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KNOWLEDGE-BASED  
ECONOMY AND SOCIAL  
CAPITAL IN CENTRAL AND  
EASTERN EUROPEAN  
COUNTRIES



## INTRODUCTION

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Daniel Bell (1973) developed the concept of the post-industrial society. His notion was that after modernisation and industrialisation, the most developed societies would move into the next stage of development. This next stage is characterised by a change in the basic production structure, from industry to the tertiary sector, or a so-called process of de-industrialization. The main empirical indicator for the transition from one stage to another, used by Bell, is the employment structure. When employment in the service sector outnumbers employment in industry sector, the economy is seen to be entering the post-industrial stage. In such a system, knowledge is replacing capital, innovation is replacing tradition, and ideas are replacing manual work as the main sources of power and economic growth. The notion that capital is replaced by knowledge as the main source of growth and power gave rise to the idea of the “knowledge based economy”. This is an economy where knowledge is the predominant resource, much in the same way that capital previously replaced land as the power source in the transition from the pre-industrial to industrial phase; knowledge is now replacing capital in the transition from the industrial to post-industrial. In his later works, Bell speaks of the “information society” instead of the post-industrial society, but the basic idea remains essentially the same. The reason why the concept of information society is now so widespread lies in the phenomenal expansion and economic importance of information technology and its application in all sectors of the economy and society.

The information society means, not only a shift in the dominant sector, but also a change in the demand for workers who are highly skilled and well educated. The majority of newly created jobs in developed economies are knowledge based and most of them are in the service sector. Green et al. (1998) found that in the UK, between 1986 and 1997, the average levels of work skills required

had increased, as had the usage of skill. Consequently, the proportion of jobs that required only short training periods decreased. The structure of labour demand (Gera, 1996) has shifted in favour of skilled workers and workers with higher skills enjoy higher employment rates. Employment growth is increasingly related to the use and production of knowledge (Gera, 1996) and the direction of employment in all sectors is shifting toward knowledge.

The other significant change is happening in the labour market and in the nature of employment. There is a tendency towards increased part-time, casual employment and a loss of job security in general. Globalisation and competitiveness are placing increasing pressure on businesses, which spills-over into pressure for a more flexible workforce. The nature of these tendencies was not predicted by the theories of post-industrialism and the information society. These theories reflected the optimism of a liberal ideology and its belief in continuous progress. The change in labour market is acknowledged as the key argument behind the claim that post-industrial and information societies are only a new stage of the capitalist development. Knowledge is not a new power resource but simply a new element in the production for profit. Although the neo-Marxist theorists did not develop their own theories of post-industrialism (post-Fordism comes closest to it), they insist that we cannot speak about a new type of society and economy, only about a new stage of capitalist development. The best framework for understanding the changes in the labour market, and the changes in the nature of work, are still profit maximization and labour-capital relations.

The information economy is changing the predominant content of work (Won-Ki, 2001). The life cycle of jobs is shortening and the demand for permanent learning becomes required. In addition, higher-level skills such as problem-solving capabilities, communication, social skills and computer skills are increasingly required in contemporary organizations (Green et al., 1998). These skills, as well as capabilities for permanent learning, rely heavily on the educational system for support. The general educational level of a society is becoming an important element of that society's human capital.

Consequently, other institutions have responded to the demand emanating from the economy. Of course, the feedback mechanism is also present because when educational institutions started to expand they started to create demand for education in its own right. Educational institutions started to expand the number of programs offered

on all levels, and the number of students enrolled increased significantly. Permanent learning and training programs have become a constituent part of business organisation and educational institutions. Educational institutions promote knowledge and push towards a more knowledge-based society. Business organisations rely on knowledge and also advance the creation of the knowledge-based society. We are now facing an explosive increase in knowledge emanating from the educational and research institutions, from corporations and businesses, and from their joint cooperation. This knowledge base has a tendency to double in a shorter and shorter time (Won-Ki, 2001).

Universities and R&D are basic institutions for knowledge production and innovation through scientific research, transmitted through education and training, and disseminated through information and communication technology. In an economic context Evans, Carter and Koop (1990) defined innovations as the transformation of existing knowledge and ideas (inventions) into new or better commercial products that add value to the customer. Consequently, the basic institutions for knowledge implementation and commercialisations are businesses. The relationship between universities, R&D, and businesses has been described in the context of the western market economy as a balance between science-push and market-pull factors (Muller and Etzkowitz, 2000). In economic terms, it is a market model based on forces of supply and demand. The traditional separation of the institutions of higher education and business has started to change. Relationships between businesses on one side, and universities on other side, are becoming closer and more interdependent. Universities, once the citadel of the detached and abstract research, who scorned mundane business activities, are becoming more and more entrepreneurial (Etzkowitz, 2000, 2003). On the other hand, businesses have started to educate their labour force and conduct their own research. The third partner in this relationship is government, the resulting triangle has been described as a triple helix model (Leydesdorff and Etzkowitz, 2001) in which all three institutions reinforce each other in an effort to promote knowledge and innovation and stimulate economic growth.

It has become obvious that knowledge and skills are central and that economic growth and value-adding activities increasingly rely on innovative capabilities. Knowledge and innovation are becoming critical for job creation. From an economic perspective, it can be said that a *knowl-*

*edge-based society is a system where knowledge capital and innovation starts to play a dominant role in the national economy.*

## DRIVING FORCES IN THE KNOWLEDGE-BASED SOCIETY

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The main forces driving a knowledge-based society are the interaction of two main processes. On the one hand, there is a contextual change for the operation of modern societies and economies, commonly called globalisation. The process of globalisation and on the other hand the new information and communication technology operates as a drivers for the full utilisation of the innovation of our age.

Globalisation, in general, is a concept that reflects societal change in the modern world, from the isolation of human societies towards a prevalence of interaction among them. Globalisation, from an economic perspective, can be defined as a process of converting the relatively separated (sometimes isolated) national economy into a more integrated, more open world economy. Although the process of globalisation can be observed through history, it has accelerated immensely in recent times. The historical dimension of globalisation is emphasised by some authors who speak of “globalisation waves”. Goran Therborn (2000) thinks that the first wave of globalisation started with the spread of global religions and then continued through European colonisation, intra-European power struggles resulting in warfare for global domination, continuing further through imperialism based on bulk trade, trans-oceanic migrations and faster means of transport and communication. The fifth wave of globalization started after WWII and was based on the declining costs of transport and communication but was impeded by the global rivalry expressed in the Cold War. The last and present wave of globalization is the result of the nexus and mutual reinforcement of the rise in information and communication technologies, and the removal of obstacles based on the capitalist-communist divisions. This process intensified competition among businesses on a local, national and global level. It boosted trade export orientation by offering attractive conditions for foreign direct investment, and by promoting privatisation, rationalisation and global freedom of enterprise (McMichael, 1996). It has opened borders for all types of interactions. This openness stimulates more creativity and innovation. The operations of global markets are restricting inherent tendencies for monopolistic behaviour. The prevailing culture of neo-liberalism is encouraging anti-trust actions on the side of

governments that further erode the capacity of the big players in monopolistic behaviour, as is evidenced in the current developments around Microsoft.

New information and communication technology (ICT) is regarded as a major source of economic and social change in recent years, and it has made globalisation possible in every respect. It has allowed companies to operate (produce and trade) globally. One dimension has been the opening of global financial markets, thereby creating the possibility of instantaneous transfer of funds around the world. This new technology has opened the flow of information, enabling a tremendous increase in the speed and transfer of all types of information, knowledge and innovation. (National Science Foundation, 1999) Electronic commerce has tremendous impact on how firms do business. Increased use of information technology (IT) is not only limited to the business enterprises, but also to government, science and technology, R&D, innovation, higher education, and the general public. A good deal of government information and activities are being made available on-line. The implications of IT for science and engineering are tremendous. Most notably, its potential can be seen in its capability to use more modelling and simulation in experimentation, the management of large databases that help improve performance in all area of research, electronic version of journals, and more collaboration between scientists, rapid innovation, and distance learning. Knowledge-innovation backed up with ICT has become the driving force of economic growth and job creation. Because ICT has played such a central part in the debate on the new knowledge-based economy, an immense effort has gone into the development of measurement indicators of these new phenomena.

## COMPARATIVE ANALYSIS BETWEEN SOME CEEC AND EU COUNTRIES

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This paper focuses on Central and Eastern European Countries (CEEC) or former communist countries. Its first aim is to do a “diagnostic study” to find out how much CEECs are lagging behind in the key dimensions that constitute knowledge-based societies. Our purpose is to diagnose the main aspects, and the size of the existing gap between CEECs and the Western economies, whose standards and practices they want to emulate.

CEECs have suffered in varying degrees from isolation from the globalising trends of the Western economies. Isolation, and the self-contained nature of the cen-

trally planned economies of this region, has prevented them from participating in the global process of economic integration. Globalisation processes, that first accelerated in the 1970s when international corporations started to relocate their factories to areas of low wages (Frobel, Heinrichs and Kreye, 1980) around the world and contributed to the international division of labour, left those countries out of this process.

We witnessed the disparate processes in the Western and CEEC economies after the fall of communism in the late eighties. The speed of change resulting from globalization trends and increases in living standards accelerated in the Western economies. The same could not be said for the CEECs. Expectations about the full and speedy “catch up” with the West were not fulfilled. The aging industries and non-existing institutional infrastructure did not allow these economies to start successful integration without a slow, erratic and painful restructuring process. The collapse of the COMECON structure, for example, left these economies without foreign markets and because of the shabby quality of their products, they were not able to re-orient themselves within the Western markets.

The previous institutional structure was inadequate; it did not support the transformation toward markets and openness, even in the relatively more open economies. The goal of building the new institutions was imperative amidst the deep transformation crisis. The problem was also that the “end of the tunnel” was, and is not, quite visible. The period of “building of communism”, where the present sacrifices were made in the name of a better distant future, has been replaced with the “building of capitalism”, where again the present sacrifices are made in expectation of a better distant future. The generations to whom the better future was promised, for their whole lives, are now again faced with the same promises. In such situations a political backlash is inevitable. The situation has been aggravated by wars in some of these countries including the former Yugoslavia and the Caucasus region of the former USSR.

We can summarise that the CEECs are faced with the legacies of their isolation from the globalising trends of the world economy. They are also, to a large extent, unable to fully participate in present developments because of their preoccupation with institutional restructuring. The big question is whether the technological gaps that have existed are closing, or whether they are continuing to widen as the result of all of these processes.

We can argue that some of the peculiar characteristics of communist industrialisation are not automatically an



impediment for the transformation into market and open economies. Furthermore, some of these characteristics could be seen as assets in the transition process. Compulsory education resulting in high enrolment rates and policies aimed at equal positioning of women has created a labour force with great potential for fulfilling the requirements of a knowledge based economy. At the same time, the much lower technological sophistication of these economies is a constant obstacle for the more complete adoption of the standards and operational methods of Western economies.

In this study, a sample of EU countries and CEECs is used for comparative purposes. However, within the EU countries there is also a different level of development. Northern Europe is more developed than southern Europe. Taking the dimension of the macro-region (north-south) and the political-economic legacy (CEEC and EU) the sample of the countries compared in this study is as follows:

	CEEC <sup>1</sup>	EU
Southern Europe	Croatia Slovenia	Greece Spain
Northern Europe	Hungary Poland Slovakia Russian Fed. Estonia	France Ireland Denmark Finland

Five groups of indicators that identify the level of development of the knowledge-based economy and society are examined:

- The first is employment: by major economic sectors, employment changes over previous year, unemployment levels, particularly youth unemployment.
- The second group of indicators are: higher education enrolment, higher education graduates, and share of GDP going towards education. EU member-states aim to spend at least 5% of GDP of public expenditure on education in general (Commission of the European Community, 2003). It is important to examine whether CEECs match this standard.
- The third group are indicators of R&D capabilities: the number of researchers, investment in R&D (R&D expenditure as percentage of gross national product), source of funding for R&D, and performance of R&D measured by the number of patents and publications.

The last two indicator groups directly reflect the characteristics of the knowledge-based economy:

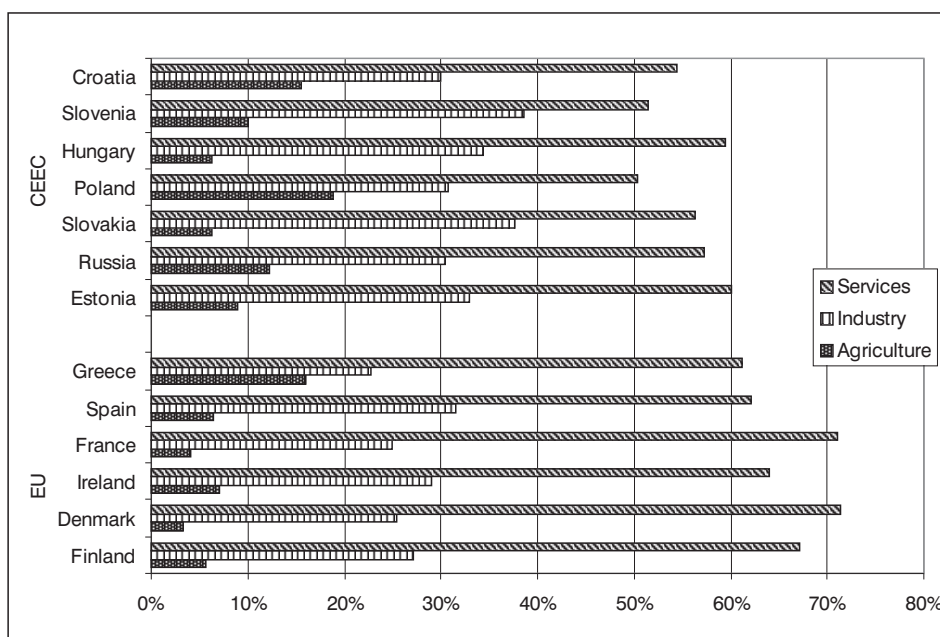
- Globalisation can be measured through indicators such as imports, exports, (particularly high tech exports), foreign direct investment, membership of international organisations, and migration rates. These indicators measure the involvement of each country in the global economy and its participation in international institutions. In the open economy, trade involves the trading of goods and services and also the free migration of people.
- Communication and information technology is a key dimension because it opens up an economy and society to new influences and information flows. This can be measured using indicators such as the number of phone lines, penetration of mobile phones, numbers of personal computers per capita, and Internet usage.

### Model of analysing Knowledge-based society

The 17 indicators can first, reveal the differences that exist between the developed north and less developed south of Europe, as well as between EU countries and CEECs, which is our primary aim. Second, and probably more important, they can reveal the extent to which these countries reflect the shape of a new knowledge based economy or whether they are retaining characteristics of the old economy. "In the New Economy, a state's economic success will increasingly be determined by how effectively it can spur technological innovation, entrepreneurship, education, specialized skills, and the transition of all organizations, both public and private, from bureaucratic hierarchies to learning networks" (Atkinson, Court and Ward, 1999:4).

### Employment structure

Graph 1 show that the employment structure in CEECs is similar to EU countries. Most employees work in the service sector, rather than in industry, and only a small minority are employed in agriculture. However, the relationship between these three sectors is different: in EU countries, a higher percentage of employees work in the service sector (on average 66.1%) and in CEECs the average is 55.6%. In industry, EU countries have less than 26.8% of the employed population and CEECs more than 33.54% are employed in industry %. In agriculture, EU countries employ only 7.06% of the workforce, whilst CEECs employ 11.1%.



Source: UNECE Statistics. Trends in Europe and North America 2003 Statistical Yearbook of the UN/ECE, [http://www.unec.org/stats/trend/trend\\_h.htm](http://www.unec.org/stats/trend/trend_h.htm)

**Graph 1**  
Employment structure

	Agriculture	Industry	Services
CEEC	11.1%	33.5%	55.6%
EU	7.1%	26.8%	66.1%

Average employment by major economic sector in 2001

The relationship between sectors of production is the same in EU countries and in CEECs. The CEECs have an employment structure with relatively stronger representation of industry and a more modest shift toward services. EU countries show an employment structure with services more represented, which is typical for a post-industrial economy. From this we can conclude that the employment structure indicates a modest gap between CEECs and Western Europe. All of the employment structural indicators are pointing toward a post-industrial structure with Western Europe being “a step” ahead.

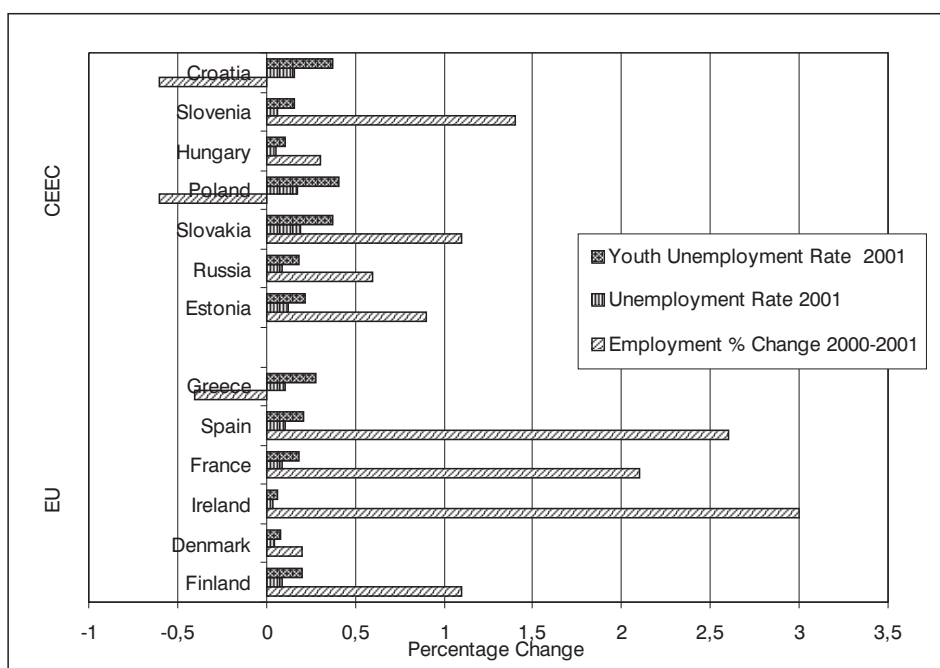
### Employment – unemployment indicators

Employment indicators show the dynamic and the direction of change within economies. They indicate whether an economy is growing steadily and generating new jobs, if it has a slow rate of growth, or is stagnating.

Ireland shows the healthiest picture of economic development among EU countries with the highest relative

Graph 2  
Employment indicators

creation of new jobs, lowest unemployment rate and lowest youth unemployment. Greece and Spain are showing higher than EU average unemployment rates and higher youth unemployment rates. The CEECs closest to the EU averages are Hungary and Slovenia, while Croatia and Poland are showing negative to slow employment growth, very high unemployment rates and extremely high levels of youth unemployment.



Source: UNECE Statistics. Trends in Europe and North America 2003 Statistical Yearbook of the UN/ECE, [http://www.unece.org/stats/trend/trend\\_h.htm](http://www.unece.org/stats/trend/trend_h.htm)

Employment-unemployment indicators average for CEEC and EU

	Employment % change over previous year 2001	Unemployment rate (% 2001)	Youth unemployment (% 2001)
CEEC +	0.44%	12.2%	26.1%
EU +	1.43%	6.2%	18.2%

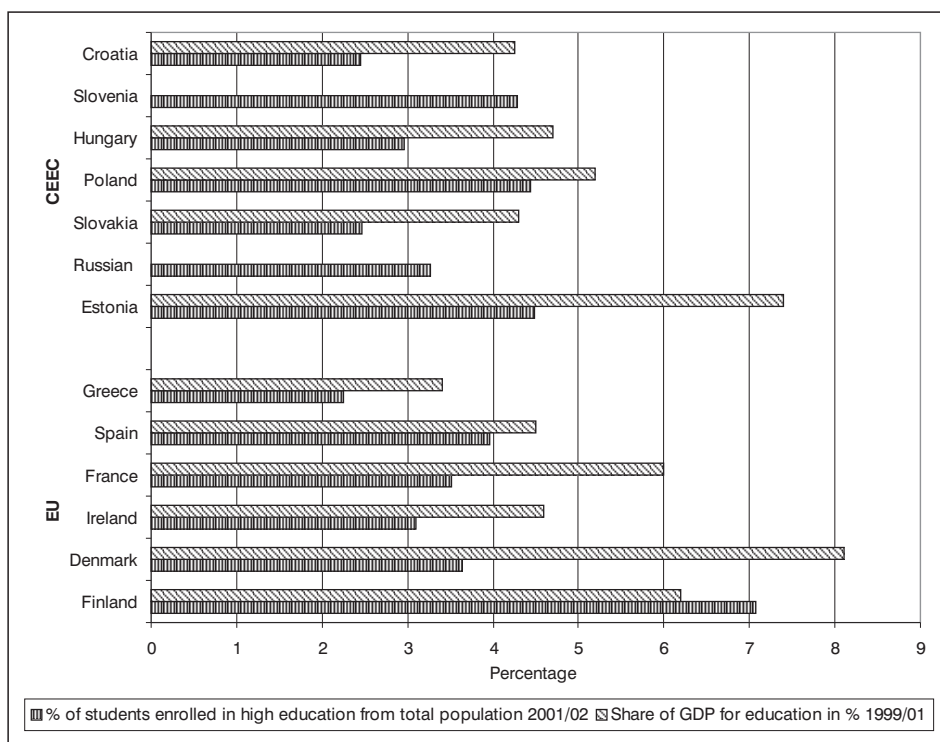
CEECs have, on average, 0.44% higher employment rate than in the previous year, a 12.21% unemployment rate that is twice as much as EU countries and a 26.07% youth unemployment rate. EU countries have an employment growth rate of 1.43% that is almost three times the highest of the rates for CEECs and a 6.21% unemployment rate with a rate of 18.18% for youth unemployment.

It is clear from this data that the EU countries are showing much higher economic dynamics, and are significantly outperforming CEECs.

### Educational indicators

Educational structure is certainly one of the most important indicators of a knowledge-based society. One of the indicators telling us most about the shift of the economy in the direction of the knowledge base is the number of students enrolled in higher education. Only an educated population with a high knowledge capability can respond to future economic challenges and be innovative. In the EU, one quarter of all those aged 30-34 had a tertiary education qualification in 2000 (European Commission, 2002), which represents significant human capital. The more students we have now, the more knowledge based the society will be in the future.

**Graph 3**  
 High education  
 enrolment and share of  
 GDP for education



Source: See sources in Appendix Table 2

Graph 3 shows that in CEECs, enrolment in higher education ranges from 2.45% of total population (in Croatia) to 4.49% (in Estonia). In EU countries the range is from 2.25% (in Greece) to 7.06% (in Finland). On aver-

age, the rate of student enrolment in higher education is similar for both groups of countries: 3.47% for CEEC and 3.92% in the EU. Similar ranges can also be seen on the financial side. The shares of GNP spent on public education are, on average, CEECs 5.15%, and EU 5.45%.

Average higher education enrolment and share of GDP spent on education

	% of population enrolled in higher education	% of GDP for higher education
CEEC	3.47%	5.17%
EU	3.92%	5.46%

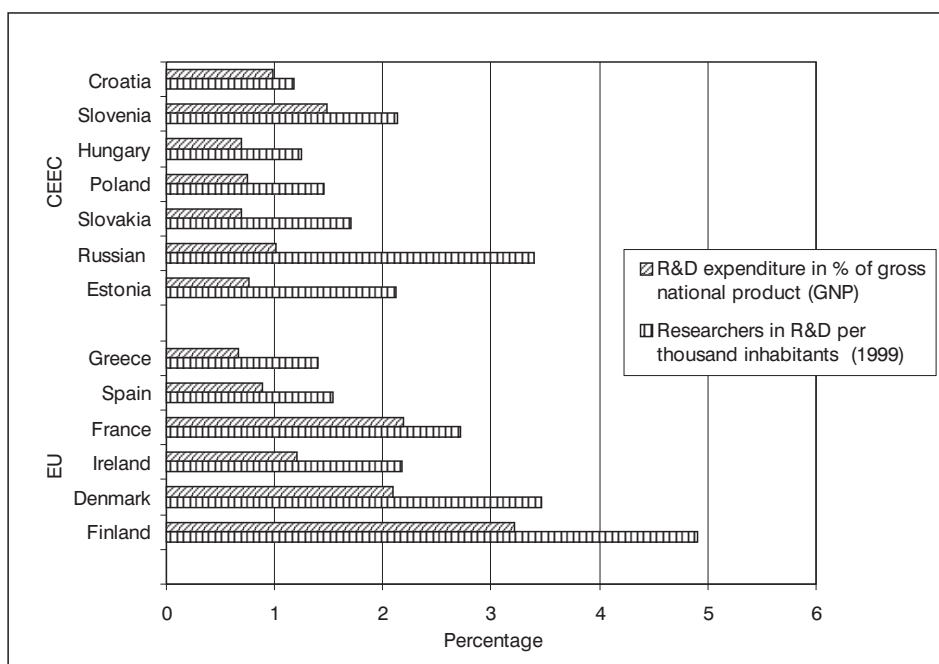
In this respect, the difference between the European north and south is bigger than the difference between EU and CEEC. Furthermore, these findings support the hypothesis that communist systems have emphasised the importance of education and that these efforts have left residual effects, even today. As a consequence, the CEECs are not lagging behind EU countries in respect to educational indicators. These findings tell us that a number of prerequisites for the introduction of a knowledge-based economy are present in the CEECs and that not everything needs to be built from scratch. Although these indicators do not tell us much about the quality of that education, the quantitative base is present and ready to be used in any economic transformation.

## Research indicators

### *Research capabilities*

Research capabilities are the engine for producing new knowledge, implementing it, and in general, pushing the boundaries of innovation further. Creation of new jobs depends more than ever on innovation processes. The numbers of researchers (per thousand inhabitants) in R&D organisations and the proportion of GNP spent on R&D indicate the capacity of a nation to innovate.

In CEECs the number of researchers per 1000 inhabitants is between 1.25 in Hungary and 3.39 in the Russian Federation. The Russian Federation inherited huge number of scientists and researchers from S&T institutes and that number still shapes its research structure. In the EU countries, the lowest number of researchers per 1000 people is in Greece (1.40) and the highest is in Finland with 4.91 per 1000.



Source: Institute for Statistics, UNESCO, [http://portal.unesco.org/uis/ev.php?URL\\_ID=5218&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201](http://portal.unesco.org/uis/ev.php?URL_ID=5218&URL_DO=DO_TOPIC&URL_SECTION=201)

**Graph 4**  
Research indicators

	Researchers in R&D per thousand inhabitants	R&D expenditure, % of GDP
CEEC	1.89	0.90
EU	2.70	1.71

Average researchers and expenditure on R&D in 1999

On average, the ratio of researchers per 1000 inhabitants in EU countries is higher than in CEECs (2.70: 1.89). We can assume that this higher ratio does not reflect any deliberate government policy but rather, that it is largely a reflection of the market forces of supply and demand. The fact that businesses see the usefulness of R&D means that they more readily finance it. In this way, the high ratio reflects the “nature” of the knowledge based society, where spontaneous market forces produce such a high representation of researches. On the other hand, the number of researchers in the planned economies of the CEECs reflects the priorities of the planning centres, rather than emanating from the direct needs of the economy.

The proportion of GNP spent on R&D in CEECs ranges from 0.69% in Hungary to 1.48% in Slovenia. In EU countries, the range is from 0.67% in Greece to 3.22% in Finland. Within the EU there is a large difference in investment and number of researchers. “The Nordic coun-

tries Finland, Sweden and Denmark are best prepared and rapidly turning their economies into knowledge-based economies” (European Commission Research 2002:10). At the other extreme are Greece and Spain which have much lower spending on R&D than is the EU average. The average investment for CEECs is 0.90% of GNP compared to 1.71% in the EU. These findings indicate that there is potential for widening the gap between the EU, and that EU countries have higher development capabilities than their CEEC counterparts. Despite this, it must be noted that EU countries themselves are lagging significantly behind the USA and Japan.

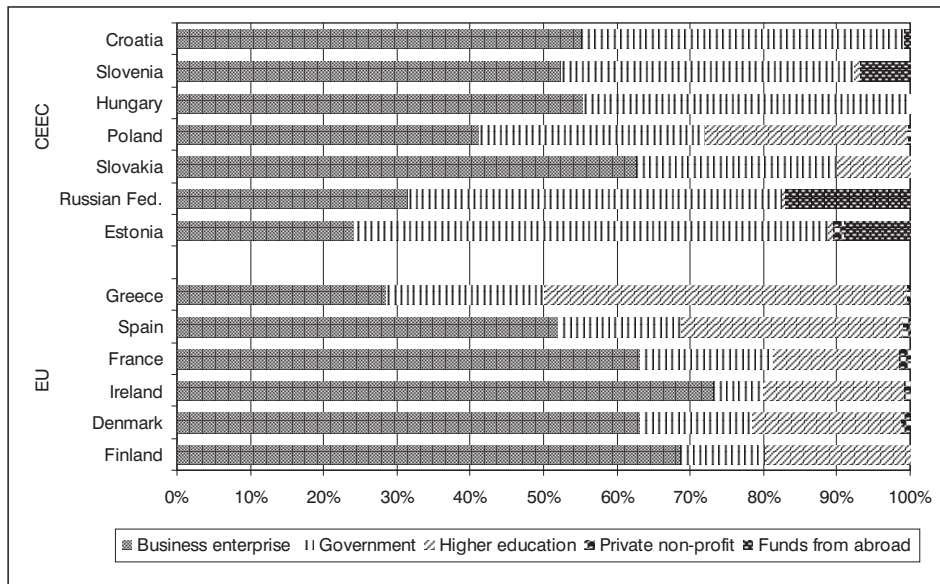
### *Research funding*

The next important question is who finances R&D. The source of R&D funding can come from business, government, higher education, private non-profit organisations, and funds from abroad. The way in which R&D is financed indicates the role that different actors play in society and the type of relationships between them. The dominant actors are the triangle of government, business, and higher education; the relationship between them is described in the form of the triple helix model (Leydesdorff and Etzkowitz, 1998).

In the context of this model, we shall try to identify any differences between the EU countries and the CEECs. The main characteristic of the CEECs is in the dominant role of the government in shaping every activity in society and the absence of market forces and business initiatives. It can be expected that in these countries the government is still the primary source of financing for R&D activities.

Graph 5 unveils different funding patterns for R&D activities. In the majority of CEECs analysed here, the business sector is the dominant player in R&D investment. In Croatia, Slovenia, Hungary, Poland and Slovakia, business investment is greater than government funding. In the Russian Federation, as well as in Estonia, governments invest in R&D substantially more than the business sector. The legacy in these countries is a strong S&T system traditionally financed by the government. This pattern still exists, and combined with the large number of researchers and scientists in these countries, means that it will take time and a huge effort to reorient these human resources (Muller and Etzkowitz, 2000), with the accumulated scientific knowledge, into an entrepreneurial force. They were traditionally oriented toward the government and not towards market demand.





Source: Institute for Statistics, UNESCO, [http://portal.unesco.org/uis/ev.php?URL\\_ID=5218&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201](http://portal.unesco.org/uis/ev.php?URL_ID=5218&URL_DO=DO_TOPIC&URL_SECTION=201)

Graph 5  
Sources of R&D funding

The only CEECs where the higher education sector invests significantly in R&D are Poland and Slovakia. Funding from abroad is substantially present especially in Russia and Estonia, and on a smaller scale in Slovenia and Croatia.

In the EU countries, the pattern of R&D is different. In all EU countries (except Greece) business enterprises are by far the most dominant investors in R&D. They are then followed by higher education, and to a lesser degree government investment. Private non-profit organisations do invest, but on very small scale.

The sources of funding indicate the existence of at least three financing models. The first model begins with business enterprises as major investors in R&D, followed by higher education, and the government. Countries having this model spend a higher percentage of GNP on R&D than countries practising other models. We can hypothesise that this model emphasizes or reflects the close connection of industry and research, and that this research is directly oriented to serving industry, producing innovations and focused toward the commercialisation of knowledge. Countries that practise this model are Spain, Ireland, Denmark, and Finland. The average spending on R&D is 1.85 % of GNP. Obviously, this model is practised in the most developed knowledge-based economies. This means that we can expect that with development, the emphasis in financing R&D will shift more and more toward the busi-

ness sector and higher education, and the role of the government will diminish in importance.

The second model is where the dominant actors are business and the government. This model is characteristic of societies where governments traditionally played an important role, and continue to support and invest in R&D, but where business enterprises are also becoming increasingly important. The countries practising this model include Croatia, Slovenia, Hungary, Poland and Slovakia. The average spending on R&D is 0.91% of GNP.

The third model is characterised by government domination of investment in R&D. The gap between the government and business is large, with business lagging far behind government investment. This pattern is vivid in the countries with a heavy legacy of central planning and direct government control over all activities. Although countries using this model have a relatively high number of researchers, they are heavily dependent on government funding. Therefore it is difficult to expect that the business sector can replace the government any time soon. The average spending on R&D in these countries is 0.88% of GNP.

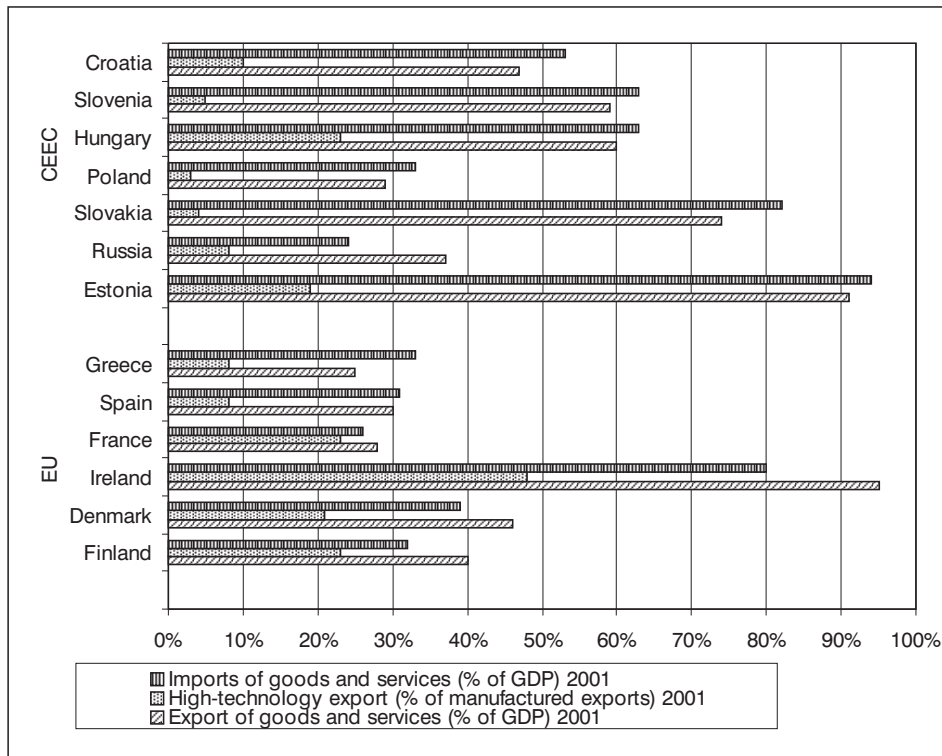
## Economic globalisation indicators

### *Trade*

Economic globalisation means openness measured by tariff reduction and removal of trade barriers for goods and services, free flows of investment, speculative capital and people. Greater openness for trade indicates a country's increased integration into the world economy, and consequently its participation in the globalization process.

Graph 6 reveals several important features of trade patterns. It is obvious that different countries within both groups have different volumes of trade. Russia and Poland trade less than other CEECs, which indicate that they are less open and less integrated into the world economy. Russia exports more than it imports, whereas in Poland the reverse applies. The other CEECs trade significantly more and their main characteristic is that they import more than they export.

The trade level of EU countries is generally lower than that of CEECs. Only Ireland matches the trade levels of Estonia, Slovakia, Hungary, Slovenia and Croatia. Other EU countries have lower levels, similar to Russia and Poland. Greece and Spain trade less, and import more than they export, while other EU countries are exporting more than they are importing.



Sources: World Development Indicators Database

Graph 6  
Trade indicators

Combining two dimensions; level of trade and the import/export ratio, we produce four major types. Trade level is measured by exports and imports in relationship to GDP where high indicates that imports and exports comprise more than 50% of GDP and low indicates a ratio of less than 50%. The second dimension is based on the relationship between the levels of export in relationship to the level of imports.

	Exporting more than importing	Importing more than exporting
<i>High</i>	Ireland	Estonia, Slovakia, Hungary, Slovenia, Croatia
<i>Low</i>	Denmark, Finland, France, Russian	Greece, Spain, Poland

Import-export balance by level of trade

Surprisingly, most of the CEECs have a high trade level, which indicates that they have high openness toward the world market. But this openness is more in the direction of dependency because they import more than they export. The only exception is Russia, which continues its trend from the communist period of high exports but re-

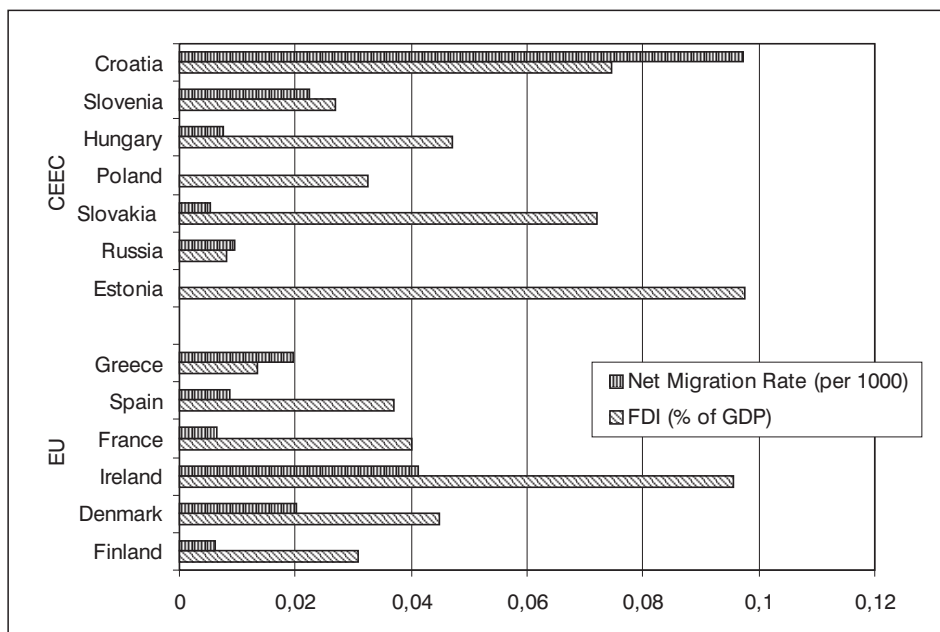
mains relatively closed against world markets. This has been possible because of the size of the Russian economy and its heavy reliance on the export of raw materials.

*Foreign direct investment*

Countries with a high FDI as a percentage of GDP are Estonia, Ireland, Croatia and Slovakia. All of these countries also have also high levels of trade. The countries with lower FDI rates are the Russian Federation, Greece, Slovenia and Finland. These countries also have lower rates of trade. The other countries are located in the middle with a modest FDI.

Foreign trade and FDI are obviously correlated. All of the CEECs have successfully opened their economies and are becoming attractive destinations for investors. The FDI Confidence Index (A. T. Kearney, 2003) reveals that Central and Eastern Europe achieved higher levels of FDI in 2002, and in the first quarter in 2003. Countries like Slovenia, Romania, Baltic States and Croatia are “little tigers” of Europe because investors are increasingly optimistic about investing there. The problem is that they are still not fully participating in the world economy, which is clearly indicated by their heavy import dependency. The extent to which this is just a transitional phase remains to be seen.

Graph 7  
FDI and migration indicators



### *Migration*

A constituent element of openness is the free flow of people and a flexible labour market. Both of these elements are prerequisites for a healthy economy and economic growth. One of the main advantages of the US economy is its openness and high level of immigration, combined with a flexible labour market and the willingness of people to move to where jobs are available. Europe has a rigid labour market, and much more limited openness toward immigration. The reasons for a much more limited intra-European migration may be the language differences combined with lack of co-recognition of education qualifications. All of this, combined with strong nationalistic feelings, means that national borders play an important role. Those problems are well recognised in the EU (Commission of the European Communities, 2003) and policies toward openness are recognized as a necessary precondition for the creation of a future European knowledge based society.

The data in Table 4 (see Appendix), which are the estimates for 2002, indicate that Croatia has the highest migration rate: 9.72 per 1000 inhabitants. High migration is a consequence of political and economic conditions in neighbouring Bosnia, combined with the legacies of nationalist policies and war. It is not the result of a healthy economy or the markets demand for a workforce. Croatia has a very high unemployment rate. It is important to note that there is no language barrier, nor problems with recognition of educational qualifications between Croatia and Bosnia. The migration of Croats and Muslims from Bosnia and Herzegovina has been easy and was, on the one hand forced by the war, and on the other encouraged by the nationalist policies of the former government. Countries relatively open to migration are Ireland (4.12%), Slovenia (2.24%), Denmark (2.01%) and Greece (1.96%). Other countries have migration rates below 1%. Poland and Estonia have negative migration rates because more people are moving out than in.

### *Membership in international organisations*

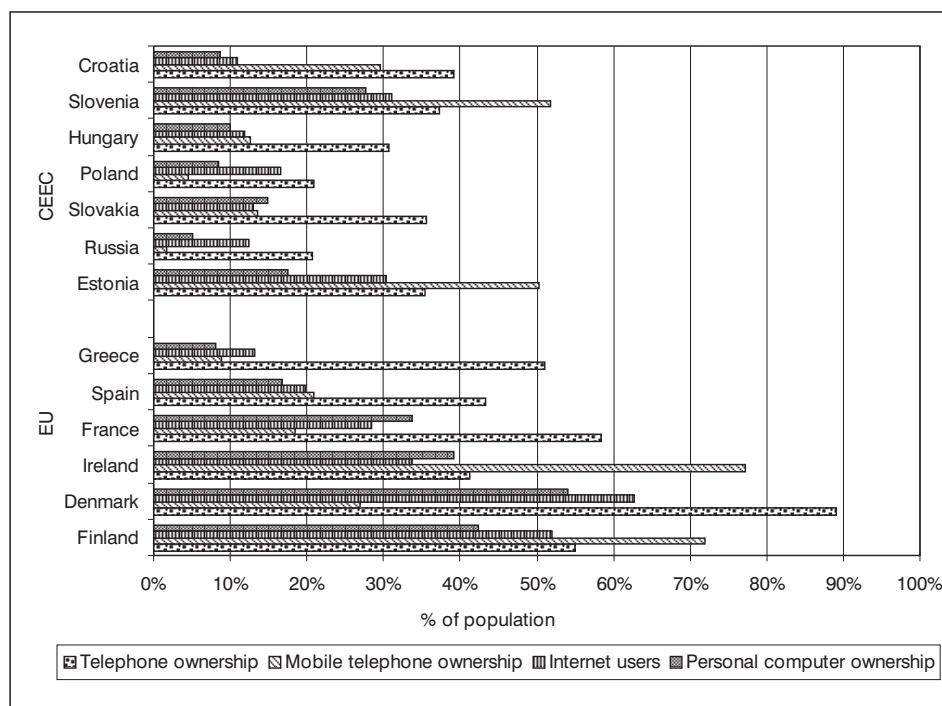
Globalisation is not limited to the economic sphere it also has a political dimension. Today we are witnessing a mushrooming of the number of international organizations with more and more spheres of governance penetrated by them. Formal membership in these international organizations is one important indicator of the level of

participation, by a particular country, in globalization. The data uncovers some simple membership patterns (see table 4 in Appendix). The countries that emerged as successor states from the disintegrating federations such as the Soviet Union, or Yugoslavia, are less present as members of international organisation, than the countries that have had continuous independence recognized internationally. Consequently, Slovakia, Slovenia, Croatia and Estonia have lower membership rates of international organisations than other countries. However, we should not read too much into this information. Presumably, in due course, these countries will “catch up” and achieve the same membership rate as the most established independent countries. There is no reason to believe that this information tells us anything other than the longer period of the existence as independent actors in the international system mean higher membership.

### Information and communication technology indicators

**Graph 8**  
Information and  
communication technology  
indicators

The other dynamic forces of change in contemporary societies are the development of information and communication technologies.



Sources: World Development Indicators Database, CIA – The World Factbook 2002

Every EU country has more telephone lines per person than any of the CEECs. The percentage of population connected to the traditional phone lines ranges from Denmark's 89.13% to Ireland's 41.20%. The average for EU countries is 56.31%. CEECs have a significantly lower rate of population connection. The highest is in Croatia (39.2%) and the lowest in Russian Federation with 20.69%. The average rate is 31.42%. The data in this field could be misleading because of the rapid increase in the number of people connected since 2001. The most recent data for different countries is not available for the same year, this alone could account for some observed differences.

The fastest expansion in communication is in the area of mobile phones. Because of the low infrastructural requirements and high market demand, their expansion has been extremely fast. The highest percentage of people having mobile phones occurs in Ireland (77.26%) and Finland (71.93%) followed by two CEECs, Slovenia (51.74%), and Estonia (50.22%). The Russian Federation (1.72%) and Poland (4.61%) are seriously lagging behind other CEECs and EU countries.

Ownership of personal computers per 1000 people uncovers a two-way difference between north and south, and east and west of Europe. The top countries for the highest level of personal computer usage are Denmark, Finland, Ireland, France and some distance behind them, Slovenia. The rest of the CEECs and EU countries are far behind.

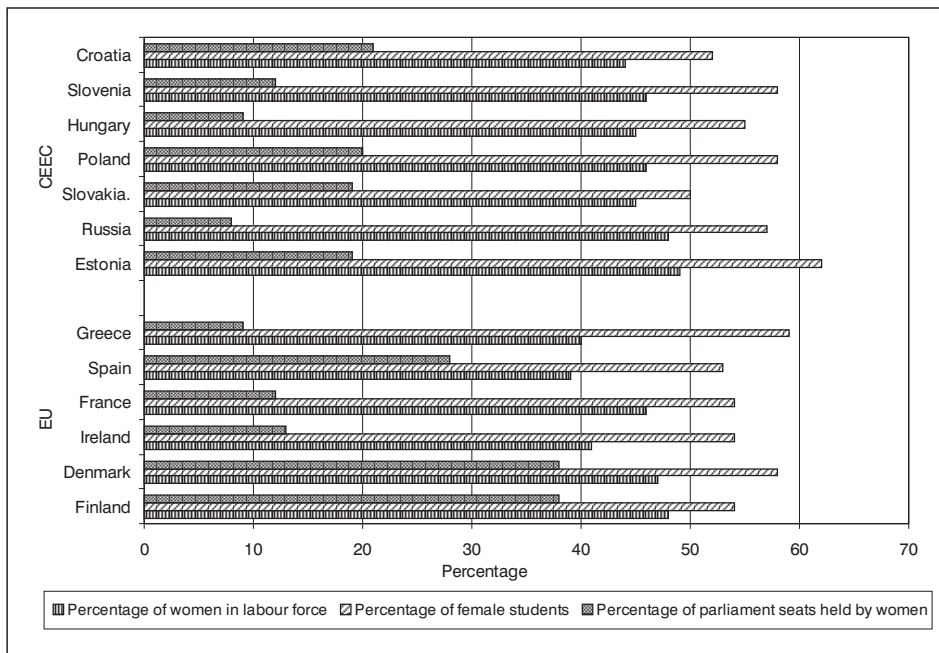
Finally, the number of Internet users as a percentage of total population shows the same pattern as personal computer ownership. In general, countries that have more personal computers have more people connected to the Internet. Consequently, the first three countries are Denmark, Finland, Ireland, followed by Slovenia and Estonia.

If we want to summarize high-tech indicators, we can conclude that the countries leading in the implementation of new technologies are Finland, Denmark, Ireland, Slovenia, and Estonia, with France some distance behind. The rest of the CEECs and the EU countries are substantially further behind. Obviously there is a great difference in the uptake of this technology among countries. When taking into account the importance of these indicators for a knowledge-based growth, it is clear that some of these countries are significantly lagging behind. In these countries, the basic infrastructure necessary for developing a knowledge-based economy, as the growth engine, is lacking.

## Female participation indicators

One of the dimensions mentioned at the beginning of the paper was the ideological emphasis of the former communist countries on women's participation in education, politics, and the labour force. Similar goals were expressed in western societies as a result of general social and cultural change, and the influence of the feminist movement. The female participation rate in these three areas is indicative of a modern values orientation, and full usage of human capital as prerequisite for the development of a knowledge-based society. Although these parameters are not economic indicators of development per se, they are important because of their broader indication of the usage of human capital.

Graph 9  
Female participations indicators



Source: UNECE Statistics. Trends in Europe and North America 2003 Statistical Yearbook of the UN/ECE, [http://www.unece.org/stats/trend/trend\\_h.htm](http://www.unece.org/stats/trend/trend_h.htm)

The participation of women in the workforce is almost the same in CEECs as it is in EU countries. The significantly higher participation of women in the labour force existing in the former socialist countries 20 years ago has almost disappeared (Šporer, 1985). The average percentage of women in the labour force in CEECs is 46.2% and in EU countries 43.5%.

The new trend characterizing all developed countries is that of high female participation in higher education.



What should be specially emphasized is that this trend is equally valid for CEECs as well as EU countries.

There is still a visible gap in female participation in politics. However, the gap is much smaller in the parliaments of EU countries (average female representation 23%) than in the CEECs (average representation 15.4%). Almost equal participation in the workforce and in higher education has translated into political representation being much less in the CEECs than in their EU counterparts. A possible explanation for this phenomenon lies in the way women's emancipation was introduced in the first place. In the former socialist countries, women's emancipation was part of the official ideology and the policies to achieve this goal were implemented in a "top down" fashion. In the EU countries, female emancipation was more the result of the general social modernization and the spontaneous feminist movement in a "bottom up" manner. The consequence is that female participation has spread more evenly through all spheres of social life in the countries characterized by the "bottom up" model, rather than in the countries with the "top down" model.

From this part of the analysis, we can conclude that CEECs have the capability of faster development than that which they show now. These countries had different historical development patterns and it is impossible to describe them using a "one size fits all" model. However, we can argue that they emulate the development pattern of the earlier phase of EU countries. In this sense, we can imply a certain evolutionary model in describing the patterns of development.

The present picture of the CEECs is in some dimensions repeating an "earlier phase" of development of the EU countries. From this standpoint, we can argue that they are on the same track as EU countries, and therefore will repeat the same development pattern. The open question is the speed of development. That is, if changes in the "right direction" are implemented fast enough, meaningful development will deliver an increase in the standard of living in the not too distant future. The capabilities related to their human capital, such as high education enrolment rates, high investment in the educational sectors (not much below the EU average), and the relatively high numbers of researchers, are all good starting points for the creation of knowledge-based economies.

## The case of Croatia

The aim of this section is to describe the extent of Croatia's lag behind other CEECs. In order to make the comparison clear, we can assess Croatia's position on each of the indicators analysed according to whether Croatia's standing is below, at, or above the average of other CEECs.

Table 1  
Croatia

Indicators	Low	Medium	High
Economic structure			
<i>Sectors of production</i>		√	
Employment rate	√		
Education			
<i>Enrolment in higher education</i>	√		
Spending on education	√		
R&D			
<i>Number of researchers</i>		√	
Investment in R&D		√	
Source of funding		√	
Globalisation			
<i>Trade</i>		√	
FDI			√
<i>Migration</i>			√
ICT			
Phone			√
Mobile		√	
PC	√		
Internet	√		
Female participation			
<i>Female labour force</i>		√	
<i>Female students</i>		√	
<i>Females in parliament</i>			√

Table 1 clearly shows, not only that Croatia is below the EU average, but on many dimensions is also below the CEEC average. Croatia is clearly lagging behind in the job creation area and in the area of higher education, where Croatia is below EU and CEEC averages. Croatia is also below the CEEC average in PC ownership and the number of Internet users. On all of these indicators, Croatia is

well below the EU average. Low spending on education and a low presence of information and communication technology indicates a significant lack of some of the basic prerequisites for the development of a knowledge-based economy.

In other dimensions such as the sectoral distribution of the labour force, the number of researchers, investment in R&D and type of funding sources of R&D, Croatia falls within the average range for CEECs. The same holds for trade, mobile phone presence, proportion of female participation in the labour force and proportion of female students.

Finally, there are some dimensions where Croatia is among the leaders in the CEEC group. These dimensions are the above average levels of FDI, migration rate, telephone connections, and female representation in parliament.

## SOCIAL CAPITAL

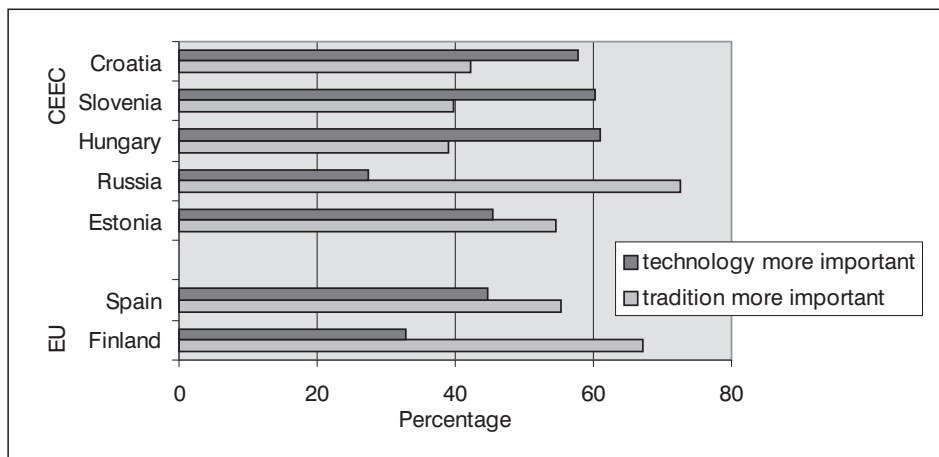
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Adam Smith argues that the economy is deeply imbedded in social life and it cannot be divorced from culture. Successful economic activities (Fukuyama, 1999) are based on a variety of norms, values, rules and regulations that profoundly shape every society. Coleman (1988) argues that in addition to skills and knowledge an important part of human capital is people's ability to associate with each other. This ability is based on shared norms and values, and willingness to subordinate individual interest to the interest of a large group. Putnam (1995, and Putnam and Gross, 2002) reinvented the idea of importance of culture for economics in the concept of "social capital". They defined social capital as a "feature of social life - network, norms and trusts - that enable participants to act together more effectively to pursue shared objectives." Putnam's intention was to apply this concept specifically to the functioning of democratic institutions. In this vision the "right" social capital as a characteristic of the particular society is a precondition for efficient functioning of democratic institutions. In an extension of the original Putnam's and Fukuyama's work, Lundvall (2002) defined social capital as tradition of cooperation with others outside the narrow circle of the family, in the pursuit of solving common problems.

## Social capital as a value system

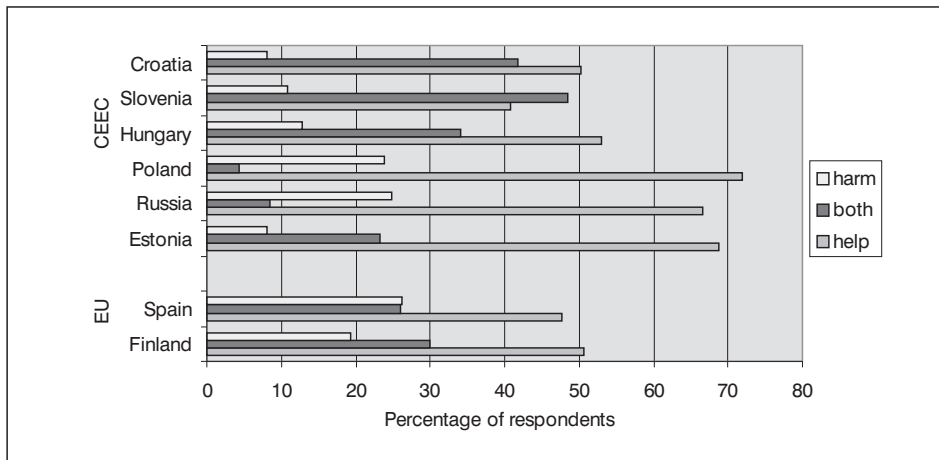
What are the characteristics of social capital in CEECs? Can it be assumed that social capital in CEECs, due to the historical circumstances of their development is of a “different kind” from the one prevailing in the EU and other Western countries? Is it of the “kind” that presents a barrier for faster development toward a knowledge-based society and democracy? Is the legacy of the communist ideology and institutional structure also adding to these negative characteristics of the prevailing social capital? The communist systems were development oriented and they transformed the predominantly agricultural societies into industrial ones. In that process the role of natural science and technology was strongly emphasised. Education was compulsory and effort was made to involve women in the labour force. The importance of work was emphasised, as in the old slogan “those who do not work do not need to eat.” Work was the essence of the ideology and it was regarded as much more important than family or leisure. Although the market, competition and openness were not so much present, work, development, and science and technology were positively valued. The World Values Survey conducted in 1995-6 (<http://wvs.isr.umich.edu/>) reveals that technology, science and work are more positively valued (see graph 10) in CEECs than in EU countries.

Graph 10  
What is more important:  
tradition or technology?



Source: World Value Survey 1995-96

On the question “What is more important; tradition or technology?” respondents in Hungary, Slovenia and Croatia were more in favour of technology than of tradition. In other CEECs as well as in EU countries, the respondents favoured tradition more than technology.

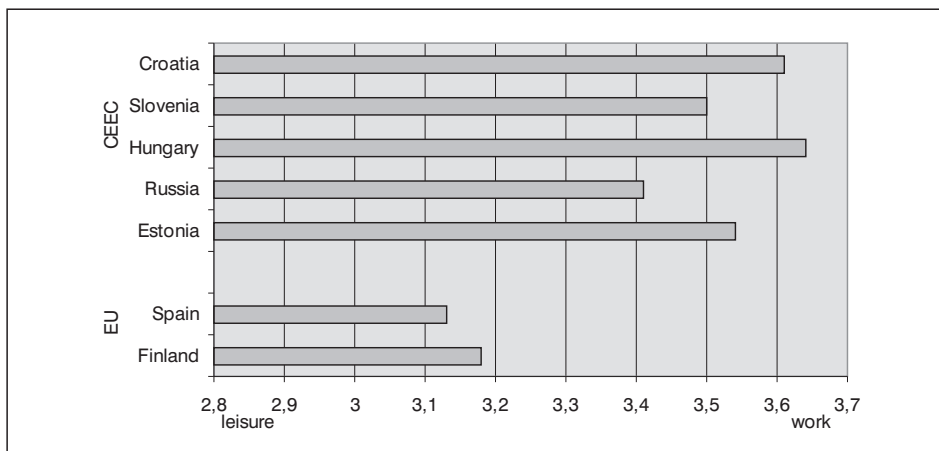


Source: World Value Survey 1995-96

Advancement in science (graph 11) was positively regarded in all countries and was seen as a process that in general was more helpful than harmful. On that basis we can assume that the introduction of communication and information technology will not be impeded by personal values.

Graph 11

Does advance of science help or harm?

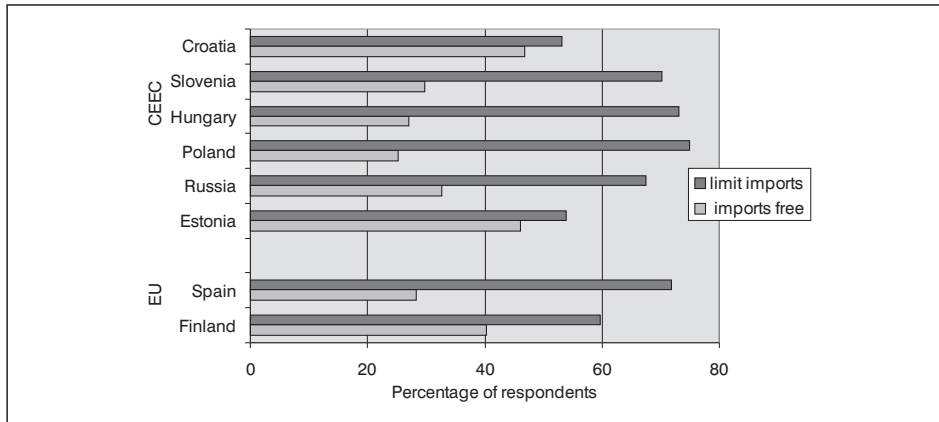


Source: World Value Survey 1995-96

The relative priorities of work and leisure (graph 12) show that respondents in CEECs stressed work more than was the case in EU countries. These values are certainly not obstacles for a knowledge-based society. Quite the contrary, they are instrumental for social transformations that lead in that direction. In this respect EU countries are more post-modernist and the importance of leisure is seen as being higher.

Graph 12

Importance of leisure or work on the scale 1-5

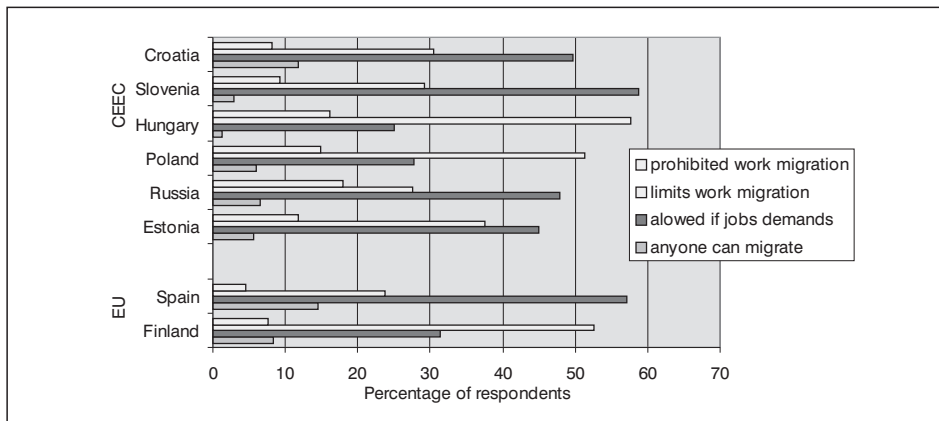


Source: World Value Survey 1995-96

**Graph 13**  
Attitudes towards free trade

Openness is a basic feature of the globalised world. Attitudes toward free trade show that (graph 13) people in Croatia and Estonia, although preferring some limitations of imports over completely free imports, at the same time show greater openness toward free trade than in other countries. Taking into account the fact that Croatia already is a significant importer and trader, this can be a good signal regarding popular support for participation in the world market and open economy. We may say that the Croatian policy of openness has relatively wide popular support, and has not been imposed unilaterally by the political elite.

**Graph 14**  
What is your opinion in relation with the foreign workers?



Source: World Value Survey 1995-96

The attitude toward free movement of foreign workers (graph 14) shows large differences between countries, regardless of whether they are CEECs or EU members. Spain has the most positive attitude toward foreign work-

ers, followed by Croatia and Slovenia. The countries that are more negative and prefer more control of labour migration are Hungary, Poland and Finland, all of which have very low immigration rates. Regarding the causal relationship between the attitudes and migration rates, we can argue that higher migration (due to geographical and economic circumstances) leads to more positive attitudes toward migration.

### Social capital as a network and relationship

Social capital as a system of values is usually measured on the individual level, but it is also understood as the property of a group to build networks and relationships that make cooperation more successful. Societal institutional arrangements are built on and supported by the system of networks and relationships that exist among groups and individuals. An analogy can be drawn between organisations and society. In organisational theory, distinctions are made between formal and informal organisations. When a formal organisation becomes dysfunctional, the informal structure of that organisation helps the organisation to function. The informal organisation helps to overcome the obstacles caused by the formal structure. It can be assumed that the same mechanisms operated in the former communist societies. Social capital as a system of networks and relationships helped communist societies to function, in spite of the obstacles coming from the centralised system and nonexistent or distorted markets.

Can we assume that the same social capital that helped people to survive rapid industrialisation, a centralised economy, the one party system and other features associated with communism is now an obstacle for democracy and a knowledge-based economy? Because the communist system was dysfunctional, especially in relation to markets and democracy, party social ties and social networks replaced market forces. Market forces were replaced by command (the extent to which markets were operating varied among the communist countries), and the institutional structure necessary for the operation of a market economy (like consumer protection, private property and security of contracts) was underdeveloped. The system was dysfunctional especially because it suppressed entrepreneurial behaviour. Because of this, social capital was compensating for the imperfections of the formal system, and social network and trust became more important than the law and regulatory institutional systems. Consequently, the first people responding to market incentives were

those who were not only ready to take risks (just as most of them did when this type of behaviour was considered criminal activity) but also the people with already created network of predominantly illegal activities. When “Big Brother” was controlling everything, distorting markets and undermining democracy, the unintended consequence was the development of the type of social capital that relied extensively on social networking, and undermining law, regulation and the legal system.

### Social capital as norms and trust

According to the World Bank “social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society’s social interactions... Social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together.” (Office of the National Statistics, 2001) The main characteristics of the communist system were that its institutions were built from the “top down”. The system designers expected that the imposed institutions would work as designed. The answer to the manifestations of dysfunction of the imposed institutions was to impose new institutional designs. In that way, society was caught in the endless process of change that did not evolve as a gradual adaptation, but which emanated from the ideological designs very often at odds with social reality. Instead of a gradual institutional change reflecting the processes of economic, technological and social change there was a constant “revolutionizing” process, imposing new institutional designs. The population regarded this process as something that should be avoided as much as possible. The institutions were not perceived as something that helped society to solve problems, but as something that was imposed from “outside”. In order to solve the problems, “ways around” had to be found.

First, the communist elites introduced a new institutional system, and through it destroyed the previous system. Because the new system did not work as designed (as it couldn’t, because of the utopian premises on which it was built) the institutions were changed very often. (Yugoslavia was introducing new constitutions every 10 years.) The consequence was instability of institutional systems, because institutions were not perceived as permanent. The norms were often ignored because they were perceived as unrealistic and ideologically driven. Trust in institutions was very low, and stability and permanence were found only in informal networks and relationships. The question



of whether this social network was positive or negative for development in the direction introduced in 1990 is highly debatable. The social network facilitates performance, but it is not always certain whether it is done legally or illegally, whether it benefits society or individuals against the society, or whether it produces social conflict and disintegration of the new institutional system.

Social capital becomes also an important issue in post-modernist Western societies because the individualistic spirit of capitalism has been destroying the social bonds of community, which are vital as the social glue that holds society together. The problem is certainly different in the CEECs. The absence of stable institutions and the lack of trust in the institutional system is the crucial problem. Fixing institutional systems in a way to enable the functioning of markets and democracy, and at the same time to control negative elements of the previous social networks, is the most important goal of the societal policy.

## CONCLUSIONS AND RECOMMENDATIONS

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The comparative analyses of the economic indicators between EU and CEEC reveals a complex picture of similarities and differences due to historically different pattern of development. In the sectors of production, CEECs have a structure resembling characteristics of industrial society while EU is more a prototype of the post-industrial type. The capabilities of human capital, such as high educational enrolment rates, or investment in education, and the number of researches, show that on average CEECs do not lag behind the EU (with the exception of Croatia which is behind other CEECs in spending on education).

The indicators of the drivers of social and economic change such as globalisation show that some of the CEECs are more open toward the world economy than many of the EU countries. This openness is not universal but varies from country to country. In countries open for foreign trade, the FDI rate is also high and conversely, in countries less open to trade the FDI rate is lower.

The dimensions in which CEECs are lagging far behind EU countries are several. CEECs have a different pattern of **research funding** and they are lagging behind in overall research funding. On average, CEECs invest less in research, and the government is still heavily involved in research funding. Business enterprise involvement in R&D funding is low, and that reflects an absence of relationships between industry and research institutions. Research

activities are not directly oriented to serve industry or to produce innovation, and are not focusing on the commercialisation of knowledge. On the other hand business enterprises are not using the knowledge and innovative capabilities of R&D. *That is certainly one major problem that needs to be addressed by the government. The government should aim to facilitate such stimulative policy for business enterprises and R&D to promote closer relationships, commercialisation of knowledge, and entrepreneurial behaviour.* Bridging that gap between businesses and R&D is the focus of government policy around the world because it becomes extremely important to use knowledge capabilities to solve the problems and produce more innovations in knowledge-based society. Knowledge and innovation are becoming critical for job creation. An example of successful government policy in this area policy is tax relief for the businesses that invest in R&D. Another is when research projects funded by businesses receive additional funding from government. The main role of the government is to ensure a stimulative environment and to **foster collaboration** between those agents.

Whenever radical technological innovation was introduced the consequence was a spiral effect, or a new economic cycle. The last big wave of innovations began in the 1990s and is based on digital networks, software and new materials. (*The Economist*, February 20<sup>th</sup> 1999) That brings economic growth, and its associated social change. What is essential for every economy is to introduce that new technology as soon as possible and ride the economic growth from the peak of this new innovation wave. CEECs (and Croatia particularly) are substantial lagging behind EU countries in **implementing new technology** (ICT). That means that these countries are not taking advantage of the new cycle of innovation, and the gap is widening. Government policies should be based on activities that promote technological diffusion: by increasing competitiveness in telecommunications technology, building confidence and making e-government a priority. Through these activities government should be an example to other sectors in using the high technology.

Investment in ICT will stimulate demand for new technology. The large organisations are in the process of rationalisation, specialisation and outsourcing certain activities. Those processes combined with the privatisation process in CEECs will create more small businesses. Bojnec (2001) found that most of the newly created firms in Slovenia arose out of necessity because people lost their jobs or had difficulties in finding new jobs. Few firms were created

based on an entrepreneurial motivation to start up new business, and most of them are outgrowing on the family-based entrepreneurial tradition. CEECs with their high human capital capabilities combined with the aggressive introduction of ICT can stimulate creation of small **high tech firms** that are attractive for venture capital.

The ability to implement and adapt to change depends on human capital and institutional arrangements, but also on social capital. Social capital defined as a value system indicates a prevalence of modernistic orientation in CEECs (and particularly in Croatia), which are certainly positive bases for building knowledge-based society.

However, social capital is also a characteristic of the group, to build networks, relationships, and trust in institutions. In that dimension, unintended negative consequences of the previous system are still shaping the way that people do business. In the relation to this negative effect of social capital, the main function of the government policy in CEECs is to create stable institutional systems, impose a rule of law, and to implement stimulative and non-restrictive regulation. In the long run, that will produce trust in the institutions and stability of the market and democracy.

## FOOTNOTE

<sup>1</sup> A distinction between EU candidate countries and CEECs has not been made, because candidate countries differ in many respects, e.g. Norway, Iceland, Turkey, Malta, and Cyprus. Furthermore, CEECs share the same recent history that ultimately influences the structure of society and economy, and makes them more similar in the dimensions that are important for a knowledge-based economy.

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## APPENDIX

**Table I**  
Employment structure

Countries	Employment by major economic sectors (2001) % of labour force			Employment (% change over previous year 2001)	Unemployment (% 2001)	Youth unemployment (% 2001)	
	Agriculture	Industry	Services				
CEEC	Croatia	15.5	30.0	54.5	-0.6	15.8	37.3
	Slovenia	10.0	38.6	51.4	1.4	5.9	16.1
	Hungary	6.2	34.4	59.4	0.3	5.7	10.8
	Poland	18.8	30.8	50.4	-0.6	17.4	41.0
	Slovakia	6.2	37.6	56.3	1.1	19.2	37.3
	Russian Fed.	12.3	30.4	57.3	0.6	8.9	18.0
Estonia	8.9	33.0	60.1	0.9	12.6	22.0	
EU	Greece	16.0	22.8	61.2	-0.4	10.2	28.0
	Spain	6.4	31.5	62.1	2.6	10.5	20.8
	France	4.0	25.0	71.0	2.1	8.5	18.7
	Ireland	7.0	29.0	64.0	3.0	3.7	6.2
	Denmark	3.3	25.4	71.3	0.2	4.3	8.3
	Finland	5.7	27.2	67.1	1.1	9.1	19.9

Source: UNECE Statistics. Trends in Europe and North America 2003 Statistical Yearbook of the UN/ECE.  
[http://www.unecce.org/stats/trend/trend\\_h.htm](http://www.unecce.org/stats/trend/trend_h.htm)

**Table 2**

Enrolment in high education and graduates in CEEC and EU countries 2001/02

	Countries	% of students enrolled in high education from total population 2001/02	% of high education graduate from total population 2001/02 <sup>1</sup>	Share of GDP for education in % 1999/01 <sup>2</sup>
CEEC	Croatia	2.45 <sup>3</sup>	0.31	4.26
	Slovenia	4.28 <sup>4</sup>		
	Hungary	2.96 <sup>5</sup>		4.7
	Poland	4.44 <sup>6</sup>	0.78	5.2
	Slovakia	2.46 <sup>7</sup>		4.3
	Russian Fed.	3.27 <sup>8</sup>		
	Estonia	4.49 <sup>9</sup>	0.62	7.4
EU	Greece	2.25 <sup>10</sup>	0.29	3.4
	Spain	3.96 <sup>11</sup>	0.52	4.5
	France	3.51 <sup>12</sup>		6.0
	Ireland	3.09 <sup>13</sup>		4.6
	Denmark	3.64 <sup>14</sup>	0.73	8.1
	Finland	7.08 <sup>15</sup>	0.81	6.2

<sup>1</sup> European Commission: Key Data on Education in Europe, Tertiary Education

<sup>2</sup> European Commission; Key data of Education in Europe 2002, Financing of Education pp3

<sup>3</sup> Central Bureau of Statistics of the Republic of Croatia, <http://www.dzs.hr/ljetopis2002/24podat.htm>

<sup>4</sup> National Statistical Office of the Republic of Slovenia, <http://www.sigov.si/zrs/eng/index.html>

<sup>5</sup> European Centre for Higher Education, [http://www.cepes.ro/information\\_services/statistics.htm](http://www.cepes.ro/information_services/statistics.htm)

<sup>6</sup> Polska Statystyka Publiczna [Statistical Office], <http://www.stat.gov.pl/english/index.htm>

<sup>7</sup> Statistical Office of the Slovak Republic, [http://www.statistics.sk/webdata/english/index2\\_a.htm](http://www.statistics.sk/webdata/english/index2_a.htm)

<sup>8</sup> European Centre for Higher Education, [http://www.cepes.ro/information\\_services/statistics.htm](http://www.cepes.ro/information_services/statistics.htm)

<sup>9</sup> Statistical Office of Estonia, [http://gatekeeper.stat.ee:8000/px-web./08Higher\\_education/&lang=1](http://gatekeeper.stat.ee:8000/px-web./08Higher_education/&lang=1)

<sup>10</sup> National Statistical Service of Greece, [http://www.statistics.gr/eng\\_tables/hellas\\_in\\_numbers\\_eng.pdf](http://www.statistics.gr/eng_tables/hellas_in_numbers_eng.pdf)

<sup>11</sup> National Institute of Statistics, <http://www.ine.es/inebase/cgi/um?L=1&N=&O=pcaxis&M=%2Ft13%2Fp405%2Fa1999-2000>

<sup>12</sup> DPD, Ministry of National Education, Research and Technology, [http://www.insee.fr/en/ffc/docs\\_ffc/ds9905.html](http://www.insee.fr/en/ffc/docs_ffc/ds9905.html)

<sup>13</sup> Department of Education and Science, <http://www.education.ie/home/home.jsp?maincat=17216&category=17216&feature=Statistics&language=EN>

<sup>14</sup> Statistics Denmark [Bureau of Statistics], <http://www.cyberschoolbus.un.org/infonation/index.asp?theme=eco&id=208>

<sup>15</sup> Statistics Finland [Bureau of Statistics], <http://www.stat.fi/tk/he/edufinland/edut.html>

**Table 3**  
R&D structure and expenditure in 1999

Countries	Researchers in R&D per thousand inhabitants (1999)	R&D expenditure in % of gross national product (GNP)	Source of funds					
			Business enterprise in %	Government in %	High education in %	Private non-profit in %	Funds from abroad in%	
CEEC	Croatia	1.18	0.98	53.3	42.3			0.8
	Slovenia	2.14*	1.48*	52.5	39.9	0.8		6.8
	Hungary	1.25	0.69	40.2	32.3			
	Poland	1.46	0.75	41.3	30.8	27.8	0.1	
	Slovakia	1.70	0.69	62.6	27.5	9.9		
	Russian Fed.	3.39	1.01	31.6	51.1	0.4		16.9
	Estonia	2.12	0.76	24.3	64.6	0.7	1.6	8.9
EU	Greece	1.40	0.67	28.5	21.7	49.5	0.3	
	Spain	1.54	0.88	52.0	16.9	30.1	1.0	
	France	2.71	2.19	63.2	18.1	17.2	1.5	
	Ireland	2.18	1.21	73.1	7.0	19.2	0.7	
	Denmark	3.47	2.09	63.4	15.2	20.3	1.2	
	Finland	4.91	3.22	68.2	11.4	19.7		

Source: Institute for Statistics, UNESCO.  
[http://portal.unesco.org/uis/ev.php?URL\\_ID=5218&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201](http://portal.unesco.org/uis/ev.php?URL_ID=5218&URL_DO=DO_TOPIC&URL_SECTION=201)  
 \* Data for 1998

**Table 4**  
Globalisation indicators

Countries	Imports of goods and services (% of GDP) 2001	Export of goods and services (% of GDP) 2001	High-technology export (% of manufactured exports) 2001	FDI as % of GDP in (US\$) 2001	Net migration rate per 1 000 (2002 est.) <sup>1</sup>	Membership in international organisations <sup>2</sup>	
CEEC	Croatia	53	47	10	7.46	9.72	45
	Slovenia	63*	59*	5	2.68	2.24	48
	Hungary	63	60	23	4.70	0.76	63
	Poland	33	29	3	3.24	-0.49	68
	Slovakia	82	74	4	7.21	0.53	56
	Russian Fed.	24	37	8*	0.80	0.94	69
	Estonia	94	91	19	9.76	-0.73	40
EU	Greece	33*	25*	8	1.35	1.96	63
	Spain	31	30	8*	3.70	0.87	64
	France	26	28	23	4.01	0.64	90
	Ireland	80	95	48	9.55	4.12	64
	Denmark	39	46	21	4.48	2.01	71
	Finland	32	40	23	3.09	0.62	72

Source: World Development Indicators Database  
 \* Data for 2000

<sup>1</sup> CIA – The World Factbook 2002

<sup>2</sup> CIA – The World Factbook 2002

**Table 5**

Indicators for information and communication technology

	Countries	Phone (as % of total population)	Mobile (as % of total population)	Personal computers (per 1000 people) 2001	Internet users (as % of total population)
CEEC	Croatia	39.20 (2000)	29.61 (2001)	86	10.93 (2001)
	Slovenia	37.35 (1997)	51.74 (2000)	276	31.04 (2001)
	Hungary	30.72 (1997)	12.60 (1999)	100	11.91 (2001)
	Poland	20.89 (1998)	4.61 (1998)	85	16.57 (2001)
	Slovakia	35.68 (1998)	13.59 (1999)	148	12.91 (2000)
	Russian Fed.	20.69 (1998)	1.72 (2000)	50	12.42 (2002)
	Estonia	35.44 (2000)	50.22 (2001)	175	30.35 (2002)
EU	Greece	51.02 (1997)	8.81 (1997)	81	13.15 (2002)
	Spain	43.26 (1999)	20.94 (1999)	168	19.69 (2002)
	France	58.33 (1998)	18.54 (1998)	337	28.39 (2002)
	Ireland	41.20 (2002)	77.26 (2002)	391	33.74 (2002)
	Denmark	89.13 (1997)	26.90 (1997)	540	62.77 (2002)
	Finland	54.94 (2001)	71.93 (2001)	423	51.89 (2002)

**Table 6**

Female Participation Indicators

	Countries	Percentage of Women in Labour Force (2001)	Percentage of female students 2001	Percentage of parliament seats held by women 2001
CEEC	Croatia	44	52	21
	Slovenia	46	58	12
	Hungary	45	55	9
	Poland	46	58	20
	Slovakia	45	50	19
	Russian Fed.	48	57	8
	Estonia	49	62	19
EU	Greece	40	59	9
	Spain	39	53	28
	France	46	54	12
	Ireland	41	54	13
	Denmark	47	58	38
	Finland	48	54	38

Source: UNECE Statistics. Trends in Europe and North America 2003 Statistical Yearbook of the UN/ECE. [http://www.unece.org/stats/trend/trend\\_h.htm](http://www.unece.org/stats/trend/trend_h.htm)