12	15	28	18	12
in selected techology areas							
High-tech total	**9**	**13**	**7**	**14**	**29**	**18**	**21**
Communication technologies	1	3	3	-	2	1	3
Lasers	-	-	-	-	-	-	-
Aeronautics	3	-	-	-	3	1	-
Microorganic and genetic engineering	2	10	4	10	19	12	16
Computers and automated control systems	3	-	-	2	5	1	2
Semiconductors	-	-	-	2	-	3	-
ICT total	**26**	**21**	**25**	**24**	**42**	**37**	**54**
Telecommunication	1	4	3	1	4	5	4
Consumer electronics	1	1	1	-	1	2	2
Computers	6	3	4	5	5	1	2
other ICT	18	13	17	18	32	29	46
Biotechnology	**2**	**8**	**3**	**10**	**18**	**7**	**16**
Renewable resources	**3**	**6**	**1**	**3**	**4**	**4**	**3**
by applicant domicile (CZ-NUTS3/regions)							
Praha	115	91	84	87	146	116	124
Středočeský	51	18	20	25	35	32	19
Jihočeský	10	13	6	9	11	14	21
Plzeňský	14	8	18	12	8	10	11
Karlovarský	4	5	2	4	2	2	0
Ústecký	10	10	1	10	12	8	12
Liberecký	24	26	18	8	29	15	25
Královéhradecký	18	10	11	18	12	12	13
Pardubický	16	6	13	25	29	19	13
Vysočina	7	6	6	5	8	4	5
Jihomoravský	27	30	19	22	48	19	48
Olomoucký	16	11	13	2	18	14	15
Zlínský	8	8	6	9	10	15	11
Moravskoslezský	28	24	19	16	18	14	24

** year of patent award*

Source: CZSO 2012 according to IPO and own calculations

Tab. C.12 Patent licenses provided by Czech subjects

a) Licensors in the monitored year — **count**

	2005	2006	2007	2008	2009	2010	2011
Total	**22**	**36**	**40**	**42**	**42**	**53**	**60**
new licenses in the given year	*9*	*15*	*13*	*11*	*11*	*18*	*24*
by the amount of license fees							
no fee	.	.	13	16	17	26	19
less than 0,1 mil. CZK	.	.	7	7	10	8	14
0,1 - 0,99 mil. CZK	.	.	13	10	5	6	19
1 - 9,9 mil. CZK	.	.	3	7	9	10	6
10 - 99,9 mil. CZK	.	.	2	1	-	2	1
100 + mil. CZK	.	.	2	1	1	1	1
by licensor type							
Public universities	2	2	4	5	4	7	11
Public research institutions	5	6	7	9	10	11	11
Businesses	10	18	18	27	27	34	23
Natural persons	4	9	10	.	.	.	14
Other subjects	1	1	1	1	1	1	1
by country of licensee							
Czech Republic	.	.	30	31	32	40	49
EU27 (excl. CZ) total	.	.	7	11	9	9	8
Germany	*.*	*.*	*1*	*4*	*6*	*5*	*5*
China	.	.	1	1	2	2	2
Russia	.	.	1	1	1	1	1
USA	.	.	3	2	5	5	7
Switzerland	.	.	1	1	1	2	1
other	.	.	2	3	4	1	1

* one licensor can provide license to several countries in a given year

b) Licensed patents — **count**

	2005	2006	2007	2008	2009	2010	2011
Total						**134**	**147**
by amount of income for patent-protected invention							
no fee						40	24
less than 0,1 mil. CZK						23	38
0,1 - 0,99 mil. CZK						20	35
1 - 9,9 mil. CZK						16	9
10 - 99,9 mil. CZK						35	41
100 + mil. CZK						-	-
by licensor type							
Public universities						16	32
Public research institutions						53	57
Businesses						64	40
Natural persons						.	17
Other subjects						1	1

c) License fees from provided right to use patent-protected inventions — **mil. CZK**

	2005	2006	2007	2008	2009	2010	2011
Total	**518**	**672**	**1 107**	**960**	**1 152**	**1 427**	**1 519**
new licenses in a given year	*16*	*55*	*131*	*10*	*7*	*117*	*16*
by licensor type							
Public universities	0	0	0	1	2	53	4
Public research institutions	469	601	951	909	1 129	1 340	1 472
Businesses	47	67	153	49	22	35	42
Natural persons	1	3	3	.	.	.	2
Other subjects	1	0	0	0	0	0	0
by selected production codes of the license							
Basic pharmaceutical products	.	.	.	913	1 126	1 340	1 471
Machines and other equipment	.	.	.	24	7	18	35
Measurement, testing and navigation tools	.	.	.	-	-	51	0
Chemical substances and agents	.	.	.	1	1	2	3
Vehicles (excl. motocycles), trailers, semi-trailers	.	.	.	2	2	2	-
R&D	.	.	.	2	4	2	3
Other subjects	.	.	.	17	14	13	7
by country of licensee							
Czech Republic	.	13	7	17	15	68	17
EU27 (excl. CZ) total	.	7	52	28	7	6	0
Germany	*.*	*3*	*3*	*5*	*6*	*4*	*0*
China	.	24	-	-	0	13	27
Russia	.	-	85	-	-	-	-
USA	.	598	949	905	1 124	1 338	1 469
Switzerland	.	-	-	-	-	2	6
other	.	30	14	9	6	-	-

* according to publicly available reports of the Institute of organic chemistry and biochemistry of AS CR this subject contributed more than 95% of the values in the last three years

Source: CZSO, annual license survey Lic 5-01

Tab. C.14 Patents awarded by the EPO

	number of patents									per 1 million inhabitants								
	1995	2000	2005	2006	2007	2008	2009	2010	2011	1995	2000	2005	2006	2007	2008	2009	2010	2011
Belgium	298	297	458	563	523	595	584	643	702	29,4	29,0	43,7	53,4	49,2	55,6	54,1	59,1	63,9
Bulgaria	2	3	5	4	6	4	5	3	8	0,2	0,3	0,6	0,5	0,8	0,5	0,7	0,4	1,1
Czech Republic	**11**	**4**	**27**	**21**	**37**	**44**	**40**	**45**	**55**	**1,1**	**0,4**	**2,6**	**2,0**	**3,6**	**4,2**	**3,8**	**4,3**	**5,2**
Denmark	206	204	432	507	419	464	434	515	592	39,4	38,2	79,7	93,2	76,7	84,5	78,6	92,9	106,3
Estonia	0	0	3	2	4	3	8	7	6	0,0	0,0	2,2	1,5	3,0	2,2	6,0	5,2	4,5
Finland	272	265	754	883	758	817	661	679	587	53,3	51,1	143,7	167,7	143,3	153,8	123,8	126,6	109,0
France	3 466	2 111	3 738	4 499	3 980	4 801	4 029	4 540	4 799	58,4	34,8	59,4	71,0	62,4	74,9	62,5	70,0	73,6
Ireland	43	41	118	121	127	123	144	154	180	12,0	10,8	28,4	28,4	29,1	27,7	32,2	34,4	40,1
Italy	1 267	917	1 864	2 314	1 966	2 254	1 992	2 286	2 289	22,3	16,1	31,8	39,3	33,1	37,7	33,1	37,8	37,7
Cyprus	3	9	7	16	13	15	24	18	21	4,6	12,3	9,3	20,9	16,7	19,0	30,1	22,4	26,1
Lithuania	0	0	1	0	1	2	0	1	3	0,0	0,0	0,3	0,0	0,3	0,6	0,0	0,3	0,9
Latvia	0	0	0	2	3	3	2	8	11	0,0	0,0	0,0	0,9	1,3	1,3	0,9	3,6	4,9
Luxebourg	42	34	76	69	87	104	86	132	161	102,8	76,8	163,5	146,1	181,3	213,1	172,9	260,7	310,8
Hungary	42	14	32	34	34	48	38	58	46	4,1	1,4	3,2	3,4	3,4	4,8	3,8	5,8	4,6
Malta	0	1	3	6	6	10	12	18	25	0,0	2,6	7,5	14,8	14,7	24,4	29,0	43,4	59,9
Germany	8 766	5 390	12 487	14 275	11 929	13 496	11 375	12 552	13 583	107,4	65,6	151,4	173,3	145,0	164,3	138,9	153,5	166,1
Netherlands	1 387	967	1 521	1 921	1 831	1 941	1 596	1 725	1 818	89,7	60,7	93,2	117,6	111,8	118,1	96,6	103,8	108,9
Poland	3	7	15	17	27	26	33	44	45	0,1	0,2	0,4	0,4	0,7	0,7	0,9	1,2	1,2
Portugal	3	14	22	19	22	26	24	29	26	0,3	1,4	2,1	1,8	2,1	2,4	2,3	2,7	2,4
Austria	435	230	533	654	518	624	576	668	737	54,8	28,7	64,8	79,1	62,4	74,9	68,9	79,6	87,5
Romania	0	1	5	0	4	7	4	3	2	0,0	0,0	0,2	0,0	0,2	0,3	0,2	0,1	0,1
Greece	7	6	15	31	15	28	24	16	29	0,7	0,5	1,4	2,8	1,3	2,5	2,1	1,4	2,6
Slovakia	0	3	10	8	9	7	9	12	3	0,0	0,5	1,9	1,5	1,7	1,3	1,7	2,2	0,6
Slovenia	4	3	24	21	17	33	28	33	42	2,0	1,5	12,0	10,5	8,4	16,3	13,7	16,1	20,5
UK	1 847	1 320	2 144	2 241	1 900	1 969	1 647	1 851	1 948	31,8	22,4	35,6	37,0	31,2	32,1	26,7	29,7	31,1
Spain	116	126	319	361	331	416	349	392	381	3,0	3,1	7,4	8,2	7,4	9,1	7,6	8,5	8,3
Sweden	630	565	1 345	1 498	1 489	1 581	1 302	1 462	1 491	71,4	63,7	148,9	165,0	162,8	171,5	140,0	155,9	157,9
EU27 total	**18 851**	**12 529**	**25 958**	**30 087**	**26 056**	**29 441**	**25 026**	**27 894**	**29 590**	**39,5**	**26,0**	**52,7**	**60,9**	**52,5**	**59,1**	**50,0**	**55,6**	**58,8**
Australia	157	129	245	302	300	336	240	295	308	8,6	6,7	11,9	14,5	14,1	15,5	10,8	13,1	13,4
Chile	2	1	4	4	3	4	5	6	3	0,1	0,1	0,2	0,2	0,2	0,2	0,3	0,4	0,2
Iceland	1	2	18	7	11	13	10	6	22	3,7	5,3	60,8	23,0	35,3	40,7	31,3	18,9	69,0
Israel	92	80	224	258	192	299	228	279	282	16,6	12,7	32,2	36,4	26,6	40,7	30,5	36,6	36,5
Japan	9 888	5 503	9 549	12 044	10 651	10 915	9 436	10 587	11 649	78,7	43,4	74,7	94,3	83,4	85,5	74,0	82,7	90,6
Canada	320	277	630	791	770	768	666	730	738	10,9	9,0	19,5	24,3	23,4	23,1	19,8	21,4	21,4
Korea	44	166	486	787	858	1 201	1 095	1 390	1 427	1,0	3,5	10,1	16,3	17,7	24,7	22,5	28,4	29,1
Mexico	3	2	8	12	9	7	12	7	24	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,2
Norway	99	117	221	221	177	163	142	183	194	22,7	26,1	47,8	47,4	37,6	34,2	29,4	37,4	39,2
New Zealand	13	21	40	49	40	46	34	38	46	3,5	5,4	9,6	11,7	9,4	10,7	7,8	8,7	10,4
USA	10 298	7 450	13 004	14 833	12 505	12 730	11 347	12 512	13 382	38,6	26,4	43,9	49,6	41,4	41,8	36,9	40,3	42,8
Switzerland	1 549	987	1 920	2 216	1 985	2 421	2 221	2 389	2 531	218,7	136,9	256,0	293,2	260,5	314,0	284,7	306,8	322,6
Turkey	1	3	20	31	39	49	59	89	95	0,0	0,0	0,3	0,4	0,6	0,7	0,8	1,2	1,3
OECD	**41 312**	**27 253**	**52 306**	**61 614**	**53 563**	**58 352**	**50 474**	**56 354**	**60 221**	**37,7**	**24,0**	**44,5**	**52,0**	**44,3**	**47,9**	**41,2**	**45,7**	**48,3**
China	13	11	80	115	136	270	351	431	515	0,0	0,0	0,1	0,1	0,1	0,2	0,3	0,3	0,4
Brazil	14	13	50	61	43	57	43	47	52	0,1	0,1	0,3	0,3	0,2	0,3	0,2	0,2	0,3
India	7	7	76	106	113	126	124	121	117	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1
SAR	36	27	55	59	58	53	49	53	53	0,9	0,6	1,1	1,2	1,2	1,1	1,0	1,0	1,0
Russia	23	24	25	34	34	43	58	69	40	0,2	0,2	0,2	0,2	0,2	0,3	0,4	0,5	0,3
other countries	*457*	*178*	*642*	*760*	*720*	*859*	*811*	*993*	*1 044*									

Source: CZSO according to EPO and own calculations

Tab. D.2 Innovating enterprises in the Czech Republic by innovation type, 2008–2010

	Product innovation		Process innovation		Marketing innovation		Organizational innovation
	amount	%*	amount	%*	amount	%*	amount
CZ total	**4 960**	**24,1%**	**4 704**	**22,9%**	**6 092**	**29,6%**	**6 354**
by company ownership							
domestic	3 524	22,7%	3 186	20,5%	4 623	29,8%	4 243
foreign-controlled	1 436	28,6%	1 518	30,3%	1 469	29,3%	2 111
by size							
small /10-49 /	3 029	19,5%	2 861	18,5%	4 294	27,7%	4 123
medium /50-249 /	1 362	34,2%	1 274	32,0%	1 348	33,9%	1 589
large /250+/	569	52,6%	569	52,6%	449	41,5%	643
podle CZ-NACE							
Průmysl celkem	**3 386**	**27,5%**	**3 031**	**24,6%**	**3 599**	**29,2%**	**3 730**
podle velikosti podniku							
small /10-49 /	*1 817*	*21,0%*	*1 588*	*18,4%*	*2 291*	*26,5%*	*2 078*
medium /50-249 /	*1 109*	*38,6%*	*986*	*34,3%*	*976*	*34,0%*	*1 164*
large /250+/	*460*	*56,7%*	*456*	*56,3%*	*333*	*41,1%*	*487*
B Mining	21	16,0%	26	19,7%	28	21,2%	27
C Manufacturing industry	3 266	28,5%	2 851	24,9%	3 416	29,8%	3 490
D Production and distribution of electricity, gas, heat and air conditioning	43	16,8%	55	21,5%	52	20,5%	72
E Water supply, activities related to waste water and sewage	57	11,6%	99	20,1%	103	21,0%	141
Services total	**1 574**	**19,1%**	**1 673**	**20,4%**	**2 492**	**30,3%**	**2 625**
podle velikosti podniku							
small /10-49 /	*1 211*	*17,7%*	*1 273*	*18,6%*	*2 004*	*29,3%*	*2 044*
medium /50-249 /	*253*	*22,9%*	*288*	*26,1%*	*372*	*33,7%*	*425*
large /250+/	*109*	*40,3%*	*113*	*41,6%*	*116*	*42,9%*	*156*
G 46 Wholesale excl. vehicles	651	17,3%	759	20,1%	1 359	36,1%	1 153
H Transport and storage	149	7,4%	282	14,0%	363	18,0%	520
J Information and communication activities (section 58, 61–63)	520	46,7%	363	32,6%	454	40,8%	519
K Finances and insurance	119	37,2%	116	36,0%	126	39,3%	163
M 71 Architectural and construction, technical tests and analyses	135	13,4%	155	15,5%	190	18,9%	269
by regions NUTS3							
Praha	1 212	*28,3%*	1 075	25,1%	1 364	31,8%	1 378
Středočeský	425	*24,7%*	446	25,9%	507	29,5%	497
Jihočeský	249	*19,5%*	262	20,6%	284	22,3%	355
Plzeňský	203	*18,6%*	195	17,9%	266	24,5%	345
Karlovarský	103	*19,2%*	122	22,9%	151	28,3%	166
Ústecký	226	*21,4%*	192	18,1%	304	28,8%	354
Liberecký	179	*22,9%*	233	29,8%	231	29,5%	241
Královéhradecký	269	*26,2%*	211	20,6%	342	33,4%	300
Pardubický	235	*26,8%*	230	26,2%	261	29,8%	305
Vysočina	267	*25,8%*	214	20,6%	306	29,5%	327
Jihomoravský	595	*22,7%*	635	24,3%	886	33,9%	785
Olomoucký	243	*21,6%*	260	23,2%	238	21,2%	280
Zlínský	344	*26,0%*	241	18,2%	375	28,4%	420
Moravskoslezský	412	*22,7%*	389	21,5%	577	31,8%	601

*share in the total number of businesses in a given group

Tab. D.16 Enterprises with innovation activities* (product, process, marketing, organizational), 2006 - 2008

NACE rev. 2	Total**				share in manufacturing industry			
Country/size group	**Total**	Small	Medium	Large	**Total**	Small	Medium	Large
EU-27	**51,6%**	47,7%	63,7%	78,8%	**54,5%**	49,7%	..	..
Belgium	**58,1%**	54,0%	71,9%	83,8%	**63,0%**	57,4%	77,2%	88,4%
Bulgaria	**30,8%**	25,5%	44,6%	69,1%	**37,2%**	30,6%	50,8%	75,0%
Czech Republic	**56,0%**	52,3%	63,5%	80,7%	**56,4%**	50,0%	67,0%	83,1%
Denmark	**51,9%**	47,9%	60,6%	80,2%	**53,0%**	46,7%	65,6%	86,5%
Germanu	**79,9%**	77,7%	84,2%	94,6%	**86,3%**	84,2%	89,9%	97,2%
Estonia	**56,4%**	51,0%	73,6%	91,0%	**59,8%**	51,5%	78,2%	95,7%
Ireland	**56,5%**	52,0%	72,8%	83,8%	**62,2%**	55,1%	78,5%	88,7%
Spain	**43,5%**	40,1%	59,1%	78,3%	**44,7%**	39,8%	67,5%	89,2%
France	**50,2%**	45,0%	66,5%	81,8%	**53,0%**	46,3%	71,4%	87,1%
Italy	**53,2%**	50,2%	71,7%	81,9%	**56,0%**	52,6%	77,2%	88,9%
Cyprus	**56,2%**	52,5%	71,4%	80,6%	**62,9%**	60,3%	78,2%	80,0%
Latvia	**24,3%**	19,9%	38,9%	73,2%	**30,9%**	25,6%	43,1%	76,2%
Lithuania	**30,3%**	25,1%	41,7%	70,9%	**30,2%**	23,7%	39,9%	70,4%
Luxembourg	**64,7%**	59,8%	73,6%	88,7%	**63,6%**	52,9%	..	..
Hungary	**28,9%**	24,5%	39,6%	67,1%	**28,4%**	23,1%	38,2%	65,0%
Malta	**37,4%**	31,3%	62,4%	74,1%	**45,2%**	37,0%	71,4%	76,9%
Netherlands	**44,9%**	40,2%	59,9%	77,9%	**50,2%**	43,0%	69,4%	81,2%
Austria	**56,2%**	50,9%	70,2%	86,4%	**59,4%**	50,7%	77,2%	94,2%
Poland	**27,9%**	22,4%	40,0%	66,7%	**29,2%**	22,5%	41,2%	68,7%
Portugal	**57,8%**	54,6%	69,2%	89,6%	**54,1%**	50,2%	67,6%	90,1%
Romania	**33,3%**	29,8%	40,8%	58,9%	**35,0%**	30,9%	41,8%	59,9%
Slovenia	**50,3%**	44,5%	63,4%	89,2%	**54,6%**	46,6%	67,7%	93,2%
Slovakia	**36,1%**	31,5%	48,7%	67,5%	**37,3%**	31,0%	47,9%	66,3%
Finland	**52,2%**	47,7%	63,6%	80,7%	**57,1%**	51,2%	68,2%	87,4%
Sweden	**53,7%**	49,2%	67,4%	85,2%	**57,9%**	51,5%	73,5%	91,7%
UK	**45,6%**	43,0%	54,9%	58,3%	**49,5%**	45,2%	61,3%	64,8%
Norway	**49,2%**	44,6%	63,7%	72,8%	**51,5%**	43,7%	74,7%	87,2%
Croatia	**44,2%**	39,4%	57,3%	78,7%	**47,3%**	42,2%	57,2%	78,7%

*share in total number of businesses in a given group

**Companies with 10+ employees in key areas for innovation(NACE sections: B, C, D, E, G46, H, J58, J61, J62, J63, K, M71)

Source: Eurostat (STI database)

Tab. D.33 Total Czech high-tech export

	SITC Rev. 3									SITC Rev. 3.1					SITC rev. 4				
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
total	**23 020**	**26 822**	**35 048**	**39 055**	**45 767**	**53 763**	**60 130**	**88 261**	**115 129**	**154 811**	**169 587**	**206 866**	**219 612**	**276 317**	**378 381**	**388 725**	**353 595**	**437 055**	**490 959**
Share in total Czech export	***5,5%***	***5,8%***	***6,2%***	***6,5%***	***6,5%***	***6,4%***	***6,6%***	***7,9%***	***9,1%***	***12,3%***	***12,4%***	***12,0%***	***11,8%***	***12,9%***	***15,3%***	***15,7%***	***16,5%***	***17,3%***	***17,1%***
by country																			
Belgium	878	121	218	225	351	445	532	1 568	10 569	3 910	2 329	2 490	4 037	5 894	9 804	10 035	7 576	8 506	9 015
Bulgaria	97	70	109	134	103	169	249	227	140	158	258	430	793	712	1 236	1 355	1 137	1 188	1 534
Denmark	63	56	134	134	60	75	161	183	474	682	812	859	1 920	2 739	4 028	3 720	3 662	4 636	4 958
Estonia	103	7	152	8	16	97	23	23	65	48	39	155	212	386	906	338	215	252	337
Finland	25	47	102	96	126	181	269	622	908	559	1 010	872	1 310	1 650	1 741	1 788	1 695	2 248	2 903
France	995	1 450	2 009	3 115	4 277	4 415	5 009	6 972	8 040	9 173	11 154	11 191	17 486	21 438	23 729	24 545	21 839	24 169	31 864
Ireland	28	85	216	207	150	305	341	1 756	5 613	4 774	3 165	2 689	3 615	3 750	2 823	1 324	1 096	1 051	2 029
Italy	468	542	797	1 025	1 229	1 591	1 570	2 383	3 064	7 659	11 557	11 468	9 903	11 368	16 497	17 575	14 300	15 607	15 208
Cyprus	16	4	11	3	37	165	14	5	14	28	27	42	120	187	205	193	370	836	406
Lithuania	65	67	73	145	137	150	86	272	139	122	145	280	358	684	974	870	532	765	1 242
Latvia	9	20	42	13	47	424	31	124	62	94	70	87	86	305	359	355	205	310	412
Luxembourg	8	9	36	19	18	46	15	34	167	206	628	569	106	124	97	94	184	257	369
Hungary	146	199	249	395	701	362	403	616	901	7 374	3 296	4 429	5 690	10 555	13 566	6 753	3 764	5 117	6 127
Malta	0	3	2	6	6	4	6	11	40	45	30	165	25	26	147	138	124	190	319
Germany	5 957	6 314	9 358	9 083	11 040	16 097	17 405	22 502	24 417	29 710	34 662	59 314	48 283	59 803	81 749	95 198	92 536	139 413	162 776
Netherlands	637	706	846	921	989	2 521	2 584	2 750	8 717	22 899	27 387	31 367	24 630	28 578	43 068	46 477	41 303	41 199	37 217
Poland	341	563	1 299	703	905	1 036	1 097	1 507	1 332	1 389	1 195	3 423	5 562	6 530	11 470	13 006	10 470	12 898	15 224
Portugal	10	13	23	26	35	39	34	52	105	210	239	391	1 207	1 431	1 809	1 874	1 967	2 014	2 625
Austria	660	968	1 090	939	848	1 156	1 144	1 253	1 643	1 963	4 423	6 492	5 382	8 970	12 117	11 994	10 440	14 290	14 844
Romania	7	29	45	41	93	79	97	110	132	178	258	683	1 384	2 279	3 065	2 771	1 919	2 131	2 689
Greece	26	54	42	126	131	84	55	60	73	502	1 325	837	709	1 315	886	1 378	1 203	1 409	1 539
Slovakia	4 727	4 420	4 459	4 986	5 850	5 280	4 350	5 188	5 669	5 070	6 145	9 658	12 162	13 131	16 889	16 668	15 950	17 267	20 270
Slovenia	28	85	44	119	86	79	230	195	226	117	157	428	779	666	828	975	806	935	1 005
UK	1 818	2 288	3 336	2 638	4 442	5 421	6 840	13 618	17 462	20 514	23 579	13 002	13 919	21 264	33 184	34 699	30 479	35 570	33 473
Spain	221	171	197	213	490	635	484	515	983	2 605	2 678	5 883	8 386	11 469	14 535	14 106	9 326	9 891	9 801
Sweden	88	108	181	116	208	511	840	1 203	1 156	1 798	1 203	1 116	3 954	5 757	9 928	10 908	10 305	11 298	12 602
EU27 total	17 422	18 397	25 069	25 433	32 373	41 366	43 871	63 750	92 113	121 788	137 768	168 321	172 018	221 012	305 639	319 135	283 403	353 448	390 788
Australia	14	29	89	88	61	28	55	77	68	235	75	166	248	655	754	990	269	279	361
Chile	4	15	7	8	18	9	4	6	16	5	12	4	16	22	94	45	56	133	65
Iceland	0	1	1	1	1	1	3	11	3	137	3	49	49	103	323	52	31	77	113
Israel	29	202	45	35	42	44	83	70	87	381	183	536	2 152	3 810	4 192	2 654	1 698	2 551	2 818
Japan	40	96	214	191	155	248	241	1 267	1 007	777	449	401	500	595	852	758	671	751	1 193
Canada	194	203	265	236	404	569	393	605	435	310	405	541	666	1 384	624	869	641	324	620
Korea	10	44	83	85	313	89	143	876	774	272	142	207	196	386	530	439	716	679	1 293
Mexico	29	6	4	3	36	61	75	71	76	113	102	169	201	826	647	618	637	885	781
Norway	30	41	50	67	71	123	160	131	307	1 010	888	964	884	1 373	2 028	1 511	1 695	2 320	2 703
New Zealand	4	8	3	2	7	17	41	32	19	51	28	51	22	40	112	95	41	39	39
USA	653	1 240	2 491	2 874	3 710	3 507	4 554	6 018	7 313	9 373	9 779	9 973	12 088	11 499	10 996	10 094	8 390	9 735	11 712
Switzerland	279	327	381	403	396	394	518	658	2 310	3 922	4 300	3 296	3 847	5 227	7 423	8 776	8 548	11 205	13 707
Turkey	135	141	343	305	267	177	116	350	209	376	375	888	1 278	1 601	2 649	2 421	5 799	3 327	3 278
OECD	16 830	18 269	25 426	26 752	32 991	40 223	42 932	59 555	86 747	117 609	130 144	170 878	177 482	223 075	297 693	308 075	277 826	344 763	389 396
China	145	215	323	199	174	163	283	242	354	1 492	1 338	841	1 465	2 116	3 792	2 762	3 344	4 679	6 124
Brazil	36	94	72	79	109	108	139	240	181	305	229	128	256	323	347	542	436	619	732
India	127	106	128	226	411	153	282	300	179	284	131	291	438	616	1 013	953	964	694	1 210
SAR	36	25	207	3 097	92	143	60	37	66	413	205	484	1 724	2 344	3 381	1 838	1 882	2 366	2 499
Russia	677	1 066	840	571	2 349	1 360	1 825	1 896	1 587	1 852	2 202	3 263	5 261	5 866	7 398	9 159	8 664	15 296	17 920
Egypt	1 993	1 980	294	44	139	80	165	84	41	92	66	178	210	187	401	570	511	1 119	555
Phillipines	2	8	14	26	37	42	72	84	59	72	369	410	946	1 118	1 153	969	760	1 246	1 236
Hongkong	22	86	247	133	136	558	1 014	1 074	1 123	1 533	1 966	2 690	2 411	2 379	2 517	2 109	3 204	3 396	4 454
Croatia	23	34	74	86	122	125	108	91	111	169	138	385	611	824	1 042	864	894	1 547	1 203
Saudi Arabia	2	4	1	4	11	18	4	12	12	31	10	279	256	75	550	1 145	1 433	1 479	1 877
Singapore	10	74	882	1 340	1 773	2 165	2 996	4 475	2 373	2 111	2 782	3 043	1 485	1 712	1 794	1 293	530	625	1 228
UAE	43	4	44	5	30	37	17	95	149	1 938	504	1 140	1 641	1 489	1 837	2 663	2 606	3 676	4 329
Serbia	4	7	7	35	49	67	19	41	68	90	166	310	237	385	3 189	2 143	437	677	904
Thailand	294	939	59	207	189	60	52	73	147	705	85	1 836	229	466	318	282	373	379	539
Ukraine	121	303	371	793	943	516	171	313	425	570	966	2 382	3 687	3 511	3 593	2 785	1 688	3 103	4 969
not specified	46	121	209	495	84	35	4	7	0	228	1 078	93	15	3	2	1 611	20	12	309
others	596	1 007	2 231	1 983	1 263	1 498	2 664	5 276	3 515	4 179	2 841	3 548	4 574	4 372	9 190	8 583	13 255	10 388	11 403

Source: CZSO, foreign trade database statistics

E.1: Participation in FP7 - international comparison

* data as of 19.6.2012

	Number of participations	Success rate (%)	Relative activity	Relative activity (teams / 1000 FTE R&D employees)	Number of projects	EU contribution (mil. Eur)	Share of participant's own funds (%)	Contribution per 1 mld. GERD (mil. EUR)	Financial success rate (%)	Partcipation of teams by sector					EU contribution by sectors (mil. Eur)					Specific programmme IDEAS (ERC)	
										Univeristy	Research	Private	Other	Public	Univeristy	Research	Private	Other	Public	Number of participations	EU contribution (mil. Eur)
Belgium	3357	27	1422,0	411,2	2265	1022,8	31,5	30,9	25,0	1098	740	909	478	132	423,7	257,6	229,1	89,5	22,8	94	118,5
Bulgaria	510	17	436,1	288,8	383	64,5	29,0	78,0	11,4	151	167	122	29	41	22,3	19,3	17,0	2,7	3,1	3	2,7
Czech Republic	940	21	473,8	171,1	768	176,9	36,1	17,2	17,2	297	277	277	55	34	59,0	53,9	53,8	5,4	4,8	10	11,4
Denmark	1631	24	1414,9	227,5	1245	594,0	34,6	18,5	24,6	853	193	416	38	131	341,2	57,4	141,2	10,3	43,8	49	69,5
Estonia	344	22	1302,8	435,3	295	55,2	31,0	57,3	16,2	114	49	104	57	20	22,3	7,8	15,2	6,7	3,2	2	2,0
Finland	1687	23	1554,4	204,7	1163	557,9	39,1	17,1	21,2	617	559	381	55	75	229,0	207,9	97,9	15,0	8,0	48	73,5
France	7869	26	525,6	148,8	4551	3089,8	35,4	15,1	27,3	1312	3326	2682	269	280	438,4	1570,6	813,0	215,9	51,8	365	514,3
Ireland	1142	23	1349,5	426,1	882	360,4	28,0	28,0	20,7	641	100	324	25	52	233,1	23,9	86,6	4,7	12,2	26	32,4
Italy	7388	19	734,1	440,2	3975	2198,2	36,6	23,7	16,7	2444	2086	2437	137	284	788,2	684,3	648,5	24,2	53,1	208	240,4
Cyprus	298	16	2429,8	2339,8	255	54,6	28,9	145,5	11,7	124	14	101	38	21	29,6	1,7	19,4	1,8	2,2	5	6,7
Lithuania	279	21	480,1	188,0	220	33,5	34,6	29,9	15,8	123	45	56	7	48	14,3	4,3	10,3	0,8	3,8	0	0,0
Latvia	221	23	469,9	257,7	157	21,6	26,7	37,4	13,2	101	66	20	7	27	12,3	4,5	3,0	0,5	1,4	0	0,0
Luxembourg	134	20	1364,7	289,1	123	33,3	22,6	10,9	14,2	18	20	65	15	16	5,8	3,8	13,5	2,1	8,1	0	0,0
Hungary	1070	21	565,2	293,0	841	188,4	23,6	36,7	15,2	409	261	276	22	102	68,1	55,3	47,3	2,2	15,4	29	36,0
Malta	125	20	1736,7	1359,8	110	10,7	24,7	64,8	10,9	25	6	38	3	53	2,2	0,7	4,5	0,2	3,1	0	0,0
Germany	11141	24	623,5	165,2	5495	4323,2	35,5	13,4	25,8	3863	3211	3616	150	301	1620,6	1461,8	1137,1	31,3	72,4	402	601,1
Netherlands	4736	26	1272,3	419,1	3131	1811,5	28,2	34,7	24,7	2071	1132	1248	118	167	987,1	447,2	309,9	36,2	31,2	230	333,8
Poland	1504	19	235,4	144,4	1177	286,6	32,8	28,2	13,3	592	453	354	14	91	118,0	93,5	62,0	2,0	11,1	17	15,7
Portugal	1355	20	758,5	202,8	1010	298,5	34,4	25,6	16,4	397	452	364	66	76	83,9	121,4	72,0	7,6	13,7	17	26,6
Austria	2153	22	1291,5	315,8	1550	709,6	28,9	19,7	21,8	832	478	658	59	126	319,9	154,9	201,4	8,1	25,3	80	116,0
Romania	708	15	247,9	275,6	575	96,0	34,5	31,6	9,5	195	214	197	21	81	30,3	30,2	25,3	1,6	8,7	1	0,4
Greece	2382	17	1403,0	751,7	1632	656,2	31,1	NA	14,1	765	884	631	43	59	221,1	275,2	150,4	4,7	4,7	26	37,2
Slovakia	344	19	358,4	145,1	275	46,9	34,8	31,4	14,0	114	83	100	14	33	16,0	11,7	16,0	1,0	2,2	0	0,0
Slovenia	589	16	1972,0	564,3	487	103,1	33,5	34,3	12,4	171	176	146	16	80	30,2	35,7	28,4	1,6	7,2	2	0,6
Spain	6341	20	793,0	277,4	3820	1828,5	35,4	26,5	19,2	1597	2228	1964	182	370	460,3	725,2	530,6	31,1	81,3	172	227,8
Sweden	2782	24	1419,2	274,8	1975	1018,0	32,1	17,6	20,0	1500	366	700	37	179	659,7	121,6	201,4	4,5	30,8	108	176,2
UK	10527	24	820,2	202,9	6306	3968,7	25,9	24,5	22,2	6446	1116	2451	180	334	2792,5	384,7	677,3	32,0	82,2	637	905,0