

# 2006-2007

## The Competitiveness Yearbook Czech Republic

Centre for Economic Studies – University of Economics and Management  
National Observatory of Employment and Training – National Training Fund

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et al.**



**ANALYSIS**



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CZECH REPUBLIC  
2006-2007**

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## Introduction

The Competitiveness Yearbook of the Czech Republic has been published by two research teams – Centre for Economic Studies and National Observatory of Employment and Training. The yearbook comprises a broad range of indicators enabling a comprehensive assessment of the Czech Republic position within the enlarged EU in terms of five pillars: institutional quality, structural competitiveness, innovation performance, and human resources quality, within the framework of macroeconomic stability and performance.

### Growth performance and stability

The first part is divided into three chapters. The first deals with growth performance, its main sources and the real convergence to the EU average. The second chapter examines the changes on the demand side and macroeconomic stability, analyzed in terms of national saving and domestic investment with impact on external balance. The third chapter covers the nominal convergence in terms of closing gaps in comparative price and wage levels.

**Growth and supply side of the economy** (Vojtěch Spěvák, Růžena Vintrová, Mojmir Hájek, Václav Žďárek): The factors are presented which led to the acceleration of economic growth in 2001-2006. Growth is measured both with the traditional indicator of GDP and alternative indicators of real income (reflecting the effects of terms of trade and income flows with the rest of the world). The process of real convergence (quite rapid in 2001-2006) is measured in terms of GDP per capita in PPS. The analysis of growth factors on the supply side takes into account the growth of labour, capital and total factor productivity and shows that the growth of the Czech economy was predominantly caused by the growth of total factor productivity.

**Demand side and macroeconomic balance** (Vojtěch Spěvák, Eva Zamrazilová): On the demand side the structural changes are analyzed together with the contribution of demand components to GDP growth. A positive change can be seen in the contribution of foreign trade. Special attention is given to private consumption and main factors which determined its development. The evaluation of macroeconomic stability is based on the relationship of domestic supply and demand and on the relation of national saving and domestic investment. The gap between investment and saving indicates potential danger due to the decline of saving rates of households and falling savings of government sector. External balance is increasingly influenced by foreign direct investment and the role of companies under foreign control.

**Nominal convergence** (Václav Žďárek, Růžena Vintrová): Nominal convergence is reflected in the closing gaps in comparative price and wage levels. The comparative price levels converge through two transmission channels: by inflation differential and through the nominal exchange rate appreciation. The second channel will disappear after the adoption of common currency. In this case certain danger of acceleration of inflation exists. The price level in the Czech Republic is substantially lower than in the countries with similar economic level. However, the increase of comparative price level in the Czech Republic was relatively steep in the last ten years. The chapter also analyses relative price levels in different commodity

groups with special attention given to the tradables vs. non-tradables.

### Institutional quality

The third part of the analysis is divided into two major chapters. The first is assessing quality of governance and the second one concerns conditions of doing business. Institutional quality is measured with public expenditures and competitiveness indices. Evaluation includes wide range of characteristics and results are measured in relation with other economic and institutional indicators as tax burden, index of economic freedom or corruption.

**Quality of governance** (Milan Žák): Assessing and measuring governance quality is based on the data published in the World Bank project Governance Matters together with other, more specific resources. Aggregate governance quality index is based on the evaluation of voice and accountability, political instability and violence, government effectiveness, regulatory quality, rule of law and control of corruption. Specific attention is given to the measurement and evaluation of compliance with so called five principles of good regulation, and to the implementation of the related programme measures in public service in the Czech Republic (making use of EU and OECD methodology SIGMA). Specific problem of institutional quality in the new EU members includes the corruption control. The chapter also covers dynamics of institutional changes in the new EU members.

**Doing business** (Václav Šmejkal): The chapter presents results of World Bank survey undertaken within the project Doing Business, with special regard to the Czech Republic position. Doing business conditions are assessed in terms of regulation burden and its impacts on entrepreneurship and related indicators of tax burden and corruption. The evaluation includes ten key indicators (further divided into partial aspects): starting and closing a business, dealing with licenses, hiring and firing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts. The paper includes specific problems of the Czech Republic legislation, and related changes directed to their improvement. Specific attention is given to the opinions of Czech entrepreneurs collected in the field survey.

### Structural competitiveness

This part is divided into three chapters. The first assesses the position of the Czech Republic with comprehensive indicators of micro and macro competitiveness. Furthermore, two structural aspects (industrial and regional) are applied to evaluate the performance and qualitative characteristics of the selected industrial groups of manufacturing and services and regions in the Czech Republic.

**Comprehensive assessment of competitiveness** (Anna Kadeřábková, Michal Beneš): Complex approach to the competitiveness makes at first use of the structural indicators for monitoring the Lisbon Strategy achievements. The second approach is based on the methodology of the World Bank with an emphasis on the knowledge economy pillars in a sound institutional framework (knowledge assessment matrix). Specific accent is put on the position of the Czech Republic within European Innovation Scoreboard and its key components, though the explanatory value of the composite indicator remains rather limited,

especially in the new EU members. Finally, the results published by WEF and IMD are used for the competitiveness assessment. More specifically, the position of the Czech Republic is compared in with Finland.

**Industrial competitiveness** (Marek Rojíček): Analysis ranks industries in terms of a wide range of indicators, both performance and quality-based, such as productivity level and its growth, R&D intensity, share of qualified employees, export share, share of gross value added in foreign-controlled enterprises, output multiplier (indicating the intensity of industry linkages within the economy). Comparison is made by individual characteristics and average position in overall indicator of industrial competitiveness. Key competitiveness factors are enlisted in each industry, where manufacturing is explored in more detail. The key role is played by car industry with relatively favourable knowledge characteristics. Besides the level of individual industries, the analysis also includes groupings in terms of technology and knowledge intensity (though its actual level remains low in the Czech Republic).

**Regional competitiveness** (Jaroslav Kahoun): Regional competitiveness is measured at level NUTS3 (there are 14 of them in the Czech Republic). Included variables are divided into the categories of economic performance, innovation performance and quality of life. Special emphasis is put on technology intensive industries and research and development inputs, foreign direct investment inflows per capita, and labour market duality characteristics. Attention is given both to the achieved level in the individual categories and their changes in time to identify regions which are catching-up, stagnating, falling behind and further improving their position.

### Innovation performance

The fourth part is divided into three chapters. The first evaluates the inputs and outputs of innovation performance according to the main sectors of the national innovation system. The second chapter focuses on the characteristics of the business innovation performance and its effects and barriers. The third chapter evaluates the characteristics of the business IT development in the Czech Republic in the context of global trends in information society.

**Inputs and outputs of innovation performance** (Anna Kadeřábková, Michal Beneš, Karel Muller): The evaluation is based on the concept of national innovation system according to its inputs, specific infrastructural pre-conditions and outputs (scientific and technical performance). The analysis of inputs includes the characteristics national research and development system, describes the dynamics and structural changes of research and development sectors and specific problems of their internal structuration and mutual interfaces. The scope of inputs covers also broader factors influencing innovation performance, like the availability of the highly qualified experts, the level of scientific and technological activities, level and growth rate of government expenditures, cooperation between universities with companies, availability of venture capital.

**Business innovation performance** (Michal Beneš, Michal Pazour): The chapter evaluates the key aspects of innovation performance of Czech enterprises, particularly using the results of latest Community Innovation Survey (2003-2005). The types of innovation (including non-technical), innovation activities, their effects and hampering factors are studied more thoroughly. The attention is also given to the

extent and type of cooperation in the innovation process and the significance of alternative information sources. The more complex view on the innovation inputs and outputs evaluates the structure of employees in terms of the prevailing learning models and their impact on the innovation mode. The analysis finishes with references to specific conceptual and methodological problems of statistical surveying and measurement of innovation.

**Information society and business informatics** (Josef Basl, Josef Pour): The chapter deals with the quality of informatics at three levels – at the level of the society, at the level of the ICT market in the Czech Republic and the level of informatics in firms. International comparison points out the key characteristics of the achieved level of information society, for example accessibility of the internet to firms and individuals, using of e-business and e-government applications, etc. The second part evaluates the current situation and the expected development of the ICT market in the Czech Republic. It analyses only the supply side of information applications and all sorts of related services. The evaluation is based on ad hoc survey undertaken among the company and ICT managers. The last part deals with the quality of business informatics and its influence on competitiveness. The effects of business informatics are discussed and evaluated through the filed opinion survey.

### Quality of human resources

This part is divided down into two chapters. The first chapter deals with lifelong learning. Adult participation in education is assessed, the barriers to participation are identified and training in enterprises is analysed. The second chapter focuses on human resources for knowledge-based economy. The attention is paid to employment structure, wage differentiation in the relation to qualification and to the globalisation of tertiary education.

**Lifelong learning** (Věra Czesaná, Olga Kofroňová, Zdeňka Matoušková): The first part of this chapter focuses on the adult participation in education in relation to their labour market positions, gender and occupation, the position of CR in the frame of EU-27 is assessed. The second part on the base of adult population survey identifies the most important reasons why the population do not participate in continuing education. These reasons are investigated according to the age, education, profession, place of residence and the income level. The third part analyses the willingness of firms located in the individual EU-27 countries to invest into employee training. The influence of a shortage of qualified employees on companies' innovating activities and innovating companies' approach to human resources development is also searched.

**Human resources for knowledge economy** (Věra Czesaná, Věra Havlíčková, Zdeňka Matoušková): The chapter is divided into three parts. The first one deals with the employment in qualification demanded occupation and in qualification-intensive sectors. Second part includes the analysis of wage differentiations among educational group and inside these groups. Average earning in high-tech manufacturing industry is compared with average earnings in manufacturing as a whole. The same approach is applied for knowledge intensive service sector. The third part aims at the analysis of mobility of students in the EU and focuses specifically on foreign students studying in the CR and Czech citizens studying abroad. The teaching professional' opinions on including the student mobility as an obligatory part of curricula are contained, too.

## **Growth performance and stability**



## 1. Growth and supply-side economics

The chapter assesses the growth potential of the Czech economy in international context for the period 2001–2006, using alternative indicators, as well as the real convergence process in comparison to the EU economic level. A distinction has been made between the influence of real GDP growth and the influence of improvement of the terms of trade in foreign trade on real convergence. In respect to the supply side, the contribution of basic sectors towards the GDP growth has been identified, as well as, using the growth accounting method, the importance of labour, capital and total factor productivity.

### 1.1 International economic development

After the slow-down in 2001 and 2002, the GDP dynamics of the world economy have increased significantly, reaching 5% on average over the last 5 years (it is the strongest expansion since the 70's). So far, the slow-down of the American economy has been compensated by high dynamics of the Asian region (China, India), oil-exporting countries (OPEC and Russia) as well as developing countries. However, the International Monetary Fund (IMF) has predicted that GDP will slightly slow down to 4.9% in 2007 and 2008. There are significant differences in economic performances between regions (USA, Europe or Asian countries), as well as possible threats (the real-estate and mortgage crisis in the USA, growth of oil prices, increase in interest rates). Additionally, these factors are joined by political instability in some regions, awakening protectionism in international trade and significant global imbalance. These factors could slow down the future growth.

#### Structure of global economic growth

According to an April forecast of the IMF (see IMF, 2007), the economic growth will differ widely among the various regions of the world. Emerging economies such as China and India, oil exporting countries and developing countries will become the main growth boosters. A slow-down is expected for the European Union and USA (see Table 1).

**Table 1: Real GDP and world trade (percentage annual change)**

	2005	2006	2007	2008
GDP – world	4.9	5.4	4.9	4.9
United States	3.2	3.3	2.2	2.8
European Union	1.9	3.2	2.8	2.7
Japan	1.9	2.2	2.3	1.9
China	10.4	10.7	10.0	9.5
India	9.2	9.2	8.4	7.8
Russia	6.4	6.7	6.4	5.9
World trade	7.4	9.2	7.0	7.4

Source: IMF (2007), pp. 2.

#### Development of the US economy

The US economy slowed down significantly in the last three quarters of 2006, with only a slight GDP growth of 2.2% expected in 2007. While private consumption has been growing quickly, the **real estate market** has been hindering the growth. In the second half of 2006, residential investments were down by approximately 19%. In the past, residential prices were growing, positively influencing economic activity, consumption, investment construction and the employment rate. However, the prices were overheated and the

cool-down process is under way now. The decrease in the real prices of houses results in a decrease in investments and consumption (with negative effect on wealth and employment). The real estate market plays an important role in the US economy and, according to an IMF analysis, the reduction of the real appreciation of property from 10% to zero may slow down the economic growth by up to 2 percentage points over one year. The question remains whether the slow-down is only temporary or whether it is a permanent change that could turn into a recession. The labour market situation, satisfactory profitability of enterprises and, from a historical perspective, low interest rates have been considered positive factors.

The dependence of the world economy on the development in the USA has been the focal point of analytical interest for many years. The pivotal role of the USA has been clear for several decades, however, Asian countries and oil exporting countries are becoming increasingly important. Based on IMF analysis, the global influence of the US on the world economy is present, even though not to such a significant extent as expected originally. **International trade** is the source of this influence since, in this respect, the USA is still the key player (see Table 2). Over the recent years, the reduced US export rate and, opposed to that, the increased import rate have positively influenced the world economy. Nevertheless, the reduction of import demand as a result of weakening US economic growth will have a negative impact.

**Table 2: Shares of world trade, 2001–2005 (in per cent)**

	Export	Import
United States	11.6	19.7
EU-12	18.5	16.9
Japan	7.4	5.8
United Kingdom	4.7	5.6
Canada	4.4	4.0
China	7.2	6.2
Mexiko	2.7	2.9
Korea	3.1	2.7
India	1.0	1.2
Brazil	1.2	0.9

Source: IMF (2007), tab. 4.1, pp. 122–123.

#### Development of the EU economy

From the perspective of the Czech Republic, the development in the countries of the European Union is of significant importance, with this territory accepting 85% of its exports and, on the contrary, serving as the source of the majority of its investments. From the global perspective, the EU remains a slow-growing region despite improved rates (growing from 1.8 in 2005 to 3% in 2006). An ECFIN forecast for the next two years expects a slight reduction to 2.9% and 2.7% respectively, reflecting the influence of fiscal consolidation and stricter monetary policies. The risks to the future EU development are associated with the development of the US economy, possible turbulences on financial markets and the development of energy and raw material prices on which Europe depends heavily.

The future EU growth relies especially on the positive development of domestic demand that should stimulate a fast growth of fixed capital investments. The dynamics of private

consumption are expected to gradually grow to 2.6% in 2008 (see Table 3). The influence of foreign trade on the GDP growth will be negligible.

The growth has reached more significant values in **Germany**, the Czech Republic's main trading partner (up from 0.8% in 2005 to 2.9% in 2006). A reduction to 2.5% is expected over the next two years. Investments and foreign trade should be the main growth factors since domestic demand is not expected to accelerate before 2008 (as a result of VAT changes in January 2007).

**Table 3: Components of real GDP in EU-27 (percentage annual change)**

	2005	2006	2007	2008
GDP	1.7	3.0	2.9	2.7
Private consumption	1.7	2.2	2.5	2.6
Public consumption	1.7	2.1	1.8	1.8
GFCF	3.1	5.6	5.2	4.2
Export of goods and services	5.3	9.2	7.0	6.2
Final demand	2.8	4.7	4.3	3.7
Import of goods and services	5.8	9.1	7.2	6.6

Source: ECFIN (2007), pp. 27.

### 1.2 Growth and convergence of the Czech economy

The economic development in the Czech Republic in the late 90's was negatively influenced by the impacts of the recession during 1997 and 1998. However, between 2001 and 2006, the growth has picked up significantly, reaching 4.2% per year on average (see Table 4). The effect of several factors has had a positive influence, e.g. strong inflow of direct foreign investments and the growing importance of enterprises under foreign control with higher productivity, fast expansion of domestic investments and export, privatization and restructuring of banks (and the resulting consolidation of this sector, dropping interest rates or expansive fiscal policy).

**Table 4: Real GDP (percentage average annual change)**

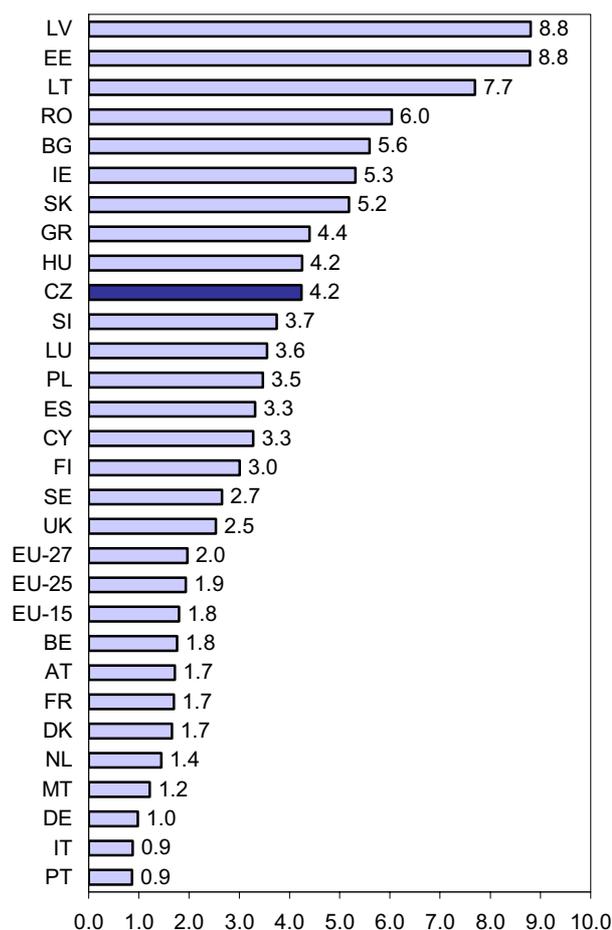
	CZ	HU	PL	SK	SI	EU-15
2001	2.5	4.1	1.1	3.2	2.7	1.9
2002	1.9	4.3	1.4	4.1	3.5	1.1
2003	3.6	4.1	3.8	4.2	2.7	1.1
2004	4.6	4.9	5.3	5.4	4.4	2.3
2005	6.5	4.2	3.5	6.0	4.0	1.6
2006	6.4	3.9	5.8	8.3	5.2	2.8
2001–2006	4.2	4.2	3.5	5.2	3.8	1.8
2001–2003	2.7	4.2	2.1	3.8	3.0	1.4
2004–2006	5.8	4.3	4.9	6.6	4.5	2.2

Source: EUROSTAT (2007d), own calculation.

When examining **individual periods in detail**, a higher economic growth rate is apparent in Q4 of 2002 (see Figure 2), with the highest rate on record so far in Q4 of 2005 (7.0%). In 2006, the growth rate went slightly down from 6.6% in Q1 to 6.1 in Q4. So far in 2007, the Czech economy has been able to maintain the dynamics above 6%. A gradual slow-down may be expected in the upcoming periods that will also be influenced by the development in the region. The turbulences on the world financial markets could affect the main trading partners of the Czech Republic in the European Union (due to financial ties, in particular with Germany).

When **compared internationally**, the Czech Republic came in tenth in the EU-27 GDP growth chart for the period of 2001 to 2006. The Baltic republics, followed by Romania, Bulgaria, Ireland, Slovakia, Greece and Hungary (see Figure 1), took the lead. The significantly faster growth rate of the Czech Republic in comparison to the EU, where the GDP growth reached only 1.8% on average between 2001–2006, resulted in a faster convergence (approximation of the per capita income to the average value).

**Figure 1: Real GDP (percentage average annual change in 2001–2006)**



Source: EUROSTAT (2007d), ČSÚ (2007a), own calculation.

So far, **the period of 2004 to 2006** has been, from an economic perspective, the most successful in the history of the Czech Republic. In comparison to the three preceding years, the economic growth sped up by more than 3 percentage points, which is the best result of the EU-5 group.<sup>1</sup> The EU accession has been undoubtedly a positive impulse since it cultivated the institutional environment and increased possibilities for the free movement of goods, services, capital and

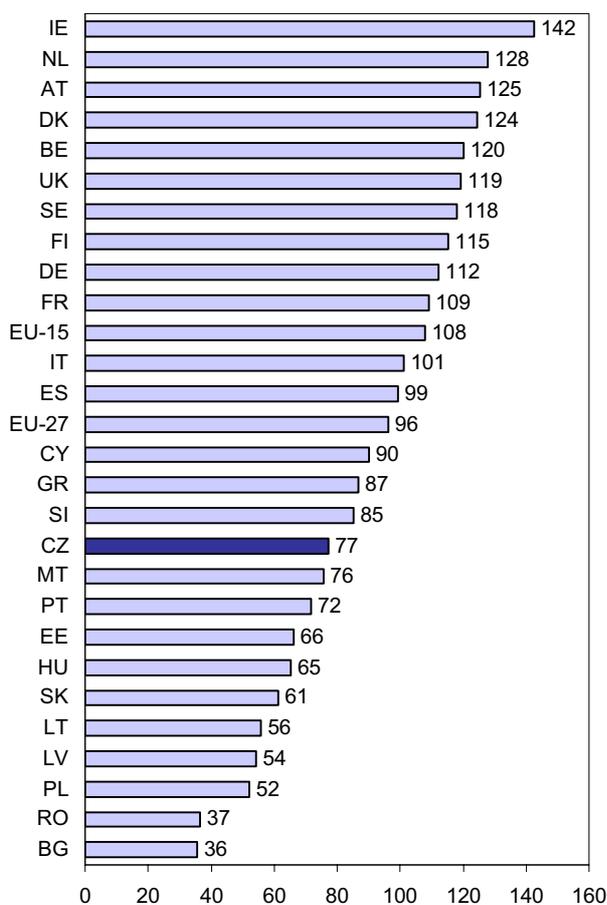
<sup>1</sup> In June 2007, the Czech Statistical Office reviewed data concerning the formation and use of GDP for the period of 2004 – 2006. The reason for this was the reconciliation of quarterly and yearly accounts and changes in the methodology in relation to the Czech Republic joining the EU. Based on the revision, the real GDP growth went up by 0.4 percentage points in 2004 and 2005 and by 0.3 percentage points in 2006. Upon the conversion into constant prices, all impacts of modifications of the method of import and export evaluations were included in deflators in order not to interrupt the comparability within the timeline.

labour. Nevertheless, from the perspective of long-term growth factors, the inflow of **direct foreign investments** and the related production restructuring and export expansion seem to be key factors. Other favourable influences include the recovery of economic activity in Western Europe (especially in Germany), increase in the profitability of non-financial enterprises or growth of credit amounts provided to enterprises and households.

**Real convergence**

In international comparison, the economic level is assessed by **GDP per capita** (GDP p.c.) in purchasing power parity, which, for the EU countries, is expressed by purchasing power standard. Based on its economic level, the Czech Republic was the 17<sup>th</sup> of the EU-27 (see Figure 2). The **catch-up process** differs among the individual new members states, undergoing variations, with several states having seen changes in their position over the last decade. The Baltic countries were developing most dynamically, overtaking Poland, with Estonia also taking lead over Slovakia and Hungary. Economically most developed new states – Slovenia and the Czech Republic – made their way before Portugal and Malta. The states that were the last to join the EU, i.e. Bulgaria and Romania, came in last. Their economic level reaches, respectively, only 33% and 36% of the EU-27. (Approximately the same level as the Baltic countries in the second half of the 90's.)

**Figure 2: GDP per capita in PPS (EU-25=100, 2006)**



Note: Luxembourg = 262. Source: EUROSTAT (2007c, 1. 7. 2007).

In this decade, the Czech Republic (after the divergence in the second half of the 90's) has been catching up with the EU average very fast, by approximately 2 percentage points per year. Over the last years, convergence has also sped up in other EU-5 countries, except for Poland (see Table 5). A comparison of the new member states and the cohesion states (Greece, Spain, Portugal) for the period from 1995 shows an exceptionally fast catch-up rate in the Baltic countries, with a relatively fast rate in Hungary, Slovakia and Slovenia as well as Greece (of the cohesion states). On the contrary, Portugal has undergone divergence.

New member states fall into the **catching-up** category. They may adopt technologies from developed countries (at the level of best practises), therefore, the lower economic level implies a faster catch-up rate. The convergence speed is the highest in the Baltic countries, with the most developed states (the Czech Republic and Cyprus) converging at the slowest rate. Slovenia converged closer than what would be justified by its economic standing; the contrary is true for Poland.

**Table 5: GDP per capita (in PPS, 1995-2006, EU-25=100)**

	1995	2000	2006	Difference in p.p.	
				1995–2006	2000–2006
CZ	69	65	77	8	12
HU	49	54	63	14	9
PL	41	46	51	10	5
SK	45	48	60	15	12
SI	68	74	84	16	10
EE	34	43	65	31	22
LT	34	38	56	22	18
LV	30	35	54	24	19
BG	31	27	36	5	9
RO	..	25	36	..	11
PT	..	75	72	..	-3
GR	71	73	85	14	12
ES	87	93	98	11	5

Note: 1995 - EUROSTAT estimation except of cohesion countries. 2006 CZ and PT EUROSTAT forecast. In PT from 2003 break in time series. Source: EUROSTAT (2007c, d, 3. 9. 2007).

**National income and real gross domestic income**

Assessment of macroeconomic performance (growth and economic level) is most commonly based on the gross domestic product (GDP) indicator. In order to carry out a more complex assessment, other indicators should be considered as well (those included in the system of national accounts), especially when assessing new member states. Due to significant external openness, their national income is substantially reduced by the outflow of primary incomes, with the terms of trade in international trade influencing real income. The development of the supply side and the use of GDP should be examined as well.

**Gross national income** (GNI) takes into account the processes of primary distribution between the national economy and the world. It is a total of primary incomes of residential institutional units. With the liberalisation of capital flows, their movement between countries becomes increasingly important, with the places of creating and using the income being different. GDP and GNI are almost identical within the EU-15 group that constitutes a more or less closed economic entity

(with the exception of Ireland and Luxembourg).<sup>2</sup> However, within the EU-5 the difference between GNI and GDP continues growing as a result of a significant inflow of foreign direct investments (FDI) and the free movement of labour force (see Table 6). The loss of primary incomes over the last years has been most significant in Hungary, followed by the Czech Republic. In Slovakia, the inflow of primary incomes was even higher than their outflow in 2004. The loss of income in the process of primary distribution has a real impact on the economy. As a result, GNI grows at a slower rate than GDP,<sup>3</sup> which usually negatively impacts the growth of final consumption and investment.<sup>4</sup>

**Table 6: Gross national income in per cent of GDP**

	2004	2005	2006	GNI minus GDP <sup>1)</sup>
EU-15	100.2	100.1	100.3	0.2
ČZ	94.5	95.1	94.6	-5.3
Hungary	94.1	94.2	92.1	-6.5
Poland	95.9	96.6	95.7	-3.9
Slovakia	100.4	97.4	97.0	-1.7
Slovenia	98.8	99.1	98.8	-1.1

Note: <sup>1)</sup> Annual average in the years 2004–2006, in p.p. Source: EUROSTAT – National Accounts (July 2007), own calculation.

The outflow of income is caused especially by payments made in relation to the previous inflow of **foreign direct investments** (profit reinvestment, payment of dividend on FDIs and FDI interests). This development usually follows certain phases – after the inflow phase, the importance of reinvested profit increases, followed by prevailing repatriation of profits in the third phase. The differences between the EU-5 states are substantial. Hungary saw the peak of inflow of investments in the early 90's, the Czech Republic and Slovakia until the end of the decade, while in Slovenia the inflow was negligible as a result of a higher level of regulation of capital flows to foreign countries. Another form of primary income flow is represented by wages, or migration, that reflect the importance of foreign workers - e.g. While an outflow of wages prevails in the Czech Republic, an inflow prevails in Slovakia (as a result of a high number of Slovak workers working abroad).

**Real gross domestic income of residents (RHDD)** is influenced by the production volume measured by GDP in constant prices but also by a ratio of export and import transactions carried out with non-residents, i.e. by **terms of trade**.<sup>5</sup> RHDD is calculated by adding or subtracting

<sup>2</sup> In Ireland, GDP has grown at one of the fastest rates, while the GNI has grown at a much slower rate. Therefore, it has one of the highest GDP per capita in the EU, while GNI only reaches average levels. In 2006, Irish GNI was 13.9% lower than GDP (reaching 86.1% of GDP). The situation was similar in Luxembourg, with GNI reaching only 83.2% of GDP in 2006.

<sup>3</sup> Between 2001 and 2006, the Czech Republic generated an average GNI to GDP loss of 0.6 percentage points per year, with the same development taking place in Hungary from 2003 to 2006. The difference in Poland was quite small, with the exception of 2004, and it reached negligible levels in Slovakia. GNI in Slovakia grew at a slower rate over the last two years, the loss in 2005 amounted to more than 3 percentage points. To learn more details about the calculation, see ECFIN (2007), p. 51, 81, 91, 97, 99.

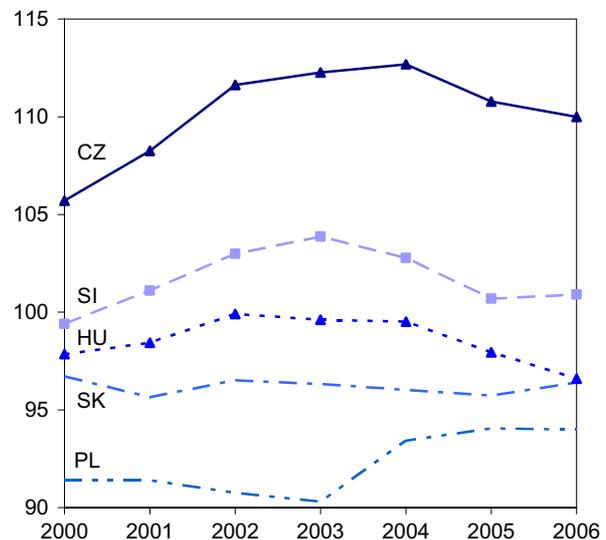
<sup>4</sup> Since reinvested investments are included in the outflow of primary incomes, the impact of the outflow of incomes does not have to be so strong in reality.

<sup>5</sup> If terms of trade improve, less export is needed to pay for a given amount of import, therefore, products and services may be moved from export to consumption or capital formation while maintaining the

gains or losses from/to GDP in constant prices (for details, see Spěvácěk, 2005; Spěvácěk, Vintrová, 2005). Changes in the terms of trade influence the real domestic income indicator as well as foreign trade balance and macroeconomic balance.

The influence of changes in terms of trade is significant in the Czech economy. For a long time, gains prevailed, losses were incurred only in 2005 and 2006. Short-term variations were caused especially by external shocks initiated by sudden changes in the prices of oil and other raw materials. An international comparison shows (see Figure 3) that between 2001 and 2006, despite an important increase in the price of energy and other raw materials, the Czech Republic saw a positive development of the terms of trade. In comparison to 2000, the index reached a value of 104.1 in 2006. The terms of trade slightly deteriorated in Hungary and Slovakia (index of 98.7 and 97.7, respectively), while improving slightly in Poland and Slovenia (see ECFIN 2007a, pp. 84–85).

**Obrázek 3: Terms of trade in goods and services (1995 = 100)**



Note: according to import/export deflators from national accounts. Source: ECFIN (2007a), pp. 84–85.

During the reviewed period, the growth performance of the Czech Republic was higher based on the **real domestic income** indicator rather than traditionally used GDP (see Table 7). The increase in the price of oil after 2004 has led to a deterioration of the terms of trade and the GDP and RHDD relationship in all countries receiving oil supplies. However, the impact was especially strong in the Czech Republic and Slovakia because of the relatively high share of energy in intermediate consumption. In 2005, RHDD in the Czech Republic grew 1.4 percentage points slower than GDP. A similar difference was apparent in Slovakia in 2006, when RHDD grew just by 7% despite the fact that GDP grew by 8.3%. In 2007, the relationship between the growth rate of both indicators has become reversed, with RHDD growing faster than GDP. The growth rate difference for both indicators has been negligible in Hungary, Poland and Slovenia. In the Czech economy, the improvement of the terms of trade brought about a positive contribution towards

same level of domestic production. On the contrary, GDP may grow fast during deterioration of the terms of trade, however, consumption and investments have usually lower dynamics since a part of the products is lost in foreign trade.

the RHDD growth of 0.4 percentage points per year (the contribution was 0.6 percentage points for the period between 2001 and 2005). The development of this factor in the Czech economy differs from the development in the rest of the EU-5.

**Table 7: GNI, RGDI and GDP in the Czech Republic (percentage average annual change, constant prices of the preceding year)**

	2001	2002	2003	2004	2005	2006	2001–2006
GNI	1.2	0.5	3.9	3.1	7.3	5.6	3.6
RGDI	4.1	4.1	3.9	4.8	5.1	5.8	4.6
GDP	2.5	1.9	3.6	4.6	6.5	6.4	4.2
Difference <sup>1)</sup>	1.6	2.2	0.3	0.2	-1.4	-0.6	0.4

Note: <sup>1)</sup> In p.p. Source: ČSÚ (2007a, b), own calculation.

Besides the real gross domestic income indicator, the real income indicators also include the **real gross national income** indicator (RHND) and the **real gross disposable income** indicator. These indicators consider not just the gains and losses arising from the changes in the terms of trade but also the influence of the primary and secondary distribution of income between the national economy and the rest of the world (for national income, it is the balance of primary incomes with foreign countries and, for disposable income, it is the balance of current transfers with the rest of the world). While the data on the development of RHDD are published by the Czech Statistical Office in quarterly national accounts, the data on the development of real gross national and disposable income are only included in the annual national account and, therefore subject to significant delay. Between 2001 and 2005, the positive influence of the terms of trade was more or less compensated by the negative influence of outflow of the primary incomes leaving the country, therefore, real gross national income grew at a rate almost identical to that of gross domestic product (with the RHND index reaching 120.6 and the GDP growth index reaching 120.4 between 2000 and 2005).

### 1.3 Sector and industry structure

In terms of influence that individual sectors have on the development of gross value added (GVA) in basic prices (see Table 8)<sup>6</sup>, the **industrial sector** was key for the growth of the Czech economy between 2004 and 2006. Its GVA was increasing by a year-to-year average of 12.3% (while the growth in the service reached just 3.7%). The industrial production growth substantially exceeded the EU average. It was positively influenced by the continuing structural changes that were related above all to high performance of private enterprises under foreign control.

After the relatively high GVA growth between 2004 and 2005, the **building** sector slowed down to 2.2% in 2006. In the years 2005 and 2006, **services** grew at a solid rate (after having stagnated in 2004) and, given their high share in overall GVA, significantly contributed to the economic performance.

<sup>6</sup> Gross value added in basic prices differs from gross domestic product in purchase prices by taxes on products (that increase GDP) and subsidies on products (that decrease GDP). GVA differs from GDP by both the value and growth rate. In 2006, GVA in the entire national economy grew by 6.9%, while GDP grew only by 6.4%.

**Table 8: Gross value added by economic activity in the Czech Republic (percentage annual change)**

	2001	2002	2003	2004	2005	2006
Agriculture	-2.8	3.3	4.0	7.8	5.7	-8.0
Industry	-1.2	4.0	-1.2	13.1	10.8	12.9
Mining	-6.5	2.7	-10.9	14.5	-8.7	13.2
Manufacturing	-0.5	5.4	-1.0	13.4	12.4	15.1
Electricity, gas	-4.4	-7.5	1.6	9.3	4.2	-9.1
Construction	-5.0	-1.9	2.6	6.2	6.0	2.2
Services	5.7	2.3	4.9	0.1	5.7	5.5
GVA <sup>1)</sup>	2.5	2.5	2.9	4.6	6.7	6.9

Note: <sup>1)</sup> Total, without FISIM. Source: ČSÚ (2007a), own calculation.

The different growth rate in individual basic sectors also changed the **sector structure** of the Czech economy. Between 2001 and 2006, the structural changes at the macroeconomic level were not very significant. The agriculture share continued diminishing, while the industrial sector grew at the expense of the service sector (see Table 9). As a result, the Czech economy structure is, when compared internationally, significantly different from that of developed countries. In 2005, the service share in the EU states reached 72% on average, with substantial differences – highest in Luxembourg with 83% and the lowest in Romania with 56%, followed by the Czech Republic. On the contrary, the Czech Republic has the highest industrial share (including building industry) of all member states (38% as opposed to 26% EU average). This may be explained by the focus of foreign investments on this sector (with generous state support).

**Table 9: Structure of gross value added in the Czech Republic (in per cent, current prices)**

	Agriculture	Industry	Construction	Services
2001	3.9	31.5	6.3	58.3
2002	3.3	30.5	6.2	60.0
2003	3.1	29.5	6.4	61.0
2004	3.3	32.1	6.5	58.1
2005	2.9	31.5	6.8	58.8
2006	2.7	32.3	6.8	58.2

Note: Data after revision from June 2007. Source: ČSÚ (2007a), own calculation.

### 1.4 Labour market

After 2004, the situation on the Czech labour market started to improve. However, the **economic activity rate** (economic participation) gradually fell below the EU-15 average. The labour market in the Czech Republic is, to a large extent, influenced by favourable **demographics**. The post-war baby-boom generation is in its productive age, therefore, the number of inhabitants in the productive age (15–64 years of age) grew every year during the reviewed period of 2001 to 2006, although the increase was not that significant (see Table 10). At the same time, the workforce grew, even if at a significantly lower rate. In this case the development was different between 2001 – 2004 and 2005–2006. In the last two years, the number of the unemployed stabilized and started to drop, with the number of the employed rising.

Changes in the employment rate in the Czech Republic show strong **industry variations**, even though the intensity of structural changes has dropped after 2000. The real estate and rent industry grew significantly, followed

by processing industry, accommodation and catering. On the contrary, agriculture, forestry, fishing as well as mining have continued losing their employment share. A slight decrease has occurred in energy, financial mediation and in a part of the public services sector (education).

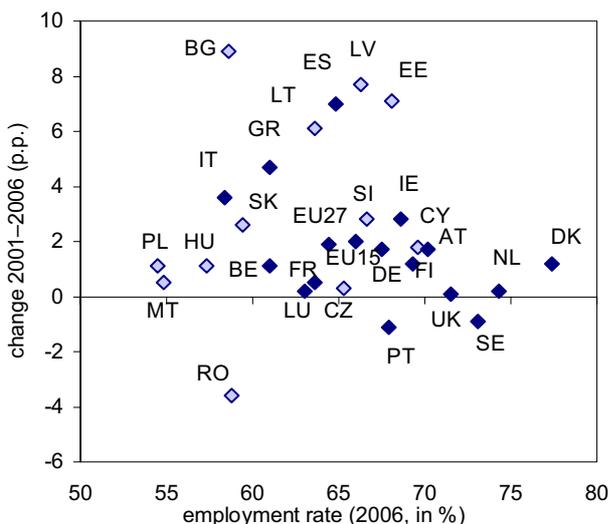
**Table 10: Labour market indicators in the Czech Republic**

		2001	2002	2003	2004	2005	2006
ILO	Employment rate <sup>1)</sup>	66.0	66.3	65.6	64.9	65.5	66.1
	Particip. rate <sup>2)</sup>	71.9	71.5	71.1	70.8	71.2	71.2
	Unempl. rate	8.1	7.3	7.8	8.3	7.9	7.1
	Long-term unem.	52.1	50.2	48.8	51.0	53.0	54.2
	Youth unempl. <sup>3)</sup>	17.3	16.9	18.6	21.0	19.2	17.5
MPSV	Registered unem.	8.5	9.2	9.9	10.2	9.8	8.9
	Reg. unem. rate <sup>4)</sup>	..	..	..	9.2	9.0	8.1

Note: <sup>1)</sup> Share of employed persons in total population (15–64). <sup>2)</sup> Share of labour force in total population (15–64). <sup>3)</sup> Share of young people (0–25) in total population (15–64). <sup>4)</sup> Based on definition of so called accessible unemployed. Source: ČSÚ (2007), MPSV (2007a), EUROSTAT (2007), pp. 110, own calculation.

The unemployment rate in the Czech Republic (based on a sample survey of workforce) dropped gradually from 8.1% in 2001 to 7.1% in 2006 (i.e. from 421 thousand to 371 thousand persons). The decrease in the number of the unemployed has continued during 2007, reaching its lowest rates since 1998 (6.0%, i.e. 311.2 thousand in Q1). However, quite significant structural and regional imbalances are still present, which is also reflected in the rate of long-term unemployment being above 50%. Within the EU-27, the Czech Republic belongs to the average (see Figure 5). In 2004, the rate of registered unemployment in the Czech Republic (calculated by the Ministry of Labour and Social Affairs for the “disposable unemployed”) reached 9.2% (on yearly average), dropping to 8.1% in 2006. (According to the latest data of August 2007, it reached 6.4%.)

**Figure 4: Employment and its changes in EU-27, 2001–2006 (in per cent of labour force)**

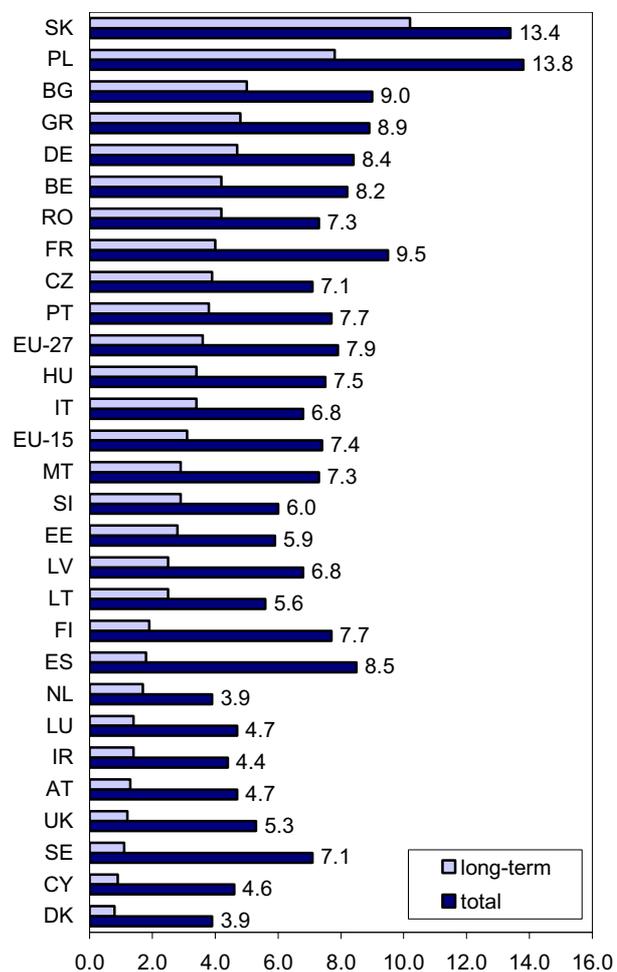


Source: EUROSTAT (2007b), own calculation.

Figure 4 shows the dynamics of the employment rate in the EU states. Between 2001 and 2006, Portugal, Romania and Sweden experienced a decrease (with the employment rate being substantially different in each of them). Poland and

Malta showed a very low amount and dynamics of changes. To a large extent, the differences among the various countries were influenced by the adopted reforms that reduced taxation of labour, while supporting labour market flexibility.<sup>7</sup> Despite the partial progress made, more positive development in terms of increasing the employment rate within the EU is hindered by rigidity of labour legislation and taxation of labour that lead to technological substitution and relocation of production (to the new member states or further to the South or East). Demographic factors, such as aging of the population, may play their role as well. In the Czech Republic as well as in the majority of other new member states, a substantially lower share of part-time employment prevails in comparison to the EU-15 (with the exception of Poland and the Baltic countries). The amount of employees on contracts concluded for a definite time period is relatively low as well.

**Figure 5: Total and long-term unemployment rate, 2006 (in per cent)**



Note: Countries are lined up by the long-term unemployment rate (descending). 2006 preliminary indices for France, EU-27, EU-25. Source: EUROSTAT (2007), own adaptation.

Long-term unemployment on the Czech labour market (as well as in other EU member states) is an important issue (see Figure 5). It was not before 2005 that it was reduced below 4%. Slovakia and Poland report the highest values in

<sup>7</sup> All these measures may reduce not just the actual unemployment rate, but also the natural unemployment rate, or NAIRU, which affects the price development of the economy within an economic cycle.

this respect. Sweden, Cyprus and Denmark are on the opposite side of the spectrum. Besides the long-term unemployment rate, the EU states also differ in a way long-term unemployment contributes to overall unemployment that suggests the seriousness of structural imbalances on the job market (see Figure 9). The position of the Czech Republic is, in both respects, one of the worst in the EU. A high share of long-term unemployed persons is formed by problematic groups – the young without completed education or a suitable qualification or those lacking experience (graduates), women with small children, the elderly and persons of Romany ethnicity.

**Regional imbalances**, persisting since the late 90's (combined with regionally concentrated long-term unemployment), present an important problem in the Czech Republic. The source of this situation is the unequal distribution of industries within the territory of the Czech Republic, with new investments (especially foreign direct investments) flowing predominantly to regions with quality infrastructure or existing companies that form a part of the production chain. From this perspective, the location of traditional industries (mining and processing of raw materials, steel industry, textile and tanning) is especially problematic, affecting the territories of North Moravia, North Bohemia and Vysočina. These industries have been influenced by changes in demand and destination markets or by the import of cheap Asian products that they cannot compete against.

**1.5 Sources of economic growth**

The dynamics of the growth of real GDP depend on their sources, effectiveness of their use and the flexibility of their allocation. Labour, capital and technology progress, or the total factor productivity, are the source of economic growth. The importance of these key factors is identified based on growth accounting at the macroeconomic and industry level.

**Source of growth of the Czech economy between 2001 and 2006**

Table 11 and Figure 6 show a comparison of the growth of GDP, labour and capital in the Czech Republic. Between 2001 and 2006 labour productivity grew by an average of 3.8%, capital productivity by 2.5% and the total factor productivity by 3.1%.

**Table 11: Sources of real GDP growth in the Czech Republic (average annual percentage change)**

	2001–2006	2001–2003	2004–2006
GDP	4.2	2.6	5.8
Employment	0.5	-0.1	1.0
Capital	1.7	1.6	1.7
Capital/labour ratio	1.2	1.7	0.7
Labour productivity	3.8	2.8	4.8
Capital productivity	2.5	1.0	4.1
Total factor product.	3.3	2.1	4.5

Note: GDP and capital in constant prices of 2000. Capital intensity of labour = capital dividend by employment. Source: ČSÚ (2007a, b), own calculation.

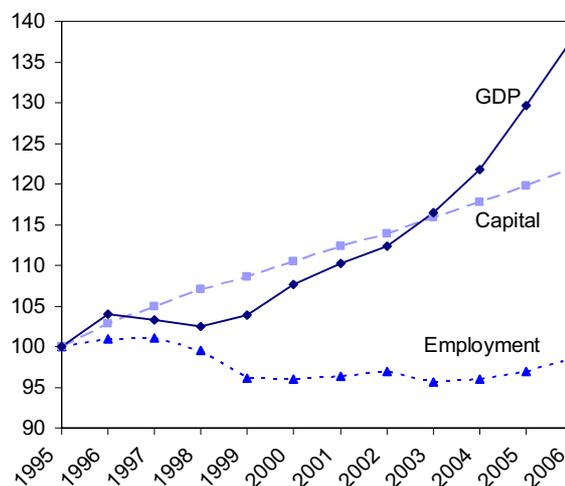
**The employment rate** between 2001 and 2006 grew only slightly (on average by 0.5% per year), therefore, the dynamics of labour productivity were decisive (90%) for the growth of real GDP. During the entire period, the labour productivity in the Czech Republic grew at a faster rate than that of both the EU-15 and EU-27. This suggests a strong influence of technical progress and growing competitive

advantage. On the other hand, is also means a low use of labour force and relatively high unemployment. The effort to increase employment is hindered by enterprises' attempts to increase their productivity and competitive advantage by cutting down on the labour costs – this tendency is most apparent in enterprises under foreign control. Nevertheless, since 2004 the employment rate in the national economy started to grow gradually. The period of jobless growth thus came to its end.

Between 2001 and 2006, investments increased by average 4.3%, with the **stock of physical capital** growing by 1.7% per year. As a result of increasing employment in the second period (2004 – 2006), the growth of capital disposable to labour slowed down but, on the other hand. The impacts of the slow-down may be offset by introducing innovations and technical progress. The **capital productivity growth** improved significantly. While labour productivity between 2004 and 2006 sped up by 2 percentage points (i.e. up to 4.8%) in comparison to the 2001 to 2003 period, the capital productivity growth accelerated by 3.1 percentage points (up to 4.1%).

The growth of capital productivity means that the capital coefficient (K/Y), also known as **capital intensity**, went down at an average yearly rate of 2.4%, especially as a result of technical progress (due to the inflow of foreign investments). Nevertheless, it still reached above-average EU-15 levels (3.9 in the Czech Republic as opposed 2.9 in 2006, calculated in constant prices of 2000). The Czech Republic shows very different capital coefficients at the industry level.

**Figure 6: Real GDP, capital and employment in the Czech Republic (indices, 1995=100)**

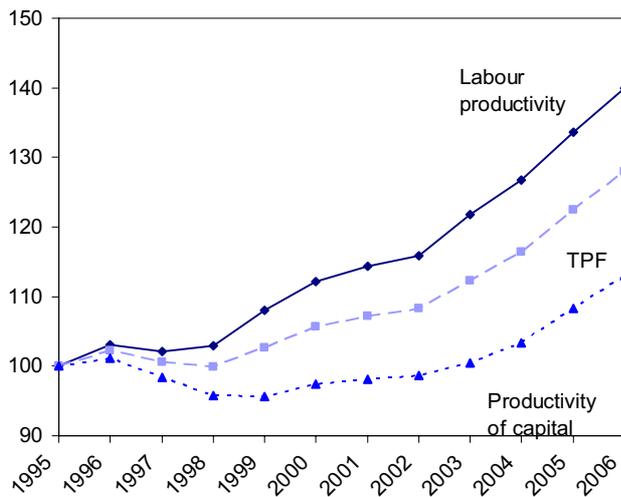


Note: Capital and GDP in constant prices of 2000. Source: ČSÚ (2007a, b).

At the **industry level**, the manufacturing industry, catering, as well as transport and telecommunications all reached above-average growth of gross value added during the period of 2001 to 2006, while the lowest growth was reported by mining and building industries.

**Total factor productivity** (labour and capital) between 2001 to 2006 increased at a high yearly rate of 3.3% (see Figure 7) which presented a 79% contribution to the growth of real GDP. TFP also contributed to GDP changes between 2001 and 2003 and between 2003 and 2004 (by 75%).

**Figure 7: Total factor productivity, labour productivity and capital productivity in the Czech Republic (indices, 1995=100)**



Source: ČSÚ (2007a, b), own calculation.

**Table 12: Contribution of factors to real GDP growth (average annual percentage change)**

		2001–2006	2001–2003	2004–2006
CZ	GDP	4.2	2.6	5.8
	Employment	0.3	-0.1	0.6
	Capital	0.7	0.7	0.7
	TFP	3.3	2.1	4.5
HU	GDP	4.2	4.2	4.3
	Employment	0.2	0.3	0.0
	Capital	1.0	0.9	1.1
	TFP	3.1	3.0	3.3
PL	GDP	3.5	2.1	4.9
	Employment	0.0	-1.4	1.3
	Capital	0.4	0.3	0.6
	TFP	3.1	3.2	3.0
SK	GDP	5.2	3.8	6.6
	Employment	0.4	0.3	0.5
	Capital	1.6	1.4	1.8
	TFP	3.2	2.1	4.2
SI	GDP	3.7	3.0	4.5
	Employment	0.4	0.4	5.0
	Capital	0.8	0.7	0.9
	TFP	2.5	1.9	3.1
EU-15	GDP	1.8	1.4	2.2
	Employment	0.6	0.6	0.6
	Capital	0.7	0.7	0.7
	TFP	0.5	0.1	0.8

Source: ECFIN (2007a), ČSÚ (2007a, b), own calculation.

**Sources of economic growth in the EU-5 and EU-15**

Between 2001 and 2006, all countries from the group of new Central European member states reached an average yearly growth of real GDP that was higher than that of the EU-15 average. As far as **growth sources**<sup>8</sup> are concerned, total

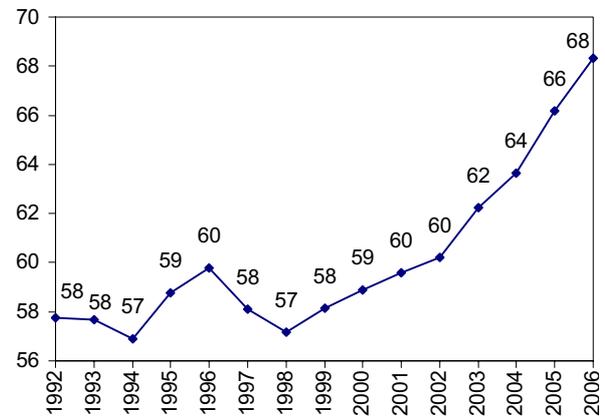
<sup>8</sup> The physical stock of capital in the Czech Republic was derived from ČSÚ's data (2007b). GDP, stock and consumption of capital and the formation of gross fixed capital have been calculated in constant prices of 2000. For the years of 2005 and 2006, the stock of capital in the Czech Republic was based on an estimate. For other countries, it was calculated using the perpetual inventory method (PIM), i.e. by cumulating the formation of gross fixed capital in constant prices of 2000 less the consumption

factor productivity played a decisive role in this respect (see Table 12). In the EU-5, it grew by a yearly rate of approximately 3%, while the growth reached only 0.5% in the EU-15 (however, its contribution to the growth of real GDP reached only less than one third, i.e. below the contribution level of labour and capital).<sup>9</sup> The high growth rate of TFP in the EU-5 was caused predominantly by a high inflow of foreign investment (see e.g. WB, 2007), introduction of new technologies, corporate restructuring and reallocation of resources.

Figure 8 shows an estimate of the **relative level of total productivity** in the Czech Republic compared to the EU-15.<sup>10</sup> Compared to the EU-15, the Czech labour productivity was 48% lower (GDP per employee in PPS) and TFP was 41% lower in 1995. After 1998, the relative level of TFP in the Czech Republic went up, reaching 68.3% in 2006.

Between 2004-2006, the highest average yearly growth of both GDP and total productivity was reported in the Czech Republic (5.8% and 4.5% respectively) and Slovakia (6.6% and 4.2% respectively). In Poland, the GDP growth was driven (unlike in other states), by capital and, especially, by employment that more than compensated the decreased TFP dynamics. (Using the ILO methodology, the unemployment rate in Poland dropped from 18.2% in 2001 to 13.8% in 2006, with similar development in Slovakia – dropping from 19.3% to 13.4%). Compared to the previous period, the slight increase in the GDP growth within the EU-15 was entirely attributable to TFP (yet it still reached limited levels), while the share of capital and labour remained unchanged.

**Figure 8: Relative level of total factor productivity in the Czech Republic (EU-15=100)**



Source: ČSÚ (2007a, b), ECFIN (2002, 2007), own calculation.

of capital. Its weight on labour (labour income share) was calculated as a ratio of remuneration paid out to employees to gross value added (in current prices) multiplied by the ratio between the total number of working persons and the number of employees. This way, the remuneration imputed to one entrepreneur is the same as the average remuneration amount imputed to an employee. This method is used by the European Commission under the name of 'adjusted wage share'. The value that needs to be added to receive the value of one is the capital income share used for weighting the capital growth rate.

<sup>9</sup> The share of TFP in the average yearly growth of real GDP between 2001 and 2006 reached 89% in Poland, 79% in the Czech Republic, 74% in Hungary, 68% in Slovenia and 62% in Slovakia.

<sup>10</sup> The estimate is based on an assumption that the TFP growth rate is equal to the weighted total of growth rates of labour productivity and productivity of capital. If the growth (in %) is interpreted as a difference of the applicable values between two countries, it is also possible to identify the difference between the TFP levels, provided that the differences in labour productivity, capital productivity and the applicable weights of individual factors are also known.

## 2. Demand and macroeconomic balance

This chapter deals with the demand side of the economy which is, from the short-term perspective, decisive for economic growth and for the development of macroeconomic balance. Special attention is devoted to final consumption of households and to basic factors that influence it. As far as the formation of gross capital is concerned, the chapter analyzes its dynamics, investment rates and their structure. The assessment of macroeconomic stability is based on the relationship between domestic supply and demand and on the relationship between national savings and domestic investments that is reflected in the external economic balance.

### 2.1 Demand structure and growth of its components

The demand structure of the Czech economy is characteristic by a high share of public consumption, foreign trade and investments (Table 1). The share of private consumption has been moving around one half of GDP. Over the last six years (except for 2003), the share of private consumption dropped from 52% in 2001 to 48% in 2006. The share of gross fixed capital formation (investments) in GDP was dropping steadily as well. On the contrary, the share of export was growing significantly.<sup>11</sup>

**Table 1: The share of demand components in GDP (in per cent, current prices)**

	2001	2002	2003	2004	2005	2006
Priv. cons.	51.9	51.2	51.7	50.3	49.0	48.3
Public cons.	21.1	22.3	23.4	22.2	22.1	21.4
GCF	29.5	28.6	27.2	27.5	25.8	27.1
GFCF	28.0	27.5	26.7	25.8	24.9	25.2
Export	65.4	60.2	61.8	70.0	72.0	76.0
Import	67.9	62.3	64.1	70.0	68.8	72.8
F.T.balance	-2.5	-2.1	-2.3	0.0	3.2	3.2

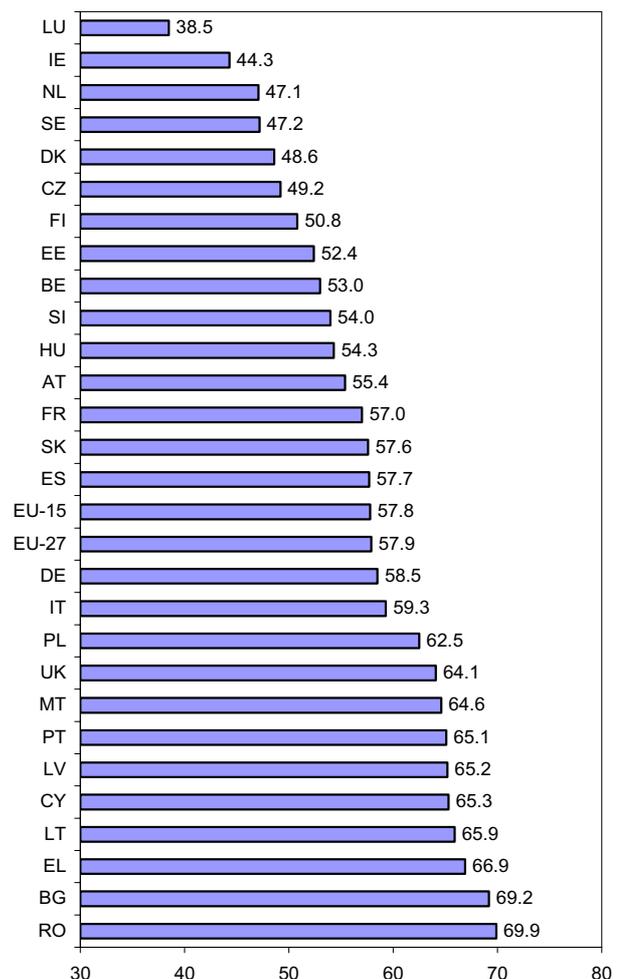
Note: Private consumption contains households and non-profit organizations expenditures on final consumption. Source: ČSÚ, quarterly national accounts (July 2007).

In an international comparison, the share of private consumption in GDP in the Czech Republic is very low, below 50%, and dropping steadily. The share has been steady in the EU-15, with the levels being below 60%. However, significant differences persist between individual countries, ranging from 39% in Luxembourg to 67% in Greece. Luxembourg is somewhat extreme in this sense, since its GDP also includes salaries of foreign workers that are used to pay for consumption abroad (in the neighbouring countries especially).<sup>12</sup> Substantial differences also persist

between the new EU member states (see Figure 1). The countries with a high share of private consumption usually have a low investment rate.

The growth of **demand components** depends on a variety of factors (both internal and external), therefore their structure changes as well. Some segments, such as private consumption, are quite constant, while others, such as changes in stocks or investments in fixed capital, are subject to variations. Foreign trade is, besides internal factors, strongly influenced by the development in the world and in the countries of the main trade partners.

**Figure 1: Share of private consumption in GDP (in per cent, 2006)**



Source: ECFIN (2007a), pp. 54–55.

The development of the main demand components in the Czech Republic is shown in Table 2. Between 2001 and 2006, Czech real GDP grew at a yearly average rate of 4.2%. Exports and imports of goods and services grew more significantly (by more than 10%). Due to the export rate exceeding that of imports, there was a surplus of trade balance over the last three years. The total domestic use of GDP (the final consumption and formation of gross capital) grew at a slower rate than GDP (3.7% per year), thus weakening the import rate growth. Table 2 shows two different periods. While between 2001 and 2003, domestic demand exceeded the GDP growth, the situation reversed between 2004 and 2006. Due to the favourable development of the

<sup>11</sup> Important changes occurred in the methodology of foreign trade used by the ČSÚ in June 2007 to revise the data on the formation and use of GDP during the 2004–2006 period (besides the reconciliation of quarterly and annual national accounts, the data on import of goods, that were appraised by CIF prices, are now reported in FOB prices, with the transport and insurance costs being included in service balance). As a result of these changes, nominal GDP and its real growth have increased and the dynamics of demand components, as well as their structure, changed.

<sup>12</sup> Data based on the national prices of a given country reflect its price relations; therefore, they are not entirely comparable with other countries. More objective information is based on calculations in international prices where the demand component is recalculated using purchasing power parity. These calculations are contained in international comparative programmes carried out by OECD and EUROSTAT.

terms of trade up until 2005, demand exceeding supply did not result in the worsening of trade balance.

**Private consumption** (expenditures of households on final consumption) in the Czech Republic grew at a significantly slower rate than GDP (except for 2003). The reason for that was the reduction of the real growth of disposable income of households – the dynamics of salaries, wages and social security benefits were dropping, while consumer prices continued rising (this was especially true for food, energies and due to an increase in value added tax). In 2006, private consumption was revived due to increased employment, relative fast growth of wages and an acceptable inflation rate. Between 2004 and 2006, there was a rather significant slow-down in public consumption. Pronounced variations can be seen in the **gross fixed capital formation**. After stagnation in 2003, the investment growth picked up again in 2004. This was caused by increased profitability of enterprises, low interest rates and improved investors' confidence. However, in 2005 the gross fixed capital formation slowed down again despite the overall very positive situation in the national economy. In 2006, the level of fixed investments started to rise again.

**Table 2: Final demand components (percentage annual change, constant prices of the preceding year)**

	2001	2002	2003	2004	2005	2006	Growth <sup>1)</sup>
GDP	2.5	1.9	3.6	4.6	6.5	6.4	4.2
Dom.demand	3.7	3.8	4.0	3.3	1.6	5.8	3.7
Final cons.	2.6	3.5	6.3	1.1	2.4	3.4	3.2
Private cons.	2.3	2.2	6.0	2.9	2.4	4.4	3.4
Public cons.	3.6	6.7	7.1	-3.1	2.3	1.1	2.9
GCF	6.6	4.6	-1.4	9.1	-0.2	11.7	5.0
GFCF	6.6	5.1	0.4	3.9	2.3	7.6	4.3
Export	11.2	2.1	7.2	20.7	11.8	15.9	11.3
Import	12.8	5.0	8.0	17.9	5.0	15.2	10.5

Note: <sup>1)</sup> Annual growth in the years 2001–2006. Source: ČSÚ, annual national accounts (July 2007).

### Influence of demand on GDP growth

The contributions of the main components of demand to GDP growth between 2001 and 2006, divided into **domestic demand and foreign sector contribution**, show a strong influence of the final domestic demand (final consumption and formation of gross capital) between 2001 and 2003 (see Table 3). During this period, more than 100% of the GDP dynamics were driven by domestic absorption and the influence of foreign trade was negative (its deficit in constant prices was increasing). Between 2004 and 2006, foreign trade started to assert positive influence. Especially in 2005, the influence of domestic demand on the GDP dynamics dropped significantly, with foreign trade becoming the key factor (contributing by almost 75%). The reason for that was especially the slow-down of real disposable income of households, fast increase in exports that exceeded imports, worsening of the terms of trade (that limited the space for growth of wages and investments).

In 2006, domestic absorption grew, thus driving the GDP growth, nevertheless, foreign trade developed positively, adding 1 percentage point. It will be quite difficult to increase the surplus of trade balance in the future due to a faster growth rate of domestic demand, increase in the world energy prices and other raw materials, as well as the cooling of the global conjuncture. Therefore, weaken-

ing of the positive influence of foreign trade on the GDP growth may be expected.

**Table 3: Contribution of demand components to GDP growth (constant prices of the preceding year, in percentage points of GDP growth)**

	2001	2002	2003	2004	2005	2006
GDP	2.5	1.9	3.6	4.6	6.5	6.4
Final cons.	1.9	2.6	4.7	0.8	1.8	2.4
Private con.	1.2	1.1	3.0	1.5	1.2	2.1
Public cons.	0.8	1.4	1.6	-0.7	0.5	0.2
GCF	2.0	1.4	-0.4	2.5	-0.1	3.0
GFCF	1.8	1.4	0.1	1.1	0.6	1.9
Inventories	0.1	-0.1	-0.6	1.5	-0.6	1.1
Dom. Dem.	3.9	4.0	4.3	3.3	1.7	5.4
FT balance	-1.4	-2.0	-0.6	1.3	4.8	1.0

Source: ČSÚ, quarterly national accounts (July 2007).

**The influence of the components of domestic demand** on GDP was very variable. Private consumption (expenditures of households on the final consumption) played the pivotal role in 2003. Between 2001 and 2006, it contributed to the GDP growth by 40%, i.e. less than its GDP share would suggest. The influence of public consumption (government spending on the final consumption) played an important role between 2001 and 2003. Significant variations in the development of investments were apparent also in the way they influenced the GDP growth. Between 2003 and 2005, the influence of gross fixed capital formation was originally very small, it was not until 2006 that it rose up to 1.9 percentage points of GDP, which was slightly more than the share of investments in GDP would suggest. The high dynamics of gross fixed capital formation are important since they increase the stock of capital in the economy, improve infrastructure, boost technical progress, thus becoming a precondition of Czech economy's competitive advantage.

### 2.2 Household consumption (private consumption)

**The household sector** plays a number of functions in the economy. Foremost, it carries out final consumption of goods since households are usually perceived as consumers. Additionally, it provides employment opportunities and receives labour income. For practical reasons, the household sector also includes small businesses that carry out their activities based on a trade license and are not incorporated in the Companies Register, yet that form a significant part of GDP. However, certain heterogeneity of this sector may distort economic analyses.

Expenditures of households on final consumption (private consumption) represent a final effect of economic activities and are the key component of the **standard of living of the population**. As a rule, the faster an economy grows (usually based on GDP), the faster is the growth of private consumption and the standard of living. Due to this reason, an increase in GDP is often identified as an indicator of wellbeing, which corresponds to the situation in the majority of developed economies. For example, during the last 10 years (1996–2005), the dynamics of GDP and private consumption was identical, reaching 2.2% yearly on average (see Table 4). The relationship is two-way: the GDP growth is, to a large extent, conditioned by the growth of private consumption on the demand side of the economy (private consumption is the major part of GDP use – approx. 50% in the Czech Republic, however, it reaches approximately 60% in the most devel-

oped countries). From a long-term perspective, the development of private consumption in the Czech Republic<sup>13</sup> was significantly different from that of GDP when compared to the developed Western countries.

Between 1996–2000 (a period affected by the crisis of the Czech economy between 1997 and 1998), the average yearly rate of private consumption grew substantially faster than the GDP rate. Between 2001 and 2006, in the growth phase of the economic cycle, the trend was reversed (household consumption grew by an average of 3.4% a year, whereas GDP by 4.2%). There is a certain paradox in the long-term development of the Czech economy. The consumption develops in a more positive way during the years of stagnation, while the strong economic expansion of recent years has not yet fully affected private consumption rates. Yet the growth of private consumption is felt by the population much more intensively than the GDP growth since it is a precondition for the improvement of standard of living.

**Table 4: Real GDP and private consumption (average annual percentage change)**

	EU-15		CZ	
	GDP	Private consump.	GDP	Private consump.
1996–2000	2.8	2.8	1.5	2.7
2001–2005	1.6	1.7	3.8	3.2
1996–2005	2.2	2.2	2.7	3.0

Source: ECFIN (2007).

The amount and development of disposable household income, changes in saving and consumption tendencies, the real interest rate, development of consumer credits, value of household property as well as demographic or psychological factors or national or regional differences all belong among the basic factors that influence the **growth and structure of private consumption**. Expectations of consumers play their part as well. Therefore, it is impossible to build a simple model that could fully clarify and identify the influence of individual factors. The current analysis is limited to the factors that may be considered key, i.e. disposable income, saving rates, wealth of households and loans and credits provided to households.

**Disposable household income** remains the most important factor affecting consumer expenditures. However, the development of both values may differ due to changing saving tendencies. During the years of dropping saving rates, private consumption usually grows faster than disposable income, yet during the years when the saving rate grows, consumption expenditures show lower dynamics compared to income. Changes in household savings rates offset variations in the development of their disposable income. As a result, private consumption develops in a more constant way, being able to face shocks in the development of current income.

From a long-term perspective, the growth of private consumption exceeded the growth of household disposable income (see Table 5). Between 1996 and 2005, the real consumption grew by a yearly average of 3%, with real disposable income only growing by 1.9%. This resulted in a

decrease in **household savings**. During the years when private consumption grew at a faster rate than disposable income, the savings rate went down (the propensity to consumption was growing). That was the case of the majority of years (1996–2001, 2003 and 2004). The relationship between the development of private consumption and disposable income was reversed in only 2002 and 2005, with the savings rate growing. Over the last few years, the development of consumption is also affected by loans granted to households that have seen a steep rise after 2002. Even though the majority of them are represented by housing-related loans, which will become apparent especially in household investment rates, the expansion of consumer loans has already clearly boosted private consumption.

Rather than using GDP, international comparisons use **disposable household income per capita** as a more reliable indicator of the standard of living. This applies especially to the regional level since the flows of primary and secondary incomes between regions are often stronger than between states. As a result, GDP per capita may be substantially different from indicators expressed in a form of disposable household income (see EUROSTAT, 2006).

**The household savings rate** in the Czech Republic has been subject to variations, showing a steady decline (see Table 5). This is a reason for concern, since household savings are usually one of the financing sources for other sectors of the economy. Unless they are replaced by an increased savings in other sectors, the economy has to either reduce its investments or becomes increasingly dependant on foreign savings.

**Table 5: Disposable incomes of households and private consumption (annual percentage change)**

	2001	2002	2003	2004	2005
DIH (current prices)	5.0	4.3	4.5	3.9	4.3
DIH (constant prices)	1.1	3.1	4.9	0.7	3.5
Private consumption (constant prices)	2.3	2.2	6.0	2.9	2.4
Saving rate	7.4	8.3	7.4	5.6	6.6

Note: Real growth of disposable incomes of households (DIH) in constant prices = growth of nominal disposable incomes of households in current prices divided by deflator of private consumption. Saving rate of households = gross savings of households divided by their gross disposable income. Source: ČSU, annual national accounts (June 2007).

**Household wealth** and its changes depend on a number of factors: on savings and net capital transfers, on the influence of nominal losses/gains from holdings (such as changes in stock prices) and on other changes in the asset volume. It is of interest that nominal gains from holdings were the principal factor influencing the development of net wealth. The average yearly growth of household assets reached more than 6% for the period of 1995 to 2005. It was a relatively high rate, considering that it is a stock value that exceeds the value of GDP. Since the values are nominal, real growth of household wealth cannot be calculated.<sup>14</sup>

<sup>13</sup> Statistics distinguishes between domestic and national household expenditures on final consumption. The national approach is considered key; the value is derived by subtracting expenditures of non-residents on final consumption in the Czech Republic, while adding expenditures of Czech residents on final consumption abroad.

<sup>14</sup> When assessing the value of wealth, both wealth (assets) and liabilities (debts) need to be considered. The difference between the two is net assets that balance sheets report always at the beginning and at the end of a given period. Assets serve as a stock of value and their owners receive benefits arising from their holding and use. Assets are divided into two groups: non-financial assets (produced assets, including fixed assets, inventories, valuables and non-produced assets that may be either tangible, such as land and underground resources, or intangible, such as patents) and financial assets (currency and deposits, securities, loans,

The question of how the increasing wealth of households reflects in the consumption growth is a complex one. **Wealth effect** is considered of importance in the stabilized western economies. It concerns mainly real estate wealth but also certain forms of financial assets, such as shares. Real estate may influence household consumption through different channels – e.g. purchase of a new apartment or house will result in increased demand for household equipment as well as related services.

**Loans and credits** that influence household consumption are a rather new factor in the Czech Republic. Their importance has grown since 2002, after the banks had been privatized, becoming more active. In this respect, the real estate market and low interest rates were an important factor both historically as well as in an international comparison.

**Provided credits** (especially mortgages) resulted in a higher investment construction rate and increased private household consumption (as a result of consumer credits and of fitting new apartments and houses with equipment). Since it is considered a financial transaction, household credits are not included in disposable income. On the other hand, they increase private consumption, thus indirectly reducing savings. A decrease in savings, together with the growth of indebtedness, is a negative aspect of a fast expansion of household credits. Together with the increasing investment rate and housing credit incentives, these present an important cause of the negative gap between savings and investments in this sector. During the last five years, the value of credits provided to households has grown significantly, by more than 30% p.a. on average (see Table 6). The share of housing credits grew to reach almost 70% at the end of 2006 (up from 19% in 2000), with consumer credits reaching 20% of total credits provided by financial institutions.

**Table 6: Stock of credits provided to households by monetary financial institutions (bil. CZK, to 31. 12.)**

	2000	2001	2002	2003	2004	2005	2006
Total credit	121.5	139.5	180.2	236.1	312.6	413.7	535.2
Growth <sup>1)</sup>	10.9	14.8	29.2	31.0	32.4	32.3	29.4
Cons. credit	23.1	29.9	43.8	53.9	67.9	88.9	109.2
Housing cr.	23.2	34.7	111.7	154.9	208.5	279.9	371.1
Mortgage cr.	23.2	34.7	50.7	78.4	115.2	166.7	238.2

Note: <sup>1)</sup> annual percentage change of total credit. Source: CNB (2007), Databasis of time series ARAD.

So far, the **household indebtedness** rate has been bearable; however, a risk of imbalanced development of assets and liabilities exists in the future. The household debt to GDP ratio in the Czech Republic was approximately 20% at the end of 2006. In comparison to the developed EU countries, the indebtedness rate is still relatively low (it was more than 60% in the EU-15). While credits provided to households increase household consumption, the growth of their indebtedness may potentially reflect either in the decrease of savings or in the limitation of consumption. This is especially true for low-income households that only have limited savings. Other influences that could negatively influence the development of

private consumption, such as a growth of interest rates, labour market situation etc., may not be ruled out.

### 2.3 Investments

**The gross capital formation** (investments) is a flow value that identifies the acquisition of produced non-financial assets. In terms of the weight and importance in total gross capital formation, the gross fixed capital formation (GFCF) plays the key role.<sup>15</sup> The second component of investments is the change in inventories that applies to materials and supplies, work in progress, finished goods and goods for resale. The third component includes valuables (jewels, precious metals, antiques and works of art), mainly for the purposes of value preservation. This item is not important; however, its character places it in the gross capital formation. Investments are expressed as gross (including the consumption of fixed capital) or net (after subtracting the consumption of fixed capital).

The gross fixed capital formation renews outdated capital and increases its supply at a higher technological level, thus becoming one of the decisive factors of economic performance. A faster growth of GFCF also usually means a faster GDP growth, even though the relationship is not direct. It depends on a number of factors, such as investment structure, its technological level and effectiveness of use. There is a time gap between investments and production growth.

In the long run, **the GFCF growth** precedes the employment growth, which results in an increase in the physical volume of capital (machinery, appliances etc.) per employee and in labour productivity. In macroeconomic analyses, the increase in GFCF (or investments) is studied from two perspectives: from the demand perspective (contribution to the GDP growth) and supply side (influence on the growth of the stock of physical capital). The real dynamics of GFCF are subject to substantial variations that, given the asynchronous course of the economic cycle in individual countries, take part in different time periods.

From an international perspective, the investment rate in the Baltic countries grew most significantly (see Table 7) over the last ten years. From a long-term perspective, the Czech Republic was among countries with lower investment dynamics. The data for two five-year periods often show contradictory tendencies. The majority of the old member states, as a result of a slow-down of economic performance over the last five years, reduced the growth of investments. Different developments are shown in the new member states of Central Europe. While in the Czech Republic and Slovakia, the growth picked up significantly in the second five-year period, in Poland, Hungary and Slovenia the growth slowed down. Nevertheless, the Czech Republic showed the lowest yearly GFCF growth of the EU-5 group during that period.

Long-term averages hint the presence of **investment cycles** that are apparent in shorter time intervals. After the stagnation between 2001 and 2003, the eurozone countries started to improve its investment activity and the growth in 2006 is, according to ECFIN, estimated at 4.7%. The increased growth rate was apparent in most EU countries in 2006. This was a result of a revival of economic activity and the resulting

shares and other equity, insurance technical reserves). When drawing a balance sheet, the evaluation of individual items is the major issue since there is a general rule that both assets and liabilities should be evaluated at their market value valid at the balance sheet date.

<sup>15</sup> Tangible fixed assets include dwellings, other buildings and structures, transport equipment, other machinery and equipment and cultivated assets (livestock, permanent vegetation). Intangible fixed assets include computer software and other intangible fixed assets (mineral exploration, original works of art and culture).

investors' optimistic expectations. Portugal is the only country where a decrease in investments is expected.

**Table 7: Gross fixed capital formation (average annual percentage change)**

	1997–2001	2002–2006
Eurozone	4.1	1.8
Slovenia	8.4	5.7
Czech Republic	0.3	3.7
Estonia	7.7	15.3
Latvia	17.4	18.1
Lithuania	8.1	12.3
Hungary	8.2	4.6
Poland	6.6	4.3
Slovakia	1.4	5.3

Source: ECFIN (2007a), pp. 131.

### Investment rate

The investment ratio indicator (the share of gross fixed capital formation in GDP) expresses the part of GDP that is not consumed but is accumulated in a form of augmentation of fixed assets. From a long-term perspective, the **investment ratio** belongs to important indicators of economy's competitiveness. A comparison of the investment ratio with the savings rate reveals an important source of external economic imbalance that is caused by the lack of national savings in relation to investments that needs to be covered by foreign savings (through the inflow of foreign capital).

**Table 8: Investment Ratio (gross fixed capit. form., in % of GDP)**

	1995	2000	2006
EU-15	19.6	20.5	20.4
Czech Republic	31.5	28.0	25.1
Estonia	26.4	26.0	33.8
Lithuania	21.0	18.8	23.1
Latvia	13.6	24.2	34.4
Hungary	19.5	22.9	21.9
Poland	17.7	23.7	20.0
Slovakia	24.6	25.7	26.4
Slovenia	20.9	25.6	25.8

Source: ECFIN (2007a), tab. 19, pp. 66–67.

The differences in the investment ratios **among the individual countries** may be explained by a number of factors, including activities of major multinational companies and the inflow of foreign direct investments that they bring. The investment development is subject to rather significant variations during the individual phases of the economic cycle. During recessions, investment activity is usually hampered significantly, however, during conjunctures; the investment activity becomes the most dynamic component of final demand. **Price relations** of individual countries also affect the investment ratios. In less developed countries, investments in fixed capital are relatively expensive since their substantial part is imported. In comparison to the price level of the EU, the price level of gross fixed capital formation of a given country is thus higher than the price level of GDP which results in an increase in the investment ratios.<sup>16</sup>

The investment ratio in the **Czech Republic** is very variable. After a significant decrease in the previous period, the situation became stabilized between 2000 and 2001, followed by another decrease between 2002 and 2005, to see another revival in 2006 as a result of a fast increase in the amount of

fixed investments. In an international comparison, the investment ratio in the Czech Republic is higher than that of the developed EU states. Within the group of new members states of Central Europe, the Czech Republic came third following Slovakia and Slovenia. Between 1995–2006, the investment ratio of EU-15 amounted to approximately 20% of GDP (see Table 8). However, differences between the individual countries were significant in 2006, ranging from 30% in Spain to 17% in the UK. The new member states of Central and Eastern Europe, except for Poland, reported values above the EU-25 average. In 2006, the highest investment ratio was achieved in Estonia.<sup>16</sup>

### Investment structure

The investment structure may be examined from different perspectives. **Material division** is among the basic approaches, showing the share of the active component (machinery, appliances and means of transport) and the passive component (housing and other buildings and structures). The data for the Czech Republic have been disposable since 2003. During this period, the material structure has changed in favour of housing and other buildings and constructions. Their share in the gross fixed capital formation went up from 49.2% in 2003 to 51.7% in 2006. As opposed to that, the share of machinery, appliances and transport equipment went down from 45.5% in 2003 to 43.2% in 2006. The share of transport equipment grew substantially in 2006. A faster dynamics of investments in machinery and appliances has prevailed in the majority of the EU states from the long-term perspective, as is documented by the growing share of this component in the total gross fixed capital formation. Of the new member states, this tendency has been apparent in Slovakia and in Poland.

Using the **industry division**, the highest share of investments in the Czech Republic goes to the processing industry, transport and telecommunication, real estate and trade. Other industries, with the exception of education and health-care, show stagnation or decrease in investments. The decrease has been most apparent in financial and insurance services, public administration, defence and social security.

### 2.4 Macroeconomic balance

Macroeconomic imbalance, magnified by the surging energy prices over the last years, presents a serious issue for the majority of countries. It is a result of a gap between national savings and domestic investments. So far, due to free movement of capital and sufficiency of resources, this has been financed without major shocks in the world economy. However, undisturbed capital flow from the countries with excess of savings towards deficit countries is not guaranteed and significant shifts of prices, interests and exchange rates, affecting global demand and economic growth, cannot be ruled out. In the case of the Czech Republic, macroeconomic stability is a necessary prerequisite for sustainable growth performance and smooth access to the European Monetary Union.

#### Supply-demand relationship

From the perspective of **macroeconomic balance**, the interaction between domestic supply (GDP) and domestic demand (final consumption and gross capital formation) is considered key. The basic source of macroeconomic imbalance is the fact that countries use more goods and services

<sup>16</sup> For this reason, international comparisons carried out by OECD and EUROSTAT indicate the investment rate calculated in PPP.

**Table 9: Creation and utilization of GDP (current prices, bil. CZK and per cent of GDP)**

	GDP	Domestic demand	FT balance	From it:			in % of GDP	
				goods	services	total	goods	services
2001	2352.2	2411.0	-58.8	-116.7	57.9	-2.5	-5.0	2.5
2002	2464.4	2515.8	-51.4	-71.3	19.9	-2.1	-2.9	0.8
2003	2577.1	2635.9	-58.8	-69.8	11.0	-2.3	-2.7	0.4
2004	2817.4	2816.3	1.1	-13.4	14.5	0.0	-0.5	0.5
2005	2994.4	2899.7	94.7	59.4	35.3	3.2	2.0	1.2
2006	3220.3	3117.3	102.9	68.2	34.7	3.2	2.1	1.1

Source: ČSÚ, annual national accounts (July 2007).

**Tabulka 10: Gross disposable income, national saving and gross capital formation (bil. CZK, current prices)**

	2001	2002	2003	2004	2005
Gross disposable income (GDI)	2287.4	2365.1	2467.8	2660.4	2830.0
Final consumption	1717.0	1811.8	1935.6	2041.9	2126.9
Gross national saving (S)	570.4	553.3	532.2	618.5	703.1
Gross capital formation (I)	694.0	704.0	700.3	774.4	772.8
Balance of national current transactions (S – I)	-123.7	-150.7	-168.1	-155.9	-69.7
Saving rate in per cent of GDI	24.9	23.4	21.6	23.2	24.8
Saving rate in per cent of GDP	24.2	22.4	20.7	21.9	23.5
Investment ratio in per cent of GDP	29.5	28.6	27.2	27.5	25.8
Difference between saving rate and investment ratio	-5.3	-6.1	-6.5	-5.5	-2.3
Net borrowing in per cent of GDP	-5.1	-4.7	-6.3	-5.4	-2.8

Note: Net borrowing = balance on current account according to national accounts (ESA 1995). The difference against the balance of national current transactions is given by capital transactions with non-residents (mainly capital transfers and net acquisition of non-produced non-financial assets from non-residents). Source: ČSÚ, annual national accounts (July 2007).

than they produce (domestic demand is higher than domestic supply). This gap is bridged by imports being higher than exports (negative net export). The development of domestic supply and demand in the Czech Republic between 2001 and 2006 is shown in Table 9.<sup>17</sup> Between 2001 and 2003, foreign trade in goods and services reported constant deficit, while between 2004 and 2006, a surplus was generated. This important change contributed to the growth of GDP and to the improvement of macroeconomic balance. The balance of services was positive, with the surplus becoming significantly more pronounced over the last two years.

Both the inflow of foreign direct investments to the Czech Republic and the country's accession to the EU played a positive role in the strong growth of Czech exports. It is quite remarkable that between 2005 and 2006, a high performance balance surplus was reported despite the worsened terms of trade. The positive development of foreign trade, with the export growth exceeding that of imports, is also a proof of the growing competitiveness of the Czech economy, even with the Czech crown appreciating.

Almost all new EU member states, with the exception of Slovenia, had to face the **issue of maintaining macroeconomic balance**. The reason was that domestic demand grew faster than GDP (resulting in a trade balance deficit) or the negative national savings to investments ratio (which was reflected in the deficit in the current account of balance of payments). Investment needs were brought about by structural changes and the building of infrastructure as well as in an attempt to improve the growth of standard of living (wages, private consumption) above potential given by the

labour productivity growth. The deficits of public budgets and the decreasing household savings rate played an increasingly important part in this macroeconomic imbalance.

Between 2001 and 2006, the gap between domestic demand and supply expressed as **performance balance** was least significant in the Czech Republic and Slovenia, while Slovakia showed the highest rates. In 2006, a trade balance surplus was generated not only in the Czech Republic, but also in Hungary, with the deficit being relatively low in Poland and Slovenia. Trade balance has given way to balance of incomes as the basic source of external imbalance.

#### Savings and investments relationship

The gap between domestic supply and demand is an important source of macroeconomic imbalance (both external and internal) but, in order to make the picture complete, we also need to consider the influence of distribution of income **between the national economy and the rest of the world**, taking into account the formation of disposable income and its use on consumption and savings<sup>18</sup>. At the macroeconomic level, the balance may be assessed from the perspective of the relationship between national savings and domestic investments (see Table 10).

The relationship between savings and investments in individual sectors in the Czech Republic shows that the long-term decrease in the rate of domestic savings has been caused especially by a significant drop of **household** saving rate, from 15.2% of disposable household income in 1995 to 6.6% in 2005. The formation of gross savings in the **government**

<sup>17</sup> If A is assigned to the sum of final consumption and investments (domestic absorption), then the following equation applies:  $GDP - A = X - M$ , with X = export of goods and services, M = import of goods and services.

<sup>18</sup> The following equation applies:  $S - I = CAB$ , with S = national savings, I = gross capital formation (investments), CAB = current account balance. This balance includes three main components: balance of exports and imports of goods and services (X – M), balance of primary incomes (NY) and balance of current transfers (NCT) between residents and non-residents, i.e.  $CAB = (X - M) + NY + NCT$ .

sector had been decreasing until 2003.<sup>19</sup> The increase in the subsequent years was driven especially by the fast growth of the economy and the related tax receipts. Relatively high investment needs of the government led to a situation where the formerly positive gap between savings and investments turned into a negative one, showing a strong growing tendency between 2000 and 2003. However, in 2004 the gap was reduced significantly, yet there was another increase in 2005. This, in itself, was an indicator of the growing government deficit. The need to finance the government sector is derived not only from the negative gap between savings and investments but also from net capital transfers that were negative and of a relatively high amount. This led to substantially **higher net borrowings** that exceeded, between 2000 and 2003, 6% of GDP annually. The deterioration of the government deficit measured by net borrowings was caused, to a large extent, by the growth of social benefits, one-off expenditures in relation to the restructuring of the banking and business sector and by including all guarantees provided by the government. In 2004 net borrowings dropped below the Maastricht criterion of 3% GDP. However, they grew back up to 3.6% in 2006.

Net operating surplus is the basic source of savings for **non-financial enterprises**.<sup>20</sup> It may be perceived as “profit” of non-financial enterprises that is subject to primary and secondary distribution. This leads to the formation of disposable incomes that are equal to the savings in the sector. Their growth between 2001 and 2005 was rather remarkable (from 373 CZK billion to 478 CZK billion). The share of savings within the non-financial enterprises sector in total gross national savings went up from 39% in 1995 to 68% in 2005, with their position in the Czech economy becoming of a key importance – especially given the dropping rate of household savings. Because of the substantial investment needs of non-financial enterprises, the gap between savings and investments had been negative up until 2004, becoming virtually neutral in 2005. It had not been before 2005 that net borrowings of non-financial enterprises, which were strongly volatile between 1995 and 2004, turned into loans provided to other sectors for the first time (as a result of a rapid increase in gross savings while investments were dropping).<sup>21</sup>

## 2.5 Current account of balance of payment

A dual concept of macroeconomic balance, based on the relationship of domestic supply and demand and on the relationship between investments and savings, is reflected in the current account. The gap expressed as trade balance and service balance (performance balance) and the current account balance must be filled with foreign resources. The current account balance is a more comprehensive tool for assessing macroeconomic balance since it considers both the balance of goods and services as well as the inflow and outflow of primary incomes abroad (income balance) and the balance of current transfers with the world (one-way

<sup>19</sup> Net savings of the government sector (net of consumed fixed capital) have been permanently negative since 1996.

<sup>20</sup> Balancing item in the account of income formation, which is left after subtracting remuneration of employees from net domestic product, with a modifying influence of taxes on production and imports and of subsidies.

<sup>21</sup> The Czech Republic is no exception in this sense. Enterprises in a number of developed countries changed their traditional behaviour (borrowing savings from other sectors to finance investments) and, instead, form financial surplus that they lend to other sectors. The growth of profit of enterprises as a result of low interest rates and reduction of tax burden, decrease of relative prices of investment goods and investment expenditures and an effort to generate a higher amount of liquidity in reaction to unstable external environment were among the main contributing factors enabling to increase savings.

transfers). By being equal to the difference between national savings and domestic investments, it points to the internal source of the external imbalance. Since the deficit of the current account must be financed by external sources, it is also tied to the financial account, investment position and external debt. While in the past the balance of current account was predominantly influenced by trade balance of goods and services, the flows of primary incomes in a form of wages, reinvested and repatriated profits and interests have become increasingly important as a result of free movement of capital and labour. Foreign direct investment contributed significantly to this major change of the current account structure.

**Current account deficit** expressed as a share of GDP (see Table 11) reached average 4.5% between 2001 and 2006. Over the last two years, it dropped significantly to 1.6% in 2005 and 3.1% in 2006. Net outflow of primary incomes to foreign countries in a form of wages, reinvested or repatriated incomes and interests reached average 5.3% of GDP between 2002 and 2006. Gross national income of the Czech Republic was lower by the aforementioned amount in comparison to gross domestic product. Similarly to Hungary or Ireland, the Czech Republic loses a substantial part of created income that cannot be used for consumption or investments. It may be expected that reinvestments and repatriations of profits will continue being the major source of the current account deficit.

Table 11: Current account (in per cent of GDP)

	Current account	Balance of trade	Services	Income	Current transfers
2001	-5.4	-5.0	2.5	-3.6	0.8
2002	-5.6	-2.9	0.9	-4.8	1.2
2003	-6.3	-2.7	0.5	-4.7	0.6
2004	-5.2	-0.5	0.6	-5.6	0.2
2005	-1.6	2.0	1.2	-5.2	0.4
2006	-3.1	2.1	1.1	-5.7	-0.6

Source: ČNB (2007), own calculation.

Table 12 shows a comparison of the EU-5 states of Central Europe. Between 2001 and 2006, the most significant deficits of the current account were generated in Hungary, followed by Slovakia and the Czech Republic. Slovenia shows positive results overall, however, with deteriorating tendencies. Substantial macroeconomic imbalance starts to trouble Hungary. Additionally, the deficit has been covered over the last years by an inflow of foreign portfolio investments in Hungarian government securities that, contrary to foreign direct investment, increase the foreign indebtedness of the country.

Table 12: Current account (in per cent of GDP)

	CZ	HU	PL	SI	SK
2001	-5.4	-6.0	-2.8	0.2	-7.1
2002	-5.6	-6.9	-2.5	1.1	-7.3
2003	-6.3	-7.9	-2.1	-0.8	-2.1
2004	-5.2	-8.4	-4.4	-2.6	-2.5
2005	-1.6	-6.8	-1.7	-2.0	-7.9
2006	-3.1	-5.9	-2.2	-2.7	-7.7
2001–2006	-4.5	-7.0	-2.6	1.1	-5.8

Note: Data for the Czech Republic after the revision in June 2007. Source: ECFIN (2007a), pp. 116–117.

When assessing the deficit of the current account of balance of payments, a limit beyond which the **macroeconomic**

**stability** of a country is at risk cannot be drawn mechanically. The simplified 5% GDP limit is often cited in literature as the imbalance warning sign. However, the impacts of the deficit depend on the sources of its financing (whether it is debt-generating, short-term or long-term capital), its use (investments or consumption), the level of foreign debt and foreign currency reserves and on the overall macroeconomic situation of the country. Considering these factors, the Czech Republic's current account deficit does not seem to be dangerous since it has been financed mostly by foreign direct investments, supported investment growth and has not contributed to increasing relative indebtedness of the country.

#### Influence of foreign direct investment on payment balance

The substantial inflow of foreign direct investments (see Box 1) has an important impact on the trade and income balances. Based on the disposable data, it is apparent<sup>22</sup> that enterprises controlled by foreign corporations have been creating deficits of trade with goods and services until 2000. However, their **performance balance** has been active since 2001, with a permanently growing surplus.

#### Box 1 – Companies with the participation of foreign capital

There are two different characteristics of foreign direct investments (FDI) and subsequently of the respective companies. 1) **FDI in the framework of the balance of payments** (FDI – defined by the IMF). Under this concept, the share of the investor's ownership must amount to at least 10 % of total fixed assets (equities, voting rights or their equivalents). Such a company is called FIE (foreign investment enterprise), i.e. companies with foreign participation (see Hunya, Geishecker, 2005). The definition indicates long-term relationship between the company and the investor. 2) **Companies under foreign control** in the framework of national accounts ESA 95 (the same definition is used by OECD – see OECD, 2005d). The precondition of this approach in the case of non-financial private companies is the participation on the fixed assets amounting to at least 50 %. Such a company is then called as the company under foreign control (controlled by non-residential institutional unit – FCE). Along with this definition, the Czech Statistical Office publishes the data on non-financial companies (above 100 employees). These two concepts, however, represent some problem for international comparisons.

Since 1998, negative **income balance** has been growing due to expenditures being significantly higher than receipts (see Table 13).

**Table 13: Balance of incomes (bil. CZK)**

	Receipts	Expenditures	Balance
2000	75.4	128.4	-53.0
2001	84.9	168.4	-83.5
2002	66.8	182.4	-115.6
2003	75.5	195.4	-119.9
2004	87.2	243.8	-156.6
2005	105.7	261.4	-155.7
2006	121.4	304.8	-183.4

Source: ČNB (2007), BOP statistics (31. 7. 2007), own calculation.

In terms of expenditures connected to direct investments (bringing profit to foreign investors), **reinvestments and dividends** prevail, with interests permanently being the least important item (see Table 14). The shift from reinvestments to dividends is clearly obvious. In 2001, more than three

quarters of profits were reinvested, while in 2006 less than one half. Similarly, the importance of paid dividends has been growing. Over the last five years, the share of repatriated profits more than doubled to 52%.

**Table 14: Components of the balance of incomes (bil. CZK)**

	2000	2005	2006
Balance of incomes	-53.0	-155.7	-183.4
Labour incomes	-12.0	-23.5	-35.7
Capital incomes	-41.0	-132.2	-147.7
Other investment (interest)	20.1	9.3	19.1
Portfolio investment	-7.5	6.3	4.3
Foreign direct investment	-53.6	-147.8	-171.1

Source: ČNB (2007), BOP statistics (31. 7. 2007), own calculation.

The Czech economy has confirmed the experience of other host economies where the positive impacts of the inflow of FDI on trade balance are accompanied by negative impact on income balance; with **growing profitability of foreign-controlled enterprises** (see e.g. Brada, Tomšík, 2003). It is likely that the tendency to shift profits from reinvestments to repatriations will continue in the Czech Republic. UNCTAD analysis (2006) shows that investors from developed countries repatriated on average 55% of their profits between 1990 and 2004.

**Foreign debt** reflects the long-term external imbalance. Its changes depend on the method of financing of the current account deficit (whether or not it is debt-generating). Hungary shows the highest debt of the group of Central European countries, with indebtedness growing from 56% of GDP in 2002 to almost 90% of GDP in 2006. Imbalance was getting worse in Slovakia over the two last years, with the current account deficit being increasingly more influenced by the negative income balance. Short-term capital begins to participate in the financing of the deficit, which reflects in the growth of foreign indebtedness (gross foreign debt went from 48% of GDP in 2002 to 58% of GDP in 2005). A debt growth (up to 80%) was also reported in Slovenia. The Czech Republic has the lowest foreign debt rate of all countries of Central Europe (below 40% of GDP).

The inflow of foreign direct investments still remains the most important source of **deficit funding**. Even though FDIs are still considered a predominantly non-debt-generating, their part (represented by other capital) becomes a part of foreign debt. This involves inter-company loans between direct investors and subsidiaries and branches. The amount of foreign debt and its structure is an important indicator since the debt service consumes resources that cannot be used in the domestic economy.

**Table 15: Investment position of the Czech Republic (bil. CZK, to 31. 12.)**

	Investment position	FDI	Portfolio investment	Other investment
2000	-191.9	-790.5	15.8	84.9
2005	-835.2	-1402.8	30.0	-199.8
2006	-1034.0	-1511.5	44.0	-240.2

Source: ČNB (2007), BOP statistics (31. 7. 2007), own calculation.

Direct foreign investments have even a greater impact on **investment position**. The Czech Republic recorded a high deficit of the foreign direct investments item, reaching up to CZK 1511.5 billion at the end of 2006 (see Table 15). An EU-25 comparison shows that, per capita, the Czech Republic has a similar investment position as Hungary.

<sup>22</sup> Contributions of companies under foreign control to the entire trade with goods and services may be quantified based on annual surveys carried out by the Czech National Bank (see ČNB, 2007b). The last available data relate to 2005.

### 3. Nominal convergence

Convergence of nominal values takes place simultaneously with real convergence. This process includes approximation of price and wage levels of catching-up economies with the European average. Two transmission mechanisms are involved in nominal convergence: inflation differential and appreciation of the nominal currency exchange rate. Currently, the impacts of the euro adoption, resulting in the disappearance of the exchange rate channel, are discussed. The course of nominal convergence is subject to a number of structural specifics, especially when looking separately at tradable and non-tradable sectors as well as individual items of GDP expenditures and various categories of household consumption expenditures.

#### 3.1 Price level convergence

In economic theory, price convergence is understood as a process of approximation of the **total (i.e. comparative) price level – CPL** – to that of another country or a group of countries.<sup>23</sup> Price convergence is a part of nominal convergence (process), i.e. convergence of all values present in the economy. For analytical purposes, the macroeconomic view, including comparative price levels and their determinants, with the microeconomic view, focused on structural aspects (convergence of relative prices), need to be considered.<sup>24</sup> The **price level** lagging behind the economic level has been a typical feature of the Czech economy (see Vintrová, Žďárek, 2007), despite its fast growth since 1995 (56% vs. 71% in comparison to the EU-15 in 2006 – see Figure 1). During the entire period, the differences were not as pronounced in Hungary, Slovakia and Slovenia, with the price level in Poland even preceding the economic one (however, this could also be influenced by the parity calculation method).

**Adjustments** of the price and economic levels may be carried out through two different channels. (See Box 1.) In the case of the Czech Republic, it has only been happening due to appreciation of the domestic currency over the last decade, with the inflation differential compared to the EU states having no effect (it even reaches negative values on yearly averages). Between 2001 and 2006, the average annual inflation rate in the Czech Republic was 1.9%, whereas, in the eurozone, it was 2.2% (according to HICP). The average yearly appreciation toward the euro reached 3.9%, however, the trade

and performance balance did not deteriorated, and has even been generating surplus since 2005. This fact should be considered when **adopting the euro**; the exchange rate channel will no longer play its role and the approximation of price levels will only be carried out through positive inflation differential.

#### Box 1 – Channels in case of the price convergence

Adjustment of the comparative price level (CPL) in a national economy can be written with help of a simple equation as (see Lewis, 2007):  $CPL_t = X_t + \pi_t$ , where  $X_t$  is change of exchange rate and  $\pi_t$  is rate of domestic inflation for given year  $t$ . The relative importance of both channels depends on the regime of exchange rate in a given country. If there is a fix exchange rate, the adjustment carries out through the inflation channel (i.e. positive inflation differential), in case of a free float the total change of CPL is given by composition resulting from both channels and thus relative proportion (importance) may vary. If there is set an inflation target for conduct of monetary policy (this is the case of the Czech Republic, Slovak Republic or Poland), it is simultaneously given the upper limit for inflation channel for a year in the process of price convergence.

**The price channel** which influences the national price level in an economy in question is given by a higher annual rate of domestic inflation. This results from changes of economic structure (for example so-called selective inflation in case of Balassa-Samuelson effect), demand and supply factors, on-going process of deregulation of administered prices, changes of taxes (for example changes due to harmonization within the EU) etc. **The exchange channel** which influences the national price level, is given by changes (appreciation) of exchange rate. However, changes of exchange rate may be influenced both short-lived (i.e. temporary) and long-lived (i.e. fundamental) factors. While transitory factors may lead to temporary disturbances and changes of exchange rate (for example set interest rates in economy resulting in important interest rate differentials), fundamental factors are supposed to be more relevant (for example changes of labour productivity, i.e. GDP per employed person, in a given economy).

**Sectoral differences** of labour productivity are supposed to be given by influences resulting from Balassa-Samuelson effect (supply side effect) in neoclassical economic theory. Other explanations are focused on factors linked up with changes of real income of economic subject by different elasticities of consumption influenced by level of disposable income and its changes (see e.g. Bergstrand, 1991), influence of relative abundance of inputs (factors of production, i.e. their relative abundance or relative scarcity, see e.g. Bhagwati, 1984). There are a large number of other variables which have impact on national price level (so-called structural factors) and are discussed and often empirically tested in literature (see Čihák, Holub, 2003<sup>25</sup>; Kleiman, 1993<sup>26</sup>; Nestić, 2005<sup>27</sup>).

<sup>23</sup> The progress of nominal convergence has been assessed in literature from other perspectives as well: e.g. approximation of the difference of GDP expressed in the euro based on the purchasing power parity and the market exchange rate (i.e. reduction of the ERDI coefficient) or the compliance with Maastricht (convergence) criteria for euro adoption. (See e.g. EC, 2006; ECB, 2006; Schadler et al., 2005; Dobrinsky, 2006; Vávra, 1999).

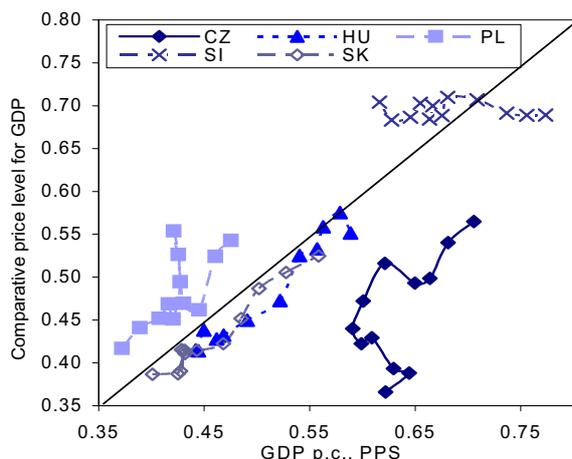
<sup>24</sup> Some of the studies taking a closer look at price convergence in the new EU member states are: Čihák, Holub (2001a, 2001b, 2003); Holub, Čihák (2000); Nestić (2005). These have confirmed the continuing price convergence in the majority of the countries, both in comparison to the averages of countries (e.g. the EU-15 or the eurozone countries) as well as to Germany. Price convergence has been confirmed for the old EU states (see e.g. ECB, 1999), confirming convergence for tradable goods. On the contrary, studies by Lutz (2002) and Buseti et al. (2006) did not confirm the progress of price convergence. One of the reasons may be that trade barriers still persist in the internal EU market.

<sup>25</sup> The empirical testing of determinants of the national price level based on ECP data set show that the highest relative importance has level of real income, taxation, labour productivity, etc.

<sup>26</sup> Taxation may give rise to increasing prices in domestic economy (in case of shift of tax burden to consumer while having accommodative monetary policy). Influence of government expenditures on prices is supposed to be given by the necessity to finance higher government expenditures either by higher taxes and/or higher ineffectiveness of government production and distribution of goods and services in comparison with private sector.

<sup>27</sup> ECP data set for 1999 confirmed the importance of government revenues and expenditures and labour productivity as the most important factors for determining comparative price level in a given economy.

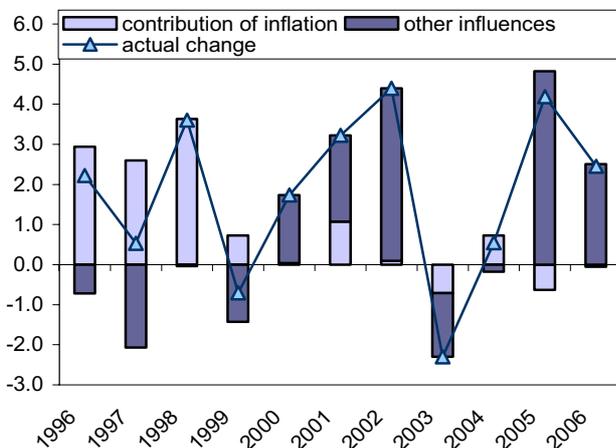
**Figure 1: Real and nominal convergence, EU-5 countries, 1995–2006 (EU-15 = 1)**



Source: EUROSTAT (2007c), (downloaded 14. 7. 2007), own calculation.

Figure 2 shows a change in comparable price level for GDP that has been broken down into price development, the influence of other factors in the Czech Republic. Between 1996 and 1998, inflation differential significantly contributed to nominal convergence (the growth of the CPL value). After 1999, the disinflation policies of the ČNB modified the form of nominal convergence, resulting in negligible or even negative inflation differentials compared to the EU-15 which confirms the prevailing importance of the exchange rate channel for price convergence. So far the only exception to the rule was year 2004.

**Figure 2: Decomposition of price convergence for GDP in the Czech Republic, 1995–2006 (in p.p., EU-15 = 100)**



Note: actual change = change of CPL ( $CPL_{GDP, t} - CPL_{GDP, t-1}$ ), other influences = change of nominal exchange rate, changes of methodology. Source: EUROSTAT (2007c), (download. 14. 7. 2007), own calculations.

The process of price (nominal) convergence may also be analyzed from the perspective of **factors** that contributed to the overall change. Besides the inflation rate differential (measured by the difference of the deflator in the national economy and deflator in e.g. a reference group), they also include the development of nominal exchange rate as well as methodological changes (transfer to a different system of national accounts, changes in the sample of surveyed items, different methods of identification) that are, however, only hardly quantifiable without the knowledge of related circumstances.

The issue of a relatively **low comparative price level** in comparison to the economic level of the Czech Republic has been often discussed in literature. It could present a problem upon the adoption of the common currency, or during the ERM II stage. The authors do not draw identical conclusions, however, some of the factors that have had an important impact on the price level within the Czech economy have been identified.<sup>28</sup> These include especially triple devaluation of the crown at the beginning of the transformation process, price terms and their distortion during the communist regime (centrally planned economy), the influence of indirect taxes, speed and costs of arbitrations, share of the sector producing non-tradable goods and services, a lack of full competition, non-economic factors, or statistical fallacy.<sup>29</sup>

Contrary to simple models, a number of goods and services (commodities) may not be traded internationally (exported or imported) but are produced and consumed within the national economy (non-tradable commodities). **Tradability** is influenced by a number of factors and changes throughout the time. High transport costs that may be reduced by the development of technical progress (e.g. the development of information and communication technologies, ICT),<sup>30</sup> or customs duties, quotas and regulations are examples of obstacles to tradability.

The issue of statistical fallacy may be a very specific one. Unless a given representative is available in the compared economies, expert quality modifications are carried out by choosing a different representative. The first step involves the modification of the relevant Czech item (e.g. type of food or clothes), with the difference in the foreign and Czech prices being appraised by the costs of its production. Other factors, such as preference, fashion or luxury consumption effect may present a problem to carrying out the appraisal of brand products within the given economy. In any case, the price is a hypothetical (created) price that may differ from the real one that may be reached on the market. This way, an under appraisal of the price level in the national economy is created that may be of importance should the specific items (i.e. those estimated or adjusted) form an important share of the surveyed items (errors in calculations accumulate).

**Structural aspects of price level development**

Strictly macroeconomic approach to assessing the development of nominal convergence would not suffice since the development of individual parts may be mutually offset. Therefore, an analysis of the individual parts needs to be carried out. It uses data from an international project aimed at comparing prices and actual production in individual countries. Variations from the comparative price level ( $CPL_{GDP}$ ) in the EU-5 states compared to the EU-15 are significantly influenced especially by a different price level of public consumption (it is significantly lower than the GDP

<sup>28</sup> See Škořepa (2001); the issue is discussed at a more general level by e.g. Égert (2006).

<sup>29</sup> Empirical verification of individual variables is rather problematic, however, some authors attempt it (see Nestić, 2005; Žďárek, 2006). The availability of observations for incomplete periods and interrupted flow of observation may present a problem (the data for periods between individual phases of the international survey are estimated in different ways which results in distortions that cannot be fully identified).

<sup>30</sup> Example: banking services, insurance or data processing services that are often provided to companies in different parts of the world based on cost advantage (this does not apply to specific quality- or control-intensive services). On the other hand, newspapers and goods in the national language are virtually non-tradable in other parts of the world (except for the main world languages).

price level). This effect is apparent from the CPL of household consumption expenditures being different from the CPL of actual individual consumption that includes a part of public consumption (For definitions, see Box 2). Yet the price level of household expenditures is almost identical to the GDP price level (see Table 1).

**Box 2 – International comparison project and key definitions**

International Comparison Programme, ICP started in 50's as reaction to needs of OEEC (OECD) for having the same economic indicators for measuring performance of OECD member states. The current form of the ICP was created at the end of 60s (1967). It was the methodology created under supervision of the United Nations (with help of World Bank) that made it possible. Given the fact that this project was done for countries of all level of income all over the world, later was created European Comparison Programme (ECP). On its basis is run the common project of OECD and EUROSTAT. The first round was in 1980 and included 18 countries (see e.g. study of Kravise and Hestona, 1988). The following rounds were every five years. Since 1993 the rounds have been done every three years and number of countries has continued to rise up to 42 in 2005. since 1993 there has been new methodology for ECP (ICP), i.e. common approach for setting-up and measurement of main economic indicators (the system of national accounts SNA 1993 and ESA 1995), which replaced the previous system of national accounts SNA 1968 (ESA 1970).

**Comparative price level (CPL)** is measured as ratio of current (spot) exchange rate and PPP exchange rate. Indicator of CPI is usually expressed in percentage points in relation to a reference country (or as an average of a group of countries). EUROSTAT uses similar indicator of comparative price level which is price level index (PLI).

The comparative price level for GDP is the most comprehensive view. Comparative price levels for the **main GDP components** are also calculated: consumption (private and public), gross fixed capital formation (machinery and equipment, construction and others) and export and import of goods and services. The comparative price level for GDP is calculated as weighted average of the main GDP components.

There are two approaches to measurement of **consumption** (who pays and who consumes) as a component GDP. It is also calculated household consumption (actual and individual), consumption of non-profit institutions serving households (NIPSH) and government consumption (actual and individual). The main problem is linked up with prices of non-market production (i.e. various government services) and their prices have to be calculated artificially.

**Actual individual consumption** is one of the indicator of consumption which is measured (and preferred) in ICP (ECP). It is one of the indicator defined in ESA 1995 and consists of all consumed paid or unpaid goods and services (this is a view – who really consumes). It also makes up of both total amount of goods and services paid by the households and amount of goods and services produced by government and distributed among households free of charge or for very low prices (for example health and education).<sup>31</sup>

**Final household consumption expenditure** are the second type of consumption which is calculated within national accounts framework. In this particular case it is important who pays for the amount of goods and services. If goods or services are consumed by a household but paid by government it is not included within this category.

**Actual collective consumption** is consumption of government institutions and it is a part of final household consumption expenditure. This type of consumption is used for the parts of government consumption which cannot be added to individual consumer (household). It is a heterogeneous group of various services – national defence, public administration, security, judiciary, etc.

<sup>31</sup> Non-profit institutions serving household are included in this type of consumption.

**Table 1: CPL for total GDP and its components (EU-15 = 100)**

		CZ	HU	PL	SK	SI	EU-25	OECD
2002	GDP	51	52	52	41	70	96	106
	H. expen. <sup>1)</sup>	53	55	57	43	73	97	109
	Actual c. <sup>2)</sup>	48	49	51	38	70	96	110
2005	GDP	56	55	54	52	69	96	94
	H. expen. <sup>1)</sup>	56	60	58	54	72	96	..
	Actual c. <sup>2)</sup>	51	55	52	48	70	95	..

Note: <sup>1)</sup> Individual consumption expenditure by households. <sup>2)</sup> Actual individual consumption. Source: OECD (2005), pp. 37, pp. 40, pp. 137–138, pp. 141–142; OECD (2007a), pp. 279; EUROSTAT (2007e), own calculation.

Within the CPL of total GDP, lower prices of public consumption within the EU-5 countries are compensated by other items, especially by higher prices of **gross capital formation** (this applies especially to machinery that is mainly imported). CPL of investment goods saw the quickest rise as shown by the data for the Czech Republic and other EU-5 states. For example, in 2005, the CPL of machinery and appliances in the Czech Republic reached as much as 93% of the EU-15 level (rising by 17 percentage points between 1999 and 2005). The CPL of built structures rose by significant 28%, however, it still remains below the CPL GDP average (see Table 2) and, unlike machinery, these are usually considered non-tradable goods.

The last round of the European Comparison Project (ECP) for the 2002 round enables a more **detailed analysis of the structure** of price level development in selected new and old EU member states (or their groups). This detailed structure of goods and service prices provides sufficient data on the sources of potential price convergence (i.e. the process of price adjustment). Table 3 shows the price levels and variable coefficients for the main expenditure categories in the EMU and EU-5 states.

**Table 2: Comparative price levels for selected items of gross capital formation (EU-15=100)**

		CZ	HU	PL	SK	SI	EU-25
1999	GFCF	57.8	66.3	62.6	73.5	65.2	97.4
	Machin. & eq.	79.4	78.5	79.4	92.6	88.0	98.6
	Construction	41.4	56.1	47.5	56.7	47.0	95.7
2002	GFCF	67.5	70.8	67.0	66.4	71.2	97.7
	Machin. & eq..	92.9	84.1	93.8	86.9	88.4	99.3
	Construction	48.4	60.4	47.2	57.3	49.5	96.0
2005	GFCF	68.3	75.8	62.9	70.4	67.7	97.4
	Machin. & eq.	93.0	92.8	93.3	91.5	97.6	99.5
	Construction	53.0	65.4	47.0	53.2	52.9	95.2

Note: gross capital formation = gross fixed capital formation, machinery and equipment, construction. Source: EUROSTAT (2007e), own calculation.

Clothes, shoes, recreation, culture, sports and house equipment show the **lowest variability** (measured by coefficient of variation) of all consumer goods in the EMU. As for the EU-5, the situation is almost identical, with the lowest variability levels in clothes, shoes, and transport or house equipment. These goods are usually tradable, thus being subject to arbitration and the resulting price balancing between the countries. On the other hand, there are significant differences in goods with limited tradability, such as housing, education or healthcare. A similar situation exists in goods that are on the limit of both groups (with limited tradability, or subject to strong state regulation), with apparent significant differences

(e.g. alcoholic beverages, tobacco, pharmaceutical products). Additionally, catering and accommodation services, similarly to posts and telecommunications, show substantial differences among the various EU-5 states.

**Table 3: CPL and their variability, 2002 (EU-15 = 100)**

	EMU	Var.	EU-5	Var.
GDP	97	0.130	54	0.173
Household final consumpt. expen.	98	0.138	56	0.172
Food and non-alc. beverages	99	0.105	63	0.190
Alc. bever., tobac., narcotics	96	0.302	60	0.124
Clothing and footwear	104	0.108	77	0.094
Hous., water, elec., gas, ot. fuels	100	0.270	41	0.324
Hous. furnishing, equip., mainten.	97	0.092	65	0.047
Health	96	0.178	48	0.223
Transport	96	0.127	70	0.113
Communication	98	0.107	93	0.220
Recreation and culture	98	0.103	65	0.194
Education	112	0.318	33	0.433
Restaurants and hotels	99	0.146	54	0.237
Misc. goods and services	97	0.149	57	0.177
Final consumpt. expen. of NPISH	91	0.229	32	0.413
Final cons. expen. of gen. gov'nt	98	0.200	39	0.340
individual con. exp. of gen. gov'nt	97	0.217	36	0.375
Collective con. exp. of gen. gov'nt	98	0.184	44	0.304
Gross fixed capital formation	96	0.129	69	0.029
Machinery and equipment	101	0.062	89	0.041
Construction	94	0.218	53	0.100
Other	97	0.087	86	0.090

Note: Variability (Var.) expressed by means of coefficient of variation. Source: OECD (2005), pp. 140–143, own calculation.

Differences in the **levels and variability of prices** are documented by a comparison of public consumption expenditures with GFCF data (the machinery and appliances item). In the EU-5 as well as in other transition countries (see Nestić, 2005), the price level of machinery and appliances stands at almost 90% of the eurozone average (with a correspondingly low coefficient of variation). As opposed to that, in terms of public expenditures, the EU-5 states are at approximately two fifths of the EMU average, showing significant variations among themselves (the indicator is influenced by Slovenia and its public consumption level above 55% of the EMU). Similar differences also apply to the goods and services that may be perceived as tradable or non-tradable.

### 3.2 Selected implications from nominal convergence in the EU

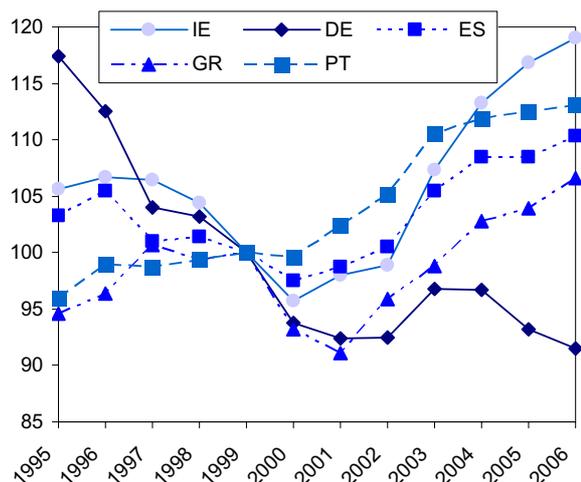
Studies dedicated to nominal convergence in Europe have shown that it is a gradual, yet very significant process in a number of states of the EU and the monetary union (see ECB, 1999, 2005), especially in respect to tradable goods.<sup>32</sup> The opposite is true for non-tradable goods affected by taxation or regulation. However, some studies do not confirm price convergence (see Lutz, 2002; Buseti et al., 2006). This would point to the prevailing barriers within the EU that should be completely eliminated by the process of European integration.

<sup>32</sup> A comparison between the development in the eurozone and the USA seems rather problematic due to the latter's different structural characteristics.

The existing differences in price levels lead to inflation pressures since the exchange rate channel is closed, with price movements being the only (market) way of price level adjustment. The different inflation rates in the EMU countries (a group of South European converging countries vs. the EU founders) hinder the effectiveness and impacts of the **common monetary policy**. As a result of the EMU enlargement, the share of countries with a higher inflation rate could grow, with the effects of more stringent currency policies, such as a negative real interest rate, in the countries with positive inflation differential or the countries with a negative differential possibly reflecting in investors' decisions on allocating funds, as well as in customers' decisions on savings or long-term investments (financed with the help of various financial tools).<sup>33</sup>

**Real effective exchange rate (REER)** serves as a reflection of the various inflation rates in the competitive position of the individual eurozone states. Figure 3 shows the development in selected EMU countries. If the new EU member states access the EMU in a situation of real convergence (with the Balassa-Samuelson effect also apparent), the higher inflation rate could significantly affect their REER and, as a result, the price competitive of a country.

**Figure 3: Development of real effective exchange rate (REER) for selected EU countries, 1999 = 100**



Source: EUROSTAT (2007f), Sustainable Development Indicators, Economic Development.

The **exchange rate and price channels** are both important for the development of nominal convergence. After accessing Exchange Rate Mechanism II (ERM II) and the set-up of central parity for the national currency, the importance of the price channel diminishes to be removed completely after the accession to the common European currency. The entire process of adjusting national nominal value will be carried out through prices. The price channel will be of a great importance in the countries with significantly different nominal and real (economic) levels which is the case of Slovenia and the Czech Republic in particular. If the importance of this channel is suppressed, it may result in a slow-down of necessary structural changes (real convergence).<sup>34</sup> The information on

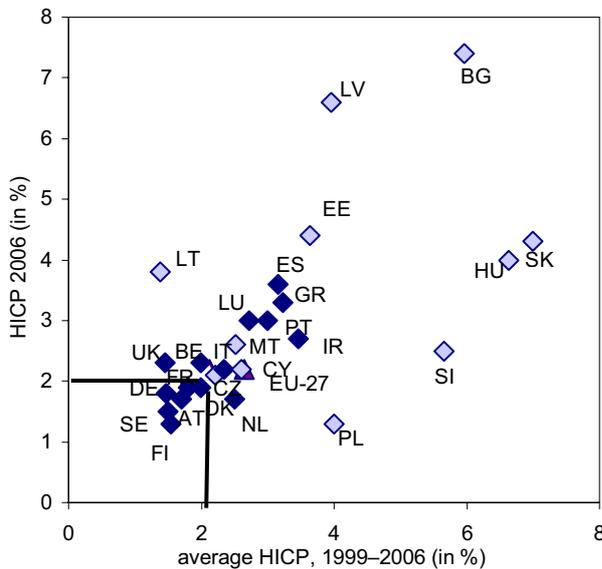
<sup>33</sup> The actual construction of the Maastricht convergence criterion is very problematic in respect to the price growth. To learn more, see e.g. Brook (2005) or Bulíř, Hurník (2006).

<sup>34</sup> Let's consider the criterion fulfilled if the exchange rate oscillates within a narrow band of  $\pm 2.25\%$ . Asymmetric zone, i.e. with a possi-

the functioning of the eurozone is rather mixed, also due to the fact that the countries in the first wave were on a higher development level (except for three or four states that joined the EU in the 80's or Ireland a decade earlier) than the level of the current new EU member states is. Relatively higher economic and price level does not require such significant changes in price structures (and convergence) as in the case of the less developed countries.

Other factors influence the inflation rate and adjustment of price relations. One of the most frequent and problematic is Balassa-Samuelson effect (or Harrod-Balassa-Samuelson effect – HBS). While its estimated values for the EU-15 states (or more precisely the eurozone) and its effect on the inflation rate are marginal, it may present an important pro-inflation impetus in the new member states.<sup>35</sup> The HBS effect is responsible for structural inflation. The estimates of its importance are very different and rather ambiguous, with a strong dependence on author's approach (the model type of the HBS effect) and the subsequently used method of economic estimate (see Égert, 2006).

Figure 4: Development of inflation, EU-27 countries, 1999–2006, HICP (%)



Note: Romania: average for the period 1999–2006: 23.0%, average for 2006: 6.6%. EU-25: 2.1%, 2.2%; EU-15: 2.0%, 2.2%; EU-12: 2.1%, 2.2%. Within the current ECB's target (HICP close to 2%) only 6 countries (AT, DE, DK, FI, FR, SE). Source: EUROSTAT (2007e), own calculation.

Figure 4 illustrates inflation differentials that reflect price adjustments and the influence of the HBS effect in the EU

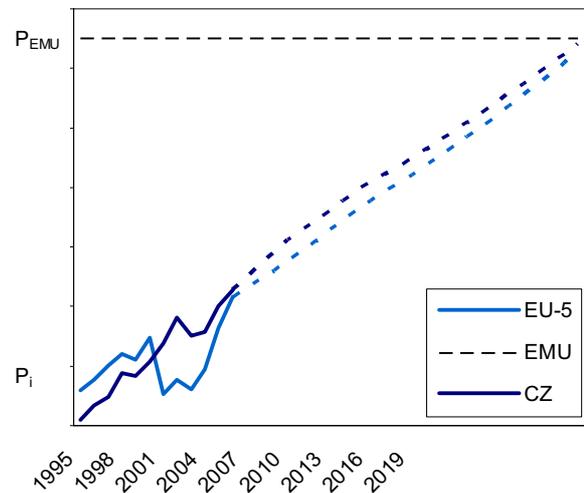
ble significant appreciation (up to 15%) would not have to be perceived as the fulfilment of the criterion, with the same also applying to changes in central parity. However, Slovakia, for example, that showed a significant currency appreciation in 2006 was able to put through the change in central parity without major difficulties.

<sup>35</sup> Some of the most frequently cited works, including those of Mihaljek and Klau (2003), estimate the influence of the HBS effect on the inflation rate between 0.1 to 2.0 percentage points (the average yearly inflation rate per country) which should not present a problem to the fulfilment of the Maastricht convergence criteria by the new EU member states. However, the latest estimates (see Brook, 2005) noted the importance of the influx of foreign direct investments to the EU-5 states over the last years, which indirectly increases the importance of the growth of this effect. To learn more on its importance and issues related to the fulfilment of the Maastricht convergence criteria of price and exchange rate stability, see the discussions in UNECE (2001), Dobrinsky (2006).

states. It shows the development of harmonized **inflation rate** in both the long-term perspective (the average over 7 last years after the introduction of the euro) as well as the 2006 yearly average. The goal set by the ECB for the inflation rate (2% on average) was completely achieved in just six countries (Finland, Sweden, Denmark, France, Germany and Austria), i.e. mature economies that do not undergo any significant convergence processes or sudden structural changes or stagnation. If the inflation rate goal had been at 3%, 14 countries would have achieved it (almost all eurozone states with the exception of Ireland, Greece and Spain), also including the Czech Republic. The remaining new member states showed a significantly higher inflation rate. As a result they may expect substantial problems when fulfilling the Maastricht convergence criterion that is set at approximately 2%.

**Suboptimality of monetary policies** has a real impact on the economies of the EU states in a form of e.g. negative real interest rates in some countries (Ireland and Greece), leading to excessive investment activity or increased danger of creation of bubbles on asset markets (and the real estate market in particular).<sup>36</sup> Other aspects include the issues of the actual construction of the Maastricht convergence criterion that takes into account three countries with the lowest inflation rate in the EU, not just the countries using the common currency (eurozone). Additionally, the goal is variable and, therefore, it is very difficult for the new member states to forecast it in an effort to fulfil the convergence criteria.<sup>37</sup>

Figure 5: Paths of nominal convergence in relation to the EMU average (EU-12), 1995–2006 and forecast for the next years



Note: Actual path of nominal convergence is showed by 2006, 2007 onwards it is a projection. Average rate of growth for the path of the Czech Republic was set by 3.4% (by 2010), 2.4% (by 2015) and 1.8% (2016 onwards). In case of EU-5 countries was chosen the rate of growth 2.6% (by 2015) and 2.1% onwards. Source: EUROSTAT (2007e), own calculations.

<sup>36</sup> For example in significantly positive interest rates in countries such as Finland or Germany.

<sup>37</sup> The problem is twofold. One question is whether countries outside the eurozone should also be included in the calculation of this criterion (non-members may push the criterion value down as was the case of Lithuania in 2006), while the other one is whether the total inflation rate in the economy should be considered. The European Parliament has already discussed the possibility of reviewing the Maastricht criteria, and the inflation criterion in particular.

The course of nominal convergence may be expressed through dynamic approach. Figure 5 shows both the real course of nominal convergence compared to the eurozone average (up until 2006) and the estimate for the future period. In comparison to the EMU level, the new member states remove a part of the nominal gap every year, i.e. they have to show a higher growth rate of prices or movement of exchange rates or a combination of both. A decreasing rate of nominal convergence is expected in relation to joining the ERM II mechanism, or, the monetary union. Subsequently, price adjustments via exclusively the price channel will take place. As the experience of converging countries, EMU members, has shown, further convergence may be much slower, or may come to a complete stop.

### 3.3 Conflict between real and nominal convergence and its impact on the euro adoption

The differences between real and nominal convergence and the variously developed relationships between real and nominal convergence is projected in the preparedness of individual countries to adopt the euro. Within the process of price convergence, which accompanies real convergence, price pressures increase, possibly resulting in selective inflation. They are mostly apparent in the sector of non-tradable goods and services where they do not correspond to the labour productivity growth (see the Harrod-Balassa-Samuels effect). The continuing deregulation and tax adjustments (adjustments of consumer and environmental taxes) also affect the growth of prices. The higher growth of the domestic price levels, arising from the adjustment of relative prices, leads toward appreciation of the real exchange rate and to increasing the price of goods exported to foreign markets. The loss of price advantage may only be faced by the increasing share of top-quality products.

In terms of the euro adoption, the **Czech Republic** shows some specifics. The major difference between purchasing power parity of the crown and the exchange rate, which has been present since the beginning of the transformation, even though it has diminished significantly over the last period. It is necessary to expect that the process of relative price adjustment will take place, including the necessary maintenance of price stability during the preparation period for the euro adoption, also taking into account the weakened usability of the exchange rate channel. The relative price level, corresponding to the economic maturity of the Czech Republic, should currently be at 75% (in relation to the EU-27); however, it is more than 15 percentage points lower. With the current rate of price level approximation, which reached slightly below 4% over the last 6 years, the expected level in comparison to the EU-27 could be reached approximately between 2012 and 2013, or at a later date due to the expected slow-down of the appreciation process.<sup>38</sup> As a result, given the concur-

<sup>38</sup> The approximation of the price level, carried out through nominal appreciation of the CZK, initially came to a stop at the beginning of 2007, to become reversed later. However, between 2005 and 2006, the appreciation reached above-average values (in comparison to the euro, the CZK appreciated at a yearly average rate of 7.1% and 5.1% respectively), so it may only present a deviation from the course, similar to that in 2002 after a period of excessively rapid appreciation. (During that year, the CZK/EUR exchange rate appreciated by 10.6%, however depreciation occurred between 2003 and 2004). Besides the development of the fundamental values, the exchange rate is subject to influence of a number of factors. Due to low interest rates in the Czech

rent course of real convergence, the CPL would still be significantly below the level of equally developed countries (the economic level of the Czech Republic in relation to the EU-27 may be estimated at some 85% to 90% for the period in question).

In order to ensure the stability of the single currency, the adoption of the euro requires compliance with the strict inflation rules and the related interest rates as well as reasonable development of public budgets. In rapidly-converging economies, these requirements may be in conflict with the goal of fast economic growth. Therefore, the adoption of the single currency requires that certain progress in real convergence be achieved. It may be expected that the most important structural changes have already taken place in the Czech Republic and, in this respect; the country is ready for accessing the eurozone.

So far, real convergence in the **EU-5 and the Baltic countries** has been connected to relatively high inflation rates that were substantially over the EU-state average during the transformation period. At the beginning of the decade, the Czech Republic and Lithuania were an exception to the rule, with their inflation rates lower than the eurozone average (even reaching negative values according to the HICP indicator in 2003). In the current decade, the high inflation still persists in Hungary, Slovakia and Slovenia. As a part of preparations for the euro adoption, the inflation rate in Slovenia dropped in 2006, with a similar process currently being under way in Slovakia (in 2007). (See Table 4).<sup>39</sup>

Table 4: Rate of inflation (HICP)

	Rate of inflation (annual average, in %)			
	1997–2006	1997–2000	2001–2006	2006
CZ	3.4	5.8	1.9	2.1
HU	8.5	13.1	5.5	4.0
PL	5.8	11.0	2.5	1.3
SK	6.9	8.8	5.6	4.3
SI	6.1	7.8	5.1	2.5
Eurozone	1.9	1.5	2.2	2.2

Source: EUROSTAT (2007d), (downloaded 21. 5. 2007).

The accession to an environment with low inflation rate and low interest rates, supporting investments and growth, presents an important advantage for the economic growth after the adoption of the single currency. In the EU-5 countries, with the exception of the Czech Republic, interest rates are substantially higher than those in the eurozone. As a result, lower interest rates may speed up real convergence. At the same time, a danger of overheating and subsequent slow-down of

Republic (third lowest globally, following Switzerland and Japan), the CZK is used, similarly to Japanese yen, only for financial transactions where credits are accepted in crowns to be then exchanged for other currencies that are subsequently invested in countries with higher interest yields. After the fluctuation in the US real estate market at the beginning of Q3, the situation changed and the exchange rate development reversed again. The CZK has begun to appreciate in respect to both the EUR and the USD. The future effects of these factors, that may significantly modify the development of the exchange rate, are very difficult to predict from the long-term perspective.

<sup>39</sup> Lithuania, a formerly low-inflation country, presents a specific example. Due to a delay in deregulation, the inflation grew. This tendency was a reason for the country to be refused the access to the ERM II exchange rate mechanism, even though the Maastricht criterion was exceeded only negligibly.

the economic growth is created, unless the catching-up countries show sufficiently faster growth of the labour productivity compared to the more developed states and if the domestic demand is covered by disproportionate growth of imports, with excessive use of foreign savings (as was the case of Portugal after accessing the eurozone).

The positive impacts of removing **exchange rate risks** vary under different circumstances. The reduction of risks is important for the countries that suffer from high deficits of the current payment balance account. This is the case of especially the Baltic countries and Hungary. For them, the single currency means protection against a monetary crisis that could occur as a result of pressures exercised by financial speculations. In specific cases, ensuring the stability of the exchange rate may prevail over possible disadvantages. However, this conclusion does not apply to the Czech Republic that shows a positive trade and performance balance, with the deficit of the current payment balance account being at acceptable levels over the last years. The growing deficit of income balance, to a large extent swallowing the trade balance surplus, may present a potential risk for the future.

Reduction of the **transaction costs** due to the single currency has a positive impact on all countries involved, with exporters especially profiting. Another positive effect is increased transparency with prices and wages indicated in euros, i.e. a certain demonstrative effect. This could also contribute towards an approximation of price and wage levels, especially in geographically close countries and regions. Countries with their macroeconomic stability at risk may profit from the corrective influence of the Stability Pact the conditions of which are aimed at **increasing financial discipline**. However, as the examples of Greece and Portugal have shown, the pressure of the Stability Pact may not suffice, with the countries being able to find their way around it.

The specific **balances of gains and costs** of adopting the single currency differ among the individual EU-8 states. Slovenia showed the least amount of problems when adopting the single currency, with the country already reaching rather high economic (87% in 2006) and price (73%) level in comparison to the EU-27. Similarly, Slovenian nominal wages are substantially closer to the developed EU member states than those of the EU-8. Compliance with the Maastricht criteria did not present a major problem to Slovenia when being in ERM II. The country managed to decrease the inflation rate to 2.5% and the public budget deficit to below 2% before accessing the eurozone. The interest rates also corresponded to the inflation rates, with the public debt rate also being low. The nominal exchange rate of Slovenian tolar stopped depreciating in a major way in 2005 (due to some non-market operations).

In terms of the achieved economic level, the Baltic countries stand on the opposite pole. Lithuania is closest to fulfilling the Maastricht criteria, with Latvia showing more substantial problems with the inflation rate. In general, the Baltic economies show healthy public finance. Their relative price level is low, more or less in accordance with the low economic level. During their history they have basically never carried out an independent monetary policy (Estonia and Lithuania use the currency board arrangement). They all share high deficits of the

current account of payment balance that could present a threat during the existence of their own currencies.

Slovakia, that joined ERM II in November 2005, is closest of all Central European countries to adopting the euro, and expects to access the eurozone on January 1, 2009. In terms of the compliance with the Maastricht criteria, it has been successful at dealing with the problematic inflation rate; however, deficits of public budgets may prove more difficult in the long-term perspective.<sup>40</sup> The Czech economy may profit from the lesson learned by Slovakia when fulfilling the exchange rate stability criteria. Similarly to the Czech crown, the Slovak crown has not yet used its full appreciating potential. Therefore, Slovakia had to appreciate the original central parity of 38.5 SKK/EUR, which was valid upon its joining ERM II, to 35.4 SKK/EUR in March 2007 (i.e. by 8.8%). The European Commission and the ECB accepted the shift in central parity. This documents that appreciating deviations from the exchange rate are not assessed as strictly as in case of depreciation (however, they still hint exchange rate instability).

Of all Central European countries, Hungary has the most substantial problems with the fulfilment of the public budget deficit criterion (9.2% in 2006), while it also exceeds, as the only EU-8 state, the public debt criterion (61.7% of GDP in 2006). The government has already prepared a plan for the deficit reduction; however, the bodies of the EU do not consider it sufficient. In general, Hungary is not expected to be ready for the euro adoption before 2014. In Poland, the euro adoption is positioned as a political problem with a referendum on the matter also being considered. Based on economic indicators, the access to the eurozone is not expected before 2012.<sup>41</sup> Similarly to the Czech Republic, Hungary expects to reduce its presence in the ERM II mechanism to the required minimum of two years.

In 2004, the Government of the Czech Republic approved an Updated Strategy of Czech Republic's Accession to the Eurozone that stresses the fact that the main hurdle preventing the fulfilment of the Maastricht criteria is the unconsolidated state of public finance. This fact, together with the low flexibility of the economy, and the labour market in particular, also presents a risk to functioning of the Czech economy in the eurozone, preventing the advantages expected from the euro adoption from becoming apparent (See MF ČR 2007b, paragraph 44). No specific date of the euro adoption has been set since it depends on solving the above issues. This will require a major reform of public finance and the strengthening of the flexibility of the Czech economy. It is the Government's aim to remove these obstacles before the end of its office term.

<sup>40</sup> Based on consumer prices, the inflation rate in 2006 was at a yearly average of 4.5%, with a year-to-year rate of 4.5% in December 2006. In the period from January to July 2007, the monthly average dropped to 2.8% (with a July year-to-year rate of 2.3% which translates, according to the internationally comparable HICP index, into 1.8%). In terms of budget deficits, Slovakia is subject to the excessive deficit procedure (EDP) pursuant to the Stability and Growth Pact. The impacts of the pension reform on public budgets are yet to be identified.

<sup>41</sup> Poland is also subject to the excessive deficit procedure pursuant to the Stability and Growth Pact. In 2006, the public budget deficit reached 3.9% of GDP (see ECFIN 2007, p. 177).

#### 4. Conclusion

Due to significant external openness of the Czech economy, **international economic development** will be of a great importance for the its future growth. So far it has been favourable, the global GDP dynamics have picked significantly after a slow-down between 2001 and 2002, reaching 5% on average over the last five years. The slow-down of the American economy has been compensated by the high dynamics of the Asian region (China, India), the oil-exporting countries (OPEC and Russia) as well as developing countries. From the Czech Republic's perspective, the development in the EU states is important since 85% of Czech exports is directed there, with the country also receiving the majority of its investments from the EU. Globally, the EU remains a slow-growing region despite the more rapid growth in 2006 (from 1.8% to 3%). However, the European Commission predicts a mild slow-down for the next two years, from 2.9% down to 2.7%.

The development of the last months, with the mortgage market crisis and its effect on the entire financial system, has deteriorated future expectations, leading to reassessment of risks on financial markets, global macroeconomic imbalance, protectionism pressures and further growth of oil prices and prices of raw materials.

Between 2005 and 2007, **the economic growth of the Czech Republic** has increased substantially, reaching 6% on average per year. The following factors influenced the development positively: inflow of foreign direct investments and the growing importance of enterprises under foreign control, with significantly higher performance levels and modernization and restructuring of production capacities, growth of credits provided to households and enterprises in combination with low interest rates, as well as expansive fiscal policy (however, it also contributes to the unfavourable state of public finance). **From a structural perspective** and in comparison to the developed EU states, GDP of the Czech Republic shows a high share of industrial production with the service share remaining low; however, its development offers a good potential for further economic growth.

From a long-term perspective, the high economic growth should be maintained in order to ensure further improvement of the living standard and rapid progression of real convergence with a full use of disposable workforce. **Total factor productivity** (of labour and capital) becomes the most important source of growth, relying on qualitative growth factors with the key importance of the processing industry. Between 2001 and 2006, TFP reached a yearly growth of 3.3%, thus becoming the most rapid of all new Central European EU member states, also preceding that of the EU-15 by 2.8 percentage points. With the expected dropping share of population in productive age, caused by the aging process, and together with the high employment rate at the European level, the maintenance of the leading position in the growth of labour productivity and total factor productivity will become almost the only source of balancing the economic level with developed countries.

The **labour market** situation has improved over the last years, with a slight growth of the employment rate and a slight reduction of the unemployment rate. A high share of the long-term unemployed, reaching approximately one half of all unemployed, remains an important problem. Significant regional differences in the unemployment rate present another problematic area.

As a result of the increased economic activity over the last years, the availability of a number of professions has been reduced, with the situation resulting in an increase in the number of foreign workers and in labour costs. Increasing the flexibility of the labour market remains an important challenge to the economic policy and sustainability of the high economic growth rate. Key measures, that could help the labour market, are connected to the reform of the **social and educational systems**. Their set-up should support working activity of the people who want to work and are willing to relocate to get a job or who are willing to acquire new knowledge and skills in the process of life-long learning as well as part-time employment that could reduce the high unemployment rate of persons whose position within the labour market is rather problematic. The first steps leading towards eliminating institutional barriers have already been made as a part of the reform package introduced by the Government. An issue that is yet to be solved is the rate of replacing non-working retirement with working retirement.

Economic policies supporting growth must be tied to the goal of **macroeconomic stability** which is a precondition of a balanced economic development, full realization of the growth potential and nominal convergence that would ensure a smooth accession of the Czech Republic to the eurozone. A high growth rate of the Czech Republic between 2000 and 2007 has been accompanied by some negative trends in this respect.

The Czech Republic had to boost its own national savings with foreign resources in order to cover the **deficits of the current account of payment balance**. The income balance, with the outflow of the primary incomes in connection with foreign direct investments (repatriated and reinvested profit) became the basic source of the deficit. At the same time, enterprises with foreign interests the share of repatriated profit has been growing which could lead to an increase in the deficits of the current account. Over the recent years, the share of wages paid out to foreign workers, whose numbers have also been growing in enterprises under foreign control, has been increasing.

In terms of the future development, the dropping rates of **household savings** are perceived as a risk factor. A pension reform and positive real interest rates would support their increasing. Similarly to developed countries, the Czech Republic has seen a steep increase in the amount of credits (especially mortgages) granted to households over the last years. This was caused by low interest rates and increased activity of banks. The credit growth has contributed to an increase in private consumption and housing construction rate. On the other hand, household savings rate has been dropping, with household debts increasing, even though they still remain low in comparison to the developed foreign countries. Nevertheless, there is a risk of unequal development of assets and liabilities of households, with low-income groups possibly having a problem with the repayment of their credits.

Major public infrastructure investment projects and generous social policies have led to relatively **high deficits of public budgets**. From the perspective of macroeconomic stability, public finance of the Czech Republic appears as the weakest spot of the economic development. The persisting relatively high deficits in a phase of fast economic growth need to be considered dangerous.

A public finance reform, relying on the relative reduction of expenditures, will be necessary in order to reduce the deficit. This reform is becoming the priority of the economic policies also in relation to the expected adoption of the euro, and it also is a necessary condition for fulfilling the Maastricht criteria. On the other hand, the Czech Republic has shown a constant and low-inflation environment which has been caused in part due to the appreciation of the crown. Maintaining the inflation rate at low levels while offering low interest rates would create a favourable environment for the future economic growth. From this perspective, the growth of wages needs to be maintained within the limits set by the labour productivity growth.

**The process of real convergence** toward the EU average has sped up significantly in the new millennium. Within the EU-27, the Czech Republic has become one of the countries with medium economic development, taking a lead over the new member states, except for Slovenia, but also preceding Portugal. The ambition is to reach at least the EU-27 economic average. Based on the current estimates of the International Institute for Economic Com-

parisons in Vienna of July 2007, the Czech Republic should reach this goal sometimes around 2020. While the economic level of the Czech Republic, measured by GDP per inhabitant in PPS, reaches four fifths of the EU-27 average and the labour productivity (GDP per employee in PPS) reaching more than two thirds, the comparable price level of total GDP reaches only three fifths. Other new member states show a more balanced ratio between economic and price levels.

**The tendency toward balancing the price levels** of tradable goods and services with the developed EU economies is expected to continue within the single market, also affecting the non-tradable sector via growth of wages. Prevention of undesirable inflation pressures under the persisting major differences in price levels will be made easier by postponing the adoption of the euro in accordance with the Updated Strategy of August 2007. The postponement provides more time for appreciation of the nominal exchange rate, the potential of which has not yet been, by far, fully used and that will remain the main price convergence channel of the Czech economy.

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## **Institutional quality**



## 1. Quality of governance

Institutional quality is considered one of the most important factors contributing to the increase in competitiveness and shaping long-term economic development. Its direct measurement, however, is difficult, which complicates the comparisons over time and across countries. The most comprehensive approach to evaluation of the institutional environment is the methodology developed by the World Bank. One of the key aspects of the effectiveness of institutions are regulatory mechanisms that influence the economic decision-making of market and non-market agents and the related costs. Consequently, there have been attempts to devise principles of better regulation and to find ways of employing them in law-making. Besides economic efficiency, the importance of adequate control of corruption in the society – a sore point in new EU members – is often emphasized.

### 1.1 Quality of governance

A number of approaches to evaluate and measure the quality of institutional environment exist. They describe the impact of institutions on the growth performance and competitiveness of the economy.

#### Composite indicators

The World Bank has been working with the concept of governance quality for more than two decades. Since 1996, it has been monitoring six basic aggregated indicators in the Governance Matters (GM) project. In this approach, governance is understood rather broadly as the traditions and institutions through which power is exercised in a particular country. According to the definition, three basic areas are studied (each of them is described by two indicators): (1) processes of government selection, supervision and change; (2) the ability of the government to formulate and implement suitable policies effectively and (3) the respect by citizens for institutions and the shape of institutions that govern economic and social interactions among citizens.

The quality of political processes is expressed by the indicator of **democracy** which evaluates the quality of political, civil and human rights and the quality of political processes. This indicator also reflects the independence of the media. The indicator of **political stability and use of violence** measures the likelihood that the government will be destabilized or overthrown by constitutional means or violence including terrorism. It also indicates whether - besides the continuity of policies - changes in government also influence possibility of choosing and modifying government and policies.

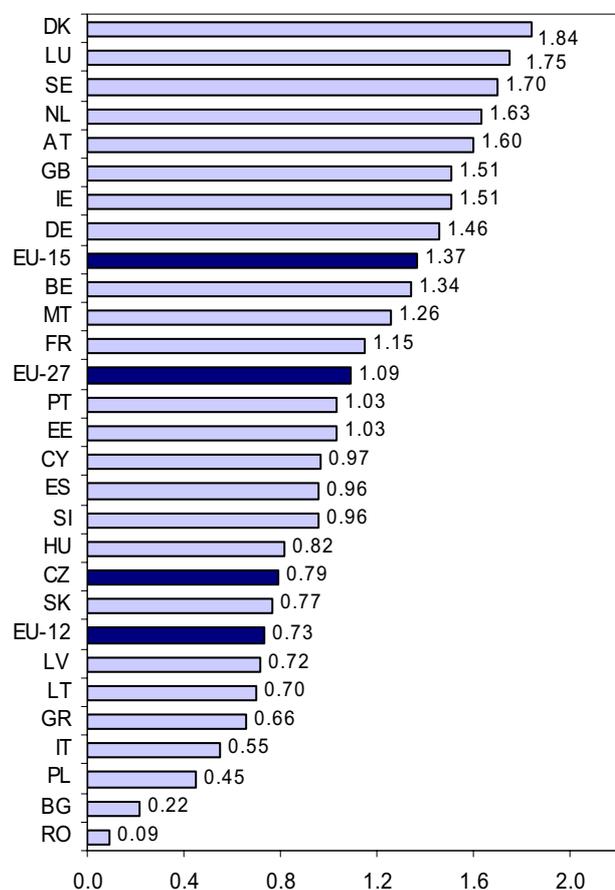
The second pair of indicators describes the ability of the government to formulate and implement suitable policies. The **effectiveness of government** deals not only with the effectiveness and credibility of government policies, but it also reflects the performance of bureaucracy, its independence from political pressures and the quality of public sector services. The indicator of **regulatory quality** evaluates the use of market-unfriendly policies (price controls, undue bank regulations) and their impact on domestic and foreign investors.

Finally, the third pair assesses the quality of institutional interactions. The indicator of **rule and law** includes the willingness of social players to abide by the law, the effectiveness and predictability of courts, the

protection of property, the quality of contract enforcement and of the police and the likelihood of both violent and non-violent crime. The indicator of **corruption control** describes power abuse for private ends, be it grand (political) and petty (bureaucratic) corruption or the extent to which lobbyists can have laws and policies tailored to their needs (state capture).

The **composite index** of governance quality is computed on the basis of the six indicators as their arithmetic mean for the EU-27 countries (see Figure 1). The averages for old and new EU countries (EU-15 and EU-12) are highlighted, too. The comparatively worse results of the new member countries lowered the average quality of governance in the EU after the enlargement rounds in 2004 and 2007.

Figure 1: Composite index of governance quality (2006)



Source: World Bank (2007), own calculations.

Relevant data are available for 1996 onwards. Hence, trends in the monitored EU countries and in the Czech Republic can be traced (Table 1). While the EU-12 was steadily improving in 1996-2006, the EU-15 took a turn for the worse in 2002. The deterioration continued until 2006 and the group ended up with a lower quality than in 1996. This makes it easier for the new member countries to catch up. The gap, while still very wide, is about one-third smaller than in 1996 (from 1.01 to 0.64). The quality of governance in the Czech Republic oscillated throughout the monitored period. It has been gradually losing its

initial advantage over other new members. A detailed comparison of development divided into individual indicators is shown in table 2.

**Table 1: Composite indicator of governance quality**

	1996	1998	2000	2002	2004	2006
EU-27	1.04	1.11	1.11	1.17	1.12	1.09
EU-15	1.49	1.53	1.51	1.52	1.42	1.37
EU-12	0.48	0.60	0.61	0.73	0.74	0.73
ČR	0.88	0.76	0.70	0.81	0.74	0.79

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

**Table 2: Indicators of governance quality**

		EU-15	EU-12	ČR
Voice and Accountability	1998	1.33	0.85	0.96
	2006	1.43	0.89	0.96
Political Instability and Violence	1998	1.24	0.81	0.78
	2006	0.82	0.65	0.75
Government Effectiveness	1998	1.77	0.48	0.72
	2006	1.49	0.70	1.01
Regulatory Quality	1998	1.23	0.67	0.73
	2006	1.39	0.90	0.95
Rule of Law	1998	1.66	0.42	0.83
	2006	1.48	0.45	0.73
Control of Corruption	1998	1.93	0.34	0.43
	2006	1.62	0.34	0.36

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

The following developments account for the decrease in the composite indicator of governance quality of the EU-15: The quality of democracy has remained almost unchanged but political stability has deteriorated. Adverse development can be observed in other partial indicators as well, namely in the increase in regulatory burden and in the degree of corruption. The only positive change has been the improvement in the legal environment.

In the new member countries, on the other hand, the indicators have improved in all monitored areas save for political stability. The situation in the Czech Republic is somewhat special, however. According to the GM project, the country was equally democratic and less politically stable in 2006 compared to 1998 but it had a more efficient government. The country has been successful in reducing the regulatory burden but the quality of its laws has been deteriorating. Control of corruption remains the most urgent and growing problem (see table 3).

**Table 3: Elements of the composite index of governance quality in the Czech Republic**

	1998	2000	2002	2004	2006
Voice and Accountability	0.96	0.82	1.02	1.03	0.96
Polit. Inst. and Violence	0.78	0.59	0.97	0.67	0.75
Govern. Effectiveness	0.72	0.77	0.87	0.75	1.01
Regulatory Quality	0.73	0.68	1.16	1.06	0.95
Rule of Law	0.83	0.68	0.73	0.70	0.73
Control of Corruption	0.43	0.26	0.35	0.36	0.36

Source: World Bank (2007), own calculations.

### Partial indicators of governance quality

The indicator of **democracy** evaluates the quality and advancement of democratization processes in politics, civil rights, human rights and independence of the media (see Table 4). The EU-15 countries with their established democratic systems are far ahead of the new member countries and the gap hasn't been closing considerably (from 0.35 to 0.24). The development of the relative position of the Czech Republic is alarming. The loss of its comparatively good position demonstrates that the country has not yet quite succeeded in becoming a standard Western European democracy.

**Table 4: Democracy**

	1996	1998	2000	2002	2004	2006
EU-27	1.22	1.18	1.20	1.26	1.23	1.21
EU-15	1.45	1.33	1.31	1.42	1.32	1.43
EU-12	0.87	0.95	1.03	1.03	1.09	0.94
ČR	0.96	0.96	0.82	1.02	1.03	0.96

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

The indicator of **government effectiveness** measures the quality of bureaucracy and public sector services. The gap between the EU-15 and the EU-12 has been diminishing over time but not substantially, which implies that government effectiveness remains a serious and perennial problem in new member countries. While developed countries primarily struggle against widespread red tape, the EU-12 are additionally faced with ineffective bureaucracy, bad structure of public expenditures, institutional failure and low quality of public services. The Czech Republic had not advanced considerably until the last year when it put an end to the unfavourable trend of convergence to the EU-12 average.

**Table 5: Effectiveness of government**

	1996	1998	2000	2002	2004	2006
EU-27	1.13	1.2	1.15	1.26	1.16	1.18
EU-15	1.74	1.77	1.64	1.74	1.56	1.49
EU-12	0.38	0.48	0.53	0.65	0.65	0.79
ČR	0.84	0.72	0.77	0.87	0.75	1.01

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

Degree and **quality of regulation** are a fundamental institutional characteristic. Accordingly, monitoring of regulatory quality is an essential signal for economic policy that pursues the goal of higher competitiveness. The necessity of regulation is intuitive but it must not stifle private enterprise. The indicator of regulatory burden evaluates the quality of regulatory measures but not the degree of regulation itself (see Table 6).

Significant improvement in the EU-12 countries notwithstanding, a number of problems persist – excessive regulation in some industries, taxation systems of labyrinthine complexity, and market-unfriendly interventions in some markets. The good starting position of the Czech Republic started deteriorating rapidly in the second half of the 1990s. Some improvement was observed as late as after 2000 – privatization of major banks and majority state-owned firms, decrease in the VAT rate and adjustments in some sectors (telecommunications,

energy production). As far as the indicator of regulatory burden is concerned, however, the Czech Republic stayed on the level of 8 years ago. Regulations in the labour, housing and energy markets have been plaguing the economy.

**Table 6: Regulatory quality**

	1996	1998	2000	2002	2004	2006
EU-27	1.02	0.97	1.03	1.28	1.22	1.20
EU-15	1.41	1.23	1.36	1.58	1.40	1.39
EU-12	0.52	0.67	0.62	0.91	1.00	0.95
ČR	1.18	0.73	0.68	1.16	1.06	0.95

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

Effective **legal system** is one of the most essential institutional characteristics of modern societies. Definition of elementary formal rules conditions the behaviour of economic agents. The indicator of legal system quality mainly reflects the degree of property protection and contract enforcement.

Despite adverse development in the last four years, the indicator of **rule of law** in the EU-15 attests to their being developed countries with established political and legal systems. The deterioration might be due to some measures against terrorism. The EU-12 countries have been catching up by adopting the *acquis communautaire* both before and after joining the EU. The initial difference of 1.41 plummeted to 0.91 in the last monitored year but it is still far from negligible. The value of the indicator for the Czech Republic has been hovering between 0.68 and 0.84. Unfortunately, the country failed to capitalise on the advantageous position it had at the beginning of transition. The quality of rule and law has been pinpointed as one of the chief institutional problems throughout the transition.

**Table 7: Rule of law**

	1996	1998	2000	2002	2004	2006
EU-27	1.05	1.11	1.14	1.12	1.11	1.08
EU-15	1.67	1.66	1.67	1.56	1.52	1.48
EU-12	0.26	0.42	0.49	0.56	0.60	0.57
ČR	0.84	0.83	0.68	0.73	0.70	0.73

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

Unlike old approaches based on the performance of formal institutions, the indicator of **corruption control** assesses informal ones, which boils down to the state and development of moral in the society. Measuring corruption is, therefore, rather a reflection than an indicator of institutional conditions. Corruption erodes the credibility of countries for investors, the efficiency of resources use and, consequently, the economic performance. Corruption environment and corruption practices feed off insufficiently clear separation of state and market, public and private sphere, excessive and ad hoc regulation.

Table 8 reveals that corruption is not a major problem in old EU countries. While considerable differences prevail from country to country (Finland leads with 2.57 and Italy comes in last with 0.31), the EU-15 average is quite high. The situation in the EU-12 is considerably worse. Efforts to eradicate corruption have failed to deliver desirable results. What is more, the development points

to a permanent nature of the problem – corruption is deeply rooted in the societies. Indices of corruption control for the Czech Republic have not changed much in the monitored period, which also true for the EU-12 average.

**Table 8: Control of corruption in quality of governance**

	1996	1998	2000	2002	2004	2006
EU-27	0.98	1.23	1.18	1.13	1.17	1.10
EU-15	1.54	1.93	1.80	1.71	1.73	1.62
EU-12	0.28	0.34	0.41	0.40	0.48	0.45
ČR	0.58	0.43	0.26	0.35	0.36	0.36

Note: Unweighted averages of values for groups of countries. Source: World Bank (2007), own calculations.

### Overall evaluation of quality of governance

The overall evaluation sheds light on the process of convergence of the EU-12 to the EU-15 that is expressed by differences in levels of individual institutional characteristics of quality of governance. The results are aggregated in Table 9. The smallest differences between the two groups are observed in political stability followed by democracy and regulatory burden. In those areas, the process of convergence has proceeded quite successfully as the EU-12 countries are democratic and politically stable. Substantial differences prevail in government effectiveness and quality of legal system throughout the monitored period.

**Table 9: Gap between the EU-12 and the EU-15 in quality of governance**

	1998	2000	2002	2004	2006
Voice and Accountability	-0.49	-0.43	-0.34	-0.55	-0.49
Political Instability and Violence	-0.38	-0.50	-0.26	-0.16	-0.14
Government Effectiveness	-1.11	-1.10	-1.07	-0.92	-0.70
Regulatory Quality	-0.45	-0.77	-0.59	-0.50	-0.44
Rule of Law	-1.02	-1.02	-0.96	-0.94	-0.91
Control of Corruption	-1.40	-1.37	-1.38	-1.22	-1.17

Source: World Bank (2007), own calculations.

Control of corruption is the worst indicator. It presents a serious problem for the EU-12 countries and its solution is an ongoing project requiring systemic approach. The gap in institutional quality between old and new EU countries was huge in 2006 and the changes were rather negligible in the monitored period. The gap in institutional quality stands out in comparison with the best countries of the EU. In the Czech Republic, the development is alarming because the situation has actually worsened in some areas. Control of corruption, an area with consistently poorest results, is the chief problem. In this respect, the Czech Republic faces similar problems with institutional quality like other new member countries. The progress in government effectiveness and regulatory quality was not sufficient to help the country attain at least the EU-27 level. The only field where the Czech Republic has done better than the average of the EU-27 is the indicator of political stability. Nevertheless, Finland outperforms the Czech Republic as far as political stability is concerned.

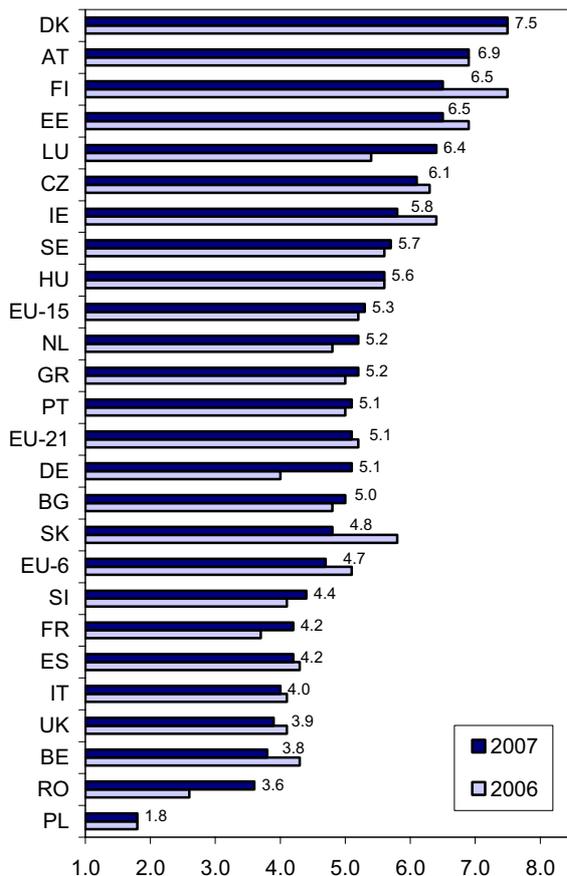
1.2 Principles of effective regulation

In theory or regulation, there is widespread agreement on the rules that regulatory measures should respect. Five principles of **good regulation** set out by the Better Regulation Commission in 2005 include proportionality, accountability, consistency, transparency and targeting. Compliance with those principles needs to be evaluated in international analyses and comparisons. The following indicators elaborated by the World Economic Forum (WEF) and the Institute of Management Development (IMD) are employed and studied from more than 50 viewpoints (see Table 10):

Table 10: Principles of regulation and related indicators

Principle	Indicator	Source
Proportionality	Extent of regulation	IMD
Accountability	Quality of information about policy and regulatory changes	WEF
Consistency	Adaptability of economic policy	IMD
Transparency	Transparency	IMD
Targeting	Easy doing business ias a competitive advantage	IMD

Figure 2: Regulation as an obstacle to competition

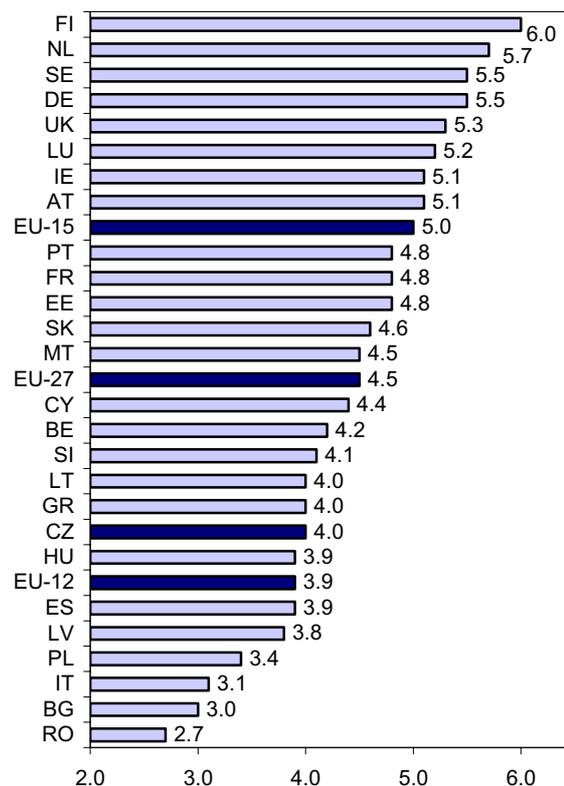


Note: The extent of regulation in the country hampers competition (0 = worst evaluation, 10 = best evaluation). Source: IMD (2006, 2007).

Principle of **proportionality** stipulates that regulation should be introduced if and only if there is need for it. Regulatory measures should be in line with the risks and with identified and minimized costs. They should be pre-

ceded by a comparison of various possible instruments whereby the same objectives can be reached (regulation, guidance or information campaign, self-regulation etc.). In the process of preparation, the interests of small enterprises that are hard hit by regulation should be taken account of. Figure 2 illustrates the impact of regulation on competition, an example of how the principle of proportionality can be evaluated. In this respect, new member countries (with the exception of Poland and, in part, Romania) do not fare badly. The favourable evaluation of regulation in the EU-12 is mostly due to the deregulation process in the early stages of transition that created a more deregulated environment than the one prevailing in the EU-15 countries.

Figure 3: Awareness of policy and regulatory changes



Notes: Awareness of firms as to changes affecting their business (1 = never informed, 7 = always informed). Source: WEF (2006).

According to the principle of **accountability**, which derives from the model of political representation, regulators should be able to defend their decision and they should be monitored by the public. Any proposals need to be published and duly discussed before a final decision is taken. An efficient and transparent system of complaints and appeals should be put in place. In most new EU member countries, the degree of awareness of economic agents as to policy and regulatory changes trails behind the levels in old member countries (see Figure 3). The poor awareness is in part attributable to the legislative whirlwind related to the adoption of the *acquis communautaire*. A myriad of new laws brought turbulent changes that affected a number of areas without being adequately communicated to the public.

The **principle of consistency** says that all regulators should operate on the same basis, that regulation should be predictable and that it should reduce uncertainty and instability for

regulated firms. All new measures have to dovetail with existing ones. Enforcement authorities should operate consistently all over the country. An indicator of adaptability of economic policy to changes in economic environment is used to evaluate the principle of consistency (see Table 11). The awareness has been gradually deteriorating across the EU. New member countries (not counting Romania and Bulgaria) have even surpassed the EU-15 group. The position of the Czech Republic greatly improved in 2006 but the progress turned out to be ephemeral. The Czech Republic is the fifth worth country in the EU.

**Table 11: Adaptability of economic policy**

	2001	2002	2003	2004	2005	2006	2007
DK	5.00	5.82	5.49	6.07	6.03	6.80	6.58
LU	7.79	6.79	6.84	6.38	5.56	5.61	6.21
IE	7.54	6.53	5.37	5.53	5.88	6.61	5.96
AT	6.60	5.00	4.82	5.33	4.75	5.54	5.95
SE	5.15	4.52	4.14	3.73	3.33	3.61	5.53
EE	5.47	4.98	5.37	5.60	5.25	5.96	5.09
FI	7.53	6.53	6.16	4.86	4.75	4.85	4.65
EU-15	5.66	4.83	4.55	4.42	3.90	4.23	4.54
NL	6.47	5.69	4.13	3.97	4.03	4.11	4.50
HU	5.33	5.56	4.79	3.82	4.09	3.76	4.43
PT	3.52	2.85	4.74	4.06	2.94	3.89	4.40
UK	5.02	4.92	4.15	4.35	3.90	3.89	4.40
GR	5.40	4.00	3.78	3.72	3.01	3.82	4.18
EU-24	5.48	4.75	4.48	4.32	3.91	4.24	4.11
LT	..	..	..	..	..	..	3.77
DE	5.35	2.73	1.49	2.62	2.47	2.99	3.45
SI	4.60	4.69	4.26	2.89	2.63	3.43	3.44
EU-9	5.03	4.56	4.32	4.08	3.92	4.27	3.40
ES	6.32	5.64	5.40	6.00	3.48	3.44	3.38
BE	6.00	3.86	3.70	3.56	2.64	2.95	3.35
BG	..	..	..	..	..	..	3.22
CZ	4.57	4.67	4.00	3.40	3.11	4.57	3.20
RO	..	..	..	..	..	..	3.15
FR	3.30	2.91	4.27	3.31	3.01	2.70	2.77
IT	3.95	4.60	3.79	2.75	2.78	2.69	2.74
SK	6.15	4.32	4.71	6.22	6.00	5.82	2.71
PL	4.07	3.13	2.80	2.52	2.42	2.08	1.58

Note: 0 = government never fine-tunes its policy to changes in economic environment, 10 = government always fine-tunes its policy. Source: IMD (2001–2007).

The principle of **transparency** requires that regulation be plain and transparent. Political objectives that include the need for regulation should be defined and presented clearly so that regulated subjects are acquainted with their duties as well as consequences of non-compliance. Evaluation of EU countries (see Table 12) reveals that new members have been falling behind. The situation in the Czech Republic has been below average even in comparison with EU-12 with a slight improvement recorded in 2006.

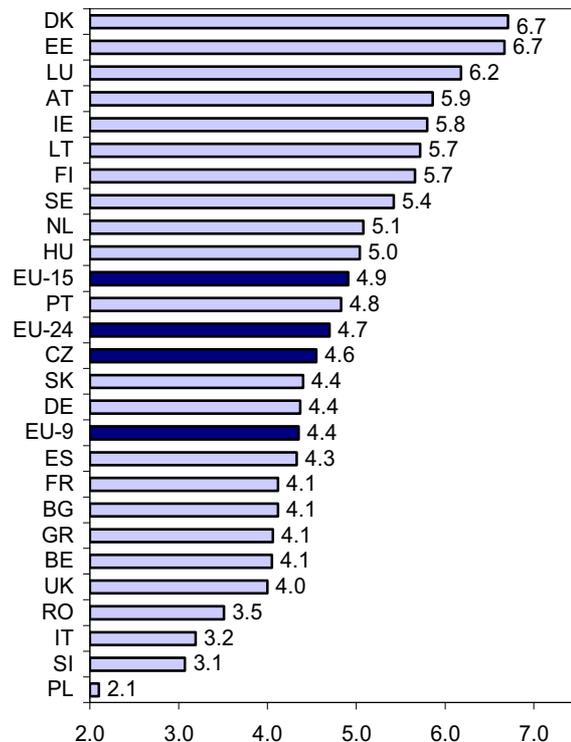
The principle of **targeting** says that regulation has to focus on solving a specific problem with a precisely defined objective under minimization of side effects. It has to be capable of being adjusted to the given objective under changed conditions. Regulators should only address exceptionally risky activities. Indispensability and effectiveness of regulatory measures should be repeatedly evaluated. Ineffective and redundant measures should be amended or lifted. The way regulation influences enterprise (see Figure 4) is a specific example of how well this principle is applied. In new EU countries, regulation often harms enterprise. An exception is Estonia whose regulatory system is assessed as conducive to enterprise.

**Table 12: Transparency**

	2001	2002	2003	2004	2005	2006	2007
DK	5.58	7.69	7.03	7.63	7.42	8.29	7.90
SE	4.61	6.49	6.07	6.21	4.90	5.76	7.01
AT	6.24	6.50	6.10	6.41	5.96	6.83	6.67
IE	6.69	6.19	5.78	5.47	5.94	6.43	6.67
NL	6.92	6.88	4.84	5.49	5.91	5.89	6.58
LU	7.05	6.93	6.74	6.28	5.75	5.77	6.36
FI	7.25	8.11	8.05	7.66	7.77	7.82	6.00
EU-15	5.61	5.76	5.52	5.36	5.04	5.37	5.62
EE	5.40	5.49	6.00	5.96	5.82	6.00	5.57
DE	5.69	5.84	4.02	4.16	4.33	4.99	5.33
PT	3.74	3.07	5.61	5.09	3.55	4.44	5.18
GR	4.68	3.81	3.35	3.45	4.25	4.65	4.84
EU-24	5.24	5.28	5.25	4.94	4.74	5.04	4.78
UK	5.26	5.58	5.23	4.70	3.81	4.36	4.77
BE	5.55	4.54	4.90	4.14	4.10	4.16	4.71
FR	4.91	4.37	5.76	4.78	4.43	4.73	4.62
ES	6.00	5.94	5.66	5.88	4.10	3.62	4.03
SI	3.60	3.78	4.26	3.70	3.71	4.34	3.98
LT	..	..	..	..	..	..	3.59
IT	4.00	4.44	3.72	3.05	3.34	2.87	3.56
HU	4.67	3.41	4.97	3.50	4.14	3.84	3.48
RO	..	..	..	..	..	..	3.43
EU-9	4.32	4.10	4.58	3.88	4.01	4.20	3.38
CZ	3.66	4.40	4.33	3.60	2.59	4.40	2.90
SK	5.39	4.29	5.05	4.28	5.57	4.71	2.71
PL	3.23	3.20	2.84	2.21	2.24	1.89	2.51
BG	..	..	..	..	..	..	2.29

Note: 0 = government does not communicate its intentions to the public in clear terms, 10 = government always clearly communicates its intentions. Source: IMD (2001–2006).

**Figure 4: Impact of regulation on companies**



Note: 0 = regulation harmful to enterprise, 10 = regulation conducive to enterprise. Source: IMD (2007).

Red tape and regulatory burden were studied in a survey of **quality of institutions and business environment** in the Czech Republic (see Box 1). Legislation, that needs to be

simplified and stabilized, is perceived as the chief obstacle to enterprise development. A change is overdue in administrative obligations of entrepreneurs that were identified as the third main problem. The larger the firm, the less strong the perception of regulatory burden. Hence, smaller enterprises are hit disproportionately (see Table 13).

In the opinion of the surveyed business people, legal and institutional environment can be primarily improved by incessant monitoring and reduction of red tape and the regulatory burden that is associated with each legislative measure, further by curbing corruption and also by a change in the thinking of the state so that government intervention into the life of society is curtailed. In addition to effectively combating corruption and non-transparent lobbying in politics, a better performance and accountability of civil servants would help businesses reach an adequate influence on forming the business environment. Table 16 shows the ranking of measures that are considered necessary for the development of Czech businesses.

**Table 13: Measures necessary to support enterprise and competitiveness**

	Total	< 50 empl.	> 50 empl.
Simplification and stabilisation of legislation	1.37	1.32	1.46
Eradication of corruption and of the economic crime it breeds	1.50	1.45	1.58
Simplification and elimination of administrative duties of businesses	1.60	1.57	1.65
Reduction of taxes and other payments (indirect labour costs)	1.60	1.51	1.76
Improvement in the judiciary	1.61	1.55	1.72
Improvement of bureaucracy (more helpful, less formalistic)	1.78	1.71	1.92
Deregulation, support of competition	1.87	1.79	1.97
Liberalisation of employment and enhancement of effectiveness of the welfare system	1.91	1.79	2.10
Improvement in professional training of future employees	2.16	2.14	2.19
Improvement in transport infrastructure	2.23	2.26	2.16
Easier credit and other sources of free capital	2.33	2.21	2.54
Simplification and acceleration of procedures of entry into and exit from industry	2.36	2.27	2.52
More state funding for businesses	2.39	2.23	2.67
Weakening of the legal standing of trade unions	2.44	2.21	2.81
Enhancement of entrepreneurial self-regulation and lobbying	2.70	2.56	2.93

Note: Averages of all replies of each particular group from 1 (a fundamental problem) to 4 (irrelevant). Source: Survey of CES VSEM 2006.

The most burdensome obligation of businesses is administration and paying taxes (others are listed in Table 14), the chief problem being frequent changes in tax laws, methods, and forms, their extent and complexity. High taxes are only the third biggest problem. The attitude of civil servants to people willing to bear entrepreneurial risk is perceived as very negative. Only two factors score higher - the excessively generous and poorly supervised welfare system that does not encourage people to be responsible for their own lives and the intricate and unstable legal framework for

enterprise. Indirect labour costs prevent businesses from hiring more and so do the virtual impossibility of dismissing employees without explanation and the difficulty in matching requirements of businesses with the qualification and practical training of potential employees on the labour market.

**Box 1 – Survey of Quality of institutions and of business environment in the Czech Republic**

In cooperation with the Czech Chamber of Commerce, the Confederation of Employers' and Entrepreneurs' Association of the Czech Republic, the Association of Middle-Sized Enterprises and Brain Logistics, s.r.o., the Centre of Economic Studies conducted a survey of quality of institutions and of business environment in the autumn of 2006. 201 surveyed companies responded to 12 questions in three areas – general perception of quality of institutions in the Czech Republic; quality of legislation and administration; regulation, businesses and markets. Each question had several possible replies to which the surveyed businesses assigned values from 1 to 4 depending on how strongly they felt about them (1 – fundamental, to be reformed, eliminated or improved immediately, 2 – very important, the solution should not be postponed, 3 – also important but it can wait, 4 – unimportant and irrelevant). In each question, the surveyed subjects were given an opportunity to express their own opinion about the issue. Firms were classified by five criteria – size (the number of employees 1-20, 20-50, 50-250, 250+), industry (according to the official classification of economic activities by sectors), location of headquarters (in the Czech Republic or abroad), size of the target market (local, national, international), change in productivity in the last 3 years (growth, fall, no change).

**Table 14: Administrative burden**

	Total	< 50 empl.	> 50 empl.
Administration and paying taxes	1.73	1.68	1.85
Obligations towards the system of social security and health insurance	1.79	1.71	1.97
Obligations towards authorities supervising safety and hygiene at work	1.92	1.92	1.95
Obligations towards the Czech Statistics Office	2.06	2.02	2.16
Obligations towards environmental protection authorities	2.08	2.03	2.19
Obtaining planning permission	2.15	2.06	2.3
Obligations towards the Office of Employment	2.19	2.15	2.24
Reporting to the Land Register Office	2.32	2.18	2.58
Obtaining trade licence	2.64	2.56	2.77
Obligations associated with imported goods (duties, taxes, statistics, certificates of compliance)	2.7	2.75	2.64
The need to register companies and report changes to the Register of Companies	2.71	2.57	2.93
Registration of industrial property	2.74	2.67	2.86
Registration of vehicles	2.79	2.61	3.11

Note: Averages of all replies of each particular group from 1 (a fundamental problem) to 4 (irrelevant). Source: Survey of CES VSEM 2006.

**Evaluation of regulation in the CR in the SIGMA**

The project of assessment of regulatory mechanisms in new EU countries complements the medium-term revision of the Lisbon process in 2005. Economic growth and employment are now in the focus of attention. To reach those objectives, the Commission introduced three key measures

in March 2005. One of them is the support of consistent use of the above discussed principles of **better regulation** in all member countries. The content of laws should be improved, the legislation process should be more open to the public, the administrative burden should be lowered and the expected impact on all affected subjects should be evaluated with particular consideration for middle-sized and small companies. The activity of member countries themselves is of utmost importance for the objectives to be reached. Therefore, the Commission recommended that countries **create and implement strategies** whereby principles of better regulation would be pushed through, in particular a system of integrated evaluation of economic, social and environmental impacts. **Supplementary institutions** should be created respecting local conditions. This way, measures to improve the legal environment at the level of states became parts of National Reform Programmes.

In an OECD project, regulatory mechanisms in the Czech Republic were evaluated in depth in 2000-2001. The European Commission launched the **SIGMA programme** (Support for Improvement in Governance and Management) to assist new member countries in development of national strategies of better regulation. The goal is to identify defects in preparation, approval and subsequent enforcement of regulation and to single out areas that could be improved. The project also assesses the capability of the Czech regulatory mechanisms to ensure the implementation of principles of better regulation and offers reform suggestions. The assessment focused on the following areas:

- Preparation of governmental strategic and legislative proposals;
- Using the available tools to ensure quality;
- Transparency of the legislative process;
- The involvement of the public in policy formation;
- The way regulation is enforced and the actual compliance.

The evaluation process included a survey conducted in the spring 2006 and a peer review in the autumn of the same year. Direct conversations of evaluators with representatives of bureaucracy and industry regulators as well as with trade associations and interest groups helped identify generally perceived problems in preparation and implementation of policies. The evaluation combined with knowledge of the country's specific characteristics led to the formulation of suggestions that draw on the established practice in other countries<sup>1</sup>.

The evaluation did not label the Czech regulation as good or bad because in this respect, there is no agreement about the content of good regulation. The development of **regulatory capacities** was what mattered. The report said that the country was strong in technical and legal quality, constitutionality and agreement of norms with international commitments. However, the effectiveness of passed legislation, i.e. the ability of regulation to reach the required objectives with the lowest possible regulatory burden, appeared quite problematic.

Consequently, procedural changes are recommended that will abandon the purely legalistic approach to formulation of

strategies and proposals of legislation. Instead, a more comprehensive and multi-disciplinary approach based on **quality assessment** (i.e. the introduction of regulatory impact assessment – RIA) will be adopted. A compact strategy of better regulation cannot be carried through without unequivocal **political backing**. A particular member of the government should be put in charge of pushing through the objectives of the strategy.

The current government declared its commitment to the principles of better regulation in its Policy Statement at the assumption of office in January 2007. Among other goals, it pledged to improve the process whereby new laws are passed and to make it more transparent, to involve the public into the legislative process and to introduce an obligatory assessment of regulatory and administrative impact (see the first chapter Rule of Law, Security, Public Control, Anti-Corruption Measures and Human Rights). The interior minister is now responsible for regulatory reform (the Office of the Government used to work cover the agenda previously). In July 2007, the government passed a strategy called **Effective Public Administration and Friendly Public Services** (decision Nr. 757) that is eligible for support from the EU Structural Funds. The document also contains a list of measures to improve the regulatory environment in the Czech Republic.

In July, the government approved an amendment to the Legislative Procedures (decision Nr. 816 effective from 1 November 2007) that introduces an obligatory assessment of impacts of new legislation or regulation according to the RIA methodology (even today, laws are supposed to contain an analysis of the legal and the actual state). In the future, the evaluation should also feature a reference to the evaluation of administrative costs. In the middle of 2007, the government approved an amended version of the obligatory Methodology for Measuring and Identifying of Administrative Burdens that was first used to measure the total administrative burden on Czech entrepreneurs in 2005 (see the government decision Nr. 759/2007).

As soon as its new status<sup>2</sup> is confirmed, the Council of Experts for Regulatory Reform and Effective Public Administration will evaluate and approve further steps in projects related to the strategy of regulatory reform, which should improve the **institutional framework**. The Council will also supervise the quality of regulatory impact assessment (before regulations are submitted to the government for approval). The capacity and instruments for improving the regulatory process should be enhanced and also employed in the process of creating secondary legislation at ministries, industry regulators or local self-government.

The discussed recommendations and measures concern the executive branch but the situation in the legislative branch is even more complicated as the principles of better regulation are less known there. What is more, requirements for regulatory impact assessment of new legislation can be bypassed by initiatives on the part of parliament members or by interventions in the process of approval. In the future, this danger could be eliminated by introducing similar procedures in the Parliament of the Czech Republic.

<sup>1</sup> Results of those two phases were incorporated into the final report in December 2006 that was verified and sent to the Commission that requested it.

<sup>2</sup> Its members should be deputy ministers and representatives of other central administrative bodies, representatives of the Association of Regions of the Czech Republic, the Association of Towns and Villages of the Czech Republic. The minister of interior is assumed to chair it.

## 2. Doing Business

The chapter assesses the conditions for doing business (regulatory quality) in the Czech Republic within the European Union, using findings of the World Bank (WB) research for 2006 carried out within the *Doing Business* project (with data valid in January of the relevant year). Comments on the Czech regulatory practice and suggestions for their future use in an economic analysis are presented. The WB project assesses the conditions for doing business or the quality of regulation of entrepreneurial activities in 175 countries, including 24 European Union member states (excluding Luxembourg, Cyprus and Malta). Conditions for doing business are evaluated especially according to the characteristics and impact of the regulatory burden. The range of monitored indicators is gradually extended (ten indicators were monitored in 2006) and their methodology changes slightly, resulting in somewhat limited comparability of results in time (data for a period starting from 2003 available). The wide span of the project with regard to the number of countries allows extensive international comparisons for groups of countries at various levels of economic and institutional development. The study is structured to examine ten indicators of conditions for doing business, i.e. starting and closing business, granting licenses, enforcing contracts, protecting investors, registering property, getting credit, hiring and firing workers, trading across borders and paying taxes.

### 2.1 Theoretical and methodological basis for assessing regulatory quality

Conditions for doing business significantly and directly influence the execution and productivity of entrepreneurial activities and subsequently have impact on the overall economic productivity. Results of their quality assessment help to identify the impact of enterprise regulation on the economic and social characteristics of productivity and the related institutional characteristics (such as motivation to engage in corrupt practices). On the other hand, assessment of conditions for doing business helps in planning and implementing related (individual and comprehensive) reforms, which may contribute to increased competitiveness of a country through improving the quality of its institutional environment and boosting incentives to invest and employ. However, this does not mean that better evaluation of conditions for doing business is a reflection of no regulation. For example creating an adequate information system or ensuring enforceability of parties' rights often requires an advanced regulatory framework and significant expenses. Nonetheless, regulation in countries with favourable conditions for doing business represents a smaller administrative and financial burden for companies and makes their operation easier. Higher tax rates in these countries may be connected with a higher quality of public services, which apart from a minimal regulatory burden is also reflected for example in the quality of infrastructure, higher human development index values and a lower degree of corruption.

Leading modern **theoretical approaches** to regulation follow Pigou's concept of regulation as public interest, Coase's contractual solution theory and Stigler's theory of regulatory capture (see WB, 2003, p. 90–92). According to the public interest regulation theory, markets demonstrate frequent failures and governments striving for societal effectiveness are responsible for correcting these failures. Stiglitz draws attention to increased incidence of

market failures in less developed countries requiring more extensive regulation. This concept of the need for regulation is criticized from a number of aspects.

Firstly, the expected extent of market failures and the inability of the competitive environment to solve the majority of alleged problems without regulatory intervention are considered excessive. Private arrangements are often capable of solving this problem even in the case of insufficient effectiveness of competitive forces. If this is not the case, impartial courts may serve this purpose, provided that they are able to effectively enforce adherence to proprietary rights and contractual provisions. Finally, the critics of regulation point out the assumption of competence and good intentions of the government as the regulator as erroneous. According to this concept, regulation is abused for the benefit of entities capable of influencing it. State intervention cannot increase the welfare of the society; on the contrary it contributes to its decrease. Regulation increases corruption in the environment and transaction costs.

Nonetheless, a certain level of regulation is necessary in the real world of market economies and this regulation increases the quality of life and the economic productivity. The enforcement theory (see Djankov et al., 2003) that compares two types of societal costs – private damage costs and state intervention costs – represents an attempt to define the optimal extent of regulation. Private damage occurs as a result of private actors' ability to harm other entities, for example by theft, fraud, overcharging or creating external costs. State intervention is a manifestation of the public servants' ability to harm private entities through bureaucratic bullying or expropriation. As solutions progress from private arrangements within the market discipline to private judicial settlement, regulation and state ownership, the government's decision-making power increases, the authority of private actors decreases, societal loss due to private damage reduces and societal loss due to state intervention rises. Adequate forms of governmental intervention will depend on the type of activity and specific conditions in the relevant country, such as the productivity of the public administration and courts. Minimizing the cost of regulation triggered by its misuse for private gain requires a certain system for supervising regulators.

Two basic principles should apply in enterprise regulation – regulation is only necessary if private solutions cannot prevent harmful acts and feasible if it can be enforced effectively (i.e. when its misuse can be prevented). Countries achieving positive results in conditions for doing business typically simplify and deregulate competitive markets and thus increase their ability to generate private and societal optimum without the need for external intervention. When regulation is considered necessary, maximum effort must be made to simplify it as much as possible. Strengthening property rights and ensuring their enforceability must be the key aspect of regulation. An efficient judicial system significantly reduces opportunities for breaching contractual obligations. Wider use of information and communication technologies increases the effectiveness and reduces the burden of administrative procedures, minimizes personal contact with public servants and thus reduces opportunities for demanding bribes, and improves the access to information for parties involved, thus decreasing their transaction costs.

**Box 1 - Quality of regulation (institutional environment) and economic performance**

Analyses of the relationship between the regulatory quality and economic performance on the micro and macroeconomic levels are comprehensive, i.e. including various aspects of the regulatory quality, or focus on its individual aspects (such as the labour market, credit markets, etc.). **Eifert, Gelb and Ramachandran** (2005) use microeconomic data obtained from the investment climate research carried out within the World Bank project (World Bank, 2004) to demonstrate the impact of a low corporate environment quality on the overall factor productivity in African countries (in a wider international comparison). The related high regulation costs reduce the labour factor revenue and thus decrease the demand for labour and real wages. **Love and Mylenko** (2003) use the World Bank research data on the quality of corporate environment to assess the importance of public and private credit registers for reduction of financing restrictions and increase in the share of financing through external (bank) resources. This relationship is apparent in the case of private registers (the impact of public registers is insignificant mainly due to their lower information value) and reflects especially in the availability of financing for small and medium-size enterprises. **Arunada, González-Díaz and Fernández** (2004) explain the differences between European and American forms of organisation (volume structures) and ownership in motor freight transport by institutional differences in labour regulation and taxation laws, which increase the cost of vertical integration in Europe compared to the USA. **Hoang Lan Ha** (2003) presents a (statistically significant) positive relationship between efficiency of judicial systems and development of credit markets in a wider international comparison. Judicial system efficiency is measured according to the speed and simplicity of the system. Countries with better contract enforcement systems exhibit more developed credit markets, greater banking sector volumes and higher shares of credit provided to the private sector. **Pierre and Scarpetta** (2004) demonstrate the perception of regulation on the part of employers and their response to situations when regulation is seen as restricting company operation. The company research results are compared to the actual labour legislation valid in the monitored countries. As a rule, stronger *de iure* regulation reflects in more intense perception of regulation as a limiting factor on the part of firms. However, there are significant differences between enterprises in adverse effects of this regulation – medium-size and innovative firms tend to feel the impact more intensely. Small firms address the regulatory pressure (which increases the cost of hiring and firing employees) through larger numbers of definite term contracts, while medium-size, large and innovative companies increase their investments into education at a workplace. **Pica and Mora** (2004) present the impact of similarity/difference in regulation between individual countries on their bilateral flow of direct foreign investment. This impact is significant and negative. Implementation of DFI is associated with additional fixed costs, which include the cost of managing different regulation. Similar levels of regulation support DFI, and increase wages, output and productivity. Higher productivity is a result of forcing out less efficient local entrepreneurs by foreign entities supported by more efficient allocation of resources. **Loayza, Oviedo and Servén** (2005) explore the impact of regulation on economic growth and relative volume of the informal sector. Regulation (especially on product and labour markets) influences macroeconomic and especially growth performance by stimulating transfer of resources to grey economy whenever it is excessively intense. The negative impact of the degree of regulation on economic growth is reduced or even eliminated by a high institutional quality. At the microeconomic level the authors focus on a mechanism through which dissimilar forms of regulating firms' input and output (negatively) influence growth of productivity. Interventions on the product and labour markets and fiscal regulation complicate input and output and thus negatively affect the Schumpeterian process of creative destruction as a condition for constructive corporate dynamics. **Bolaky and Freund** (2004) study the relationship between openness of economies, economic growth and regulation, concluding that greater openness of economies in countries with high regulation does not have a significant impact on economic growth, while a positive relationship between growth and openness of economies can be observed in countries with less intense regulation. In view of the effect of regulation, the relationship between openness and growth appears stronger compared to the previous studies.

Decreasing regulatory burden, especially the time demands and the cost of regulation, is significantly supported by limiting participation of courts in business matters to cases that cannot be solved by extrajudicial settlement or replacing judicial procedures with administrative procedures. Effective improvement in the quality of conditions depends on the consistency of reforming efforts. Many countries have recently introduced regulatory impact assessment for proposals of new regulatory measures. The requirement for analyzing the cost and benefit effectively helps to remove superfluous and burdening regulatory measures.

## 2.2 Factors and significance of regulatory quality

The regulatory quality is affected by a number of factors and it is a consequence of local choice or efforts to achieve higher regulatory efficiency to a limited extent only (WB 2003, pp. 84-85). In a wider international comparison, countries with more developed economies on average regulate less and more consistently than less developed countries. Differences in regulation between developed countries are influenced by their history and these differences were previously also reflected in institutional structure of their former colonies. Anglo-American common law was typical for independent judges and juries, low weight of regulation and preference of private settlement of disputes. France developed a tradition of civil law based on the Roman law with state judges, emphasis on codes of law and procedures and preference of state regulation over private solution. Germany and Nordic countries developed their own versions of the civil law also based on the Roman law. Nordic countries and countries with Anglo-American legal systems exhibit the lowest regulation, while regulation is the most intense in countries with the French civil law system.<sup>3</sup>

Levels of economic development and legal system heritage explain 60 % of differences in the degree of regulation between countries included in the World Bank survey in 2003 (WB 2003, p. 76). The impact of the remaining factors is less prominent and systemic. Political systems play a specific role. In countries with representative government systems, the aim of regulation is mainly to correct market failures, while the tendency towards exploiting regulation by narrow lobby groups is manifested in less democratic regimes. Regulation is less intense in countries with a greater degree of political freedom.

The general comparison according to the positions achieved in individual indicators of conditions for doing business based on the WB survey identifies weaknesses and strengths of EU member states within the entire sample (see Table 1). Baltic countries, especially Lithuania and Estonia were among the new EU member states achieving the best results, while Italy and especially Greece were among the old member states lagging behind the rest the most. In the overall comparison, eight EU member states, seven Nordic European states (including five EU member states plus Norway and Iceland) and nine non-European states were among the first twenty countries. United Kingdom as the best EU member state was surpassed by Singapore, New Zealand, United States,

<sup>3</sup> Central and Eastern European countries in transition are seen as influenced by the German law to a great extent as a heritage of the Austrian-Hungarian Empire's impact. The German model includes Baltic economies, which in addition adopt certain qualities from economies of their wealthier Scandinavian neighbours.

Hong Kong and Canada, i.e. by countries with the same Anglo-American common law heritage.

**Table 1: Differences between EU-10 and EU-14**

	Difference
Closing business	24.64
Granting licenses	22.41
Trading across borders	17.48
Starting business	12.60
Paying taxes	10.15
Enforcing contracts	8.07
Hiring/firing workers	5.10
Registering property	2.04
Getting credit	1.56
Protecting investors	-1.30

Note: Displayed figures reflect differences in averages of percentiles for each of indicators based on EU countries' positions in the world ranking. Higher figure means greater distance of EU-10 from EU-14. Source: Own calculations using the WB data (2006).

As regards to the European Union, the results show that very significant differences between member states in conditions for doing business (regulatory quality) often remain. No significant harmonization among the original member states in this regard can be seen at this point. The position of EU states on average in the wider international comparison is clearly the worst in employment regulation (this indicator also shows the most significant differences between individual member states). High level

of protection of European labour markets therefore undoubtedly contributes to their lower flexibility, especially with regard to (un)employment in more problematic groups. The second worst position of the EU countries of average is in conditions for paying taxes due to relatively high tax rates which in many cases are not matched by the quality of conditions for doing business. Low investor protection and registration of property remain a very significant weakness for the EU. On the other hand, the EU has achieved the best results in conditions for foreign trade and conditions for starting and closing business and also for enforcement of contracts.

Table 1 displays differences in doing business conditions between new (EU-10) and old member states (EU-14) based on their positions in the world ranking. This comparison shows that new EU member states lay behind old EU-14 mainly in conditions for closing a business, due to an excessive length of procedures and a very low level of return for investors and creditors. In trading across borders conditions old and new EU member states also widely differ, however the excellent position of EU-14 in the overall world ranking puts the whole EU-24 very high in the world comparison regardless of the EU-10 relative backwardness (caused mainly by an improper functioning of their state bureaucracies as the legal base as well as all customs duties are unified in the framework of the EU common commercial policy). This burden of cumbersome and lengthy administrative procedures is clearly reflected by EU-10/EU-14 differences in conditions for granting licenses and starting business.

**Table 2: Country ranking according to the business conditions indicators, 2005**

	Overall ranking	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Starting business	Granting licences	Hiring/firing workers	Registering property	Obtaining credit	Protecting investors	Paying taxes	Trading across borders	Enforcing contracts	Closing business
U. Kingdom	6	9	46	17	19	1	9	12	14	22	10
Denmark	7	14	69	15	36	13	19	15	3	1	20
Ireland	10	6	20	83	80	7	5	2	30	24	7
Sweden	13	20	17	94	7	33	46	39	9	2	17
Finland	14	18	35	111	15	21	46	75	2	13	6
Lithuania	16	48	23	119	3	33	60	40	32	4	30
Estonia	17	51	13	151	23	48	33	29	6	20	47
Belgium	20	37	48	23	158	48	12	60	36	21	8
Germany	21	66	21	129	42	3	83	73	7	29	28
Netherlands	22	38	80	86	20	13	99	82	16	31	9
Latvia	24	25	65	123	82	13	46	52	28	11	62
Austria	30	74	50	103	28	21	142	102	15	14	19
France	35	12	26	134	160	48	60	91	26	19	32
Slovakia	36	63	47	72	5	13	118	114	88	59	31
Spain	39	102	53	161	33	21	83	112	25	42	15
Portugal	40	33	115	155	98	65	33	61	27	35	18
Romania	49	7	116	101	114	48	33	131	35	45	108
Czech Rep.	52	74	110	45	58	21	83	110	41	57	113
Bulgaria	54	85	140	100	65	33	33	107	104	52	64
Slovenia	61	98	63	146	97	48	46	84	108	84	35
Hungary	66	87	134	90	103	21	118	118	76	12	48
Poland	75	114	146	49	86	65	33	71	102	112	85
Italy	82	52	104	101	53	65	83	117	110	141	49
Greece	109	140	55	166	94	83	156	108	123	48	34

Source: Own calculations using the WB data (2006).

However, in the case of registering property, the new EU member states have become increasingly liberal and thanks to the bank sector privatization into hands of transnational financial corporations they have almost matched the EU-10 qualities in conditions for getting credit. It is remarkable that in conditions for hiring/firing workers the new EU member states looked better than the old ones in 2005 but thanks to an accelerated pace of labor market reforms in several old EU member states this relative lead was recently lost.

When comparing the Czech Republic or the EU-10 new member states to the EU average, it has to be always realized whether the EU as a whole represents the world's best in that specific criterion or whether it is just a second-rate or even a below the average player. It is obvious that a comparison with selected EU member states, namely those ranked among the best performing, will often be much more inspiring. Last but not least, it should never be forgotten that especially after the recent EU enlargements, first to 25 then to 27 members, any EU-24 average result hides great differences in quality and performance.

### 2.3 Conditions for doing business in the Czech Republic

The overall assessment of individual conditions for doing business and their elements for the Czech Republic is supplemented with a comparison against the average figures for the EU-24, EU-14 (old member states), EU-10 (new member states) and the United States, which is often used by the EU for comparison when assessing the progress in fulfilling the Lisbon Strategy. In this regard we can conclude that the values for the EU are often better than those valid for the USA only in the number of procedures required for obtaining an approval. Doing business in the EU is therefore subject to a significantly greater administrative and financial burden, though often with major differences at the national level. The subsequent summarising ranking according to individual elements of the monitored indicators allows us to identify the weakest areas of conditions for doing business in the CR and focus greater and more consistent reformation effort on these areas.

When conditions for **starting business** are assessed, the administrative burden according to the number of procedures required and the estimated number of days necessary for their completion is determined. The financial cost of starting business after all related obligations have been fulfilled and the minimum capital investment has been ensured is also defined. A lower burden from the conditions for starting business has a positive impact on the dynamics of founding new companies and thus development of entrepreneurial activities in the formal sector. A significant administrative burden arising from the high number of procedures and days in combination with relatively high requirements for the minimum capital investment is one of the main problems in CR (74<sup>th</sup> place). The (direct) financial cost of starting business is relatively low. The administrative burden is being gradually reduced in recent years by simplifying recording in the Commercial Register and establishing central registration facilities for entrepreneurs with the possibility of filing forms electronically. Connection to the information system of the public administration authorities will only allow one-off provision of information by entrepreneurs. A more significant systemic reduction in the adminis-

trative burden associated with starting business does not involve mere formal and technical simplification of the procedures carried out in order to speed up the registration process, but requires transforming registration to a purely administrative process. Although courts still play a central role in registering companies in the Czech Republic, they are required to carry it out within five days period, or 15 days in complex cases.

**Table 3: Starting business**

		CZ	EU-24	EU-14	EU-10	USA
Procedures (number)	abs.	10.0	7.2	6.9	7.6	5.0
	perc.	51.7	26.6	25.2	28.5	
Time (days)	abs.	24.0	23.9	19.7	29.8	5.0
	perc.	28.1	29	22.4	38.1	
Cost (% income)	abs.	8.9	7.4	6.3	8.9	0.7
	perc.	25.2	19.3	16.5	23.3	
Min. capital (% income)	abs.	36.8	43.6	3.9	57.1	0.0
	perc.	63.7	53.6	49.1	60.0	

Source: Own calculations using the WB data (2006).

In the case of conditions for **dealing with licenses**, all procedures required for obtaining the prescribed licences are recorded on the model example of civil engineering. The administrative burden arising from all related acts is determined according to the number of procedures and days and their financial cost. Low demands on the licensing proceedings help to reduce the occurrence of illegal construction and lessen the opportunities and motivation to engage in corrupt behaviour. In the CR (110<sup>th</sup> place), the burden arising from the number of procedures combined with great demands on time is the worst, while the costs of licensing proceedings are among the lowest. However, the high administration burden in fact makes preparation for construction costly. Preparation of an application for a zoning and planning decision and construction permit with the requirement to obtain consent from all affected state administration bodies and all distribution network owners is the biggest problem. The new Administrative Procedure Code should provide some relief from 2006. More significant changes were brought about only by the new Construction Act, which from 2007 allows combination of the zoning and planning proceedings with the construction permit proceedings to a greater degree, determine fixed deadlines for all types of proceedings and permits implementation of a wider range of buildings based on a notification only. It will however take some time before these legal changes affect significantly the existing situation.

**Table 4: Dealing with licenses**

		CZ	EU-24	EU-14	EU-10	USA
Procedures (number)	abs.	31.0	16.3	13.9	19.6	19.0
	perc.	96.4	39.9	28.6	55.7	
Time (days)	abs.	245.0	192.7	175.2	217.2	69.0
	perc.	78.9	49.4	42.2	59.4	
Cost (% income)	abs.	14.5	98.1	83.0	119.1	16.0
	perc.	3.5	30.1	29.7	30.6	

Source: Own calculations using the WB data (2006).

Conditions for **hiring/firing workers** are evaluated according to the employment rigidity index, which represents the average value for three sub-indexes – the index of difficulty in hiring employees, the index of working hours inflexibility and

the index of difficulty in firing employees. Another two indicators of the conditions for hiring/firing workers measure the cost of hiring and firing employees. Lower employment regulation supports the flexibility of labour markets and the supply of employment opportunities especially for problematic groups. It also allows employers to optimize the demand for labour according to the development of external economic conditions.

**Table 5: Hiring/firing workers**

		CZ	EU-24	EU-14	EU-10	USA
Difficulty of hiring index	abs.	33.0	33.5	33.3	31.9	0.0
	perc.	42.5	45.4	45.3	42.8	
Rigidity of hours index	abs.	20.0	57.5	52.9	60.0	0.0
	perc.	8.6	56.6	48.9	61.2	
Difficulty of firing index	abs.	30.0	37.9	37.9	41.3	0.0
	perc.	40.2	51.4	51.3	55.5	
Hiring cost (% salary)	abs.	35.0	28.1	27.0	29.0	8.5
	perc.	94.8	79.0	74.0	84.7	
Firing cost (% salary)	abs.	21.7	31.9	9.3	25.5	0.0
	perc.	24.7	37.4	44.6	32.2	

Source: Own calculations using the WB data (2006).

The burden associated with employment regulation in the CR (45<sup>th</sup> place) is among the lowest in the EU on average. However, the situation is very different with regard to the rigidity of regulation, which ranks among the best even in the wider international comparison against the cost of employment. The rigidity of regulation is the strongest in the case of hiring employees, weaker in the case of firing employees and the weakest in rigidity of working hours. The cost of employment is very high in the case of hiring employees especially due to employers' payments towards social security, while the burden associated with the cost of firing employees is significantly lower. Despite strong reservations to the new version of the Labour Code on the part of employers, which were due to the continuing rigidity of regulation in favour of employee protection (especially in the case of restriction of terminating employment by a notice served for reasons on the part of the employer), the high cost of hiring employees continues to be the greatest problem in this regard and this problem significantly affects the demand for problematic groups on the labour market. In addition, the demotivating social benefit scheme has a negative impact on the offer of employment especially in low-income groups.

Conditions for **registering property** are assessed according to the number of procedures, number of days required for their completion and the relative cost of related payments. Lower administrative and financial demands on registering property facilitate disposing of assets and using assets in other types of transactions, and reinforce the institution of property rights. The conditions in the CR (58<sup>th</sup> place) are problematic especially in terms of the related time demands, while the number and the cost of procedures are relatively low. The great demands on time are caused mainly by long periods for entering registrations in the Land Registry of Prague (as the situation in the capital city is the reference value for the WB researchers). In other regions of the country the time limit prescribed by the Administrative code (30 days) is respected. Another problem is posed by the fact that a record in the Land Registry alone does not still prove the

existence of ownership with certainty, despite the number of documents required for filing an application for registration also poses major problems. This is caused by the low level of property registration prior to 1989 and partially also at the beginning of the 90s. Ascertaining ownership of properties with certainty therefore often requires private investigation of the history of the real estate in question and additional contractual assurance of the transfer, which naturally results in higher costs.

**Table 6: Registering property**

		CZ	EU-24	EU-14	EU-10	USA
Procedures (numer)	abs.	4.0	5.2	5.0	5.4	4.0
	perc.	14.1	33.1	31.1	35.7	
Time (day)	abs.	123.0	72.5	46.9	108.0	12.0
	perc.	80.0	43.8	34.9	56.3	
Cost (% value)	abs.	3.0	4.2	5.4	2.6	0.5
	perc.	26.4	36.2	46.7	21.5	

Source: Own calculations using the WB data (2006).

Assessment of conditions for **getting credit** includes the issue of creditor and debtor rights and sharing credit information. The first set of indicators focuses on the effectiveness of the lien and bankruptcy laws for lending financial resources, while the second set of indicators studies the market coverage, extent of information, and the quality and accessibility of credit information through private and public credit registers. High-quality conditions for obtaining credit increase the accessibility of external financial resources within the economy mainly due to the decreased creditor risk. The Czech Republic's position (21<sup>st</sup> place) is quite positive in the extent and quality of credit information, as well as the intensity of creditor protection. The situation in these areas has improved significantly compared to the 90s. The right of lien is one of the safest methods of securing receivables owing to high-quality legal regulation. The quality of credit information is high and the extent of covering the population and the range of information gradually grow. The interconnection between the banking and the non-banking registers introduced in 2006 has also increased the information value.

**Table 7: Getting credit**

		CZ	EU-24	EU-14	EU-10	USA
Creditors rights index	abs.	6.0	5.8	5.9	5.7	7.0
	perc.	33.4	42.1	41.4	43.2	
Credit information index	abs.	5.0	4.7	4.9	4.4	6.0
	perc.	29.4	31.1	28.4	34.8	
Private register	abs.	51.0	35.1	45.5	19.0	100.0
	perc.	14.8	34.3	29.0	42.4	

Source: Own calculations using the WB data (2006).

The **investor protection** indicator assesses the power of protection of minority shareholders against abusing corporate assets on the part of the managers. The indicators distinguish between three key areas of investor protection: transparency of transactions, managers' responsibility for operations and options for suing managers by shareholders. Adequate investor protection supports mainly the extent of investment activities in the economy by preventing misuse of entrusted resources or

allows recourse for potential misuse. The situation in the Czech Republic (83<sup>rd</sup> place) is very uneven. Openness and transparency of transactions is assessed with the worst results, while managers' responsibility for their actions is evaluated with very good results as well as options for suing managers by shareholders. However, the importance and actual impact of a positive level of responsibility and opportunities for suing for misuse of entrusted resources for personal gain is significantly reduced by the low level of openness of information on carried out transactions.

The fact that although formal regulation of protecting creditor rights exists, this regulation is not up to the standard in a number of cases (for example – provisions on contracts on control, reports on associated persons, company mergers and divisions, transfer of assets, the right to purchase subscribed securities, etc., have been adopted incompletely and non-conceptually from the original usually German and Austrian legal regulation) poses a significant problem. The enforceability and effectiveness of investor protection is reduced by the overall unclear situation due to frequent amendments and unsanctioned breaches of information obligations, ineffectiveness of process instruments available to minority investors and non-existence of effective instruments for preventing misuse of economic power by majority owners.

**Table 8: Protecting investors**

		CZ	EU-24	EU-14	EU-10	USA
Extent of disclosure index	abs.	2.0	5.9	6.2	5.4	7.0
	perc.	87.9	45.1	41.5	50.0	
Director's liability index	abs.	5.0	4.3	4.5	4.1	9.0
	perc.	53.8	60.3	56.9	65.1	
Ease of Shareholder Suit Index	abs.	8.0	6.4	6.1	6.8	9.0
	perc.	17.4	47.9	52.8	41.2	

Source: Own calculations using the WB data (2006).

In the case of conditions for **paying taxes** the number of tax procedures and their demands on time expressed as the number of hours per year required for preparing, filing and paying the three main types of taxes is assessed. The tax burden indicator measures all taxes payable by companies, except for the wage tax and social security payments. A lower burden associated with paying taxes has a positive impact on the fulfilment of tax obligations and therefore the amount of tax revenues, and supports the effectiveness of public expenses for tax administration. In the CR (110<sup>th</sup> place), the time demands represent the worst burden, the number of tax procedures is relatively low and the overall tax burden is one of the smaller tax burdens in the EU. Therefore, simplifying and clarifying the taxation system and improving the quality of the tax administrator work represent the greatest reforming challenge. Ideally, tax administration should represent a minimum burden for the tax payers and the comfort of fulfilling tax obligations should be improved. However, the procedure for simplifying the taxation system as such in order to achieve a significant reduction in the demands associated with paying taxes remains the key question. The issue of adequacy of the quality of public services provided for the collected taxes (which include the quality of conditions for doing business), i.e. the issue of effectiveness of public expenses or the extent of redistribution considered desirable or acceptable in the relevant society, is more relevant with regard to the tax burden.

**Table 9: Paying taxes**

		CZ	EU-24	EU-14	EU-10	USA
Payments (number)	abs.	14.0	22.0	16.9	29.3	9.0
	perc.	13.2	27.3	20.4	37.0	
Time (hours year)	abs.	930.0	272.0	222.0	343.0	325.0
	perc.	94.2	46.7	40.0	56.1	
Tax burden (% profit)	abs.	49.0	50.2	52.8	46.6	46.0
	perc.	62.6	58.2	61.5	53.5	

Source: Own calculations using the WB data (2006).

Conditions for **trading across borders** are evaluated by recording all procedural requirements for export and import of a standardised shipment of goods. This indicator includes all official procedures from the agreement between the two contractual parties to delivery of the shipment. The demands on the number of signatures, documents and days required for the completion of all applicable procedures are assessed. A low administrative burden of commercial activities promotes the competitiveness of the production on foreign and local markets. The conditions in the CR (41<sup>st</sup> place) are more favourable in the case of export where only the time demands achieve worse results, while the number of documents and signatures is among the lowest even in the wider international comparison. The administrative burden in import is greater, though not dramatically. The worst results are again shown in the time demands and the number of documents and signatures follows. The conditions for trading across borders are affected to a certain extent by harmonisation with the EC laws. The differences in comparison with other member states are therefore caused mainly by other than legal circumstances, mainly the quality and promptness of the state administration and availability of assistance services.

**Table 10: Trading across borders**

		CZ	EU-24	EU-14	EU-10	USA
Export-doc. (number)	abs.	5.0	5.3	4.7	6.2	6.0
	perc.	11.1	19.9	12.2	30.7	
Export - time (days)	abs.	20.0	12.9	10.5	16.2	9.0
	perc.	41.1	20.4	13.1	30.7	
Export – Cost	abs.	713	967	885	1082	625
	perc.	27.6	44.7	40.5	50.4	
Import – doc. (number)	abs.	8.0	6.8	5.9	8.1	5.0
	perc.	28.7	23.4	16.7	32.7	
Export-time (days)	abs.	22.0	15.1	12.4	19.0	9.0
	perc.	36.2	20.1	13.6	29.2	
Import – cost	abs.	833	1015	942	1118	625
	perc.	25.8	36.8	33.5	41.4	

Source: Own calculations using the WB data (2006).

Conditions for **enforcing contracts** are evaluated according to the number of procedures (requiring interaction between the parties to the proceedings), time demands of the entire proceedings from filing an action to enforcing a payment (including waiting times between individual stages of the proceedings) in the number of days and the cost of proceedings (including all related expenses). A high quality of conditions in enforceability of contracts positively influences the transaction costs of business activities and the level of risk associated with providing a loan. The conditions in the CR

(57<sup>th</sup> place) are assessed as relatively positive ones. The situation is the best in the cost of debt collection, the number of related procedures is also relatively low but the time demands continue to be a grave problem. Czech entrepreneurs are almost unanimous that slowness of judicial proceedings severely damages the local business environment. Arbitration proceedings before an independent arbitrator or a permanent arbitration court are increasingly used as an alternative solution. The previously highly problematic execution of a legitimate decision has significantly increased as the new legislation allowing the involvement of private judicial executors motivated to achieve the highest possible return on the amount owed for the creditor was introduced.

**Table 11: Enforcing contracts**

		CZ	EU-24	EU-14	EU-10	USA
Procedures (number)	abs.	21.0	25.5	23.6	28.2	17.0
	perc.	8.6	24.0	18.8	31.3	
Time (days)	abs.	820.0	472.1	416.1	550.6	300.0
	perc.	86.7	38.3	33.2	45.5	
Cost (% debt value)	abs.	14.1	12.3	12.4	12.1	7.7
	perc.	25.8	19.9	21.5	17.7	

Source: Own calculations using the WB data (2006).

Assessment of conditions for **closing business** is specified for the course of bankruptcy proceedings. The time demands are expressed as the average number of years and include all possible delays caused by obstructing parties to the proceedings. The financial demands of the proceedings are expressed according to the cost of proceedings and the level of return on the resources the entitled parties may obtain from the insolvent company from the total amount of their receivables. Fast progress of closing business releases economic resources for their new use and thus promotes their effective allocation, and a high level of return on claimed finance positively influences development of investment activities. The conditions in the CR (113<sup>th</sup> place) are the worst in the overview of all monitored indicators of conditions for doing business.

**Table 12: Closing business**

		CZ	EU-24	EU-14	EU-10	USA
Time (years)	abs.	9.2	2.3	1.5	3.6	1.5
	perc.	98.6	30.4	14.9	52.1	
Cost (% of estate)	abs.	14.5	10.4	9.0	12.4	7.0
	perc.	46.4	31.3	26.1	38.6	
Recovery rate (% of investment)	abs.	18.5	56.4	71.0	35.9	77.0
	perc.	63.0	78.9	11.0	64.3	

Source: Own calculations using the WB data (2006).

Bankruptcy proceedings are relatively costly, provide a very low level of return and, most importantly, are excessively lengthy. The related legal regulation is complicated and subject to frequent amendments. Slow progress of the courts combined with obstructions by parties to the proceedings leads to significant delays and thus causes deterioration of the claimed resources. On the positive note, the Insolvency Act, applicable from January 2008, focuses on comprehensive transformation of the bankruptcy law with an emphasis on strengthening the role of creditors, allows acceleration of bankruptcy proceedings by determining binding periods for

individual acts and introduce alternative insolvency solutions through bankruptcy proceedings with the aim to maintain a functioning company.

All in all the CR achieves the worst results in conditions for closing business (especially in the time demands and the closely related level of return), conditions for granting licences (mainly in the number of procedures and the subsequent time demands) and paying taxes (in the time demands). These negative characteristics influence especially developing business activities, releasing the existing resources for new and therefore more effective use, effectiveness of tax collection (and the subsequent higher tax revenues) and additional costs due to delays in licensing procedures or attempts to speed the proceedings up through illegal practices. With regard to individual elements of indicators of conditions for doing business, the cumbersome procedure of company registration, the level of information openness in protecting investors, time demands associated with registering property and the cost of hiring employees are also considered negative. These characteristics reflect in greater opportunities for exploiting entrusted resources for personal gain, slowing down establishment of new businesses, transfer of property and thus increasing the transaction costs for the parties involved, and a lower level of employment especially in low-income and problematic workers.

On the other hand, the CR's position is the most favourable in conditions for obtaining credit, in the administrative burden associated with trading across borders (especially in export) and quite surprisingly in employers' duties and costs. These characteristics positively influence the availability of external financial resources for business and the penetration of foreign markets by local production, and development of foreign competition of local manufacturers. Regulation of employment, however complex, seems to be less burdening than in the majority of highly developed countries. Regarding the types of conditions for doing business in the CR, the worst results are in most cases demonstrated in the time demands associated with the required regulatory procedures (rather than the cost-related burden). Decreasing the time demands would therefore bring significant improvement in the overall standard of regulation and in combination with a reduced number of procedures would weaken the motivation and opportunities for engaging in corrupt behaviour, which has been the Czech Republic's long term problem.

The results of the Czech government's reforming efforts have so far been limited or have not involved any more extensive and in-depth changes to the systemic character, which has been a typical trait of the Czech economic policy on a long-term basis. Rather than focusing on major improvement in the regulatory quality, attention for example to discussion on tax cuts is paid in the media, despite the tax burden in the Czech Republic being one of the lowest in the EU (while social security payments at a level well above the average remain unchanged). Czech entrepreneurs give the worst rating in surveys to the low quality in execution of the state's authority, in particular the executive and judicial functions and their impact on the business sector. Execution of the state's authority, especially in tax administration but also in administrative supervision and decision making, has been subject to continuous criticism. The other recurring criticism refers to the complicated enforceability of justified claims of entrepreneurs through legal proceedings, which is caused mainly by the slowness of the courts' proceedings. In the case of authorities and courts, entrepreneurs see the limited predictability of final decisions

and the differences between individual regions in the CR as a serious problem. In the tax administration the ever changing legal base and its confusing complexity are the most criticized flaws.

Any major improvement in the entrepreneurial environment in the Czech Republic will therefore require effective reforms of the state administration and judicature. On the other hand, entrepreneurs deliver significantly more positive evaluation of the accessibility of loans and information necessary for doing business, the work of state (EGAP, Czechtrade, Czechinvest) and other than state (professional chambers, associations) organisations providing assistance services than in the 90s. The effort of executive authorities to broaden the use of information and communication technologies in dealing with the state and public administration, and the standardisation of regular official procedures (forms, fixed periods, etc.) is also assessed positively.

The contents and formal legal quality of laws regulating enterprise in the in the CR continue to feel the negative effect of transformation from the totalitarian state rigorously controlling the economy to a modern liberal democracy regulating a market economy. Major legal codes

have been subjected to dozens of amendments but no radical modernising transformation. Judicature and interpretation have not been established in a number of cases. The so-called legislation rush, which was necessary at the end of the previous and the beginning of this century due to harmonisation of the local laws with the EC laws, has obviously sped up the reforming processes but at the same time at least temporarily reduced the clarity and stability of the legal environment. What's more, some of the provisions of laws (taxation, industrial, etc.) criticized by entrepreneurs are a natural consequence of the structure of political powers in the country, i.e. the fact that left centre has had the control of the government in the Czech Republic between 1998-2006. Quite understandably, a left-wing government cooperated better with unions rather than entrepreneurial associations. On the other hand, all Czech governments after 1997 have been quite unstable coalitions with only a slight parliament majority, i.e. not positioned to carry out deep and at first painful reforms. It has been mainly the need to react adequately to changes in the integration of the Czech market in the single EU market and in the wider context to the globalisation processes, that have brought certain improvements for enterprises.

### 3. Conclusion

Viewing the weak points of the Czech Republic following from assessment of competitiveness the especially alarming issue is the long-term poor score of the **framework conditions**. The quality of institutional environment in complex evaluations further reduces the already poor results of other characteristics of competitiveness. While other transition countries have recently improved quality of governance, the Czech Republic has even shown worsening in certain indicators. And yet the role of the framework conditions is very significant, which is evidenced by the ever increasing inclination towards a broader concept of innovation systems, including institutional environment. Unlike the possibility of affecting innovation abilities in the narrow sense, improvement of framework conditions is in full responsibility and competence of economic policy agents. A small piece of good news after a long period of unfavourable development is the return of the Czech Republic to the position occupied by the country in 1997 in terms of corruption perception index.

In regulation of business environment whose quality plays a decisive role in innovation activities, the Czech Republic shows characteristics of a country with continental, Franco-German legal tradition. In addition, the country lacks sufficiently good institutions (as shown among other things by weak fulfilment of the principles of the so called better regulation) to mitigate the excessive state interference and procedural formalism, typical of this legal tradition, with effective performance of judicial power and state administration. Despite the partial efforts at improvement of **business environment** in 2006 the Czech Republic became slightly worse in comparison to the previous period due to a moderate drop in eight of the ten evaluated criteria. The analysis of the current legislation and administrative measures has shown that absolute worsening of conditions occurred in none of the areas, but virtually all of them (except starting of business) only implemented partial changes for the better, and slowly or with considerable problems (such as the effect of the new Labour Code on employers). In comparison to more dra-

matic reforms in a number of countries of the world (including the very region of Central and Eastern Europe) the Czech Republic has thus dropped to lower positions in the overall and the partial hierarchies.

These slow changes of conditions for doing business in the Czech Republic in the course of last year reflect in the **current results** of the World Bank published in September 2007. The Czech Republic occupies 56<sup>th</sup> position (in comparison to 52<sup>nd</sup> position in the previous year) even though the results are not fully comparable to last year due to moderate change of the methodology. And yet the region of Central and Eastern Europe is the most frequent reformer, with at least one change introduced by 79 countries of the region.

The overall critical outcome of the international comparison corresponds with the opinions of the **Czech businessmen**, who express ever stronger criticism of the business environment in the Czech Republic in the various surveys and opinion pools. Their criticism is mainly and for a long time already focused on poor quality of performance of state administration, especially executive and judicial, with its subsequent impact on the business environment. Execution of state administration, especially in the tax area, but also in the areas of state surveillance and decision-making, is another target of permanent criticism. A further area of chronic complaints is the difficult enforceability of legal entitlements, mainly due to the slowness of the courts. Both in the case of authorities and in the case of courts the businessmen complain on the difficulty to predict the final decisions and their cross-regional differences. Another objection corresponding with the above analysed results of WB evaluation targets the complexity and length of proceedings and procedures that the businesses need to undergo.

Concentrated expression of the **drawbacks of the Czech business environment**, identified and analysed in the evaluation published in the yearbook, can be found in the statement of the Economic Chamber of the Czech Repub-

lic dated to the last year. The legislative framework for doing business in the Czech Republic is rather vague, often changed by amendments to various acts, overfilled with all sorts of legal regulations, and negatively affected by unprofessional interferences in the course of act passing procedures.

Too hasty passing of legal standards and ambiguous interpretations of many of them cannot contribute to increased legal certainty of businesses. Protracted litigations in the case of disputes following from the condition of the legislation in particular cases threaten further existence of the affected entities. These problems result in devastation of legal awareness of business public, legal uncertainty, lack of trust in the law and in flexibility and transparency of court decisions, and above all extensive complications for businesses themselves.

A similarly critical evaluation – especially considering **administrative burden** of businesses – was issued by the government itself in 2006. The analysis performed by the Office of the Government of the Czech Republic showed that the total annual administrative load of businesses, i.e. their costs of fulfilment of their administrative obligations, amounts to at least CZK 86 billion. The highest administrative burden is represented by the regulations issued by the Ministry of Labour and Social Affairs, the Ministry of Agriculture, the Ministry of Healthcare, the Ministry of Finance and the Ministry of the Environment (together over 80 % of the above amount). The most costly legal regulations for businesses include the legislation stipulating health insurance payments, organisation and performance of social security policies, income tax acts, etc., which also corresponds to the findings of the World Bank. In 2007 the Government of the Czech Republic announced its intention to reduce the administrative load of businesses by 20 % by 2010 (in comparison to the situation in 2005), by means of revisions, amendments or cancellations of the existing regulations and systematic evaluation of the impact of the newly drafted regulations (using the RIA methodology), which should be an obligatory part of the legislative rules of the Government since mid 2007. Business representatives welcomed these initiatives.

The Government of the Czech Republic expressed its intention to improve the **overall business conditions** in a number of its documents, in the most complex manner in the National Lisbon Programme for the period 2005–2008. The Office of the Government of CR prepared a number of materials in the period 2005–2006 for assessment and reduction of administrative burden of businesses, even including an action plan which should culminate in approval of the amendment eliminating excessive administrative load by a one-off change of all sorts of acts and sub-legislative standards. Partial initiatives were started by individual ministries (mainly by the Ministry of Industry and Trade and by the Ministry of Finance), always at the presence of representatives of business associations (especially the Council for Development of Business Environment as the professional inter-ministerial authority of the Ministry of Industry and Trade). The report of the Government of the Czech Republic on fulfilment of the National Programme of Reforms focused on a number of issues of the business environment, including the results of the international comparisons of WB. These liabilities virtually correspond to the recommendations of the European Commission issued on the occasion of enlivening of

the so far not very successful Lisbon Strategy in March 2006.

The basic measures proposed by the **European Commission** include establishment of an administrative job of assistant to future businesses in fulfilment of all necessary administrative requirements (strived at by the Czech Republic with the projects of the Central Registration Point and partly the Czech Point), and further shortening of the period necessary for a company incorporation by one half with the final aim of reduction to maximum one week (attempted by the Czech Republic through change of functioning of the Commercial Register) and also application of the methodology of measurement of administrative costs following from the prepared national regulations (to become part of legislative rules of the Government in the Czech Republic in the course of 2007).

An undoubtedly positive fact is that the long-term criticism on the part of the businesses and similarly critical assessments by renowned international institutions have made the Czech Government deal with drawbacks of regulation preventing **development of entrepreneurship**. On the other hand, there is the regretful fact that quality of business conditions has only been concentrated on recently, due to weakness and instability of the Czech Governments, and with only little emphasis and with insufficiently systematic approach. The results of the above outlined reform efforts are thus still limited, or in other words do not yet include broader and deeper changes of **system nature**, which is a general long-term characteristic of Czech economic policy. And yet examples of the Baltic countries, Slovakia and some Balkan countries show that a stable government, ready to undertake even unpopular reforms to support competitiveness, and thus economic growth and creation of new job opportunities, is able in just a couple of years to change the country scoring not only in international comparisons of the WB type, but also in the eyes of domestic and foreign businesses and investors, with a real positive impact on the economic development of the country.

A more significant improvement of the Czech business environment therefore requires above all effective **reforms of state administration** and judicature and pro-competition oriented economic policy. Even though this is a general formulation of objectives, it accurately reflects the basic requirement for optimum regulation of business enterprising: less regulation (as a consequence of user-friendly economic policy) and radical improvement of the necessary regulation (by reform of state administration and judicature). These steps, however, require a wider political consensus concerning not only their necessity, but also the depth and speed of their execution. The consensus, however, has not yet been reached by the decisive political forces in the country, and the period of weak, insufficiently reform-intensive Czech governments was not even closed by the parliamentary election in June 2006. The roots of the continuing unsatisfactory condition of the domestic business environment may therefore be traced (in addition to the dominant legal tradition) mainly in the condition of the local political scene, the nature of the political parties and their leading representatives, and also in the continuing passive approach of the society, including businessmen, in relation to the many times defined and media attacked drawbacks of functioning of politics and execution of state power in the Czech Republic.

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# **Innovations and competitiveness**



## 1. Structural competitiveness

The assessment of competitiveness is distinguished by analytical levels of the position of the Czech Republic in international comparison with an emphasis on the priorities of the Lisbon Strategy, or pillars of knowledge based economy (innovation, quality of human resources and supporting factors of information and communication infrastructure and institutional environment). This is followed by industrial and regional standards assessed on the basis of summary indicators (performance and qualitative indicators) and a detailed assessment on the levels of the individual industries and regions in the Czech Republic.

### 1.1 Competitiveness of countries

There is a set of **structural indicators** focusing on qualitative characteristics of competitiveness. The indicators assess the progress of implementation of the Lisbon Strategy. The position of the Czech Republic is compared to averages of the original EU members (EU-15), EU-27 and also Finland as an example of the most successful knowledge-based economy which has come through a deep structural transformation.

In the area of **research and innovation** the key performance indicators in the Czech Republic show the prevailing trend of lower expenditure on research and development (R&D), weak patenting activity and poor access to venture capital. Despite the remarkable progress of ICT accompanied mainly with large investment in communication technologies their use still remains less intense. In the area of education the Czech Republic lags behind in terms of low level of expenditure, share of university educated people and scope of participation in lifelong learning. On the contrary, the number of persons with at least secondary education is above average.

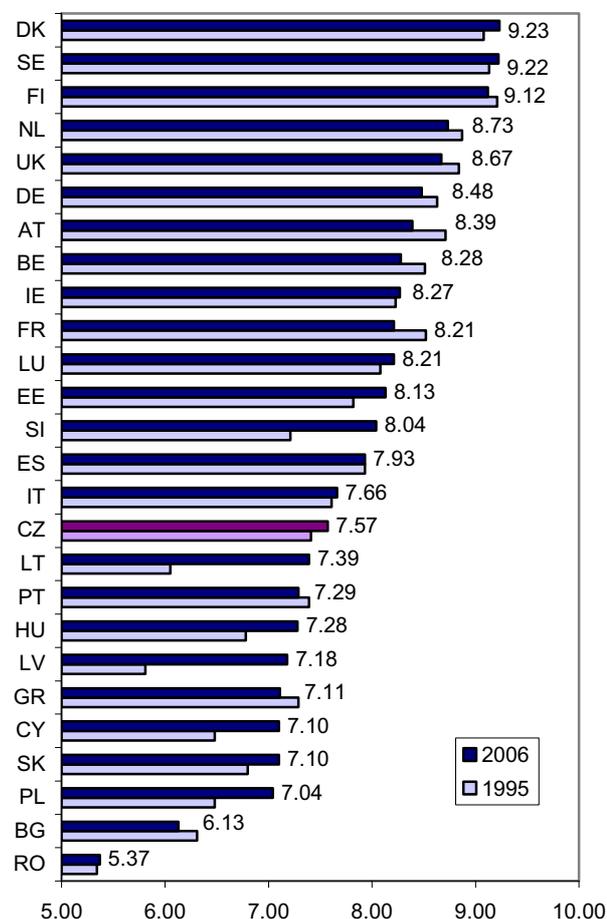
The **economic reform** indicators have shown a significant decrease in the relative use of state subsidies, especially of the vertical type (industrial- and company-specific subsidies), with simultaneous pressure on transparency of public procurement. Long-term issues include the low level of administrative conditions for entrepreneurship. Even though network industries gradually integrate their markets, the price of electricity keeps growing.

In the area of **social cohesion** the Czech Republic still shows favourable conditions. The share of population with an disposable income below the risk-of-poverty threshold is lower than the EU-27 average, as well as the share of population living in jobless households. Inequality of income distribution and dispersion of regional employment rates also shows favourable values. However, high rate of long-term unemployment is a serious issue. Postponement of the pension and health insurance reform represents the basic problem of future social development, especially because of the ageing population. In the case of **environmental sustainability** there is a high energy intensity and a low share of electricity generated from renewable sources in the Czech Republic.

**Knowledge-based competitive advantage** is evaluated according to the Knowledge Assessment Methodology (KAM) of the World Bank. On its basis the Czech economy remains below average in the overall assessment based on the Knowledge Economy Index (see Figure 1). Especially lag behind Scandinavian countries is remark-

able (of the new EU members Estonia and Slovenia show better evaluation).

Figure 1: Values of knowledge economy index



Note: Higher value (max. 10) = better result. Source: KAM, World Bank 2006–2007.

The reason for the low overall index of the Czech Republic is mainly the poor evaluation of the framework conditions of knowledge based economy. Moreover, the institutional quality has worsen further in comparison to 1995 (see Table 1). On the other hand, the knowledge components of the overall index show improvement, mainly in the area of human resources. The poor assessment of institutional quality in the Czech Republic is mainly due to the low quality of administration in all monitored indicators, especially corruption control and legal system quality.

Table 1: Components of knowledge-based competitiveness

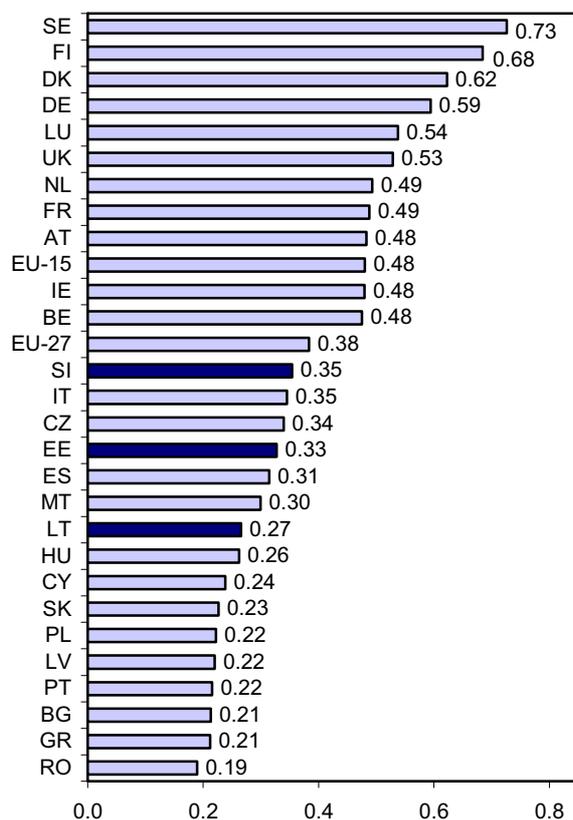
		CZ	FI	EU-12	EU-15	EU-27
Economic regime	1995	8.33	8.46	6.06	8.21	7.30
	2006	7.35	8.79	6.83	8.17	7.60
Innovation system	1995	6.62	9.56	6.35	8.31	7.48
	2006	7.34	9.71	6.73	8.40	7.69
Human resources	1995	7.20	9.15	7.09	8.46	7.88
	2006	7.55	9.16	7.59	8.20	7.94
ICT	1995	7.49	9.66	6.85	8.62	7.87
	2006	8.04	8.84	7.34	8.52	8.02

Source: KAM, World Bank 2006–2007.

In the case of partial indicators of the **knowledge index** the innovation performance is affected by the problem of low production of knowledge and low innovation performance, which corresponds to the achieved level of development of domestic knowledge base (with lower relevance of the own innovation capabilities). What is positive, though, is the considerable openness to business and investment flows, representing a strong potential for transfer of external technological knowledge and its adaptation to domestic needs.

In the area of human resources quality of education in natural science and technology is assessed very high, including the relatively large proportion of graduates from these fields in the total number of university graduates. Problems in this area are represented by low investment into education and low level of further training in companies. Relatively positive is the standard of development of infrastructure of information and communication technologies, especially telephone equipment. Poorer still is availability or utilisation of more sophisticated technologies and applications, including commercial use of these.

Figure 2: Summary innovation index (2006)



Source: European Commission – European Innovation Scoreboard 2006, own modifications.

Innovation based competitiveness of EU countries is comprehensively assessed in the **European innovation scoreboard** (EIS) in division to innovation inputs and outputs. In the case of the inputs three areas are monitored: innovation drivers, knowledge creation and innovation – entrepreneurship relationship. The outputs are further divided to innovation applications and intellectual property rights. A comparison based on the summary innovation index (see Figure 2) shows a strong position of

Scandinavian countries and South European and new member states lagging behind. The position of the Czech Republic in 2006 was below EU-27 average (13<sup>th</sup> position), with only Slovenia being a better assessed new EU member. In comparison to 2002 both the score (from 0.31 to 0.34) and the position of the country improved (in 2002 the Czech Republic was 16<sup>th</sup>).

New EU states on average lag behind in all areas of the innovation process (see Table 2). The largest gap appears in the areas of intellectual property rights and knowledge generation. On the other hand, the new member states approach the EU-15 most in the area of innovation application. The Czech Republic lags behind EU-27 in the area of innovation drivers and intellectual property rights. On the other hand, in the area of innovation application the Czech Republic occupies a favourable 6<sup>th</sup> position among EU-27 (however, this position is significantly affected by the bias represented by the informative value of industrial-based indicators). Stagnation of innovation-based competitiveness of EU manifests itself when comparing development of the Summary Innovation Index in time. Its value has not changed for the EU-15 average and just slightly changed for EU-12.

Table 2: Components of Summary Innovation Index (2006)

	CZ	FI	EU-12	EU-15	EU-27
Innovation drivers	0.30	0.81	0.34	0.53	0.44
Knowledge creation	0.38	0.75	0.23	0.50	0.38
Innov. and entrepr.	0.38	0.62	0.32	0.47	0.41
Applications	0.59	0.62	0.39	0.48	0.44
Intellectual property	0.06	0.62	0.05	0.42	0.25

Source: European Commission – European Innovation Scoreboard 2006, own modifications.

Specification of EIS on the regional level (NUTS2) is represented by the **European Regional Innovation Scoreboard** based on seven indicators. International comparisons reveal considerable differences between European regions, including within individual national economies. The best scores are usually achieved by metropolitan areas, comparison of European countries showing the best scores of Scandinavian and German regions. In the Czech Republic a privileged position is occupied by Prague, with 15<sup>th</sup> place among the total of 208 scored regions. The other Czech regions lag behind, with the only exception of Central-Bohemian region, holding a good position in one of the partial indicators, namely corporate research and development.

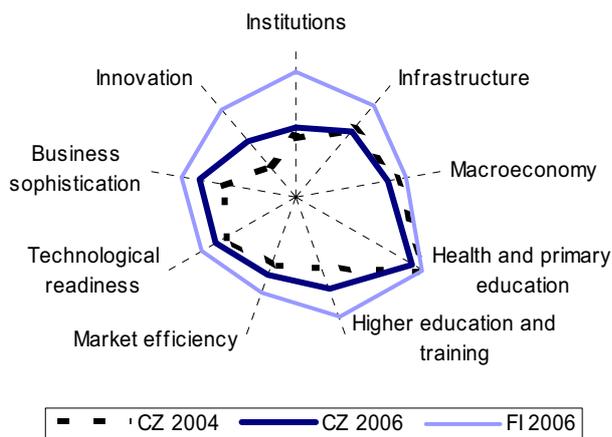
An overall evaluation of competitiveness is performed every year by the **World Economic Forum** (WEF), whose yearbook presents two summary indexes – the Global Competitiveness Index (GCI) and the Business Competitiveness Index (BCI). Following the GCI the best score is held by Switzerland, thanks to the healthy institutional environment, excellent infrastructure, effective markets and high standards of technological innovation. Leading positions have also been held by Scandinavian countries (Finland, Sweden, Denmark) with excellent score of institutional quality.

The position of the USA somewhat deteriorated in 2006 (with a drop from 1<sup>st</sup> to 6<sup>th</sup> place) due to significant macroeconomic unbalance. Stable good position has been held by Germany (8<sup>th</sup> position) and Great Britain (10<sup>th</sup>

position). Very good scores have been achieved by certain Asian economies (especially Singapore and Japan), which are characterised by high-standard infrastructure, flexible and effective markets, highly educated workforce and technological readiness and innovation capacity. The position of India and China has still been weaker. Comparisons within EU-27 show surviving retardation of the new members in comparison to the original EU-15.

The position of the Czech Republic in WEF evaluation has been stable (29<sup>th</sup> position). Of the new EU members a better position has only been held by Estonia. Following the **stages of competitiveness development** the Czech Republic has been in the stage of transition from efficiency-driven to innovation-driven. The country has still significantly lagged behind the countries with the best scores in innovation-based competitiveness, to the greatest extent in the quality of institutions and innovations (see Figure 3). In comparison to 2004 certain improvement has been achieved in these indicators: business sophistication, innovation and higher education and training. On the other hand, scoring of macroeconomic stability, infrastructure and primary education has deteriorated. Moderate improvement has been reported in the area of quality of institutions, technological readiness and market efficiency.

Figure 3: Pillars of Global Competitiveness Index



Source: WEF – The Global Competitiveness Report 2004–2007, own modifications.

Strengths of the Czech Republic mainly include quality of mathematical and technical education, weak restrictions of international ownership, the scope of technology transfer of international investment, equipment with mobile phones and availability of scientists and engineers. On the other hand, weak points are represented by quality of institutions and markets efficiency. The WEF survey also includes **assessment of business conditions** in the individual countries. The biggest issues in the Czech Republic identified by the survey include the level and system of taxes, ineffectiveness of public administration and related corruption and further regulation of job market and availability of funding.

In the context of the **Lisbon Review** published by WEF fulfilment of the Lisbon Strategy is monitored through eight key areas and their qualitative indicators (see Table 3). The last survey of 2006 shows continuing lag of the Czech Republic behind the former EU-15, espe-

cially in the area of corporate environment quality, innovation and research, efficiency and integration of financial services. Somewhat better position is occupied by the Czech Republic in the area of network industries liberalisation, level of social inclusion and sustainable development. In comparison to the previous round (2004) the overall scoring of the country has slightly improved.

Table 3: Assessment of Lisbon Strategy implementation (2006)

	CZ	FI	EU-12	EU-15	EU-27
Information society	4.10	5.41	4.02	4.83	4.47
Innovation, R&D	3.85	5.90	3.56	4.62	4.15
Liberalization	4.96	5.58	4.37	5.19	4.83
Network industries	5.16	5.93	4.59	5.76	5.24
Eff and int. fin. services	4.84	6.29	4.84	5.99	5.48
Corporate environment	3.99	5.24	4.14	4.82	4.51
Social integration	4.44	5.35	3.95	4.60	4.31
Sustainable develop.	4.90	6.23	4.22	5.47	4.91
Total	4.53	5.74	4.21	5.16	4.74

Source: WEF – The Lisbon Review 2006.

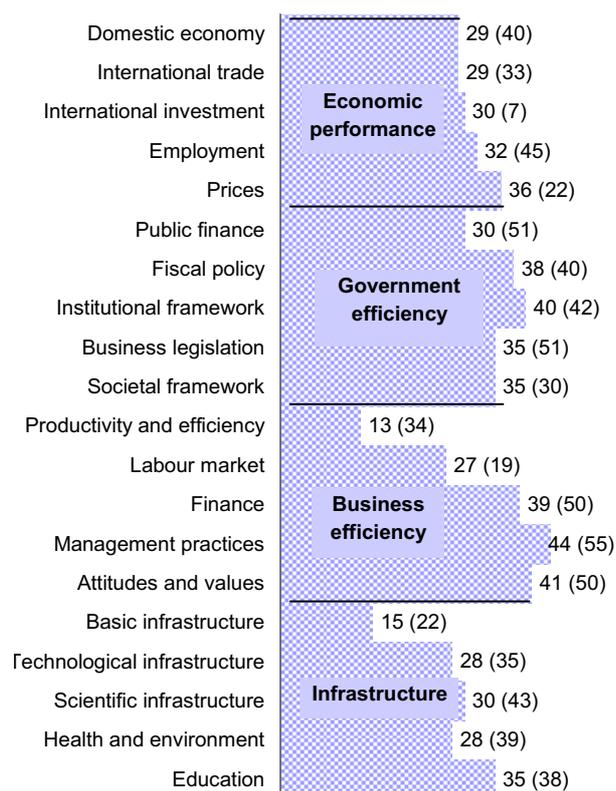
An alternative overall evaluation is provided by the yearbook of Global Competitiveness published by the **International Institute for Management Development (IMD)**. The evaluation is based on four basic factors of competitiveness: economic performance, government efficiency, business efficiency and quality of infrastructure. Pursuant to IMD the most competitive economy is represented by the USA followed by Singapore and Hong Kong. The position of Scandinavian countries in the scoring of IMD is worse than in the scoring of WEF. The Czech Republic ranked 32<sup>nd</sup> in the last evaluation. The other new EU members (except Estonia and Lithuania) received worse scorings, similarly to Greece, Portugal or Italy (see Table 4).

Table 4: Countries ranked by competitiveness (2007)

Best 15 and other EU countries		
USA (1)	Australia (12)	Lithuania (31)
Singapore (2)	Norway (13)	Czech Rep. (32)
Hong Kong (3)	Ireland (14)	Slovakia (34)
Luxembourg (4)	China (15)	Hungary (35)
Denmark (5)	Germany (16)	Greece (36)
Switzerland (6)	Finland (17)	Portugal (39)
Island (7)	G. Britain (20)	Slovenia (40)
Netherlands (8)	Estonia (22)	Bulgaria (41)
Sweden (9)	Belgium (25)	Italy (42)
Canada (10)	France (28)	Romania (44)
Austria (11)	Spain (30)	Poland (52)

Source: IMD - World Competitiveness Yearbook 2003-2007.

The so called **landscape of competitiveness** shows the partial criteria of competitiveness evaluation according to IMD in detail (see Figure 4). The comparison of the partial criteria for the Czech Republic with the year 2004 shows that improvement has been achieved in nearly all of the monitored indicators, including but not limited to the area of public finance, productivity and efficiency and quality of scientific infrastructure. Certain deterioration can be seen in the area of relevance of international investment, price development, quality of societal framework and the labour market.

**Figure 4: Partial indicators of the Czech Republic (2007)**


Note: Position in brackets – year 2004. Source: IMD - World Competitiveness Yearbook 2004-2007.

## 1.2 Competitiveness of industries

Competitiveness of industries is evaluated on the basis of a wide spectrum of indicators of economic performance with an emphasis on qualitative aspects. Out of the eighteen industrial branches in the Czech Republic ten belong to manufacturing industry. The individual industries show large differences in the **productivity level**. In 2005 above-average manufacturing industry branches in the Czech Republic, measured by average productivity, through gross value added per employee, included raw material mining, chemical industry and manufacture of transport equipment. On the other hand, below-average values were reported in textile and leather industry, and manufacture of furniture. The most productive branches in the service area included transport and communications, with the other services showing low productivity.

Significant differences were also shown in **dynamics of productivity** (see Table 5). Some industries grew by more than 8 % a year, with high dynamics, paradoxically enough, shown by textile, clothing and leather industry, where productivity grew by 8.4 % on average, with value added only growing by 1.0 %, though. The increase of productivity was mainly caused by the decreasing employment.

**Employment** rates dropped in many industries in that period, in addition to textile, clothing and leather processing industry also in agriculture, forestry and mining. More than 10 % increase in annual productivity was achieved by electrotechnical industry, other industries with high dynamics further including mechanical engineering and manufacture of transport equipment, but

also agriculture and forestry. Productivity dropped in food processing and tobacco industry, and stagnated in paper production and publishing. The overall average annual productivity growth across the manufacturing industrie amounted to 5.6 %. Dynamics of the services sector was maintained by trade, hotel, restaurants and financial intermediation.

**Table 5: Annual real growth of labour productivity and gross value added in the Czech Republic between 2000 and 2005 (in %)**

	GVA	LP
Total	3.8	3.7
Agriculture, forestry, fishing	3.5	8.3
Industry	4.8	5.1
Mining	-2.2	4.7
Manuf. of food and tobacco	-3.3	-1.6
Manuf. of textile and footwear	1.0	8.4
Manuf. of wood, paper, printing, publishing	3.0	0.0
Manuf. of coke, petrol. prod., chemicals	6.2	6.8
Manuf. of rubber, plastics, mineral products	8.8	7.3
Manuf. of metal products	1.1	0.9
Manuf. of machinery and equipment	7.5	7.5
Manuf. of office mach., TV, optical instr.	13.0	10.2
Manuf. of transport equipment	13.5	8.8
Manuf. of furniture, manuf. n.e.c.	1.7	4.0
Elektricity, gas and water supply	0.5	3.5
Construction	1.5	1.2
Trade, transport, hotels and restaurants	4.9	4.8
Financial intermediation	2.6	3.8
Real estate, renting and business activities	3.8	0.5
Other services	1.3	0.8

Note: GVA – gross value added, LP – labour productivity. Source: Czech Statistical Office, Database of National Accounts (June 30, 2007).

With the help of analysis of **inter-industrial relationships** (based on input-output model) the major drivers of growth were identified whose development most significantly affects the other industries of national economy (multiplication effect). Above-average values are mainly achieved by wood processing industry, refineries, steel industry, energy industry, construction, and some branches of services such as transport and communications and business and finance services. In comparison to 1995 a certain drop has been observed in engineering for only small part of machinery is produced in the country, the rest relying on imports. The main cause is the increasing openness of Czech economy, with the rising share of cross-border transactions.

**Table 6: R&D intensity of value added by technological intensity, 2001–2003 (in %)**

	CZ	SE	FI	GE	UK	ES	IE
Total	2.1 (2.4)	15.2	10.4	7.7	6.9	2.4	1.9
High	3.0 (5.2)	62.5	28.1	24.1	26.0	16.3	5.3
M-high	5.0 (4.9)	14.9	10.6	10.4	8.2	3.6	0.5
M-low	0.8 (1.0)	2.7	3.6	1.8	1.8	1.0	1.7
Low	0.2 (0.3)	1.5	2.0	0.8	0.7	0.6	0.7

Note: Figures for Czech Republic (2005) in brackets. Source: STAN Database OECD, August 31, 2007, Czech Republic – Czech Statistical Office, National Accounts, Indicators of research and development 2005, own modifications.

Industries are distinguished by **technological intensity** (in the case of manufacturing industry), or **knowledge intensity** (in the case of services). International comparisons, however, are problematic, for the reason of differences in the actually reported R&D intensity. Due to international fragmentation of production chains there is the trend of localisation of segments based on routine operations in less developed countries, while strategically significant segment demanding advanced technology and high qualifications remain in the knowledge-developed countries.

The industrial point of view also entails often large differences between companies in R&D intensity and innovation performance. R&D intensity in terms of the standard classification of technological intensity in selected EU countries shows that the average technological intensity in Swedish manufacturing industry is seven times higher than in the Czech Republic or in Ireland (see Table 6).

Evaluation of economic activities on the basis of the aspect of technological and knowledge intensity shows a high share of industries with lower or low technological intensity in value added and employment (see Table 7). The share of industries with lower and low technological intensity represents more than 50 % in both indicators. What is especially important is the low **share of value added in production** of industries with high technological intensity, pointing to the role of manufacturing segments of assembly type. Services show dominance of less knowledge-intensive market services in all indicators.

**Table 7: Structure of economic activities by technological and knowledge intensity in the Czech Republic (in %)**

	Output	GVA	Employment
HT	10.6	6.4	6.9
MHT	35.1	35.0	30.3
MLT	29.4	30.9	28.4
LT	24.8	27.7	34.4
Total Manufacturing	100.0	100.0	100.0
KIS_HT	7.5	8.1	4.9
KIS_MS	23.5	20.7	15.2
KIS_FS	6.5	5.5	2.9
KIS_OS	13.4	16.7	21.2
LKIS_MS	38.6	36.7	41.4
LKIS_OS	10.5	12.3	14.4
Total Services	100.0	100.0	100.0

Note: GVA – gross value added, technology and knowledge intensity in manufacturing: HT – high, MHT – medium-high, MLT – medium-low, LT – low. knowledge intensive services (KIS): HT – high-tech, MS – market, FS – financial, OS – other. Knowledge less intensive services (LKIS): MS – market, OS – other. Source: Czech Statistical Office (CSO), June 30, 2007, own calculations.

The highest **level of productivity** was achieved in 2005 by industries of medium technological intensity, while the high-tech industries ranked third. The relevance of the medium technological intensive industries is also evidenced by the one-third share in value added creation by manufacturing industry and the 15 % higher productivity than the average in the manufacturing in general. Also productivity dynamics on this level is above-average. On the other hand, industries with high technological intensity show lower productivity level than industries with lower technological intensity (see Table 8).

**Table 8: Level (thousands of CZK, current prices) and average real labour productivity change and gross value added by technological intensity (in %)**

	Productivity		GVA	Product
	Level		Growth	
	1995	2005	1996–2005	
High	243	474	7.1	4.2
Medium-high	219	596	9.0	7.9
Medium-low	267	561	-1.9	-2.0
Low	209	416	1.6	3.4

Note: Data in real terms were obtained by using GVA deflator a) for chemical industry (NACE 24), b) for manufacturing of other transport equipment (NACE 35). Source: CSO, Database of national Accounts (June 30, 2007).

With regard to **innovation performance** (share of innovating businesses the highest values in the Czech Republic have been achieved by coke and chemical industry, research and development, computer technology and financial intermediation, electrical and optic instruments, machinery and equipment, transport equipment, manufacture of metals, manufacture of plastics and food processing industry. Industries with higher innovation potential in the Czech Republic therefore also include some of the less technologically intensive activities (see Table 9).

**Table 9: Shares of innovating enterprises in the Czech Republic (in %, 2003–2005), and R&D expenditure (in % of gross value added, 2005)**

	INO	R&D
Mining and quarrying	40.0	0.32
Manuf. of food and tobacco	54.7	0.17
Manuf. of textile and footwear	42.2	0.82
Manuf. of wood, paper, publishing	47.3	0.07
Manuf. of coke, chemical products	75.3	3.40
Man. of rubber, plastics, miner. products	58.2	1.36
Manuf. of metal products	54.6	0.65
Manuf. of machinery and equipment	64.9	3.05
Manuf. of electrical and optical equip.	59.6	3.09
Manuf. of transport equip.	68.4	8.18
Manuf. of furniture, manuf. n.e.c.	43.1	0.36
Electricity, gas and water supply	40.6	0.20
Construction	37.5	0.19
Trade, repairs	43.1	0.04
Hotels and restaurants	25.9	0.01
Transport, communications	35.2	0.01
Financial intermediation	73.9	0.33
Real estate services	25.1	0.03
IT services	71.9	6.16
Other business services	44.1	0.72

Note: INO = proportion of innovating companies, R&D = research and development intensity. Source: CSO (2006), Annual national accounts database (June 30, 2007), own modification.

On the basis of the **Overall indicator of industrial competitiveness** (OIIC) the position of the industries within Czech economy has been specified (see Table 10). The index is constructed on the basis of seven partial indicators, including: level and dynamics of productivity, share of exports in production, share of highly qualified employees, share of cost of research and development in revenues, share of businesses under foreign control in gross value added, production multiplier.

The industries are further monitored with a view to the **share of gross added value in production**, capital coefficient, levels of unit labour costs and share of exports and imports. The most successful industries on the basis of OIIC clearly are manufacture of transport equipment followed by finance and insurance and electrotechnical industry. The least successful industries include other services, construction, agriculture, forestry and fishing.

**Table 10: Industries ranked by OIIC in the CR (2005)**

		OIIC
DM	Manufacture of transport equipment	5.3
J	Financial intermediation	6.6
DL	Manufacture of electrical and optical equip.	6.9
DF+DG	Manuf. coke, petrol. products, chemicals	7.0
DK	Manufacture of machinery and equipment	7.4
DH+DI	Man. of rubber, plastics, mineral products	8.0
E	Electricity, gas and water supply	8.7
K	Real estate, business services	8.7
DJ	Manufacture of metal products	9.6
C	Mining and quarrying	10.1
DB+DC	Manufacture of textile and footwear	10.4
DA	Manufacture of food and tobacco	10.7
G+H+I	Trade, accom.& restaur., transport, commun.	10.9
DN	Manuf. of furniture, manuf. n.e.c.	11.6
DD+DE	Manuf. of wood, paper, printing, publishing	11.9
A+B	Agriculture, forestry, fishing	12.3
F	Construction	12.4
L-P	Other services	12.6

Source: CSO, own calculations.

The importance of **agriculture, forestry and fishing** dropped significantly in the period 1995 to 2005, with the share in employment decreasing from 6.4 % to 3.8 % and the share in value added dropping from 5 % to 2.9 %. The development of the sector was strongly affected by EU accession (and the subsequent involvement in the Common Agricultural Policy) and by the two strong waves of floods. The branch lags behind in nearly all partial indicators of competitiveness except for productivity, which increased significantly mainly due to the large decrease of employment. Another favourable feature is the relatively high proportion of value added in production. On the other hand, the role of qualitative factors in competitiveness is much below the average, with especially expenditures related to R&D highly lagging behind.

**Mining and quarrying** has experienced a drop in the share in employment and value added. The most important branch of mining is represented by energy materials, mainly coal. Higher dynamics has been observed in crude petroleum and natural gas mining and mining of other minerals. About one fourth of the total production is exported. Majority of the raw materials are imported to the Czech Republic and consumed, mainly by the refineries and by power generation. With a view to competitiveness raw material mining is one of the average industries.

**Food processing industry** is one of the four most important branches of manufacturing industry with about 10 % share in the revenues. At present the industry faces transformations in agriculture following from the Common Agricultural Policy, and pressure on price reductions from retail chains. According to the competitiveness indicator

the industry is classified as one of the less competitive (bottom half of the hierarchy). The industry shows a relatively high proportion of businesses under foreign control and the highest value of production multiplier.

**Textile, clothing and footwear industry** has been put under extreme pressure recently especially from Asian competitors, using cheap labour. Czech manufacturers often cannot resist, especially in leather industry. That is why the relevance of the industry keeps decreasing. Despite that the industry has managed to keep a relatively high percentage of exports (today up to 90 %). Segments capable of international competitiveness include for example the knowledge-demanding segments of textile industry (nano-fibre) or fashionable collections of the higher price categories. The industry structure is characterised with a relatively low level of concentration and strong specialisation.

The industry of **wood processing and paper production** represents a very heterogeneous group with wood processing industry representing its major part. Wood processing is very much export-oriented and uses sufficient domestic supply of raw material. Wood processing is closely connected with other industries, such as manufacture of paper and fibre (and further print and publishing), but also furniture manufacturing and construction. With regard to competitiveness this group is very low in the ranking. The reasons include low technological intensity of the production and nearly zero investment into research and development. What is relatively high, though, is the share of employees with higher qualifications and the share of value added in the production.

Revenues of **refineries and chemical industry** strongly reflect fluctuations of global oil prices. In contrast to chemical industry with a high share of exports (about 70 % of all production) the share of exports in production of refineries is relatively low. Evaluation of competitiveness placed the group on fourth position mainly thanks to the high standards and dynamics of productivity, the share of qualified staff and investment into R&D. Further development of the industry will mainly be affected by increasing energy prices and more and more stringent environmental legislation.

Manufacture of **plastics and other non-metallic mineral products** is dynamic with a growing share in GDP. High dynamics is especially typical of manufacture of rubber and plastics products, supported by the conjuncture in automotive industry. The high domestic demand has somewhat decreased the share of exports but still the industry keeps positively contributing to the trade balance. Traditional exporting industries also include glass production, with a trend towards decline of consumer glass and inclination towards technical glass. The group can be found in the top third of the competitiveness hierarchy, especially thanks to high productivity (more than double the average of the CR, despite employment growth). There is also the high investment into R&D, but on the other hand a very low proportion of highly qualified staff.

**Metallurgy** is strongly affected by globalisation trends, accompanied with growing concentration. Similar characteristics can also be traced in the Czech Republic (the largest local metallurgical company has become part of the strongest global group of steel manufacturers.) The industry has invested a lot into improvement of product

quality and transfer onto segment with higher value added. At present the industry is on the way up, which is mainly caused by the construction boom, and participation in implementation of large investments into automotive and electrotechnical industry. The position in the competitiveness ranking in the Czech Republic still remains around the middle, though.

**Manufacture of machinery and equipment** has a long tradition in the Czech Republic and a strong base of qualified workforce. The strong revival after 2000 was caused by the inflow of foreign investment. The most serious current issue is insufficient supply of workforce, which generates pressure on wage increase. Mechanical engineering is currently the export industry of Czech economy with the biggest output and the highest positive commercial balance at the same time. As for competitiveness the industry ranks fifth thanks to the high proportion of export production and high productivity dynamics. The industry also shows above-average investment into R&D.

The most dynamic industry of Czech economy certainly is **manufacture of office equipment, computers and communication technologies**. The growing significance of this industry is reflected in the massive inflow of foreign investment. A substantial part of the production (nearly 100 %) is exported, but the level of component import is high. Therefore it does not create much value added in the Czech Republic, with the manufacture being of rather assembly nature. The low value of production multiplier points to negligible impact on other industries of economy. The group shows relatively low R&D investment, which means that the knowledge intensity of the industry does not correspond to the classification as high-tech industry.

**Manufacture of transport equipment** is the key industry of Czech economy. The dominant role is played by automotive industry, representing about one fifth of overall exports, and the greatest number of job opportunities. The industry performance in exports keeps increasing (now covering about three quarters of the whole production). As mentioned above, the competitiveness evaluation places the industry on the very top, mainly thanks to high investment into R&D and the high share of foreign capital. Another favourable indicator is above-average standard and dynamics of productivity and export output. The below-average indicators include the low share of qualified workforce.

In the context of **other manufacturing industry** the most important role is performed by furniture manufacture, characterised with high material but low investment demand. This is why most of the companies in the field are SMEs. The present boom of the industry is due to the boom in construction. However, there is the high pressure from competitors, especially Polish. The growing pressure on environmental waste disposal and exhaustion of natural resources of non-ferrous metals in the Czech Republic create a good perspective for development of recycling. As for competitiveness the industry is rather below-average.

**Energy sector** is currently characterised with strong globalisation trends and growing international importance. Liberalisation within EU leads to growing cross-border flows and weakening of the former national monopolies. Prices of energy have grown significantly in the

recent years, especially electricity. Generation of electricity and production of gas, water and heat shows the highest productivity of all industries of national economy. The significance of the group is also evidenced by the high value of production multiplier.

**Construction** is very sensitive in relation to the economic cycle. The boom after 2000 has mainly been due to significant investment into transport infrastructure, industrial and administrative centres but also residential housing. Continuing expansion, however, is threatened by lack of workforce. The sector can be characterised as a group with a high concentration showing a relatively high production multiplier. As for competitiveness evaluation construction is one of the lowest positioned.

The group of industries including **trade, hotels, restaurants, transport and communications** is quite heterogeneous. The trade, transport and communications business is highly concentrated with a strong effect of foreign investment. A substantial proportion of public companies still prevails in transport and mail services, even though the role of the public sector keeps decreasing. Thanks to the EU accession and geographical position of the country in combination with development of telecommunications the role of transport and communications in the service sphere has been significantly strengthened. Important factors of demand in this group include tourist industry.

The industry of **finance and insurance** has undergone a substantial restructuring resulting in a significant increase of the proportion of foreign entities, currently controlling around 75 % of the value added. In the competitiveness hierarchy the industry ranks second, especially thanks to the high production multiplier and share of qualified workforce, above-average share of foreign investment and a high level of productivity. Provisions of loans to households, both by banks and by non-bank institutions, have increased considerably recently.

The industry of **businesses services** globally belongs to the most dynamic activities with increasing presence of supra-national activities. The reason is the trend towards stronger linkages between industry and services, with growing share of services in the value of industrial output and increasing outsourcing in industry. The most dynamic industries in the Czech Republic include job intermediation. Competitiveness evaluation placed the industry on the eighth position.

**Other services** are divided into public administration, education and healthcare. The low position in the competitiveness scale is mainly due to the low level and dynamics of productivity and low proportion of international control. The industry growth mainly depends on the dynamics of final demand, which is quite elastic depending on pensions.

### 1.3 Regional competitiveness

Competitiveness of regions (on the level of NUTS3) was evaluated on the basis of three key aspects: economic and innovation performance and quality of life. The comparison of the **overall competitiveness of regions** in 2005 with development dynamics in the years 2001–2005 rather shows deepening of regional disparities (see Table 11). The differences in the aver-

age dynamics of all indicators are not as significant as the differences in the average level of these indicators. Even so certain deepening of regional disparities exists and generally regions with low levels of competitiveness achieve rather lower development dynamics and vice versa.

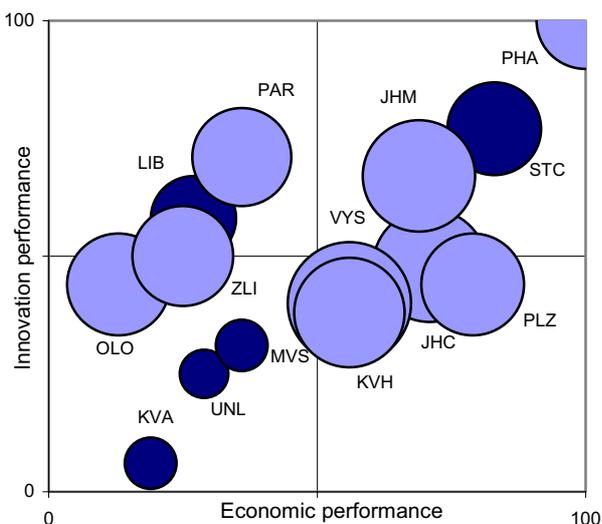
**Table 11: Level and dynamics of regional competitiveness development in the Czech Republic**

	Level (2005)		Dynamics (2001-2005)	
	Value	Ranking	Value	Ranking
PHA	84	1	51	7
STC	69	2	65	1
JHC	63	4	48	11
PLZ	60	5	60	3
KVA	13	14	24	14
UNL	22	13	40	13
LIB	42	10	48	9
KVH	54	7	52	6
PAR	54	8	48	10
VYS	60	6	61	2
JHM	69	3	51	8
OLO	38	11	55	4
ZLI	44	9	53	5
MVS	28	12	45	12

Note: PHA – Prague, STC – Central Bohemia, JHC – South Bohemia, PLZ – Pilsen region, KVA – Karlovy vary, UNL – Ústí, LIB – Liberec, KVH – Hradec Králové, PAR – Pardubice, VYS – Vysočina, JHM – South Moravia, OLO – Olomouc, ZLI – Zlín, MVS – Moravia-Silesia. Source: own calculations.

From the long-term perspective the **position of Prague** is the most favourable, while above-average economic and innovation performance is also shown by South Moravia (with also above-average quality of life) and Central Bohemia. The worst position is occupied by Karlovy Vary region, Ústecký region and Moravia Silesia region with low economic and innovation performance and quality of life (see Figure 5).

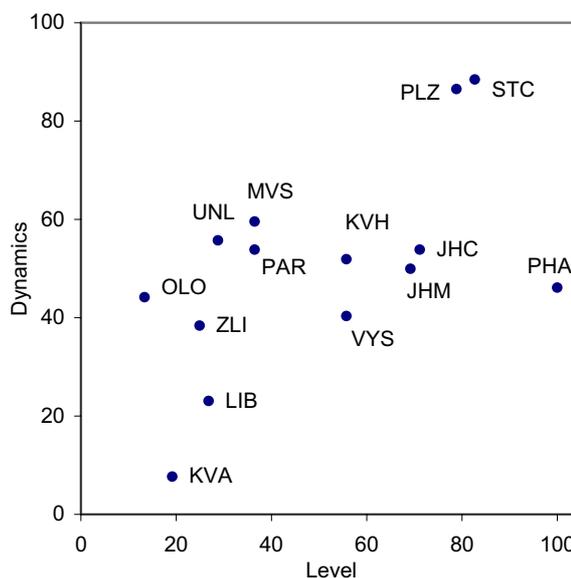
**Figure 5: Components of regional competitiveness (2005)**



Note: Values are averages of percentils for individual indicators. Size of bubbles = value of quality of life index. Dark bubbles are regions with below-average quality of life. Source: Czech Statistical Office, Czech National Bank, Ministry of Labour and Social Affairs, Police of CR, Hydrometeorology Institute, own calculations.

**Economic performance** was evaluated on the basis of the index of economic performance constructed from GDP per capita, productivity of work, unemployment rate and gross fixed capital formation. Comparisons of the level and dynamics of economic performance show continuing deepening of regional disparities in the Czech Republic after 2001 (see Figure 6). High economic level and dynamics has mainly been kept by Central-Bohemia and Pilsen region, with Karlovy Vary and Liberec regions lagging behind. Certain improvement has been achieved by Moravia-Silesia and Olomouc regions. Position of Prague in terms of dynamics of economic performance is much worse than the reached economic level. It is caused by the significant growth of industrial production which is concentrated in other regions. Effects of the EU accession and FDI, that are the main sources of the current economic growth of the CR, are not so important in Prague.

**Figure 6: level and dynamics of economic performance in regions of the Czech Republic (percentiles, 2001–2005, 2005)**



Source: Czech Statistical Office, own calculations.

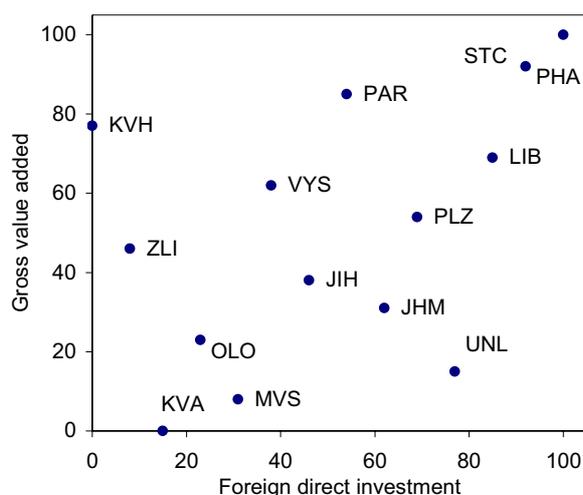
There are considerable differences between the regions of the Czech Republic in **innovation performance** based on the level of relative intensity of research and development activities (see Table 12). Prague has kept its dominant position in this. Another major centre of R&D has been South Moravia region and Central Bohemia, the latter mainly thanks to automotive industry. Considerable regional differences can be seen in innovation performance on the sectoral level with a difference between innovation activity in manufacturing industry and in services.

With regard to the share of **technologically and knowledge intensive activities** in gross value added per employee an exceptional position is again held by Prague, followed by Central Bohemia, Pardubický and Královéhradecký Regions. In the case of **foreign direct investment (FDI)** their highest accumulated inflow is again seen in Prague and Central Bohemia, followed with Liberec and Ústí regions (here, however, the high inflow of FDI is not accompanied by a higher share of technologically and knowledge intensive activities in gross value added, see Figure 7).

**Table 12: Expenditures and employment in R&D in regions of the Czech Republic**

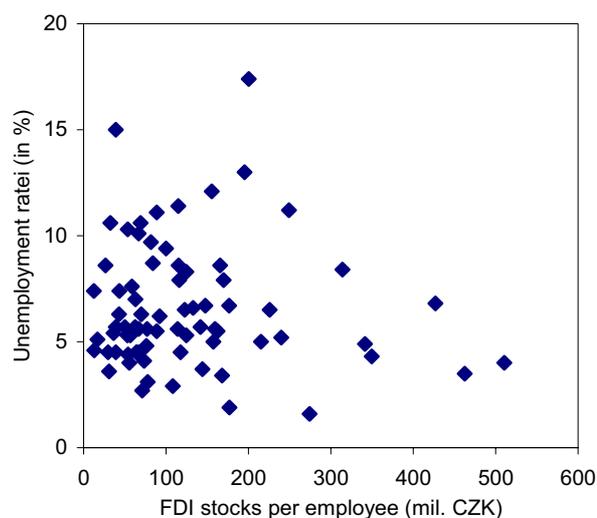
	Expenditures per capita (CR=100)		Expenditure in % of GDP (GERD)		Employment per 1,000 inhabitants		Share in R&D employment in (in %)	
	2001	2005	2001	2005	2001	2005	2001	2005
	CZ	100	100	1.20	1.42	5.1	6.4	100.0
PHA	314	327	1.83	2.22	18.1	22.7	40.7	40.8
STC	232	181	3.00	2.76	3.7	4.4	8.0	7.7
JHC	47	62	0.62	0.99	3.0	3.9	3.6	3.7
PLZ	43	50	0.55	0.74	3.3	4.2	3.5	3.5
KVA	8	6	0.12	0.11	0.8	0.5	0.4	0.2
UNL	22	17	0.33	0.30	1.2	1.2	2.0	1.5
LIB	61	63	0.84	1.12	3.4	3.7	2.8	2.5
KVH	45	52	0.59	0.82	2.8	4.1	3.0	3.5
PAR	71	78	1.01	1.35	4.0	5.2	3.9	4.0
VYS	22	34	0.31	0.57	1.1	1.7	1.1	1.3
JHM	97	100	1.27	1.54	8.0	10.1	17.6	17.4
OLO	42	52	0.64	0.95	2.9	4.7	3.6	4.6
ZLI	42	65	0.60	1.14	2.4	3.8	2.8	3.4
MVS	50	42	0.78	0.73	2.9	3.1	7.1	5.9

Source: CSO – Research and development indicator of the Czech Republic (2001–2005); own calculations.

**Figure 7: Positions of regions in level of foreign direct investment (2004) and level of gross value added in high-tech industries (percentiles, 2005)**


Source: CZO, Czech National Bank, own calculations.

Closely monitored aspects of FDI represent their effect on the **labour market**. A comparison of unemployment rate and FDI stocks per employee by region shows a weak relationship between the two variables (see Figure 8). Development of unemployment in groups of districts with the highest or the lowest supply of foreign direct investment was similar. This fact is also confirmed by analysis based on correlation coefficients. There is a stronger relationship, though, between FDI and new job offer. FDI therefore plays a positive role in creation of new job opportunities. Regarding the generous social system and often relatively low wages offered by foreign investors in the new establishments the creation of new job opportunities does not lead to any significant drop of unemployment. The new jobs, in addition, are often occupied by foreign workers.

**Figure 8: Unemployment rate (2007) and FDI stocks (by the end of 2005) in districts of the Czech Republic**


Source: Czech National Bank, Ministry of Labour and Social Affairs, own calculation.

**Prague** occupies exceptional position among regions in the Czech Republic as for economic and innovation performance. The position of Prague is considerably affected by the geographical location, thanks to which Prague does not include the closest surroundings, for which it serves as the economic centre (which manifests itself by the high proportion of commuters). The metropolitan nature of the region reflects in a high level of added value created by the government sector, in concentration of most services industries and a higher price level, which is not taken into consideration in the regional differences in recalculations of GDP by purchasing power parity. Prague shows a high dynamics of GDP growth, the lowest unemployment rate, the best innovation performance, and just slightly worse quality of life. The exceptional position of Prague is also supported by the fact that Prague is the twelfth wealthiest region of EU on the level of 157 % of EU average in GDP per capita based on purchasing power parity.

**Central Bohemia** forms workforce source for the metropolis, which affects some of the characteristics of the region thanks to the high number of commuters working in Prague and living in the region. Even though the economic indicators of the region are underestimated thanks to this, the region showed the highest dynamics of development of economic performance in the years 1995–2005. The quick economic growth, supported with massive inflow of foreign direct investment, contributed to the very low level of unemployment. The region makes use of quality infrastructure and tradition of developed industry. The best position among regions of CR held by the Central Bohemia region relates to research and development investment, especially thanks to automotive industry. Closeness of the metropolis and industrial activities of the region negatively affect quality of life, though.

**South Bohemia** region is characterised by low population density, strong share of agriculture (and the lowest share of industry) and well preserved environment, creating good prerequisites for development of tourism. A positive role in the region's development is performed

by the closeness of Austria and Germany. The region has reported one of the highest increases of GDP, successfully achieved mainly in the period 1995–1999. Thanks to the rather rural nature the region has not undergone the deep structural changes in the beginning of the transformation process, which is reflected in long-term low unemployment rate. However, the region lags behind in innovation performance indicators. Obstacles to further development of the region include insufficiently developed transport infrastructure.

**Pilsen region** is specific with the strong role of the regional capital as a significant economic centre. Like South Bohemia the region draws from the proximity of developed countries and shows low population density. The region, however, is more industry-oriented and its transport infrastructure is better developed. In the period of transformation the region underwent considerable structural problems. FDI became a strong stimulus for the region's development. GDP showed fourth highest growth in the Czech Republic and the unemployment rate is well under the national average. As for indicators of innovation performance the region lags behind in investment into R&D.

**Karlovy Vary region** is the least populated region with specific population structure. A significant role in the region's economy is performed by spa and tourism, which, however, is unable to outbalance the burden of decayed industry with a concentration of industries with low gross value added share in production. The region shows the lowest gross domestic product dynamics and the unemployment rate ranks third highest in the country. Very weak is innovation performance and quality of life in the region.

**Ústí region** is characteristic with strong concentration of industrial production. The region reports the second lowest dynamics of gross domestic product, reflecting economic problems related to industry restructuring and attenuation of coal mining. The region has long belonged to regions most affected by unemployment. One of the worst values is also shown in the area of innovation. Social and economic problems together with the industrial nature of the region very negatively reflect in quality of life indicators.

**Liberec region** is the second smallest region as for area and population. Historically the region belongs to major centres of industrial development. GDP dynamics was below-average of the Czech Republic. In comparison to other regions, however, the region managed to cope well with restructuring, as the long-term decay in textile and glass industry was outbalanced with development of electro-technical and automotive industries (thanks to a high inflow of foreign direct investment). This is manifested in a below-average unemployment rate. Relatively favourable is the region's position in innovation performance indicators.

**Hradec Králové region** holds a strong position in agriculture and tourism. The region showed the third largest increase in GDP, especially thanks to development of automotive industry. The region also shows one of the lowest unemployment rates in the country. Investment activity of the region is low, which is related to the relatively weak inflow of FDI. In the area of innovation performance indicators the region shows an average position, while in quality of life it is one of the best.

**Pardubice region** is largely agricultural, with a high share of village population. Industrial structure of the region did not undergo significant changes in the period of transformation. Even though GDP development was rather below-average, the region has kept a relatively low unemployment level. The region has also been very successful in development of indicators of innovation performance, especially thanks to the significant share of high-tech industry, and relatively high research and development investment.

**Vysočina region** showed the third largest growth of GDP in the country, thanks to which it moved from the least developed to the above-average regions. Despite that the unemployment rate in the region has been relatively high, with strong intra-region differences. The region shows a high share of high-tech industries, with low investment into R&D, though, as well as the share of university graduates in workforce (which suggests a prevalently assembly nature of the activities). As for quality of life Vysočina ranks first in the Czech Republic.

**South Moravia** is specific in the high contrast between the developed centre, the regional capital Brno, and the underdeveloped rural districts. GDP dynamics was below-average, resulting in a high level of unemployment. The region was not very successful in FDI inflow. The innovation performance indicators are opposite to Vysočina, i.e. the share of high-tech industries is low, while R&D investment is high. Quality of life ranks among the best in the country.

**Olomouc region** is distinguished by the relatively developed central part and the underdeveloped marginal districts. As a whole the region belongs to the economically weakest in the Czech Republic, with rather above-average GDP dynamics in the past period, though. The unemployment rate in the region is high thanks to the remote mountain areas. As for innovation performance indicators the region rather belongs to the below-average ones, with the exception of the high share of university graduates thanks to the Olomouc university. The quality of life in the region is above-average.

**Zlín region**, despite its geographical remoteness, can boast of good industrial tradition thanks to the Baťa business. Economic development is unsatisfactory, though, thanks to the structural difficulties related to extensive restructuring. The region therefore shows long-term high unemployment rate. Low is the level of investment activity, and FDI inflow, due to low transport accessibility. As for innovation performance the region's position is somewhat better, with especially high investment into R&D. The well preserved natural environment reflects in above-average quality of life.

**Moravia Silesia** is the most densely populated region of the country with a high concentration of the population in the Ostrava-Karviná agglomeration. The region is traditionally industrial with a high proportion of mining and steel industry. Restructuring in the period of transformation resulted in strong unbalances accompanied with a high level of unemployment, prevailing until today. However, the region reported a relatively high increase in GDP, drawing from mass inflow of FDI, and its situation has been improving. The innovation performance indicators are unfavourable, though, thanks to the prevailing economic structure. The quality of life in the region is very poor, too.

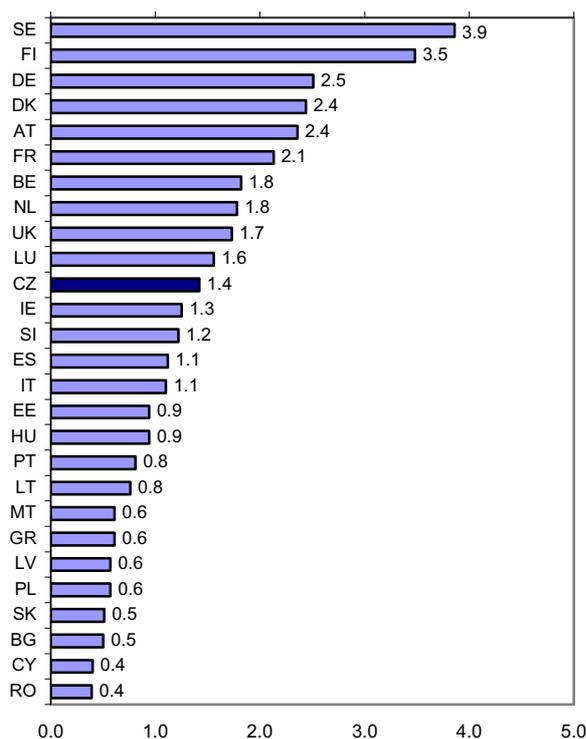
## 2. Innovation performance

The key concept in the evaluation of innovation performance is the national innovation system and its inputs and outputs (financial and personnel related). The structural characteristics of the innovation system (regional and industry-based) are assessed in more detail, with emphasis on research and development activities in the business sector and its innovation performance.

### 2.1 Innovation inputs and outputs

Measuring the inputs and outputs of innovation performance, particularly in the sphere of research and development, is based on the relatively advanced harmonisation of the **methodological approaches** used in the countries of the OECD and EU. The demands on the explanatory ability of indicators are still rising, however, especially with the growing emphasis on support for qualitatively based competitiveness. In the case of research and development activities themselves, the need to take the specifics of the service sector into consideration is stressed.

**Figure 1: Gross expenditure on research and development (GERD, in % of GDP), 2005**



Notes: 2005 or the last available year. Source: EUROSTAT – New Cronos, Science and Technology (at 12.8.2007).

Ever greater attention is also turning to internal innovation activities and their sources in the wider sense as opposed to the prevailing focus on (internal) research and development to date. The main thing to have happened is a broadening of the concept of innovation to include non-technical types. In the case of information and communication technology, problems are caused by the lack of a uniform approach to measuring its effects at all analytical levels thus far, an approach that would go beyond the narrow technological perspective

or which would capture the impacts brought about in related activities. In terms of human capital, we are mainly lacking data on the full spectrum of forms of lifelong learning and on the qualifications and skills attained out of the system of formal education and training.

**Research and development capacities** are a significant source of innovation efficiency in the traditional sense. According to indicators that look at the extent of financial and human resources invested in this area, the Czech Republic occupies a leading position in the group of new EU countries (see Figure 1). Moreover, it has come considerably closer to the EU-15 average in recent years. In the case of gross expenditure on research and development, the lag of the Czech Republic behind the original members of the EU stood at 0.75 percentage points in 2002, but was only 0.49 percentage points in 2005 (see Table 1).

Even then, however, a level of expenditure amounting to 1.42 % GDP cannot be regarded as sufficient since it does not make even half of the 3 % target set out as part of compliance with the Lisbon Strategy. However, only Finland and Sweden have been able to meet this target of the other members of the EU. The feasibility of actually reaching this target level has recently been the subject of ever fiercer debate because this could be significantly conditioned by the industrial structure of the individual countries (a varying share of industry with different demands on the added value of research and development).

**Table 1: Gross domestic expenditure on research and development (GERD, in % of GDP)**

	EU-27	EU-15	CZ
2000	1.86 <sup>s</sup>	1.92 <sup>s</sup>	1.21
2001	1.88 <sup>s</sup>	1.94 <sup>s</sup>	1.20
2002	1.88 <sup>s</sup>	1.95 <sup>s</sup>	1.20
2003	1.87 <sup>s</sup>	1.93 <sup>s</sup>	1.25
2004	1.84 <sup>s</sup>	1.91 <sup>s</sup>	1.26
2005	1.84 <sup>s</sup>	1.91 <sup>s</sup>	1.42

Notes: s – estimate by EUROSTAT. Source: EUROSTAT – New Cronos, Science and Technology (at 12.8.2007).

There has also been a considerable improvement in the situation in terms of the relative number of **employees in research and development**. The share of such employees in overall employment in 2002 stood at 1.13 % (expressed in HC), which was some 0.47 percentage points less than the EU-15. This difference in 2004 stood at only 0.31 percentage points and the Czech Republic maintained its high growth tempo in the number of employees (and research workers) in 2005 (see Table 2).

The improvement in the situation is even more distinctive expressed as a full-time equivalent (FTE). However, a change in the method of its calculation that came into effect in the Czech Republic the previous year played a significant role here. Thanks to this the share of human resource stocks expressed in FTE against HC is now comparable with the values in the EU-25 (approximately around 2/3, with higher values in

business sector and lower values in higher education institutions). However, the Czech Republic continues to lag behind the Scandinavian countries in particular in spite of considerable increases in the stocks of human resources in research and development.

**Table 2: Total R&D personnel and researchers (in % of total employment, HC)**

	Total R&D personnel					
	2000	2001	2002	2003	2004	2005
EU-25	1.44 <sup>s</sup>	1.45 <sup>s</sup>	1.50 <sup>s</sup>	1.50 <sup>s</sup>	1.49 <sup>s</sup>	..
EU-15	1.54 <sup>s</sup>	1.55 <sup>s</sup>	1.60 <sup>s</sup>	1.60 <sup>s</sup>	1.59 <sup>s</sup>	..
CZ	1.14	1.11	1.13	1.18	1.28	1.37
	Researchers					
EU-25	0.84 <sup>s</sup>	0.86 <sup>s</sup>	0.90 <sup>s</sup>	0.91 <sup>s</sup>	0.92 <sup>s</sup>	..
EU-15	0.88 <sup>s</sup>	0.90 <sup>s</sup>	0.94 <sup>s</sup>	0.95 <sup>s</sup>	0.96 <sup>s</sup>	..
CZ	0.64	0.62	0.65	0.67	0.73	0.79

Notes: s – estimate by EUROSTAT. Source: EUROSTAT – New Cronos, Science and Technology (at 12.8.2007).

The constant growth trend in the supply of young, qualified research workers in the Czech Republic can also be seen positively. The percentage of graduates of doctorate study programmes in science and technology field in the 25-34 age group has roughly doubled from 0.3 ‰ to 0.6 ‰ in the past five years. However, the slight downturn in the percentage of graduates of natural and technical specialisations in the overall number of graduates of doctorate studies is less positive. Nonetheless, this percentage is still more than 10 percentage points higher than in the EU-27. Indeed it is even higher than in Finland or Sweden. However, the percentage of graduates in the population stands at 1.2 and 1.0 ‰ respectively in these countries.

**Table 3: Ph.D. graduates in science and technology field**

	Share in total Ph.D. graduates					
	2000	2001	2002	2003	2004	2005
EU-27	43.4 <sup>s</sup>	43.1 <sup>s</sup>	43.2 <sup>s</sup>	41.7 <sup>s</sup>	42.1 <sup>s</sup>	40.8 <sup>s</sup>
CZ	57.0	52.2	50.6	52.7	50.7	51.6
	Share in population 25–34 years (in ‰)					
EU-27	0.5 <sup>s</sup>	0.5 <sup>s</sup>	0.5 <sup>s</sup>	0.5 <sup>s</sup>	0.6 <sup>s</sup>	0.6 <sup>s</sup>
CZ	0.3	0.4	0.4	0.5	0.5	0.6

Notes: s – estimate by EUROSTAT. Source: EUROSTAT – New Cronos, Education and Training (at 1.8.2007).

**The structure of financing and performing** research and development according to institutional sectors is relatively stable. The Czech Republic has retained a high share of the business sector in financing research and development (54.1 % in 2005), which is comparable with the level in the EU-15 (although considerably beneath the set aim of a two-thirds share). By contrast, the share of foreign resources in financing domestic R&D is lagging behind (only 4.0 %), whilst the share of government is relatively high (40.9 %). There is a similar situation as concerns the implementation of R&D, where the share of business is comparable with the EU-15, the share of government is higher and the share of the academic sector is considerably lower. In spite of the fact that the latter has taken a bigger share of the implementation of R&D than a few years ago (its share has risen by 2.5 percentage points in five years),

it is still of fairly minor significance in international comparison (see Table 4).

The structure of human resources according to their institutional affiliation tells a similar story. The Czech Republic is one of the countries with the highest share of government and lowest share of higher education in the total number of researchers. It would appear, then, that the heritage of the former separation of research from the universities to the academies of science has remained. The share of the business sector in the number of research workers is considerably lower in the Czech Republic than in the EU-15 (by approximately 10 percentage points), which contrasts sharply with the share of businesses in the implementation of R&D.

**Table 4: The structure of expenditure on R&D by sources of funds and sector of performance (in %)**

Source of funds	Businesses		Government		Abroad	
	1999	2004	1999	2004	1999	2004
EU-27	56.1 <sup>s</sup>	54.9 <sup>s</sup>	34.5 <sup>s</sup>	34.6 <sup>s</sup>	7.2 <sup>s</sup>	8.2 <sup>s</sup>
EU-15	56.3 <sup>s</sup>	55.2 <sup>s</sup>	34.2 <sup>s</sup>	34.3 <sup>s</sup>	7.3 <sup>s</sup>	8.3 <sup>s</sup>
CZ	52.6	52.8	42.6	41.9	4.0	3.7
Sector of performance	Businesses		Government		Higher education	
	1999	2004	1999	2004	1999	2004
EU-27	64.6 <sup>s</sup>	63.7 <sup>s</sup>	14.3 <sup>s</sup>	13.3 <sup>s</sup>	20.4 <sup>s</sup>	22.0 <sup>s</sup>
EU-15	64.9 <sup>s</sup>	64.1 <sup>s</sup>	14.0 <sup>s</sup>	13.0 <sup>s</sup>	20.4 <sup>s</sup>	21.9 <sup>s</sup>
CZ	62.9	63.7	24.3	21.2	12.3	14.8

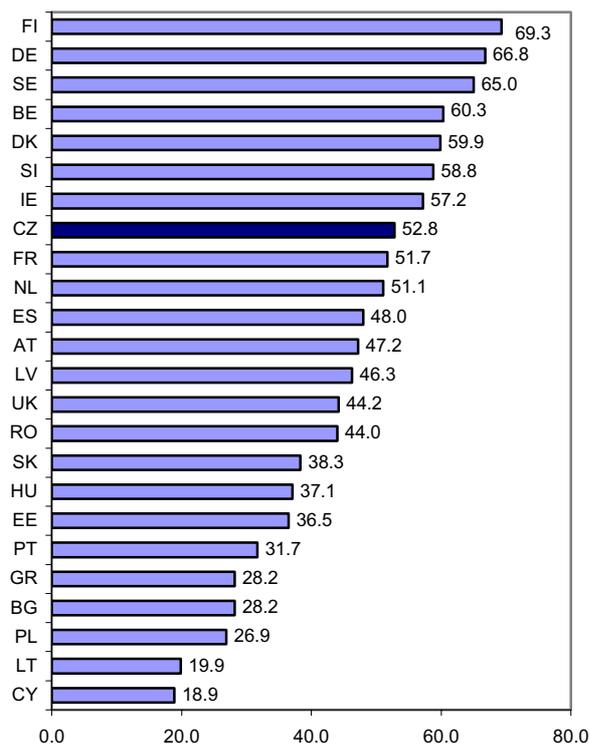
Notes: s – estimate by EUROSTAT. Source: EUROSTAT – New Cronos, Science and Technology (at 12.8.2007), own calculations.

Considerable differences can be seen between the countries in the EU-27 in terms of the characteristics of research sectors, from a considerable share of the business sector in financing and conducting research and development or by contrast a considerable share of the government sector to broadly-based systems with balanced shares of the business, government and higher education sectors. From a structural perspective, a target value for the share of the business sector in financing research and development was set at a level of at least 65 % at the Barcelona summit within the bounds of the Lisbon Strategy. According to the most recent available information, this level has reached almost 55 % in the EU-27 (61 % in the USA and 75 % in Japan) in the light of a stagnating trend. The highest share is usually shown by countries with a high share of total domestic expenditure on R&D (see Figure 2).

The most open from the perspective of **inter-sectoral flows** of financial resources in research and development in the Czech Republic is the government sector (which ensues from its function in support of this area of activity). The business sector receives a relatively large amount of resources for its own research from other sources (19.2 %), mostly from government sources (almost 14.7 %). On the other side of the coin, however, it commissions research in other sectors to a lesser extent. Therefore the openness of the business sector is not reciprocated. It accepts far greater resources for research and development from other sectors than it hands out for external implementation. Another negative aspect of inter-sector flows of funds

in the Czech Republic has in all likelihood deepened over time in that the share of higher education research financed by the business and foreign sector (0.8 % and 2.8 % respectively) has continued to fall. By contrast, the government sector (in particular the institutes of the Academy of Sciences) is still preferred by the business and foreign sectors. The extremely low share of foreign financial resources in all sectors of the national innovation system is alarming.

Figure 2: Share of the business sector in funding research and development (2004, in %)



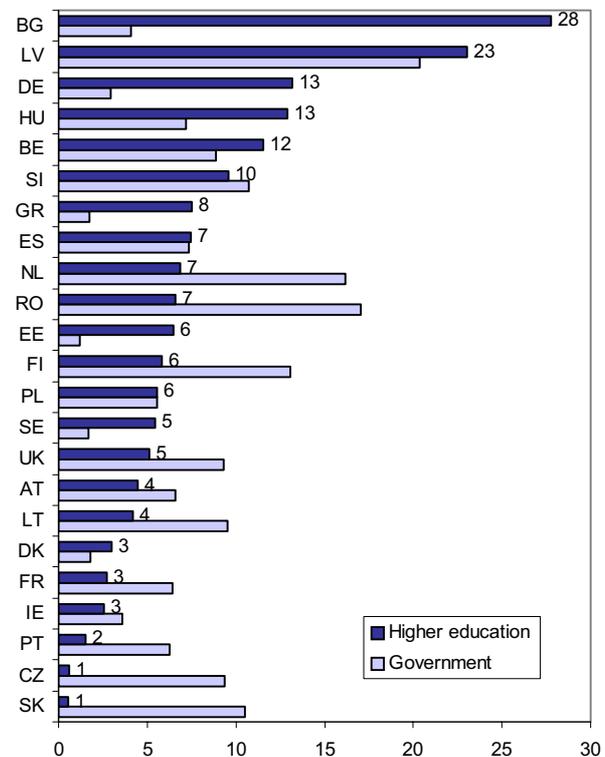
Notes: 2004 or the last available year. Source: EUROSTAT – Ne-Cronos, Science and Technology Database (at 12.8.2007).

There is an interesting contrast between hard and soft data in **relations between universities and the business sector**. The Czech Republic and Slovakia occupy the worst position in the share of business expenditure on higher education research. However, there would appear to be an improving trend according to the assessment of an expert investigation. The Czech Republic is now even the best assessed new member state in this regard and is succeeding in reducing its lag behind the original member states. Given the specific position of the government sector in the new countries of the EU in which the research institutes of academies of science are incorporated, it is appropriate to expand the inter-sector analysis to include relations between the business sector and the government sector. According to this information, businesses within the EU most considerably share in financing the implementation of research and development in the government sector in Latvia, more than 10 % (see Figure 3).

The highest figures in the case of the share of business in research and development conducted at universities are seen in Latvia, Bulgaria, Germany, Hungary and Belgium. The share of business expenditure in the

government sector in Germany has been very low for a long time now. The Czech Republic is one of the countries in the comparison in question with a relatively high share of business in the implementation of research and development in the government sector, but has an almost negligible share of business in the implementation of research at universities.

Figure 3: Business funded R&D in the higher education and government sectors in 2004 (in %)



Notes: Belgium, Greece, Luxembourg, Malta, Portugal and Sweden for 2003. Source: EUROSTAT – New Cronos, Science and Technology (at 17.8.2007), own calculations.

**Business expenditure on R&D** has mainly grown in the past three years and as with overall expenditure on R&D is seeing a gradual convergence with the EU-15 level. Whereas the Czech Republic lagged behind the original members of the EU by 0.47 percentage points in 2002, the gap was down to 0.3 percentage points in 2005 (see Table 5). The Czech Republic mainly has a favourable position in comparison with the other new member countries of the EU, among which it is in first position (see Figure 4).

Table 5: Business expenditure on R&D (in %)

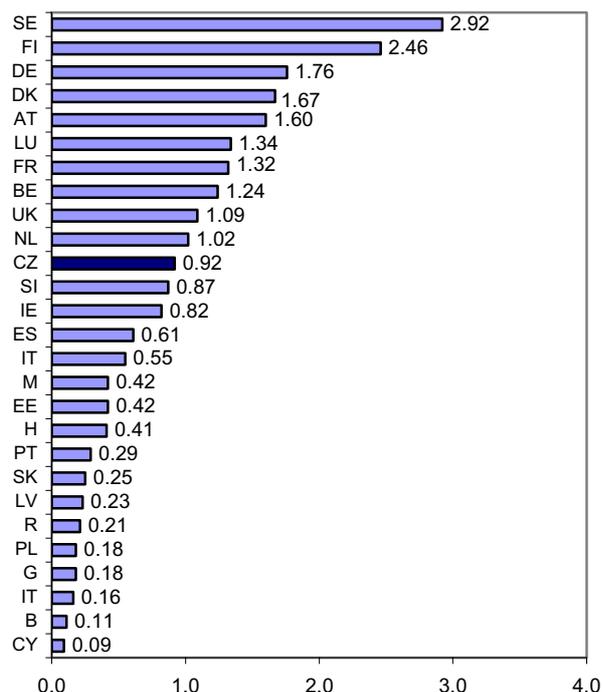
	2000	2001	2002	2003	2004	2005
EU-27	1.21	1.21	1.21	1.19	1.17	1.17
EU-15	1.25	1.26	1.26	1.24	1.22	1.22
CZ	0.73	0.72	0.73	0.76	0.80	0.92

Notes: EU-27, EU-15 – EUROSTAT estimate. Source: EUROSTAT – New Cronos, Science and Technology (at 12.8.2007).

The implementation of research and development is significantly concentrated according to the **size perspective** of the workplaces. Larger businesses generally show a greater intensity and extent of research

activity, which mainly applies to industries with major demands on research and development. Only sufficiently large research and development teams with the corresponding history are able to keep the said company on the frontier of the best practice in such industries. Large companies (with more than 250 employees) share around two-thirds of the implementation of business R&D in the Czech Republic, which is an average value in comparison with the other countries of the European Union. Germany, Sweden and Great Britain have a considerably higher share (up to 90 %).

Figure 4: Business enterprise expenditure on R&D (BERD, in % GDP), 2005



Notes: Great Britain and Romania for 2004. Source: EUROSTAT – New Cronos, Science and Technology, OECD – Main Science and Technology Indicators (at 12.8.2007).

A major concentration of expenditure in transport engineering is clear in **industry-based division**, in particular in the production of motor vehicles. The share of this branch of industry in overall business expenditure on R&D in the processing industry is more than two-fifths and roughly half when including the production of other means of transport. The significance of this industry in the use of human resources in R&D is actually considerably lower at around a half. The research and development sector, which is specific, is dominant in service industries. Other branches of industry with prominent activity from the perspective of research and development include computing, in particular the creation of software and consultation in this field (see Table 6).

A parallel comparison of the industry-based structure according to expenditure and number of employees shows certain significant differences. For example, the manufacture of motor vehicles had a share of 42 % in expenditure on research and development, whereas the share of employees is around half. The production and repair of machinery is the exact opposite. These differences ensue from the different demands of the

individual branches of industry or sectors on financial and human resources. Other inter-sector differences can be found in patent and innovation activity or (in a more comprehensive view) in the effectiveness of innovation activities. The industry-based structure of economic activities in a given country can therefore strongly influence the values of aggregate information about, for example, the demanding nature of GDP or the labour force on research and development.

The so-called **structural effect** points to this problem. For example, in an economy with a predominance of industries with lesser demands on research and development it is essentially impossible to achieve a more significant increase in the share of expenditure on research and development in GDP without a shift in the structure to technology more intensive industries.

Table 6: Business enterprise expenditure R&D (BERD) and R&D personnel (FTE) by branches of manufacturing industries and services in the CR (in %)

	Expenditure		Personnel	
	2000	2005	2000	2005
15–22 Food, textiles, wood	2.1	2.3	4.3	4.7
23–24 Coke, crude oil, chemicals	12.6	12.7	15.1	13.5
24 Chemicals and pharmaceuticals	10.3	8.4	12.6	9.4
24 – 244 Chemical products	6.0	3.5	9.4	5.6
244 Pharmaceuticals	4.3	4.9	3.2	3.7
25 Rubber and plastics products	2.1	4.2	2.4	4.0
26 Other non-metallic products	2.2	3.3	1.8	3.3
27 Basic metals	4.4	2.5	3.0	2.0
28–35 Engineering industry	76.7	78.7	73.5	75.0
29 Machinery and equipment	13.0	12.6	19.6	20.2
30 Office equipment, computers	0.1	0.3	0.2	0.6
31 Electrical machinery	3.7	4.7	5.8	8.7
32 Radio, television equipment	3.6	7.7	5.1	8.9
33 Medical and optical instruments	1.9	2.6	4.4	5.1
34 Manufacture of motor vehicles	44.4	42.3	25.9	21.4
35 Other transport equipment	7.0	6.4	7.9	6.9
36 Manufacture of furniture	2.0	0.6	2.4	1.5
Manufacturing industry	100.0	100.0	100.0	100.0
50 – 52 Sales and repairs	2.9	7.1	3.9	5.1
55 Hotels and restaurants	0.0	0.0	0.0	0.1
60–64 Transport, communications	2.4	0.4	2.3	0.3
65–67 Financial intermediation	0.0	3.0	0.0	1.1
70–74 R&D, business activities	80.2	83.7	88.6	85.1
72 Computer and related services	8.5	26.6	10.0	29.3
722 Software and consultancy	7.8	20.0	9.2	25.1
73 Research and development	66.9	45.8	71.8	43.3
74 Other business activities	4.8	10.9	6.6	11.9
75–99 Public admin., other services	14.5	5.8	5.2	8.4
Services	100.0	100.0	100.0	100.0

Source: EUROSTAT – New Cronos, Science and Technology (at 4.8.2007).

By contrast, countries with a higher share of industries that are demanding in terms of research and development have better conditions to also exhibit higher GERD or BERD values as a consequence of the structural effect. Therefore, the traditional concept is not sufficient for a comparison of structurally different economies. A conversion of expenditure according to a standardised industry structure that is the same for all countries under examination is used in order to eliminate the structural effect. The calculations show for the Czech Republic that the influence of the structural effect is gradually falling and was almost negligible by 2005.

It ensues from a **regional analysis** that R&D is mainly concentrated in Prague. The Central Bohemia Region also plays a significant role in expenditure on R&D thanks to the location of the car industry. Nonetheless, the position of the Central Bohemian agglomeration has been gradually weakening over time, whereas a number of other regions have shown a growth dynamic. However, the significance of the other regions (with the exception of the South Moravia Region) is still negligible (see Table 7).

The aforementioned undersized nature of the university sector can be seen once again in terms of the **structure of human resources** in research and development. By contrast, the government sector is more than double the average for the EU-15 (see Table 8). One specific characteristic is the percentage of women research and development workers, which is one of the lowest in the Czech Republic (whilst the other new member states of the EU are in first position here). Their role is traditionally less significant in technical sectors, which are the most prominent in the Czech Republic (with a 42 % share of research workers). Orientation on increasing the **percentage of women** employed in research now plays an important role in strategies aimed at advancing research and development. The reasons for this are mainly of an emancipative nature. However, it is also a reaction to limitations on the influx of new labour into this area.

Table 7: R&D expenditure (GERD) and personnel (FTE) by region (in %)

	Expenditure		Personnel	
	2001	2005	2001	2005
City of Prague	35.7	37.5	41.4	40.5
Central Bohemia	25.5	20.3	10.9	10.4
South Bohemia	2.8	3.8	3.9	3.8
Pilsen	2.3	2.7	3.4	3.3
Karlovy Vary	0.2	0.2	0.4	0.2
Ústí nad Labem	1.8	1.4	2.0	1.6
Liberec	2.6	2.6	2.5	3.0
Hradec Králové	2.4	2.8	2.6	3.1
Pardubice	3.5	3.9	4.4	4.5
Vysočina	1.1	1.7	1.2	1.6
South Moravia	10.8	11.0	14.4	13.9
Olomouc	2.6	3.3	3.5	4.7
Zlín	2.4	3.7	3.0	3.8
Moravian Silesia	6.2	5.2	6.3	5.5

Source: Czech Statistical Office (2002, 2006).

It is assumed that the university education of the female population could be a significant source of growth for new human resources in research and development. The possibility of increasing the percentage of women in research and development is no doubt based on the even number of women and men in higher education that is generally the case in all countries.

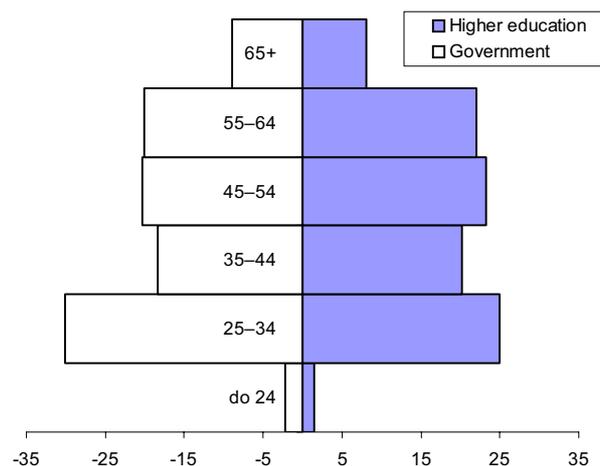
Table 8: Researchers by sector (2005, FTE, in %)

	Businesses	Government	Higher education
EU-25	49.2	13.1	36.6
EU-15	52.4	12.0	34.5
CZ	42.8	25.3	31.3

Notes: EU-25, EU-15 – EUROSTAT estimate for 2004. Source: EUROSTAT – New Cronos, Science and Technology (at 4.8.2007), own calculations.

The **age structure of research workers** in the government and academic sectors is extremely unfavourable in the Czech Republic, with a relatively low percentage of the most productive middle generation of researchers (see Figure 5). This structure indicates a “brain drain” tendency from research activities after reaching a certain age (with a similar structure affecting the other new member states of the EU). The reasons for this could be economic or career-related (insufficient financial rewards or limited possibilities for advancement and therefore professional fulfilment).

Figure 10: Age structure of researchers (HC, in %, 2005)



Source: Czech Statistical Office, own modifications.

**Scientific and technical efficiency** is currently low in the Czech Republic, which roughly corresponds to the level of development of the domestic knowledge base. The question is whether it is possible to expect a more significant efficiency shift in a short space of time with the resources available and at the given level of this development. The relative number of publications expressed per capita has risen significantly, but is still less than 60 % of the level of the EU-15 (see Table 9).

Table 9: Number of scientific and technical publications per 1000 population

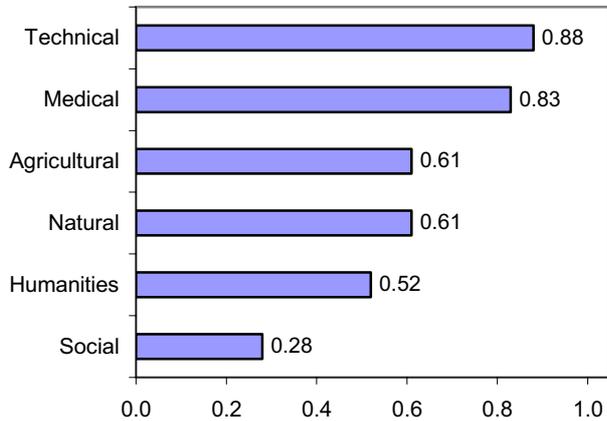
	EU-27	EU-15	CZ
2000	0.870	1.034	0.435
2001	0.908	1.074	0.512
2002	0.865	1.017	0.514
2003	1.000	1.174	0.603
2004	0.941	1.097	0.604
2005	1.121	1.307	0.730

Source: ISI Web of Science (publications, at 17.8.2007); EUROSTAT – New Cronos, Population, own calculations.

The relative **citation impact** of Czech publications is also very low (in spite of rapid growth). This is expressed as a percentage of the impact factor for the relevant country and the impact factor of the group of countries. The impact factor for a specific country characterises the ratio of the number of quotes to publications in the given country. The average relative quotation impact of Czech publications is somewhere at the level of only two-thirds of the OECD level. The highest

citation impact is from Danish, Dutch and Swedish publications. By contrast, the countries of southern Europe, Ireland and the new member states are lagging behind. The position of individual areas of science in the Czech Republic is considerably different in this regard. Technical specialisations do fairly well, but the quotation impact of publications from the social sciences is negligible (see Figure 11).

Figure 11: Relative citation impact by field of science in the Czech Republic (average 2001 – 2005)



Note: Average for OECD countries = 1. Source: Lehvo, Nuutinen (2006), pp. 36–37, own modifications.

An analysis of **patent activities** comes out even worse than that of publication activity. In spite of the fact that the Czech Republic has seen a respectable growth tempo in the number of patent registrations, its lagging behind more advanced countries has not fallen for this indicator. A growing difference is clear when distinguishing according to applicants and creators to the detriment of applicants (see Table 10). The reason for this could be the fact that the multinational corporations that conduct R&D in the Czech Republic that leads to patents tend to register these at their own parent head offices. One other explanation is that the output of local innovation activity is ceded to foreign organisations even before patent applications are submitted.

Table 10: Patent applications at the European Patent Office (per million inhabitants), distinguishing between applicants and inventors

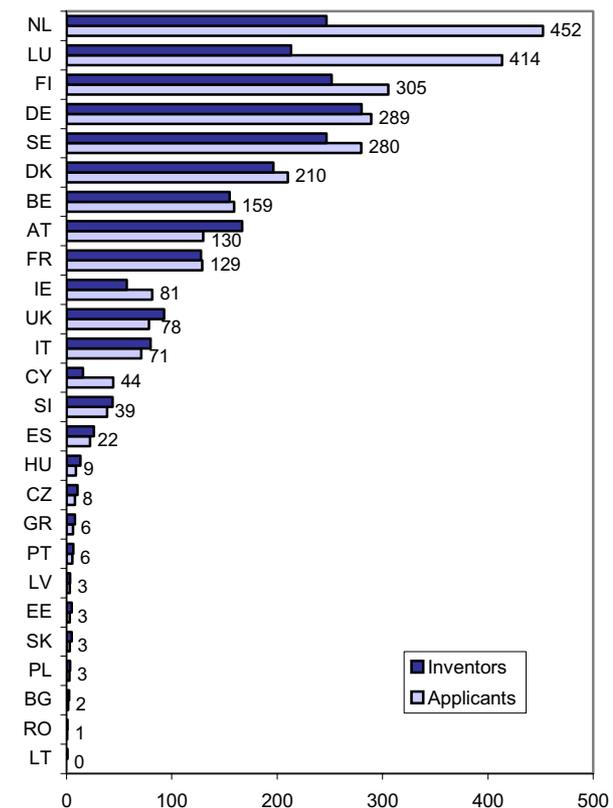
	Applicants				
	1992–1994	1995–1997	1998–2000	2001–2003	2004–2006
EU-27	55.70	63.14	87.20	105.28	118.54
EU-15	71.39	80.62	111.07	133.34	148.97
CZ	0.90	1.58	3.14	4.69	7.79
	Inventors				
	1992–1994	1995–1997	1998–2000	2001–2003	2004–2006
EU-27	55.23	62.17	87.59	102.40	112.32
EU-15	70.77	79.36	111.47	129.51	140.81
CZ	0.58	2.29	4.44	6.36	10.36

Source: European Patent Office (at 25.8.2007); EUROSTAT – New Cronos, Population and Social Condition (at 25.8.2007), own calculations.

The differences between the countries of the EU or their groupings are quite considerable from both perspectives (see Figure 12). Holland and Luxembourg have long been

at the top of the ladder in terms of applicants (Switzerland is a similar case in Europe), which has its basis in the formal headquarters of certain multinational corporations that make use of the favourable regime in these countries. However, a comparison by patent creator is of greater significance for an assessment of the level of scientific activity. Traditionally the best here are the Scandinavian countries, Germany and Holland. The new member states and Spain, Portugal and Greece are lagging well behind the average. As for the new member states, the long-term leader is Slovenia, which is more productive in terms of patents than the countries of the southern wing of the EU.

Figure 12: Number of patent applications at the EPO per million inhabitants (average 2004–2006)



Source: European Patent Office; EUROSTAT – New Cronos, Population and Social Condition (at 25.8.2007), own calculations.

The unfavourable situation in international patent activity is caused by a whole range of factors. The lesser (economic) significance attributed to the protection of intellectual property itself when breaking into foreign markets is undoubtedly one such factor or the below average demands of economic activities on research and development and other innovation activity. The level of protection of intellectual property rights has been very poor in the Czech Republic for some time now (in particular its enforceability), which also corresponds to the generally low development of a knowledge society. On the other side of the coin, the Czech Republic is one of the countries with an above-average level of regulation for almost all aspects of business, which is a particularly unsuitable combination of characteristics with significant anti-innovation effect.

The most commonly mentioned problem in terms of implementing innovation activities is the availability of

funds, a complaint mainly levelled by smaller companies. **Financing business research and development** is strongly dependent on the type of organisation. Self-financing (within the same sector) prevails for large businesses and the role of government and foreign investment is negligible. Non-business resources are far more important for small and medium-sized businesses. In an international comparison, the Czech Republic is one of the countries with the highest share of government investment in financing business R&D (15 % of the total and 24.7 % for small and medium-sized businesses). By contrast, the share of foreign investment is low, mainly for financing R&D conducted by major businesses. The share of the government in research and development carried out by large companies is usually lower than for small and medium-sized businesses. Exceptions here are only found in Spain and Great Britain, whereby the latter's situation is affected by state subsidies for defence research undertaken by private companies (see Table 11).

**Table 11: Structure of financing business enterprise expenditure on R&D in 2004**

	SMEs			Large enterprises		
	Businesses	Government	Abroad	Businesses	Government	Abroad
AT	75.4	11.7	12.8	64.2	4.5	31.3
BE	69.6	8.0	22.3	89.0	3.8	7.2
CY	71.9	10.2	17.8	97.7	0.2	2.1
CZ	66.4	24.7	8.9	87.1	9.7	1.0
DE	85.9	11.6	2.1	93.9	3.8	2.3
DK	89.1	2.9	8.0	84.0	2.1	13.8
EE	73.3	7.5	19.0	..	..	..
ES	79.5	13.8	6.0	84.2	11.4	4.4
FI	88.8	8.1	3.0	97.0	2.5	0.5
GR	74.9	4.4	20.4	76.3	4.5	18.8
HU	74.4	18.6	6.4	78.1	1.0	21.0
IE	89.3	5.5	5.3	84.9	0.8	14.3
IT	77.5	15.8	6.6	76.0	13.8	10.2
LT	49.3	4.7	45.1	98.3	0.9	2.8
LV	65.7	5.2	29.1	98.1	17.8	1.9
PL	72.2	24.1	3.4	84.6	12.4	2.9
PT	84.3	10.1	5.6	92.5	2.1	5.4
RO	67.8	27.8	4.1	65.7	25.6	8.7
SE	..	..	..	87.5	5.5	7.0
SI	57.0	11.8	30.4	91.9	1.6	6.5
SK	58.0	38.2	3.7	80.8	18.5	0.7
UK	76.9	2.4	20.7	59.8	12.9	27.2

Notes: Belgium, Denmark, Germany, Greece, Portugal, Sweden and Great Britain for 2003. Source: EUROSTAT – New Cronos, Science and Technology (at 20.8.2007), own calculations.

The share of **government expenditure on R&D** (GBAORD) in GDP is still lower in the Czech Republic (0.55 % GDP in 2005) than is common in the countries of the EU-15 (0.77 %). The high share of the government in financing business R&D is therefore to a certain extent based on the weaker role of the other financing sectors. However, the lag of the Czech Republic from the perspective of government expenditure is lower if we deduct defence R&D. In the case of civil R&D, the Czech Republic is only lagging behind by 0.11 percentage points (see Table 12). The share of

defence R&D is only 3.8 % in the case of the CR and is also low in most other EU countries.

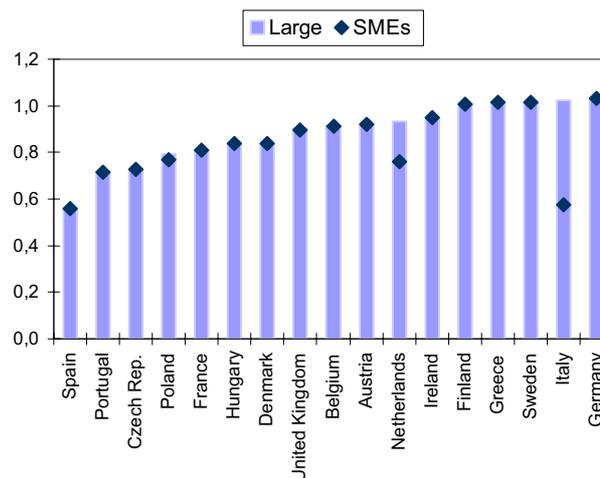
**Table 12: Government budget outlays on R&D (in %)**

	Total (% of GDP)			
	2002	2003	2004	2005
EU-27	0.75 <sup>s</sup>	0.76 <sup>s</sup>	0.75 <sup>s</sup>	0.74 <sup>s</sup>
EU-15	0.78 <sup>s</sup>	0.78 <sup>s</sup>	0.77 <sup>s</sup>	0.77 <sup>s</sup>
CZ	0.50	0.52	0.51	0.55 <sup>p</sup>
	Civil R&D (% of GDP)			
EU-27	..	..	0.64 <sup>s</sup>	0.63 <sup>s</sup>
EU-15	0.66 <sup>s</sup>	0.66 <sup>s</sup>	0.66 <sup>s</sup>	0.65 <sup>s</sup>
CZ	0.48	0.50	0.49	0.54 <sup>p</sup>
	As % of total government expenditure			
EU-27	1.61 <sup>s</sup>	1.60 <sup>s</sup>	1.59 <sup>s</sup>	1.58 <sup>s</sup>
EU-15	1.65 <sup>s</sup>	1.64 <sup>s</sup>	1.63 <sup>s</sup>	1.62 <sup>s</sup>
CZ	1.07	1.10	1.15	1.26 <sup>p</sup>

Notes: s – estimate by EUROSTAT, p – provisional value. Source: EUROSTAT – New Cronos, Science and Technology (at 1.8.2007)

It ensues from a more detailed analysis of the **structure of government subsidies** that a fundamental part is directed to services, whereas the share of agriculture is negligible. According to the size structure, the most significant recipients of government support are medium-sized businesses, followed closely by large companies. The share of small companies is considerably lower, which is again in contrast with the significance of government subsidies for their R&D. Apart from direct subsidising, business R&D is also supported by the government indirectly through tax incentives. Based on an international comparison of their generosity using a so-called B-index, the Czech Republic is one of the countries with the largest support of business R&D in this form (see Figure 13).

**Figure 13: B-index value in 2006**



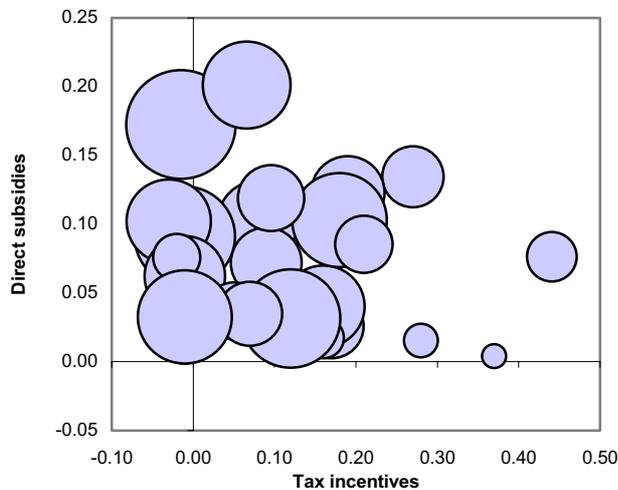
Source: OECD – STI Outlook 2006, p. 242, own modifications.

**Tax incentives** only represent a certain degree of potential support that directly influences the marginal costs of research and development at companies. The actual extent of this form of state aid is determined by the companies themselves based on the intensity of use of the instruments offered. The state only reduces

the relative price of R&D for them. It is therefore possible that a system of tax incentives, albeit generously set up, need not actually lead to higher business expenditure. There are relatively significant differences between individual countries in the degree of use of direct subsidies and tax incentives (see Figure 14). Countries with a higher intensity of expenditure on research and development usually use more subsidies than incentives. Nonetheless, no statistically significant dependence of these variables can be proven. However, a parallel comparison of direct subsidies and the generosity of tax incentives is problematic given the aforementioned fact that tax incentives are only potential aid, whereas information about subsidies includes actually invested expenditure.

The actual increase in public expenditure in business research and development, whether direct or indirect, can (but need not) increase its overall level. It can therefore happen that public expenditure merely replaces expenditure from other sources, with the occurrence of the crowd-out effect. For this reason the so-called **additionality concept** is used as an instrument to evaluate the productivity of aid instruments. The hypothetical status without state intervention is compared in this case with the current status upon implementation. Besides the crowd out effect, we might also see the crowd-in effect of other private investment, which is invoked, for example, by state support for a project that would otherwise not go ahead since the company would not have sufficient funds.

Figure 14: Share of direct subsidising on BERD (in % GDP) and tax incentives (1 minus B-index) in 2006



Notes: 2006 or the last available year. Size of bubble = BERD in % GDP Source: OECD – STI Outlook 2006, page 225, own calculations.

One specific source of financing research and development activities and the commercialisation of their results is **risk capital** provided by individual investors or specialised financial institutions acting as brokers between primary sources of funds (banks or pension funds) and businesses. Risk capital is a significant source of financing for new, technologically-based companies and plays a key role in supporting ground-breaking innovation and the commercialisation of the scientific and technical know-how created in private and public research. However, its role in financing R&D is relatively negligible in the Czech Republic. The near

zero significance of risk capital in financing the pre-launch and launch stages of company development is unfavourable (see Table 13).

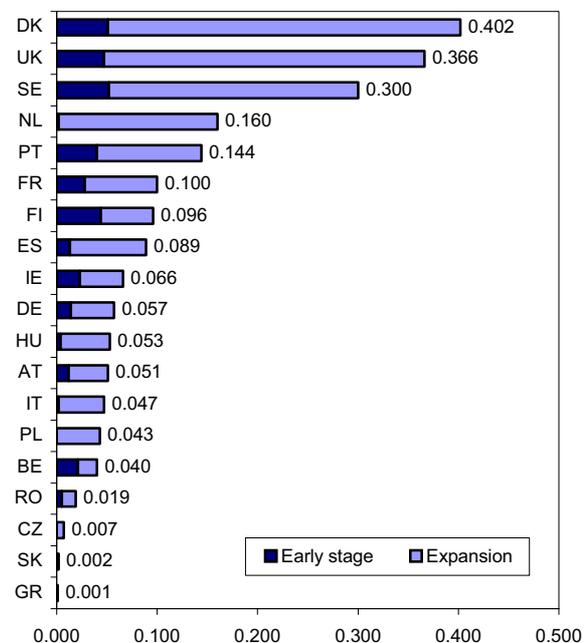
Table 13: Expenditure on venture capital by stages of business development (in % GDP)

	Seed and start-up					
	2000	2001	2002	2003	2004	2005
EU-15	0.075	0.045	0.029	0.021	0.023	0.022
CZ	0.026	0.010	0.001	0.001	0.000	0.000
	Expansion and replacement					
	2000	2001	2002	2003	2004	2005
EU-15	0.154	0.099	0.081	0.088	0.085	0.116
CZ	0.175	0.029	0.037	0.002	0.010	0.007

Source: EUROSTAT – Structural Indicators (at 14.8.2006).

If we take the international context of the creation and application of risk capital into consideration, it can therefore be said that the significance of expenditure on risk capital in the EU is still very low on average in comparison with the USA (at half the level in 2003). On average, less than one-fifth of risk capital heads into the EU for the initial stages of company development. More than 40 % is concentrated in Denmark, Sweden and Portugal (see Figure 15). The most attractive countries for the influx of foreign risk capital are Finland, Ireland, Switzerland and Austria, which gained more risk capital from abroad than from domestic sources. Banking institutions in Sweden, Great Britain and Holland were able to create greater domestic sources of risk capital than the amount of such sources domestic companies obtained from abroad (see OECD, 2005, page 42).

Figure 15: Expenditure on venture capital by stages of business development (in % GDP), 2005



Source: EUROSTAT – Structural Indicators (at 14.8.2006).

## 2.2 Business innovation performance

The innovation activities of the business sector were evaluated on the basis of a Community Innovation Survey (CIS). It ensues from its most recent round that

the **innovation activity of businesses** in the Czech Republic is only slightly lagging behind the average for the EU-15 and is fully comparable with the EU-27. Lower efficiency can only be seen in services. Innovation efficiency nonetheless demonstrates a number of structural specifics. First off it is important to distinguish between types of innovation into a basic division of technical and non-technical. The role of non-technical innovation activities (marketing and organisational activities) is stressed in the most recent round of the CIS alongside traditional technical innovations (product and procedural innovations). Organisational innovation unambiguously predominates in the Czech Republic (33 % of businesses undertake this) followed by procedural innovation (24 %), product innovation (20 %) and marketing innovation (17 %).

The next structural perspective involves the size of the business. Large companies are the most innovative. Small companies lag far behind in all types of innovation (see Table 14). This characteristic is common in the whole set of countries and is reflected in the increasing disposability of innovation resources depending on the size of the company. Larger companies also show stronger orientation towards foreign markets and on average a stronger relationship between innovation and research and development. Larger companies (and companies with technical innovation) not only carry out research activity on a large scale, but more systematically.

**Table 14: Innovating firms by type of innovation (share in total number of firms, in %, 2003–2005)**

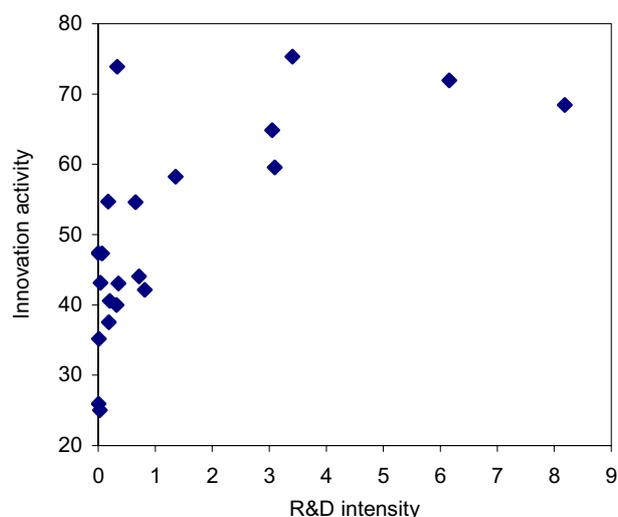
	Product	Process	Organisat.	Market.
Czech Republic	20.0	23.9	32.8	16.7
Small enterprises	15.9	19.1	28.1	14.6
Medium-sized enterprises	31.0	37.2	45.7	22.2
Large enterprises	49.8	55.1	64.2	33.4
Extracting mineral resources	11.9	19.4	33.9	9.1
Total manufacturing	30.8	32.7	37.2	20.0
Food and tobacco	39.6	32.9	32.9	27.4
Textile and leather	19.8	16.9	27.4	22.5
Wood processing and paper	18.1	26.6	30.7	16.8
Cokes and chemicals	61.2	51.0	50.9	37.1
Rubber and plastic products	37.4	37.4	44.3	23.2
Metals and metal products	26.9	34.7	35.5	18.2
Machinery and equipment	37.9	42.7	45.9	15.0
Electr.I and optical instruments	34.0	36.6	43.2	16.5
Transport vehicles	44.1	43.2	47.8	20.8
Other manufacturing	21.9	18.3	30.1	17.0
Electricity, gas, water	10.9	24.4	30.9	4.4
Construction	7.9	13.4	30.5	7.8
Total services	16.2	20.7	30.4	17.2
Sales and repairs	14.2	20.4	31.4	19.9
Hotels, restaurants	8.1	11.5	17.9	12.1
Transport and communications	16.2	17.9	27.5	13.6
Financial services	47.7	40.2	60.2	33.3
Real estate activity	9.0	13.0	17.4	8.3
Renting services	18.7	33.1	35.3	11.2
ICT services	56.5	44.9	48.3	35.4
Research and development	58.2	48.5	51.4	18.4
Other business activities	16.5	23.6	34.5	13.5

Source: Czech Statistical Office (2006)

The **industry-specific differences** in innovation activity are also considerable. At the same time, it applies that innovation activity is not only dependent on expenditure on research and development. In spite of the fact

that there exists a certain correlation between both indicators, where higher expenditure on research and development is associated with higher innovation activity, significant differences can be seen in the relationship in the Czech Republic (see Figure 16). Most branches of industry are marked by low/high demands of added value on research and development and low/high innovation efficiency. Nonetheless, in four cases a low R&D intensity is combined with high innovation efficiency (financial brokering, food and tobacco industry, production of metals and metal products, production of plastics and other non-metallic mineral products).

**Figure 16: Innovation activity and R&D intensity by industries in the CR (in %, 2003–2005)**



Notes.: Innovation activity = share of innovating companies in total number of firms in industry (CIS4), intensity of R&D = share of expenditure on R&D in value added (2005). Source: Czech Statistical Office, own modifications.

**Table 15: Expenditures on innovation and innovation intensity in the CR (in %, 2003–2005)**

	Intra-mural R&D	Extra-mural R&D	Machinery and equipment	Other external knowledge	Innovation intensity
Czech Republic	22.0	13.0	47.1	17.9	3.3
Small enterprises	37.1	5.5	54.5	2.9	3.1
Medium-sized enterprises	31.3	9.0	56.0	3.7	3.6
Large enterprises	15.7	15.9	42.2	26.2	3.2
Manufacturing	24.1	18.7	54.9	2.2	3.4
Services	31.6	9.5	53.6	5.3	2.4

Source: Czech Statistical Office, own adjustments

The most significant item from the perspective of the **structure of expenditure on innovation** is machinery and equipment. Therefore the innovation process in the Czech Republic is still based on the transfer of technology rather than one's own research and development. Interaction with customers and suppliers has become more important in the service sector. Large com-

panies direct almost half their expenses on research and development at acquiring outside know-how, whilst internal research and development fully predominates in smaller companies (see Table 15). The innovation intensity indicator, which is gradually rising for companies in the CR, tells us about the relative costliness of the innovation process (in share in receipts). The trend of reinvesting revenues from introduced innovations in other innovation activities has become stronger among companies.

The share of receipts from innovated products evaluates the **effect of product innovation**. This varies greatly according to the individual branches of industry and the degree of newness. Whereas the effects of innovation for products new to the market are more prominent in the production of electrical and optical instruments, products new to a company are most significant in the textile and leather-making industry and in the manufacture of motor vehicles. From the perspective of inter-sector differences, receipts from innovated products have a larger share in the processing industry than in services. From the perspective of size structure, meanwhile, the share of these receipts is more prominent in larger businesses. However, the share of receipts from innovated products indicator monitors only one type of innovation and so businesses that concentrate on innovation of another type are not included in this case. For this reason a qualitative differentiation of the significance of the effects of innovation activities for individual businesses is used. In general, businesses in the processing industry consider the impacts of innovation activities to be more significant than those in services. The expansion of the range of products is stressed in the first case and the increase in the quality of services in the second. The most prominent goal in introducing organisational and marketing innovations in both sectors is to increase the quality of goods or services.

The main **barriers to innovation activities** are considered to be insufficient internal and external funds, something which concerns both innovating and non-innovating companies. Other companies, for example customers or suppliers, are mainly considered to be important in an evaluation of the role of partners in the implementation of innovation activities. By contrast the role of universities and research institutes is appraised as being relatively weak, similarly as with their use as sources information for innovation. The key organisations in the national innovation system are therefore only weakly linked in the Czech economy.

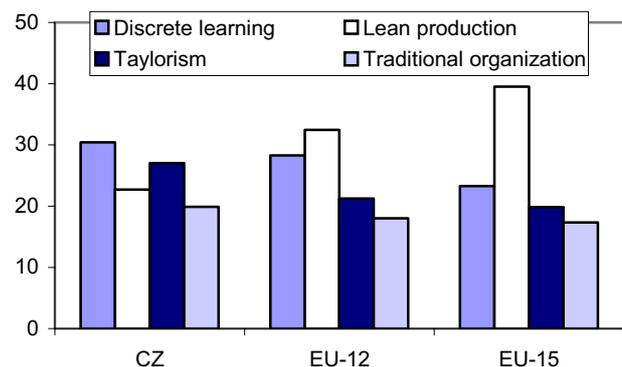
From a comparison of the structure of employees according to **clusters of forms of the organisation of work and learning** we can see a lower percentage of employees in qualitatively more intensive form, i.e. in the cluster of discrete learning. By contrast, the percentage in the form of lean production and Taylorist organisation is higher. The lesser importance of teamwork, the rotation of job positions, the complexity of tasks, learning and problem-solving are manifested from the perspective of sub-characteristics of the organisation of work in the Czech Republic. By contrast, the significance of monotony and various forms of controlling the work process is higher.

In the case of the **structural characteristics of employees** according to forms of work organisation, independent decision-making is best represented in other services.

Manufacturing is marked by a very low share of independent decision-making as opposed to the old members, a lower share of lean production and by contrast by the high importance of Taylorism. From the perspective of groups of occupations, the Czech Republic is mainly lagging behind due to the low significance of the form of independent decision-making in qualitatively more demanding professions, mainly to the benefit of slimline production. The least qualified professions are marked by a higher share of Taylorist organisation.

Considerable differences in the structure of employees according to forms of work organisation appear at a national level between individual EU members or their groupings. The Nordic countries are marked by a larger percentage of independent decision-making organisation. The Czech Republic, meanwhile, is one of the new members with the highest share of independent decision-making organisation, surpassing the average for the EU-12. However, it is still some way behind the average for the EU-15 (see Figure 17). The significance of national characteristics for the quality of structure according to work organisation and training is striking. Nonetheless, a considerable part of the differences shown must be ascribed to other factors beyond the structural characteristics in question (employment grouping, branch of industry and size of company).

Figure 17: Organisation modes (in % of labour force, 2005)



Source: ESWC (2005), own calculations.

An analysis shows a strong relationship between the form of organisation and the **type of innovation activity**. If lean production is predominant at the company, there is no clear tendency to any type of innovator. The form of work organisation characterised as Taylorism is mainly marked out by a non-innovative type. All other innovative types have the tendency not to appear in this form of work organisation. A similar tendency as for Taylorist production is seen for traditional organisation.

Table 16: Relation between innovation and organization modes, EU-27

	Discrete learning	Lean production	Taylorism	Traditional organisation
Strategic	0.69*	0.01	-0.62*	-0.53*
Intermittent	0.53*	0.19	-0.57*	-0.50*
Modifiers	0.50*	-0.15	-0.33	-0.37
Adopters	-0.20	-0.18	0.25	0.26
Non-innov.	-0.52*	0.09	0.41*	0.37

Notes: \* 5% significance. Source: EIS (2005), ESWC (2005) databases, own calculations.

### 3. Information society and business informatics

The quality of business informatics has gradually become one of the key resources of the competitiveness of companies and organizations. It is influenced by many factors, mainly the level of rendered informatics services, and the quality of application within business information systems and also the degree of the quality of business informatics management. The substantial influence on the development of business informatics has also reached the level of the entire **information society**, i.e. development of the infrastructure, informatics qualification of the workforce, quality and absorption faculty of the ICT market. This means that if we want to analyze the status and development of business informatics in our country, we have to do so in the broader context of development of the information society.

#### 3.1 Business informatics in the information society

Information and communication technology represent one of the key sectors which contribute to increasing the competitiveness of companies and also entire national economies as they fuel economic growth and provide new jobs. The quality and **efficiency of business informatics** is even more important for small- and medium-sized companies, on whose growth and prosperity to a large extent depends the efficiency of the European economy. Even this is the conclusion of strategic documents of the EU, the Lisbon Strategy and others.

#### Information society and European initiatives

At the end of 2005, the European Commission adopted a vision of further development of the information society for subsequent years. The following main conclusions resulted from analyses of the current status of the development of the EU information society and realization of the eEurope program (EUROSTAT, 2006). Although a series of **realized projects** and programs remain in the development and use of ICT, many others stay unrealized or entirely non-initiated. In EU countries approx. 80% of the population was able to access high-speed internet in June 2004, but only 7.7% on average were, in fact, connected. The presented difference represents a huge potential for future development along with the upcoming third generation of mobile devices.

The influence of ICT on the economy and society dramatically increases with the entry of new, highly important subjects on the world market. Great progress in the years 1992 – 2001 was made in the ICT area mainly in China, India and Brazil, which noted a year-to-year increase in production in the region of 20-35%. The EU must make provision for these trends and react to their impact. Such participation in decision-making on the global structure and management of IT networks, navigation systems and other infrastructural solutions of this type is therefore highly strategic for the EU.

The dynamic entrance of China, India and other, mainly Asian countries, forces leading ICT companies to use so-called **off-shoring**, i.e. to move the research and development of mainly basic software systems and technical equipment to these countries. Huge development centers of Hewlett-Packard, IBM and other companies in India (e.g. Bangalore), which employ tens of thousands of high-quality developers, are examples.

Effective utilization of ICT is becoming **more complex** and preparation-intensive over time. Hence the quick adapting of new software standards and tools including assurance of their effective connectivity, i.e. the ability to easily, quickly and mutually communicate and exchange data, is necessary.

An important customer as well as supplier of ICT is **government and government organizations**. Examples are activities and programs such as e-government, e-health and e-learning. Stress placed on the efficiency and effectiveness of the public sector, which must adapt their services to company and citizen needs, has been increasing.

Among areas identified as a priority for development of the information society after 2005 are mostly included the development of services of ICT, e.g. in the field of multimedia and audiovisual technology, of the support for the incorporation of all citizen groups into structures of the information society and prevention of their possible exclusion due to unavailability of information resources and services, the development of comprehensive public ICT services executed on the basis of ICT, the creation of programs for the development of skills and jobs associated with informatics tools and services, the support for citizens' confidence in the application possibilities of ICT and boosting their active approach to ICT and communication capacities, the utilization of ICT tools for rationalization of business procedures and for various forms of cooperation between companies.

#### EU ICT Strategy until 2010

The European Commission adopted in June 2005 the **European Information Society Strategy 2010-i2010** as a consequence of fulfillment of Lisbon goals. The Strategy determined three following basic directions for development in the information society: (1) to create an open and competitive single market for information and media services within the EU, (2) to increase investments of the EU into the development of innovative programs in the area of information and communication technologies by 80 % (currently, the EU is, with its 80 EUR per capita, drastically lacking behind Japan with 350 EUR and USA with 400 EUR), (3) to clearly define priority areas of the information society and to prepare the realization plans for them, e.g. to execute a plan for assurance of services for inhabitants by 2006, to make accessible outputs of the European culture by 2007 in the form of multimedia and multilingual digital libraries, to render various information and navigation services for the support of safer car traveling etc.

One of the priorities of the **National Reform Program** in the Czech Republic is an implementation of high-speed networks with focus on broader use of new electronic services by mostly small- and medium-sized companies and by households with anticipated reaching of high-speed access to the Internet for 50 % of the population. The current trend shows that while in the 4<sup>th</sup> quarter of 2003 the availability of the high-speed Internet access was on the level of approx. 2 %, in 2<sup>nd</sup> quarter of 2006 it was already 15 % of households.

The condition is especially a liberalization of the telecommunication sector and increase in service offer in electronic communication with the public service within the framework of the e-government. Also services within the

framework of the Public Service Portal, which maps the availability of the high-speed internet access in the entire Czech Republic, come up to that approx. 90 % of the areas of the Czech Republic are currently covered by ADSL (Asymmetric Digital Subscribe Line) technology and with the use of wireless technologies it represents nearly 100% of the population.

Another significant trend leading towards increase of the quality of the information society is the advanced integration of information systems and technological resources within the public service. Information nucleus of the e-government in the Czech Republic should comprise three central registers – Territory Identification and Address Register, Economical Register and Inhabitant Register. Operation launch of the Economical Register is planned since 2010. It will centralize data of approx. 2.4 mil. business subjects and will replace tens of current information systems and sources.

A substantial shift in the development of the Czech e-government means wider possibilities for registration submissions to the health insurance and other functions. The main organization for receiving electronic submissions is the Czech Social Security Administration, which had received approx. 11 mil. electronic documents by 2006 and this offer is used by more than 65 % of companies and organizations. These development trends are positive, however EUROSTAT measures the progress in e-government of member countries based on 20 given criteria. According to this evaluation, the Czech Republic has dropped in last years from 19<sup>th</sup> to 21<sup>st</sup> place and is on 5<sup>th</sup> place among new EU members. Unfortunately it is necessary to emphasize also an utterly poor qualification preparation in this entire area, including university study programs.

While observing the impacts of ICT, the attention is mainly focused on facilities and infrastructure as an inevitable assumption for execution of the informatics in business activities. Three key characteristics were used for the evaluation in 2006: the quality of technological infrastructure (mainly the accessibility of information and communication technologies), the utilization of ICT applications (e.g. in e-business) and the utilization of ICT in development of the public service (e-government).

### Availability of ICT

Here are, beside the very technical availability, monitored indicators evaluating also an economic availability of information technologies and sources, a number of connectable telecommunication equipments, in position of telecommunication operators and, generally, an expenditure on information and mainly communication infrastructure. With regard to trends in availability of mainly broadband Internet it is very significant to look at its use in a business area (the situation is illustrated in Figure 1).

**Table 1: Availability of internet in companies (in %)**

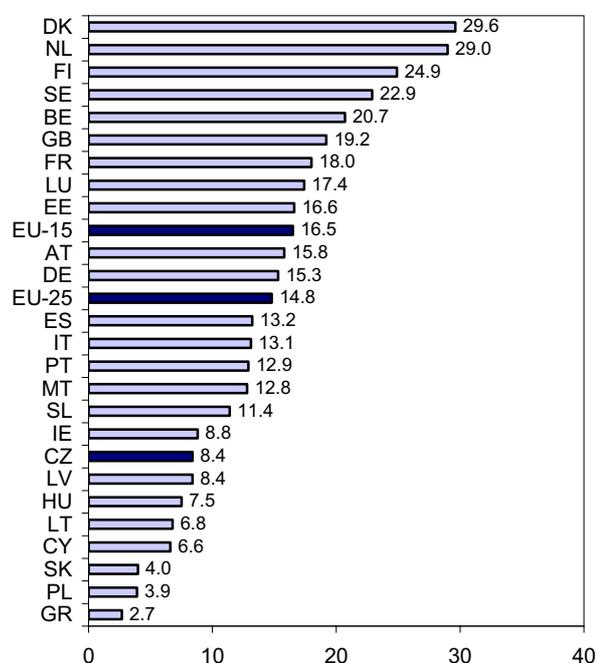
	2005	2006
EU-27	..	92
EU-25	91	93
EU-15	92	94
CZ	92	95

Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

The Czech Republic does not occupy a good position in EU-25 (with no data available yet for EU-27) according to the rate of penetration of broadband connection to the Internet, as expressed in number of connections in relation to the number of inhabitants. Despite the number of connections nearly doubled year-to-year, the Czech Republic still reaches the value of just 8 %, with the EU average of approx. 14 %. In case of the Internet access in companies is the situation in the Czech Republic more favorable (see Table 1).

However, for the information society development is also important the ICT availability and Internet access on the part of households, where the Czech Republic occupies one of the last positions in the EU (29 % in CZ compared to 49 % in EU-27). This situation is, among others, a reason for even lower use of the Internet ordering and purchasing goods or services and generally for use of e-commerce and electronic execution of e-government.

**Figure 1: Availability of broadband internet (in %, for 2006)**



Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of 1st May, 2007).

### Use of ICT in e-business

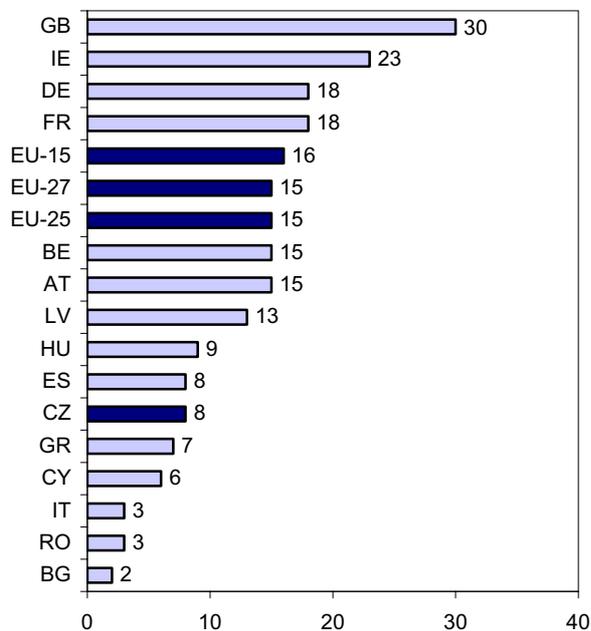
**Electronic business** (e-business) belongs to the basic areas of use of ICT. It is expected that the informatics supports finding of new business methods, effective approaches for penetration to new markets, the support for launching new products and services on the market etc. To this area belong also possibilities of support of business processes through the informatics, i.e. mainly support by Internet services but also features of mobile phones, electronic communicators, PDA (Personal Digital Assistant) and laptops.

For electronic on-line commerce, an appropriate legislative environment, which ensures a legislative frame and protection of trading subjects including payments for delivered goods, must be ensured besides a technological base. One of the key pieces of legislation is an Act on Electronic Signature. This technology is used by Czech

companies in relative scarcity, regardless of the size of the company.

The use of on-line commerce is often linked to a certain industry. E.g. suppliers of automotive industry belong with their own data standards and use of Electronic Data Interchange (EDI) to pioneers and important users in this entire area. A second standpoint is the type of traded goods, where consumables and ticket booking dominate. A wider use of electronic on-line commerce is yet impeded by not only the availability (technical and price) of required ICT, but also the customers' confidence in relation to the protection of their personal data including execution of on-line payments. A typical problem in this context is also assurance of highly effective logistic processes coherent to electronically realized information processes. Differences in their speed and flexibility sometimes depreciate the quality of the whole system. Figure 2 shows the level of the use of the ICT in e-business for accepting of orders in companies in EU-27.

Figure 2: Companies accepting on-line orders (in %, for 2006)



Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

A special attention in this area is paid to **small- and medium-sized companies (SME)**, which is confirmed also by prepared EU operation programs for 2007 – 2013. Use of technologies and applications of e-business is a key factor for efficiency and competitiveness of SME. Relatively high costs cumbered a broader expansion mainly of e-procurement based on EDI technologies so far. However, this is being solved by a gradual changeover to the XML (eXtensible Markup Language) environment.

As shown in Table 2, the situation in the area of **on-line company purchases** is not so bad in the Czech Republic; however, the recorded decreasing trend is somewhat surprising. The differences are noticeable in comparison with advanced countries though. (51 % in Great Britain, 53 % in Ireland). Backwardness of Czech companies has a very negative impact on their performance and total competitiveness, e.g. impacts on common periods and flexibility of executed orders.

Table 2: Companies purchasing on-line (in %)

	2005	2006
EU-27	..	27
EU-25	24	28
EU-15	26	31
CZ	21	17

Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

Looking at the total use of **e-commerce** and its share in turnover of companies, the situation of the Czech Republic is also under the European average with decreasing trend in time (see Table 3). All types of e-business are included in this evaluation. It includes e-procurement based on relationships between two trading companies, e-commerce and e-marketplaces.

Table 3: E-commerce in % of company turnover

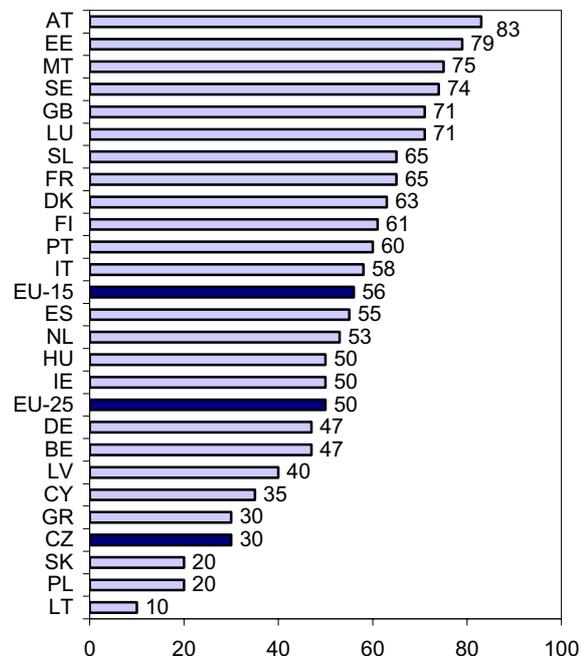
	2005	2006
EU-27	..	4.0
EU-25	2.7	4.0
EU-15	2.8	4.1
CZ	3.3	3.1

Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

### Use of ICT in communication with Public Service

One of the basic goals of the utilization of ICT in the **public service** is to offer the citizens and companies professional, faster and less complicated services. E-government is one of the basic monitored area in eEurope and i2010 Strategies.

Figure 3: E-government availability – offer side (in %, for 2006)



Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

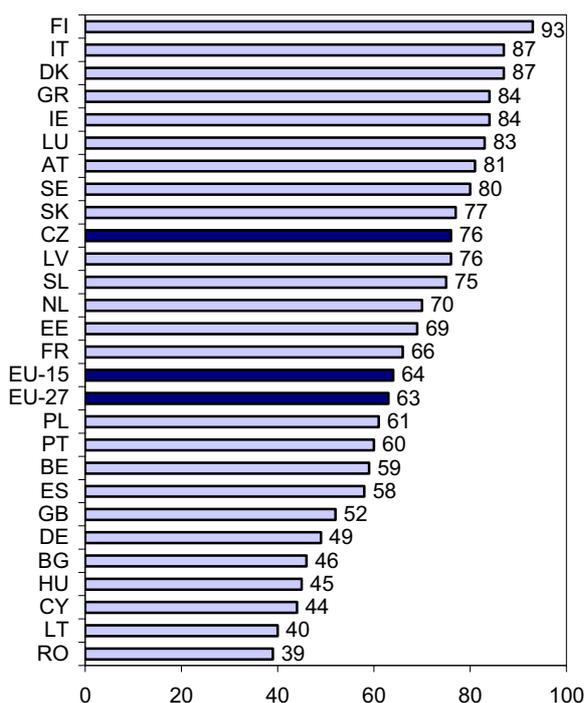
Part of the available statistics is data on use of the Internet by individuals and companies in relation to the public

service, mainly data on use of web pages of the public service for searching information, downloading forms and on-line fill-out of the forms. Figure 3 illustrates the e-government availability for companies in 2006.

Average values of e-government availability differ for EU-15 and EU-25 (no data available yet for EU-27) by 6 p.p. with the Czech Republic and its 30 % on 5th place from the end. This bad position in relation to other EU members persists despite above-mentioned partial improvements. Nordic countries of Finland and Sweden, Estonia has been developing rapidly reaching highly above-average values in all areas of the e-government. The problem of low efficiency of the Czech e-government services then influences also the efficiency of the commercial sphere. It represents spending of time and financial costs for needless or completely ineffective operations in communication with the public service.

Figure 4 and then also Table 4 show the position of the Czech Republic in use of e-government by **companies** in the area of communication with the public service. The Czech Republic had been reaching comparable, or better values than the EU average, in 2006, however, it fell behind in the growth rate.

**Figure 4: Companies using e-government for communication with public service (in %, for 2006)**



Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

**Table 4: Companies communicating with public service electronically (in %)**

	2005	2006
EU-27	..	63
EU-25	57	64
EU-15	56	64
CZ	79	76

Source: EUROSTAT – New Cronos, Information Society Statistics/Structural Indicators (as of May 1, 2007).

### Changes of information society on company level

Changes of the information society come primarily **from outside** of the company and represent new possibilities of product and processes ICT-based digitalization, whereby the Internet plays the key role. Further, changes coming from the company itself and incumbent on effective understanding and mastering of these new tools and methods as evoked or conditioned with ICT by nearly all workers. The changes must, at the same time, regard also their behavior and re-engineering of business processes. Especially projects of BPR (Business Process Reengineering) represent very strong perspective for increasing company's efficiency, for the documentation and optimization of business processes is often a basis for their subsequent work-flow management and automation.

Changes brought by the information society include all important aspects of a company and its business – customers, suppliers, partners, competitors and own employees. Changes come to light in the absolute **company paradigm**, as, owing to the globalization, protected markets are disappearing, and the life-cycle of products is being shortened up. Other products must be scheduled already at the time of launching novelties on market; markets behave globally not only in terms of possible locations, where producers place their companies.

Reduction of protective measures is happening on closed markets on which both new companies and new alliances of well-established companies dynamically operate. The key factor of success is to sell offered goods and services, as a number of professions are currently overdimensioned in capacity and the possibilities surpass an actual level of possible consumption by customers for a given product. Therefore all employees of the companies must be **customer-oriented** with the bigger portion of passion and creativeness. So not only vendors and businessmen are concerned, but also e.g. call center workers, designers of new products and their implementers into the production. Apart from necessary quality and low price, a short term of the product delivery on the market is expected.

Changing **customer behavior** then causes the prediction of the further market development to be nearly impossible. It is not possible to use traditional decision tools anymore, as former conceptions and strategies gradually cease to work, boundaries between spheres of business and customers' loyalty are changing. The companies seek a new position on the market with previously unthought-of activities. Traditional boundaries between spheres of business are changing, as banks offer insurance, insurance companies deal with hospital management, vendors of information systems operate with leasing. The traditional customer loyalty yields to the need of yet more colorful and individualized product demands. The number of new products is quickly growing and the time for their launch on the market is constantly being shortened. PC's and mobile phones can be taken as examples.

Companies try to react in various ways on the new conditions. Generally, their approaches can be divided into two groups. In the first one, mainly organizational changes and those also focused on the social-psychological area domain, in the other one, the bigger emphasis is given on a dominant role of ICT. Primarily, there are changes inside the company and the key role in this process is played by human resources. – literally every employee

of the company from the management to the representatives in the important first line of customer contact or on realization of the product or service. ICT's are being understood in this case as a necessary and essential success condition of the changes in company's culture. The second type of approaches focuses mainly on the integration into the outer relationships of the company. The goal is to on-line link with other business subjects on the market. Modern ICT's occupy a dominant position in this sense. An important role is therefore played by concepts or management models, of virtual company, company's cluster, and management of suppliers' chains, or networks (SCM), customer relationship management (CRM).

### Restructuring of global ICT market

Some segments of the ICT market show especially **high dynamics**, mainly investments into internet technologies and applications, mobile application and applications oriented on end-user. The growth of the ICT market is expected also for the next couple of years, although not at the level of 20-30 % as in the end of the nineties. **ICT expenditure** grew by 5.6 % on average in 2000-2005 worldwide, mostly due to developing economies. ICT expenditures are growing the fastest in China, Russia and India, which is shown also in the growth of their proportion in the world market, in the amount of investments into the ICT sector and the number and amount of acquisitions. The employment in the top ICT companies had a decreasing trend and has been slowly increasing only since 2003. On the other hand, revenue from and expenditure for research and development was showing a fluctuation and a slow decrease until 2002 at 250 most important companies, yet they have shown a strong growth recently.

Mostly manufacturers of electronic products and equipments from Asia have been expanding. Apart from an increase of the share in the ICT products market of countries like China or India, also services realized in the off-shoring form (a transfer of servicing activities abroad either from the company's headquarter to its foreign branches or to external providers, which is a specific form of outsourcing) have been expanding. A significant increase has been recorded for expenditures in the ICT **research and development**, mainly in the area of the development of new basic electronic and communication components, software solutions and ICT services. Permanently decreasing prices of electronic products with increasing its performance and qualitative parameters, thus an improving price performance ratio has brought a revival in the volume of international trade. The current proportion of the ICT products is only slightly higher compared to the 10-years-ago level.

An orientation of the business and direct foreign investments has dramatically changed with the production and, to a certain extent, even the ICT services having been moved outside of the advanced countries. A further intensification of these trends with the movement also in case of products with high added value and, at the same time, even services demanding more qualification is expected. Another characteristics of the current ICT market is also a high proportion of new acquisitions (such as Oracle, Microsoft, Infor, SSA Global), which was in 2006 ever the highest from the start and the sharp progress of so-called dot.com companies.

**Future development** on the ICT market will be followed by various trends. Above all, a convergence of various technologies such as nanotechnology, biotechnology and ICT towards integrated solutions and products is happening as well as the development of navigation and localization systems for monitoring the move of vehicles, goods etc. RFID (radio frequency identification) technologies are ever more available and have been completely changing the nature of most of the business and logistic processes. So-called participation web (Web 2.0) technology enabling the Internet users to markedly more effectively participate in creation of its information content has been undergoing a rapid development. ICT applications have been developed and spread into nearly all spheres of human activities, whereby systems for identifications and warning against natural disasters have been gaining a special position.

The rapid development of ICT enables significant changes in the **geographical distribution** of rendered information services. Off-shoring and the information services market have, however, two sides. Countries like India successfully accept a global business model for services rendered worldwide, which are based on their availability thanks to the Internet. On the other side, a domestic services demand has been growing, which opens the markets even for a foreign competition and an increase of its quality. Therefore in China, India and other countries the development of ICT export is shifted from the production and supplies of PC components to considerably more sophisticated information services together with a growing level of the qualification of their information and communication technology specialists.

The position and possibilities of the Czech Republic in the off-shoring of information, or strategic services and the offer of investment incentives related thereto are a very actual topic of the development of the information society. The efficiency of investments into the off-shoring of these services actually highly surpasses even the success of foreign investments e.g. into the manufacturing industry.

### 3.2 Expected development of Czech ICT market

In the first half of 2007, a survey of the CES and the Czech Society for Systems Integration oriented on the conditions and expected trends on the Czech ICT market was carried out. Suppliers of ICT were the respondents with the participation of more than 60 most important suppliers. Results of the survey are summarized in this chapter. One of the key questions was current level of the saturation with various types of applications such as ERP, business intelligence, CRM. Based on the survey as well as studies by analytic companies (Gartner, IDC, IDG), basic development tendencies on the Czech ICT market can be anticipated.

#### Enterprise information systems

About 80 products designed for big and medium-sized customers represent at the moment the offer of **enterprise applications** in the Czech Republic. Basically all top suppliers of these software products have their representations on the market. Therefore the segment of enterprise applications (ERP, enterprise resource planning) is one of the segments, which at the moment show the biggest saturation (see Table 5).

**Table 5: Forecast of market saturation for ERP in the Czech Republic (in % of the respondents, 2006)**

	Market Saturation in %								
	10	20	30	40	50	60	70	80	90
Respond.	0	0	0	2	5	2	12	19	8

Source: Own survey.

**Currently**, this most important category of business software records a high dynamics in the number of installations and then even implementations. Big market saturation entails in this case also a very strong competition and the endeavor of the suppliers to seek new opportunities mainly in rendered services and the orientation on products with limited distribution among customers up to now. Another distinctive characteristic of the current ERP market is the orientation on small- and medium-sized enterprises (SME). Specific license conditions, adjusted implementation methodologies, and rendered services for running the entire information system are also offered to the small companies.

From the **further expectation development** point of view, a vision of further expansion of ERP solutions into the area of small- and medium-sized enterprises (60 % of positive answers) and also the public service (27 %) generally prevails at the suppliers. The expansion into the area of services or other companies is being considered only exceptionally (the market saturation is the biggest here). The increase in positive expectation of the market development compared to the last year is visible with 20 % of the respondents going to 28 % (see Table 6). Meanwhile, the functionality of the ERP systems is not being changed dramatically. Changes in the approach of the suppliers towards the implementation of individual ERP products, e.g. significant shortening of the implementation time (from 9 to 12 months in 1996 to current 3-4 months) is becoming more evident.

**Table 6: Expected development of Czech ERP market (in % of respondents, 2006)**

Market Development	%
will worsen	1
will be stable	18
will improve	25
will significantly improve	3

Source: Own survey.

Shorter period of the implementation is evident not only in lower price and customer employees' load but also brings sooner the planned effects. These effects have been changed in the last years as well. In the mid-1990s, the main goal was to implement the ERP for reducing the warehouse stock, degree of completion of the production, overrunning of normative times, total price of material purchase and thus a total reduction of costs. Current analysis and future expectations rather mention better data availability, superior support of decision-making, improvement and enhancement of business processes and also improvement of feedback on customers' demands. Also the ability of ERP to support the integration and communication with company's surroundings are significantly evaluated nowadays.

### Analytical and planning applications

The estimated market saturation with analytical and planning application of **business intelligence** (BI) is significantly lower than with ERP and the majority of estimations

move around 20 – 40 % (see Table 7). IDC surveys however show at the same time that the medium-sized and big companies put more and more stress on increasing the total capacity. BI applications provide in this respect not only the needed information on e.g. company's growth rate but also analyses factors that impact the growth rate. Special BI applications are offered for the needs of SME segment.

**Table 7: Estimations of market saturation with BI in Czech Republic (in % of respondents, 2006)**

	Market Saturation in %								
	10	20	30	40	50	60	70	80	90
Respond.	3	15	5	8	7	2	0	0	2

Source: Own survey.

Exactly BI applications improve the quality of company's informatics in a decisive way. However, this area is burdened with various problems, though. BI does not yet play the expected **integration role** of information systems and the solutions are oriented on isolated projects, which only bring partial effects. That completely and legitimately derogates the usage and support of BI for an increase of the capacity and quality of basic cross-sectional business processes.

An **insufficient co-operation** between user and ICT departments is another problem. A specific role is played by the activity or resistance of the middle management, for the most of the BI functionality is usually against its interest and replaces the activities, which the middle management carries out (consolidation of information, processing of consolidated reports etc.). BI projects must be oriented on the entire company though, with the whole concept for the complex solution of business processes. That needs substantially bigger activity of the users on all levels of company's management than it is with other applications. Another problem is an insufficient link of business and technological knowledge on the part of the users and informatics and a low quality of source data.

A demand for BI solutions is gradually growing strong. The BI become **strategic tools** for business management and penetrate all its levels (so-called pervasive BI). Applications and tools will be more and more available to the majority of the company's employees, i.e. as basic office products or transaction applications. Simplifying of BI tools and their significantly better economic availability contributes to that.

According to survey, BI is the third **priority area** of ICT managers; where they intent to invest (right after the integration of corporate applications and security of IT systems). A dynamic market growth is in the Czech Republic expected until 2010. The influencing factors include mainly the state regulation and requirements for the quality and standardized reporting (see e.g. Sarbanes-Oxley), competition forces, increasing dynamics of the market, new customers' requests and so evoked pressure for the increasing quality and efficiency of the business management.

### Supply chain management

The integration of the corporate informatics is oriented in the long term on the management of material flows, which enables to ensure high availability of products for custom-

ers as well as reducing of logistics costs. A mutual supply chaining is based on the complex support of ICT and applications of supply chain management software (SCM). The shortening and improvement of liability of product deliveries happens through SCM. The co-operation and integration of companies in bigger units, in which they share key information and optimize basic processes within the entire chain, therefore becomes a significant competition advantage on the market. The area of **market saturation** in the Czech Republic moves around 30 – 40 % for SCM applications (see Table 8).

**Table 8: Forecast of market saturation for SCM (in % of respondents, 2006)**

	Market Saturation in %								
	10	20	30	40	50	60	70	80	90
Respond.	2	5	15	15	3	3	2	2	2

Source: Own survey.

The applications were initially limited to the ability to forecast customer demand and thus ensure as smooth functioning of the entire chain as possible. Current technologies offer entirely new possibilities and use of effective management methods: (1) Continuous replenishment planning (CRP), (2) Vendor managed inventory (VMI), (3) Efficient customer response (ECR), (4) Collaborative planning, forecasting and replenishment (CFPR).

### Customer relationship management

The main task of **customer relationship management** (CRM) is to create the relationships to customers and improve them by using various communication channels including the Internet. The main functions of CRM are (1) Monitoring of customer demands and their assessment, (2) Creation of a new value with the utilization of complex and consistent information on customers, (3) Focus of business resources on activities leading towards creation of long-term and economically valuable customer relationships.

**Market saturation** with CRM applications in the Czech Republic is between 30 – 60 % (see Table 9), the representatives of foreign companies mention 30 – 40 %. The difference is caused by a different understanding of this term by suppliers of mainly inland solutions. A considerable revival of customers' interest in these kinds of applications is happening though; after a certain decrement caused by smaller effects as compared to expectations.

The majority of customer disillusiones from launching of CRM applications has been caused by a wrong strategy and errors in the implementation. As experience show, if the CRM is not executed in a close link on the re-engineering of corporate processes its contributions are very limited. It is expected that with new supplier experience will also come other positive shifts in the offer and demand on the ICT market. A demand increase can therefore be definitely expected in the CRM area.

**Table 9: Forecast of Market Saturation for CRM in Czech Republic (in % of the respondents, 2006)**

	Market Saturation in %								
	10	20	30	40	50	60	70	80	90
Respond.	3	3	14	8	3	12	2	0	2

Source: Own survey.

### Expected development of application products

**Product development** can be distinguished according to the extent and way of realization, i.e. adjustments from tiny appearance and functionality changes to changes in algorithms and significant technological innovations (see Table 10). The situation of the market saturation forces the suppliers to bigger innovation of their ERP solutions. It is developed both of enhancing the algorithms (increase of positive answers by 30 % compared to last year) and also includes extension of the functionality. The proportion of products with significant innovation does not change.

**Table 10: Expected development of ERP products in Czech Republic (in % of respondents, 2006)**

ERP Products Development	%
No Changes	17
User Interface	15
Functionality Changes	8
New Algorithms	18
New Functionality	30
Conception Innovation	11

Source: Own survey.

One of the sharp development tendencies of the ERP products is a use of various means and technologies for the function of **e-commerce** (see Table 11). The representation of XML environment is very strong on 92 %, which leads to the support of mostly specialized applications for exchange of business documents with external partners. The representation of the support of already classic EDI standards (electronic data interchange), such as EDIFACT, ANSI X.12, ODETTE and other standards for electronic data exchange is a bit lower.

The support of **on-line shops** implementation and use of mobile devices (mobile phones, communicators and others) is very strong as proved by a significant and so far much unfilled potential for applications of this type. On the other hand, the development in functionality of e-marketplaces in consideration is significantly lower. Rather specialized products are asserted in this area with lower integration into basic enterprise applications.

**Table 11: Support of E-commerce in ERP products in Czech Republic (in % of respondents, 2006)**

ERP Support	%
Market Places	19
Online Shops	66
Supplier Auctions	22
EDI Support	76
XML Support	92
Mobile Devices	66

Source: Own survey.

Another, significantly establishing group of products on the ICT market are applications for **enterprise content management** (ECM). Here belong technologies and applications for data and document management characterized as non-structured (in contrast to databases for ERP, BI and other applications) – they represent up to 80 % of data in the company on average. The functionality of offered ECM solutions gradually increases. A convergence and an integration of once independent applications is happening, their enrichment by other modules.

### Expected development of ICT services

**Informatics services** are a phenomenon on the current ICT market. One of the problems with analysis and estimations of further progress is their structure. OECD divides services into twelve groups (e.g. technical consultations services in ICT, design and development services, hosting services, implementation services and others). In the case of services connected to the implementation of standard applications on the Czech ICT market becomes evident a tendency to increase a proportion of costs on the administration and maintenance of these systems. A decrease in proportion of income from the sale of licenses and, by contrast, an increase in proportion of income from services is indicated also in information as published by most of the suppliers.

From the long-term perspective the tendency towards increasing of the percentage proportion of administration and maintenance costs of these systems results on the Czech market of services associated with the ERP. Changes in this area are indirectly symbolized in a way, in which financial values of the implementation and subsequent maintenance of applications, or the application software are shown. Looking at the results of this year's survey compared to the previous years, there was less percentage formulation of these amounts from purchase prices (which then the user has to recalculate for possible basic comparison of the products) or their value is only shown absolutely in relation to one month, which causes their optical decrease.

The nature and types of offered **implementation services** in the next years is illustrated in Table 12. Completely dominating endowment of suppliers with their own implementation methodologies (i.e. recommended procedures for analyses, projection and launching of ERP solutions into operation) and their rendering to customers is evident. Relatively high percentage of offered services appears in the improvement area, or re-engineering of corporate processes. Another tendency towards a very strong support of process automation (workflow) integrated in the basic corporate ERP applications can be therefore expected.

**Table 12: Nature of rendered implementation services in Czech Republic (in % of respondents, 2006)**

Service Nature	%
Own Methodology	93
Process Improvement	61
ASP	27
Consultancy Co.	27
Virtual Company	22
Knowledge Databases	63

Source: Own survey.

**The anticipated development** of the range of implementation services connected with the implementation of application products (see Table 13) is nearly identical with previous years.

A certain shift compared to previous years represents a fact that, even in 2005, the suppliers promised their extension in approx. one third of the cases, whereas in 2006 it was only approx. 2 % of suppliers, which in our case means one supplier. All the others assume an

identical level of services within the common maintenance.

**Table 13: Presumed development of implementation services in Czech Republic (in % of respondents, 2006)**

Service Progress	%
No Changes	56
Scope Decreased	2
Scope Increased	32

Source: Own survey.

As shown in the overview, the Czech ICT market is very dynamic and its further positive development, mainly towards services and more advanced applications, can be expected.

### 3.3 Evaluation of effects of business informatics

Results of executed corporate surveys in given area during 2006 are shown in this section. The survey included three main spheres of respondents: top managers on the Czech market (18), workers in middle management and operative level management (33) and managers and specialists acting directly in ICT area (67). Respondents come from companies of various sizes – from small to big – and act on markets of various sizes (national to worldwide). Results assessment is divided into the following parts: (1) analysis of really reached effects in companies in the view of their content, significance for company and then according to the level of their management, measuring and evaluation, (2) analysis of effect sources, i.e. main components of the corporate informatics and their management.

#### Effects of informatics and their management

Effects connected with an increase in process capacity of the company and the quality of its management prevails on evaluation of achieved effects in the informatics according to their **content definition** (see Table 14).

**Table 14: Informatics effects distribution according to their content (in % of respondents, 2006)**

	Informat-ics	Middle man.	Top man.	Total
Direct Benefits	33	6	6	21
Added Value	13	9	0	10
Economical Effects	19	36	12	23
Company's Position	10	33	29	20
Process Efficiency	37	33	47	38
Management Quality	46	36	71	47

Source: Own survey.

Answers, which accentuate the economical effects, are in the middle. On the other side, the use of the informatics as an added value to the basic offered products and services, e.g. in support of project and design works (e.g. in construction and furniture industry), consultancy services etc. is shown as very low. Furthermore, there was no positive answer in this case of top managers.

The distinction of informatics effects is, due to its use on the market, a key based on the **significance for company**. The breakdown of respondents' answers is illustrated in Table 15. The prevailing part of the answers is related to the basic assurance of serviceability of a com-

pany, i.e. accountancy and financial operations, common business transactions etc. This value was the highest in all three groups of respondents, with top management group representing nearly 80 % of the answers. Similarly it is with values of increasing of total efficiency of a company (i.e. process, managerial and analytical). Significance is also given to the strengthening of the company's image both in top management group and middle management group. On the contrary, the image has an insignificant share in informatics group.

**Table 15: Distinction of informatics significance for company (in % of answers)**

	Infor-matics	Middle man.	Top man.	Total
Strategic Importance	40	33	18	35
Competition Advantage	27	24	35	27
Competitiveness	22	30	24	25
Company's Image	16	33	41	25
Efficiency	42	52	65	48
Serviceability	54	64	76	60

Source: Own survey.

Portions of answers in the case of the strategic importance of the informatics, or importance for the competition advantage and competitiveness may appear as relatively low. However, in comparison with the situation in the past it represents a significant move; at that time the informatics only meant a basic serviceability of a company. With respect to yet more increasing number of progressive applications we can expect even further positive development in this area. A limiting factor represents the ICT qualification of managers, yet even here we can see desirable changes.

Table 16 shows respondents' preferences for the **measurement of effects** of the informatics. Direct financial indicators domain. Only a small part of the companies do not measure the effects at all. So-called soft indicators are preferred mainly by the group of informatics, whereas middle management inclines clearly toward the combination of hard, direct indicators and soft scaleable values. In any case these results imply a positive change compared to the past, when the opinion that the influence of the informatics can be measured with difficulty or not at all was prevailing in practice. This change is caused by already mentioned pressure of the competition and by companies owners on the direct determination of the effects, but also by the development of methodologies and models, which are used in this area more often.

**Table 16: Forms of determination of effects of informatics (in % of answers)**

	Infor-matics	Middle man.	Top man.	Total
Financial Indicators	33	27	41	32
Non-financial indic.	24	27	0	21
Soft Indicators	30	12	24	24
Combination	25	52	0	29
Nothing At All	12	15	18	14

Source: Own survey.

The quality of the informatics and its actual effects are normally linked also to the way of their **planning** within the whole management of the corporate informatics. On

managerial level, the planning is systematical and regular only in a small number of cases; the proportion of the planning of the effects together with the preparation and assignment of new projects is higher, which results from existing methodologies. On the other side, only in a very limited number of organizations the effects are not planned at all.

**Table 17: Method of planning of effects of informatics (in % of answers)**

	Infor-matics	Middle man.	Top man.	Total
At project assignment	45	15	35	34
Regularly	39	33	18	34
Randomly	9	45	29	24
Not at all	6	8	18	8

Source: Own survey.

The basic impacts on the success is in this case apparently the pressure for determination of the real effects already within the project solutions and also ever more intensive need on standard project methodologies, which directly demand the specification of the target effects for each proposed project.

A favorable proportion of answers can be seen in **time distribution** of the analyses of actually achieved effects, which are carried out continuously or in regular time intervals; analyses after project completion are significantly less frequent. The effects are not analyzed at all only in a negligible number of companies (see Table 18).

The answers are mainly favorable (57 % of companies relate effects to individual corporate processes, 37 % don't) for the evaluation of relationships of the effects of the informatics to the **individual management areas**, or key corporate processes (e.g. order management, maintenance management).

**Table 18: Method of evaluation of business informatics effect (in % of answers)**

	Infor-matics	Middle man.	Top man.	Total
At project closure	30	12	13	23
Regularly	35	26	27	32
Continuously	18	29	20	21
Randomly	13	24	20	17
Not at all	3	9	20	6
Other	1	0	0	1

Source: Own survey.

The trends relates to the insistence of the management on a clear allocation of the liability of the users not only for expensed ICT costs but also planned and actually achieved effects. The actual interest in shortening of running times of the corporate processes and increasing of their flexibility changes approaches and priorities in management and operations of ICT.

**Sources of informatics effects and their management**

Sources of effects of the informatics are divided into personal and financial (i.e. informatics costs) and then applications, services and innovation methods of the informatics. A level of the **HR set-out** of the company is a decisive resource impacting the quality of the information system. Users according to management

levels and specialists of ICT departments can be included into the HR. The actual users determine the final effects of the informatics at a decisive rate, for the high-quality ICT and related investments may be completely depreciated in hands of incompetent and demotivated users. Therefore the analytic companies assume a significant increase in investments into the qualification programs for users.

According to the evaluations of the partial results of the survey and practical experience, the problem seems to be an appropriate structure of the qualification programs oriented mainly on the possibilities of the use of the implemented applications with respect to the needs of a company. The actual insufficiencies related to the incorrectly oriented qualification programs lead often to the functionality of the high-quality application software being used in practice in some cases only around 30 %.

Even with the prevailing number of big companies among the respondents (above 250 workers) prevail subjects with departments of 1 to 3 workers. There are only 34 % of big ICT departments (with more than 20 workers). This clearly illustrates strong tendencies towards outsourcing not only for system development but also for their operation. The tendency towards all sorts of outsourcing and thus orientation on external specialized services is definite here. Decreasing of the number of own informatics is often also lead by the determination to decrease costs and thus reaching better price-and-performance ration of the whole system.

The open question in many companies is the professional orientation of internal informatics. As the survey shows these workers focus more and more on analytic and project activities, mainly while solving strategic or specific projects compared to common operational or development works. Relatively high percentage of companies with big development teams is influenced by a strong representation of ICT companies and a high portion of big companies, which solve specific and difficult development tasks (in telecommunication, banks or utilities).

**Corporate informatics costs** are around 5 % of the company turnover on average. The important role is played by the industrial orientation and other company characteristics. Still relatively high costs enforce the execution of analyses specifically for the informatics. Costs are analyzed continuously in 31 % of the companies and regularly, i.e. in annual or monthly intervals even in 56 % of the cases.

In terms of details of the executed analyses, 73 % of the respondents mention a higher number of applied criteria. A frequent problem of cost analyses in the informatics is however the availability of required detailed source data from the analytical accountancy. Perhaps the most interesting observed fact is that 51 % of the companies allocate the informatics costs to individual departments, with companies where the costs are paid from budgets of specialized departments (21 %) and companies where they are paid from the ICT department budget (30 %). This is a relatively high percentage, mainly with making provision for the problems, which are brought with such allocation exactly in the informatics (e.g. re-calculation of infrastructure costs and costs of some services, questions of the license policy of the suppliers and other). Positive movements in this area can be credited to the increas-

ing interest of the managers in the structure of users of ICT resources, in some cases with the calculation of ICT costs per individual, e.g. analyses as to what costs to allocate to one user.

In cases of **ICT applications** it has clearly resulted from the survey that the decisive use has standard enterprise ERP systems in the companies. By individual application modules, in companies are operated e.g. financial modules (71 %), modules for management of sale, purchase, warehouse (65 %), HR management (71 %), production management (41 %) etc. The utilization of currently highly perspective BI application was very different according to their types. Definitely the biggest use has the standard reporting. The use of data warehouses as the core of a BI complex is on 30 %, which represents a favorable movement, but in comparison with the Western Europe (50 %) or even USA (80 %) it is still a very humble number. Similarly, the use of data-mining applications is very low.

In e-business area, applications of e-commerce dominate, i.e. applications ensuring usually the sale through business web applications to the end users (see Table 19). It is obvious that in this case these are mainly companies of a retail nature, which impacts the utilization scope. The use of roles of e-procurement is very low, i.e. applications and tools ensuring direct communication and business links between two companies. These results are partially compensated in the actual use of e-marketplaces and systems of supplier chain management.

**Table 19: Use of e-business applications (in % of answers)**

	Infor- matics	Top man.	Total
E-shop	22	12	20
E-procurement	3	6	4
E-marketplaces	7	6	7
Supplier chain management	7	12	8
Mobile commerce	0	0	0
Other applications	3	0	2

Source: Own survey.

Applications complex, so-called enterprise content management (ECM) shows higher use, mainly with applications of tools of clearly infrastructure nature (e.g. document management, groupware, web content management, and workflow) – see Table 20. From the perspective of the company's performance is the scope of the use of workflow management important and with its integration into other application products (e.g. EPR) it can be expected its further positive progress.

**Table 20: Use of enterprise content management applications (in % of answers)**

	Infor- matics	Top man.	Total
Groupware	39	41	39
Document Management	43	47	44
Workflow	36	29	35
Web Content Manag.	33	35	33
Product Management	7	6	7
Multimedia Management	6	12	7
Knowledge Management	13	18	14
Other	0	0	0

Source: Own survey.

## 4. Conclusion

In the long-term horizon, following a period of temporary slow down of economic performance in the latter half of 1990s, the Czech Republic experiences a considerable **acceleration of growth dynamics**. Significantly pro-growth was the impact of the system changes related to the economic transformation (privatisation, liberalisation, openness towards outside) in combination with robust structural changes, thanks to which resource allocation (static efficiency) and technology level of production (dynamic efficiency) improved. The external openness played a key role in penetration of domestic producers to the qualitatively more demanding international markets and their inclusion to the supra-national value chains (through inflow of foreign direct investment).

The high growth performance also reflects in successful **conversion of CR economic level** to the (present) EU-27 average. This, however, at the same time, causes inevitable exhaustion of the so far prevailing sources of competitive advantage based rather on low costs and adoption of foreign technologies (both in export performance and in attractiveness for foreign investors). The new EU members thus face the major challenge of **qualitative shift** of sources of their competitiveness, especially through development of their own innovation capacity.

The loss of cost advantage requires **new sources of competitiveness** – a supply of unique, constantly innovated products and processes with high added value produced and applied by educated workforce in a flexible business environment. In fact, the necessity of changing sources of competitive advantage in the environment of knowledge-based global economy has been faced by most EU countries.

Even though the year 2010 has been approaching, the **Lisbon Strategy** has not yet achieved a convincing result in relation to the originally defined objective. Europe has not yet significantly approached its main competitors (USA, Japan) and, in addition, new ones have emerged (India, China and other emerging markets). Regarding the approaching deadline of 2010 sharper discussion may be expected on further progress of the Lisbon agenda. Various levels of this discussion largely reflect the prevailing, or growing differences in sources of competitiveness among countries and regions of EU.

The position of the Czech Republic is typical of the group of the less developed EU members, i.e. with prevailing reliance on adopted technologies, own innovation capabilities being still less developed. Even though **increased innovation performance** is in the focus of interest in the all EU members, on the national level there are considerable differences, especially manifested by the advance of Scandinavian countries both in innovation inputs and in innovation outputs. The position of new members in development of innovation-based competitiveness represents a great challenge for formulation and implementation of the supporting policies. Their specifics are not yet sufficiently considered on the EU level and their position is often perceived as second-rate.

The Czech Republic is one of the best among the new EU members, which means an average position among EU-27. The key issue therefore is the form and scope of the impulse that might stimulate a shift towards **above-average results** in knowledge production and their use in

knowledge high intensive industry and service activities. This shift is absolutely necessary for sustainability, let alone increase of innovation-based competitiveness.

The new EU members, thanks to their medium-technology intensive structure in the traditional manufacturing industries, are most threatened by competitors from the emerging Asian and Latin American economies. Their qualitative position in global economy begins to change – they penetrate more and more to the segments with **higher technology intensity**, they are able to offer attractive conditions for technology intensive foreign investment, including above-average production of highly educated human resources. EU countries will inevitably face external competition on ever higher levels of technology knowledge.

**Skill levels** increase globally, with an especially quick increase in emerging markets (allowed by availability of cheap and skilled workforce in large masses). A new dimension is represented by support of inflow of high-skilled human resources by means of selective immigration policy. This inflow, however, is in the first place affected by the knowledge and economic attractiveness of the domestic innovation system for talented individuals. In that point the discussion starts about policies attracting high-skilled workforce to EU, including application of the “green card” instrument (in a blue card version). On the other hand, the new EU members face the outflow of qualified workforce to the more developed members and the EU as a whole faces brain-drain to the USA and the weaker attractiveness for non-European brain inflow in competition with the USA.

**Trade, foreign investment and research and development** in the emerging markets show ambition as well as potential to cover the whole product spectrum, i.e. including skill and technology intensive outputs. The share of emerging markets in total foreign investment will keep growing and at the same time the structure of trade and investment will include an ever growing share of flows into industries with higher value added. Europe is thus increasingly facing competition of the less developed countries even in skill and technology intensive industries with an unrivalled cost advantage on their side.

The ever growing role in the national innovation system is played by **foreign companies**. It is therefore desirable to maximise their contribution to development of domestic knowledge base, i.e. technology transfer. EU countries ever more intensely strive to attract technology intensive foreign investment competing with each other and with emerging Asian markets. Even within EU there are tensions related to the ongoing or expected relocation of production chains to cheaper destinations, including segments more intensive in terms of in-house research activities. Even though in the Czech Republic the share of foreign companies in investment into research and development keeps growing, their share in the value added remains below the EU average.

Technology progress, especially in ICT, the relative growth of the service sector and change of business models allow for increased share of services, research and development and financial and human capital in cross-border flows. The increased mobility of knowledge intensive production activities requires a corresponding

form of **business environment** with an emphasis on deregulation and flexibility of product and factor markets. The key role of SMEs with high growth and innovation potential in these segments requires minimisation of regulatory burdens (in the first place negatively affecting these entities), easy access to financing sources and flexible labour supply. Discussed is the orientation and effectiveness of policies specifically focusing on this segment of businesses (small, with high growth and innovation potential).

Competitiveness and its sources are region- and industry-specific. The most dynamic industries in the Czech Republic include **electro-technical industry**, i.e. production of office technology, computers and communication technologies. Nearly all production is exported and at the same time most components are imported. Therefore in the Czech economy this industry creates low value added and contribution to trade balance. Despite the industry classification as high-tech, the stages of production chain located in the Czech Republic still show very low level of investment into research and development and include mostly assembly operations. The principal competitive advantage is based on low labour costs together with geographic position. Growing wages will therefore increase the risk of relocation of the production capacities to countries with more competitive labour costs.

Pillars of Czech economy include industries with medium technology intensity and long tradition in the country, such as **production of transport vehicles and mechanical engineering**. These industries are largely export-oriented and their demand for imported components is lower, which positively affects trade balance. There is also a strong influence of automotive industry onto the rest of economy through supplier-customer relationships (manufacture of rubber and plastic components, glass industry).

Both mechanical engineering and, above all, automotive industry relatively largely invest into research and development and improvement of their workforce skills. The Industries face increasing lack of suitable candidates for jobs on the Czech labour market, which results in recruitment of foreign workers. Despite the strong pressure on wage increase (so far balanced by productivity increase) relocation of production into cheaper destinations is not very likely at the moment. Increasing labour costs and lack of skilled workforce, however, may lead to attenuation of investment and stagnation of production.

The declining industries include mainly **textile and clothing**. Especially the other is strongly affected by competition from cheaper Asian producers. Prospering segments include production of fashionable and stylish collections achieving relatively high profit margins. Even this segment, however, experiences relocation of the labour-intensive parts of production to cheaper countries. In textile industry the most competitive activities include production of technical textiles with its relatively strong cooperation with applied research. In this area the Czech Republic should make use of its competitive advantage based on strong tradition and skilled workforce. Even in low-tech industries there are parts of the value chain that create high value added. Examples include research and development activities in production of nanofibres, or marketing in clothing industry. The role of design keeps increasing in all segments of production of consumption goods.

Development of individual industries is closely connected with **regional competitiveness**. Industrial regions face

loss of competitiveness as a consequence of the strong Czech currency and increasing wage costs. Most large foreign investments in the past went to industries mostly threatened by price competitiveness of countries with low production costs. The regions making currently best use of the prosperous manufacturing (especially Central Bohemia, Pilsen Region and Moravian Silesia) can face structural problems in the future due to the potential loss of competitiveness. In addition there may be an unfavourable impact of global demand on certain industries on which the regions rely (manufacture of metals, manufacture of cars and car parts, electro-technical industry).

What may also be expected is unfavourable impact of the growing lack of skilled workforce and filling of the attractive industrial zones, which is mainly the case of Central Bohemia, South Bohemia and Pilsen region. Lack of workforce may be partially compensated by increased mobility of citizens under the pressure of the reform of the social system and inflow of foreign workers.

**The Capital City of Prague** will on the one hand deal with absence of contributions from the EU Structural Funds and lack of skilled workforce, but on the other continue to make use of its importance as a centre of services, institutions of public administration, research and development and natural significance as a metropolitan area. The strong concentration of services and the significance of the country capital provide Prague with better protection against potential global economic recession.

**Moravia-Silesia**, in the period of transformation one of the regions whose structure was most negatively affected, is now in the stage of favourable economic development. Sustainability of this development depends on the global demand for commodities forming the basis of current regional prosperity, i.e. especially production of steel, cars and car parts.

The continuing growth of foreign demand, interest of foreign investors, the convenient geographic position and extensive supply of workforce may represent an impulse for development of the regions with most negatively affected **structure in the past** in North Bohemia – Liberec and Usti regions. On the other hand, in the case of the Karlovy Vary region the interest of foreign investors is minimal. The basic preconditions of more dynamic development include improvement of transport accessibility.

Modern production capacities become a potential factor of increase of innovation activities in a number of **off-Prague regions**, including those where in the past hardly any research and development activities existed (such as the Vysocina region). On the other hand, long-term unfavourable development is shown by indicators of innovation performance of Karlovy Vary and Usti regions and Moravia-Silesia. Potential boom in these regions is therefore rather based on production with low value added. The threats following from loss of cost competitiveness are therefore the highest in their case. One of the ways out may be more dynamic development of services and technology more intensive production (unlike the to-date focus of investment incentives).

In the case of **periphery regions**, today mostly badly affected by structural problems, it is worth considering reevaluation of their position as fringe regions (especially to Prague) to parts of other areas with their natural centres. An alternative to connection of every region to a motorway may be connection of the regions with important metropo-

lises abroad. Due to accession to the Schengen area increased mobility of inhabitants of the **border regions** may be expected. A good example is Moravia Silesia (very narrowly connected with Polish Silesia and North-West Slovakia) or South Moravia (close to Vienna and Bratislava country capitals). As shown by Korean investment in the northern regions of the Czech Republic, some companies already take these deeper interconnections into consideration. Besides maximum efforts at exploitation of the Structural Funds, regional policies should in future also focus on the disparities between cities and the countryside, which is mainly a problem of Moravian regions.

System changes, the growth of external openness, use of technology transfer and development of educational and research capacities in the CR have favourably affected above all the so-called **absorption capacity** for successful technology catch-up. Thanks to integration into supranational value (mainly production) chains the share of industries with higher (medium-high) technology intensity has significantly increased, while their actual knowledge intensity has still remained low. There is the prevailing reliance on adopted technologies (external technology knowledge) with eventual modifications for local needs.

In just a small number of companies **innovation activities** (whether in-house or external) represent a strategic source of their competitiveness. Another problem is strong specialisation to traditional manufacturing industries with rather limited technology potential and strong sensitivity to decreasing cost competitiveness. Underdeveloped remains the segment of industries with **high knowledge intensity** (based on top technology and development of own innovation capacities) and thus high value added both in manufacturing and in services (the so called science-based industries, or industries of specialised suppliers).

The reason for this underdevelopment lies above all in low knowledge intensity and development dynamics of the national innovation system and therefore its **low productivity** – with the result of missing top quality human and technology resources (outdated infrastructure), or low efficiency of their exploitation. The cause is a poorly adjusted system of **public support** (both innovation performance in narrow sense and innovation-friendly institutional environment) in combination with the so far low level of innovation demand of the business sector and weak linkages between the key agents of the innovation system.

The formation and development of top innovation capacities and innovation environment **is not effectively supported** – neither systemically nor specifically. Despite the growing expenditure on education and research (as necessary but not sufficient preconditions for increasing innovation performance) the technology level of production and innovation performance increase rather slowly – the expended support resources (including generous investment incentives) therefore show weak pro-innovation impact.

Traditional manufacturing industries with **medium technology intensity** are not sufficient for a more remarkable improvement of competitiveness of the new EU members. Long-term competitive advantage requires development of activities with higher value added, i.e. an effective innovation system with a dynamic core of top technologies wrapped in a cluster of knowledge-intensive, closely linked industries (innovation clusters). Modern **innovation policy** plays a significant role in development of such a system, combining horizontal support (of closely related

research, education and innovation activities and pro-innovation environment) with measures focusing on excellence with strong spillovers. However, the so far formulated concept and especially the practice of innovation support are very remote from a policy of such a type.

What survives in the Czech Republic in particular is the traditional concept of the key role of the **basic (academic) research** in the national innovation system with broad support mostly without a reference to (objectively measurable) performance. While in the developed countries second generation innovation policy has developed since 1990s with a focus on systematic approach supporting the key agents and activities of the innovation system, in the Czech environment such integration has not even started yet, and there is not yet even any qualified discussion about a shift from the outdated policy of research support to the innovation policy.

The growing attention paid to the relevance of innovation for economic and social growth necessarily invoke efforts at identification of the decisive **pro-innovation factors**. Following this historic experience there is a discussion about use of targeted support for innovation performance. The innovation process changes especially thanks to the importance of non-technical innovation in the service sector. There is a clear growing inclination towards **vertical**, i.e. industry- or region-specific support (e.g. in technology platform initiatives), in addition to the traditionally preferred horizontal support. Transfer of innovation knowledge is easier, transforming the traditional approaches to protection and thus measurability of results of innovation activities.

The individual agents of innovation systems and their groups are more and more closely **linked** and their interactions represent the key precondition of innovation success. The problem faced by most EU members is particularly the weak linkage between the individual institutional sectors of the innovation system – in the first place between the academic and the business sectors. Czech companies contribute very little to financing of university research. Rather weak is also the involvement of innovation activities in long-term strategies of regional development.

In addition to targeted pro-innovation measures ever greater attention is paid to the relevance of the **broader environment** for innovation performance – quality of regulation, tax policy, business conditions, or job market flexibility. The pro-innovation environment requires flexibility of markets and minimisation of burden to its players, unbiased relationship between the incurred costs and the resulting benefits, stability and predictability of conditions for decision-making in the long run, corresponding remuneration for success and willingness to undertake a risk. European countries are characterised by generally stronger aversion to risk and uncertainty which, however, represents a necessary accompanying feature of innovation activities.

The Czech Republic lags behind more developed economies mainly in the **innovation outputs**. Recently the input indicators (financial and human resources) have significantly improved, converging to the average levels in EU-27, or even EU-15 in some cases. Therefore, besides further increase of the inputs, the economic policy should focus more on qualitative indicators, structure and effects of the expended resources. Efforts to make up for the underdeveloped **infrastructural conditions** of research

activities in public institutions is certainly desirable (subsidies from the EU structural funds have the same focus), but their future exploitation primarily depends on sufficient numbers of top researchers and prospective projects bringing about innovation outputs and being at least partly financially self-sufficient.

The size of **human capital** in research and development has increased considerably in the Czech Republic recently and not only due to the revised methodology of their statistical evidence. However, its structure in government and higher education sectors appears problematic, especially in terms of its age. Statistics show that especially middle-aged researchers are missing, whose productivity is the highest. This shows that it is not that much difficult to attract young specialists to Czech science, but to keep them in when they become older (mostly after they finish their Ph.D. studies). The reasons may be financial, in combination with the prospects of further career growth or opportunities for independent professional work with adequate resources and equipment.

Long discussed but yet unsolved is the issue of position of **universities** in the national innovation system in the Czech Republic. Their role as innovation agents has still been quite weak, which is caused, among other things, by the survived dual system of academic research (undertaken in public institutes) and university education. Their reintegration (together with a fierce openness towards other innovating agents) is therefore a necessary precondition for increased productivity of the national innovation system.

Without any significant systematic change in this respect a more remarkable increase of innovation outputs cannot be expected. Even though the numbers of professional publications and patent applications have been increasing, the overall falling behind (in international comparison) is still quite remarkable. Publication activities show considerable difference between the individual science fields, especially in the citation impact. While the position of the technical fields is at least average, social sciences are nearly invisible in international scale.

Informatics in Czech practice has been undergoing very **dynamic development** both on technological and on application and managerial levels. One of the key requirements is reevaluation and change of priorities in investment into IT development. While in the past there was the long-term preference for building ever stronger technological infrastructure and assurance of its security, today the main emphasis is laid on increased quality of

information services on the basis of ICT applications. This will also reflect in increasing demand for the standards of management of IT services, measurement of their volume and quality, and for higher level of management regarding the relationships between customers and providers of these services.

A special and ever more important application area of ICT is represented by **small and medium-sized enterprises**. Not only the Czech Republic but also the whole EU understand this segment as a substantial factor of economic growth. However, informatics of these businesses is today still confined to the basic functionalities and support to common economic tasks. On the other hand, particularly in this segment, there is a strong potential for exploitation of services and applications that might lead to increased business performance and strengthening of competitiveness of SMEs. Such applications include electronic and mobile services, application of RFID technologies, complex of applications and technologies for increasing quality of management – business intelligence, instruments for document management, work flow management etc. There are still significant differences between the individual businesses of this size.

Another strong challenge for Czech informatics is represented by **electronisation of public administration** (e-government). As shown by EU statistics, the Czech Republic is one of the least developed countries in this aspect. It is not influenced by the quality of technological infrastructure itself but by its application in practice, by reevaluation and change of administrative management procedures in relation to deployment of advanced ICT, by limited possibilities of database sharing in more offices etc. The nearest task therefore lies in valorization of investment incurred into computer and other technologies and their more rational exploitation in favour of businesses and citizens of the Czech Republic.

One of the basic issues faced by the Czech Republic is lack of **qualified ICT staff**, both on the part of suppliers and on the part of customers. Czech universities do not produce a sufficient number of graduates in ICT and the imaginary scissors between the supply and the demand keep opening apart. Very difficult for example is provision of the required workforce for global service centres, such as those established in Prague and in Brno by IBM and DHL companies etc. Provision of skills for ICT may also be considered one of the most substantial challenges not only for informatics as such but for Czech universities in general.

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## **Quality of human resources**



## 1. Lifelong learning

Learning in adulthood is becoming an essential part of the life of every individual. Employability for one's entire productive life increasingly requires supplementing and deepening one's qualifications or gaining new qualifications. The significance of continuing education is growing along (a) with the increased speed of technological progress, since knowledge acquired during one's initial education may become outdated and (b) with the continued rise in retirement age. The longer the period between completing one's initial education and retirement, the more frequently the individual will have to renew his or her qualifications.

### 1.1 Adult participation in education

Since the 1960s, national and international institutions have been paying close attention to the issue of continuing education as part of the concept of lifelong learning. The contemporary conception of lifelong learning in addition to formal education emphasises the role of non-formal and informal learning in various environments. Responsibility for lifelong learning is distributed among all main actors: state, regions, municipalities, employers, individuals. One keystone for lifelong learning should be the completion of upper secondary education, i.e. remaining in initial education at least until age 17–18.<sup>1</sup>

The analysis of participation in continuing education is based on data from the Labour Force Survey conducted in the second quarter of each year. The values of indicators are counted only from valid responses; respondents who did not answer a question are not included. The analysis focuses on overall participation in education by the population aged 25–64 and on differences in the level of education as related to position on the labour market, gender and the intensity of an occupation's qualification requirements. Also studied is participation in non-formal learning – both overall adult participation as well as the participation of population groups with various levels of formal education.

#### Adult participation in education

Adult participation in education is analysed on the basis of participation in formal and non-formal education by people aged 25–64 over the four weeks prior to the survey. The definitions of formal and non-formal education used during the survey are given in the box 1.

In 2006, almost 10% of the adult population in the EU-27 countries participated in education, with a relatively prominent difference between old and new member states. In the new member states, the figure was only about 4% of the population aged 25–64, while in the old member states it was 11% – an almost threefold difference.

In the Czech Republic, 6% of the population participated in education, i.e. significantly less than the EU-15 average. Participation in education was weaker than the EU-27 average but stronger than in the new member states. Figure 1 shows the average level of participation in education in 2006; the values for the entire 2003–2006 period are given in table 1A in Annex.

#### Box 1: Definition of formal and non-formal education

**Formal education** is defined as education and training with the following characteristics:

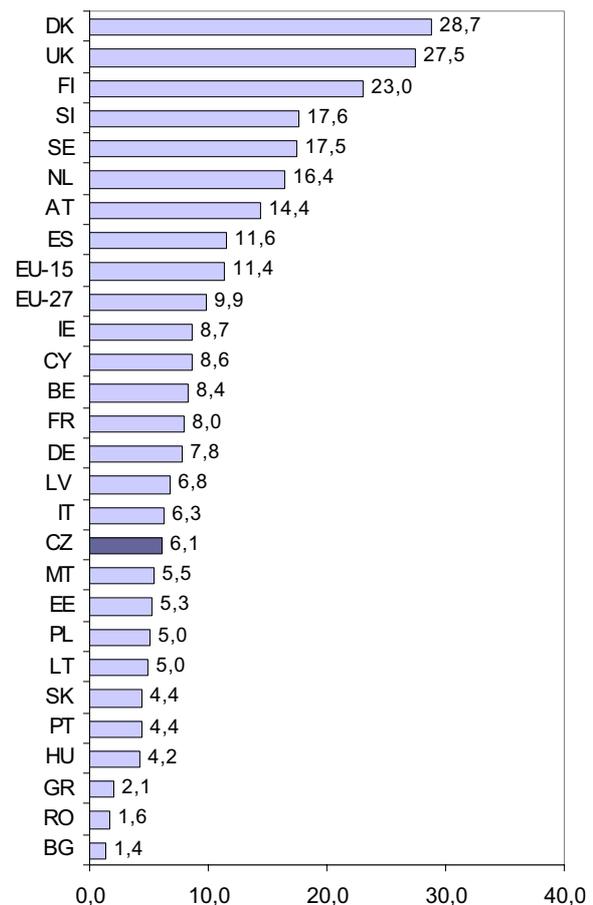
- purpose and format are predetermined,
- provided in the system of schools, colleges, universities and other educational institutions,
- it normally constitutes a continuous ladder of education,
- it is structured in terms of learning objectives, learning time and learning support,
- it is normally intended to lead to a certification recognized by national authorities qualifying for a specific education or programme.

**Non-formal education** is defined as being organized like a course, a conference or seminar for which the interviewee has applied and has participated in. It could be for a short or longer period also with minor breaks.

Source: EUROSTAT (2006a, pp. 52–53).

There are clear differences between the individual member states. On one end of the spectrum there are the Nordic member states, where around one fourth of the population participates in education, while on the other end there are the newest EU members: Bulgaria with 1.4% Romania with 1.6% rate of participation.

Figure 1: Adult participation in education (% , 2006)



Note: no data available for Luxembourg. Source: EUROSTAT (2006b), own calculations.

To a certain extent, differences in the level of participation in education are influenced by the methodology used for indicators calculation. The population includes all people

<sup>1</sup> OECD: Lifelong learning for all. EC: White Paper on education and training.

of the given age, i.e. even those who are still completing their initial education – considering the age group, this would be namely tertiary education. This means that countries with a large level of participation in tertiary education by people aged 25 and over are statistically advantageous. An illustrative example is Denmark, which recorded the highest level of participation in education as well as the highest median age of people in tertiary education. In Denmark the age which divides the population studying tertiary education into two equal halves is 25.3, while the EU-27 average is 22.1.<sup>2</sup>

The data for 2006 indicate that the great majority of countries was not able to implement the suitable measures that would have allowed them to meet the goals laid out by the Lisbon strategy. This goal was at least 12.5% rate of participation in education among the population aged 25–64 by the year 2010. Even if there are still four years to go, it is unlikely that countries with participation levels of 6% will be able to achieve this goal. In 2006, a total of 10 countries had participation levels lower than 6%. This group mostly includes new member states (except Slovenia, Latvia and Cyprus) plus Portugal and Greece.

For these countries, achieving the Lisbon objectives would mean more than doubling participation in education. The example of Spain does indicate that this is possible, however. In Spain, participation in education in 2003 was slightly less than 6%, but in 2006 it was almost 12% (see table 1). This is more likely to be an exceptional case, however, and only the data for 2007 will show whether the country can sustain this very positive level of participation.

**Table 1: Changes in adult participation in education (% , percentage points)**

	2003	2006	2006–2003
EU-27	8.6	9.9	1.3
EU-15	9.8	11.4	1.6
ČR	5.4	6.1	0.7
Denmark	18.9	28.7	9.8
United Kingdom	21.2	27.5	6.3
Spain	5.8	11.6	5.8
Hungary	6.0	4.2	-1.8
Greece	3.9	2.1	-1.9
Sweden	34.2	17.5	-16.7

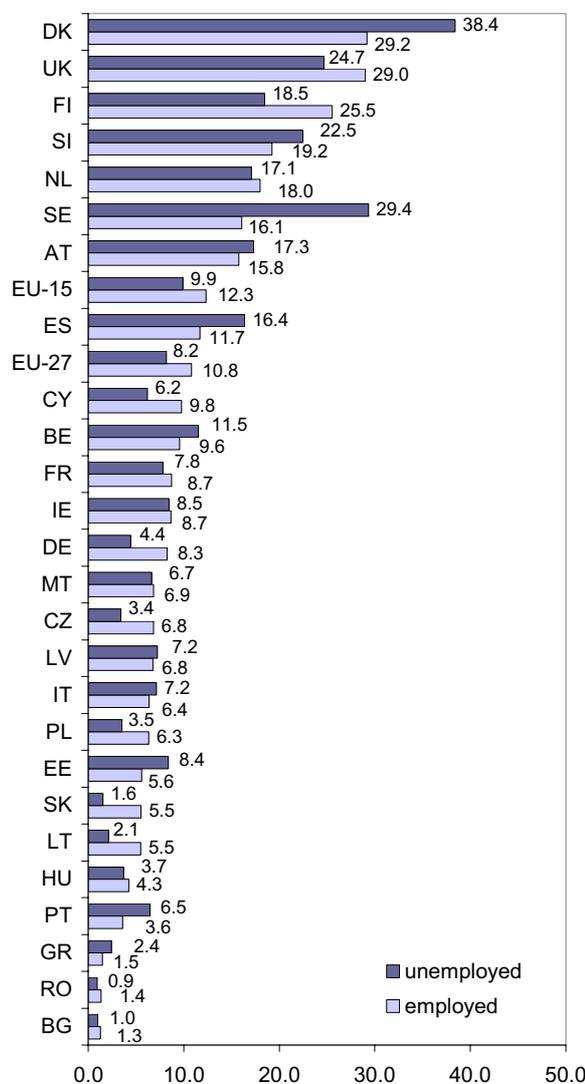
Source: EUROSTAT (2003, 2006b), own calculations.

In comparison to 2003, in 2006 the average participation in education increased by 1.3 percentage points for the EU-27 countries and by 1.6 percentage points for the EU-15 countries. The growth in participation is slower in the new member states, although it is very low in these countries. Across the EU-27, most countries' participation in education increased; only in nine countries there was a decrease (the 2006 data for Luxembourg are not available). The most dramatic decline occurred in Sweden, where the level of participation dropped from 34% to 18%. In the other countries, the decline was no more than 2 percentage points. A decline was recorded not only in countries with a high level of participation, but also in countries with a low level of participation. One example is Greece, where participation dropped from 4% in 2003 to

2% in 2006. In the Czech Republic, participation increased from 5.1% to 5.6%.

Participation in education differs significantly by individuals' **position on the labour market**, i.e. whether the person is employed or unemployed. On average across the EU-27, participation in education was greater among the employed than the unemployed people. In 2006, 11% of employed persons but only 8% of the unemployed participated in education. As can be seen from figure 2, however, in a relatively large number of countries (10), unemployed people participate in education at higher rates than the employed. These include countries with different levels of economic development (Denmark, Latvia) which apparently have in common the fact that much attention is paid on the education or re-training of the unemployed, on appropriate guidance and counselling systems and on effective tools for encouraging the unemployed to participate in education.

**Figure 2: Participation of employed and unemployed individuals in education (% , 2006)**



Note: no data available for Luxembourg. Source: EUROSTAT (2006b), own calculations.

The level of participation of employed persons is highest in Denmark (29%), that of the unemployed in Sweden (29%). The Czech Republic is located in the second half

<sup>2</sup> Source: EUROSTAT, table Median age, Tertiary education.

of the scale with 6% of the employed and a mere 3% of the unemployed participating in education. The LFS figure for education of the unemployed is significantly lower (about one half) of the data from the Ministry of Labour regarding the number of unemployed and the number of people undergoing re-training. This difference is the result of the different manner of data collection (the LFS data relate only to the four-week period prior to the survey).

The greatest difference in the level of participation in favour of the unemployed was reported by Sweden and Denmark, while the greatest difference in favour of the employed was found in Finland and the United Kingdom.

The level of participation of employed and unemployed individuals differs by gender. Table 2A in Annex clearly shows that, among both the employed and unemployed, women participate in education to a greater extent than men. In 2006 the EU-27 average was 13% of employed women but only 9% of employed men. For the unemployed, the figures were 10% of women and 7% of men. Not a single EU country deviated from this trend, i.e. in no country did the number of men (employed or unemployed) exceed the number of women participating in education. Countries with the greatest difference in favour of employed women were Lithuania and Malta (more than double the level of participation), while Belgium and Bulgaria had almost equal shares. For the unemployed, the greatest difference was recorded by Estonia, where five times as many women as men participated in education; the smallest difference was in Malta, where the difference was insignificant. In the Czech Republic, participation was 8% of employed women and 6% of employed men, and 5% of unemployed women versus only 2% of unemployed men.

Participation in education differs significantly by an individual's **profession/occupation**. Occupations are categorised using the ISCO-88 (International Standard Classification of Occupations). Occupation is understood as a specific activity or set of tasks and obligations performed by a worker. The Czech Republic uses the KZAM classification system, which is based on ISCO-88. All occupations are grouped into 10 main classes (0–9), with classes 1–3 considered to be demanding occupations and classes 4–9 less demanding. An overview of ISCO categories is given in box 2.

**Box 2: ISCO major groups**

ISCO 1	legislators, senior officials and managers
ISCO 2	professionals
ISCO 3	technicians and associate professionals
ISCO 4	clerks
ISCO 5	service workers and shop and market sales workers
ISCO 6	skilled agricultural and forest workers
ISCO 7	craft and related trades workers
ISCO 8	plant and machine operators and assemblers
ISCO 9	elementary occupations

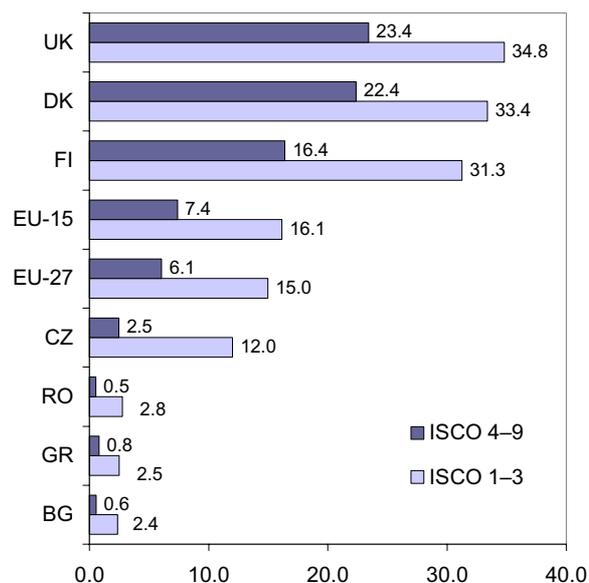
Participation in education as it relates to the person's occupation was analysed for two groups – demanding (ISCO 1–3) and less demanding occupations (ISCO 4–9). Figure 3 shows the average levels of participation in education for persons working in demanding and in less demanding occupations in the EU, the Czech Republic and the three countries with the highest and lowest values for 2006. The order of countries differs slightly from that found in figure 1, since participation in education by pro-

feSSION is calculated only for employed persons, i.e. unemployed and inactive persons are not included. The values for the individual countries and for the period 2003–2006 are contained in table 3A in Annex.

In all EU-27 countries, persons in demanding occupations participate more in education than people with less demanding occupations (see table 3A in Annex). The EU-27 average for 2006 was 15% persons in demanding positions but only 6% of persons in less demanding positions. The difference was even more dramatic in the Czech Republic, almost fourfold (12% vs. 3%).

The United Kingdom had the greatest share of people in demanding positions participating in education (35%); the smallest figure was for Bulgaria (2%). Figure 3 shows that the difference in participation between demanding and less demanding professions depends on the overall level of participation in education: the higher is overall level, the lesser are the differences. In the United Kingdom, participation in education by persons in less demanding positions was 67% of the participation by people in more demanding positions; in Bulgaria this figure was a mere 25%.

**Figure 3: Adult participation in education, by occupation (% , 2006)**



Note: only the employed are included in the calculation. Source: EUROSTAT (2006b), own calculations.

The differences within the group of demanding positions (ISCO 1, 2, 3) across the EU are shown in table 4A in Annex. On average across the EU-27, the most frequent participation in education in 2006 was among professionals (ISCO 2 – 21%), followed by technicians and associate professionals (ISCO 3 – 15%) and legislators, senior officials and managers (ISCO 1 – 12%). This order was the same in almost all countries, with the exception of five countries. In the Czech Republic, Cyprus and Slovakia, ISCO 1 was ahead of ISCO 3 (although by an insignificant one to three tenths of a percentage point). In Bulgaria participation decreases as we move towards demanding professions, and in Romania the order was ISCO 3, followed by ISCO 1 and ISCO 2. All these exceptions involve new member states.

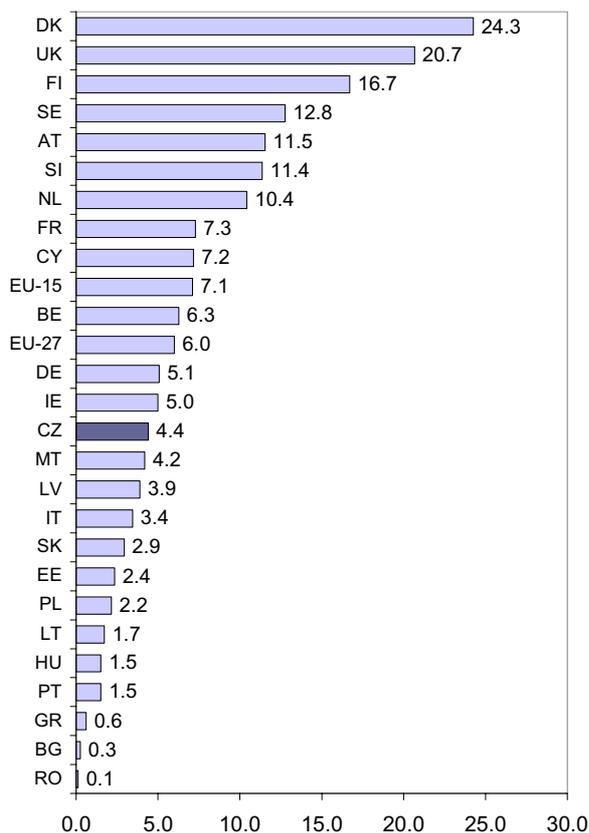
**Participation in non-formal education**

Participation in non-formal education is studied for the 25–64 age group, excluding students. The available data do not allow us to follow participation in non-formal education by students. A definition of non-formal education may be found in box 1. Participation in non-formal education is analysed from the point of view of overall participation and in relation to achieved level of initial education.

In 2006, the EU-27 average for adult participation in non-formal education was 6%. The greatest share was in Denmark (24%), the smallest was in Romania (0.1%). With a share of about 4%, the Czech Republic is relatively far below the EU-27 average (see figure 4).

The data for 2003–2006 contained in table 5A in Annex show that in this period there was no clear trend on the EU-27 level and that years with an increase in the level of participation in non-formal education alternated with years of a decline. Only two EU-27 countries recorded an increase in participation in non-formal education for every year – Denmark and Slovenia. Slovakia, on the other hand, experienced a year-on-year decline.

**Figure 4: Adult participation in non-formal education (% , 2006)**



Note: no data available for Luxembourg and Spain, students of formal education not included. Source: EUROSTAT (2006b), own calculations.

If we compare the values available for the individual countries for the initial and final years, then we can state that in most countries the share of persons participating in non-formal education declined (15 countries). The greatest decline was in Sweden (15 percentage points), the greatest growth in the United Kingdom (14 percentage points).

On average across the EU-27, the increase between 2003 and 2006 was by a mere 0.6 percentage points.

Participation in non-formal education is highly dependent on achieved level of education. **Level of education** is divided into three categories. A low level of education is associated with no more than completed lower secondary education (ISCED 0–2), a middle level of education with upper secondary education (ISCED 3, 4) and a high level of education with tertiary education (ISCED 5, 6). The situation for 2006 is similar to that in 2003.

Participation in non-formal education increases with level of formal education. In 2006, on average across the EU-27 countries, 13% of the population aged 25–64 which had completed tertiary education participated in non-formal education in the four weeks prior to the survey, 5% of people with upper secondary education and 2% of people with no more than primary or lower secondary education. On average, the level of participation of the group with the lowest level of education is around one half of the group with the highest level of education.

In countries with a relatively high level of participation in non-formal education, the differences between the different levels of education are not as large as in countries where the level of participation in non-formal education is generally low. For example, in Denmark the level of participation of the lowest educated group was about 70% of the participation of the highest educated group; in Poland, this figure was only around 14%.

**Table 2: Participation in non-formal education by level of education (2006, %)**

	ISCED		
	0–2	3,4	5,6
EU-27	2.27	5.18	12.89
EU-15	2.57	6.83	14.16
CZ	0.58	3.29	13.83
Finland	8.61	13.78	25.53
United Kingdom	12.34	18.18	30.52
Denmark	14.93	21.72	32.58
Romania	0.00	0.08	0.55
Lithuania	0.03	0.91	4.39
Estonia	0.03	2.17	3.60

Note: no data available for Luxembourg and Spain, students of formal education not included. Source: EUROSTAT (2006b), own calculations.

Level of education significantly influences participation in continuing education. It is clear that if an individual did not build a positive attitude to education during his initial education, then in later age he will continue with education only with great difficulty. Besides the individual's relationship to education or the willingness to participate in continuing education, another important factor is the ability to participate in continuing education. This disadvantage, however, may be removed by offering appropriate educational opportunities or individualising these opportunities.

**1.2 Barriers to participation in continuing education**

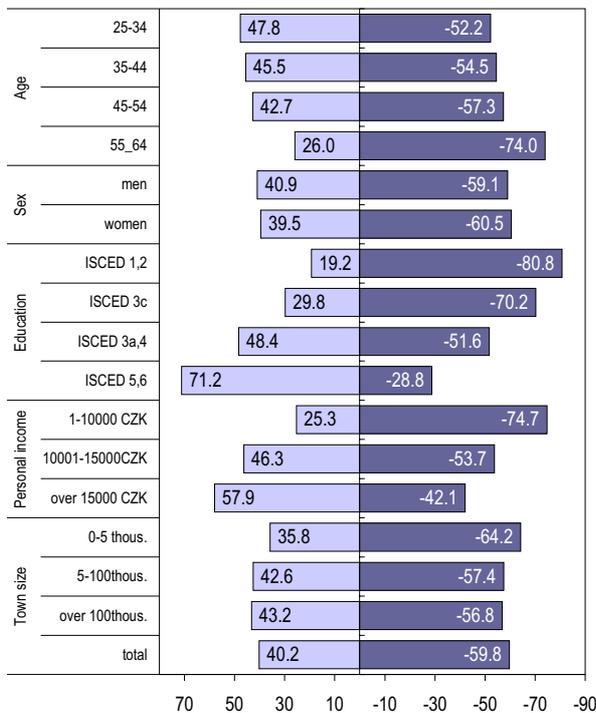
The various social groups of the adult population participate in continuing education at different levels. We see here certain inequalities in educational opportunities. This sub-chapter aims at the barriers which hinder individual

social groups' access to continuing education. Barriers to participation in continuing education are described on the basis of the results of individual surveys performed by the National Training Fund's National Observatory of Employment and Training in cooperation with the Public Opinion Research Centre (CVVM, SoÚ AVČR, 2005/2006)<sup>3</sup>. The surveyed target group was the Czech population aged 25 to 64; a total 2,987 persons were interviewed. The data were collected via standardised personal interview.

**Participation in continuing education**

The survey outcomes show that over the preceding 12 months, 40% of respondents participated in education and 60% of respondents did not participate in any form of education, nor did they in any way self educate. Figures 5 and 6 show the basic characteristics of the population which participates in some form of education (left) and of those people who do not participate in any form of education (right).

**Figure 5: Total participation and lack of participation in education I. (%)**



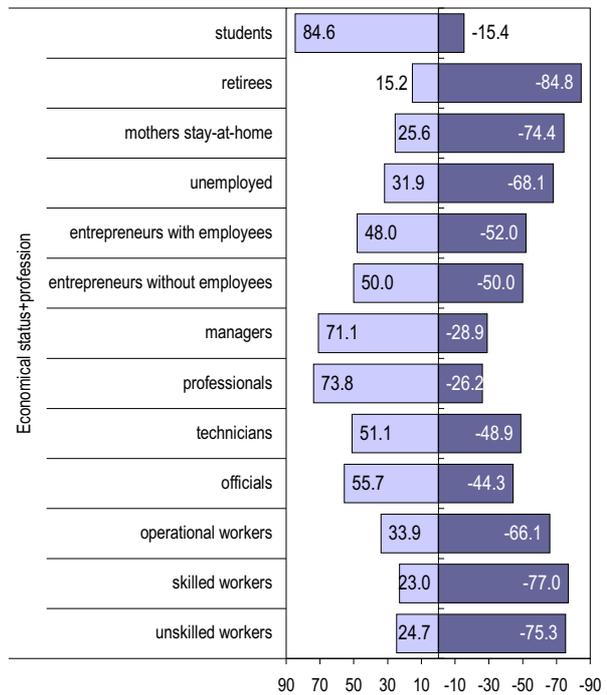
Source: NOZV, CVVM (2006).

According to the survey results, women and men participate in education at comparable levels, i.e. around 40%. With increased age, there is a slight decline in the willingness to educate oneself further (48% in the 25–34 age group, 43% among people aged 45–54), with a sharp decline in the pre-retirement age (26% of people aged 55–64). The share of people participating in education rises rapidly along with the individual's level of formal education (30% of people with upper secondary education; 71% of people with "maturita"). Participation in edu-

<sup>3</sup> The survey was performed as part of the project "Unequal Access to Education: The Extent, Sources, Social and Economic Consequences, Policy strategies".

cation also is higher with higher personal income (25% to CZK 10,000, 58% above CZK 15,000).

**Figure 6: Total participation and lack of participation in education II. (%)**



Source: NOZV, CVVM (2006).

As concerning the town size, people from towns with less than 5,000 inhabitants participate less in education. In term of regions of the Czech Republic, the lowest willingness to participate in continuing education was found in the Vysočina, Pardubice and Ústí nad Labem regions, with the other regions roughly on an equal level.

People who are economically active participate in education more frequently than those who are economically inactive (except for students in formal education). These include primarily people in higher positions (71.1% of managers, 73.8% of top professionals). Entrepreneurs participate less in continuing education (around 50%) and blue-collar workers do so least of all (23% of skilled workers, 24.7% of unskilled workers). Low participation is also found among the unemployed and economically inactive, including stay-at-home mothers (25.6%) and retirees (15.2%).

**Social groups with low participation in continuing education**

In terms of employability and the ability to succeed in the labour market, people who seek no education at all are in particular at risk. These are especially three fourths of people older than 55, i.e. those in **pre-retirement age**. With retirement age on the rise, it is very important that these people be included into non-formal continuing education, since their working career is by far not over and their ability to compete on the labour market depends on gaining new skills. One particular barrier for these people may be insufficient skills in working with information and communication technology. We also see a lack of motivation – both among this group and among employers un-

willing to finance such employees' education in view of the approaching end of their economically active years.

Another important factor in participation in education is **level of formal education**. The survey showed that people without school-leaving examination ("maturita") participate in continuing education only to a limited degree; there was not much difference between those who had only primary or lower secondary education (ISCED 0–2) and those with upper secondary education without "maturita" (ISCED 3C): 80% of people with primary or lower secondary education and 70% of people with upper secondary education without "maturita" did not participate in continuing education. We see here a significant barrier in the form of insufficient knowledge and skills vital for continuing education, as well as a habitual resistance to school education. It is not until secondary school with a school-leaving examination ("maturita") that we see a breakthrough which apparently instils the motivation and skills necessary for continuing education. In the case of tertiary education it is clear that these people are aware of the need for lifelong learning and also have easier access to education.

Another significant barrier is **personal income**. Three fourths of people with a net income of CZK 10,000 or less do not participate in any education. We may assume that this level of income is connected to a low level of formal education and with work which requires little or no qualifications. In the survey, two thirds of service workers and shop and market sales workers, and three fourths of skilled and unskilled workers did not participate in education. For this group of people, the lack of motivation and the skills necessary for continuing education – barriers associated primarily with a low level of formal education – are accompanied by financial barriers. This is because people must pay for many non-formal educational courses themselves, and even certain informal ways of learning (internet access, libraries, purchase of literature) involve financial costs.

Another group with a low level of participation in continuing education is the **unemployed**. Two thirds of unemployed people do not participate in any education and thus represent a potential but currently unused labour force. This has shown itself to be a great problem, since these people gradually lose the work and personal skills which they had, and may thus fall into the trap of long-term unemployment. Compared to other countries, in the Czech Republic only a small share of unemployed people are included in re-training programmes and a large share of the unemployed are long-term unemployed. For many of the unemployed, the previously described barriers associated with low literacy level, lack of motivation and finances combine to increase this group's risk for social exclusion. In these cases, publicly funded education can help these people to at least remain active and give them basic skills for functioning in society, without consider their immediate reintegration into employment necessarily as the main criteria for effective re-training results..

Another significant group which does not participate in education is three fourths of stay-at-home mothers and women on maternity or parental leave. Although gender per se does not represent a barrier to continuing education (according to the survey, 40% of men as well as around 40% of women participate in education), this group of women requires special attention. This is because they represent a potential labour force which must

maintain and develop its skills during its time of inactivity. It is a very diverse group in terms of educational level, but its main barrier to education is family responsibilities, frequently combined with financial barriers associated with the woman's dependent role in a household with limited income.

Another barrier in access to education, although not as significant as the previously mentioned barriers, is place of residency. Almost two thirds of residents of towns with fewer than 5,000 inhabitants do not participate in education. This, too, is a very diverse group of people.

We may assume that such towns have a smaller share of people with tertiary education than towns with more than 100,000 people, although the main barrier may be poor transport connections and thus higher financial and other costs associated with participation in non-formal education courses. We may also assume that there is poorer access to tools for information learning such as internet, libraries etc.

We may summarise the above information by saying that the typical person who does not participate in education and has encountered barriers to access to continuing education has only primary or lower secondary education, is aged 55–64, has an income of less than CZK 10,000, is economically inactive and lives in a town with fewer than 5,000 inhabitants.

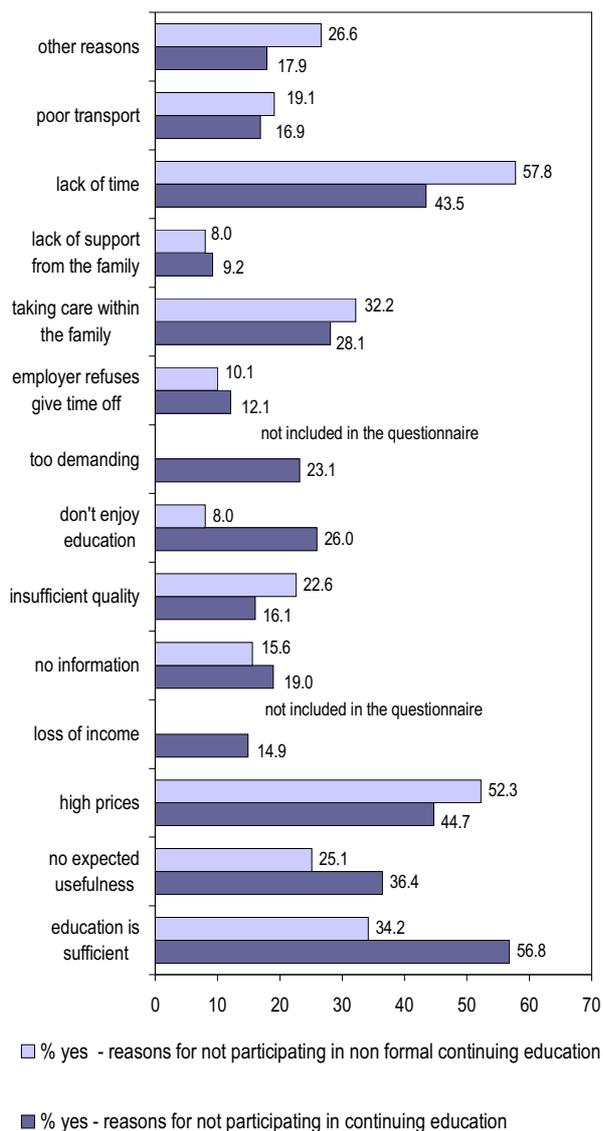
#### Reasons for not participating in continuing education

If we are to find ways to change this situation, it is important to analyse the causes which prevent individuals or socially excluded groups from participating in continuing education. When asking respondents why they did not participate in any form of continuing education, the survey offered a scale of 13 reasons. These reasons can be ordered according to the type of evaluation.

The first group of reasons involve self-evaluation and include answers such as: "I consider my education to be sufficient" and "I am concerned that education won't bring the expected usefulness". The second group of reasons is related to the first; they are also based on self-evaluation, but offer a different angle. These answers reveal the individual's attitude towards the educational process itself and include answers such as: "I don't enjoy education" or "I find education (especially formal education) too demanding". The third group includes reasons of a financial character – either "high price of courses" or possible "concerns of loss of income or lowered income while studying/attending courses". The fourth group of reasons is related to the availability of continuing education. Respondents either stated that there is an "insufficient or poor-quality offer of courses" or that they "don't have enough information about available education and would need some advice". Other reasons are related to family circumstances limiting the ability to participate in continuing education, for instance "taking care of the family" or "lack of support from within the family". Other reasons included: "lack of time", "poor transport" and an unaccommodating attitude on the part of employers ("employer refuses to give me time off").

Figure 7 shows the reasons why individuals do not participate in any continuing education, i.e. do not take advantage of any form of education, in comparison with the reasons why people do not participate in non-formal education.

**Figure 7: Reasons for not participating in any education and in non-formal education (%)**



Source: NOZV, CVVM (2006).

Adults may combine various forms of education according to their specific situation. In reality, they may focus only on certain forms of education while ignoring others, for which they may have specific reasons. The survey thus included, in addition to a question about reasons for not participating, a question aimed at people who participate partially in continuing education (for instance through informal self-learning) but do not participate in non-formal education courses. We may encounter such a situation if the person is attending some educational programme at school, i.e. is participating in formal education, or if he is involved in some form of self-learning but does not combine such self-learning with course attendance.

The majority of reasons given in the first third of the range appeared with equal frequency, i.e. they are of similar importance. The group of most important causes includes lack of time, high price of courses, satisfaction with current level of education, caring for the family and scepticism towards benefits of continuing education.

What differs, however, is their ordering. Unlike people who reject all continuing education, persons who do not make use of non-formal education courses list lack of time in first place. At the same time, fewer of them believe that their current level of education is sufficient. Even the ordering of other, less important, reasons differs between the two groups. Persons who are already participating in some form of continuing education are significantly less likely to state that they do not enjoy education (8% versus 26%) or that it is of no use (25% versus 36%). They are more likely to state, however, that they are concerned about insufficient availability of courses.

These differences clearly show that persons who are already participating in some form of education are more willing to participate in continuing educational courses, and that they are better able to find the necessary information about the availability of courses. On the other hand, in addition to their time abilities, they evaluate the offer and focus of courses far more cautiously (23% versus 16%).

In view of the relatively small sample (214 persons) of responses regarding the reasons for not participating in non-formal education, a more detailed division is not possible. In terms of the survey's ability to offer useful information from a sufficiently large sample, a more detailed analysis was performed only of the reasons given by people who did not participate in any form of education (1,787 persons).

Figures 1A and 2A in Annex show the spectrum of reasons for not participating in relation to respondents' professional status. The figures also show the intensity of individual reasons for not participating, of which the most significant are: a sense that one's education is sufficient, high financial costs and lack of time.

Reasons why people do not participate in any education are most frequently associated with their **attitudes** and a related factor, motivation. More than one half of adults (57%) interviewed were convinced that their qualifications were sufficient.<sup>4</sup> In view of the fact that the average level of education in the Czech Republic is significantly behind that of other European countries (both old members and the majority of new member states), this represents a significant overestimation of one's own knowledge and skills. At the same time, Czech adults' level of participation in continuing education is lower than that found in other EU countries (the level of participation in the Czech Republic is roughly one-third lower).

This overestimation may result from the fact that most individuals lack a more objective gauge for comparison, which may be associated with an insufficiently systematic approach by companies towards employee development. Employees are not pressured to develop along with the company's future development plans. Qualification needs are not determined and decision-making regarding personnel changes is performed short-sightedly and under pressure of the situation at hand. Satisfaction with the level of one's education also reflects the fact that most people still believe the old opinion that one gains education at school prior to entering the labour market and that

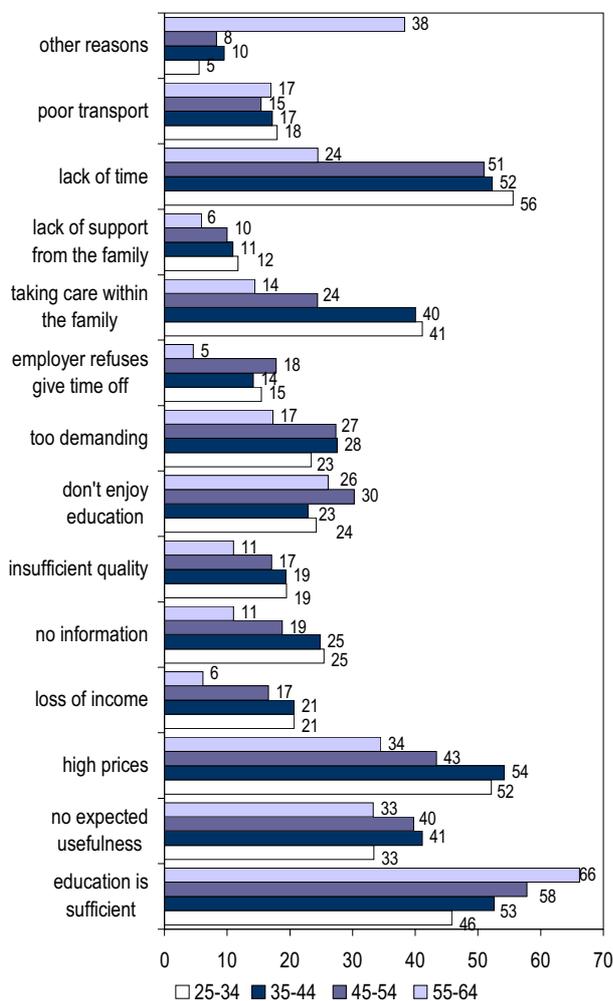
<sup>4</sup> Similar findings were made by a survey performed by ÚIV in 2003. Kuchař, P: Needs and interests of participants in continuing education – an analysis of public opinion. Prague, ÚIV, 2003.

this education determines one's future employment and is sufficient for the rest of one's career.

As shown by figure 8, satisfaction with one's level of education increases with age, although it is objectively clear that older workers have a lower level of education than younger workers. In addition, education received some 30–40 years ago is often outdated, without the necessary foundation for the use of modern technologies, language skills, etc.

People's evaluation of the sufficiency of their education clearly correlates to the number of years they have worked, i.e., to the amount of practical experience. Practical experience does form an important part of increased qualifications but with today's rapid technological changes and the occasional need to change professional focus, practice can no longer replace additional education.

Figure 8: Reasons for not participating in education, by age of respondent (%)



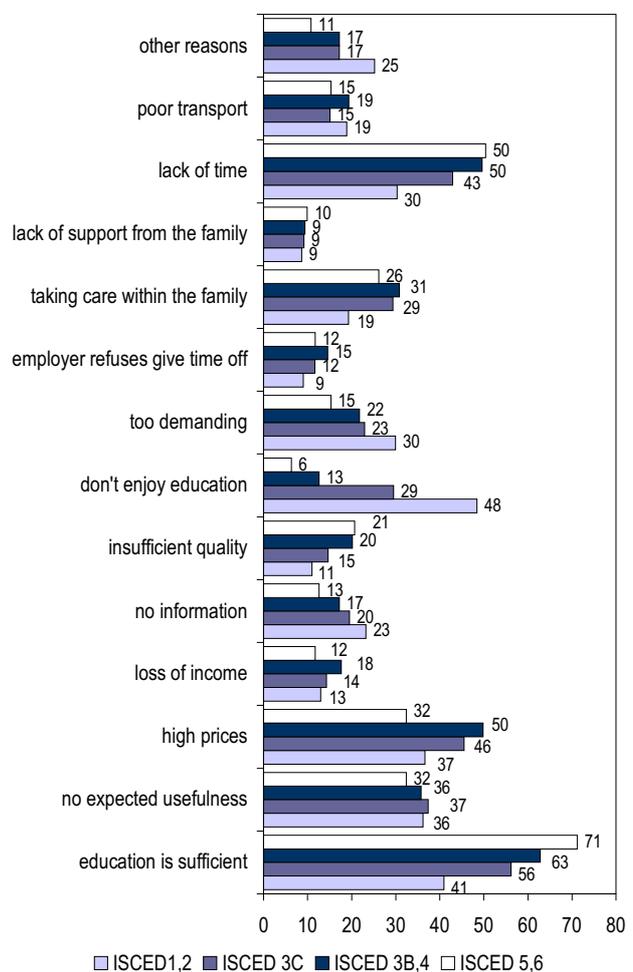
Source: NOZV, CVVM (2006).

A large number of respondents (33% – 40%) are also convinced that continuing education will not be of any positive use. This fraction is smaller than those who consider their education to be sufficient. This means that, despite the expression of satisfaction with one's current level of education, a certain part of respondents does admit that continuing education is a useful thing. Never-

theless, respondents' evaluation tends to be sceptical. This scepticism may result from an insufficient range or quality of educational opportunities. In evaluating responses related to the educational offer, it is clear that this reason is not one of the main barriers to participation in education. Scepticism is thus more associated with an unsystematic approach to the development of human resources on the part of employers, where increased qualifications are not tied to career growth and are not sufficiently reflected in remuneration.

Another important factor which influences people's decision to participate in continuing education is the **financial factor**. Some 45% of respondents gave high course prices as a reason for not participating in education. Concerns related to a possible loss of income when attending courses were much less common (only 15% of respondents). This means that in most cases continuing education does not involve an interruption of money-earning activities, but that it is done concurrently.

Figure 9: Reasons for not participating, by respondent's level of education



Source: NOZV, CVVM (2006).

Especially sensitive to the prices of courses are people from the mid-range income group, i.e. people with an average net income of CZK 10,000–15,000. People with higher income logically do not place as much importance on the costs of studies as other population groups. It is interesting, however, that a slightly higher share

(49%) of people in the mid-range income group gave the cost of courses as a barrier to continuing education than did people from the low-income category (46%). Although not significant, the difference may indicate that persons with lower income are more sure that the course costs will be covered by, for instance, their employer.

As can be seen from figure 9, another group which sees high prices of courses as a barrier to education is persons with upper secondary education (either with school-leaving examination - "maturita" or with apprenticeship certificate) – some 46% to 50%. Persons with primary and lower secondary education gave prices less frequently as a reason (37%). As with low income, this may be because people with low qualifications are considered at risk and rely more on public institutions. Another reason why such people do not see educational costs as a serious barrier may be that they do not think about education at all and thus have no idea of the costs of courses. When interpreting the data, it is important to consider that persons with a lower level of education less frequently state that they do not participate in education because of "substitute" reasons (e.g., costs and time demands) than persons at higher levels of qualifications.

From the point of view of job position and profession, only top positions – entrepreneurs with employees, managers and top professional employees – consider financial aspects to be unimportant. For all other categories of workers, the price of courses represents a barrier to participation in one half of cases (somewhat less among unskilled workers: 44%). Awareness of the importance of financial aspects increases in younger and middle ages (up to age 45), i.e. the time when people tend to be taking care of dependant children. After this, the significance of this barrier logically decreases, since the worker no longer has to take care of his or her children and also sees an increase in income as a result of practical experience.

In general, we may state that financial reasons (high course prices) play an important role in deciding whether to participate in continuing education. This applies not only for low-skilled or low-income persons – financial aspects have a strong influence on a broad group of persons of average age, qualifications and income. These factors are interrelated and, with some simplification, we may say that income level is a reflection of the other two factors. More significant financial incentives for middle income persons could thus have the most extensive positive impact on participation in education. Financial support should, however, not reduce individual initiative, and recipients of support should be aware of the full value of the education they receive and should participate financially as well.

**Lack of time** was the third most frequently stated reason for not participating in continuing education (43% of respondents). Time is the most significant for young people up to age 34 (56% of this age group), where we may assume that they have high time demands because they are caring for their family. Time ceases to be a significant barrier for education only at a later age, among persons older than 55.

This also applies for persons with the highest incomes, where there are strong demands for work efficiency and career, especially entrepreneurs, professionals, officials and clerks.

### Factor analysis of barriers to participation of social groups in continuing education

Individual social groups' level of participation in continuing education and a factor analysis of the reasons for their failure to participate helped to identify at-risk social groups which are not participating in education, as well as the barriers which limit their access to education. This analysis revealed four primary factors. For each factor, one specific aspect – barrier – clearly dominates...

- For **factor 1**, this is the barrier of "high course prices", combined with "insufficient information on course offer" and "insufficient course offer". The statement "does not enjoy education" is not all too characteristic for this factor, which we may thus label "**actual barriers**" to education. They have a real foundation in the outside world, they are real existing insufficiencies in the availability of courses, which can be removed through certain measures. The remaining three factors (though they may have real foundations) are more related to attitude or situation.
- The key barrier for **factor 2** is "lack of time". Here, a strongly present barrier is "care for family". We can also see a strong awareness that one's education is not sufficient (based on the negative factor loadings for the first aspect). This factor can thus be labelled "**cannot**" participate in continuing education.
- **Factor 3** is composed in particular of the aspect "considers education to be sufficient". From the negative marks of additional factor loadings, we can see that we are definitely not dealing with a lack of information on available courses, nor with significant concerns regarding the demanding nature of formal education. Particularly if we consider the first aspect, this factor can be labelled "**does not need**" continuing education.
- The final factor, **factor 4**, is clearly headed by the barrier "education does not offer the expected usefulness". Three other aspects are represented to a lesser extent: "does not enjoy education", "lack of time" and "formal education is too demanding". We see here a lack of trust in and distaste for continuing education. This factor can thus be labelled as having "**given up**" on continuing education.

Table 7A in Annex of factor loadings indicates the level to which each factor is covered by the original aspects of reasons for not participating in continuing education. Table 3 shows which factors/barriers are characteristic for certain social groups.

Factor analysis revealed that there are two basic groups of people who are not participating in education:

1. people who are interested in continuing education but are not realising this interest because of "actual barriers" (external, associated with offer);
2. people who are not interested in continuing education because of their attitudes or personal situation.

Re: 1) **The group interested in continuing education** is characterised by the fact that they consider their education to be insufficient, are not satisfied with it, and are

interested to continue their education. They sense so-called objective (actual) barriers existing in the world outside of them. These are primarily course prices, insufficient information on course offer and insufficient course offer.

This group in particular includes the **unemployed**. These persons are, at least for a certain period of time, motivated to participate in education. Highly significant here are labour offices, which can help these people overcome the above described barriers and provide the appropriate continuing education. The situation is more difficult, however, because among many unemployed persons these barriers are accompanied by their having given up on continuing education (see the next group).

Other people who are interested in education but mention objective barriers to access to continuing education include clerks, technicians and people aged 35–44. These barriers also affect people with secondary education with school-leaving examination (“maturita”), people with average income (CZK 10,000 – 15,000) and people living in towns with fewer than 5,000 inhabitants (who consider the main barrier to be poor transport connections); women also state that they are affected by these barriers more frequently than men.

**Table 3: Factors – barriers characteristic for social groups**

	F 1	F 2	F 3	F 4
students	<b>3.00</b>	2.50	<b>3.50</b>	<b>3.00</b>
retirees	<b>2.83</b>	<b>3.00</b>	2.46	<b>2.97</b>
mothers stay-at-home	2.48	<b>1.56</b>	2.62	<b>2.84</b>
unemployed	<b>2.24</b>	<b>3.12</b>	<b>2.86</b>	<b>2.24</b>
entrepreneurs with employees	<b>2.87</b>	<b>1.98</b>	2.63	2.33
entrepren. without employees	2.46	2.24	2.51	2.40
managers	<b>2.82</b>	2.55	<b>2.05</b>	2.45
professionals	2.66	<b>2.19</b>	<b>2.09</b>	2.54
technicians	<b>2.27</b>	2.30	2.33	2.42
clerks	<b>2.22</b>	<b>2.16</b>	2.24	2.36
operational workers	2.43	2.33	2.51	2.37
skilled workers	2.43	2.53	2.44	<b>2.20</b>
unskilled workers	2.52	2.63	<b>2.90</b>	<b>2.13</b>
personal income 1–10,000 CZK	2.51	2.62	2.58	2.60
10–15,000 CZK	2.39	2.45	2.38	2.32
over 15,000 CZK	2.74	2.33	2.29	2.37
education ISCED 1,2	2.76	<b>2.84</b>	<b>3.04</b>	2.45
ISCED 3C	2.54	2.51	2.51	2.45
ISCED 3A,4	2.35	2.35	2.25	2.56
ISCED 5,6	2.71	2.34	<b>2.11</b>	2.70
people aged 25–34	2.32	<b>2.18</b>	2.63	2.48
35–44	<b>2.29</b>	2.30	2.46	2.34
45–54	2.57	2.42	2.50	2.31
55–64	2.78	<b>2.89</b>	2.39	2.75
people living in the country	2.44	2.47	2.51	2.52
in a small towns	2.63	2.56	2.52	2.51
in a big towns	2.48	2.43	2.34	2.46
men	2.61	2.57	<b>2.40</b>	2.33
women	2.45	2.44	<b>2.56</b>	2.65

Note: F 1 – factor 1 (actual barriers), F 2 – factor 2 (cannot), F 3 – factor 3 (does not need), F 4 – factor 4 (given up), (average on the scale 1–4 – 1=yes, 4=no). Source: NOZV, CVVM (2006).

These social groups naturally require different approaches than the unemployed, although also with a focus on financial support, better access to information and advisory

services. Since most of these people are not serviced by labour offices, it is necessary to expand and increase the availability of free individual advisory services related to the possibilities of continuing education. These people also do not have access to financial support for educating the unemployed and often have limited access to employee training (companies train primarily managers and higher professionals and for this middle-qualifications and mid-income group companies pay primarily the courses required by law). Financial support, for instance in the form of educational vouchers, would be of fundamental help for increasing this group’s participation.

Re: 2) The group of people who are not interested in continuing education can be divided into three subgroups:

Subgroup 2.1 is those who have **given up** on continuing education.

Under certain circumstances, this group would like to receive education, but they do not believe that education can offer any usefulness. On the other hand, they do not trust themselves to manage such education. They have had overwhelmingly negative experiences with education, do not enjoy learning and find education too demanding.

In addition to the previously mentioned **unemployed**, this group also includes **skilled and unskilled blue-collar workers**. These people are often found on the secondary labour market, frequently change employment and have low incomes. Their current level of education offers little way out of this situation. This group is also marked by actual barriers to access to education of which they are usually not aware, in particular financial barriers. In addition to introducing measures for reducing the above mentioned actual barriers, it is thus also important to provide motivational educational approaches.

The education offered this group must be related to their actual problems in such a way that they can apply their experience while learning. Continuing education courses should thus include practical exercises so that participants immediately see the meaning and purpose of their new knowledge. Courses should definitely not resemble school, nor should they be offered in a school environment. This group would thus benefit from a special offer of courses that will motivate them to participate in education. Even if the education does not provide them with better work or pay, this approach will give them the knowledge and experience necessary to remain employable and to avoid social exclusion.

Subgroup 2.2 **cannot participate** in continuing education, usually because of lack of time and the need to care for the family.

This group would like to participate in continuing education and considers its education to be insufficient. Actual barriers do not play too great a role in their inability to participate, but they cannot find the time for education. This particularly concerns stay-at-home mothers. Although this reason is found more among women, it is also common for the younger age group (25–34) in general. This is the period in which people are starting their families and are caring for young children, which is the most demanding time in terms of the family’s financial security.

An important factor for increasing this group’s participation in continuing education is the provision of family services, in particular child care. Also important are family-oriented policies allowing people to balance

work and family life, as well as special courses for women who are returning to work after raising their children or are looking for a new place on the labour market. Promoting this group's participation in continuing education thus cannot be limited to partial measures in the area of education, but requires a comprehensive family, social and educational policy.

Other people who cannot participate in education because of a lack of time include **entrepreneurs with employees, higher professionals and officials**. Here, the lack of time is the result of this group's long working hours. Although members of this group participate in education, they are often very aware of the need for continuing education. While lack of time is a clear problem for entrepreneurs with employees, among higher professionals lack of time is often combined with lack of interest in continuing education.

Officials also often encounter the previously mentioned actual barriers. It is apparent that increased participation in education will not be solved by partial measures in education, but will require a comprehensive policy for the support of small and medium-sized businesses in order to allow entrepreneurs and key employees to take time off for continuing education courses without threatening business operations. This is an important factor for increasing a company's innovation potential and for maintaining and increasing its competitiveness.

Officials working for state and regional government offices are faced with a specific situation. This group requires specific educational programmes that will increase their qualifications and promote increased efficiency to the level of European standards. Education for this group requires public support.

Subgroup 2.3 **does not require education** because they consider their education to be sufficient

This group generally feels no actual barriers to access to education, but also has no interest in education since its members consider their education to be sufficient. This reflects the old belief that education received at school is sufficient for one's entire life.

This group includes **managers, higher professionals and people with tertiary education**. We should add that these attitudes are found only among around 30% of respondents from these groups who are not participating in education. Otherwise, this group has the highest level of participation in continuing education (more than 70%). This is probably influenced by their satisfaction with their current employment, a certain sense of resignation regarding change or an unwillingness to change. A closer examination shows that satisfaction with one's current education increases with age and is found primarily among male managers. This is a relatively unsettling situation, since by later age one's initial education is already outdated and one's experience cannot totally cover the lack of additional education. In addition, with such attitudes, managers without the proper skills may hinder company development.

Measures which could motivate these educated people to participate in continuing education should be oriented primarily on offering attractive courses that will support these employees' further development. Motivational benefits from the employer, such as time off for education, may be of great help.

Because older people in the Czech Republic participate in education overwhelmingly (90.8%) for reasons associated with employment, there is a need for a well considered retirement policy which will motivate these people to remain on the labour market and to continue to be economically active.

### 1.3 Companies' approach to human resources development

Employee development is becoming an ever more important part of companies' strategies – not only because human resources are increasingly essential for companies' competitiveness but also as a result of the growing and relatively fast-changing demands placed on employees' knowledge and skills. Companies cannot rely solely on finding suitably qualified people on the labour market, but must also be pro-active towards newly hired and existing employees. The following international comparison of companies' approaches to human resources development is based on the outcomes of a survey conducted by the World Economic Forum.

#### Box 3: The WEF survey of human resources development in companies

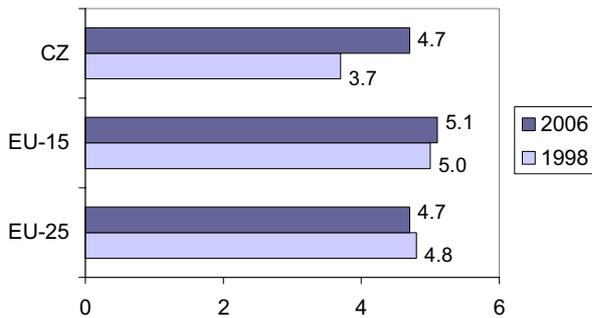
The annual questionnaire-based survey is conducted during the first five months of the year by approaching small, medium-sized and large/multinational corporations in various fields and with various ownership forms (privately-held domestic companies, foreign-owned companies and companies with government participation). The respondents answer the question: "The general approach of companies in your country to human resources is (1 = to invest little in training and employee development, 7 = to invest heavily to attract, train and retain employees). From this, a median response is calculated, along with a standard deviation indicating the match rate of responses.

According to managers and entrepreneurs, the situation in the Czech Republic regarding companies' willingness to invest into employee training and development was less favourable in 1998–2005 than the EU-25 average. Nevertheless, the gap between the Czech Republic and the EU-25 average showed a gradual decrease and in 2006 the Czech Republic was rated at the same level as the EU-25 average. Nonetheless, the willingness of companies located in the Czech Republic is still rated significantly lower than in developed countries, as shown by the difference with the EU-15, which was 0.4 points in 2006. The gap between the Czech Republic and the top-rated countries, however, is much greater. Companies located in the Czech Republic were rated at 4.7 points, while the best countries, Sweden and Denmark, received 5.9 points. The lowest rated companies in 2006 operated in Cyprus (3.4 points) or in member states that joined the EU in 2007 (Bulgaria – 2.6 points, Romania – 3.3 points). In all other member states the rating is close to or more than 4 points.

The improved position of the Czech Republic is influenced not only by the inflow of foreign capital, which is accompanied by approaches to human resources development commonly found in the home countries, but also by gradual changes in the behaviour of domestic companies. A number of other factors are also at play. Empirical analyses have shown that companies' approach to human resources development differs not

only in relation to company ownership (foreign vs. domestic), but also in relation to company size measured by number of employees and in relation to sector and profession. It is clear that a change in these characteristics, i.e. an increase in the number of foreign-owned companies, large companies, and economic sectors with above-average investment into human resources and professions with high demands on qualifications is accompanied by increased care for employee development.

**Figure 10: Companies' willingness to invest into human resources development**



Note: best rating = 7, worst rating = 1.  
Source: WEF – The Global Competitiveness Report 2004–2006.

We may assume that a company's approach to human resources development has a relatively strong correlation to whether a company is performing innovating activities. Prior to implementing innovation, innovating companies are always faced with the need to train at least a part of their employees. The range of employees to be trained and the character of training depend on the type of innovation – whether it is a product-related, process, marketing or organisational innovation.

**Influence of human resources on companies' innovating activities**

The importance of human resources for a company's innovating behaviour is also shown by the results of a survey "Innovation in the Czech Republic in the year 2005" conducted by the Czech Statistical Office (ČSÚ). This survey searched the influence of the following eleven factors: shortage of financial resources at the company, shortage of finances from sources outside the company, shortage of qualified employees, excessively high costs of innovation, shortage of information on technologies, shortage of information on markets, difficulties in finding partners, market dominated by established companies, unstable demand for innovated goods or services, no need for innovation in view of previous innovations, innovation not desired.

Of eleven surveyed factors, shortage of qualified employees was ranked seventh or eighth in relation to a company's innovativeness. Among innovating companies, defined as company that in the studied period introduced at least one innovation, this factor placed in seventh, among non-innovating in eight place. From this we can deduce that innovating companies have a greater problem to gain and maintain suitably qualified employees, that the demands placed on employees are apparently greater at innovating companies and that they expect a far greater level of flexibility from their

workers. Only 6.1% of non-innovating companies stated that human resources represent a limiting factor that highly influences the company's innovating activities, while among innovating companies the figure was 2.3 percentage points higher, i.e. 8.4%.

**Table 4: Influence of shortage of qualified employees on a company's innovating activities (in %)**

	innovating companies	non-innovating companies
Total CZ	8.4	6.1
small (10–49 employees)	7.2	5.8
medium-sized (50–249 employees)	11.6	7.9
large (250 and more employees)	9.0	2.6

Source: ČSÚ. Innovation in the Czech Republic in the year 2005.

The influence of a shortage of qualified employees on companies' innovating activities is felt with varying intensity by **small, medium-sized and large companies**. Among innovating companies, it is the greatest problem for medium-sized companies. Least affected are small companies with 10–49 employees. Among such small innovating companies, we can assume that employees have a relatively strong level of identification with company strategy and that workplace relations are more informal. Both these facts positively influence hiring and keeping employees.

Medium-sized companies are in an unfavourable position as compared to both small and large companies. The positive characteristics of small companies are not present as strongly, and compared to larger companies they are more limited by the amount of time and money they can devote to human resources development. Among non-innovating companies, the shortage of qualified employees is felt strongest by medium-sized companies; large companies have the least problems.

From the point of view of **economic sector**, the influence of a shortage of qualified employees on innovating activities is felt most strongly by innovating companies than by non-innovating companies, with the exception of two sectors: construction and the electricity, gas and water supply. Of innovating companies, the largest share of companies which feel that this factor has a large influence are active in computer and related activities (15.8%) and in the manufacture of electrical and optical equipment (15.7%). Among non-innovating companies, they are in the manufacture of machinery and equipment sector (10.3%) and construction (9.3%).

Although training is important for the functioning of all companies, we can assume that innovating companies pay more attention to their employees' development.

**Innovating companies' approach to human resources development**

A survey conducted by the National Observatory of Employment and Training (NOZV) in cooperation with the MEDIAN research agency was aimed at determining the approach to human resources by companies undergoing various types of innovation – strategic, modifying, irregular and adoptive. Basic information on the survey is contained in box 4.

**Box 4: NOZV survey – Approaches of innovating companies for gaining and developing human resources**

The survey was performed in October and November 2004 and January 2005 using the CAPI method (Computer-Assisted Personal Interviewing). A total of 327 fully completed questionnaires was received; respondents were directors of innovating companies (21%) or persons responsible for human resources management (79%). The surveyed companies were located in all regions of the Czech Republic, with most companies from Prague (16.2%) and the smallest proportion from the Karlovy Vary region (1.5%).

In term of economic sectors, the most common companies were those focused on manufacture of machinery and equipment (classification of economic activity NACE-29, 19.6%); the survey did not include companies from the service sector.

The questionnaire had six parts. The first part asked about basic information on the company, the second part focused on the characteristics of human resources at the company, the third part looked at the intensity and forms of employee training, the fourth part was about the systematic approach of companies towards human resources development, the fifth part looked at innovating activities and the sixth part at human resources development for the needs of specific innovating activities. Respondents answered a total of 32 questions, 9 of which were open questions.

If companies do not gain new employees with skills corresponding to the innovating activities, 85% of them provide for their development through one of the threemost frequent forms of training – in-house courses, external courses or self-learning (see figure

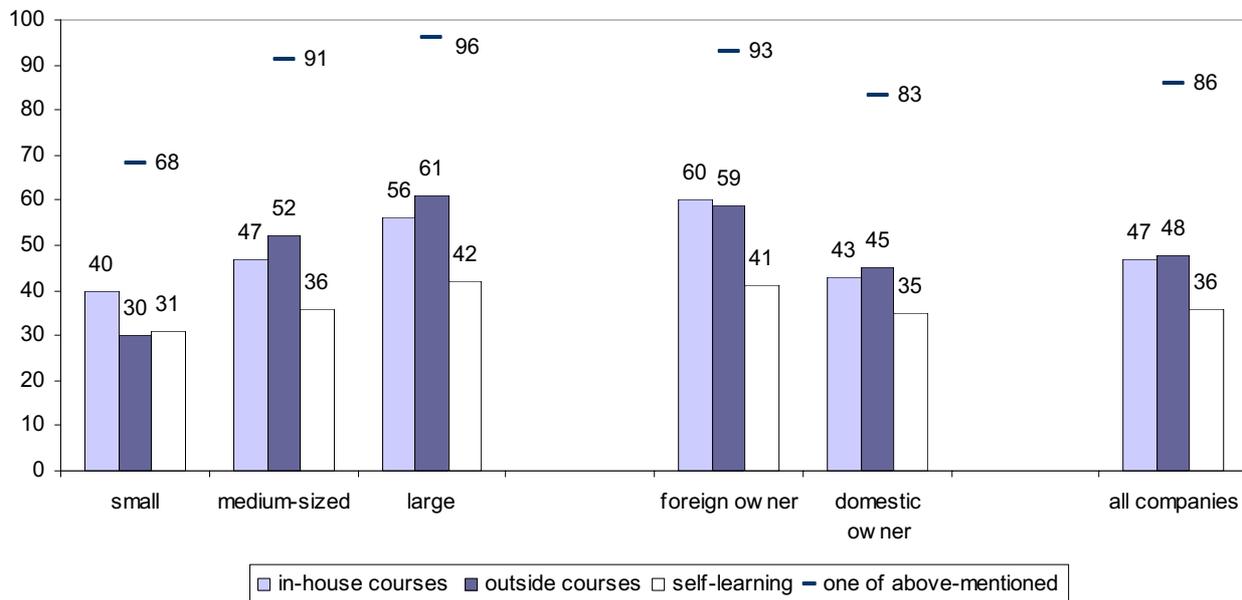
11). On average, the most frequently provided form of training for new employees are courses provided by external agencies (48% of companies) and in-house courses (47% of companies); only 36% of companies made use of self-learning.

Large companies are most active in training new employees – only 4% of companies with more than 250 employees do not focus on this issue. On the other hand, almost one third (32%) of small companies, i.e. companies with 49 or fewer employees, does not pay attention to this issue.

This means that they are either able to find employees with the corresponding skills or they rely on the employees to develop missing or insufficient skills while performing their work or on their own initiative outside of working hours. In providing training of new employees, small companies also rely more on courses provided on their own; medium-sized and large companies, on the other hand, rely on courses provided by external institutions.

Differences in the behaviour of innovating companies are expressed not only in relation to company size but also in relation to **ownership**. Foreign-owned companies provide more training of new employees than companies owned by domestic capital (93% vs. 83% of companies). While foreign-owned companies make greater use of internal manpower than external agencies for training their employees, domestically owned companies rely more on external trainers.

**Figure 11: Training of new employees in innovating companies**



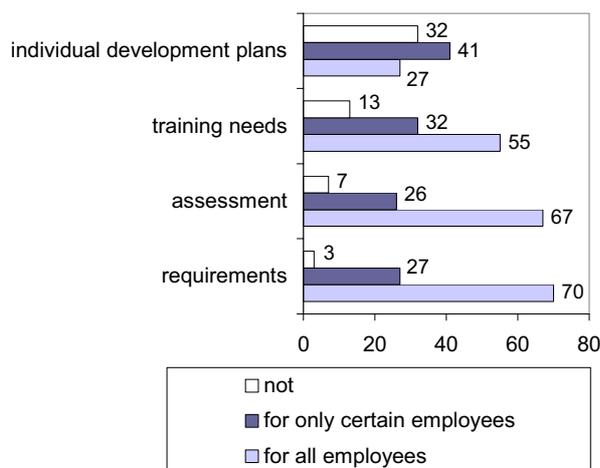
Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

**Course topics** differ in relation to the type of innovating activities which the employer is implementing. For employees involved in research and development, acquiring the results of external research and development, acquiring machines and equipment and design the most frequent course topics are new machines, materials, approaches and technology. Employees involved in acquiring other external knowledge most commonly participate in language courses; training focuses primarily on questions of work safety. Training of employees involved in introducing innovations on the market is focused primarily on management, marketing, purchase, sale, trade etc.

The ideal form of employee development involves a **systematic approach** with the constant repetition of three fundamental stages – determining training needs, providing training and inspection of quality and evaluation of benefits. Determining training needs can be divided into the following four steps:

- determine individual positions' requirements as regards qualification, knowledge and skills,
- evaluate individual employee's capability, determine differences between the position's requirements and the employee's capability,
- determine training needs,
- elaborate individual development plan.

**Figure 12: Systematic approach towards determining educational needs**



Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

As can be seen in figure 12, the level of engagement of innovating companies declines at the higher stages of the systematic approach towards determining training needs. Only 3% of innovating companies have not defined the **requirements for qualification**, knowledge and skills for individual job positions. These are companies with a small number of employees which we can assume function on the basis on informal structures and working relations and which expect a high level of flexibility and mutual substitutability from their employees. 70% of companies have defined job descriptions for all positions; 27% have done so only for selected employees. 7% of interviewed innovating companies do not perform **regular employee assessment**; among companies which do assess their employees we again see a domination of companies which evaluate all employees (67%) over companies

which assess only employees in certain positions (26%). A total of 13% of companies do not determine **training needs** at all; 55% of companies do so for all employees and 32% do so for only certain employees. A comparison of the total share of companies that provide employee assessment and determine training needs shows that about 6% of companies do not base employees' training needs on employee assessment. A full third of innovating companies does not elaborate **individual development plans**. This is also the only step that more companies realise for a selected group of employees (41%) than for all employees (27%). Such an approach does make some sense and one can assume that individual development plans are elaborated primarily for positions that to a certain extent are exclusive, with high demands on qualifications. For employees in positions represented by a large number of employees, one can assume a less individualised training approach.

Around one fifth of studied companies (20.8%) realises all stages of the systematic approach to human resources development for all employees. At these companies, qualification requirements have been established for all employees, their capability is regularly assessed, their further training needs are determined, and development plans are elaborated for them. The second largest group of companies is those which realise the first three steps of the systematic approach for all employees but elaborate individual development plans only for certain employee categories (14.7%). The third largest group (6.7%) is formed by companies which perform all activities only for certain employee categories. 2.1% of studied companies realise none of these activities, regardless of whether for all or only certain employee categories.

The comprehensiveness of a company's approach to human resources development depends to a large degree on the **type of innovating companies**. The characteristics of the individual types of innovating companies are given in box 5. Most active in relation to human resources development are strategic companies; least active are adoptive companies. Only relatively few strategic innovating companies do not implement the individual steps for determining training needs, while for adoptive companies this number is relatively significant. Modifying companies pay nearly as much attention to this issue as strategic companies, while the approach of irregular companies is closer to that of adoptive companies. The gap between modifying companies and strategic companies is relatively small, but it is more significant between adoptive and irregular companies.

**Table 5: Companies not working on human resources development (in %)**

	requirements	assessment	needs	plans
strategic	1.4	3.5	7.6	24.3
modifying	2.4	4.9	9.8	31.7
adoptive	5.0	20.0	27.5	55.0
irregular	6.6	11.5	21.3	37.7
all	3.1	7.3	13.1	32.4

Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

Besides type of innovating companies, companies' approach to determining training needs also depends on company size, market area and ownership. The influence

of these factors somewhat overlaps since larger companies are more frequently active on the international market and have a foreign owner.

**Box 5 – Types of innovating companies**

**Strategic** – innovation is a key factor in competitive strategy, internal research and development are performed systematically with the objective of developing new products or processes, the company is a source of innovations which spread to other companies.

**Irregular** – internal research and development is performed only when necessary (under pressure or favourable circumstances), but innovation is not a key strategic activity; sometimes research and development activities are focused on adapting new technologies developed by other companies to the company's personal needs.

**Modifying** – existing products and processes are adapted using innovating activities not based on research and development; frequently, the company functions as a process-based innovator which innovates through production engineering (i.e. according to practical experiences from production).

**Adoptive** – innovations are introduced by adopting innovations developed by other companies or organisations.

From the **company size** point of view, it is apparent that (a) the larger the company, the larger the share of companies which are realising the individual steps for determining training needs, (b) the larger the company, the smaller the difference in the share of individual types of innovating companies which are also realising so-called higher or supplementary steps, (c) the gap between medium-sized companies and large companies is smaller than the gap between small companies and medium-sized companies.

All large, almost all medium-sized companies (99.3%), and more than 90% of small companies (90.3%) have established qualification requirements for at least certain employee categories. Around 84% of large companies, 74% of medium companies and 41% of small companies have developed individual development plans for at least certain employee categories. In determining the requirements for qualifications, the difference between large and medium-sized companies is 0.7 percentage points and the difference between medium-sized and small companies is 9 percentage points; the difference in elaborating individual development plans, however, is about 10 and 33 percentage points, respectively (see table 6).

**Table 6: Companies implementing individual steps for the development of human resources (in %)**

employees	requirements	assessment	needs	plans
250+	100.0	97.9	94.7	84.2
50–249	99.3	97.1	92.1	74.1
- 49	90.0	80.6	71.0	40.9

Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

In term of differences in behaviour among domestically or foreign-owned companies (see table 7), the survey showed that foreign-owned companies pay more attention to the development of human resources. All foreign-owned companies regularly assess employee capability – 72% assess it of all employees and 28% assess it only of certain employees. As with differences related to company size, the difference between foreign and domestically owned companies widens in relation to more specific

stages of the systematic approach to human resources development. The share of foreign-owned companies which established requirements for job positions was 2.5 percentage points higher than domestically owned companies; for employee assessment this figure was 9.8 percentage points, for determining training needs it was 14.3 percentage points and for elaborating individual training plans it was 17.1 percentage points. This trend is similar to the one found for company size, which results from the fact that there exists a relatively strong correlation between company size and ownership: large companies tend to have a foreign owner, while small companies are usually domestically owned.

Companies' approach to human resources also differs in **relation to the market** on which the company operates – whether it is active on the international, national or regional market (see table 7). The difference between national and regional market was defined as the customers' distance from the location of the innovating company. If the main customer is located more than 50 km from the company, then the company is considered to be active on the national market; if not, then the regional market. Companies which pay the greatest attention to human resources development are those active on the international market, followed by companies active on the national and regional markets.

As with the previous two indicators, the differences are greater at more advanced stages of the comprehensive approach. In establishing qualification requirements, there is no difference between companies active on the national or international market, while the greatest difference is in the elaboration of individual development plans (18.1 percentage points). Companies active on the regional market have the smallest lag behind national companies when it comes to elaborating individual training plans (9 percentage points), but the greatest when it comes to determining training needs (27.9 percentage points).

**Table 7: Companies implementing individual steps of the systematic approach towards human resources development (in %)**

	requirements	assessment	needs	plans
<b>owner</b>				
foreign	98.8	100.0	97.5	80.4
domestic	96.3	90.2	83.2	63.3
<b>market</b>				
international	98.6	96.8	93.2	74.8
national	98.6	88.0	85.1	56.7
regional	85.7	78.6	57.2	47.7

Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

Only high quality training can provide the expected results, which is why **quality assessment** of the training provided should be an indispensable part of the systematic approach to human resources development. However, not all innovating companies which provide employee training inspect the quality of the training provided. Around one third of companies do not inspect the quality of training. The survey does not enable to draw a conclusion as to the reasons behind this fact, i.e. whether there is a lack of interest in quality (which would indicate that, to some extent, training is considered a formality), whether the companies are sure of the quality

on the basis of prior experiences or references or whether quality control of training is considered unnecessary since the outcomes/benefits of training are assessed by individual employees. In this relation, however, we should point out that about one fifth of companies do not assess benefits.

The most diligent approach to quality control of training is found with strategic innovating companies, more than three fourths of whom (76.1%) performed inspections. For irregular and modifying companies, this figure was more than 60% (64.4% and 61.7%, respectively), but for adoptive companies it was less than half (42.5%). Companies most frequently inspect the quality of training via a questionnaire survey of course participants, inspection of acquired skills or knowledge (tests or other forms), or inspection during the course. Controls are most frequently performed by the course participant's supervisor or the participant himself.

Quality of training is most frequently controlled by companies with more than 250 employees (83.2%), less so by companies with 50–249 employees (69.8%) and least of all by companies with no more than 49 employees (42.0%). Companies with foreign ownership or co-ownership inspect the quality of training more frequently than domestically owned companies (66.1% vs. 33.9%).

Quality of training is closely related to the **outcomes/benefits of training**. There is no single universal assessment tool, and assessment always depends on the individual form of training and individual professional groups. The outcomes or effectiveness of training are most easily assessed if there are clear training goals and if the training is focused on performing a specific job. Results are usually most pronounced if the person can test the acquired knowledge in practice and bears responsibility for the results. The success of training can be assessed by the fulfilment of objectives established in a regular employee appraisal.

Companies appear to be unsure about how to assess the results of training, and so nearly one fifth of studied companies (19.6%) performed no assessment. Unlike quality control of training, however, innovating companies clearly pay greater attention to assessing the benefits of training. Most frequently (in 57.5% of cases), the benefits of training are assessed by the supervisor of the trained employee; 18.9% of companies rely on assessment by the course participant himself, while the remaining 4% use other methods. Large companies assess benefits more frequently than small and medium companies; foreign-owned companies do so more frequently than domestic companies. Some 91.6% of large companies, 87.1% of medium-sized companies and a mere 58% of small companies assess benefits. A full 89% of foreign-owned companies assess benefits; among domestically owned companies, this figure is only 77.5%.

#### Intensity of training in innovating companies

The survey showed that 48% of innovating companies train their employees frequently, 29% less frequently. Although only a small proportion of companies do not train their employees at all (less than 6%). If we include also companies which only rarely train their employees, the proportion of innovating companies which does not pay much attention to human resources development reaches almost 23%.

In term of the expected development of training intensity, almost 86% of surveyed companies expected further growth, while roughly 14% anticipate a decrease in training activities. The reason for this negative trend is apparently unfulfilled expectations of training or poor experiences with the quality of training, resulting in the conviction that training represents an inefficient expenditure of resources and a waste of valuable employee time. Nevertheless, innovating companies are aware of the importance of qualified employees for their competitiveness, as proven by the fact that 40.4% of surveyed companies listed qualified employees (professionalism) as one of five key sources<sup>5</sup> of competitive advantage.

#### Formal education in innovating companies

Employees of innovating companies take only minimum advantage of the chance to increase or expand their qualifications by **studying at school**. Companies in the Czech Republic do not have a duty to accommodate employees interested in studying. The Labour Code does not require employers to provide employees with a lightened workload or material support during studies. They may provide these if the employee is increasing his qualifications for performing the work described in the employment contract. In such a case, the employer and employee may enter into an agreement in which the employer undertakes to provide a lightened workload and material support during the time in which the employee is increasing his qualifications.

The employee undertakes to remain with the employer for a specific period, but no more than five years, or to repay the costs associated with the studies if he breaks the employment relation prior to completing his studies. If the employer is not willing to provide the employee with material support or a lightened workload, the employee may take his holiday in order to meet his study-related duties. One problem with this is the fact that, according to the Labour Code, the holiday schedule is at the discretion of the employer, who need not agree with the employee's taking a holiday during the period in which he needs to meet his study-related duties.

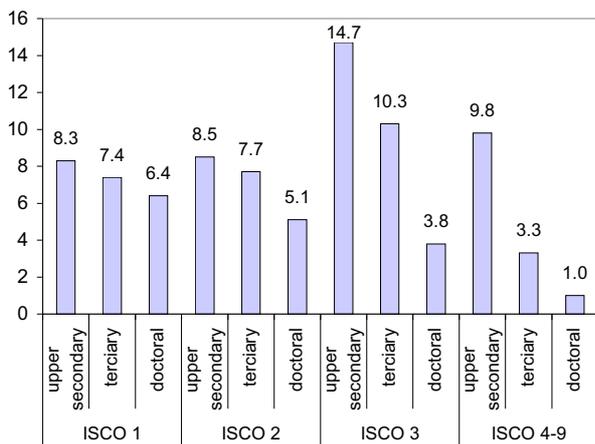
The survey showed that, at more than three fourths of innovating companies, no employees are working to increase their qualifications by studying at school. This may indicate that, at the great majority of companies, the employees' level of qualifications suits the demands of the individual jobs and that companies do not have any problem filling positions with properly qualified persons. A less favourable explanation may be a lack of employee interest in increasing their level of qualification because they sense resistance from the employer, they find it difficult to juggle work, studies and personal life, or they do not consider the results worth the effort.

As shown by figure 13, regardless of profession employees most frequently supplement their education with **upper secondary education**. With decreasing demands on qualification among the individual professions we logically see a greater difference in participation in the various levels of formal education. The smallest difference is among senior officials and managers (ISCO 1), the greatest difference is among persons in less demanding pro-

<sup>5</sup> Based on open questioning; companies did not select from a list of suggested answers.

fessions (ISCO 4–9). The sample under review included companies that enable persons in low-qualified positions to gain tertiary education. These apparently are individuals who are working part-time in order to be able to balance work and study-related duties; after finishing their studies, they move on to a job that reflects their level of education. In view of the fact that the company accommodates them in some manner, this new job is usually within the company instead of elsewhere.

Figure 13: Formal training in innovating companies (in %)



Note: proportion of companies which answered “frequently” and “less frequently” to the question with which intensity they provide the individual forms of training to the individual categories of employees. Source: Innovating companies’ approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

Technicians (ISCO 3) seek out formal education most frequently, followed by senior officials and managers (ISCO 1) and professionals (ISCO 2). Companies are least likely to enable persons in less demanding professions (ISCO 4–9) to study formal education, although they do receive a relatively strong possibility to complete upper

secondary education, which (except for employee category 9) is associated with these qualification categories.

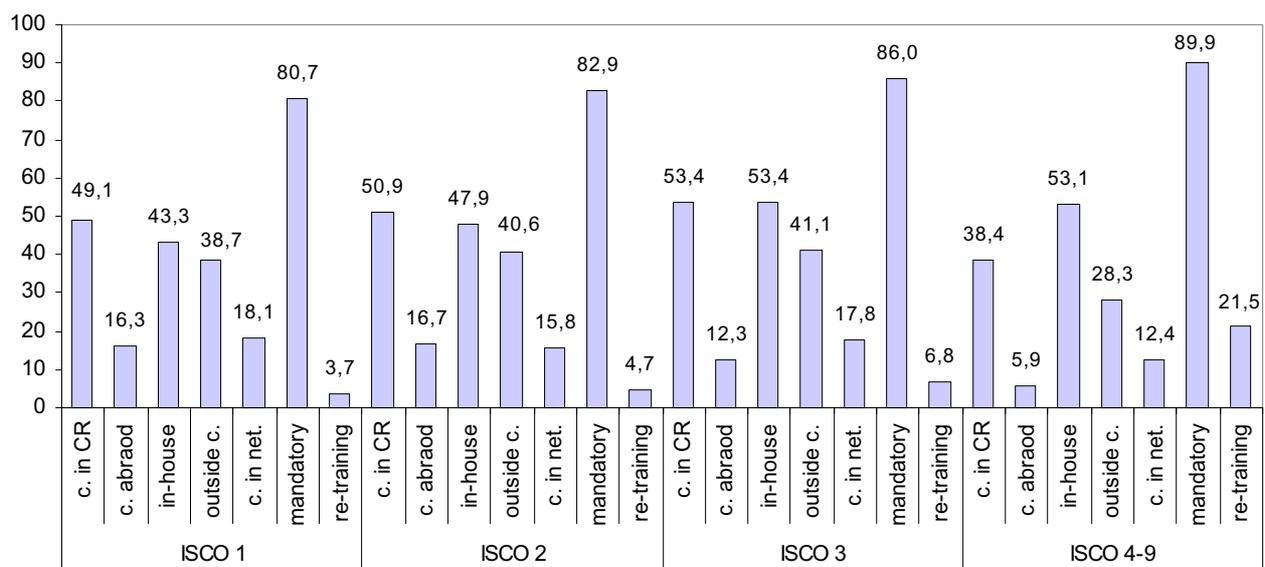
Quite surprising is the relatively high proportion of companies at which employees in highly demanding positions (ISCO 1, 2) go on to complete secondary education. No further information is available to explain this fact, so we can only hypothesise. For senior officials and managers (ISCO 1), we may surmise that we are dealing with persons in lower management positions who, as a result of a switch from a vertical to a horizontal organisational structure, have been given additional competencies and responsibilities with increased demands on their existing level of qualification, and who are thus supplementing their apprentice-level education with a school-leaving examination (“maturita”). Among professionals (ISCO 2), these are most likely individuals who acquired their necessary knowledge and skills over the course of their professional life, but are now faced with a situation in which formal education has become indispensable for the performance of their profession or for increased wages.

One pleasant finding is the fact that at a relatively large proportion of innovating companies (about 15 %) technicians (ISCO 3), whose profession usually requires capabilities corresponding to secondary professional education, are supplementing their education with studies at tertiary professional schools or higher education institutions. It is clear that increased technological demands of production are accompanied by increased demands on qualifications for technicians.

**Non-formal education in innovating companies**

The Labour Code requires employers to (a) train employees in order to ensure their safety and health protection at work; (b) arrange adequate vocational practice for graduates; (c) ensure induction training or on-the-job training for unskilled employees; (d) arrange training for an employee who is transferred to a new workplace or a new type of work.

Figure 14: Non-formal education in innovating companies (in %)



Note: c. = courses, net. = network. The share of companies that answered „often” and „less often” the question „What is the intensity of providing the individual form of training to the individual categories of employees?” on the whole number of interviewed companies. Source: NOZV, MEDIAN (2005), own calculations.

The employer is entitled to require employees to participate in training in order to increase their qualifications. For certain sectors, the education and indispensable prerequisites for performing certain professions are regulated by laws or decrees (e.g., health care, education, public administration, electricity, etc.). Legal regulations concerning mandatory education are expressed in the structure of non-formal education. In fact, courses for mandatory education were provided most frequently – by more than 80% of surveyed companies. Courses for mandatory education were most frequently provided for employees in less demanding positions (ISCO 4–9).

As shown by figure 14, at innovating companies education via professional courses regardless of form was focused primarily on **technicians** (ISCO 3), followed by professionals (ISCO 2). The least (almost equal for both categories) amount of intensity was focused on courses for less demanding positions (ISCO 4–9) and for senior officials and managers (ISCO 1). This results primarily from the higher level of mandatory education and in-company education for less qualified positions as compared to senior officials and managers.

The different approaches of the various types of innovating companies to the non-formal education of employees in various occupations can be seen in figures 3A–6A in Annex. The analysis excludes courses provided as part of mandatory training, since the differences in the intensity of their provision result from legal regulations. We can observe, however, that more expansive duties within mandatory training seem to reduce the space available for other types of non-formal education.

Most engaged towards **senior officials and managers** (ISCO 1) were strategic innovating companies, with less intensity seen among modifying companies. Except for re-training courses and courses provided as part of a network of companies, irregular companies paid more attention to non-formal education than adoptive companies. Adoptive companies lead in the provision of re-training courses, although this type of education was provided by an insignificant number of companies.

Strategic companies provide non-formal education for professionals (ISCO 2) to a greater extent than other types of innovating companies, followed by modifying, adoptive and irregular companies. Adoptive companies are significantly ahead of irregular companies when it comes to less common courses, courses provided within a network of companies, and re-training courses.

From the non-formal education point of view, technicians (ISCO 3) receive the most attention from strategic companies, somewhat less from modifying companies, followed by adoptive and irregular companies. The same conclusion applies to the education of people in less demanding positions (ISCO 4–9). Adoptive companies' lead over irregular innovating companies is again influenced primarily by the more intense use of re-training courses and courses provided in networks.

#### Informal learning in innovating companies

Informal learning at the workplace is often a more important source of information and experiences than non-formal education courses. The survey of innovating companies found the following types of informal learning:

- induction at the workplace,

- coaching,
- different forms of rotational internship,
- experiential learning within work teams,
- internet using,
- professional literature using,
- conferences participation.

As shown by figure 8A in Annex, the most frequent manner for information and experience passing out the workplace is during the **induction** of new employees. This approach is applied in particular for less qualified employees (ISCO 4–9), at three fourths of companies. Its frequency declines with increased employee qualifications. While for technicians (ISCO 3) this approach is applied frequently or less frequently by more than one half of companies, for professionals (ISCO 2), this figure is 40% and for senior officials and managers (ISCO 1) it is only one third of companies, in particular large companies. This results primarily from the fact that less qualified or unqualified employees require direct training, usually under supervision and for a specific job, and the company is obliged to provide such training.

Because it is a relatively demanding process, **coaching**, i.e. long-term guidance of an employee by an experienced employee (coach), can be expected more among highly qualified or management-level employees. Only relatively few companies (up to 15%) use coaching for all occupation groups.

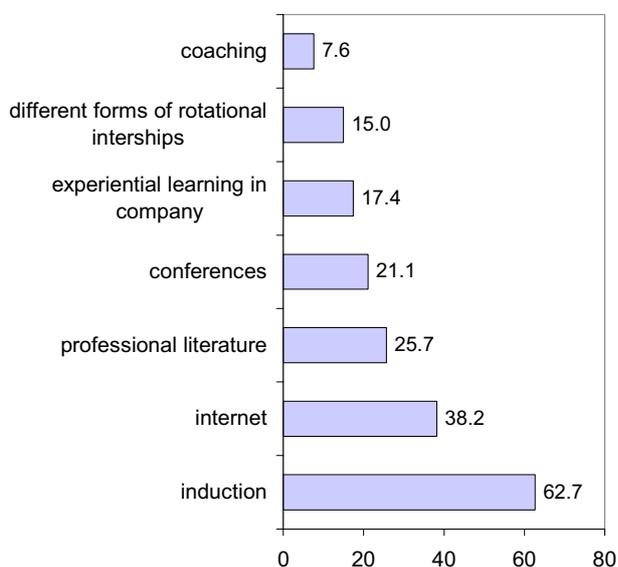
Another method for passing experience is **rotational internships**, employed primarily within the company. These are used to a greater extent for less qualified employees, although the differences are not as great. More than one fourth of companies use this method for less qualified employees (ISCO 4–9) and technicians (ISCO 3), while the figure is 19% for professionals and for managers it is 12% of companies.

A similar approach applies to **experiential learning** within work teams, which is supported more frequently for less qualified employees (ISCO 4–9 – 40% of companies, ISCO 3 – 35% of companies) than for highly qualified employees (ISCO 2 – 33% of companies) and least for senior officials and managers (ISCO 1 – 24% of companies). Although it is clear that these employees would benefit from rotational internships and experiential learning at other companies as well, this opportunity is used only minimally.

A completely different picture is offered by the use of the internet, professional literature or conferences. Companies support these sources of informal learning primarily for qualified employees. The use of the **internet** is supported by almost all companies for all qualification categories, though for less qualified employees (ISCO 4–9) only around one third of innovating companies do so. The use of professional literature is supported by 90% of companies, primarily for qualified employees, most of all for professionals (ISCO 2). Participation at conferences for qualified employees (ISCO 1,2) is supported by more than one half of companies; the figure for technicians (ISCO 3) is 40%, while unqualified employees receive only minimal support. Support of informal learning also differs by **company size**. Large companies make more frequent use of direct forms of information and experiences passing (induction, rotational internships, experiential learning in teams), while small companies support self-learning.

The main differences among the various **types of innovating companies** are that strategic and modifying companies make significantly higher use of all forms of informal learning (except for induction) than irregular or adoptive companies. Coaching, which is only used to a small degree, is used primarily by strategic companies. Practically all companies provide internet access to their qualified employees (ISCO 1,2,3), but they differ in enabling access to less qualified employees (ISCO 4–9). Nearly half of strategic companies but only roughly one third of other companies do so. Strategic and modifying companies also provide their employees with professional literature (up to 90% of companies) to a greater extent than other types of companies. Strategic and modifying companies also make more use of participation at conferences, primarily for managers and professionals (two thirds of companies), but also for technicians (one half of companies).

Figure 15: Proven methods of informal learning



Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004–5, own calculations.

Of the various types of informal learning, the one which innovating companies found most worthy (see figure 15) was induction of new employees at the workplace (in particular at large companies), followed by providing internet access (in particular at small and medium-sized companies and domestically owned companies), purchase of professional literature (again primarily at small and medium-sized companies and domestically owned companies) and participation at conferences (here, there were no large differences among the individual categories). More than one fifth of companies stated, however, that they found all forms of informal learning to be worthwhile.

**Motivation of employees to participate in continuing education in innovating companies**

Education is associated with certain expenses borne by employer and employee alike, which is why human resource strategy also includes employer incentives to increase employees' interest and responsibility in their professional growth. Incentives may take various forms

and may be financial or non-financial in nature. The survey studied the use of the following incentives at innovating companies:

- courses during working hours,
- paid time off for studies,
- financial support for individual learning,
- better pay after completing education,
- promotion at work after completing education,
- reduced risk of termination.

The use of incentives was studied in relation to different professions with varying demands on qualification as well as in relation to the type of innovating company. In view of the fact that certain professions did not exist at some companies, the intensity of the use of incentives towards individual professions is calculated only for the group of companies in which said professions were employed.

Judging by the proportion of companies which use the six surveyed types of incentives frequently and less frequently and the proportion which do so exceptionally or not at all, innovating companies do not consider motivating their employees to participate in continuing education to be very important. For all types of incentives, the proportion of companies which **do not motivate** their employees is higher than those that do, although the ratio differs for each type of incentive.

The most frequently used type of incentive is **courses during working hours**, followed at a relatively large distance by the promise of better pay and the promise of promotion. Financial support for individual learning is less common, but more so than the promise of better job security. Paid time off for studies was used least commonly. This relates to the fact that a very small percentage of employees supplement their formal education.

Innovating companies motivate the various categories of professions with different levels of intensity (see figure 7A in Annex). The survey showed that, from the point of view of motivation towards continuing education, the studied professions can be divided into two groups with a similar intensity in the use of incentives.

The group which received more attention included technicians (ISCO 3) and professionals (ISCO 2), while the second group included professions with the highest as well as lowest demands on qualifications, i.e. senior officials and managers (ISCO 1) and less qualified positions (ISCO 4–9). This may reflect the fact that senior officials and managers are expected to have strong personal initiative for self-learning, while for professions with low skill demands, companies make use of the possibilities given by the Labour Code, i.e. they prescribe training.

Overall, the least used incentive was paid time off for employees in less demanding positions (ISCO 4–9). The proportion of such companies from the entire sample of innovating companies was one tenth. The most used incentive, on the other hand, was courses during working hours for technicians (ISCO 3). The share of companies offering this incentive to them was more than half of all companies in which this employee category was represented.

**Table 1A: Adult participation in education (in %)**

	2003	2004	2005	2006
EU-27	8.6	8.4	10.1	9.9
EU-15	9.8	9.4	11.7	11.4
Austria	12.5	12.0	13.8	14.4
Belgium	8.5	9.5	10.0	8.4
Bulgaria	1.4	1.3	1.1	1.4
Cyprus	7.9	9.3	5.6	8.6
Czech Republic	5.4	6.3	5.9	6.1
Denmark	18.9	26.5	27.6	28.7
Estonia	6.2	6.7	5.9	5.3
Finland	17.6	23.5	22.8	23.0
France	7.6	7.9	7.8	8.0
Germany	6.0	7.4	8.2	7.8
Greece	3.9	1.8	1.9	2.1
Hungary	6.0	4.6	4.2	4.2
Ireland	9.6	7.2	8.0	8.7
Italy	4.7	6.8	6.2	6.3
Latvia	8.1	9.1	7.6	6.8
Lithuania	4.5	6.5	6.3	5.0
Luxembourg	6.5	9.8	8.5	0.0
Malta	4.2	4.8	5.8	5.5
Netherlands	17.4	17.3	16.6	16.4
Poland	5.0	5.5	5.0	5.0
Portugal	3.7	4.8	4.6	4.4
Romania	1.3	1.6	1.6	1.6
Slovakia	4.8	4.6	5.0	4.4
Slovenia	15.1	17.9	17.8	17.6
Spain	5.8	5.1	12.1	11.6
Sweden	34.2	35.8	18.2	17.5
United Kingdom	21.2	16.0	29.1	27.5

Note: Missing answers are not included. Source: EUROSTAT (2003, 2004, 2005, 2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 2A: Adult participation in education by labour market position and gender (in %)**

	2003						2006					
	employed			unemployed			employed			unemployed		
	men	women	total	men	women	total	men	women	total	men	women	total
EU-27	8.0	11.3	9.4	6.1	8.0	7.0	9.2	12.9	10.8	6.8	9.5	8.2
EU-15	8.9	12.6	10.5	7.7	9.5	8.6	10.5	14.7	12.3	8.5	11.3	9.9
Austria	12.9	14.2	13.5	13.4	13.8	13.6	14.3	17.6	15.8	13.7	20.8	17.3
Belgium	9.0	11	9.9	8.1	12.2	10.0	9.5	9.7	9.6	10.3	12.9	11.5
Bulgaria	0.9	1.4	1.1	0.9	2.5	1.6	1.2	1.3	1.3	0.6	1.4	1.0
Cyprus	7.4	11.4	9.2	3.5	7.8	5.6	8.5	11.4	9.8	3.4	8.6	6.2
Czech Republic	5.4	7.2	6.2	3.3	3.4	3.4	5.9	8.0	6.8	1.6	4.7	3.4
Denmark	15.4	20.8	17.9	14.6	23.8	19.3	25.5	33.5	29.2	35.5	40.7	38.4
Estonia	5.4	8.2	6.8	2.7	10.6	6.4	4.5	6.7	5.6	2.7	13.9	8.4
Finland	15.8	21.9	18.8	16.0	20.3	17.9	22.4	28.9	25.5	14.8	22.1	18.5
France	8.0	8.6	8.3	6.8	9.2	8.1	8.1	9.4	8.7	7.1	8.4	7.8
Germany	5.8	6.3	6.0	3.9	4.8	4.3	7.6	9.0	8.3	4.2	4.7	4.4
Greece	3.1	5.3	3.9	4.4	6.2	5.6	1.3	1.8	1.5	2.4	2.5	2.4
Hungary	5.9	8.5	7.1	1.9	5.0	3.3	3.5	5.2	4.3	2.5	4.9	3.7
Ireland	8.1	12.8	10.1	6.6	13.8	9.2	6.5	11.6	8.7	4.8	14.3	8.5
Italy	2.7	5.0	3.6	4.2	5.1	4.7	5.2	8.2	6.4	7.1	7.2	7.2
Latvia	7.1	12.9	10	1.3	4.7	3.0	5.1	8.4	6.8	1.4	15.5	7.2
Lithuania	3.7	6.7	5.2	2.8	1.7	2.2	3.2	7.8	5.5	1.6	2.6	2.1
Luxembourg	6.5	7.0	6.7	6.5	12.1	9.4	:	:	:	:	:	:
Malta	4.8	7.4	5.5	6.5	9.0	7.2	5.2	11.1	6.9	6.5	6.8	6.7
Netherlands	18.2	21.0	19.4	13.0	20.9	16.6	17.4	18.8	18.0	14.9	19.4	17.1
Poland	5.6	7.8	6.6	2.8	4.9	3.8	5.0	8.0	6.3	2.6	4.6	3.5
Portugal	2.6	3.8	3.1	6.6	7.7	7.2	3.3	4.0	3.6	4.4	8.2	6.5
Romania	0.7	1.3	1.0	0.8	1.8	1.2	1.1	1.6	1.4	0.9	1.1	0.9
Slovakia	5.8	6.6	6.2	1.5	2.3	1.9	4.7	6.6	5.5	0.8	2.3	1.6
Slovenia	15.8	20.2	17.8	10.5	13.9	12.2	17.5	21.1	19.2	20.1	24.3	22.5
Spain	3.8	6.2	4.7	9.5	11.4	10.7	9.9	14.3	11.7	13.4	18.5	16.4
Sweden	30.0	36.8	33.3	30.9	31.1	31.0	11.4	21.2	16.1	26.5	32.4	29.4
United Kingdom	18.4	28.5	23.1	18.0	24.6	20.5	23.6	34.9	29.0	19.6	31.1	24.7

Source: EUROSTAT (2003, 2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 3A: Adult participation in education by occupation (in %)**

	2003		2004		2005		2006	
	ISCO 1-3	ISCO 4-9						
EU-27	14.9	6.0	14.5	5.6	17.2	7.2	16.6	6.8
EU-15	15.6	7.0	15.1	6.5	18.5	8.6	17.8	8.3
Austria	21.8	9.2	20.0	8.7	23.3	10.0	24.5	10.0
Belgium	14.6	6.4	17.0	6.8	17.0	6.4	13.7	6.2
Bulgaria	2.2	0.6	2.3	0.5	1.4	0.5	2.6	0.7
Cyprus	17.7	5.4	21.5	6.0	12.6	3.7	19.3	5.7
Czech Republic	11.9	2.7	14.2	2.9	12.6	2.5	12.9	2.7
Denmark	22.8	13.4	33.2	19.6	34.7	22.5	34.8	23.4
Estonia	13.7	2.5	14.8	3.4	12.1	3.0	10.1	2.1
Finland	25.8	13.2	35.8	18.3	35.2	17.0	34.2	17.6
France	12.5	5.4	13.0	5.6	12.2	6.0	12.6	6.1
Germany	8.9	3.6	11.9	4.4	13.2	5.0	12.7	4.4
Greece	7.1	2.5	2.9	0.9	2.7	0.7	2.6	0.9
Hungary	13.0	3.9	9.4	2.6	8.1	2.6	7.7	2.3
Ireland	14.2	6.9	10.3	4.8	11.9	5.0	12.0	6.3
Italy	6.2	2.3	12.1	3.7	10.9	3.1	10.9	3.2
Latvia	21.5	4.2	22.5	4.9	18.4	3.6	13.2	2.9
Lithuania	11.0	2.5	17.0	2.6	15.3	2.7	11.1	2.4
Luxembourg	10.4	4.2	15.5	6.8	12.4	5.5	0.0	0.0
Malta	11.3	2.1	11.4	2.7	11.5	4.1	11.6	3.8
Netherlands	23.2	14.6	22.6	14.7	21.9	14.1	21.7	13.7
Poland	13.7	3.1	14.0	3.7	13.0	2.9	12.9	2.8
Portugal	6.9	1.8	8.5	2.6	7.1	2.5	7.5	2.1
Romania	3.3	0.3	4.0	0.8	3.8	0.6	3.5	0.7
Slovakia	10.9	3.5	11.2	2.5	11.1	2.6	11	2.3
Slovenia	29.7	10.4	34.1	11.7	32.6	11.7	30.5	10.7
Spain	7.9	3.2	6.7	2.8	20.9	8.5	18.8	8.2
Sweden	44.3	23.7	46.8	25.0	20.7	13.1	20.0	12.4
United Kingdom	29.5	18.0	18.6	13.0	36.7	24.6	34.5	23.5

Note: only working population is included; missing answers are not included.  
Source: EUROSTAT (2003, 2004, 2005, 2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 4A: Adult participation in education by demanding occupation (in %)**

	ISCO 1	ISCO 2	ISCO 3	ISCO 1-3
EU-27	12.4	20.6	15.2	16.6
EU-15	13.3	22.4	16.3	17.8
Austria	18.0	33.8	22.0	24.5
Belgium	10.0	17.4	10.6	13.7
Bulgaria	1.9	2.6	3.2	2.6
Cyprus	14.5	25.2	14.3	19.3
Czech Republic	10.8	18.7	10.7	12.9
Denmark	26.6	37.5	35.7	34.8
Estonia	7.5	13.9	8.3	10.1
Finland	30.3	39.0	31.5	34.2
France	7.7	15.4	12.8	12.6
Germany	7.8	16.6	11.1	12.7
Greece	0.8	3.8	2.9	2.6
Hungary	5.2	9.1	7.9	7.7
Ireland	7.1	15.9	12.4	12.0
Italy	5.5	17.0	10.2	10.9
Latvia	12.1	17.1	10.8	13.2
Lithuania	9.2	12.1	11.4	11.1
Malta	4.7	15.6	13.0	11.6
Netherlands	15.4	24.4	22.6	21.7
Poland	8.0	16.9	9.9	12.9
Portugal	2.9	11.3	7.7	7.5
Romania	3.5	2.8	4.1	3.5
Slovakia	9.8	14.2	9.5	11.0
Slovenia	25.1	36.0	27.5	30.5
Spain	7.3	26.8	17.3	18.8
Sweden	16.6	21.3	19.6	20.0
United Kingdom	27.3	39.5	37.1	34.5

Note: missing answers are not included.  
Source: EUROSTAT (2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 5A: Adult participation in non-formal education (in %)**

	2003	2004	2005	2006
EU-27	5.4	5.3	6.9	6.0
EU-15	6.1	6.2	8.3	7.1
Austria	10.1	9.5	11.2	11.5
Belgium	(:)	7.7	7.7	6.3
Bulgaria	0.4	0.3	0.2	0.3
Cyprus	6.6	7.9	4.5	7.2
Czech Republic	4.4	4.7	4.0	4.4
Denmark	13.1	20.7	22.2	24.3
Estonia	2.9	2.9	2.2	2.4
Finland	12	17.2	16.6	16.7
France	6.9	7.2	7.1	7.3
Germany	3.3	4.7	5.3	5.1
Greece	2.7	0.6	0.7	0.6
Hungary	(:)	1.8	1.6	1.5
Ireland	5.7	3.9	4.3	5.0
Italy	(:)	3.9	3.4	3.4
Latvia	4.3	4.1	3.0	3.9
Lithuania	(:)	3.2	2.9	1.7
Luxembourg	5.5	9.0	7.5	(:)
Malta	(:)	3.5	4.2	4.2
Netherlands	11.7	11.1	10.5	10.4
Poland	(:)	2.5	1.8	2.2
Portugal	(:)	1.9	1.6	1.5
Romania	0.2	0.3	0.2	0.1
Slovakia	4.0	3.3	3.4	2.9
Slovenia	9.0	11.0	11.2	11.4
Spain	3.5	3.0	9.3	(:)
Sweden	27.5	30.4	13.3	12.8
United Kingdom	(:)	6.6	21.7	20.7

Note: students of formal education are not included. Missing answers are not included. In the following countries there is higher proportion of missing answers that could influence the results: Sweden, UK, Netherlands, France in 2003, 2004, 2005, 2006, Poland in 2005.

Source: EUROSTAT (2003, 2004, 2005, 2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 6A: Adult participation in non-formal education by education attainment level (in %)**

	2003			2006		
	ISCED					
	0-2	3,4	5,6	0-2	3,4	5,6
EU-27	2.3	4.9	10.9	2.3	5.2	12.9
EU-15	2.6	5.9	11.4	2.6	6.8	14.2
Austria	3.2	10.3	20.5	4.4	10.9	22.2
Belgium	(:)	(:)	(:)	2.4	5.2	11.8
Bulgaria	0.0	0.4	1.0	0.0	0.1	0.9
Cyprus	1.5	5.4	14.6	1.3	5.8	15.4
Czech Republic	0.6	3.5	14.0	0.6	3.3	13.8
Denmark	8.2	10.7	19.7	14.9	21.7	32.6
Estonia	0.6	1.9	5.8	0.0	2.2	3.6
Finland	6.4	10.2	18.6	8.6	13.8	25.5
France	3.4	6.7	12.6	3.1	7.0	13.4
Germany	0.8	2.5	7.2	1.5	3.6	11.2
Greece	0.5	3.1	7.2	0.1	0.5	1.7
Hungary	0.0	0.0	0.0	0.4	1.3	3.6
Ireland	2.5	5.4	11	2.1	4.4	9.3
Italy	(:)	(:)	(:)	0.9	4.1	11.9
Latvia	0.9	2.9	12.8	1.7	2.9	8.8
Lithuania	(:)	(:)	(:)	0.0	0.9	4.4
Luxembourg	2.6	6.1	11.8	(:)	(:)	(:)
Malta	(:)	(:)	(:)	2.9	5.5	10.5
Netherlands	7.0	12.9	15.5	5.9	11.0	14.3
Poland	(:)	(:)	(:)	0.2	1.2	7.8
Portugal	(:)	(:)	(:)	0.7	2.5	5.4
Romania	0.0	0.2	1.0	0.0	0.1	0.5
Slovakia	0.8	3.4	11.5	0.2	2.1	9.5
Slovenia	1.8	8.1	22.0	3.2	9.0	25.7
Spain	1.5	4.1	8.2	(:)	(:)	(:)
Sweden	14.3	24.8	41.2	7.3	11.9	17.4
United Kingdom	0.0	0.0	0.0	12.3	18.2	30.5
EU-12	0.3	1.9	6.6	0.3	1.4	6.5

Note: students of formal education are not included. Missing answers are not included. In the following countries there is higher proportion of missing answers that could influence the results: Sweden, UK, Netherlands, France in 2003, 2004, 2005, 2006, Poland in 2005.

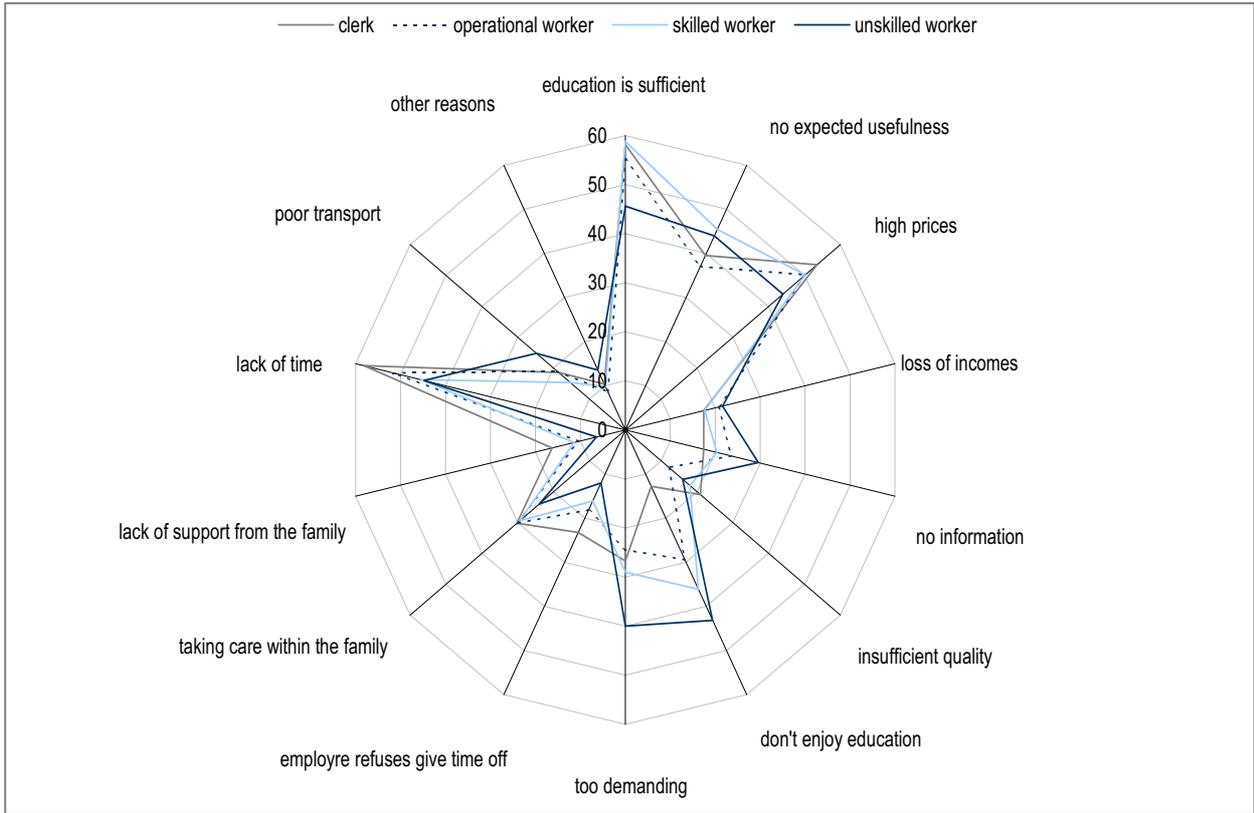
Source: EUROSTAT (2003, 2006b, 2<sup>nd</sup> quarter of individual years), own calculations.

**Table 7A: Factors of not participating in continuing education**

	<b>Factor 1 (Actual barriers)</b>	<b>Factor 2 (Cannot)</b>	<b>Factor 3 (Does not need)</b>	<b>Factor 4 (Given up)</b>
considers education to be sufficient	-0.098	<b>-0.114</b>	<b>0.445</b>	0.018
Insufficient information on course offer	<b>0.149</b>	-0.053	<b>-0.16</b>	0.001
formal education is too demanding	0.093	-0.074	<b>-0.114</b>	<b>0.103</b>
insufficient course offer	<b>0.136</b>	-0.018	-0.023	-0.023
concerns of loss of income or lowered income	0.074	0.008	-0.013	0.032
high prices of courses	<b>0.436</b>	0.032	0.048	0.048
education won't bring the expected usefulness	0.023	-0.06	0.026	<b>0.434</b>
employer refuses to give time off	0.034	0.032	0.007	-0.001
care for family	0.034	<b>0.282</b>	0.023	-0.078
lack of support from within the family	0.002	0.037	-0.016	-0.015
lack of time	-0.023	<b>0.429</b>	0.002	<b>0.122</b>
poor transport	0.103	0.001	-0.033	-0.005
does not enjoy education	<b>-0.17</b>	-0.072	-0.074	<b>0.128</b>

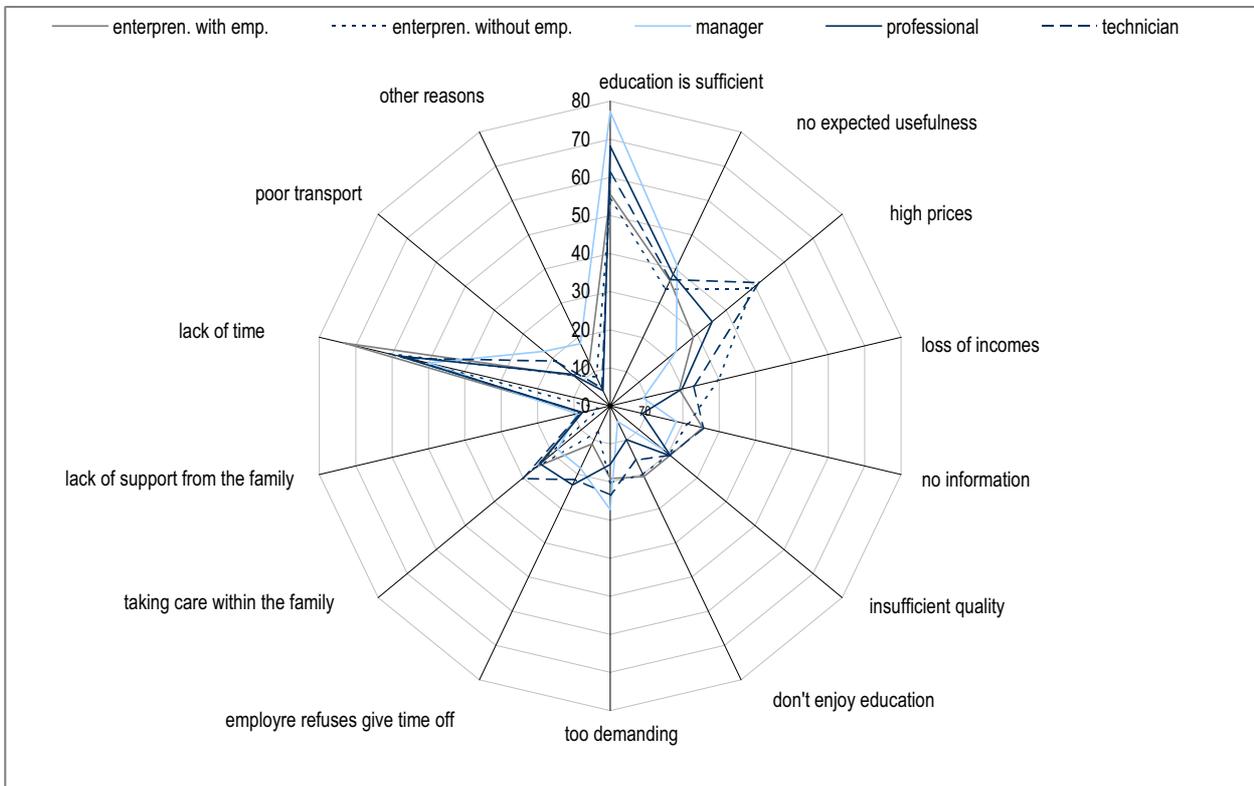
Source: NOZV, CVVM (2006).

**Figure 1A: Reasons for not participating in continuing education by respondent's professional status (in %)**



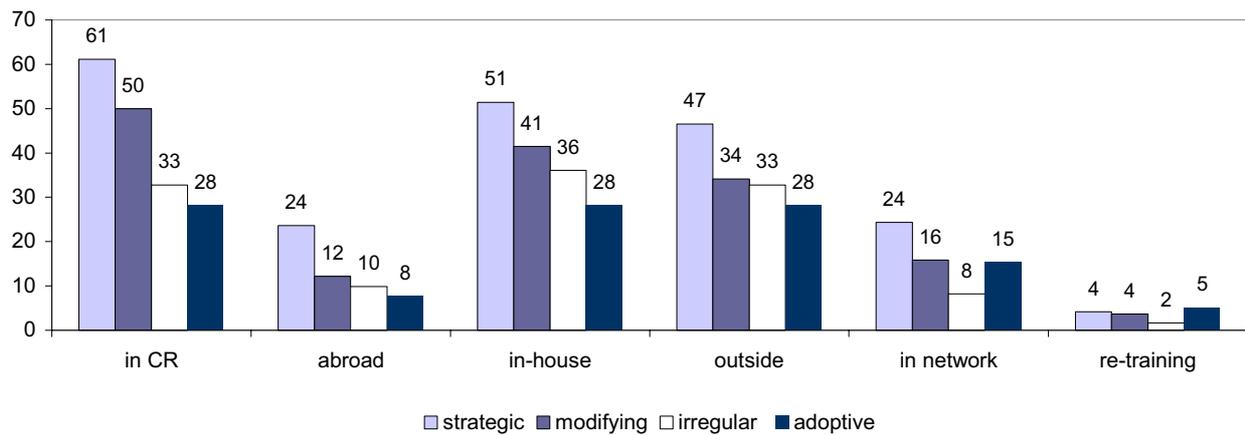
Source: NOZV, CVVM (2006).

**Figure 2A: Reasons for not participating in continuing education by respondent's professional status (in %)**



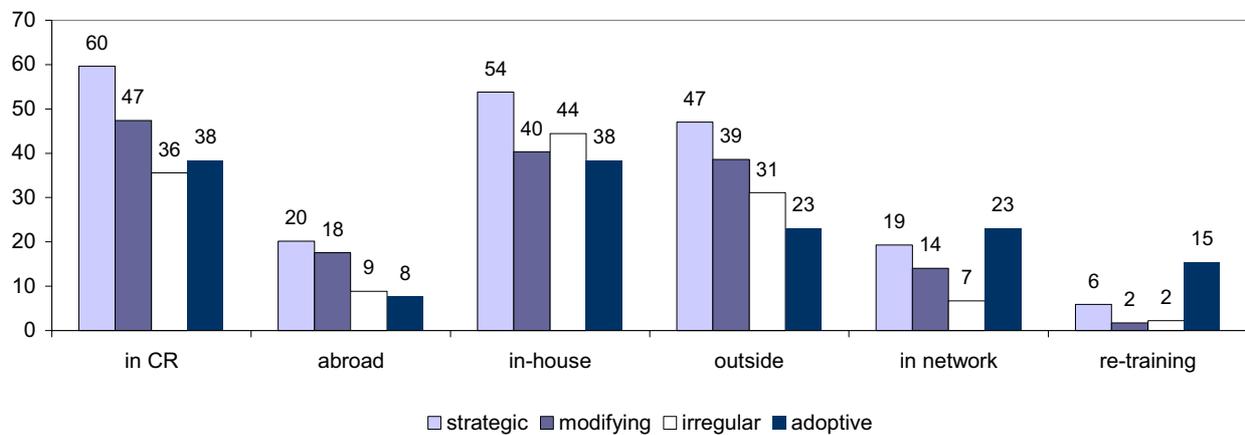
Source: NOZV, CVVM, (2006).

**Figure 3A: Non-formal education of senior officials and managers - ISCO 1 (in %)**



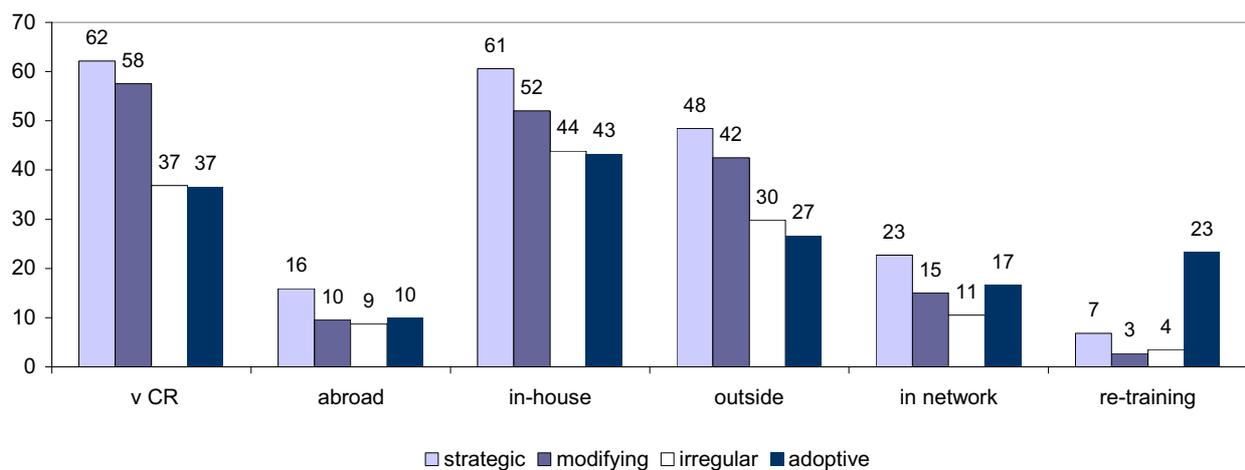
Source: NOZV, MEDIAN (2005), own calculations.

**Figure 4A: Non-formal education of professionals – ISCO 2 (in %)**



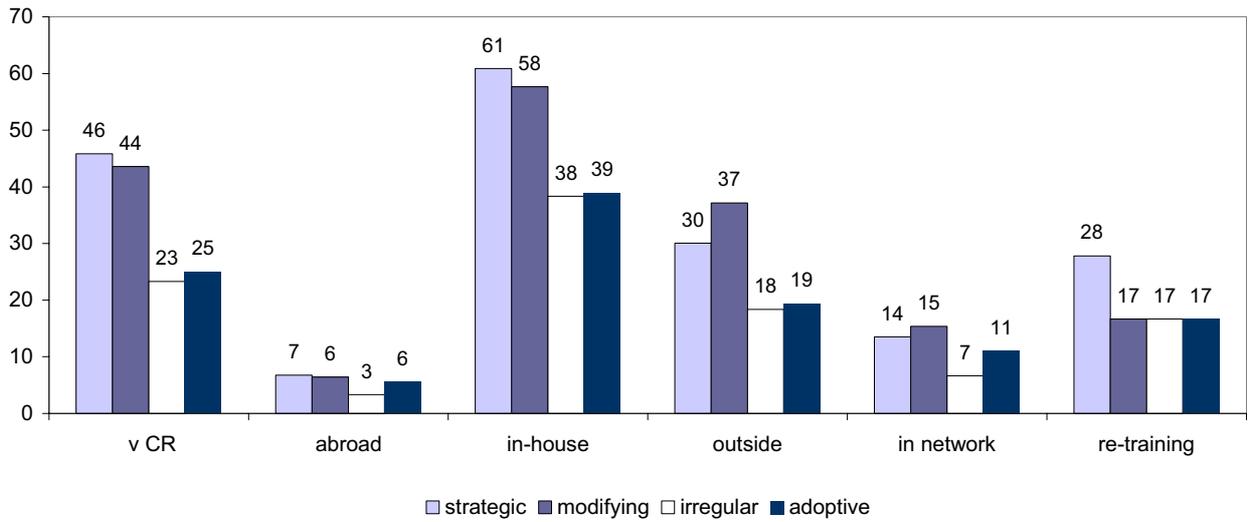
Source: NOZV, MEDIAN (2005), own calculations.

**Figure 5A: Non-formal education of technicians -ISCO 3 (in %)**



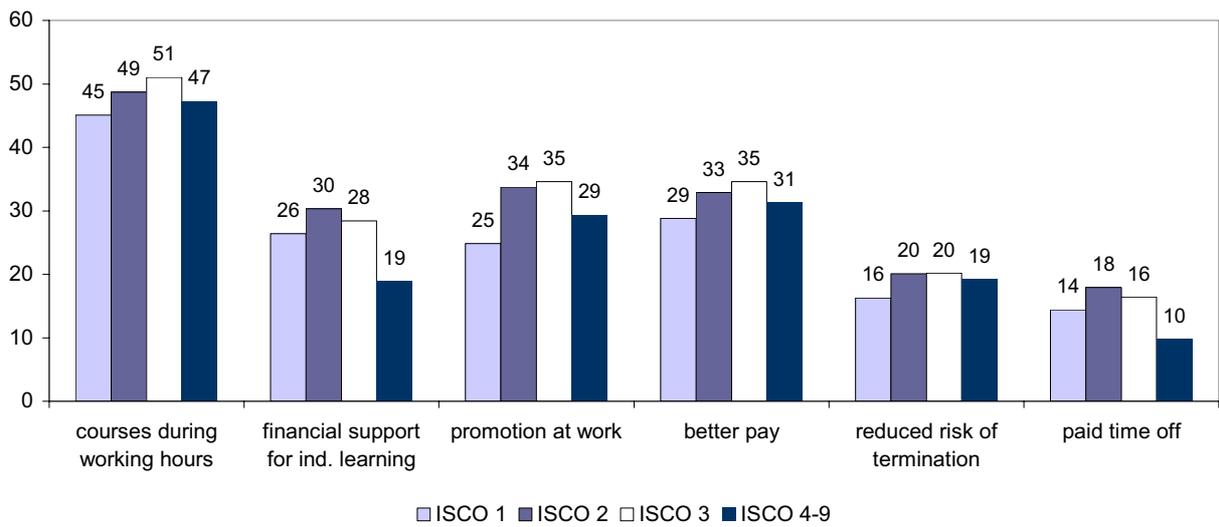
Source: NOZV, MEDIAN (2005), own calculations.

**Figure 6A: Non-formal education of less demanding professions - ISCO 4-9 (in %)**



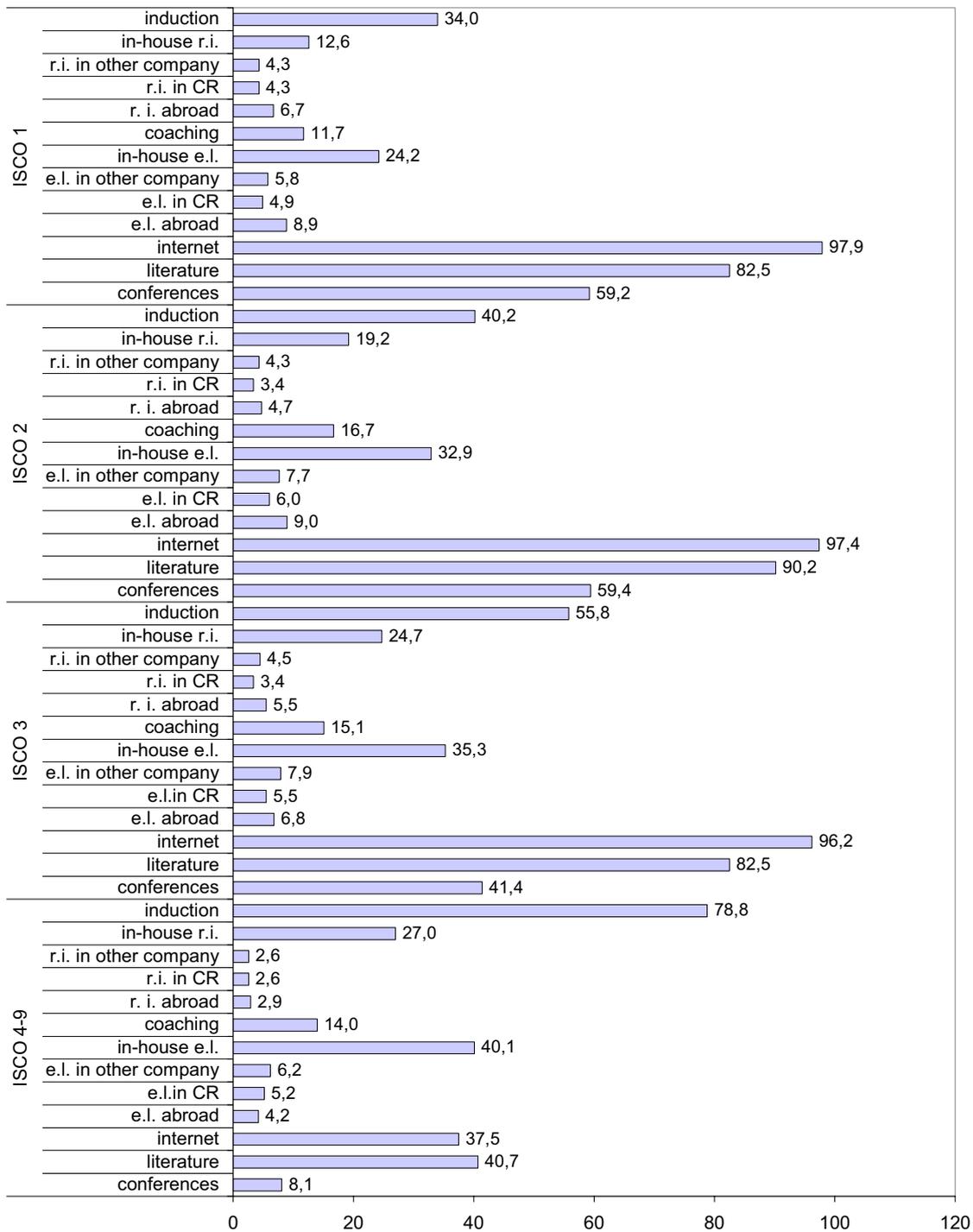
Source: NOZV, MEDIAN (2005), own calculations.

**Figure 7A: Motivation incentives using for enhancing the participation of employees in continuing education (in %)**



Note: Share of innovating companies using the individual incentives often and less often. Only companies employing individual professions are included. Source: NOZV, MEDIAN (2005), own calculations.

Figure 8A: Incentives used for individual professions (in %)



Notes: e.l. = experiential learning; r.i. = rotational internships, Source: NOZV, MEDIAN (2005), own calculations.

## 2. Human resources for the knowledge economy

This chapter is divided into three parts. The first part focuses on the level of qualification-intensity of employment in the Czech Republic, its development and a comparison with the situation in the EU. It is aimed at employment in high-tech and knowledge-intensive sectors, specifically the ICT sector. The second part focuses on questions of wage differences as an incentive for increasing one's level of qualification. It includes an international comparison of the level of wage differences in relation to level of education and the level of qualification-intensity of individual sectors and professions. The third part identifies decisive factors which influence the international openness of national systems of tertiary education, and analyses the mobility of students into and out of the Czech Republic and the individual EU countries.

### 2.1 Employment structure in qualification-intensive sectors and demanding professions

The professional and qualification structure of qualification-intensive segments of the economy is a significant factor in international competitiveness and one of indicators of a country's economic potential. A sufficient number of qualified persons and sectors with a high level of contribution to economic production have an important impact on a country's economic development.

The first factor analysed is the employment structure from the viewpoint of the share of professions at various levels of qualification intensity. This involves a comparison of the situation in the Czech Republic and the EU – not only from this point of view but also because of employment in high-tech manufacturing and knowledge-intensive services. The survey focuses on the development of individual indicators for the years 2000–2006 in the Czech Republic and the EU-27 countries. In some cases, only certain member states were chosen for a comparison. This was done because not all data were always available for all member countries, or because some countries have due to their unique situation such different results that a comparison with the Czech Republic would not offer any useful information.

#### Movement of employment in professions and their qualification structure

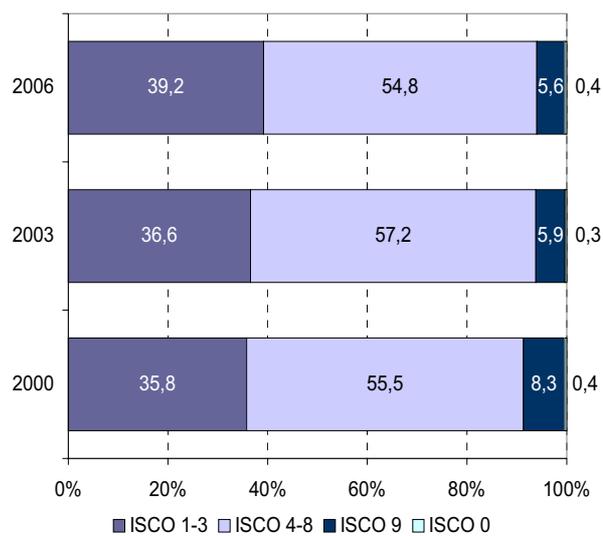
The analysis of employment in professions and of their level of qualification intensity is based on the ISCO-88 International standard classification of occupations. Occupation is understood as a specific activity or set of tasks and obligations performed by a worker. The system identifies 10 major groups (0–9) which are further subdivided. Professions may be identified in exact detail up to a four-digit numerical key.

The major ISCO groups can be organised by their level of qualification intensity into three categories: (i) – demanding professions (ISCO 1–3) (ii) – medium demanding professions (ISCO 4–8) and (iii) – elementary professions (ISCO 9) (for overview see box 2 in chapter 1.1). Members of the armed forces (ISCO 0) are not categorised because their qualification intensity can not be specified by the classification system.

On the basis of this categorisation, in 2000–2006 the Czech Republic showed an increase in employment in

demanding ISCO groups. In this period the number of people working in groups 1–3 as a share of total employment increased by 3.4 percentage points, reaching almost 40%. This increase was reflected primarily in a decrease in the share of less demanding employment in the ISCO 9 group (by 2.7 percentage points). The number of workers in medium demanding professions remained quite high (an almost 55% share) which will be analysed below in relation to developments in other European countries.

Figure 1: Development of employment in the Czech Republic by major ISCO groups (in %)



Source: EUROSTAT (2007c), averages for each year.

The growth of **employment in the ISCO 1–3 groups** reflects the increased qualification intensity of the Czech economy. These groups contain many professions which require university education (ISCED 5A, 6) (see box 2 in chapter 1.1).

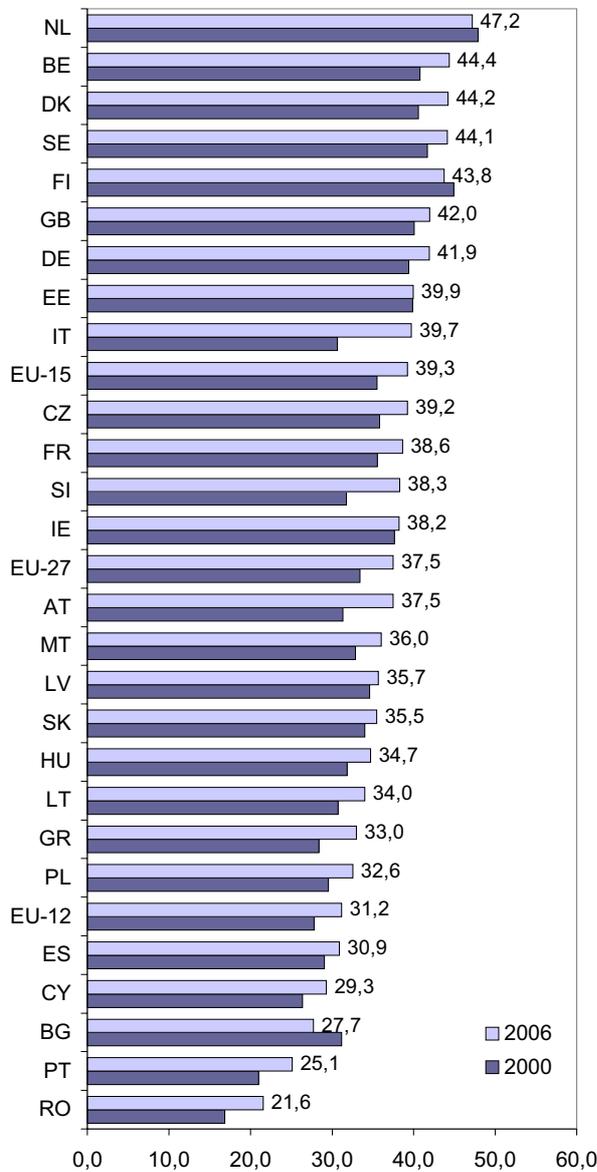
During the period under review the Czech Republic showed a development similar to the aggregate data for the entire EU-27. Increased employment in the ISCO 1–3 groups is a universal phenomenon and in the years 2000–2006 was recorded to varying extents in all countries of the European Union except for Ireland. It is influenced in particular by the individual sectors' employment structure, the initial share of these groups on total employment, the country's level of attractiveness for investors (a key factor for the creation of new jobs) and the economy's development priorities from the labour market point of view and the government's education policy.

Within the European Union the Czech Republic has the tenth highest number of ISCO 1–3 groups as a share of total employment – the same as in 2000 (see table 1A in Annex). In 2006 the ISCO 1–3 groups' share of total employment in the Czech Republic was similar to the EU-15 figure and was significantly better than the EU-27 average as well as the figure for the new EU states which joined in 2004 and 2007 (EU-12).

Among new member states the most knowledge-oriented economy is considered to be that of Estonia

(8th place) where the 2006 level of ISCO 1–3 employment (39.9%) was very close to that in the Czech Republic. In recent years rate of job creation in sectors which produce a higher value added and which create a higher share of jobs requiring tertiary education has been on the rise.

Figure 2: ISCO 1–3 as share of total employment (in %)



Source: EUROSTAT (2007c), averages for each year.

The individual subgroups within ISCO 1–3 (see box 1) developed at different rates. In the years 2000–2006, there was a significant number of people working in particular in ISCO 31 and 34 in the Czech Republic.

For the Czech Republic, the values for these two groups exceeded the average for both western European and eastern European EU members. In mid-2006, the share of ISCO 34 (other associate professionals) was 10.4% of total employment. In view of the high level of heterogeneity of professions included into this category, however, it is not possible to clearly determine any overarching trend influencing growth.

**Box 1: Two-digit categorisation of professions in the ISCO 1, 2 and 3 groups**

The occupational classification system used by the ČSÚ further divides the ISCO 1–3 groups into:

- ISCO-11 Legislators, senior officials
- ISCO-12 Corporate managers (including persons who manage enterprises or organisations, or departments, requiring a total of three or more managers)
- ISCO-13 Managers of small enterprises (including persons who manage enterprises or organisations, or departments, on their own behalf and with the assistance of no more than one other manager classified in this group)
- ISCO-21 Physical, mathematical and engineering science professionals
- ISCO-22 Life science and health professionals
- ISCO-23 Teaching professionals
- ISCO-24 Other professionals
- ISCO-31 Physical and engineering science associate professionals
- ISCO-32 Life science and health associate professionals
- ISCO-33 Teaching associate professionals
- ISCO-34 Other associate professionals

The second most significant group in terms of employment was ISCO 31 (physical and engineering science associate professionals). This group's share of total employment is related to the development of industry which continues to hold a high share of employment and with the development of certain high-tech fields (ICT). This group, too, had a significantly higher share in the Czech Republic than the European average.

Less significant shifts were observed in ISCO 1. There was a slight decline in the number of people working in ISCO 13 (managers of small enterprises). This may be related to the lower number of active small entrepreneurs. According to available information,<sup>6</sup> in 2001–2004 their numbers declined from 1,037,000 to 1,015,000 (by 2.1%). In 2000–2006, the Czech Republic showed opposite employment trends than those found in the more developed EU countries, in particular in groups ISCO 12 (CR: +0.69 percentage point, EU-15: -1.26 p.p.), ISCO 13 (CR: -0.52 p.p., EU-15: +0.77 p.p.) and ISCO 32 (CR: +0.6 p.p., EU-15: -0.1 p.p.)

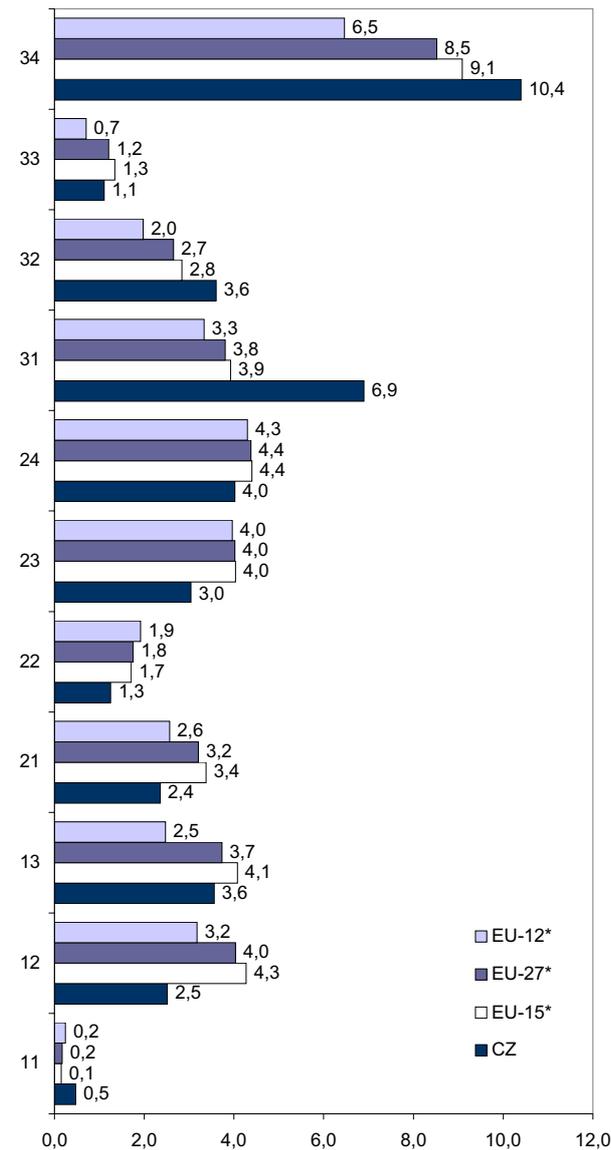
Compared to other EU countries, the Czech Republic showed significantly higher employment only in group 11 (legislators, senior officials).

Research continues to be a weak point of the Czech Republic. Employment is below average in all ISCO 2 groups (which include research professionals). In 2000–2006, in Europe there was an increase in employment particularly in ISCO 24 (other scientists and professionals), while the Czech Republic there was only a very small growth in comparison to other countries. Nevertheless, with a 4% employment share in 2006, ISCO 24 is the third most represented group of ISCO 1–3 professions in the Czech Republic.

Professions classed under ISCO 24 require in particular economically-oriented education. Higher education institutions and tertiary professional schools focused on economics have the second highest number of students in all forms of tertiary education.

<sup>6</sup> ČSÚ (2005a).

**Figure 3: Share of ISCO 1–3 subgroups of total employment (2006, in %)**



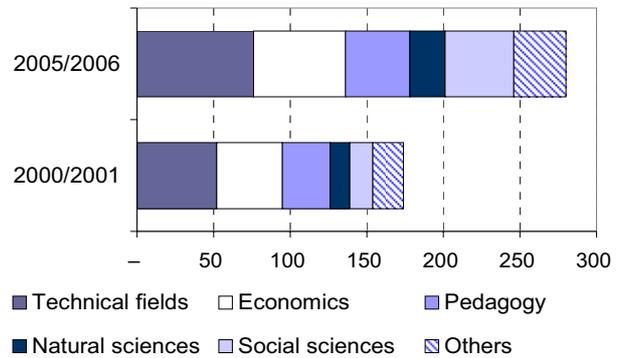
Note: \*Aggregate data does not contain data for Romania.  
Source: EUROSTAT (2007c), averages for each year.

In addition to being influenced by economic factors and employer demand, the development of employment in ISCO 1–3 also results from tertiary education students' preferences in the choice of field of study. From 2000 to 2006, the total number of students at higher education institutions and tertiary professional schools increased by more than 60%. Technical schools recorded a growth of 46%; economic schools, 40%. The fastest growth was in the number of graduates in social sciences, where the number of students increased threefold.

In addition to the share of employment in the ISCO 1–3 groups other factors are tracked as well in the area of human resources for the knowledge economy. One such factor is the share of human resources in science and technology (HRST) which the **Canberra Manual**<sup>7</sup> defines as persons with tertiary education or persons working in scientific and technical occupations requiring a high level

of qualification without being formally qualified. This group may be defined as ISCO 2 and 3.

**Figure 4: Number of students in higher education, by fields of education (in thousands)**



Note: "Other" includes fields of study in medicine, agriculture, law and the arts.  
Source: ÚIV (2006b).

In the Czech Republic, HRST (ISCO 2 and 3 and employed tertiary educated persons) increased from a 33.8% share of total employment in 2000 to 36.7% in 2006. The EU average is higher, however (40.1% for the EU-27 and 42.1% for the EU-15 in 2006). Even among the new member states, the Czech Republic is merely slightly above average (the 2006 aggregate for HRST in the EU-12 is 35.5% - see table 2A in Annex). This comparison is less favourable for the Czech Republic for two reasons. We can see again a significant orientation towards sectors with low value added and low demands on qualifications, as well as a low share of investments and government expenditure into research and development.

**The future development of employment** in the HRST group depends on several factors. In the coming years, it will be influenced both by the number of students graduating from tertiary education (see figure 4) as well as by the creation of new demanding jobs.

This factor is also significantly influenced by the level and focus of investments. For instance, among investment projects mediated by CzechInvest<sup>8</sup> in 1993–2006, the share of jobs created in projects with value added<sup>9</sup> was a mere 14%.

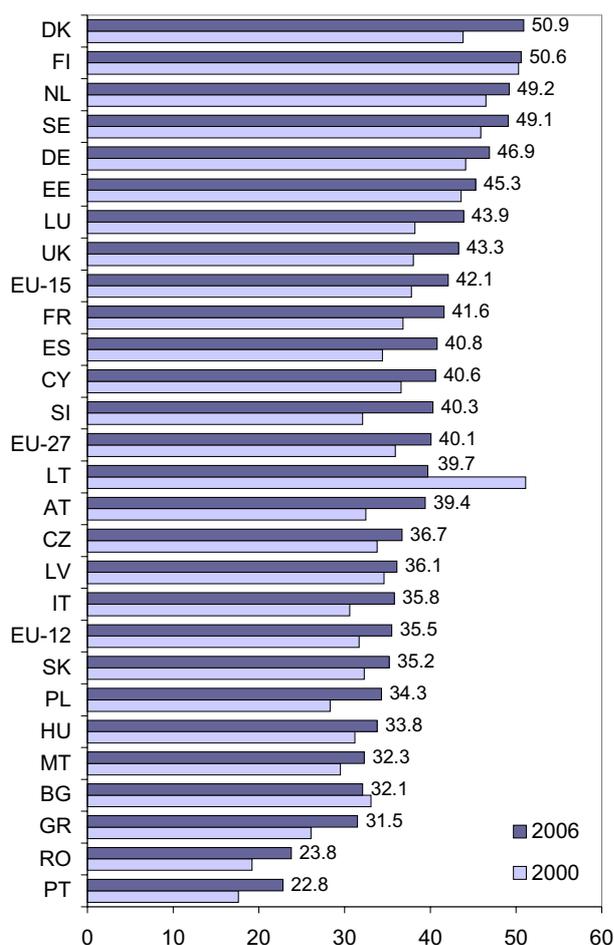
Within the HRST group, the professional group which receives the greatest attention regarding assessment of the economy's qualification intensity are so-called "scientists and engineers" – ISCO 21 (physical, mathematical and engineering science professionals) and ISCO 22 (life science and health professionals).

In an international comparison of this category, the Czech economy's distance from high-tech countries is significant. In this group's share of total employment the Czech Republic reaches neither the EU-15 average nor the EU-27 average (see table 3A in Annex). In fact, the 2006 figure for the Czech Republic (3.7%) is lower than the average for the new EU-12 member states (5.1%). Moreover this group's share of total employment in the Czech Republic has slightly decreased in the period under review.

<sup>7</sup> OECD, EUROSTAT (1995).

<sup>8</sup> www.czechinvest.org.

<sup>9</sup> Technology centres and strategic services.

**Figure 5: HRST as a share of total employment in the 25–64 age group (in %)**


Note: HRST=ISCO 2 and 3 + tertiary educated employed persons. Aggregate data for 2006 do not include Ireland. Source: EUROSTAT (2007e), averages for each year.

Of the EU-12 countries, Hungary and Estonia deserve mention as countries which are building their economies on scientific and technological progress; here, the number of scientists and engineers as a share of the total number of employed persons is roughly one-fourth higher than in the Czech Republic.

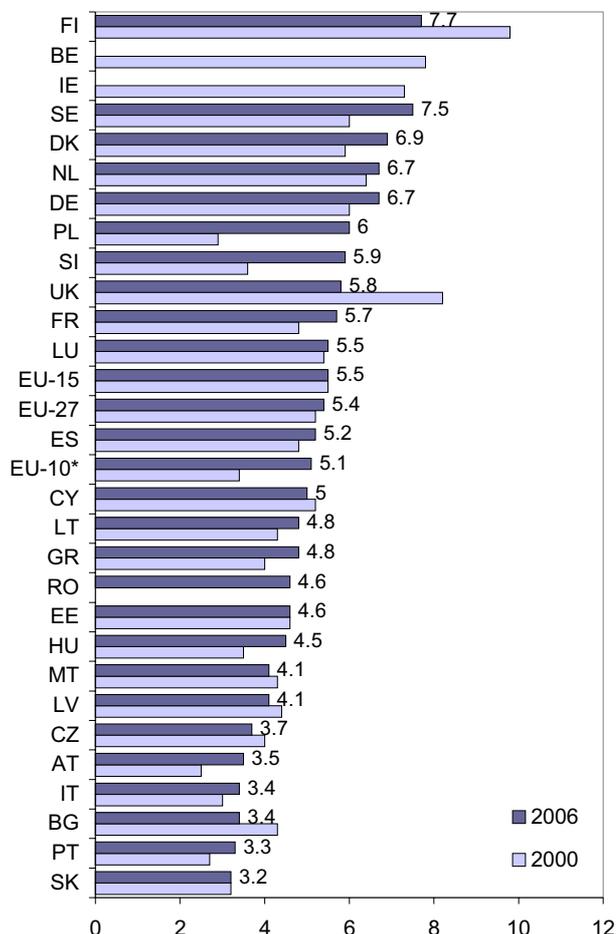
In 2006, scientists and engineers had the greatest share of employment in this group in Poland (6%). From the European point of view the leading countries are the Scandinavian countries, Belgium, Ireland and the Netherlands where the indicator was up to twice as high as in the Czech Republic (a 7–8% share of total employment).

In 2006, the Czech Republic was the sixth worst EU-27 country in this indicator – a significant drop since 2000, when the country placed 17th.

The professional structure in the Czech Republic in 2006 further shows a **high share of persons employed** in groups ISCO 4–8 (see figure 1) – a reflection of the traditionally high share of industrial production requiring qualified blue-collar workers and the historically younger trend of growth in professional services.

**Groups ISCO 4–8** are labelled as medium demanding. They usually require upper secondary education with apprenticeship certificate (ISCED 3c) or school-leaving

examination (“maturita”-ISCED 3A) and, except for lower positions in the tertiary sector (services, sales), represent the main part of employees in industry. (see Box 2 in chapter 1.1).

**Figure 6: Scientists and engineers as a share of total employment in the 25–64 age group (in %)**


Note: \*New member states joining in 2004 (does not include Romania and Bulgaria). Source: EUROSTAT (2007e), averages for each year.

The Czech economy’s greater orientation towards the development of industry has enabled the Czech Republic to maintain employment in this group at a relatively high level while in other European countries it has fallen much more rapidly. Neighbouring Slovakia has gone through a similar development as the Czech Republic.

**Table 1: Decline in ISCO 4–8 as a share of total employment (in %)**

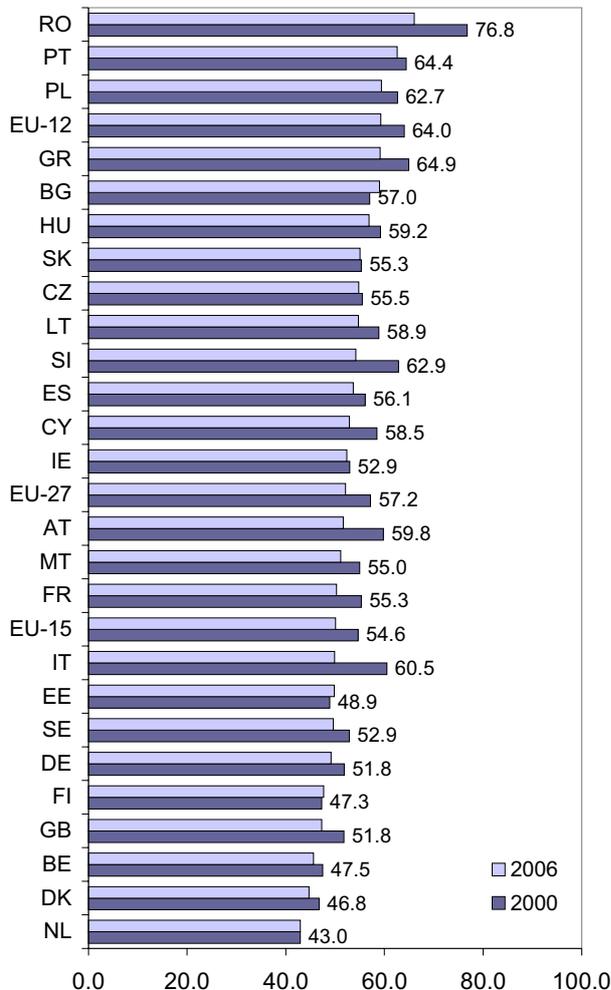
Country	Change 2000-2006 in pc
EU-27	-5.1
EU-15	-4.5
EU-12	-4.8
Czech Republic	-0.7
Slovakia	-0.3

Source: EUROSTAT (2007c), averages for each year.

The new EU members are characterised by a higher share of employment in ISCO 4–8, as well as by the fact that this share decreased more quickly in 2000–2006 than

in the EU-15 countries. The Czech Republic and Slovakia represent two exceptions to this trend. Both countries have founded their economic growth on significant support of foreign investment that would create a large number of jobs in industry. The growth in industrial employment helped to maintain a large percentage of jobs in ISCO 4–8 despite the growing demand for professions with higher educational requirements.

Figure 7: ISCO 4–8 as a share of total employment (in %)



Source: EUROSTAT (2007c), averages for each year.

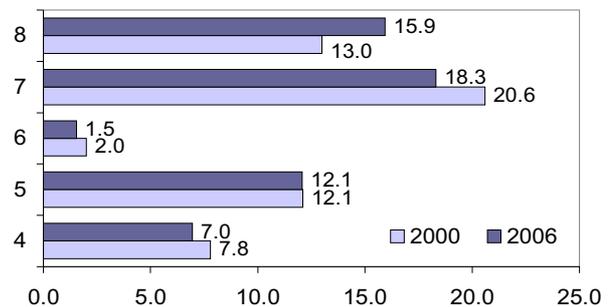
In the Czech Republic ISCO 4–8 category is headed by group 7 (18.3% of total employment in 2006). However this group's share is dropping, (by 2.7 percentage points, in 2000–2006). An overwhelming number of employees in this group are extraction and building trade workers (group 71 or more precisely 712) and metal and machinery workers (group 72).

In 2000–2006, these groups' share of total employment dropped by roughly 1 percentage point. One of the reasons may be the decreased interest in studying related fields on secondary education level. We are also seeing a decrease in the extent of professional manual labour in industry and advancing automatization with increased demands on machine operation.

A decline can also be witnessed in ISCO 6 which is related in particular with low interest in agricultural, forestry

and related work and with the decreasing significance of these sectors in the Czech economy.

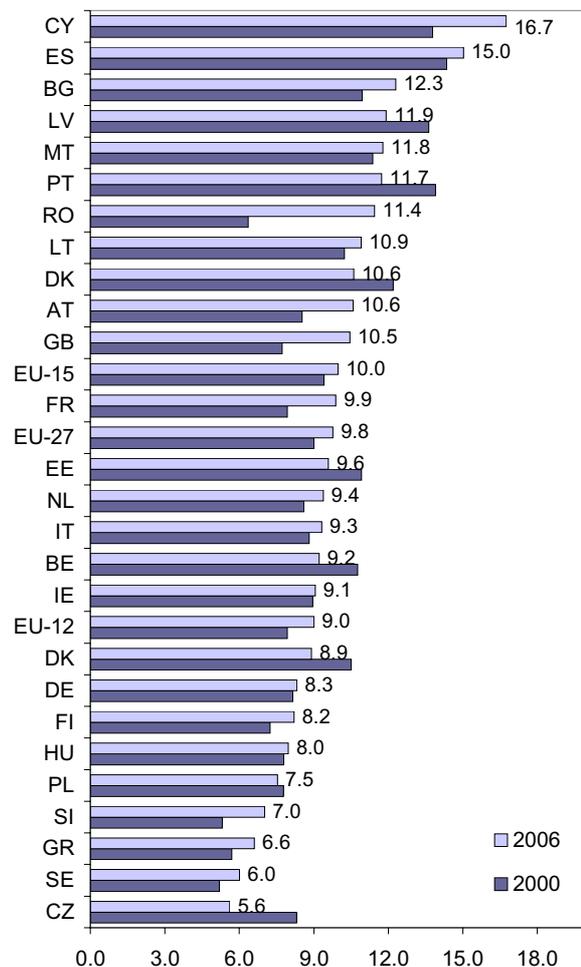
Figure 8: Development of ISCO 4–8 as a share of total employment in the Czech Republic (in %)



Source: EUROSTAT (2007c), averages for each year.

On the other hand, a growth trend was recorded in group ISCO 8 (Plant and machine operators) where the share of total employment grew by 2.9 percentage points, since 2000 to almost 16%. This trend is the result of important investments into industrial sectors with a large number of professions requiring the ability to operate machine technology (the automobile, electronics, machine and plastics industries).

Figure 9: ISCO 9 as a share of total employment (in %)



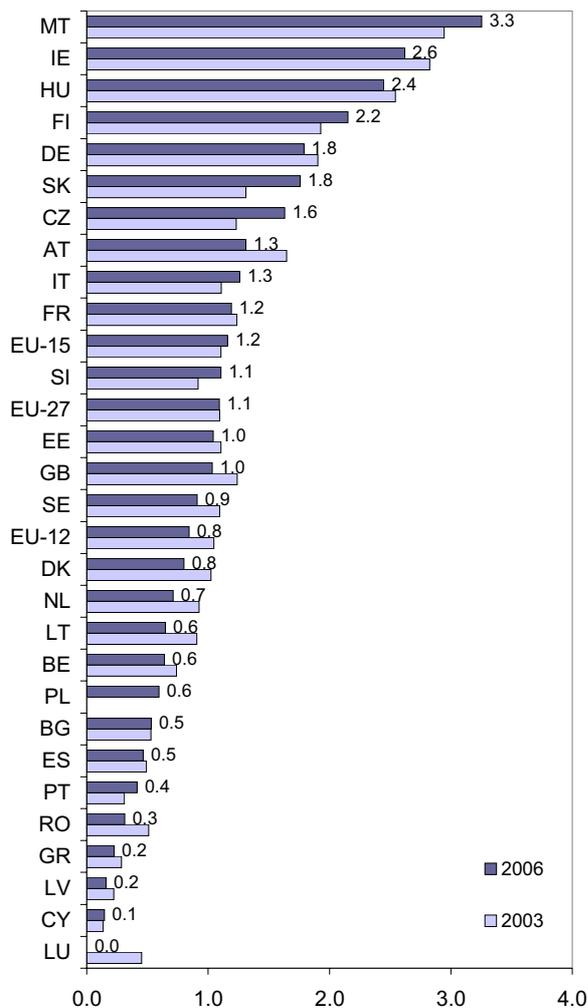
Source: EUROSTAT (2007c), averages for each year.

The years 2000–2006 saw a significant **decline in the share of employment in group ISCO 9** (Elementary occupations). Except for Luxembourg in 2006 the Czech Republic had the lowest share of employees in ISCO 9 within the entire EU. Professions requiring unskilled work are being gradually pushed out of the labour market. This favourable development has been significantly influenced in particular by the restructurisation of the economy and the concurrent increase in requirements for employment, which has led to the gradual decrease in the ability of low skilled persons to succeed in the labour market.

**Changes in employment in qualification-intensive sectors and ICT sectors**

In this chapter we use “**qualification-intensive**” to label selected sectors in the manufacturing industry and services characterised by an increased share of jobs requiring tertiary education or of professionals and technicians employed in ISCO groups 2 and 3 without such education. Qualification intensity is assessed both in industrial as well as service sectors.

**Figure 10: Employment in high-tech manufacturing as share of total employment (in %)**



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg  
 Source: EUROSTAT (2007c), averages for each year, own calculations.

In the OECD classification system, the manufacturing industry includes three sectors classified as “**high-tech manufacturing**” and another five sectors labelled as “**medium high-tech manufacturing**”. Their precise categorisation may be found in box 2.

Within the EU the Czech Republic stands out in that its manufacturing industry creates a large percentage of jobs – more than one fourth of all jobs. The EU average is less than one fifth.

As a result, in an international comparison the Czech Republic shows a higher share of employment in high-tech manufacturing and a lower share in knowledge-intensive service sectors (see table 4A in Annex).

However, the Czech manufacturing industry continues to be overwhelmingly tilted towards sectors with low value added and generally with lower qualification requirements on the labour force.

High-tech sectors in the Czech Republic are experiencing different levels of development. While computer production is one of the sectors with the greatest growth dynamics (in 2000–2005, the number of jobs increased by more than 5,700 new jobs, representing an increase of 264%), the remaining two sectors are only growing slowly.

**Box 2:**

OECD classifications divide the high-tech manufacturing industry at the level of the double-digit NACE<sup>10</sup> into two main groups:

**High-tech sectors of the manufacturing industry:**

- Manufacture of office machinery and computers (NACE 30)
- Manufacture of radio, television and communication equipment and apparatus (NACE 32)
- Manufacture of medical, precision and optical instruments, watches and clocks (NACE 33)

**Medium high-tech sectors of the manufacturing industry:**

- Manufacture of chemicals and chemical products (NACE 24)
- Manufacture of machinery and equipment not elsewhere classified (NACE 29)
- Manufacture of electrical machinery and apparatus not elsewhere classified (NACE 31)
- Manufacture of motor vehicles, trailers and semi-trailers (NACE 34)
- Manufacture of other transport equipment (NACE 35)

In manufacture of telecommunication equipment sector 1,210 new jobs were created (an increase of 3.7%) and the manufacture of medical and precision instruments sector added 1,652 jobs (a growth of 8% in five years)<sup>11</sup> (see figure 11).

We may expect that in the coming years, the Czech Republic will further increase its share of employment in high-tech sectors.

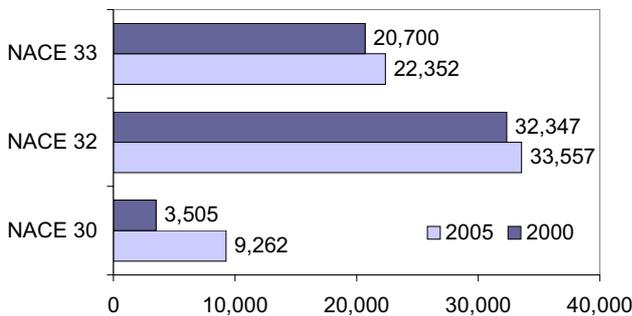
In particular the manufacture of radio, television and communication equipment and apparatuses recorded

<sup>10</sup> According to the OECD definition, a full listing of these sectors also includes NACE 24.4 – Manufacture of pharmaceuticals, medicinal chemicals and botanical products (pharmaceutical industry) and NACE 35.3 – Manufacture of aircraft and spacecraft. The methodology used for statistical analysis, however, allows us to gain comparable data for all EU member states only for double-digit NACE classes. For this reason, these two fields are not included in the analysis of high-tech sectors.

<sup>11</sup> ČSÚ (2007c), Registered number of employees.

significant investments that should add more than 10,000 new jobs to the sector over the next 10 years.

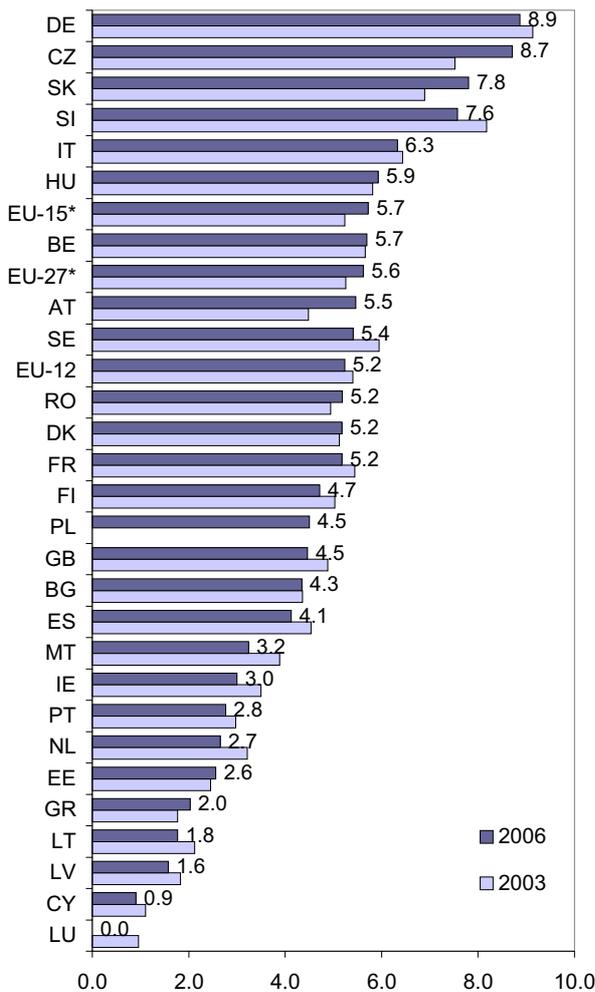
**Figure 11: Development of employment in high-tech sectors in the Czech Republic (persons)**



Source: Ministry of Industry and Trade (2006).

Among medium high-tech manufacturing, the Czech Republic has the second largest share of total employment of all EU members, thus approaching first-place Germany (see table 5A in Annex).

**Figure 12: Employment in medium high-tech manufacturing as a share of total employment (in %)**



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg  
 Source: EUROSTAT (2007c), averages for each year, own calculations.

As in neighbouring Slovakia, the rate of employment growth in this group is significantly influenced by ongoing investments into automobile manufacture and related suppliers. According to CzechInvest, newly created jobs in the automotive industry represented a total 34.8% of new jobs created as part of projects supported within the framework of the Act on Investment Incentives.

Among the EU-12 countries, in the 2003–2006 period there was a more than five-fold growth in employment in these sectors. The Czech Republic and Slovakia have the most important share in this development.

In most “knowledge economies” (Finland, Ireland, Estonia, Sweden), employment in this group has recorded stagnation or a decline and is at a markedly low level. With the growth in the price of labour in the Czech Republic, we may expect that this group’s share of total employment will no longer increase and will rather show a slight decline over the coming years.

When analysing investment projects over time, we can already see a gradual increase in the share of high-tech investments requiring a higher average level of employee qualification. In particular, there is increased investment into knowledge-intensive service sectors.

The term “knowledge-intensive services” covers all service sectors with higher qualification requirements on professions. This is subdivided into four subgroups (see box 3).

**Box 3: Knowledge-intensive service sectors**

OECD classifications divide knowledge-intensive service sectors into four main parts:

**High-tech services<sup>12</sup>:**

- Post and telecommunications – NACE 64,
- Computer and related activities – NACE 72
- Research and development - NACE 73

**Market services:**

- Water transport - NACE 61,
- Air transport – NACE 62,
- Real estate activities – NACE 70,
- Renting of machinery and equipment without operator and of personal and household goods – NACE 71
- Other business activities – NACE 74

**Financial services:**

- Financial intermediation, except insurance and pension funding – NACE 65,
- Insurance and pension funding, except compulsory social security – NACE 66
- Activities auxiliary to financial intermediation – NACE 67

**Other knowledge-intensive services:**

- Education – NACE 80,
- Health and social work – NACE 85
- Recreational, cultural and sporting activities – NACE 92

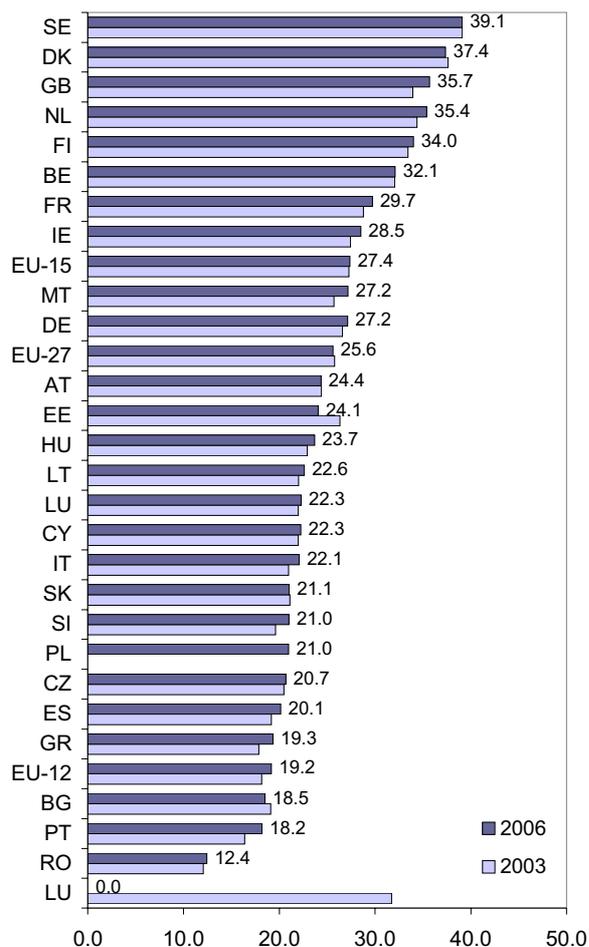
The share of knowledge-intensive services of total employment is an important indicator of an economy’s global competitiveness and level of development. Within the EU, the highest levels are found in the Scandinavian countries, which employ more than one third of all employed

<sup>12</sup> High-tech services are marked by a high percentage of ICT professions, in particular NACE 64 and 72. Besides high-tech services, other important “ICT professions” include financial services, where the share of ICT specialists is three times higher than the economy’s average.

persons in knowledge-intensive service sectors (see table 6A in Annex).

Other countries where more than 30% of employed people work in this group include the Netherlands, Great Britain and Belgium. The Czech Republic (20.7%) is only slightly above the EU-12 (new member states) average, which is significantly influenced by the low value for Romania (12.4%). Except for Bulgaria and Romania, all other EU-12 countries have a higher orientation towards knowledge-intensive services than the Czech Republic.

**Figure 13: Employment in knowledge-intensive services as a share of total employment (in %)**



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg

Source: EUROSTAT (2007c), 2<sup>nd</sup> quarter data, own calculations.

The Czech Republic's poor position is again the result of the significant level of employment in industry and also partially the role played by the large share of manufacturing investments in creating new jobs. Among all EU countries, the Czech Republic's level of employment in knowledge-intensive services places it in 22<sup>nd</sup> place.

If we look closer at the employment structure in these types of services, we see that highly developed economies have a significantly higher level of employment in other knowledge-intensive services (for instance, education).

According to the EUROSTAT indicators, in 2003–2006 the high-tech services' share of total employment in the Czech Republic decreased slightly (from 3.4% to 3%).

**Table 2: Share of employment in knowledge-intensive services in selected EU countries (2006, in %)**

	High-tech services	Market services	Financial services	Other knowledge-intensive services
CZ	3.0	1.1	1.9	14.7
EU-12	2.4	1.0	1.8	14.0
EU-15	3.4	1.6	3.2	19.2
DE	3.4	1.4	3.5	18.9
FI	4.7	2.6	1.9	24.8
SE	5.0	2.3	1.9	29.9
IE	3.8	1.4	4.3	19.0

Source: EUROSTAT (2007c), average for each year, own calculations.

It is necessary, however, to take into consideration the processes currently underway in the individual sectors within this group, in particular the restructuring of large employers in communications and related processes of outsourcing (the purchase of services which the company had previously provided itself, which influences total employment in these services as well as its internal structure).

Significant growth in the Czech service sector, on the other hand, was recorded in the area of computer technology. Demand for IT services and the country's growing significance as a service centre in the area of computer technology has had a positive impact on employment in the NACE 72 group, which has increased by more than one third over three years, to almost 43,000 people.

Overall, it is possible to say that despite the large number of "assembly" plants, the inflow of foreign investments is helping to improve the qualitative and technology structure of both industry and services. A comparison of investments mediated by CzechInvest shows a significant increase in more demanding projects with higher requirements on the labour force's level of qualifications.

**Table 3: Structure of foreign investment in the Czech Republic by project's level of technology (in %)**

Types of investments 1999	
Manufacturing industry	99
Other investments	1
Types of investments 2006	
Manufacturing industry	75
Strategic services	17
Technology centres	8

Source: CzechInvest ([www.czechinvest.org](http://www.czechinvest.org)).

**The development of high-tech services and the ICT sector** in the Czech Republic is significantly dependent on the supply and quality of employees. According to EUROSTAT survey, the Czech ICT sector (see box 4) employed 3.6% of total employment – more than the EU average.

**Box 4 – Division of the ICT sector according to ISIC Rev.3 (International Standard Industrial Classification)**

The ICT sector includes a total of 11 subdivisions; all except one are defined on the basis of the four-digit NACE classification system:

**Manufacturing industry:**

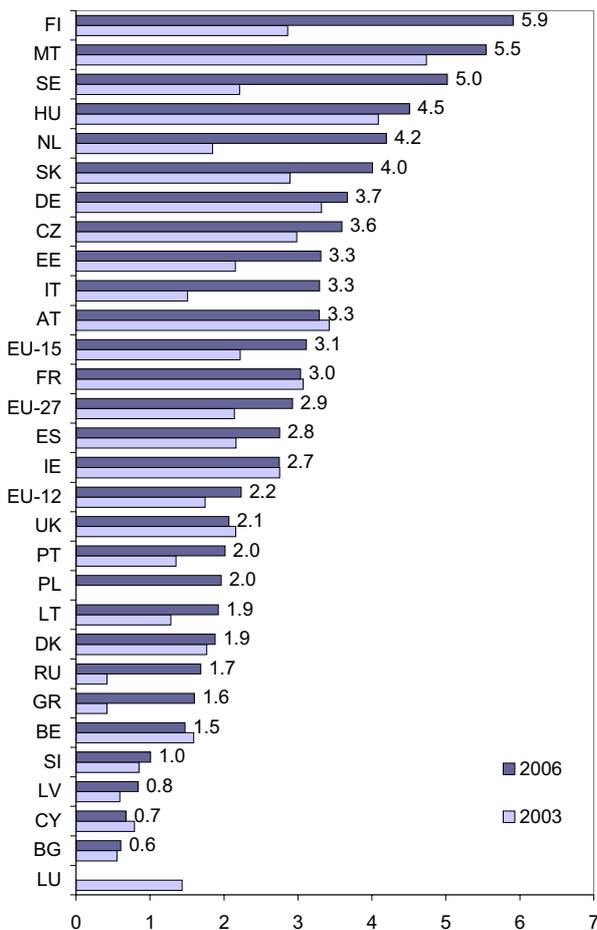
- 3000 – Manufacture of office machinery and computers
- 3130 – Manufacture of insulated wire and cable
- 3210 – Manufacture of electronic valves and tubes and other electronic components
- 3220 – Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- 3230 – Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 3312 – Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 3313 – Manufacture of industrial process control equipment

**Services:**

- 5150 – Wholesale of machinery, equipment and supplies
- 6420 – Telecommunications
- 7123 – Renting of office machinery and equipment (including computers)
- 72 – Computer and related activities

The Czech ICT sector's share of total employment is the 8th highest in the EU.

**Figure 14: Employment share of ICT sector (in %)**



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg  
 Source: EUROSTAT (2007a), averages for each year.

The share of employment in ICT is growing even faster in neighbouring Slovakia than in the Czech Republic; Hungary also has a significantly higher share of ICT workers. Further development of the Czech ICT sector and employment in this sector are supported by EU development programmes from the Operational Programme Enterprise and Innovation.

Currently, in the Czech Republic, there is a demand for workers with ICT qualifications significantly higher than supply. This has a negative effect on the country's attractiveness for foreign investors in this sector and is significantly accelerating the growth of wages in these professions at the same time. Services in the field of computer technology are a sector – both among high-tech services and within the economy as a whole – with relatively high average wages.

In 2006, more than 91,000 IT professionals<sup>13</sup> worked in the Czech Republic. Most of them were employed in the following sectors: telecommunications (NACE 64.2), computer and related activities (NACE 72) and financial intermediation (NACE 65–67).

As shown by figure 15, the only significant branch of manufacturing is the manufacture of electronic and optical instruments (NACE 30–33), where the share of ICT specialists reaches 1.9% of the total number of workers. In 2000–2005, almost all sectors recorded a growth in the number of ICT specialists as a share of the total number of employed people, with the greatest growth in financial intermediation (almost doubling from 5.1% in 2000 to 9.7% in 2006).

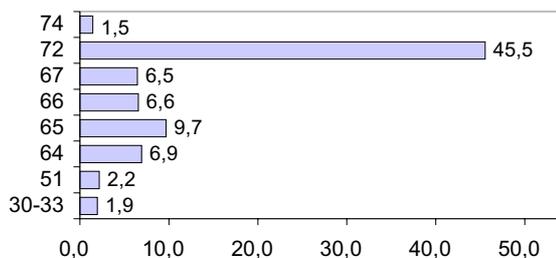
**Box 5 – Employment in ICT fields (ISCO classification)**

in the triple-digit classification of occupations used by the Czech Statistical Office, ICT professions are composed of a total of four groups:

- 213 – Computing professionals
- 312 – Computer associate professionals
- 313 – Optical and electronic equipment operators
- 724 – Electrical and electronic equipment mechanics and fitters

From the viewpoint of qualification intensity, groups 213, 312 and 313 are highly qualification-intensive. Performing these professions requires tertiary education, in some cases at least secondary education with ("maturita"). The professions in group 724 have lower qualification requirements. It is usually enough for workers to have completed secondary school with school-leaving exam ("maturita") or to have apprenticeship training in the field.

**Figure 15: Share of ICT professionals in companies with more than 10 employees (selected NACE sectors, 2006, in %)**



Source: ČSÚ (2006b).

<sup>13</sup> ČSÚ (2006f)

Employment is not developing at the same rate in all key ICT sectors. In services for computer and related activities it has increased each year while the number of employees in telecommunications and financial intermediation has fluctuated. Nevertheless, the market has recorded a constant growth in the demand for ICT specialists that has not been properly satisfied. In addition, there is a high level of demand for such professions in other EU countries as well. This has created the conditions for these professionals' job migrations, in particular into western Europe where wage conditions are often more advantageous. In view of the profession's technological character and the use of English, it is easier for such professionals to find employment abroad than other workers.

**Box 6: Outcomes of study of Competitiveness of Tertiary professional school and University Graduates in IT Fields in the labour market**

In late 2006/early 2007, the Czech Society for Systems Integration, the Association for an Information Society, the Czech Association of Managers in Information Technology and the University of Economics in Prague implemented a project focused on evaluating supply and demand on the market for ICT specialists in the Czech Republic. One of the study's main conclusions was the finding that the current supply of ICT graduates is capable of satisfying only one half of the demand generated by the labour market, and that the annual surplus of demand over supply is around 2,000 positions, most of them requiring tertiary education.

In the coming years, the demand for ICT workers is expected to continue to grow. Experts<sup>14</sup> estimate that by 2010 the market will require up to 4,000 new ICT employees each year.

**Factors in the lack of compliance between qualifications and a profession's demands**

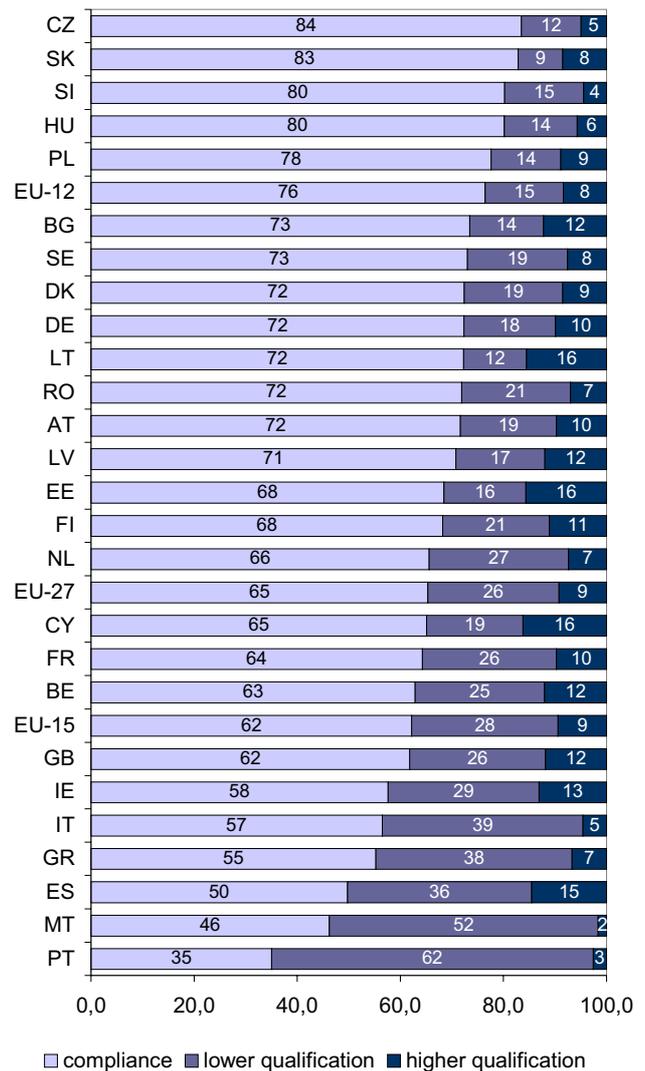
The level of qualification intensity of jobs testifies to a country's level of economic development and its orientation towards a knowledge economy. Ideally jobs would be performed by persons with the required level of qualification, but actual practice may be somewhat different. It may happen that the qualification requirements for a job are higher than the worker's level of education or that the worker is overqualified for the position in question. Both cases of lack of compliance have negative impacts. In the first case, there is the risk of lower work efficiency, which may cause harm to the employer. This situation may be corrected through increased investments into continuing education and employee training. In the second case, there is the risk of reduced motivation for work, the employee is usually paid less, and if he spends a long time working in a position with lower requirements his initial level of qualifications may decrease as well. Compliance between the employee's level of qualification and the requirements of the job in question is an indicator of the effective allocation of work.

This study's detection of the lack of compliance between requirements and qualifications is based on the assumption that ISCO 1 and 2 professions should be performed by workers with tertiary education (ISCED 5,6), ISCO 3 by workers with tertiary or upper secondary education (ISCED 3-6), ISCO 4-8 by workers with upper secondary education (ISCED 3), and ISCO 9 by workers with primary or lower secondary education (ISCED 0-2). Considering

the significant level of simplification in methodology resulting from the lack of access to more detailed categorised data, we should consider the following data and analysis performed on the basis of this data to be of a merely orientational nature.

In a comparison of EU countries, the Czech Republic fared very well. The measured lack of compliance in 2006 showed that for 84% of working people, the professional requirements of their current occupation corresponded to their level of qualification. This data are far above the EU-27 and EU-15 average and places the Czech Republic in the first place within the EU.

**Figure 16: Comparison of qualifications of employed with the professional requirement of their occupation (2006, in %)**



Note: Aggregates are created only from available data for the given year and contain only employed persons. Members of the armed forces and missing answers have been excluded. Source: EUROSTAT (2007c), data for 2<sup>nd</sup> quarter.

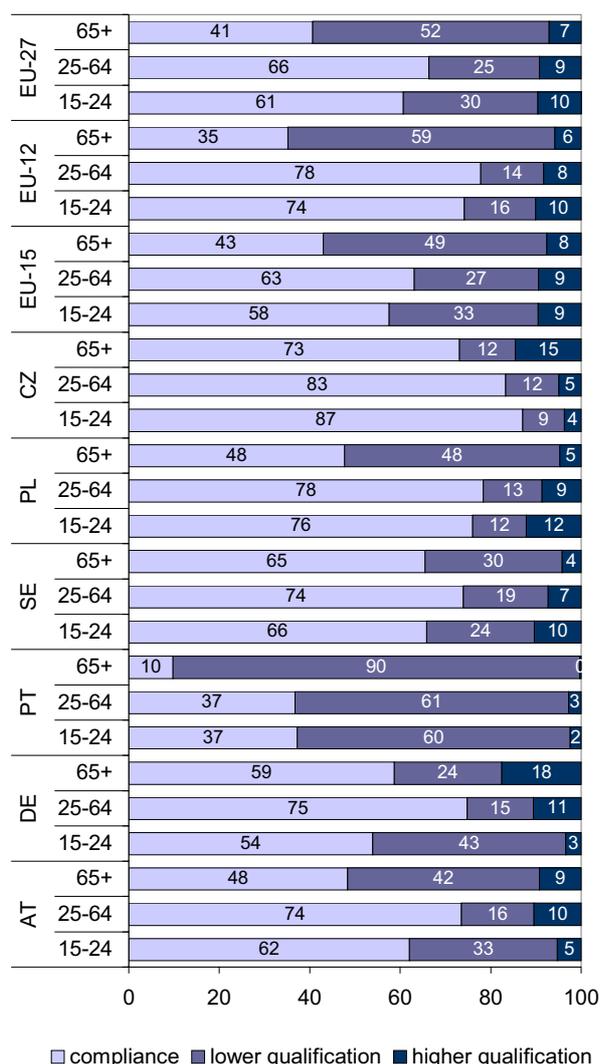
The number of positions where qualifications are in compliance with professional requirements has been increasing slightly. In 1998 there were only 79.5% such job positions in the Czech Republic, while in 2006 this figure was 84%. The measurements for 2006 showed that 11.5% of employed persons in the Czech Republic worked in posi-

<sup>14</sup> See Box 6.

tions for which they had an insufficient level of qualifications (see table 7A in Annex). This is only a slight change over 1998, when there were 14.5% such people.

The development of these indicators may be influenced by the current rate of unemployment or the number of candidates for each available position. The current long-term decrease in unemployment in the Czech Republic has improved the chances of employees for gaining better job positions, while companies have been increasingly forced to make compromises and to hire employees despite an insufficient level of qualification.

**Figure 17: Comparison of employee's qualifications with the professional requirement of their occupation by age group (2006, in %)**



Note: Aggregates are created only from available data for the given year (does not include Luxembourg).  
Source: EUROSTAT (2007c), average for 2006.

The data also showed that only 5% of employees in the Czech Republic were "overqualified" for the work they performed. This is one of the lowest figures in the entire EU. In addition, this trend has shown a slight declining tendency – in 1998 there were 6.1% of such employees. In relation to the expected development in the labour market, it is likely that this share will continue to decline.

The new EU members from Central and Eastern Europe have a higher level of compliance between qualifications and the profession's requirements.

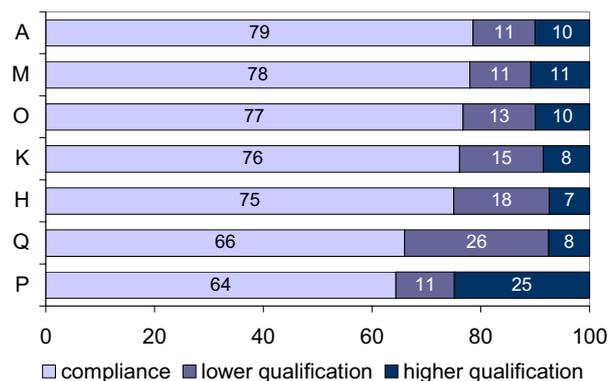
The list is led by the Czech Republic, Slovakia, Slovenia, Hungary and Poland. In western Europe (EU-15), the 2006 share of jobs performed by insufficiently qualified workers was 28.1%; the greatest problems continue to be in southern Europe (Portugal, Italy, Greece and Spain).

The Nordic countries, Germany, Great Britain and Austria also have a higher level of compliance between qualifications and job requirements.

If we look at **the influence of age on lack of compliance**, we find that the required qualification intensity of job positions is met above all by young people, while the compliance between required qualifications and offered level of employment decreases with age.

Among Czech workers older than 65, there has been a rapid decline in the number of people with proper qualifications and an increase in the number of overqualified workers. This situation is a reflection of the fact that working retirees in the Czech Republic frequently perform work which is under their qualification. This does not necessarily mean, however, that their access to the labour market is somehow hindered. In fact, at their age they may find less demanding work with lower work requirements perfectly suitable and a sufficient source of extra income on top of their pensions. It is unusual for Czech workers under 64 to perform work below their level of education. There is a significant worsening among the oldest age categories. A similar situation is found in neighbouring Germany, where 18% of the oldest workers are overqualified for their work. The Czech Republic, on the other hand, has the highest compliance of qualifications with professional requirements among young workers (age 15–24).

**Figure 18: Sectors in the Czech economy with the lowest compliance between qualifications and professional requirements (in %)**



Note: Aggregates are created only from data available in each year.  
Source: EUROSTAT (2007c), average for 2006.

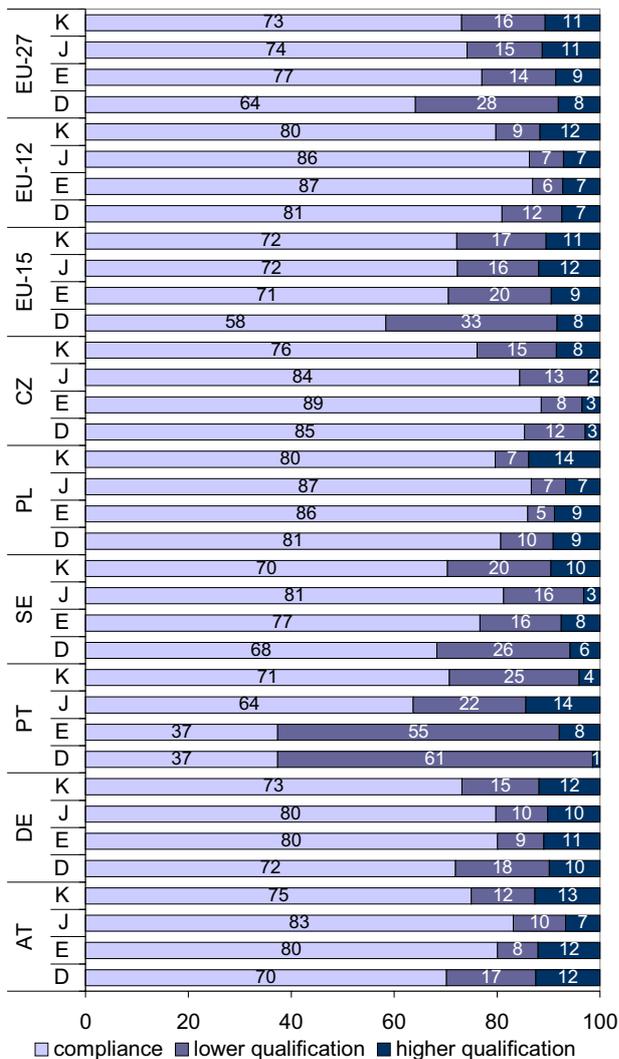
It is also possible to assess **lack of compliance from the individual economic sectors point of view**. Of the basic NACE categories (17 sectors, see box 7), 11 sectors have a level of compliance between qualifications and professional requirements higher than 80%. Only two sectors have a level of compliance lower than 70%, although neither is of key economic importance or employs a significant number of people (see figure 18).

**Box 7: Economic sectors (NACE classification)**

The Czech version of NACE classifications as defined by the Czech Statistical Office includes a total of 17 main sectors:

- A – Agriculture, hunting and forestry
- B – Fishing
- C – Mining and quarrying
- D – Manufacturing
- E – Electricity, gas and water supply
- F – Construction
- G – Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
- H – Hotels and restaurants
- I – Transport, storage and communications
- J – Financial intermediation
- K – Real estate, renting and business activities
- L – Public administration and defence; compulsory social security
- M – Education
- N – Health and social work; veterinary activities
- O – Other community, social and personal service activities
- P – Activities of households
- Q – Extra-territorial organizations and bodies

**Figure 19: Comparison of workers' qualifications with professional requirement in selected countries for selected economic sectors (2006, in %)**

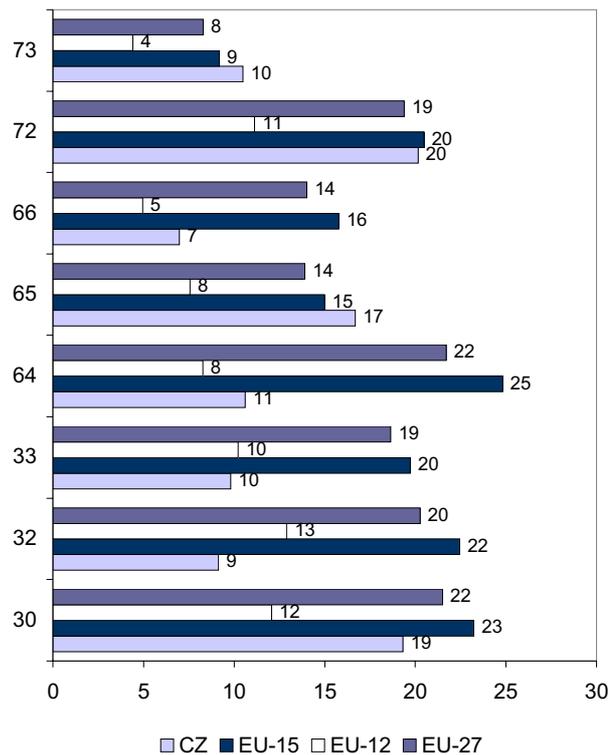


Note: Aggregates are created only from data available in each year (does not include Luxembourg).  
Source: EUROSTAT (2007c), average for 2006.

We generally find a lower level of compliance for service sectors, which are also characterised by a larger number of workers with insufficient qualifications.

Worth noting is the knowledge-intensive sector K, which has the fourth lowest level of compliance and is the third worst sector in terms of workers' insufficient qualifications. This lack of compliance indicates that the Czech Republic has a problem with competitiveness in high-tech sectors. If we compare the situation in the Czech Republic and the EU-12 countries with the more advanced western European economies (see figure 19), we can find a different level of lack of compliance for certain sectors and countries. Generally speaking, manufacturing (D) has a higher compliance of qualifications with work requirements in the EU-12 countries (81%) than in the EU-15 countries (58%). This again confirms the fact that the Central and Eastern European countries are focused more on employment in industry. The EU-12 countries (including the Czech Republic) also have an exceptionally high level of compliance in the energy supply sector (E – 87%). The gap between the EU-15 countries and new member states is smaller for knowledge-intensive services (sectors J and K – see table 8A in Annex).

**Figure 20: Share of jobs in qualification-intensive sectors held by workers with insufficient qualifications (2006, in %)**



Note: Aggregates are created only from data available in each year.  
Source: EUROSTAT (2007c), average for 2006.

If we analyse the lack of qualified workers by more detailed NACE classifications, the Czech Republic does quite well as compared to the EU average. For knowledge-intensive and high-tech sectors, the share of jobs held by workers with insufficient qualifications is generally below the EU-15 and EU-27 averages. The Czech Republic fared worse in Research and development (NACE 73) and Financial intermediation except insurance (NACE 65). In NACE sectors 32, 33, 64 and 66, on the other hand, the

situation in the Czech Republic was significantly better. In general, however, the Czech Republic is closer to the EU-15 average and significantly lags behind the EU-12 average.

## 2.2 Earnings and qualification intensity of work

Wage, as the price of work, reflects the difficulty, qualification intensity, work experience and complicated nature of performing a particular job. At the same time, however, it reflects a balance or imbalance in the labour market for the individual professions or within a certain field of activity, as well as other difficult-to-identify factors. Wage relations retroactively influence decisions made by current and future participants in the labour market: employers' decision on hiring new workers, individuals' decision regarding labour market participation, and students' decision regarding their future professional career. Under certain circumstances, wage relations can thus act as an incentive for increasing one's qualifications or for shifting employees into segments of the economy with a potential for future development.

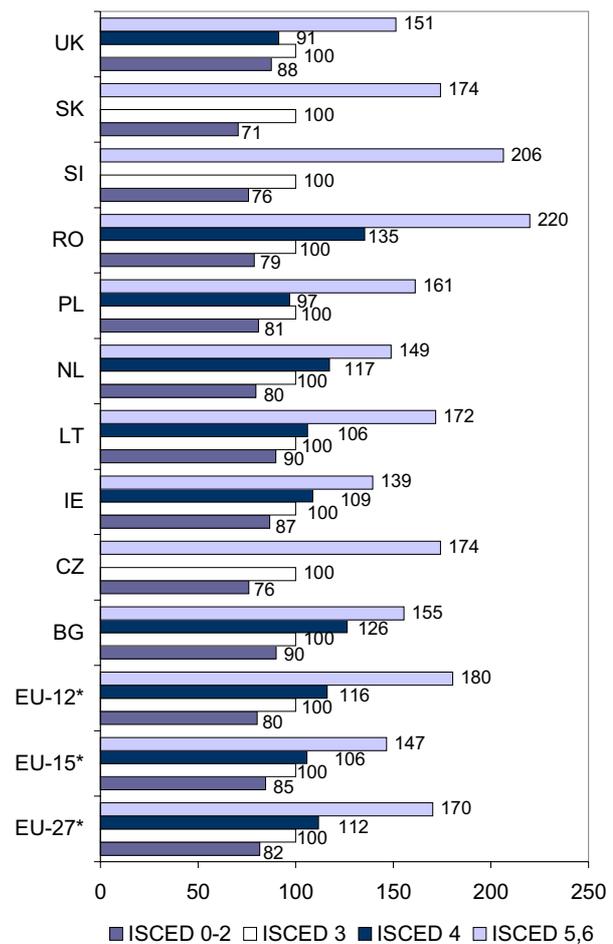
The Czech Republic is commonly characterised as a country with low income inequalities. This comparison is usually performed on the basis of the so-called Gini coefficient – which, however, compares the nature of income distribution among individual population groups rather than differences in wages and their dispersion. This sub-chapter thus aims at wage dispersion, which is an important factor for assessing the level to which higher qualifications and education are rewarded. The analysis also focuses on wage relations among the individual economic sectors and professions and on the level to which wages reflect the knowledge or technological intensity of a particular activity.

### Earning differentiation by level of education

A higher level of qualification allows an individual to perform more demanding work associated with a higher level of productivity and higher benefits for the employer. All this is generally reflected in higher earnings. However, wage relations also reflect any imbalances between supply and demand in the labour market. Here, the focus is not just on the level of compliance within individual educational categories, but also on the structural compliance of supply and demand for individual professions.

The available data (see figure 21) from the 2002 international EUROSTAT survey show that, on average, the earnings of employees with tertiary education are roughly one-half higher than those of employees with upper secondary education. Upper secondary school graduates earn roughly 20% more than people with primary or lower secondary education. The new EU member states show greater earning differences among the individual employee qualification categories than the EU-15 countries. In the new member states, people with tertiary education have much better incomes than in the EU-15 countries. To a certain level, today's high earning differences in Central and Eastern Europe is a reaction to the previous wage-leveling during "real socialism". However, it also reflects the current lack of highly qualified workers for the quickly expanding economy.

Figure 21: Average earnings by education (2002, in %)



Note: 100 % = average monthly wage of employees with secondary education (ISCED 3). ISCED 0–2 – basic and lower education, ISCED 4 Data do not include wages of workers in agriculture, fishing and working households. \*EU-27, EU-15, EU-12 – unweighted arithmetic mean from available data (only the countries listed). Source: EUROSTAT (2002b).

The Czech Republic is among the group of countries with the greatest differences in earning levels, even if compared to other new EU members (Poland, Lithuania, Bulgaria). In 2002, workers with tertiary education earned 74% more than workers with secondary education (average figure for workers with apprenticeship certificate and those with school-leaving examination - "maturita"). A somewhat greater gap existed between upper secondary education and primary or lower secondary education. Tertiary education in the Czech Republic clearly offers graduates a higher wage premium than in most other European countries. This testifies to a certain imbalance in the labour market and a high demand for tertiary educated professionals which still has not been completely satisfied.

### Earning differences within educational groups

The direct relation between increased level of education and higher earnings applies as a general rule for working people as a whole. The extent to which wages rise in relation to education is not necessarily the same in all cases, however. The wage range in which individuals with the same level of education can have different wages is

influenced by many factors, including the individual's personal characteristics and institutional factors.

Individual factors are associated in particular with real individual's skills and attitude, which affect his position at work and which is legitimately reflected in income levels. Some studies have shown that more than one half of the wage differences can be explained just by individual characteristics.

Varying length of practical experience is another factor influencing the earning differences. Skills gained while performing a job clearly extend the knowledge learned during one's initial education and are rewarded by the labour market. Also important are the competencies acquired by participation in continuing education.

In term of institutional factors, countries with more centralised wage negotiations clearly have a closer relation between a profession's status, required education and income. This leads to a smaller variability of wages within the specific qualification category. It also depends on labour market policy, on economic conditions, the nature of sector in which the person is employed, and whether it is in the private or public sector etc.

Last but not least, there are influences related to negative practices in hiring and evaluating employees – prejudices or discrimination on the basis of sex, age or social background.

The OECD compared income differences within educational groups in selected countries. These differences were expressed as the share of people with the same level of education who are situated on the margins of the income ladder in the country. The bottom boundary was formed by incomes which were less than half of the median wage, the upper boundary was incomes which were more than twice the median level.

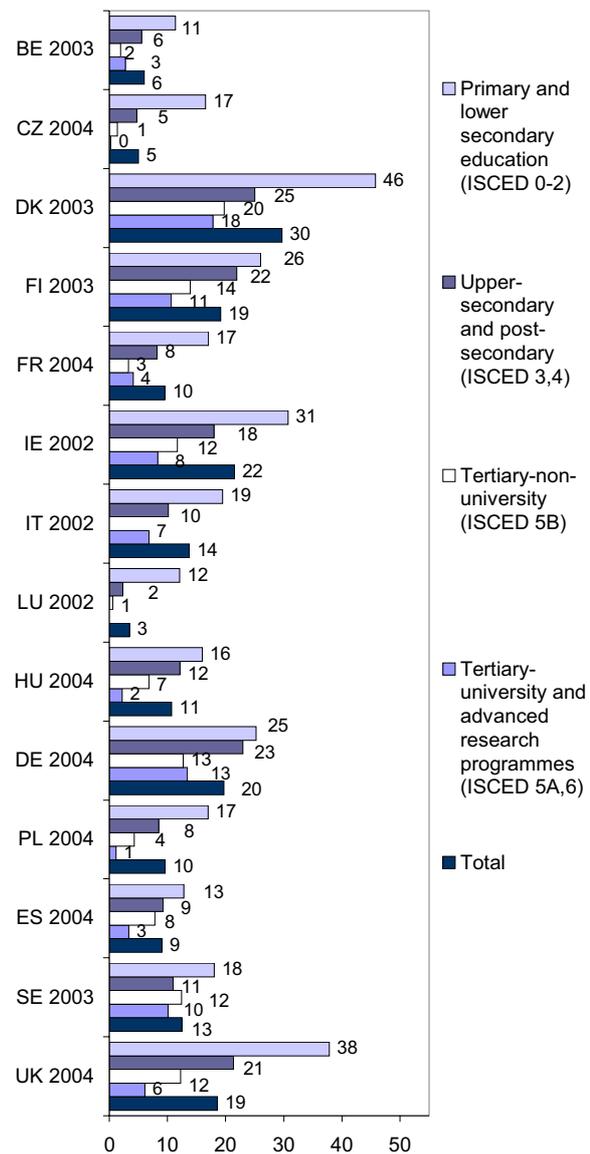
The individual educational categories showed different wage range. The greatest range of wages was found among both extreme educational categories – i.e., among persons with primary or lower secondary education (ISCED 0–2) and among persons with tertiary-university education (ISCED 5A). Although some persons with primary or lower secondary education are situated in the highest income category, in most countries their income is significantly below the median. The same, only in the reverse, applies to people with tertiary education (see figures 22 and 23).

These fundamental earning relations are also found in the Czech Republic, although employees with primary or lower secondary education are not shifted as much towards lower wages as in other countries – in the Czech Republic, only 16.5% of workers in this educational category earn less than one half of the median wage, while in other countries this figure is 30–40%.

However among persons with university education (ISCED 5A), the Czech Republic shows a significant shift towards higher income brackets. Except for Luxembourg, the Czech Republic is the only analysed country where almost nobody with university education earns a low income. Wage differences among these workers are exclusively in the upper income brackets. In other countries such as Denmark, Germany, Finland and Sweden, 10% or more of all employees with university education earn less than one half of the median income. In these

countries, there apparently is a certain (either overall or structural) imbalance between supply and demand for these qualifications. Workers who do not find acceptable work thus apparently are performing jobs that are below their level of qualification. At the same time, competition in the labour market is lowering graduates' salaries for their first employment. These factors are not widespread in the Czech Republic so far, which is reflected in the favourable wage position of tertiary educated individuals.

Figure 22: Number of persons in the lowest income category by level of education

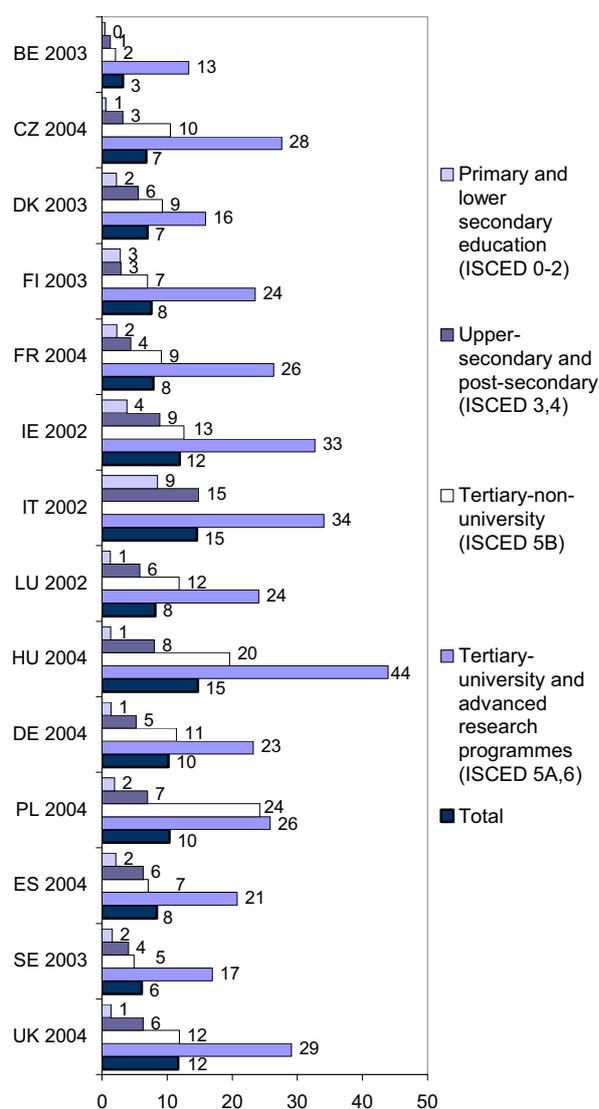


Note: Number of persons earning less than 1/2 of the country's median income. Source: OECD (2006a).

In the Czech Republic, educational groups representing upper secondary (ISCED 3) and tertiary non-university education (ISCED 5B, in the Czech Republic, this level corresponds to tertiary professional schools) show relatively little wage diversification in comparison to the selected EU countries. This applies in particular for people with upper secondary education; in the Czech Republic, their wages remain in the middle brackets. This testifies to the fact that other factors such as sector, type of profes-

sion, age etc. have less influence on this group's income than in other countries.

**Figure 23: Number of persons in the highest income category by level of education**



Note: Number of persons earning more than twice the country's median income.  
Source: OECD (2006a).

### Returns to education

The returns to education are usually assessed in two dimensions: the individual and the social dimension. Individual return is assessed as the relative income of workers with different levels of education. The individual's costs are usually expressed as the costs spent by a person in relation to education, including lost earnings. The individual benefit from the attained level of education is higher income. The calculations performed as a part of the OECD's international comparison<sup>15</sup> for 2003 show that the annual individual rate of return to tertiary education ranges from 22.6% to 8%.

The results of the OECD calculations show that in most countries the rate of return to education for persons with

secondary and tertiary education is high enough for education to be an attractive path for increasing one's standard of living. An excessively high rate of return means that there is a lack of employees with the relevant level of education, which pushes up these workers' wages. This situation may be temporary, since a high rate of return may subsequently attract a large number of people into this educational programmes. The speed of adjustment, however, depends on the capacity of the educational system and on how well the labour market is able to absorb changes in the supply of qualified people. The adjustment process may also be positively influenced by a well-functioning guidance and counselling system which provides pupils, students and parents with information on employment opportunities and on wages for certain qualification levels in the individual professions.

High differences in returns to education can also occur on a relatively stable and balanced labour market, for instance if marginal rates are significantly lower than average. This occurs if an increasing number of students is connected with lowering study abilities and decreasing motivation to study. The return to education for students with weak capabilities is probably below average. In such a case, a higher rate of return can thus be interpreted as a certain profit resulting from a better predisposition to studying and better volitional qualities such as limited resources. In this case, financial support which promotes increased participation in education has little impact and essentially will do little to influence the quality of students. Much more effective can be an educational policy focused on increasing the quality of the educational system and improving students' literacy.

The rate of returns to education was determined for the Czech Republic<sup>16</sup> using the so-called Mincer method. This allows us to calculate the average rate of return for one year of education. Using the data for hourly wages for 2000–2002, it is estimated that the average rate of return is around 10% for each year of education (around 11% for men and around 9% for women). It was shown that this level is relatively high compared to other countries. The highest level was achieved in tertiary education, which was more than 50% higher than the rate of return in Austria or Germany, i.e. countries which have a relatively similar educational system and remuneration practises in the labour market. Until 2002, the difference in rate of return for tertiary education increased in comparison to other educational levels.

### Earnings in qualification-intensive sectors

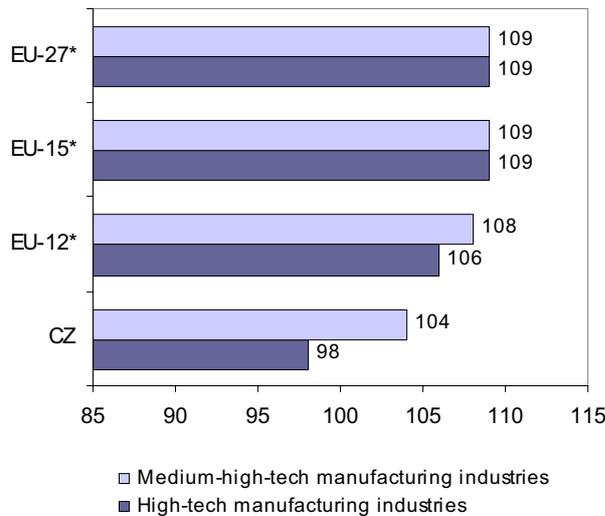
Wage differentiation in favour of higher levels of education and more complicated work should have as a result that qualification-intensive sectors and demanding professions will offer higher wages than less demanding sectors. A comparison of wage relations in these sectors with earnings in other sectors can also indicate whether these sectors or professions offer certain wage advantages in order to attract employees for the sector's further development.

Qualification-intensive sectors are defined on the basis of EUROSTAT classifications as high-tech branches of the manufacturing industry (see box 2) and knowledge-intensive services (see box 3).

<sup>15</sup> OECD (2006a).

<sup>16</sup> Jurajda, Š: (2005).

**Figure 24: Average earning in high-tech manufacturing as compared to average earning in manufacturing as a whole (2002, in %)**



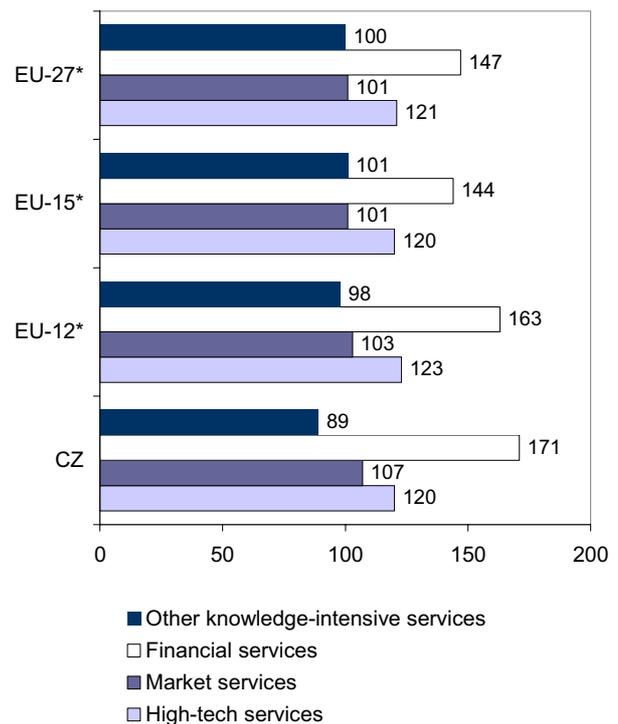
Note: \* unweighted arithmetic mean; earning in manufacturing as a whole = 100 %; EU-12 excl. Malta.  
Source: EUROSTAT (2002a), own calculations.

Average EU earnings in **high-tech manufacturing** are roughly 9% higher than in manufacturing as a whole. A similar situation is found in medium high-tech manufacturing. In fact, in some countries the average earning for workers in medium high-tech manufacturing is higher than in high-tech fields. This applies in particular for the new member states including the Czech Republic (see figure 24 and in more detail Table 10A in the Annex). Among other things, this reflects the fact that in these countries there are more allocated lower stages of high-tech manufacturing, which is also reflected in lower incomes.

In all European countries, **average earnings in knowledge-intensive services** are higher than in high-tech manufacturing (see Table 10A in the Annex). This results in particular from the fact that unlike manufacturing activities, which despite their high level of technology require a relatively significant amount of operating and auxiliary personnel. On the other hand activities in knowledge-intensive services are more dependent on qualified work. If, however, we compare the earning levels of services and industry from the point of view of comparable employee qualification structures, services no longer hold such a clear lead. Although there are roughly one third more tertiary educated workers in services than in high-tech manufacturing, earnings are higher by only about one fifth.

In knowledge-intensive services (see figure 25), in all European countries the highest wages are found in the **financial sector**, where average earnings are almost one half higher than overall earnings in services. They are also one fifth higher than earnings in high-tech services. The financial sector's advantages are even more distinct in the new member countries, with the greatest difference being in the Czech Republic. Earnings in the Czech financial sector are 71% higher than average earnings in services, 42% higher than in high-tech services.

**Figure 25: Average earning in knowledge-intensive services as compared to average earning in services as a whole (2002, in %)**

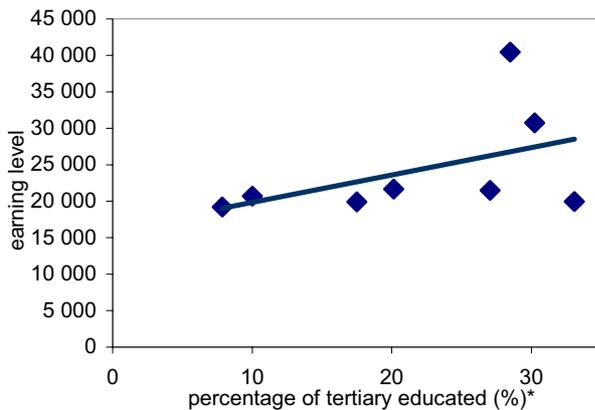


Note: \* unweighted arithmetic mean; earning in services as a whole = 100 %; EU-12 excl. Malta.  
Source: EUROSTAT (2002a), own calculations.

The Czech Republic shows a certain overrate of work in financial services and underrate in other knowledge-intensive services such as education, health and social work, and cultural services. Earnings for these activities, which are for the most part financed from public resources, are below the average for services in all countries. In the Czech Republic, however, this difference is more distinct than in the EU-15 countries as well as in the new member states. Compared to other services in the Czech Republic, wage premium for market services for companies is relatively higher than the EU average. The earning position of high-tech services in the Czech Republic roughly corresponds to the EU average for this sector.

A comparison of earning levels in the individual sectors with the number of tertiary educated workers as a share of all workers in the given sector shows clear wage under-rate in non-financial knowledge services (see figure 26). Considering the wage relations in the Czech Republic among individual qualification-intensive sectors in both industry and services as well as in financial services, it is likely that non-financial services cannot offer similar earnings as the financial sector. This definitely plays a role in the hiring of top educated professionals in other sectors (in particular management, economic and ICT professions). At the same time, the existing wage relations are one important piece of information for young people choosing their study field. This can lead to a preference for financial and economic fields of study over technical fields and natural sciences.

**Figure 26: Comparison of earning levels and number of tertiary educated persons in qualification-intensive sectors in the Czech Republic (2006)**

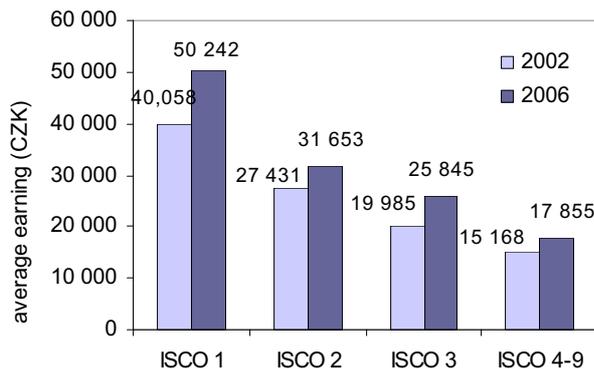


Notes: \* total employment in the sector = 100 %. Earning data include non-financial entities with 20 or more employees and financial entities and state institutions of all sizes.  
Source: ČSÚ (2007a), 2<sup>nd</sup> quarter; own calculations.

**Earnings in demanding professions in the Czech Republic**

From the wage relations point of view it is important to analyse the earning position held by workers in highly specialised and demanding jobs. This includes ISCO-88 groups 2 (scientists and professionals) and 3 (technicians, healthcare and educational employees and employees in related fields). These professions are of key importance for the development, application and use of modern technologies in the economy. It is also useful to include into the analysis the group of specialists in managerial and leading positions and related professions in the public and private sectors (ISCO 88, group 1)..

**Figure 27: Average monthly earnings by individual ISCO qualification groups (in CZK)**



Note: Includes employees working more than 30 hours a week.  
Source: ČSÚ (2003a, 2007a).

ČSÚ data on employee earnings indicate that people in demanding professions earn on average 50% to 180% higher wages than professions with fewer or no demands on qualifications (ISCO 4-9). Wage relations are unambiguously tilted in favour of workers in group ISCO 1. Remuneration for qualified work performed by scientists and professionals (ISCO 2) and technicians (ISCO 3) is significantly lower.

The development of earnings in recent years (2002–2006) continues to strengthen the leading position of managerial professions in group ISCO 1 (5.8% growth) (see Table 12A in the Annex). The earnings of technical and associated professions also grew faster than average (by 6.6%), apparently as a result of increased demand for these professions in the manufacturing industry, although their overall position was only partially influenced by this fact. Earnings of scientists and professionals not increased as rapidly as the economy’s average (3.6%).

Wage relations and their development show that earnings in the Czech Republic do not equally reflect the qualification intensity of work in the individual professional categories. It is clear that significantly higher wages at a comparable level of education are earned by workers in managerial positions. This is understandable in view of higher time demands, the higher level of stress and higher requirements for organisational and other skills required to perform managerial functions, in particular at top levels of management. There still remains the question, however, of wage premium rate in this category as compared to highly demanding professions of scientists and professionals.

**2.3 Internationalisation of tertiary education**

This subchapter first identifies the decisive factors influencing the internationalisation of tertiary education, as well as the decisive players on the international tertiary education market. It includes an analysis of the mobility of tertiary education students within the EU and focuses specifically on foreign students attending higher education institutions in the Czech Republic and Czech citizens studying abroad.

Like all other economic sectors, tertiary education is influenced by globalisation. Although education has always been one of the sectors most open, i.e. with the lowest level of internal market protection, over the past decade, tertiary education has become significantly even more international in character and we may expect this trend to continue. Not only a deepening of international cooperation among institutions has been there, but we have also seen mutual competition in acquiring students, professors and research grants.

Although the internationalisation of tertiary education is generally considered to be a very positive phenomenon, it does evoke certain concerns arising from the so-called "brain-drain", i.e. the outflow of the most talented students and top academic staff. Especially at risk of losing their intellectual elite are the less developed EU members, but the trend affects the entire EU, which competes for talented students and professors in particular with the United States.

**Important exporters on the world and European tertiary education market**

Table 4 shows the development of the position of the top exporters in tertiary education. It shows those countries whose share of the total number of students studying in countries of which they are not inhabitants exceeded 5% in 2004. There are data for the main part of the worldwide tertiary education market formed by the number of foreign students in a total of 24 countries in 1998 and 25 countries in 2004. The absolute numbers of foreign students for the years 1998–2004 are shown in table 13A in Annex.

**Table 4: Main exporters on the world tertiary education market (%)**

	1998	2004	2004–1998
USA	32.5	27.8	-4.7
United Kingdom	15.8	17.7	1.9
Germany	12.9	12.7	-0.2
France	11.2	11.2*	0.0
Australia	8.2	9.7	1.5
Japan	2.7	5.7	3
Canada	2.5	5.5	3
Czech Republic	0.3	0.7	0.4

Note: \* 2003. Source: OECD Online Education Database, own calculations

The United States continue to hold an exclusive position on the world tertiary education market, although their position weakened between 1998 and 2004, primarily due to the influence of Japan, Canada and to a lesser degree the United Kingdom. In the year 2004, the United States had about 28% share in this market. They were followed by EU countries such as the United Kingdom (18%), Germany (13%) and France (11%). In the period under review, the Czech Republic improved its international competitive position, with its share reaching almost one per cent. Nevertheless, due to its limited capacity the country cannot reach similar position as the main players. This capacity is to a significant extent predetermined by the country's size and its level of economic development, as well as by its language, which is not a world language. If the Czech Republic wishes to increase its attractiveness for foreign students, it will have to expand its educational offer particularly in the English language, which is becoming the decisive language in tertiary education.

**Table 5: Main exporters on the European tertiary education market (%)**

	1998	2005	2005–1998
Germany	28.6	27.0	-1.6
United Kingdom	32.5	23.6	-8.8
France	10.9	9.5	-1.4
Austria	6.3	5.7	-0.6
Belgium	5.7	5.6	-0.1
Czech Republic	0.7	2.6	1.9

Note: \* 1999. Includes ISCED 5–6. Source: EUROSTAT, Mobility of students in Europe, own calculations

Table 5 offers an overview of the situation on the **European tertiary education market**. It shows those countries whose share of the European tertiary education market exceeded 5%. The European tertiary education market is defined by the total number of students from the EU-27 countries, the European Economic Area and Candidate countries<sup>17</sup> studying in any of these countries of which they are not citizens. A decisive share of the European tertiary education market is held by Germany and the United Kingdom. In the year 2005, Germany's share was 27%, that of the United Kingdom 24%. Other significant positions were held by France (10%), Austria (6%) and Belgium (6%). The Czech Republic's share was slightly less than 3%, which is comparable to Spain. The

absolute numbers of foreign students in the individual countries are shown in table 14A in Annex.

Even though these five countries continue to hold an exclusive position within the EU, in the years 1998–2005 their positions weakened. The most significant decline (by almost 9 percentage points) was seen with the United Kingdom. This means that students' target countries are increasingly other EU member countries, particularly Sweden and the Netherlands, there was the greatest increase in the share of foreign students over the analysed period (by almost 2 percentage points to slightly less than 4%). Since neither of the countries speaks a world language, it is clear that higher education institutions expanded their educational programmes or at least course offer available in one of the world languages. Since English is increasingly becoming the language of tertiary education, we may assume that this is the language they focused on.

### Mobility of students within the EU

Students' mobility can be expressed using two indicators published by EUROSTAT. The first is the inflow rate of foreign students into a country and is defined as the share of students without citizenship on the whole number of students in given country. The second indicator is the outflow rate of students leaving to study abroad, expressed by the share of students studying abroad<sup>18</sup> on the whole number students with the given citizenship. The values for these two indicators for each country for the year 2004 are contained in figure 28.

Based on the ratio of these two indicators, the EU countries can be divided into two groups. In 2004, ten countries of the EU-27 had a higher share of foreign students than citizens studying abroad. The greatest difference was for Austria, where the share of foreign students was 12.5% of all students of tertiary education in Austria; the share of Austrians studying abroad was a mere 5.3% of all Austrian students. The Czech Republic is also a member of this group; the difference between the two indicators was 1 percentage point (2.8% vs. 1.8%).

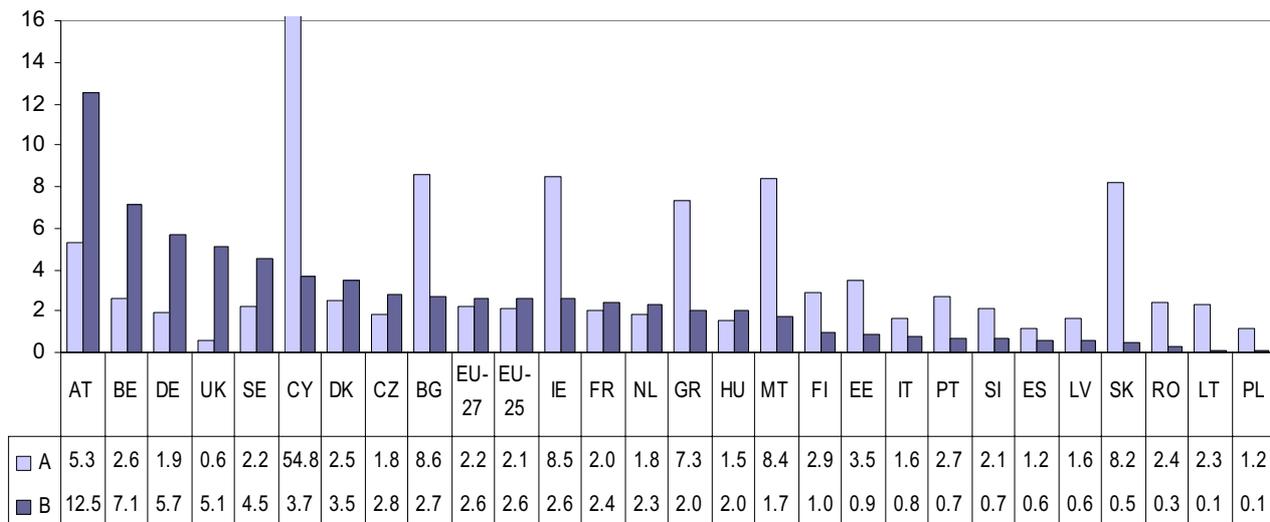
The second group of countries is composed of those countries with a higher share of students studying abroad than the share of foreign students. This group consists of 16 countries of the EU-27 (data for Luxembourg are not available). A large difference is a sign of an imbalance between supply and demand in tertiary education, specifically of relatively stronger demand than supply. In this regard, the least favourable situation was in Cyprus, with more Cypriots studying abroad in 2004 than on Cyprus itself (54.8%), while the share of foreign students was a mere 3.7%. Other countries in this group are the new member states (except for the Czech Republic and Hungary) as well as southern states but also Finland, Ireland and Italy.

Students' mobility within the EU is expected to bring an increased quality of education and to contribute to "European citizenship", which is associated with mutual understanding and knowledge of the language and culture of the other member countries.

<sup>17</sup> This includes the following countries: Norway, Iceland, Liechtenstein, Croatia, Macedonia and Turkey.

<sup>18</sup> Since the individual member states do not have exact data on students studying abroad, the number of students studying abroad is counted from the number of foreign students of each nationality.

Figure 28: Openness of tertiary education (% , 2004)



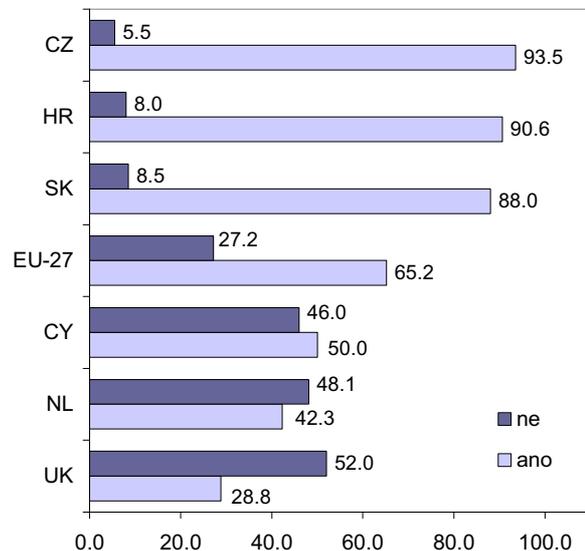
Note: Includes ISCED 5–6. A - students studying in another EU country (as % of all students); B – inflow of students form EU (as % of all students in the country); data for Germany, Slovenia and Romania do not include doctoral students; data for Belgium do not include data on private independent institutions and the German-speaking community. Source: EUROSTAT. Population and social conditions. table code educ\_thmob date 26.6.2007)

Teaching professionals’ opinions regarding student mobility

Students’ mobility receives relatively strong support from teaching professionals, i.e. instructors at higher education institutions. This is proven by the results of a Eurobarometer survey conducted in early 2007 under the name “Perceptions of tertiary education reforms”.

for the EU-15, this figure was only 62% (see Table 15A in Annex). The country with the highest level of support was the Czech Republic (94%) while the country with the lowest level of support was the United Kingdom (28%).

Figure 29: Level of agreement with making mobility an obligatory part of doctoral studies (% , 2007)



Note: remaining answers to 100% represent the answer “don’t know”. Source: Eurobarometer 2007

**Box 8: Eurobarometer – Perception of tertiary education reforms**

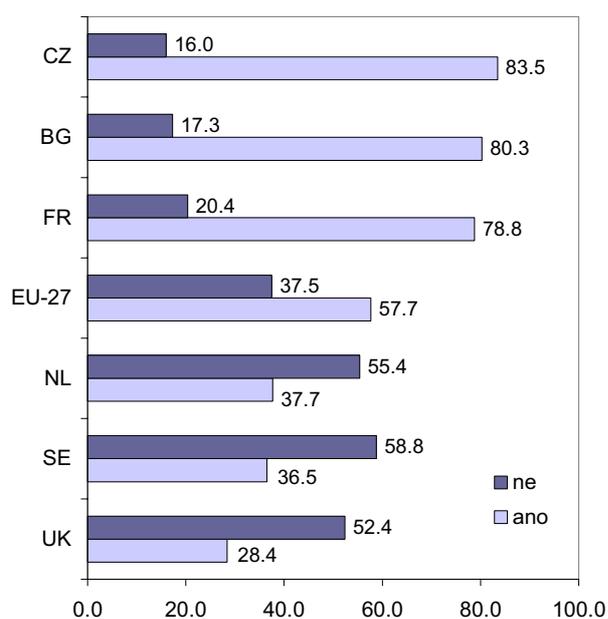
The aim of the survey, which was conducted in the EU-27 countries, Croatia, Turkey, Norway and Iceland, was to determine how teaching professionals at higher education institutions perceive the current situation in tertiary education and what attitudes they hold towards current or planned tertiary education reforms. The telephone survey was conducted using WebCATI (web-based computer assisted telephone interviewing). The target group included randomly selected rectors, deans and teaching professionals with varying pedagogical titles (professors, assistant professors, lecturers and doctoral candidates) from randomly selected institutes. The total number of interviews was about 5,800, with the number of interviews in each country dependent on the country’s size (from 50 to 250 interviews). Some 200 interviews were conducted in the Czech Republic.

Respondents stated whether they agree or disagree with presented statements, using a scale of four responses – strongly agree, agree, disagree, strongly disagree – plus don’t know. The survey determined the level of agreement or disagreement with statements related to (a) the three-cycle system of tertiary education and European quality standards, (b) adult education, joint degrees, student mobility and study programmes, (c) management and funding, (d) involvement of other institutes/companies into higher education reform.

As shown by figure 29, almost two thirds (65%) of EU-27 respondents agree that mobility, i.e. study abroad, should be an obligatory part of **doctoral studies**. The level of support for this idea differs between the old (EU-15) and new member states (EU-12). Some 79% of respondents from the EU-12 were in favour of requiring doctoral candidates to spend at least part of their studies abroad while

When asked if they agreed with making mobility an obligatory part of the curriculum for **all students** of tertiary education, i.e. for students in bachelor and master programmes as well, 68% of respondents from the EU-12 but only 56% from the EU-15 agreed; the EU-27 average was 58%. As with doctoral candidates, the country with the highest level of support was the Czech Republic (84%) and the country with the lowest support was the United Kingdom (29%).

Figure 30: Level of agreement with making mobility an obligatory part of tertiary education (% , 2007)



Note: Includes university education only. Remaining answers to 100% represent the answer "don't know". Source: Eurobarometer 2007

It is clear that requiring students to spend at least part of their studies abroad finds more support when it comes to doctoral candidates than for lower levels of tertiary education. The differences between old and new member states in the level of support for making mobility an obligatory part of the tertiary education curriculum can to some extent be explained by the fact that most of the new member states experienced a relatively long period of directive-based planning. This experience apparently continues to be reflected in the preference of duties over free choice. It may also be related, however, to an unwillingness to make students responsible for composing their own studies and to an unfavourable attitude towards the individualisation of tertiary education.

Opinions on making mobility obligatory also differed in relation to the age of the respondent or how long he or she has been active in the field. For instance, some 71% of respondents from all over the EU-27 with more than 30 years' practice were in favour of making mobility obligatory for doctoral candidates, but only 64% of respondents with less than 10 years' practice agreed. The same was found if including all students of tertiary education, with the figures being 62% and 56%, respectively. These differences may be influenced by the fact that the older generation, which did not experience such a strong internationalisation of tertiary education as the younger generation, has greater trust in the positive influence of foreign experience or that the younger generation wants to leave the decision up to the students themselves.

In term of academic title, the greatest support for making mobility obligatory for doctoral candidates was found among rectors (74%), while the least support was among doctoral candidates themselves (58%). A similar conclusion can be made in relation to all students of tertiary education – again, most in favour were rectors (67%) and least in favour were doctoral candidates (52%).

## Foreign students in the Czech Republic

The number of foreign students at higher education institutions (HEI) in the Czech Republic is continually increasing. In the 1995/96 school year, a total of 3,285 students were studying in the Czech Republic in all forms of study at all types of HEI, while in the 2006/07 school year, this figure was 24,641 students. The number of foreign students thus increased 7.5 times. The share of foreign students on the whole number of students at HEI thus increased from 2.2% in 1995/96 to 7.6% in 2006/07. These data are merely orientation in nature, since certain methodological changes occurred in recording the number of foreign students.<sup>19</sup> In 2005/06, more than three fourths of foreign students studied at public HEI (80%).<sup>20</sup>

From the **foreign students' country of origin** point of view, the first place is clearly dominated by Slovakia – in the 2006/07 academic year, there were 16,500 Slovaks studying in the Czech Republic, i.e. about two thirds of all foreign students. Other countries were represented relatively rarely, with the second largest group being Russian citizens (a mere four percent), followed by citizens of Ukraine, Vietnam and the United Kingdom. Table 6 shows the change of representation of the individual countries as compared to the 2000/01 school year.<sup>21</sup>

Table 6: Foreign students at higher education institutions in the Czech Republic (2006/07)

	2000/01		2006/07	
	number	share	number	share
Slovakia	3,501	57.3	16,503	66.9
Russian	164	2.7	1,089	4.4
Ukraine	122	2.0	760	3.1
Vietnam	52	0.9	576	2.3
United Kingdom	241	3.9	419	1.7
Total	6,109	100.0	24,641	100.0

Note: see methodological changes in footnote 14. Source: ČSÚ: Education – Data, tab. c06s07t, own calculations

During the period from 2000/01 to 2006/07 there was a significant increase in the number of Slovak students. In term of the list of the five most frequently represented countries, there was only one change. Greek citizens, who in 2000/01 represented the second largest group of foreign students (426 students), were less likely to study in the Czech Republic in 2006/07 (140 students). Citizens of Vietnam on the other hand – who were only minimally represented in 2000/01 – formed the fourth largest group of foreign students in 2006/07.

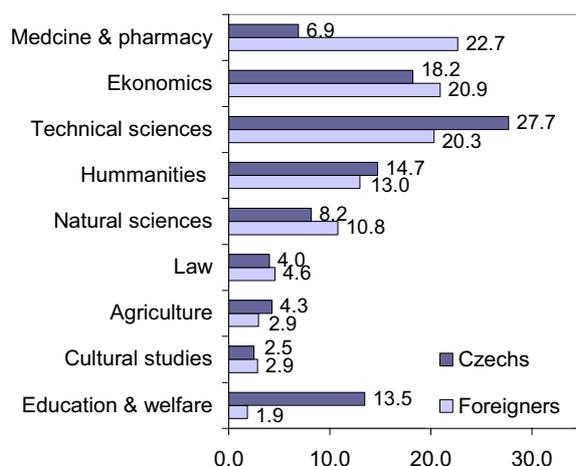
<sup>19</sup> Since the 2004/05 academic year, the number of students has been given by the number of actual persons; prior to this, it was given by the number of degrees being studied for, meaning that one student could be counted multiple times. Until 2005/06, the number included only students physically attending bachelor and master study programmes (except for state higher education institutions – Ministry of Defence and Ministry of Interior – where all students are counted). Since 2005/06, all foreign students have been counted regardless of form of study.

<sup>20</sup> Source: ČSÚ: tab.c06a04t

<sup>21</sup> The 2000/01 academic year was used as a basis because the total number of foreign students does not include students with Slovak citizenship who began their studies prior to 1993, i.e., the division of Czechoslovakia. It may be assumed that by 2001/02 all these students had already finished their studies.

Foreign students study practically all **fields of study** offered by HEI in the Czech Republic, although the greatest interest is in three fields (nearly two thirds of foreign students at public HEI study in these fields): healthcare, medicine and pharmacy (22.7%), economics (20.9%) and technical sciences (20.7%). As can be seen from figure 31, the most frequently represented fields are similar to those studied by Czech students. Of the three most frequently studied fields, two are the same for Czech and foreign students: technical sciences (27.7%) and economics (18.2%). The third most frequently studied field among Czech students is humanities and social sciences (14.7%).

**Figure 31: Students at public HEI by field of study (% , 2005)**



Source: ČSÚ: Education – Data, tab. c06a04t, own calculations

Foreign students' top fields of choice were different at private higher education institutions than at public institutions. This is because private HEIs do not offer the whole spectrum of fields of study. In 2006/07, foreign students most frequently studied economics (62%), followed by education, teacher training and social welfare (20%) and humanities and social sciences (14%). The remaining 4% of students studied technical sciences (2%), law (1%) and natural sciences (1%). The order of fields of study is similar as with Czech citizens.<sup>22</sup>

**Table 7: Students at HEI by the city in which they are studying (% , 2006/07)**

	foreigners/ foreigners	Czechs/ Czechs	foreigners/all students
Praha	56.9	35.6	11.6
Brno	21.2	21.1	7.7
Ostrava	6.3	9.1	5.4
Olomouc	4.6	6.0	6.0
Plzen	3.3	5.9	4.3

Source: ČSÚ: Education – Data, tab. c06a05t, own calculations

The spatial dispersion of tertiary education is reflected in the concentration of students in the individual cities. In the 2006/07 academic year, more than one half of foreign students studied in Prague (57%) and more than one fifth studied in Brno (21%). Other significant destinations in-

cluded Ostrava, Olomouc and Plzeň, with slightly less than 15% of foreign students.

Table 7 clearly shows that the students' choice of towns is similar for Czech and foreign students. Students with Czech citizenship are not so concentrated in Prague; for them, regional schools play a greater role. If we look at the share of foreign students on the whole number of students at higher education institutions, the only difference is in the order of towns: Olomouc had a higher share than Ostrava.

In many countries, foreign students represent an important source of income for HEIs. This is definitely not the case of public higher education institutions in the Czech Republic, since only an insignificant fraction of such students pay for their education. Foreigners may study at public schools for free if they can pass Czech language entrance exams. One exception are Slovaks, who – on the basis of bilateral agreement – can perform their entire education free of charge in Slovak.

According to the Act on Higher Education Institutions,<sup>23</sup> public HEI set fees for bachelor, master and doctoral programmes performed in a foreign language. Interested students who have not mastered Czech may pay to participate in specialised accredited study programmes in English offered by higher education institutions or may study within the framework of exchange programmes or scholarships (see below).

**Table 8: Self-paying foreign students at HEI in the Czech Republic (2006/07)**

	number		share of self-paying	
	students	self paying	A	B
United Kingdom	419	372	88.8	18.3
Portugal	277	266	96.0	13.1
Norway	244	209	85.7	10.3
Greece	140	93	66.4	4.6
Germany	256	80	31.3	3.9
Total	24,641	2,037	8.3	100.0

Note: A-self-paying students as share of all students from the given country, B- self-paying students as share of all self-paying students. Source: ČSÚ, Education – Data, tab. c06s07t, own calculations

Foreign **self-paying** students attending HEI in the 2006/07 academic year represented about 8% of all foreign students, i.e. about 2,000 paying students. The share of foreign paying students decreased almost threefold as compared to 2000/01, from 22% to the already mentioned 8%. A comparison of the data contained in tables 6 and 8 shows that the most frequently represented students (table 6) make use of the possibility of studying free of charge in Czech. Citizens of Russia and Ukraine have the advantage of speaking a related language, while Vietnamese citizens at Czech schools are primarily children who have passed lower levels of education in the Czech Republic and who have no problems with the Czech language. The available data do not allow us to deduce whether self-paying students are studying at public or private schools.

The greatest share of paying students was from EU member states, with one exception being students from

<sup>22</sup> Source: ČSÚ: Education – Data, tab. c06a04t, own calculations

<sup>23</sup> Sec. 58(5) of Act No. 111/1998

Norway. British students represented 18% of self-paying students, Portuguese 13%. An overview of the top five countries of origin of paying students is offered by table 8, which also shows the share of self-paying students on the total number of students from each country. Except for students from Greece, who may be descendants of the post-war wave of immigrants and can thus study in Czech, we may assume that students from other countries participate in courses/programmes proceeded in a foreign language. These are students who are studying in the Czech Republic as part of exchange programmes or scholarships, which is most frequently used by students from Germany. In fact, exchange programmes and scholarships between the Czech Republic and Germany are well developed, as can also be seen from the number of Czech students studying in Germany (see table 9).

Most foreign students finance their studies and daily needs with the help of **scholarships** offered on the basis of bilateral agreements or through the EU-funded Socrates/Erasmus programme. The Czech Ministry of Education, Youth and Sports provides two kinds of scholarships. **Reciprocal scholarships** are intended for students from abroad who are interested in spending no more than two semesters studying in the Czech Republic. Reciprocal stays take place on the basis of annually renewed agreements with individual HEI which clearly define the number of students and the length of their stay.

**Government scholarships** are provided to foreigners as part of foreign development aid. They are used for HEI studies in bachelor, master and doctoral programmes. Each year, the Ministry of Foreign Affairs and Ministry of Education establish quotas for each country, with the overall quota determined by the relevant government resolution. Currently, this programme includes 250 scholarships a year with the quota usually filled to around 80%.<sup>24</sup> The main reason for the relatively low level of interest is the fact that most study programmes are offered in Czech. Language does represent a fundamental barrier even though interested students participate in a year-long language course. The Ministry of Education is attempting to promote study of the Czech language abroad in order to increase foreign students' interest in passing their studies in the Czech language.

### Czech citizens studying abroad

The number of students studying abroad is calculated by EUROSTAT from records on the number of foreign students in each country by adding up all students of one nationality reported by the individual countries. There is thus relatively reliable information on the number of students studying in EU countries but not on the number studying elsewhere. Besides recipients of reciprocal scholarships this includes recipients of scholarships provided as part of inter-university agreements, as well as self-paying students who finance their studies from their personal resources. The number of foreign scholarships available for Czech students is not enough to cover interest in studying abroad.

Even though interest in studying abroad continues to significantly exceed available scholarship the number of Czech citizens studying abroad is increasing each year.

(see Table 16A in Annex). In 2004, the number of Czechs studying in the EU-27 countries was almost 5,400 – more than twice as many as in 1998. This is a reflection not only of the expanded possibilities for receiving scholarships related to the Czech Republic's accession to the EU but also of the country's improved economic situation, which allows some parents to pay for their children's study abroad on their own.

There are no data available that allow us to perform a similar analysis as the one performed for foreigners studying in the Czech Republic, i.e. to determine the share of self-paying students and the fields of study. From the **geographical destination** point of view, in 2004 most Czech students studied in Germany (46%) and France (12%). Table 9 shows the changes in destination between 1998 and 2004. The table includes all countries which were among the top five destinations for Czech students in at least one of these two years. The order of countries is determined by the situation from 2004.

**Table 9: Czech students at foreign HEI**

	1998		2004	
	number	share	number	share
Germany	1,082	50.0	2,483	46.1
France	207	9.6	662	12.3
Austria	223	10.3	500	9.3
Slovakia	287 <sup>*)</sup>	8.9 <sup>*)</sup>	443	8.2
United Kingdom	250	11.5	359	6.7
Poland	250	11.5	208	3.9
<b>Total</b>	<b>2,165</b>	<b>100.0</b>	<b>5,390</b>	<b>100.0</b>

Note: \*) data from the year 2000. Source: EUROSTAT. Population and social conditions. table educ\_enr18. 23.7.2007

Germany is in the first place in both years although its share of Czech students studying abroad decreased from 50% to 46%. Except for France, all countries' share fell. The most dramatic example being Poland. Interest in study abroad was more equally distributed across the EU-27 countries in 2004 than in 1998. The greatest increase was in Sweden, whose share rose from less than 1% to almost 7%. Outside the EU-27, Czech citizens were most likely to study in the United States (about. 1,200 students in 2003) and Switzerland, where 185 students studied in 2004 (see Table 16A in Annex).

If study abroad is to increase graduates' quality of education then they will have to study in countries or at institutions where the quality of tertiary education is better than that found at home. If this is not the case then mobility at least helps to improve language skills and to get to know and understand other cultures.

It is very difficult to perform a comprehensive evaluation of the quality of tertiary education – not just because of the need to find the right indicators but also because tertiary education is provided by many different institutions whose quality varies not only among different fields of study but also within them.

The question of the **quality of tertiary education** in the individual countries is addressed by the World Competitiveness Yearbook published by the International Institute for Management Development (IMD). The Yearbook assesses the quality of tertiary education on the basis of a questionnaire answered by some four thousand respondents from 60 analysed countries. Respondents answered

<sup>24</sup> Source: Doubrava, L.: How do foreign students gain scholarships? in Učitel'ské noviny No.2, 2005

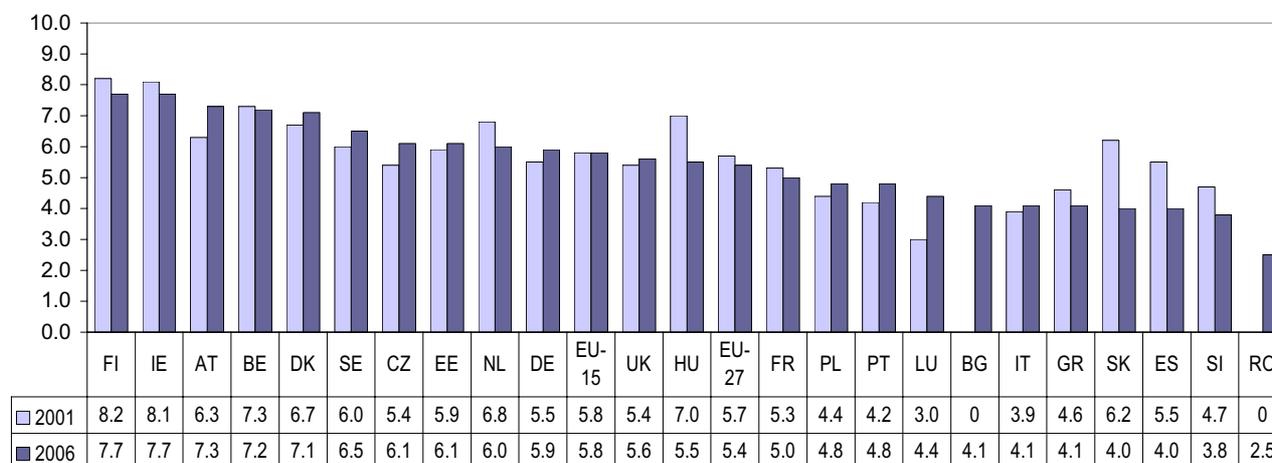
the question “How does the quality of tertiary education reflect the needs of a competitive economy” on a six-point scale, where 1 equals low quality and 6 equals high quality. The responses are converted into an average value for each country and the data are subsequently transferred onto a ten-point scale.

Figure 32 shows the assessment of tertiary education in individual countries for the years 2001 and 2006. In 2006, the Czech Republic did quite well in the international comparison. The assessed quality of tertiary education was higher than the EU-27 and EU-15 averages, and there was a significant positive shift over the year 2001. While in 2001, the country scored 5.4 points on the ten-point scale, the 2006 score was 6.1 points. This 0.7 point improvement was the third best in the EU, after Luxembourg and Austria – a positive signal for all prospective students.

On the other hand, a decrease in the assessed quality of tertiary education should be considered a warning sign for educational institutes and governments. This is particularly the case for countries with a decline of more than 1 point, i.e. Slovakia (2.2 points), Hungary and Spain (1 point).

If we compare the assessed quality of tertiary education in the countries which are the most frequent destinations for Czech citizens with the assessed quality of tertiary education in the Czech Republic we cannot reach a very positive conclusion. The assessed quality of tertiary education was significantly higher only in Austria and on a comparable level in Germany, but lower in France and Slovakia. Here we should emphasise that this is merely an orientation comparison and that other methods of assessment could reach different conclusions regarding the quality of tertiary education.

Figure 32: Quality of tertiary education in the years 2001 and 2006 (points)



Note: highest quality = 10, lowest quality = 1; EU-27, EU-15 unweighted arithmetic mean from available data; data for Cyprus, Lithuania, Latvia, Malta are not available. Source: IMD: World Competitiveness Year Book, indicator code: 4.5.08

Table 1A: ISCO 1–3 as a share of total employment (%)

	EU-27*	EU-15*	EU-12	Belgium	Bulgaria	Czech Republic	Denmark	Estonia	Finland	France	Ireland	Italy	Cyprus	Lithuania	Latvia
2000	33.4	35.5	27.8	40.8	31.2	35.8	40.6	39.9	44.9	35.6	37.6	30.7	26.4	30.7	34.6
2006	37.5	39.3	31.2	44.4	27.7	39.2	44.2	39.9	43.8	38.6	38.2	39.7	29.3	34.0	35.7

	Hungary	Malta	Germany	Netherlands	Poland	Portugal	Austria	Romania	Greece	Slovakia	Slovenia	Spain	Sweden	United Kingdom
2000	31.8	32.9	39.4	47.9	29.5	21.0	31.3	16.8	28.4	34.0	31.8	29.1	41.7	40.1
2006	34.7	36.0	41.9	47.2	32.6	25.1	37.5	21.6	33.0	35.5	38.3	30.9	44.1	42.0

Source: EUROSTAT (2007c), annual averages.

**Table 2A: Human resources in science and technologies as a share of total employment in the 25–64 age group (%)**

	2000	2006
EU-27	35.9	40.1
EU-15	37.8	42.1
EU-10	31.7	35.5
Austria	32.5	39.4
Bulgaria	33.1	32.1
Cyprus	36.6	40.6
Czech Republic	33.8	36.7
Denmark	43.8	50.9
Estonia	43.6	45.3
Finland	50.3	50.6
France	36.8	41.6
Germany	44.1	46.9
Greece	26.1	31.5
Hungary	31.2	33.8
Italy	30.6	35.8
Latvia	34.6	36.1
Lithuania	51.1	39.7
Luxembourg	38.2	43.9
Malta	29.5	32.3
Netherlands	46.5	49.2
Poland	28.3	34.3
Portugal	17.6	22.8
Romania	19.2	23.8
Slovakia	32.3	35.2
Slovenia	32.1	40.3
Spain	34.4	40.8
Sweden	45.9	49.1
United Kingdom	38.0	43.3

Note: The table does not include data for Belgium. Aggregates in 2006 do not include data for Ireland.

Source: EUROSTAT (2007c), averages for each year.

**Table 3A: Scientists and engineers as a share of total employment in the 25–64 age group (%)**

	2000	2003	2006
EU-27	5.2	5.0	5.4
EU-15	5.5	5.3	5.5
EU-12*	3.4	3.7	5.1
Austria	2.5	2.5	:
Belgium	7.8	8.7	3.4
Bulgaria	4.3	3.2	3.7
Cyprus	5.2	5.1	6.9
Czech Republic	4.0	3.6	4.6
Denmark	5.9	6.0	7.7
Estonia	4.6	3.7	5.7
Finland	9.8	7.6	:
France	4.8	5.4	3.4
Germany	6.0	6.2	5.0
Greece	4.0	3.9	4.8
Hungary	3.5	4.1	4.1
Ireland	7.3	8.5	5.5
Italy	3.0	3.0	4.5
Latvia	4.4	4.0	4.1
Lithuania	4.3	3.7	6.7
Luxembourg	5.4	3.9	6.7
Malta	4.3	3.8	6.0
Netherlands	6.4	6.5	3.3
Poland	2.9	3.6	3.5
Portugal	2.7	2.6	4.6
Romania	:	:	4.8
Slovakia	3.2	3.0	3.2
Slovenia	3.6	5.0	5.9
Spain	4.8	5.1	5.2
Sweden	6.0	6.6	7.5
United Kingdom	8.2	5.4	5.8

Note: \* does not include data for Romania and Bulgaria.

Source: EUROSTAT (2007c), averages for each year.

**Table 4A: Employment in high-tech manufacturing sector as a share of total employment (%)**

	2003	2006
EU-27*	1.1	1.1
EU-15*	1.1	1.2
EU-12	1.0	0.8
Austria	1.6	1.3
Belgium	0.7	0.6
Bulgaria	0.5	0.5
Cyprus	0.1	0.1
Czech Republic	1.2	1.6
Denmark	1.0	0.8
Estonia	1.1	1.0
Finland	1.9	2.2
France	1.2	1.2
Germany	1.9	1.8
Greece	0.3	0.2
Hungary	2.5	2.4
Ireland	2.8	2.6
Italy	1.1	1.3
Latvia	0.2	0.2
Lithuania	0.9	0.6
Luxembourg	0.5	0.0
Malta	2.9	3.3
Netherlands	0.9	0.7
Poland	0.0	0.6
Portugal	0.3	0.4
Romania	0.5	0.3
Slovakia	1.3	1.8
Slovenia	0.9	1.1
Spain	0.5	0.5
Sweden	1.1	0.9
United Kingdom	1.2	1.0

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg. Source: EUROSTAT (2007c), averages for each year., own calculations.

**Table 5A: Employment in medium high-tech manufacturing sector as a share of total employment (%)**

	2003	2006
EU-27*	5.3	5.6
EU-15*	5.2	5.7
EU-12	5.4	5.2
Austria	4.5	5.5
Belgium	5.7	5.7
Bulgaria	4.4	4.3
Cyprus	1.1	0.9
Czech Republic	7.5	8.7
Denmark	5.1	5.2
Estonia	2.5	2.6
Finland	5.0	4.7
France	5.4	5.2
Germany	9.1	8.9
Greece	1.8	2.0
Hungary	5.8	5.9
Ireland	3.5	3.0
Italy	6.4	6.3
Latvia	1.8	1.6
Lithuania	2.1	1.8
Luxembourg	1.0	0.0
Malta	3.9	3.2
Netherlands	3.2	2.7
Poland	0.0	4.5
Portugal	3.0	2.8
Romania	4.9	5.2
Slovakia	6.9	7.8
Slovenia	8.2	7.6
Spain	4.5	4.1
Sweden	5.9	5.4
United Kingdom	4.9	4.5

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg. Source: EUROSTAT (2007c), averages for each year., own calculations.

**Table 6A: Employment in knowledge-intensive services as a share of total employment (%)**

	2003	2006
EU-27*	25.8	25.6
EU-15*	27.3	27.4
EU-12	18.2	19.2
Austria	24.4	24.4
Belgium	32.1	32.1
Bulgaria	19.1	18.5
Cyprus	22.0	22.3
Czech Republic	20.5	20.7
Denmark	37.6	37.4
Estonia	26.4	24.1
Finland	33.4	34.0
France	28.8	29.7
Germany	26.6	27.2
Greece	17.9	19.3
Hungary	22.9	23.7
Ireland	27.5	28.5
Italy	21.0	22.1
Latvia	22.0	22.3
Lithuania	22.0	22.6
Luxembourg	31.7	0.0
Malta	25.7	27.2
Netherlands	34.4	35.4
Poland	0.0	21.0
Portugal	16.4	18.2
Romania	12.1	12.4
Slovakia	21.1	21.1
Slovenia	19.6	21.0
Spain	19.2	20.1
Sweden	39.1	39.1
United Kingdom	34.0	35.7

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg.  
Source: EUROSTAT (2007c), average for year 2006, own calculations.

**Table 7A: Comparison of qualification of employed persons with professional requirement of their occupation in 2006 (%)**

	compl.	lower <sup>a</sup>	higher
EU-27	65.3	25.5	9.2
EU-15	62.2	28.4	9.4
EU-12	76.5	15.2	8.4
Austria	71.7	18.6	9.7
Belgium	62.9	25.1	12.0
Bulgaria	73.4	14.3	12.2
Cyprus	65.1	18.7	16.2
Czech Republic	83.5	11.5	5.0
Denmark	72.4	19.1	8.5
Estonia	68.4	15.9	15.7
Finland	68.2	20.7	11.1
France	64.3	26.0	9.7
Germany	72.4	17.7	9.9
Greece	55.3	38.0	6.7
Hungary	80.2	14.2	5.7
Ireland	57.6	29.3	13.1
Italy	56.5	38.9	4.5
Latvia	70.8	17.3	12.0
Lithuania	72.3	12.2	15.5
Malta	46.3	52.1	1.6
Netherlands	65.6	27.0	7.4
Poland	77.6	13.5	8.9
Portugal	35.0	62.4	2.6
Romania	71.9	21.1	7.0
Slovakia	82.9	8.6	8.5
Slovenia	80.3	15.3	4.5
Spain	49.7	35.7	14.5
Sweden	73.0	19.4	7.6
United Kingdom	61.8	26.4	11.8

Note: a - „Lower“ means that the qualification of an employed person is lower than professional requirements of his occupation. „Higher“ means that the qualification of an employed person is higher than professional requirements of his occupation. The aggregates are calculated from available data (do not include Luxembourg).  
Source: EUROSTAT (2007c), average for year 2006.

**Table 8A: Comparison of qualification of employed persons with professional requirement of their occupation in selected countries by selected NACE branches in 2006 (%)**

	NACE	complied.	lower <sup>a</sup>	higher
EU-27	D	64.1	27.8	8.1
	E	77.0	14.4	8.6
	J	74.2	14.6	11.2
EU-15	K	73.1	16.2	10.6
	D	58.4	33.3	8.3
	E	70.5	20.0	9.5
EU-12	J	72.3	15.8	11.9
	K	72.2	17.3	10.5
	D	80.9	11.7	7.4
Austria	E	86.9	5.9	7.2
	J	86.2	6.7	7.1
	K	79.8	8.5	11.7
Czech Republic	D	70.2	17.4	12.4
	E	80.1	7.9	12.0
	J	83.1	10.2	6.7
Germany	K	75.0	12.4	12.6
	D	85.3	11.7	2.9
	E	88.6	7.9	3.5
Poland	J	84.4	13.4	2.3
	K	76.1	15.4	8.5
	D	71.9	18.2	9.8
Portugal	E	80.1	9.0	10.9
	J	79.7	10.1	10.2
	K	73.2	14.9	11.9
Sweden	D	80.7	10.3	9.1
	E	86.0	5.2	8.8
	J	86.7	6.6	6.7
United Kingdom	K	79.6	6.5	13.8
	D	37.4	61.2	1.5
	E	37.4	54.7	7.9
Other	J	63.7	21.9	14.4
	K	70.7	25.2	4.1
	D	68.3	25.9	5.8
Other	E	76.7	15.8	7.5
	J	81.3	15.5	3.2
	K	70.3	20.1	9.5

Note: The aggregates are calculated from available data (do not include Luxembourg).  
Source: EUROSTAT (2007c), average for year 2006.

**Table 9A: Average monthly earnings in selected European countries by education attained and their relations (EUR, %, year 2002)**

	EUR					Relation of earnings (ISCED3 = 100%)			
	Total	ISCED 0-2	ISCED 3	ISCED 4	ISCED 5,6	ISCED 0-2	ISCED 3	ISCED 4	ISCED 5,6
EU-27*	1,115	823	991	1,252	1,553	81.6	100	111.7	170.3
EU-15	2,451	1,831	2,383	2,551	3,515	76.8	100	107	147.5
Bulgaria	147	114	127	160	197	90.1	100	126.3	155.4
Czech Republic	486	333	439	:	764	76	100	:	174.2
Ireland	2,641	1,966	2,267	2,464	3,160	86.7	100	108.7	139.4
Lithuania	324	224	249	264	427	89.9	100	106	171.6
Netherlands	2,456	1,842	2,313	2,713	3,443	79.6	100	117.3	148.9
Poland	578	438	541	524	873	81	100	96.8	161.3
Romania	194	125	159	215	349	78.8	100	135.3	219.9
Slovakia	996	650	857	:	1,768	75.9	100	:	206.3
Slovenia	345	213	302	:	526	70.5	100	:	174.2
United Kingdom	2,979	2,328	2,657	2,427	4,020	87.6	100	91.4	151.3

Note: 100 % = average monthly earning of employees with secondary education (ISCED 3). Does not include earnings of employees in agriculture, fishing and private households\* EU-27 – unweighted arithmetic average of available data (listed countries only).  
Source: EUROSTAT (2002b).

**Table 10A: Average annual earnings in high-tech industries and knowledge-intensive services (EUR )**

	Total manufacturing sector	High-tech manufacturing sector	Medium high-tech manufacturing sector	Total services	High-tech services	Market services	Financial services	Other knowledge-intensive services
Austria	33,496	40,392	35,831	31,941	36,459	35,698	45,785	:
Belgium	30,718	38,500	34,688	31,378	36,133	32,473	43,983	:
Bulgaria	1,697	1,756	1,959	1,889	2,454	1,610	4,047	1,785
Cyprus	17,169	:	15,021	23,904	25,673	26,719	27,775	:
Czech Republic	6,688	6,552	6,936	7,270	8,733	7,754	12,427	6,476
Denmark	39,809	37,818	40,664	40,740	51,351	43,545	:	:
Estonia	4,601	4,770	5,531	5,101	6,773	5,253	11,230	:
Finland	31,208	35,430	31,930	30,963	33,336	31,661	35,516	:
France	29,285	34,597	32,243	29,444	35,625	32,316	42,597	:
Germany	36,719	41,190	41,459	33,275	41,670	31,367	45,676	:
Greece	17,143	20,905	19,601	18,262	23,524	18,538	27,321	15,899
Hungary	5,683	5,732	6,829	5,777	8,518	6,184	11,621	5,252
Ireland	32,455	34,317	33,229	34,962	35,420	34,966	40,897	38,232
Italy	24,449	27,033	26,547	27,354	26,538	24,312	42,451	:
Latvia	3,401	3,031	3,658	3,626	5,725	3,707	8,571	:
Lithuania	3,842	4,639	4,730	4,061	5,238	4,459	8,235	3,551
Luxembourg	35,631	26,934	36,371	39,918	50,037	32,570	61,012	:
Netherlands	33,994	38,086	38,207	34,988	38,160	36,091	46,598	36,767
Poland	6,395	7,829	7,390	6,973	9,895	6,860	11,270	6,177
Portugal	11,314	15,189	15,457	15,911	24,112	17,774	26,910	:
Romania	1,914	2,432	2,386	2,520	3,730	2,120	6,143	2,493
Slovakia	4,958	5,316	5,918	5,367	5,325	5,834	9,733	4,588
Slovenia	10,544	10,475	12,207	13,788	17,044	12,048	20,036	16,411
Spain	21,707	25,402	25,345	21,373	28,466	18,916	37,776	22,407
Sweden	29,854	:	31,089	32,480	42,956	32,078	:	:
United Kingdom	38,207	39,782	41,782	36,661	48,191	41,162	59,495	34,246
EU-12*	6,081	5,253	6,597	7,298	9,010	7,504	11,917	5,842
EU-15*	29,733	32,541	32,296	30,643	36,799	30,898	42,771	29,510
EU-27*	19,726	21,171	21,423	20,766	25,042	21,001	28,629	14,945

Note: \* unweighted arithmetic average of available data, does not include data for Malta.  
Source: EUROSTAT (2002a, 2007e), own calculations.

Table 11A: Distribution of the 25-to-64-year-old population by level of earnings and educational attainment

			Level of earnings					All categories
			At or below half of the median	More than half the median but at or below the median	More than the median but at or below 1.5 times the median	More than 1.5 times the median but at or below 2.0 times the median	More than 2 times the median	
<b>Belgium</b>	<b>2003</b>	ISCED 1+2	11.4	58.9	26.2	3.1	0.5	100.0
		ISCED 3+4	5.5	52.8	33.9	6.5	1.3	100.0
		ISCED 5B	1.9	36.6	48.7	10.6	2.1	100.0
		ISCED 5A	2.8	17.2	39.2	27.5	13.3	100.0
		All levels of education	6.0	45.4	35.6	9.8	3.2	100.0
<b>Czech Republic</b>	<b>2004</b>	ISCED 1+2	16.5	66.8	14.2	1.8	0.6	100.0
		ISCED 3+4	4.7	49.5	35.0	7.6	3.2	100.0
		ISCED 5B	1.4	35.5	39.4	13.2	10.5	100.0
		ISCED 5A	0.3	10.6	39.9	21.6	27.6	100.0
		All levels of education	5.0	45.0	33.9	9.3	6.8	100.0
<b>Denmark</b>	<b>2003</b>	ISCED 1+2	45.8	23.0	24.0	5.0	2.2	100.0
		ISCED 3+4	25.0	23.1	36.0	10.3	5.6	100.0
		ISCED 5B	19.8	14.9	37.7	18.4	9.3	100.0
		ISCED 5A	17.8	13.1	35.1	18.0	15.9	100.0
		All levels of education	29.7	20.3	32.2	10.8	7.0	100.0
<b>Finland</b>	<b>2003</b>	ISCED 1+2	26.0	36.8	27.5	6.9	2.8	100.0
		ISCED 3+4	21.9	36.3	31.1	7.8	2.9	100.0
		ISCED 5B	13.9	27.5	39.5	12.1	7.0	100.0
		ISCED 5A	10.6	15.9	27.1	22.8	23.6	100.0
		All levels of education	19.1	30.9	31.1	11.3	7.6	100.0
<b>France</b>	<b>2004</b>	ISCED 1+2	17.1	52.0	23.3	5.4	2.3	100.0
		ISCED 3+4	8.2	46.9	31.9	8.6	4.4	100.0
		ISCED 5B	3.3	28.2	41.0	18.4	9.1	100.0
		ISCED 5A	4.1	16.6	32.1	20.9	26.4	100.0
		All levels of education	9.5	41.3	30.5	10.8	7.9	100.0
<b>Germany</b>	<b>2004</b>	ISCED 1+2	25.2	38.6	29.5	5.3	1.4	100.0
		ISCED 3+4	23.0	33.9	30.0	7.9	5.3	100.0
		ISCED 5B	12.7	27.8	28.7	19.3	11.5	100.0
		ISCED 5A	13.4	18.3	24.1	20.9	23.2	100.0
		All levels of education	19.7	30.0	28.2	12.0	10.2	100.0
<b>Hungary</b>	<b>2004</b>	ISCED 1+2	16.0	64.0	15.6	3.0	1.3	100.0
		ISCED 3+4	12.2	43.6	25.9	10.3	8.0	100.0
		ISCED 5B	6.8	25.4	34.2	13.9	19.6	100.0
		ISCED 5A	2.2	6.8	21.9	25.1	43.9	100.0
		All levels of education	10.7	39.3	23.1	12.2	14.7	100.0
<b>Ireland</b>	<b>2002</b>	ISCED 1+2	30.8	34.4	23.9	7.2	3.8	100.0
		ISCED 3+4	18.0	33.8	26.0	13.3	8.9	100.0
		ISCED 5B	11.7	32.0	28.7	14.9	12.6	100.0
		ISCED 5A	8.3	14.7	21.4	22.8	32.7	100.0
		All levels of education	21.5	29.8	23.9	12.8	12.0	100.0
<b>Italy</b>	<b>2002</b>	ISCED 1+2	19.5	42.3	22.2	7.5	8.5	100.0
		ISCED 3+4	10.1	35.0	29.3	10.8	14.9	100.0
		ISCED 5B	:	:	:	:	:	:
		ISCED 5A	6.8	19.9	27.4	11.8	34.1	100.0
		All levels of education	13.8	36.2	25.9	9.5	14.6	100.0

Table 11A: continuation

			Level of earnings					
			At or below half of the median					
Luxembourg	2002	ISCED 1+2	12.1	60.1	21.6	4.9	1.3	100.0
		ISCED 3+4	2.3	52.2	28.0	11.7	5.8	100.0
		ISCED 5B	0.6	28.6	41.7	17.2	11.8	100.0
		ISCED 5A	0.0	14.4	36.6	24.9	24.1	100.0
		All levels of education	3.5	45.4	30.0	13.0	8.2	100.0
Netherlands	2002	ISCED 1+2	26.9	37.9	29.0	5.0	1.3	100.0
		ISCED 3+4	17.4	36.5	33.2	9.3	3.6	100.0
		ISCED 5A+5B	8.3	20.8	30.5	21.9	18.6	100.0
		All levels of education	17.4	32.6	31.3	11.6	7.1	100.0
Poland	2004	ISCED 1+2	17.0	54.4	21.0	5.7	1.9	100.0
		ISCED 3+4	8.5	44.7	29.1	10.7	7.0	100.0
		ISCED 5B	4.2	27.9	28.0	15.6	24.3	100.0
		ISCED 5A	1.2	16.6	35.6	20.8	25.8	100.0
		All levels of education	9.6	41.0	27.6	11.4	10.4	100.0
Spain	2004	ISCED 1+2	12.8	50.8	29.0	5.2	2.2	100.0
		ISCED 3+4	9.3	42.6	31.6	10.2	6.3	100.0
		ISCED 5B	7.8	43.8	30.6	10.6	7.1	100.0
		ISCED 5A	3.3	22.8	33.2	19.9	20.7	100.0
		All levels of education	9.1	41.0	30.9	10.7	8.4	100.0
Sweden	2003	ISCED 1+2	18.0	44.4	31.3	4.7	1.6	100.0
		ISCED 3+4	11.0	42.2	34.8	8.0	4.1	100.0
		ISCED 5B	12.4	31.3	39.6	11.7	4.9	100.0
		ISCED 5A	10.1	20.4	36.6	15.9	16.9	100.0
		All levels of education	12.5	37.5	34.8	9.2	6.1	100.0
United Kingdom	2004	ISCED 1+2	37.9	44.7	13.3	2.7	1.4	100.0
		ISCED 3+4	21.4	37.4	25.5	9.4	6.3	100.0
		ISCED 5B	12.3	30.2	28.8	16.9	11.9	100.0
		ISCED 5A	6.1	15.9	24.9	23.9	29.1	100.0
		All levels of education	18.6	32.6	24.3	12.9	11.7	100.0

Note: (:) data are not available.

Source: OECD (2006a).

Table 12A: Average monthly earnings in major ISCO groups by education attained

	2002				2006				Average growth rate (%)			
	1	2	3	4-9	1	2	3	4-9	1	2	3	4-9
TOTAL	40,058	27,431	19,985	15,168	50,242	31,653	25,845	17,855	5.8	3.6	6.6	4.2
Primary or lower secondary (ISCED 0-2)	19,724	17,519	17,237	12,991	26,448	25,111	22,029	15,026	7.6	9.4	6.3	3.7
Upper secondary with apprenticeship certificate (ISCED 3c)	18,071	16,771	17,732	15,277	23,596	25,351	23,868	17,975	6.9	10.9	7.7	4.1
Upper secondary and post-secondary with school leaving certificate (ISCED 3A,4)	30,055	22,348	19,118	16,296	37,411	27,480	24,606	19,333	5.6	5.3	6.5	4.4
Tertiary non-university + Bachelor (ISCED 5B,5A)	39,620	22,930	19,094	17,871	46,414	27,330	25,796	20,925	4.0	4.5	7.8	4.0
Master and advanced research programmes (ISCED 5A,6)	53,978	30,046	26,879	20,329	70,057	34,791	34,766	24,663	6.7	3.7	6.6	5.0

Note: Average monthly earnings in CZK. Includes employees with 30 or more weekly working hours. Source: ČSÚ (2003a, 2007a).

**Table 13A: Foreign students at tertiary education institutions (ISCED 5–6)**

	1998	1999	2000	2001	2002	2003	2004
Australia	109,437	117,485	105,764	120,987	179,619	188,160	199,284
Austria	28,447	29,819	30,382	31,682	28,452	31,101	33,707
Belgium	:	36,137	38,799	38,150	40,354	41,856	37,091
Canada	32,890	35,543	40,033	:	:	:	112,816
Czech Republic	4,074	4,583	5,698	7,750	9,753	12,474	14,923
Denmark	11,022	12,321	12,871	12,547	14,480	18,120	17,160
Finland	4,331	4,847	5,570	6,288	6,760	7,361	7,915
France	148,000	130,952	137,085	147,402	165,437	221,567	:
Germany	171,150	178,195	187,032	199,132	219,039	240,619	260,314
Greece	:	:	:	:	:	12,456	:
Hungary	6,636	8,869	9,904	11,242	11,783	12,226	12,913
Ireland	6,904	7,183	7,413	8,207	9,206	10,201	:
Island	194	207	403	421	472	580	489
Italy	23,206	23,496	24,929	29,228	28,447	36,137	40,641
Japan	35,700	56,552	59,691	63,637	74,892	86,505	117,903
Korea	2,538	2,869	3,373	3,850	4,956	7,843	10,778
Luxembourg	559	652	:	:	:	:	:
Netherlands	..	13,619	14,012	16,589	18,888	20,531	21,259
New Zealand	5,912	6,900	8,210	11,069	17,709	26,359	68,904
Norway	5,790	9,004	6,990	8,834	7,679	8,247	9,683
Poland	5,443	5,693	6,126	6,659	7,401	7,617	8,118
Portugal	:	:	11,177	:	:	15,483	16,155
Slovakia	:	1,599	1,570	1,690	1,643	1,651	1,640
Spain	29,000	32,954	40,689	39,944	44,860	53,639	41,734
Sweden	12,579	19,567	20,805	26,304	22,859	25,523	36,458
Switzerland	24,344	25,258	26,003	27,765	29,301	32,847	35,705
Turkey	18,662	19,816	17,654	16,656	16,328	15,719	15,298
United Kingdom	209,550	209,513	222,936	225,722	227,273	255,233	364,271
USA	430,786	451,934	475,169	475,169	582,992	586,316	572,509

Note: (:) data are not available.  
Source: OECD (2007b).

**Table 14A: Foreign students of tertiary education (ISCED 5–6) from EU-27, EEA and candidate countries (thousands)**

	1998	1999	2000	2001	2002	2003	2004	2005
EU-27	327.5	381.1	371.0	388.0	395.1	425.3	446.4	450.7
EU-25	316.0	369.8	360.7	378.4	387.4	417.5	438.3	442.4
Austria	20.7	22.0	23.3	24.2	22.2	24.0	25.7	25.1 <sup>i</sup>
Belgium	:	21.0 <sup>i</sup>	22.5 <sup>i</sup>	22.6 <sup>i</sup>	23.7 <sup>i</sup>	22.2 <sup>i</sup>	26.1 <sup>i</sup>	6.4
Bulharsko	6.0	6.2	6.0	6.2	4.9	5.8	6.2	11.8
Cyprus	:	0.3	0.3	0.4	0.4	0.5	0.5	8.7
Czech Republic	2.2	2.4	3.1	4.8	6.0	8.0	8.9	:
Denmark	4.4	4.9	4.7	5.2	5.6	6.7	7.3	3.1
Estonia	0.6	0.7	0.7	0.5	0.3	0.8	0.6	42.9
Finland	1.8	1.8	2.2	2.5	2.6	2.8	2.9	0.2
France	35.6	36.6	38.0	38.1	38.5	46.5	46.4	:
Germany	93.6	97.5	101.0 <sup>i</sup>	105.9 <sup>i</sup>	113.5 <sup>i</sup>	119.8 <sup>i</sup>	125.4 <sup>i</sup>	0.3
Greece	:	:	:	:	7.4	10.6	12.0	16.3
Hungary	3.8	4.1	:	7.1	7.5	7.9	8.2	0.6
Chorvatsko	:	:	:	:	:	0.2	0.2	0.2
Ireland	3.5 <sup>i</sup>	3.4 <sup>i</sup>	3.8 <sup>i</sup>	4.2 <sup>i</sup>	4.1 <sup>i</sup>	4.3 <sup>i</sup>	4.8	0.3
Island	0.1	0.2	0.3	0.3	0.4	0.4	0.3	1.0
Italy	15.7	13.2	12.2	14.0	13.1	15.6	16.6	:
Latvia	0.1	0.1	0.4	0.5	0.6	0.7	0.7	8.7
Lichtenštejnsko	:	:	:	:	:	:	:	0.1
Lithuania	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2
Luxembourg	0.5	0.6	0.6	:	:	:	:	121.6 <sup>i</sup>
Makedonie	0.1	0.1	0.1	0.1	0.1	0.0	0.1	18.5
Malta	:	0.1	0.1	0.1	0.2	0.1	0.1	5.1
Netherlands	:	7.5	7.8	9.5	11.0	11.9	12.3	2.6
Norway	2.9	3.1	3.8	4.1	4.3	4.5	4.9	2.8
Poland	1.7	1.8	1.9	2.1	2.2	2.2	2.2	25.8
Portugal	:	:	2.2	2.6	:	2.7	2.7	1.9
Romania	5.5 <sup>i</sup>	5.1 <sup>i</sup>	4.3 <sup>i</sup>	3.4 <sup>i</sup>	2.8 <sup>i</sup>	2.0	1.9	13.1
Slovakia	:	:	0.7	0.8	0.7	0.7	0.8	0.8
Slovenia	0.3 <sup>i</sup>	0.3 <sup>i</sup>	0.4 <sup>i</sup>	0.5 <sup>i</sup>	0.6 <sup>i</sup>	0.6 <sup>i</sup>	0.7 <sup>i</sup>	0.8 <sup>i</sup>
Spain	17.4	19.2	7.0	7.2	7.4	8.3	10.9	12.3
Sweden	7.7	13.2	14.2	14.9	15.9	17.4	18.7	18.8
Turkey	:	2.2	5.6	5.3	2.8	2.8	2.9	2.9
United Kingdom	106.3	119.2	113.4	110.6	103.6	103.0	103.6	106.5

Note: (:) data are not available; (i) data for ISCED 6 students is missing.  
Source: EUROSTAT (2007a).

**Table 15A: Mobility in the tertiary education (2006)**

	Mobility should be an obligatory part in the curriculum					
	for all students			for doctoral candidates		
	yes	no	NA	yes	no	NA
EU-27	57.7	37.5	4.8	65.2	27.2	7.6
EU-15	55.5	40.3	4.2	62.1	30.3	7.6
EU-12	67.6	25.2	7.3	79.1	13.5	7.4
Austria	65.0	32.5	2.5	67.5	30.5	2.0
Belgium	44.8	45.4	9.9	57.7	26.6	15.8
Bulgaria	80.3	17.3	2.4	86.0	11.5	2.4
Croatia	68.9	29.7	1.4	90.6	8.0	1.4
Cyprus	48.0	50.0	2.0	50.0	46.0	4.0
Czech Republic	83.5	16.0	0.5	93.5	5.5	1.0
Denmark	70.1	27.0	2.9	65.2	12.3	22.5
Estonia	45.1	53.0	2.0	68.6	28.4	2.9
Finland	48.0	49.5	2.5	63.2	30.9	5.9
France	78.8	20.4	0.8	71.2	17.2	11.6
Germany	48.0	50.8	1.2	57.1	38.4	4.4
Greece	51.8	42.9	5.4	75.0	16.1	8.9
Hungary	64.7	27.4	8.0	76.7	13.9	9.5
Ireland	42.6	52.0	5.4	52.9	41.6	5.4
Italy	77.8	20.7	1.6	86.5	9.9	3.6
Latvia	76.0	21.0	3.0	85.0	9.0	6.0
Lithuania	58.0	34.0	8.0	76.0	15.5	8.5
Lucembourg	64.7	33.3	2.0	56.9	37.3	5.9
Malta	58.8	33.4	7.8	82.3	13.8	3.9
Netherlands	37.7	55.4	6.9	42.3	48.1	9.6
Poland	62.6	25.7	11.7	75.9	12.8	11.3
Portugal	60.0	36.1	3.9	71.7	25.1	3.1
Romania	74.0	22.8	3.1	78.7	18.1	3.1
Slovakia	75.0	20.5	4.5	88.0	8.5	3.5
Slovenia	69.0	27.0	4.0	84.0	13.0	3.0
Spain	62.7	35.1	2.3	75.1	24.2	0.8
Sweden	36.5	58.8	4.6	60.8	36.1	3.1
United Kingdom	28.4	52.4	19.2	28.8	52.0	19.2

Note: KN/NA ./did not replay.  
Source: EC EUROBAROMETER (2007).

**Table 16A: Students with Czech citizenship studying abroad**

	1998	1999	2000	2001	2002	2003	2004
EU-27	2,165	2,750	3,234	3,780	4,317	4,990	5,390
EU-25	2,165	2,746	3,231	3,776	4,313	4,983	5,375
Austria	223	341	329	393	396	439	500
Belgium	:	33	41	29	45	56	71
Bulgaria	0	4	3	4	4	7	5
Croatia	:	:	:	:	:	0	1
Cyprus	:	:	:	0	0	4	5
Denmark	5	8	9	9	22	22	24
Estonia	0	1	1	0	0	0	0
Finland	10	12	16	25	41	47	46
France	207	250	330	371	448	585	662
Germany	1,082	1,235	1,391	1,714	2,059	2,337	2,483
Greece	:	0	:	0	6	7	6
Hungary	17	26	:	6	16	23	15
Ireland	3	2	6	17	21	21	26
Island	0	0	5	4	4	6	7
Italy	87	76	67	104	99	136	152
Japan	20	16	22	33	28	32	37
Latvia	1	0	0	5	6	4	4
Lithuania	:	-	-	-	-	-	3
Malta	:	4	2	1	0	0	0
Netherlands	:	26	33	44	56	60	55
Norway	14	14	17	30	35	36	40
Poland	250	251	265	229	229	242	208
Portugal	0	0	1	0	:	7	0
Romania	-	-	-	0	0	-	10
Slovakia	:	:	287	287	305	316	443
Slovenia	0	4	2	8	5	6	1
Spain	17	80	78	20	25	46	69
Sweden	13	98	91	102	137	190	243
Switzerland	:	:	:	:	137	164	185
Turkey	:	0	0	0	0	0	1
United Kingdom	250	299	282	412	397	435	359
USA	688	842	869	964	1,163	1,180	:

Note: (:) data are not available.  
Source: EUROSTAT (2007d).

### 3. Conclusion

The increased speed of scientific and technological progress and the application of research results in practice is accompanied by an increase in the importance of **lifelong learning**. Knowledge and skills gained during one's initial education become more quickly outdated and not even long-term practical experience can replace the need for continuing education. The importance of continuing education also increases with the increase in retirement age. In an international comparison, the Czech population aged 25-64 participates in further education to a significantly lesser degree than the EU average. It is highly unlikely that the country will meet the goal set by the Lisbon strategy: that by 2010, 12.5% of this age group will participate in further education. This would require doubling the 2006 level of participation within four years.

**Participation in continuing education** is positively influenced by an individual's initial level of education. People in the Czech Republic who have completed tertiary education participate in continuing education to a greater extent than the EU average, while persons with a lower level of education do so significantly less. Compared to other countries, the Czech Republic has been unsuccessful in changing the negative approach to education gained by some people during initial education. Change is only possible on the long-term horizon, since it requires expanding more active forms of initial and continuing education and individualising education.

From the short-term perspective, it is possible to remove partial **barriers to participation in education**. One such barrier is insufficient access to education or poor orientation in the available offer of continuing education. It is absolutely necessary to increase not only accessibility and improve information regarding the educational offer, but also to provide free individual advisory services for people who are not able to orient themselves in information systems and/or cannot decide on the focus or form of education which most suits their individual possibilities and capabilities. Financial support – for instance in the form of educational vouchers – can be important in overcoming financial barriers.

Also important is the development and implementation of specific educational methods which do not remind participants of school and which are not implemented in a school environment. For a certain part of the population, these factors represent a decisive and insurmountable barrier. Adults should also be able to apply their current skills in the educational process in order to get a tangible sense of the meaning and purpose of their new knowledge. Although the available educational offer, especially in larger towns, is beginning to properly reflect the needs of specific groups of clients, this offer still needs to be expanded in order to increase people's motivation for participating in education. Even if education does not lead to immediate success, e.g. in the form of getting job, it can help the unemployed people gain important knowledge necessary for at least remaining employable and avoiding social exclusion.

A frequently mentioned barrier is lack of time. Although this barrier may frequently be a so-called "substitute" barrier hiding an aversion to learning, for certain groups of people this reason should be taken seriously, in particular parents of small children, who spend a lot of time caring for their families. It is thus important to continue to

develop support services for families which are financially accessible to various income categories. Also important are childcare during education and family-oriented policies that allow individuals to balance working and family life. No less important is a special educational offer geared towards women who are returning to work after raising their children or are looking for a new place on the labour market. Promoting this group's participation in continuing education thus cannot be limited to partial measures in the area of education, but requires a comprehensive family, social and educational policy.

For people who do not have time because of job requirements (entrepreneurs, professionals), an important factor is that they need to be substituted while attending further education. Problems may arise in extremely small companies, where even a short period of absence of certain workers can threaten the company's smooth operation. For such companies, another problem may be the financial affordability of training. These companies should be offered certain financial support and products adapted to their educational needs, including independent learning.

Surveys have shown that there is relatively little awareness in the Czech Republic regarding the need and advantages of updating and expanding one's education. A large part of the population does not feel any need for continuing education and considers its current education to be satisfactory. This situation calls for a good educational campaign targeted at this segment of the population. The previously described activities should be implemented as well (improved educational offer, advisory services). Considering the fact that the pre-retirement age group in particular is very sceptical towards the importance of continuing education in remaining competitiveness on the labour market, activities should focus on employers as well. Many employers suffer from some prejudices towards hiring and training older workers.

A significant part of continuing education is provided by companies. **Training in companies** is significantly influenced by the situation on the labour market, i.e. whether companies are able to find a qualified workforce, the extent of innovations requiring the retraining of a certain segment of employees, and a legislative environment which either directly or indirectly forces companies to educate their employees. Companies' willingness in the Czech Republic to invest into employee development was found to be more positive than the EU-27 average, but below the average for the more advanced EU countries. The situation is positively influenced by foreign investors who introduce approaches to the development of human resources commonly found in parent companies, as well as by the increased number of large companies with more training possibilities than small companies.

Innovating companies' approach to training depends on the type of innovating company. Also, companies do not provide training to the same extent to all employee categories and do not pay sufficient attention to evaluating the quality and benefits of education. Competition and the benefits companies receive from training – even if difficult to quantify – will most likely lead companies to provide an almost optimum form and content of education.

In the Czech Republic, **human resources for the knowledge economy** are characterised by very good availabil-

ity of workers with secondary education. However, the Czech Republic lags behind the EU average in the number of professionals as a share of total employment.

**The employment structure in knowledge-intensive sectors and professions** shows that, despite much improvement, the Czech Republic continues to be more a manufacturing economy than a knowledge economy. High-tech manufacturing sectors exceed the EU average in their share of employment, but this is primarily the result of the rapid growth of new jobs in computer manufacture (NACE 30), which is rather an assembly sector with a low number of specialised professions as a share of total employment. It is still necessary to increase the number of investment projects that will help to create a higher number of qualified jobs and increase companies' potential for research and innovation.

On the other hand, the Czech Republic lacks qualified workers for many knowledge service sectors, high-tech sectors and the entire ICT sector. The gap between the demand of the labour market and the supply provided by the educational system continues to increase. Schools and employers thus need to work closely together to correlate employer requirements with the structure and content of curricula while at the same time increasing the attractiveness of professions that are indispensable to the development of the knowledge economy. It is also necessary to increase the Czech economy's competitiveness on the international labour market, to find the missing specialists in other developing countries in Central and Eastern Europe and to create the proper conditions for attracting and keeping them in the Czech Republic.

The supply of highly qualified workers is also influenced by the ratio between **wages and the qualification intensity of work**. In the Czech Republic, tertiary education offers a higher level of wage premium than the EU-27 average; the wage differentiation within this educational group is lower. Almost nobody with tertiary education in the Czech Republic earns less than half the median Czech wage. In Denmark, Germany or Finland, for example, this figure is more than 10%, which for some professions reflects excess supply over demand and the necessity to accept a job which does not correspond to one's level of qualifications.

The fact that the Czech Republic is more likely to be the place for lower stages of high-tech manufacturing causes wages in this economic sector to be lower than in medium high-tech sectors. As in all EU countries, the Czech Republic shows wage underrating in knowledge services financed primarily from public resources (education,

health and social work, cultural services). Wage premium for comparably demanding work is significantly lower in these areas than in the financial services sector – and this gap is wider in the Czech Republic than in the more advanced EU countries. Low average wages have a negative influence on acquiring specialists for these sectors, which form the social infrastructure of the knowledge economy. This situation may slow down further development. If wages in these services are to be closer to wages in market services, it is absolutely necessary to introduce private funding as well.

Czech wages do not equally reflect the qualification intensity of work. Managers tend to earn significantly higher wages at a comparable level of education, primarily due to higher time demands, level of stress and requirements for organisational and other specific skills. There still remains the question, however, of higher wages in this category as compared to highly qualification-intensive scientific and intellectual professions.

The **globalisation of tertiary education** should also help to improve the quality of tertiary education. The Czech Republic has been witnessing in particular an increase in the number of foreign students taking advantage of free tertiary education in Czech or Slovak. Because of strains on public budgets and the need to look for savings, it would be appropriate to begin discussing possible changes to the act on tertiary education and international agreements. Except for cases of international aid, if the number of foreign students exceeds the reciprocal exchange, their studies should be at the full rate. If studying at a public university, the costs (i.e., the level of state subsidies for the relevant curricula) should be paid by the state of which the student is a citizen. This income could then be used to expand scholarship programmes for Czech students and thus increase both their numbers as well as their spectrum. Currently, studying abroad is beyond many students' financial capabilities, even with a scholarship.

It is necessary to support efforts by various institutions to increase the quality of education and to expand the available range of courses/programmes offered in foreign languages. Only in this way will it be possible to increase the interest of foreign students from advanced countries in spending at least part of their studies in the Czech Republic, thus making more room for reciprocal studies by Czech students in those countries and achieving a greater level of equivalence between interest in studying abroad and the possibility of spending part of one's studies in another country.

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## **Centre for Economic Studies, University of Economics and Management**

[www.cesvsem.cz](http://www.cesvsem.cz)

Centre for Economic Studies is a research institute of the University of Economics and Management. Its team now includes 16 research workers (internal and external). Research is directed especially at the competitiveness of the Czech economy in international comparison (within the EU-25) and on the identification of related economic (particularly structural) and political implications for the support of economic convergence and transition to knowledge-based economy. The research activities, including field surveys and case studies, have been realized since 2005 within the framework of two long-term research projects (Growth performance and quality competitiveness of the Czech economy and The Centre for research on the competitiveness of the Czech economy). Thematically the research within the project is aimed at four partial components: (1) Macroeconomic performance and (external and internal) stability, real and nominal convergence, factors of long-term growth, (2) Institutional quality (governance), doing business conditions, efficiency of markets, (3) Competitive advantage (including export performance) and innovative inputs and outputs, development of information society and business application of ICT, (4) Quality of human resources (realized by National Observatory of Employment and Training). Besides national view also the regional and industry specific aspects of the competitiveness and its structural implications have been considered. CES supervises master degree program in competitiveness and management in which the results of the research activities have been exploited extensively. CES cooperates with a number of academic and governmental institutions as well as businesses, and with foreign expert bodies.

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## **National Observatory of Employment and Training, National Training Fund**

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National Observatory of Employment and Training (NOET) is an analytical section of the National Training Fund. It was set up on the initiative of the European Training Foundation as part of a network of similar institutions in Central and Eastern European countries. Its team now includes 6 research workers. The NOET provides information about human resources development, carries out research, collects data, including field surveys, and analyses development trends in the labour market and education in connection with on-going socio-economic changes. Furthermore, it coordinates pilot projects at both national and regional level. Its research activities are focused on the following main areas: (i) analyses of mutual links between the labour market and the initial as well as continuing vocational education and training (especially access to education, role of education in increasing employability); (ii) analysis and evaluation of the human resource development as a resource and result of competitiveness of the economy; (iii) development and testing of methodology for regular forecasting of qualification needs of the labour market at the national, sectoral and regional levels; enhancing a relevant information base and an institutional background for regular forecasting. Since 2005 NOET is one of three institutions creating the Centre for Research on the Competitiveness of the Czech Economy. It co-operates closely with the European Commission, the OECD, the Cedefop (European Centre for the Development of Vocational Training) and other partner institutions. It takes part in the expert European networks: ReferNet (set up under the auspices of the Cedefop), and SkillsNet (international network for co-operation in the area of forecasting skills needs).

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