CASE Network Reports

Assessing the Development Gap

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ABSTRACT

Current report aims to identify major existing gaps in the four socio-economic dimensions (economic, human, environmental, and institutional) and to reveal those gaps which could potentially hinder social and economic integration of neighbor states with the EU. To achieve this, the authors aim to assess the existing trends in the size of the gaps across countries and problem areas, taking into consideration the specific origin of the gap between EU15/EU12, on the one hand, and FSU republics, EU candidates and West Balkan countries, on the other hand.

The paper is structured as follows:

(1) An analysis of the historic roots and origins of the development gap, and its evolvement over time.

(2) A review of literature sources, draft analysis of primary statistical data, and qualitative explanations of gaps and divergences in selected development issues across four socio-economic dimensions:

- level of economic development and convergence rates based on real GDP (application of methodology testing β and σ convergence to the set of countries analyzed);
- quality of life and its components (poverty, inequality, health status and health care, access to fresh water and sanitation facilities, subjective perceptions of well-being);
- human capital and labor market development, including level of education and public spending on education, its accessibility and quality, main differences in labor market development (employment participation rates and levels of unemployment, new jobs creation and labor protection legislation);
- innovation potential, including R&D, information and communication technologies, and institutional environment;
- environmental performance in terms of environmental stresses, efforts aimed at their reduction, and institutional capacity;
- business climate, political institutions, and other institutional indicators (econometric analysis).

(3) A test econometric analysis of development gaps across selected dimensions by using a Principal Components Method (PCM). The results are further presented in the form of ranks of countries analyzed reflecting their distances from EU15 in respective aggregate averages.

Special attention is paid to gender-related development issues. Respective issues in human capital and labor market study, as well as variables included into PCM analysis were supplemented with relative gender data. Several preliminary conclusions finalize the report.

1. INTRODUCTION

Following the UN approach to monitoring development processes, in this Work-Package we attempt to assess the development gap across four dimensions: (i) economic, (ii) human, (iii) environmental, and (iv) institutional. In each dimension we specify the key sub-themes:

- in economic dimension: (i) Production level, (ii) Economic growth, (iii) openness and infrastructure, (iv) innovation potential;
- in human dimension: (i) Poverty, (ii) Human security, (iii) Education, (iv) Health (v) Equity/social exclusion (vi) Welfare and quality of life;
- in environmental dimension: (i) State of environmental systems, (ii) Reduction of environmental stresses, (iii) Institutional capacity to respond to environmental challenges;
- in institutional dimension: (i) Governance, (ii) Democracy, civil society and public participation.

Major tasks of Work-Package 1:

(1) to identify the major existing gaps in the four socio-economic dimensions and their origin as well as to assess the scope of the development lag;

(2) to identify those existing gaps which could potentially hinder social and economic integration of neighbor states with the EU, and the most urgent problems to be solved in National Development Strategies;

(3) to assess the existing trends in the size of the gaps across countries and problem areas, taking into consideration the specific origin of the gap between EU15/EU12, on the one hand, and FSU republics, EU candidates and West Balkan countries, on the other hand.

Geographical dimension of analysis

The geographical scope of the analysis includes transition countries located to the East and South-East of the EU borders which have not acquired a status of an EU Member. These include groups of countries on different stages of cooperation with the EU: candidates to EU membership, potential candidates (West Balkan countries), the

six Eastern European countries participating in European Neighborhood Policy (ENP) – Eastern European Neighbors (EEN), Russia with a status of a strategic partner in the "Common European Economic Space", and other CIS countries not participating in ENP.

The region analyzed is large and economically diversified. Its subgroups of countries differ in their levels of economic development, institutions, industrial structure, and progress achieved in market-oriented reforms. According to the latest (July 2006) World Bank country classification all six EENs are included into the group of lower-middle income countries, with Russia belonging to upper-middle-income group. Among transition countries which have recently (both in 2004 and 2007) become members of the EU (NMS), only Slovenia belongs to the group of high-income economies, while Bulgaria stays on the opposite pole, remaining in the group of lower-middle-income economies.

The overall geopolitical taxonomy of the region's countries with respect to per capita income looks as follows:

Country group	High-income economies	Upper-middle-income economies	Lower-middle-income economies	Low-income economies
EU15	EU15 (33235)			
NMS	Slovenia (17350)	Czech Republic (10710), Estonia (9100), Hungary (10030), Latvia (6760), Lithuania (7050), Poland (7110), Romania (3830), Slovak Republic (7950)	Bulgaria (3450)	
Candidates		Croatia (8060), Turkey (4710)	Macedonia, FYR (2830)	
Other West Balkans			Albania (2580), Bosnia & Herzegovina (2440), Serbia& Montenegro (3280)	
EEN			Armenia (1470), Azerbaijan (1240), Belarus (2760), Georgia (1350), Moldova (880), Ukraine (1520)	
Other CIS		Russian Federation (4460)	Kazakhstan (2930) Turkmenistan	Kyrgyz Republic (440), Tajikistan (330), Uzbekistan (510)

Notes:

Shown in brackets: GNI per capita, Atlas method (current US$), from World Development Indicators database, World Bank, 1 July 2006.

Turkmenistan is not included in our further analysis due to a lack of reliable country data.

In further analysis, in some cases (notably in calculating the rates of income convergence) we include Armenia, Azerbaijan, Georgia, Kyrgyzstan, and Moldova into the group of CIS low-income countries; and Belarus, Russia, and Ukraine into the group of CIS middle-income countries, according to the previous World Bank classification.

The table implies that West Balkans, as well as Kazakhstan, are very close to EEN countries. Croatia, Turkey and Russia surpass EENs in terms of per capita income. The rest are low-income CIS countries that belong to the group of the Region's poorest. Thus, geopolitical location could serve as a good predictor of the level of economic development. The groups' summary figures, indicating their positions in population and per capita income relative to the Region's totals, are presented below:

Geopolitical groups	Average GNI per capita, Atlas method (current US$), 2005[1]	Population (2005), million people	Population 2005 Region=100	GNI 2005 Region=100
NMS	7048.5	102,3	21.8	36.5
Candidates	4851.3	79,1	16.8	19.5
West Balkans (Potential candidate)	2920.3	15,2	3.2	2.3
EEN	1590	76,9	16.4	6.2
Other CIS upper-middle income (Russia)	4460	143.2	30.5	32.4
Other CIS	1167.4	53,4	11.4	3.2

Major results and structure of the report

(4) An analysis of the historic roots and origins of the development gap, and its evolvement over time.

(5) A review of literature sources, draft analysis of primary statistical data, and qualitative explanations of gaps and divergences in selected development issues across four socio-economic dimensions:

- level of economic development and convergence rates based on real GDP (application of methodology testing β and σ convergence[2] to the set of countries analyzed);
- quality of life and its components (poverty, inequality, health status and health care, access to fresh water and sanitation facilities, subjective perceptions of well-being);
- human capital and labor market development, including level of education and public spending on education, its accessibility and quality, main differences in labor market development (employment participation rates and levels of unemployment, new jobs creation and labor protection legislation);
- innovation potential, including R&D, information and communication technologies, and institutional environment;

[1] GNI per capita (formerly GNP per capita) is the gross national income converted to U.S. dollars using the World Bank Atlas method, divided by midyear population.

[2] Barro, R., Sala-i-Martin, X. (2001). *Economic Growth*, Cambridge, MA: MIT Press.

- environmental performance in terms of environmental stresses, efforts aimed at their reduction, and institutional capacity;
- business climate, political institutions, and other institutional indicators (econometric analysis).

(6) A test econometric analysis of development gaps across selected dimensions by using a Principal Components Method (PCM). The results were further presented in the form of ranks of countries analyzed reflecting their distances from EU15 in respective aggregate averages.

(7) Special attention was paid to gender-related development issues. Respective issues in human capital and labor market study, as well as variables included into PCM analysis were supplemented with relative gender data.

Sources of statistical and other data

Current analysis is based on the extensive body of literature describing and analyzing differences in levels of economic and institutional development, industrial structure, and progress in market-oriented reforms among countries of the region. A large portion of comparative worldwide and regional studies is provided by World Bank reports and background papers. Another important source of information, as well as of appropriate methods of analysis are comparative studies on human development across regions and subregions provided by UNDP. Research provided by global and European centers on various aspects of transition process (CEPS and other European networks, World Economic Forum, CATO institute, etc.) has also proved to be of high value.

In order to ensure comparability, most of raw statistical data were provided by online databases supported by international organizations: the World Bank World Development Indicators database, UNICEF, UNCTAD, UNESCO, ITU, EBRD, IFC and IMF databases, a number of statistical data collections supported by the UN Statistics Division, including the database of Millenium Development Goals Indicators, etc.[3]

Current research would hardly be possible without an extensive use of:

- a wide set of composite indices measuring various aspects of institutional development (World Economic Forum's Global Executive Opinion Survey, the World Bank/IFC Enterprise Survey, the World Bank's Cost of Doing Business survey, The Freedom House „Freedom in the World" ratings, and other indices provided by international NGOs);
- a widely known and often referred to UNDP approach to measuring human development, including Human Development Index (HDI) and Human Poverty Index (HPI);

[3] http://millenniumindiators.un.org/unsd/mi/mi_series_list.asp

- UN sustainable development indicators and underlying methodology.
- comprehensive environmental indicator sets permitting cross-national comparisons, produced by Yale Center for Environmental Law and Policy and Columbia University[4];
- the Knowledge Assessment Methodology (KAM) developed by the World Bank that measures a country's ability to generate, adopt and diffuse knowledge[5];
- a dataset of World Values Survey, the most comprehensive and wide-ranging survey of human values ever undertaken[6].

Despite this substantial background of research and at first glance abundant body of statistical information, we faced a serious problem of comparable data availability for our primary research object – EENs, Russia, FSU and West Balkan countries. This is due to the following reasons.

First, in the majority of FSU countries, statistical reporting formats and methods of data collection are still not adapted completely to uniform international standards, resulting in incomparability of datasets. Thus often seemingly available data could not be incorporated into our database, with the result that the datasets used are patchy and incomplete.

The existing incomparability of datasets between EUROSTAT and other databases (e.g. TransMONEE database) did not allow in most cases to use the extensive EUROSTAT data system with its well developed integrated indicators' structure for our comparative research, as we initially planned to.

Second, omissions of data for several countries, especially those that recently underwent war conflicts, in many regular statistical datasets (e.g. WDI) often could not be compensated by data provided by other international organizations in view of their incomparability (e.g. difference by several percentage points). Thus, in some cases we had to refer to expert assessments (from special publications or interviews).

Data omission is the main reason why several important variables are missing from the aggregate PCM analysis. In some cases, in order to avoid the exclusion of a country from this analysis, we had to fill in the missing data from other sources, but only when we were able to check the respective data on comparability. In cases when the relevant data were not available (which was most often the case with other CIS countries or West Balkans), we calculated final average ratings omitting the missing dimension for this specific country.

[4] The 2005 Environmental Sustainability Index Report, available at www.yale.edu/esi.
[5] World Bank Knowledge Assessment Methodology (http://info.worldbank.org/etools/kam2/KAM_page5.asp)
[6] www.worldvaluessurvey.org/

Third, a lack of comparable time series of data for several countries (e.g. some of EENs or republics of former Yugoslavia) did not allow us to provide a sound statistical background for trends in the evolvement of specific gaps in the course of transition. Thus, in some cases, we were forced to rely on more aggregate indicators available or on anecdotal examples.

Methods tested

Aiming to produce a more or less clear picture of most vivid and critical existing differences in countries' development, based on sets of indicators and indices available, we involved a variety of methods tested by other researchers.

The methods used include: (1) a descriptive comparative analysis of the raw data indicators, (2) correlation analysis between the available variables, (3) econometric analysis of composite indicators characterizing specific dimensions, (4) analysis of β and σ convergence between per capita income in selected country groups, and (5) methods of factor analysis (Principal Components Method). All of methodologies mentioned above have certain advantages and deficiencies in terms of data coverage or difficulties of results interpretation.

PCM allows mapping from the space of raw indicators (which are often highly correlated with each other) into a space of principal components (which are orthogonal to each other). To come up with a measure of a gap along each of the dimensions, we estimated the first two principal components based on the variables that characterize the dimension. The first two components in the majority of cases explain the main variation in the raw indicators.

The principal components, being the weighted sums of the raw indicators, allow to reduce the dimensionality of analysis. Application of PCM is also justified in our case since it makes the discussion of inter-country variation more tractable by allowing to identify the clusters of countries based on the distance from the EU along the chosen dimensions. The components are then used to measure distances from the EU15 average which, in turn, are converted into ratings of countries in terms of their closeness to the EU. As a result, the ratings along the nine dimensions characterize the EU-average gap for each of the neighboring countries.

We use averages for EU15 as a base for comparisons assuming that this group of countries (despite being quite heterogeneous) still provides a more homogenous background than it would be if we used the EU27 group. Another point is that we can provide additional comparisons on relative position of NMS, which are very divergent in many instances and display quite manifold characteristics across specified dimensions.

The current draft report is in fact a first stage of the total work, representing rather an effort aimed at data collection and the preliminary assessment of current inter-

country differences (gaps) across selected dimensions. This is the reason why we tested different approaches to data analysis (descriptive, statistical, econometrical), not necessarily mutually integrated. At this stage of work we also have not managed to provide an in-depth analysis of important interrelations between various dimensions, including one of the most important ones – the role of institutions in specific spheres of social and economic development. Instead, we performed an analysis of major differences in institutional development across analyzed country groups. A more aggregated approach is to be provided in the course of the second year research.

The draft report is organized as follows: a historical background is followed by the analysis of convergence trends in per capita incomes under transition, an exploration of most important differences (gaps) between countries across specific dimensions of development (quality of life, human capita, innovation, environment, and institutions), with an application of PCM for measuring development gaps in different dimensions concluding the report. At the current stage of analysis we felt that it would be premature to draw final policy recommendations: for that, an in-depth analysis of interrelations between gaps in various dimensions is yet to be completed, and a better integration with other WPs is required. Thus we finalize the current intermediate report with a brief summary of results of our data analysis and the preliminary assessment of the existing gaps.

II. ORIGINS OF THE DEVELOPMENT GAP

A development gap between present CIS countries (and Eastern Europe in general) and Western Europe was in place at least since the 13th century[7]. It became quickly widening mostly in the course of the Industrial Revolution, starting from the 19th century. However, the reasons for inability to catch up within almost two centuries were rooted deeply in history.

By the beginning of the 19th century, before the Industrial Revolution, most of FSU countries became parts of the Russian Empire. Since then, despite multiple territorial and border changes, these countries have been developing under a direct impact of Russian (later Soviet) institutions and largely shared a common economic history.

The USSR launched a large-scale forced industrialization in 1930s-60s, but despite desperate attempts failed to overcome the development gap: between late 1920s and late 1960s, the main goal of modernization was military superiority rather than development *per se*. Although successful in fighting illiteracy and creation of modern industries, the Soviet economic policy generated enormous distortions and inefficiencies. The latter caused the gap widening again in 1960s because of the USSR's failure to meet the challenges of post-industrialization.

Following the USSR breakdown at the end of 1991 and the emergence of post-Soviet countries, a profound economic and political crisis, accompanied by armed conflicts in some territories have severely damaged physical and human capital of the respective countries contributing to a deepening of the development gap during the first years of transition.

II.1. Some theoretical reasons

Following North[8], we consider persistent development gap as caused primarily by institutional factors. Institutional gap, in turn, was most probably primarily related to

[7] Author is grateful to Gennadi Poberezny for his kind help in data mining.
[8] North, D.C. (1991). 'Institutions', *The Journal of Economic Perspectives*, Vol. 5, No. 1, pp. 97-112.

the abundance of natural resources, initially arable land. Among other important factors discussed in the literature we also consider a lack of traditions of urban self-governing, and remoteness from the sea.

There are at least four factors tending to impede the development of resource-abundant countries and therefore make the resource abundance a "mixed blessing" (a "resource curse").

1. **Macroeconomics**. Export of resources or raw materials tends to appreciate the domestic currency comparing to foreign ones, and in this way make domestic production of more sophisticated goods and services non-competitive at the world market, or even at the domestic market (so called "Dutch disease" in the narrow meaning)[9]. This factor was hardly important in the case of Russia, since its historically inherited extent of foreign trade was relatively small[10].
2. **Policies**. Rents stemming from natural resources allow the authorities to postpone the necessary reforms, neglect important components of development, such as education and governance, etc.[11] This factor seems to be particularly relevant to the case in question.
3. **Political economy**. Natural resources are sources of rents. On the one hand, they feed the rent seeking aspirations and respective interests, which, in turn, tend to divert human and financial resources from productive activities[12]. On the other hand, competition for rents not only results in dissipation of rents themselves, but also brings overall insecurity. Prevention of such a competition may need an authoritarian arbiter to be in place, which brings all of the fallacies of authoritarianism[13].
4. **Institutions**. Property rights are needed to protect the renewable natural resources from devastating exploitation that can lead to their exhaustion[14]. However, the rights over natural resources are inherently somewhat weaker than the ones established over the outputs of various kinds, including fixed assets and other capital goods.

Property rights under feudalism become eventually legitimized by protection against plundering. This was the case in the medieval Western Europe, as well as in the Kievan Rus'. But this reason lost its force after the Tartar-Mongol invasion (mid 13th

[9] Sachs J.D., Warner A.M. (2001). "The curse of natural resources", *European Economic Review*, Vol. 45, pp. 827-838.

[10] In 1850 Russian exports per capita were 23 times lower than in Great Britain, and 2.7 times lower than in Spain. Twenty years after it has increased almost 4.5 times, but still remained 4.4 times less than in Germany.

[11] Gylfason, T. (2001). "Natural resources, education and economic development", *European Economic Review*, Vol. 45, May, pp. 847-859.

[12] Murphy, K., Shleifer, A., Vishny, R. (1993). "Why Is Rent-Seeking So Costly to Growth?" *American Economic Review*, Vol. 83, pp. 409-14.

[13] Dubrovskiy, V., J. Szyrmer, W. Graves III et al. (2007). "The Reform Driving Forces in a Rent-Seeking Society: Lessons From the Ukrainian Transition", forthcoming in *Understanding Market Reforms*, Palgrave Macmillan.

[14] Demsetz, H. (1967). "Toward a theory of property rights", *American Economic Review*, Vol. 75, pp. 332- 337.

century) onward. Instead, in the Muscovite Rus' the abundant lands were granted to aristocrats along with titles as a reward for their service to a Tsar. Tsar's discretionary power therefore became the only source of legitimacy for land ownership.

In the case of arable land, there was at least one more important factor. The landlords needed labor to cultivate their land, and serfdom was a means to make this labor cheaper. But in Western Europe it could be partly substituted by a sort of "cartel" of landowners that were almost exclusive employers of those times. When labor became scarce because of wars and epidemic diseases, such a cartel took the form of legal wage limitations in agriculture – which, however, stimulated the urbanization. On the other hand, under land abundance the peasants had an alternative of resettling to the virgin lands, thus in Russia serfdom had no alternative.

In Western Europe, cities served as shelters for the peasants escaped from serfdom and the region has inherited an ancient liberal democratic tradition of self-governing city-states. Competition for military superiority characteristic for Western Europe could be won only by technological progress, so the "arms race" between states, duchies, and cities became a powerful engine for development. New weapons' production required advanced technologies that were mostly developed in the cities.

In the agrarian land-abundant empires (like the Russian one), the cities were rather military and administrative centers representing very strong central authorities. Their citizens did not enjoy more freedoms than other populace, and never constituted a sizable part of the whole population. Until the invention of firearms, there were no effective means of fighting the nomads, hence technical advance did not make much difference. For these reasons, the agrarian empires of the past, although often richer and far more advanced in arts and science than medieval Western European countries, nonetheless failed to develop modern institutions that later on allowed Western Europe to outperform them in the long run.

Finally, several scholars[15] emphasize proximity to the sea coast as an important factor of economic, and especially institutional, development. They associate proximity to the sea with better conditions for trade, due to lower cost of sea transport, and its lesser vulnerability to plundering, extortion and other kinds of trade barriers. In this sense, Western Europe is a unique geographic region with none of the cities located in more than 300 kilometers from the sea coast[16] and plentiful of rivers providing convenient ways to sea ports. Ancient Russian self-governing cities-states of Pskov and Novgorod were in this sense similar to their Western European counterparts and trade partners. Unlike these, most of the territory of Muscovite Rus' but sub-polar regions had difficult access to sea, hence needed to lean on land trade.

[15] Mellinger, A.D., Sachs J.D., Gallup J.L. (1999). 'Climate, Water Navigability, and Economic Development', Center for International Development at Harvard University. CID Working Paper No. 24.

[16] Gaydar, Ye.T. (2005). *Rossiya v mire: Ocherki ekonomicheskoy istorii*. Moscow, Delo.

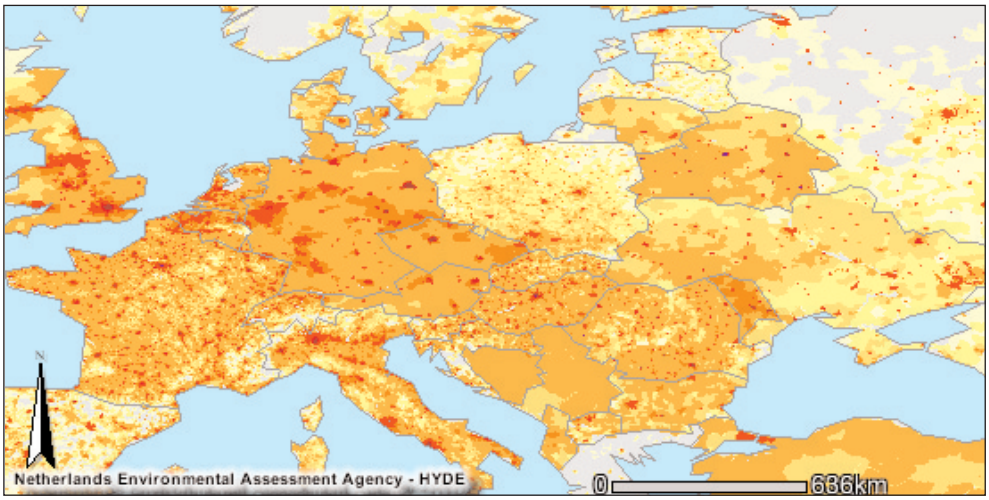
II.2. History of the development gap

Before the Industrial Revolution economic growth was very slow worldwide. Due to this reason the countries that had modernized earlier have outperformed the others in the beginning of 19th century. At the same time, industrialization gave a chance to many other countries to catch up. Therefore, history of the development gap may be divided in two periods: before and after the Industrial Revolution.

Why the industrialization was delayed

Although initially the Kievan Rus' of IX-XIII centuries has been rather following the European path, later on land abundance, plundering by the Tartars and Mongols, and then exposure to Genghis Khan's empire (succeeded by the "Golden Horde") institutions have turned it to a different path for almost three centuries. The defeat of the Horde provided the Muscovite Rus' with unlimited access to virgin fertile lands, which resulted in institutional and technological stagnation and even regress. In particular, serfdom that was rather uncommon in the Kievan Rus' has become much more severe compared to Western Europe.

Fig. 2.1. Population density in Europe by 1700



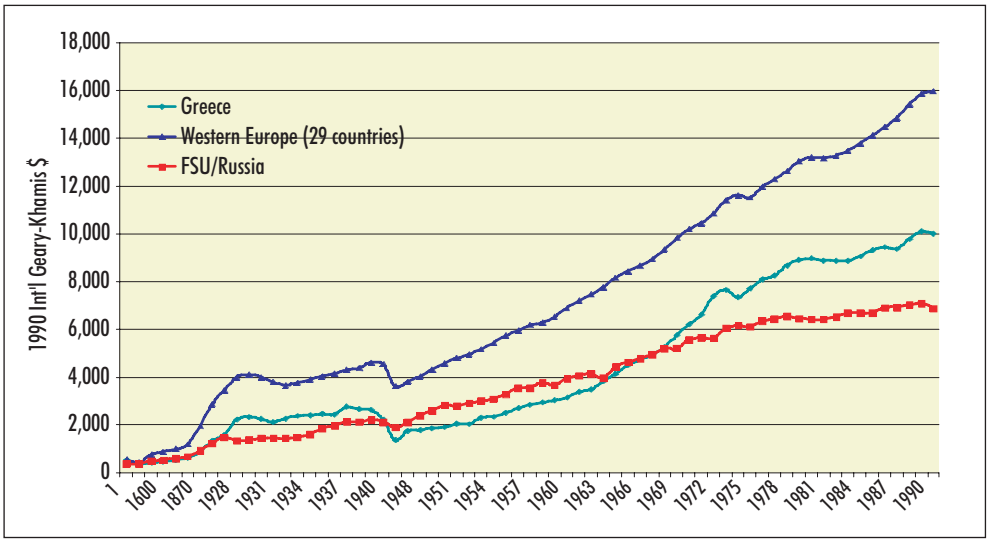
Source: http://milntj34.rivm.nl/website/intdata/hyde2005/viewer.htm

Unlike competition for overseas colonies among Western European countries, the Russian type of expansion to the East did not require any advance over other European states, since they did not compete over there. On the contrary, Russian expansion to the West and South did require some technological advance, because here Russia had to fight against the Europeans, primarily Swedes and Poles, and the Ottoman Empire.

Still, despite Peter the Great's attempt of institutional and technological catch-up in the beginning of the 18th century, by the beginning of Industrial Revolution the Russian Empire remained mostly agrarian. It remained such for quite a long period of time with less than one percent of urban population compared to fifteen percent in the Western Europe, and 5.65% in the Eastern Europe by 1720.

Authoritarianism was an essential part of any agrarian empire, and Russia was not an exception, remaining an absolute monarchy until the early 20th century. Serfdom that lasted until 1861 made labor mobility close to zero. Instead, modern industries were run mostly by the state that, in its turn, was also using mostly forced labor. At the same time, the bureaucracy and other institutions of rational rule were largely formal, while the actual rules remained inherited from the patrimonial state[17]. The rule of law and other institutions needed for complex transactions going beyond simple bazaar exchange remained weak, so the financial markets were non-existing. Therefore, not only the industrialization did not start, but the most necessary preconditions for a "market capitalist" kind of industrialization were missed along with driving forces for it.

Fig. 2.2. GDP per capita in Russia (FSU) compared to Europe and Greece



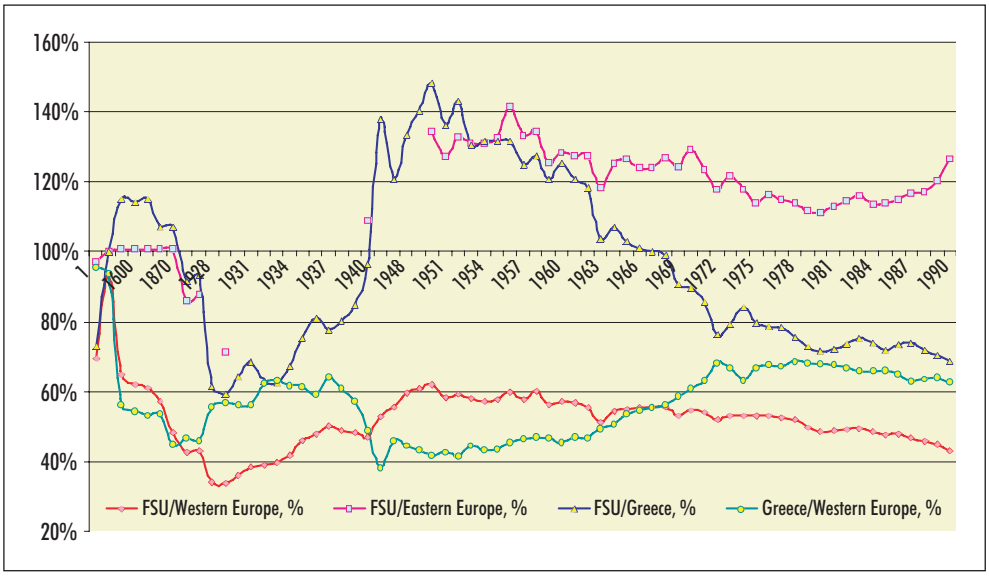
By this time the Russian Empire was already one of the largest in the world by its territory having, however, very little density of population even in its most developed European part (Fig. 2.1), abundant with virgin lands, having a severe serfdom and with very weak incentives for entrepreneurship. Examples of bourgeois revolutions

[17] Volkov, V. (2000). "Patrimonialism versus Rational Bureaucracy: on the Historical Relativity of Corruption" [in:] S. Lovell, A. V. Ledeneva, and A. Rogachevskii (ed.), *Bribery and Blat in Russia: Negotiating Reciprocity from the Middle Ages to the 1990*, School of Slavonic and Eastern European Studies, University of London. McMillan.

that took place in France and other European countries worked as a warning against liberation that could potentially be subversive to privileges of aristocracy.

The population remained mostly rural, with less than one percent living in towns – compared to a 25% of urban population in Western Europe, and about 10% in Eastern Europe (1820). The Russian Empire has managed to reach a 15% level of urbanization (the Western European level of 1700) only by the turn of the 19th century. The quality of Russian towns was also strikingly different: there was nothing in place comparable to the freedoms of Western cities and towns.

Fig. 2.3. GDP per capita in Russia (FSU) relative to ones of Western Europe, Eastern Europe, and Greece



As long as modern institutions did not emerge from the grassroots, their establishing through reforms was the only way to catch up. In the late 17th century Peter's the Great attempt of changing the societal norms by a forceful imposition of Western-like legislation and bureaucratic rule in order to catch up with the most developed Western European countries was a turning point in the institutional history of Russia. Still, contrary to the reforms' purposes, this attempt has not really destroyed the patrimonial traditions. Instead, the increased gap between the natural and formal law made almost everyone a lawbreaker. This, in turn, has created vested interests in the further excessive complication and toughening of legislation; increasing the scope of bureaucratic discretion; preservation and amplification of ambiguity and contradictions of legislation, etc.

These distortions resulted in traditions of low respect for and abeyance of law. The law enforcement became to a large extent an instrument for exercising power rather than maintaining the law and order in their Western meaning; bureaucrats in the respective positions were rather powerful state executives endowed with vast political and economic power; vertical (hierarchical) bargaining was widespread as a substitute to the impracticable formal rules, etc. This institutional legacy in fact created a background for a limited capacity of law enforcement and implementation, that complicated introduction of any new formal rules in the respective countries.

Generally, and apart of the abovementioned specifics, the formal institutions in Russia of the early 19th century were to some extent comparable to the Western European patterns of one or two centuries before. Absolutism in polity, serfdom and strong estate privileges in social relationships, and weak civil rights were as much restrictive for economic and social development as they were in Western Europe at the respective times.

As a result, the Industrial Revolution became delayed in Russia. Consequently, between 1820 and 1870 average annual growth rates in Russia constituted only 64% of those in the Western Europe, so the initial gap grew wider.

Modernization in the Russian Empire

Alexander the Second has launched a series of genuine liberal reforms that appeared to be successful and sustainable. Serfdom was abolished, civil and property rights strengthened due to the court reform, and local self-governance established. Still, most of the privileges for nobility were preserved, and peasant communities remained collectively responsible for tax collection, which made them an instrument restricting labor migration. Land reform was largely incomplete, so peasants had to buy out their land plots. All those reasons still prevented rapid urbanization and industrialization. Probably as a result of these reforms, the growth rates speeded up by half – but so did the ones in Western Europe, therefore the gap kept widening. Only in a few decades, by the end of 19th century, the Alexander II reforms yielded their fruits in terms of economic development.

The first catch-up jump occurred only in the years of 1890-1913. During this period growth rates were for the first time in history even slightly higher than the ones in the Western Europe; the share of urban population almost quadrupled. While in 1890 per capita production of iron and steel in Russia was only 11% of the one in Western Europe, just in ten years it reached 26% (Fig. 2.4). The industrialization has begun. Literacy rate that has doubled in previous 40 years from 7.4 to 15%, has once again doubled in 21 years from 1890 to 1911, still remaining, however, twice as low compared to Great Britain[18] of 1840 (Fig. 2.5). During this period the Empire has become a constitutional monarchy, launched the ambitious Stolypin land reform that

was to create a sort of "open end" at Siberia. Nevertheless, Russia still remained mostly agrarian country with agrarian sector dominating the economy, while most of Western European countries were already industrialized.

Fig. 2.4. Annual production of iron and steel in Russia /FSU and the rest of Europe

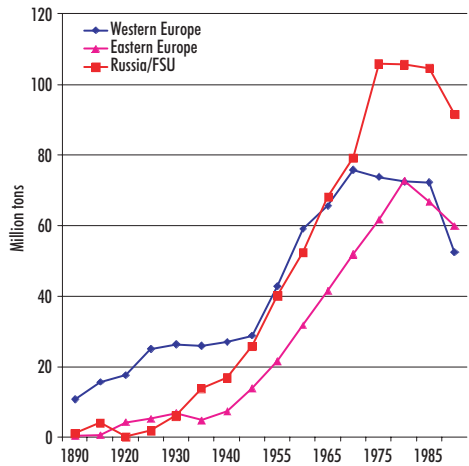
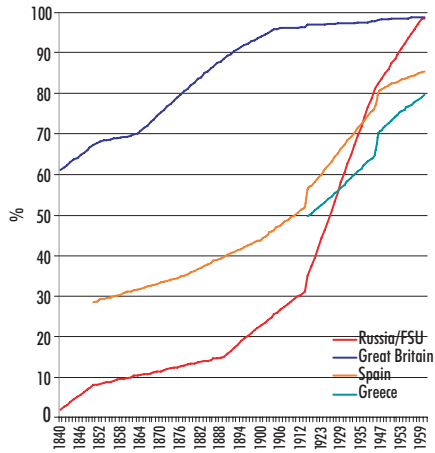


Fig. 2.5. Literacy rate in Russia/FSU and selected Western European countries



The institutional gap remained almost as wide as it was a hundred years before. Constitutional restrictions on monarchy were weak and often fake with tsar's power remaining basically unconstrained. Estate privileges and various restrictions on the freedom of migration remained in force. Quality of state governance remained poor relatively to the growing needs. Rampant corruption and favoritism along with remaining privileges and vertical mobility restrictions restrained the development of entrepreneurship. Hence, in general, the Russian Empire was again at least one stage behind the Western Europe.

Revolution of 1917 and pre-WW2 industrialization

Although most of Western European countries suffered a lot from the First World War of 1913-1918 and complementing revolutions, the Civil War of 1918-1922 that followed the Russian revolution of 1917 and communist experiments of the new government became really devastating. The former Empire lost important territories (among them, Finland, Poland, Baltic countries, Bessarabia, Western Belarus and a

[18] Great Britain was chosen as a convenient basis for comparisons, since it was a leader of Industrial Revolution, and also since its borders remained mostly unchanged during the whole period under consideration.

part of Western Ukraine); by 1921 virtually all of industry and most of agriculture were in ruins, and the Communist regime was unable to substitute deliberately destroyed market institutions with any other viable system able to provide work incentives and allocate resources.

As a result, it was at this time that the gap in wealth has hit its lowest point for the whole period between 1820 and 1990 (Fig. 2.3). Per capita iron and steel production fell twenty times compared to 1900 and constituted only 1.1% of the Western European level; per capita energy consumption fell by two-thirds, accounting for just 3.8% of that in Western Europe. At the same time, the peasants' communes were destroyed, while millions of the former peasants went to the army and then settled in the cities, so the urbanization went up. However, both countryside and cities suffered from starvation.

A short period of NEP that led to a quick economic recovery and an improvement in living standards only proved the potential of the major driving force of catching-up. A shade of liberalization by introduction of market institutions, at least in small and medium-size business, resulted in GDP in 1928 approaching the one of 1913 (while in per capita terms it was still 7% less). At the same time, in Western European countries per capita GDP was 19% higher than in 1913 (Fig. 2.2). Thus, the gap still retained: even after recovery the USSR reached only about one-third of the Western European average. To compare, during the same time period Greece[19] has caught up and already reached well above one-half – the level that the USSR did not hit even at the peak of pre-war industrialization (Fig. 2.2. and 2.3).

Further modernization required either abandonment of the Communist ideology and introduction of modern market institutions, or radical mobilization in line with this ideology and complete abandonment of economic freedoms. Soviet authorities have chosen the latter. In the 1930s, the catch-up was based on huge forced savings, and largely forced labor[20]. Abundance of human and natural resources other than land became its main engine. Rapid industrialization occurred at the expense of devastation of agriculture and huge human costs: the traditional Russian village was destroyed and replaced by collective and state farms which proved to be highly inefficient. Thus Communist ideology and central planning combined with totalitarian management appeared to some extent effective in catching-up development and recovery: within a historically short period of twelve to fifteen years, an economically backward country created a modern industrial sector and acquired new technologies that changed it from an agrarian to an industrial economy.

[19] Greece was chosen as a benchmark due to its relatively low starting point and some cultural similarities (Orthodox Christian religion) to Russia. It is the only EU-15 country that had the GDP per capita lower than the one of Russia in 1820.

[20] Olson, M. (2000). *Power and Prosperity: Outgrowing Communist and Capitalist Dictatorships*. Oxford University Press.

Fighting illiteracy appeared arguably the most successful modernization effort with literacy rate reaching 60% in 1930 (and increasing by 133% within 20 years of 1919-1939) (Fig. 2.5). Higher education expanded rapidly, with enrollment tripled in 1929 comparing to 1913, and once again tripled by 1939 – probably, to some extent, at the expense of it quality.

While the USSR was moving forward very quickly, the whole of Western Europe suffered from the Great Depression of 1930s. This, undoubtedly, contributed to Soviet catching-up efforts (see Fig. 2.3). By 1940 the USSR has reached the level of one-half of Western European per capita GDP, while producing 63% of the European level of steel and iron per capita (Fig. 2.4). Hence, this was a period of quick catch-up growth, although based mostly on forceful mobilization.

Post-war industrialization: the peak of success

The Second World War was extremely devastating for the USSR: its losses exceeded 52% of total human losses borne by all war participants. However, due to extraordinary population losses the fall in per capita GDP was relatively small: it has dropped twice as less as in Western Europe (Fig. 2.2).

The Soviet postwar economic recovery period saw a partial repetition of the process of primitive accumulation which had been attempted during the first two five-year plans of 1928–37. Living standards were forced down; millions of peasants were conscripted, cajoled, or driven by economic necessity into abandoning the land for work in industry and construction; the slave labor sector was considerably expanded (e.g. by German POW) – all so that 'capital' and labor power could be concentrated in core sectors of mining, iron and steel, construction, and machine-building[21].

A severe resource mobilization brought about substantial results: in 1950 the gap hit its lowest point with the USSR being only 37.9% less that Western Europe in per capita GDP (Fig. 2.3). During 1950s the development gap remained pretty stable in relative terms (with the USSR having per capita GDP around 60% of the Western European one), although widening respectively in absolute terms. The 1950s were also a period of rapid industrial growth in both the USSR and the Western Europe. Still, average growth rate for 1946-1962 (the longest period of continuous growth) constituted just about 4.25%, while for Germany and Italy the averages for the period of continuous growth (1946-1973) were 6.4% and 5.5% respectively.

Unlike the market economies, "socialist industrialization" has prioritized heavy ("basic") industries that were understood mostly in terms of the "coal and ore era" and "strengthening the defense capacity of the nation". These industries were reconstructed

[21] Filtzer, D. (2002). Soviet Workers and Late Stalinism: Labour and the Restoration of the Stalinist System after World War II. Cambridge University Press.

in the first instance, so at that moment the production of iron and steel per capita in the USSR constituted about 90% of the Western European average, just as much as the latter constituted fifteen years before (Fig. 2.4).

Even more importantly, the Soviet Union's postwar experience was visibly different from the rest of Europe not in the rate of economic recovery but in the lack of institutional response. Where other societies experienced radical reforms or were reconstituted, the USSR witnessed the rejuvenated reign of Stalinism[22]. The lack of institutional reforms in turn prevented modernization and inhibited the quality of economic growth.

Soviet postwar growth occurred mainly at the expense of efficiency. Already in 1950, the USSR's energy consumption per 1 dollar of GDP outpaced Western European one by 27%. While in Western Europe energy intensity has been permanently and almost evenly declining at least since 1930 (earlier data not available), in the USSR it has been steeply increasing until 1970 and then nearly stabilized at the level exceeding the Western European average of 1930 (Fig. 2.6). The same was true for many other components of development. For example, while having 23 inhabitants per physician (compared to 30 in Greece or 72 in the UK) in 1990, the USSR still had infant mortality three times as high, and life expectancy at birth constituting 65/74 years (male/female) compared to 75/80 in Greece and 72/78 in the UK respectively.

After 1960s: the decay

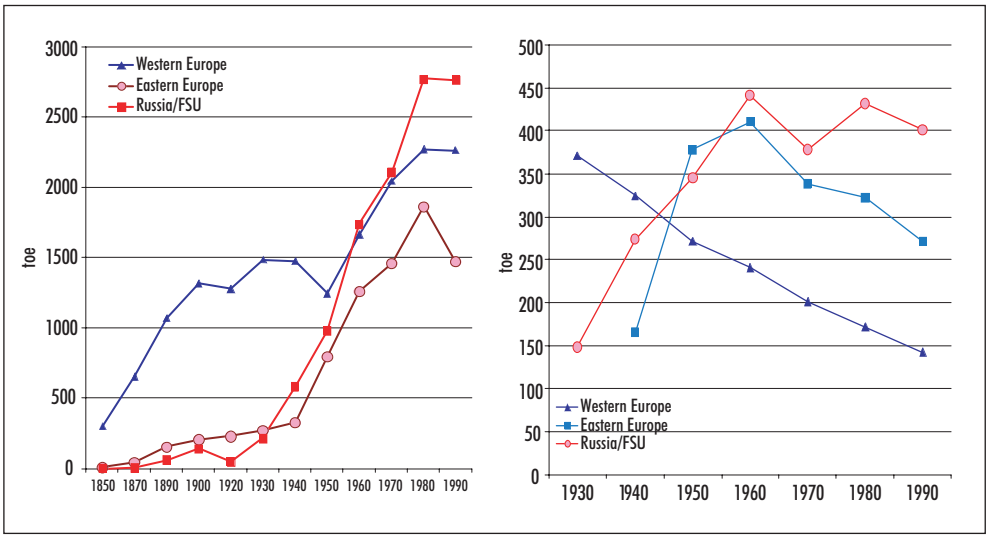
Since the late 1950s, a relative GDP per capita gap began steadily widening again (meaning an even faster increase in the gap in absolute terms) (Fig. 2.3). Since then, a smoothed trend of differences in the growth rates was permanently negative. Ironically, this change in trend coincided in time with the enunciation of a well-known Khrushchev's slogan "Catch up and overtake the advanced capitalist countries!" (1957) that for a long time remained an ever-present factor in the economic and social history of the USSR.

In general, the Soviet Union has been still pursuing the industrialization, while the Western countries have already become post-industrial. The USSR did outperform the West in per capita production of iron and steel (Fig. 2.4) – but it was not an indicator of modernity any more. Consumption of other materials, like aluminum or plastics, became indicative of technological progress. And here the USSR failed to catch up despite its wasteful technologies and material-intensive economy.

Energy consumption per capita has also "caught up" and remained roughly similar to the Western European one during the 1960s, indicative of low energy efficiency of the economy and wasteful resource consumption (Fig. 2.6). But then its growth has

[22] Harrison, M. (2006). "The Soviet Economy: War, Growth, and Dictatorship", Paper prepared for the annual meeting of the Allied Social Sciences Associations, Chicago, IL, 5-7 January, 2007.

Fig. 2.6. Per capita energy consumption **Fig. 2.7. Energy consumption per unit of GDP**



slowed down in the West due to the energy price shock of the mid-1970s, and it has even declined during 1980s. On the contrary, the USSR saw a 31.5% increase in per capita energy consumption during 1970th (Fig. 2.6).

Unlike Western Europe, where industrialization was largely driven by technological progress that increased agricultural productivity and by doing this released the excess labor, in the USSR industrialization was achieved by plundering the agrarian sector that remained gravely inefficient. Its inefficiency was further largely aggravated by collectivization. As a result, the USSR had to become a net importer of foodstuffs, mostly grain and meat. Remaining in fact an agrarian empire by its culture and institutions, it became dependent on agricultural imports.

The USSR has never managed to catch up in infrastructure. Poor quality of roads in Russia is notorious. But even being the world's leader by railroad mileage, it still has been lagging far behind the European countries in the density of railway network (Fig. 2.8). This was, of course, partly due to a low density of population and extremely large territory of permafrost. However, in terms of telephone lines per capita it was lagging far behind as well (Fig. 2.9).

Rapid urbanization continued, although at somewhat slower pace, with the USSR lagging behind the Western Europe. Massive migration was driven mostly by a huge wealth gap between cities and countryside that appeared due to rapid industrialization. It was accompanied by a scarcity of entertainment opportunities, undersupply of goods and services, poor quality of basic public goods, and weakness of social security in the countryside.

Fig. 2.8. Railroad mileage per 1 sq. mile

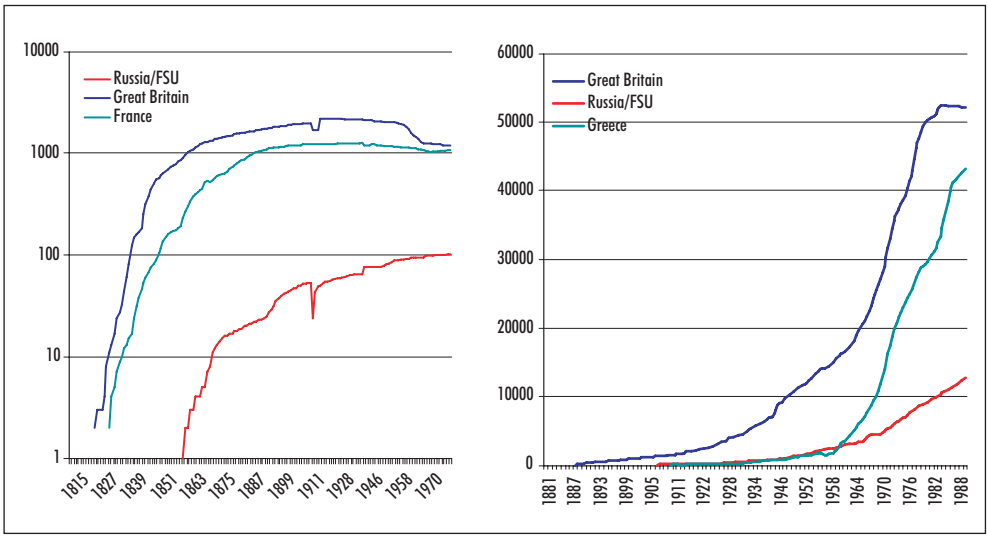


Fig. 2.9. Number of telephones per capita

What the communist regime could be praised for is the development of human capital. Education was the only but important sphere where the USSR has managed to catch up completely, and in many cases even outperform Western European countries. Already in 1960 the USSR has reached a literacy rate of almost 100%; still. it has been lagging behind in terms of university enrollment, as well as, perhaps, in its quality (at least regarding humanities). However, despite formally high human capital, the real quality of labor force was rather poor due to weak incentives. Widespread absenteeism, petty theft, weak technological discipline, and other deficiencies as well as total mismanagement resulted in excessive actual labor cost and poor quality of goods and services. The few exemptions were limited mostly to tightly closed military plants and research divisions.

Also, in terms of "human development" as defined by Welzel & Inglehart[23], the USSR has lagged behind tremendously. These authors argue that human development can be best measured in terms of the opportunities for self-realization that a society provides for its members, or the variety of choice that it provides. In the USSR the people were given very little choice that was often deliberately restricted. In addition to low incomes and a complete absence of democratic freedoms (factors considered by Welzel and Inglehart), the choice of goods and services was incredibly poor by any means. The people were restricted in choosing their occupations, since private entrepreneurship was prohibited as such; voluntary unemployment or self-employment was subject to

[23] Welzel, C. & Inglehart, R. (2001). Human development and the 'explosion' of democracy. Berlin: WZB Discussion Paper FS III 01–202,WZ.

criminal prosecution; and those who changed their jobs too often were penalized. During a long period of time large categories of soviet citizens were deprived of any choice at all, as peasants under Stalin times. Besides, there were informal quotas limiting access to high education for Jews, children of the dissidents, victims of purges, and some other categories. Art, literature, education, and science were placed under a strict ideological scrutiny; censorship was pervasive and strictly enforced.

Although formally democratic, the USSR was a totalitarian state. Market institutions were, at most, non-existing, with trading, private property, and entrepreneurship being outlawed and condemned by most of the public. No formal estate privileges were in place, but *de facto* the communist *nomenklatura* enjoyed tightly restricted privileged access not only to the goods and services in short supply, but also to the potential sources of rents.

Social capital in the USSR took a very much specific form of the so-called *blat*[24]. The reputation-based interpersonal networks of informal reciprocal exchange with favors of access to scarce goods and services penetrated the whole Soviet society.

Remarkably, by the end of the 1980s the relative GDP per capita gap became as wide as it was in 1913 (Figure 2.3). By that time the idea of 'overtaking' was clearly an illusion, and catch-up itself was failing, with the result that the gap between the West and the East in Europe was growing again. Moreover, the fact that 'the success' that had been obtained was based on an enormous consumption squeeze meant that for ordinary citizens, even though the per capita income figures might *prima facie* suggest progress, their own patterns of consumption remained far behind of what, in societies increasingly penetrated by images of the West, they aspired to[25].

II.3. Differences between Soviet republics

Since the beginning of the Industrial Revolution most of the territories of the present EEN countries were subject to the Russian Empire's and later Soviet institutional environment. They have been modernized under prevailing influence of Russian/Soviet policies, and the origin of development gap in these countries was associated mostly with these patterns. However, these countries and territories varied in maturing and intensity of this influence.

While Eastern edges of present Belarus and Ukraine were directly exposed to the Russian both formal and informal institutions, in the Caucasus part of the Empire, as

[24] Ledeneva, A.V. (1998). *Russia's Economy of Favours*. Cambridge University Press.

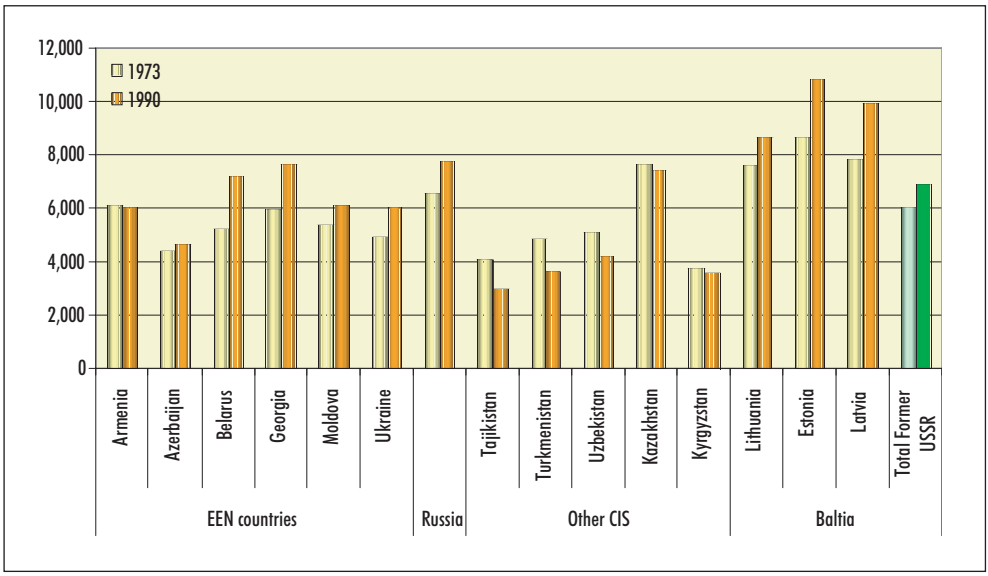
[25] Haynes M. & R. Husan (2002). "Somewhere Over the Rainbow: The Post-Soviet Transition, the Market and the Mythical Process of Convergence", *Post-Communist Economies*, Vol. 14, No. 3.

well as in non-Slavic-Orthodox peripheries traditional establishments remained largely intact, although of course influenced by the Russian institutions. Such parts, although sometimes better developed than the parent state was, were treated as a sort of "colonies", while Ukraine and Belarus considered as "sisters" parts of its mainland. This tradition, although weakened, remained during the Soviet times and became the main reason behind persisting differences in the development performance, despite some deliberate policies of "equalization" conducted by Soviet authorities.

While most of the territories were under the Soviet system for seventy years, the Western parts of Ukraine and Belarus, and the whole Moldova but the Transnistria, lived under the Soviets for only 50 years or so, which seems to explain a great deal of their later economic performance under transition. In particular, as was clearly demonstrated by Fischer and Sahay, the size of the development gap was directly related to the time squandered during the socialist experiment[26]. Certainly, the socialist system in the Soviet Union differed under Stalin and Khrushchev, both of which differed from Hungarian socialism or from the Polish socialism of Gomulka, Gierek and Jaruzelski[27]. The same was true, albeit to a somewhat lesser extent, for the republics of the FSU.

The USSR was not homogeneous: tremendous spatial differences in various dimensions of development were inherited from previous times. But despite several decades of deliberate policies aimed at equalization and unification of standards, the

Fig. 2.10. Per capita GDP in FSU Republics (1990 International Geary-Khamis dollars)



[26] Fischer, S. and Sahay, R. (2000) „The Transition Economies After Ten Years". IMF Working Paper No. 00/30.
[27] Kornai, Janos. (2000). "What the Change of System from Socialism to Capitalism Does and Does Not Mean", *The Journal of Economic Perspectives*, Vol. 14, No. 1, pp. 27-42.

differences have rather aggravated (Fig. 2.11). In 1973, the ratio of maximal to minimal GDP per capita for all Soviet republics was 2.3 times, by 1990 it has increased by a half, to 3.6 times – with Estonia and Latvia being the leaders, and Tajikistan and Kyrgyzstan the laggards. However, the six republics that are currently EEN did not vary that much. Still, the difference between the richest (Armenia) and the poorest (Azerbaijan) constituted 1.4 times in 1973, while the one between Georgia and again Azerbaijan increased to 1.6 by 1990. Notably, the growth rates of republics were quite different, from 37% for Belarus and 15% for Moldova to -1% for Armenia (in the latter case due to the war with Azerbaijan and earthquake in Spitak).

These differences largely reflected the variety of historically inherited institutional patterns. The Baltic countries managed to preserve their European institutional memory at least at the informal level. They were a sort of "mini-Europe" within the former USSR. These cultural features helped them in further building of independent states and later joining the EU. The Western Ukraine has quite similar institutional history, with even least maturity under the Russian and Soviet institutions. It has preserved the traditions of civil society and labor morale.

Most of Ukrainian countryside was historically organized as individual farms rather than villages, so the peasants were more individualistic than their Russian and Belarusian counterparts. The South-Eastern Ukraine was inhabited by cossacks, and later on by the settlers of different kinds – mostly serfs moved by their landlords, but also free farmers and entrepreneurs. Moldova has a lot in common with Romania sharing the same language and mostly same history until the mid-19th century.

In the Caucasus the *blat* networks got mixed with remaining clan networks and other remnants of patrimonial societal structures, and became especially strong. This resulted in a large shadow economy and high corruption under Soviet times. Besides, under the conditions of strong protectionism, Georgia and Azerbaijan were monopoly suppliers of subtropical fruits, flowers and tea to the whole of the former USSR.

Significant differences in development (although, in this dimension, steadily diminishing), may be well characterized by infant mortality rates, which are widely used as an indirect indicator of the quality of medical service and infrastructure. In 1985 - 1990, the gap between the best performer among the EEN countries, Belarus', and the worst performer, Azerbaijan, constituted as much as 5.2 times (16.2 vs. 85 per 1,000 births), while in Belarus infant mortality rate was "just" twice as high as in, say, Belgium (8.3 per 1,000 births, typical for Western Europe). The worst performers were catching up both in Western Europe and the USSR. But while, for instance, Greece has caught up completely, in the USSR the worst performers have not managed to, while the best performers have almost stagnated for at least the last twenty years of Soviet period at levels twice exceeding those of the EU. While the best achievement among the Soviet republics was a two-thirds reduction during the 20

years between 1970 and 1990 (from 130 to 80 per 1,000 births in Kyrgyz Republic), Greece has reduced mortality rate more than five times (from 54.4 to a European average of 10.7 during the same period).

III. ECONOMIC DEVELOPMENT GAP: MEASURING CONVERGENCE OF PER CAPITA INCOME

Do ENP countries tend to catch up with the EU in terms of per capita income during the transition from planned to market economy? One of the possible ways to answer this question is to test for the convergence of per capita incomes between the ENP countries and EU, exploring concepts of β and σ convergence. In addition, specifics of the analyzed period should be taken into account, including the depth of the adaptation recession and reforms progress in post-communist countries of the region.

The analysis is organized as follows: (1) analysis of properties of the data used; (2) analysis of β and σ convergence of per capita income in low and middle income CIS, EU candidates and West Balkan countries; (3) empirical explanations of per capita GDP convergence, including its relationship with market reforms, FDI inflow, and initial level of development; (4) conclusions about the speed of catching up and the ways of bridging the development gap between the countries of the region.

III.1. The data

For the purposes of this analysis, the data on GDP per capita in constant 2000 Euro were used. The whole set of 54 analyzed countries could be divided into the following groups: ENP countries, CIS, EU15, EU-2004, EU-2007, candidate countries, and West Balkans[28]. The maximum number of observations for each country is 17 (1989–2005).

[28] ENP countries: Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, Syria, Tunisia, Ukraine. CIS: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. EU-2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia. EU-2007: Bulgaria, Romania. Candidate countries: Croatia, Macedonia, Turkey. West Balkans: Albania, Bosnia and Herzegovina, Serbia and Montenegro.

Choice of real GDP data instead of GDP measured in PPP terms was made due to he following reasons: (1) data are available for the whole analyzed period for all countries[29], which gives us a balanced panel with 17 annual observations for each object. PPP data are available for the whole period only for EU-15, while for other countries/regions it is far more restricted (for instance, data for Serbia and Montenegro are available only since 2000); (2) if we find that real GDP and GDP (PPP) are closely correlated, we could argue that real GDP is as appropriate for measuring development gap as GDP (PPP).

We tested both the long run and short run relationships between these two measures of income. In order to test the long-run relationship, we used Pedroni cointegration test[30]. For testing the short-run relationship, an error correction model was used[31].

III.1.1. Long-run relationship

First, we implemented unit root tests in order to determine the order of integration of the variables. According to the tests, both of the variables are $I(1)$, i.e. their levels contain unit root, while first differences are stationary[32] (Table 3.1).

Second, we implemented Pedroni test for cointegration. Within this test, 7 statistics were calculated for the two alternative hypotheses: common autoregressive coefficients (4 statistics) and individual autoregressive coefficients (3 statistics). For the panel variance statistic (v-Statistic), large positive values imply that the null hypothesis of no cointegration is rejected, while for other six statistics large negative values imply that the null hypothesis is rejected[33]. Finally, the literature on panel cointegration argues that the most reliable statistics (especially in the case of a short panel) are panel and group *ADF*-statistics[34], and v-Statistics[35]. In accordance with these statistics and non-parametric *PP*-statistics, the null hypothesis about the absence of cointegration is rejected at 1% significance level (see Table 3.2).

[29] Except Bosnia and Herzegovina.

[30] Pedroni, P. (1997) "Panel Cointegration: Asympotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis. New Results" Indiana University, mimeo; Pedroni, P. (1999). "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors", *Oxford Bulletin of Economics and Statistics*, 61, 653–670.

[31] Similar technique is used in Pelipas, I., Chubrik, A. (2007). "Market Reforms and Economic Growth in Transition: Evidence from Cointegration Analysis and Equilibrium Correction Model", mimeo.

[32] According to Choi *Z*-statistics (Philips-Perron test), the level of GDP (PPP) is stationary, but two other tests show its non-stationarity.

[33] Pedroni, P. (1997), *op. cit.*

[34] Kelly, R., Mavrotas, G. (2003). Savings and Financial Sector Development: Panel Cointegration Evidence from Africa World Institute for Development Economics Research Discussion Paper 2003/12; Kappler, M. (2004). Determination of Potential Growth Using Panel Techniques, Centre for European Economic Research Discussion Paper 04-69.

[35] Bénassy-Quéré A. & M. Coupet & Th. Mayer (2005). „Institutional Determinants of Foreign Direct Investment," CEPII Working Papers No. 2005-05.

Table 3.1. Unit root tests[36]

	Levels			First differences		
	Statistic	Probability	Number of observations	Statistic	Probability	Number of observations
y (log of real GDP per capita):						
Im, Pesaran and Shin *W*-statistics	-0.31	0.38	829	-7.05	0.00	781
ADF – Choi *Z*-statistics	1.55	0.94	839	-5.59	0.00	781
PP – Choi *Z*-statistics	0.05	0.52	857	-7.90	0.00	803
yppp (log of GDP PPP per capita)						
Im, Pesaran and Shin *W*-stat	-1.27	0.10	756	-9.16	0.00	709
ADF – Choi *Z*-statistics	-0.82	0.21	756	-8.29	0.00	709
PP – Choi *Z*-statistics	-6.76	0.00	786	-12.13	0.00	732

Note. Specifications: unit root rests for levels of the variables include trend and intercept, for the first differences - intercept. Lag length was selected basing on modified Akaike information criteria. Probabilities are computed assuming asymptotic normality.

Table 3.2. Pedroni cointegration test[37]

H_a: common AR coefficients (within-dimension)	Statistic	Probability	Weighted statistic	Probability
Panel *v*-Statistic	37.26	0.00	16.06	0.00
Panel ρ-Statistic	7.47	0.00	8.04	0.00
Panel *PP*-Statistic	-7.48	0.00	-4.75	0.00
Panel *ADF*-Statistic	-6.82	0.00	-4.62	0.00
H_a: individual AR coefficients (between-dimension)				
Group ρ-Statistic	9.92	0.00	--	--
Group *PP*-Statistic	-3.88	0.00	--	--
Group *ADF*-Statistic	-5.54	0.00	--	--

Note. H_0: no cointegration. Specification: individual intercept and individual trends, automatic lag selection based on the Akaike information criteria. Number of observations: 918 (54 cross-sections, unbalanced panel).

Taking into account the results of Pedroni cointegration test, we built the model of long-run relationship between the variables similar to Engle-Granger approach for time-series analyses:

$$yppp_{i,t} = \alpha_i + \beta_i T_i + b_{LR} \cdot y_{i,t} + \varepsilon_{i,t}, \qquad (1)$$

where α_i are individual intercepts (individual effects), T_i are individual trends, $\varepsilon_{i,t}$ is the error term which would be used in the error correction model as the error correction mechanism ($ECM_{i,t}$). Estimation of this model shows a very strong relationship between the two variables (all coefficients are highly significant):

[36] Calculations were made in EViews 5.1, unless otherwise indicated.
[37] Calculations were made in EViews 6 beta.

$$yppp_{i,t} = \underset{(6.67)}{0.47} + \underset{(115.00)}{1.00} \cdot y_{i,t} + \alpha_i + \beta_i T_i + \varepsilon_{i,t}, \qquad (2)$$

where α_i are estimated as fixed effects (heteroskedasticity-consistent t-statistics are in parentheses).

III.1.2. Error correction model

Further, we implemented unit root tests for the error term from (2) in order to include it in the error correction model for revealing the short-run relationship. All tests show that $ECM_{i,t}$ is stationary (Table 3.3).

Table 3.3. Unit root tests for error correction mechanism

	Statistic	Probability	Exogenous variables	Number of observations
y (log of real GDP per capita):				
Im, Pesaran and Shin *W*-statistics	-8.79	0.00	intercept	716
ADF – Choi *Z*-statistics	-17.54	0.00	none	718
PP – Choi *Z*-statistics	-19.90	0.00	none	732

Note. Im, Pesaran and Shin test can be calculated only with exogenous variables (intercept or trend and intercept). Lag length was selected basing on modified Akaike information criteria. Probabilities are computed assuming asymptotic normality.

Stationarity of the error correction mechanism is another proof of the long-run relationship between the real and PPP-based GDP per capita, and it allows us to build up the error correction model:

$$\Delta yppp_{i,t} = \alpha_i + \beta_t + b_{SR} \cdot \Delta y_{i,t} + \gamma \cdot ECM_{i,t-1} + v_{i,t}, \qquad (3)$$

where Δ is difference operator, β_t are period dummies (period effects), $v_{i,t}$ is the error term. Estimation of this model shows that the relationship between the analyzed variables exists both in the short and the long run (all coefficients are highly significant; coefficient at the error correction mechanism is negative and less than 1 in absolute value):

$$\Delta yppp_{i,t} = \underset{(49.10)}{0.02} + \underset{(98.28)}{0.98} \cdot \Delta y_{i,t} - \underset{(-3.94)}{0.41} \cdot ECM_{i,t-1} + \alpha_i + \beta_t + v_{i,t}, \qquad (4)$$

where α_i and β_t are estimated as fixed effects (heteroskedasticity-consistent t-statistics are in parentheses).

Thus, econometric analysis demonstrates that there exist both short- and long-run relationships between per capita GDP measured in PPP and real per capita GDP

measured in constant 2000 Euro. This allows us to use real GDP as an appropriate measure to estimate economic development gap between the CIS and rest of the region.

III.2. Testing for convergence between per capita income in low and middle income countries of CIS, and European and Balkan countries

The two concepts of convergence are distinguished: β and σ convergence[38]. The first one applies if countries with lower incomes tend to grow faster than richer ones. In other words, the higher the initial level of GDP per capita, the lower its average growth rate in the long run. The second concept applies if cross-sectional dispersion tends to decline over time. β convergence tends to generate σ convergence.

III.2.1. β convergence

The simplest way to test the hypothesis of β convergence is to estimate regression

$$\Delta y_i^{aver} = a + b \cdot y_i^{initial} + \varepsilon_i, \qquad (5)$$

where Δy_i^{aver} is average growth rate of per capita GDP for a certain period (say, for 10 years), $y_i^{initial}$ is level of GDP per capita in the initial period, a and b are regression coefficients (small letters represent natural logarithms). But the empirical evidence of β convergence is controversial: for instance, R. Barro[39] found no significant relationship between starting levels of per capita income and long-run growth, but he showed that long-run growth is negatively related to initial level of GDP when several proxies of human capital are included into the equation. Thus, estimation of equation (5) may not support convergence hypothesis even in case of its presence.

Hypothesis of presence of β convergence was tested for the set of 54 countries[40] (ENP countries, CIS, EU15, EU-2004, EU-2007, candidate countries, and West Balkans) for the period of 1989–2005. Hence, the following regression was estimated:

[38] Barro, R., Sala-i-Martin, X. (2001). *Economic Growth*, the MIT Press.

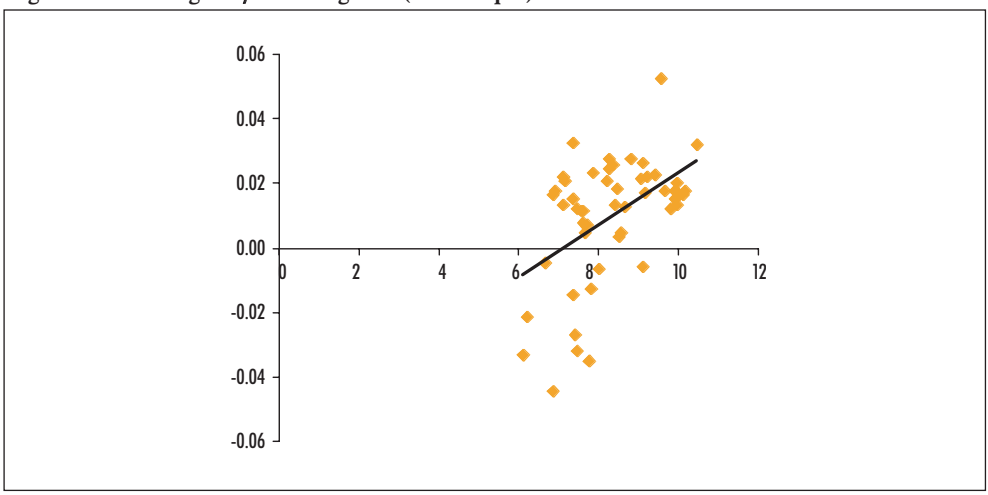
[39] Barro, R. (1991). "Economic Growth in a Cross Section of Countries", *The Quarterly Journal of Economics*, Vol. 106, No. 2, pp. 407–433.

[40] At this stage, all 54 countries were included into convergence analysis in order to capture more observations (cross-sections).

$$\Delta y_{1990-2005} = \underset{(-3.245)}{-0.058} + \underset{(4.127)}{0.008} \cdot y_{1989}, \qquad (6)$$

where y is GDP per capita in constant 2000 Euro, t-statistics are in parentheses[41]. The results of this estimation show that there is no evidence of convergence among considered countries; moreover, they diverge in terms of GDP per capita. This is supported by the Figure 3.1 demonstrating that the higher the initial per capita income, the higher its average growth rate.

Figure 3.1. Testing for β convergence (full sample)



Note. OX axis: log of GDP per capita in 1989; OY axis: average (per capita) growth rate for 1990-2005 (first logarithmic differences).

However, the analyzed set of countries includes 27 post-communist economies. All of them faced adaptation (or transition) recession, followed by a period of recovery growth[42] and (in some cases) by a certain long-run growth path. Adaptation recession is not related to long-run growth, because it has resulted from distortions inherited by these countries from the period of socialism[43]. Thus, it looks reasonable to exclude periods of adaptation recession from the consideration, and re-estimate the regression (6).

[41] Bosnia and Herzegovina was excluded from this estimate, as GDP data for it is available since 1995.

[42] Gaidar, Y. (2005). "Recovery Growth as a Stage of Post-Socialist Transition?" CASE – Center for Social and Economic Research, *Studies and Analyses* No. 292.

[43] De Melo, M., Denizer, C., Gelb, A., Tenev, S. (1997). Circumstance and Choice: the Role of Initial Condition and Policies in Transition Economies, World Bank Policy Research Working Paper 1866.

Table 3.4. Last year of adaptation recession in post-communist economies

	Last year of adaptation recession
Albania	1992
Armenia	1993
Azerbaijan	1996
Belarus	1995
Bosnia and Herzegovina	1996
Bulgaria	1993
Croatia	1993
Czech Republic	1993
Estonia	1993
Georgia	1994
Hungary	1993
Kazakhstan	1995
Kyrgyzstan	1995
Latvia	1993
Lithuania	1994
Macedonia	1995
Moldova	1996
Poland	1991
Romania	1992
Russia	1996
Serbia and Montenegro	1993
Slovakia	1992
Slovenia	1992
Tajikistan	1996
Turkmenistan	1997
Ukraine	1998
Uzbekistan	1996

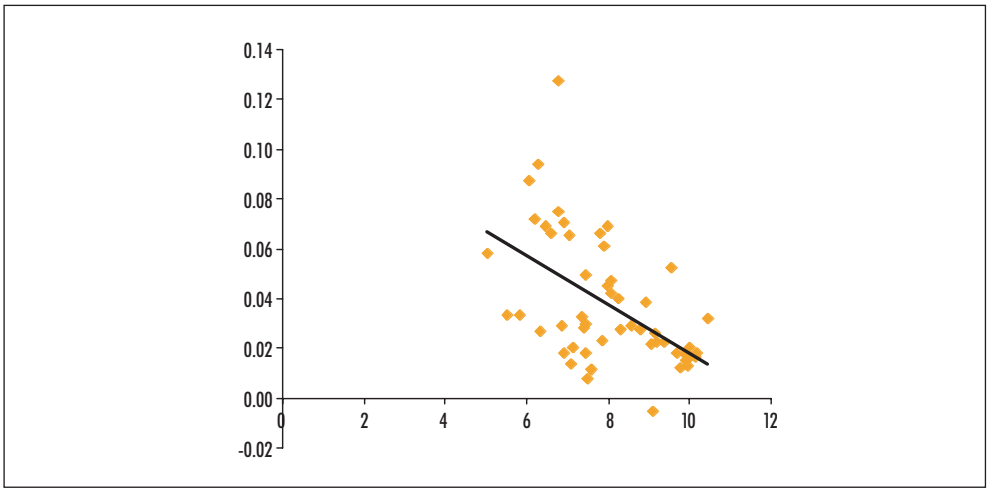
Note. The last year of adaptation recession is defined as the last year of sustainable (equal to or more than 2 years) decline of per capita GDP.

Average growth rates were calculated for these countries for the period starting from the year following those presented in Table 3.4. Additionally, GDP per capita in the last year of adaptation recession was taken as an initial one. For the rest of the countries, averages were calculated for the whole sample (1990–2005), and initial GDP was that of 1989. As a result, the following regression was estimated:

$$\Delta y_{aver} = \underset{(6.313)}{0.116} - \underset{(-4.863)}{0.010} \cdot y_{initial}. \qquad (7)$$

The new results differ from the previous ones dramatically: the convergence is revealed. The lower the initial level of GDP per capita, the faster its subsequent growth is. The results are shown at Figure 3.2.

Figure 3.2. Testing for β convergence (taking into account adaptation recession in post-communist economies)



Note. OX axis: log of GDP per capita in the initial year; OY axis: average (per capita) growth rate for the selected period (first logarithmic differences).

III.2.2. σ convergence

This type of convergence can be revealed basing on the formula proposed in Kaitila (2004)[44]:

$$\frac{\sigma_t(Y_i, Y_j)}{mean_t(Y_i, Y_j)} \cdot 100, \qquad (8)$$

where σ_t is standard deviation, Y_i, Y_j are real per capita GDP in groups of countries i and j. We calculated standard deviations for the following pairs of the countries' groups:

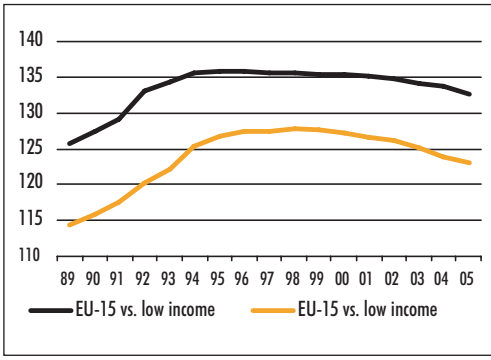
CIS (low or middle income countries[45]) vs.:	EU-2004 or EU-12 (EU-2004 plus Bulgaria and Romania);
	Candidate countries (Croatia, Macedonia, Turkey);
	Potential candidate countries (West Balkans);
	EU-15.

The results are presented at Figures 3.3-3.6. In almost all cases they support a theoretical expectation that β convergence tends to generate σ convergence (the only exception is CIS middle income countries vs. West Balkans). Thus, we can conclude

[44] Kaitila, V. (2004). "Convergence of Real GDP Per Capita in the EU15. How do the Accession Countries Fit in?", European Network of Economic Policy Research Institutes Working Paper No. 25.

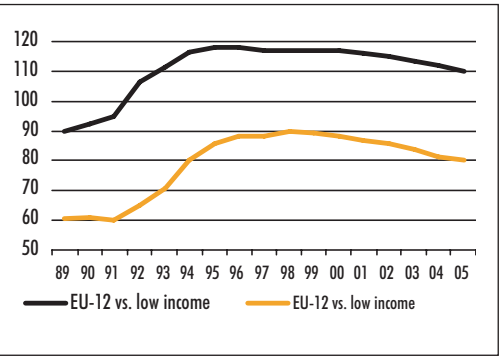
[45] CIS low income countries include Armenia, Azerbaijan, Georgia, Kyrgyzstan, and Moldova, and CIS middle-income countries are Belarus, Russia, and Ukraine. Last World Bank papers tend to place Armenia in the group of middle income countries, but during the whole sample its income was too low to include it into this group.

Figure 3.3. σ convergence between EU-15 and low and middle income CIS countries



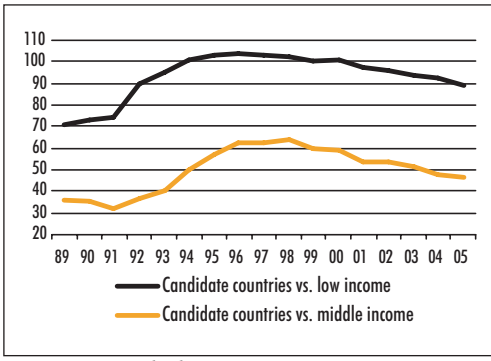
Source: Own calculations.

Figure 3.4. σ convergence between EU-12 and low and middle income CIS countries



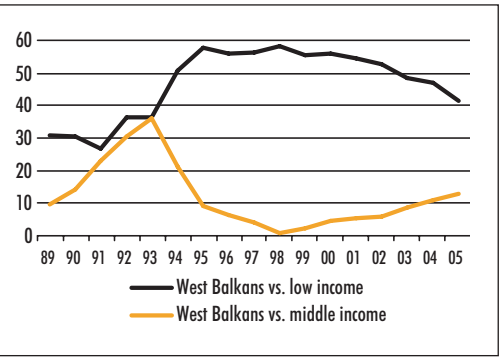
Source: Own calculations.

Figure 3.5: σ convergence between the candidate countries and low and middle income CIS countries



Source: Own calculations.

Figure 3.6: σ convergence between the West Balkans and low and middle income CIS countries



Source: Own calculations.

that CIS countries tend to catch up with European and Balkan countries in terms of real per capita GDP.

III.3. Empirical explanations of per capita GDP convergence

III.3.1. Initial level of income and convergence speed

Findings made in the previous section could be shown in a simple way based on the following approach. Fist, we leave in the sample the following groups: CIS, EU-2004, EU-2007, candidate countries, and West Balkans (31 countries). Second, we

divide these countries into 5 groups based on the level of GDP per capita in 2005: less than EUR 1,000 (in constant 2000 prices), EUR 1,001–2,000, EUR 2,001–5,000, EUR 5,001–10,000, and above EUR 10,000[46]. Additionally, these groups were subdivided into ENP countries, EU-12, and Russia. Further, we compare the average level of GDP pre capita in each of these groups with the average per capita GDP in EU-15 over the period of 1989–2005. Further, basing on the results from the previous section, we concentrate on the post-1998[47] part of the sample in order to consider post-recession period. For this purpose, the following index is calculated:

$$ratio_t^i = \frac{GDPPC_t^i / GDPPC_{1989}^i}{GDPPC_t^{EU-15} / GDPPC_{1989}^{EU-15}} \cdot 100, \qquad (9)$$

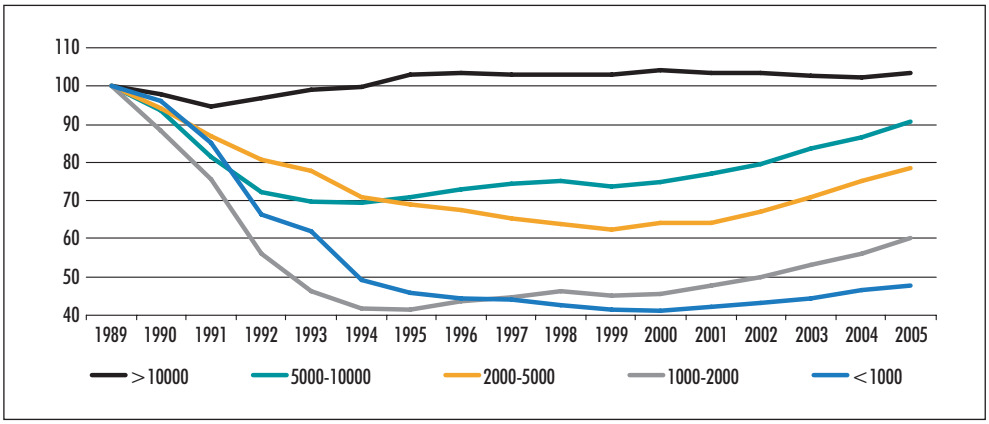
where *GDPPC* is per capita GDP, *i* denotes a group of countries, *t* denotes period of time. If this index for a country group *i* increases over time, GDP per capita in this group grows faster than in EU-15, or catch up with the EU level. Further, according to the concept of β convergence, the poorest countries should catch up fastest.

Figure 3.7 shows that the difference between per capita GDP of EU-15 and that of the analyzed groups of countries decreased compared to 1989 only in the richest countries (with average per capita GDP in 2005 above EUR 10,000). But the ratio of average per capita income for this group of countries to average EU-15 income remained almost stable since 1995. Other groups of countries demonstrate very similar profiles: growing ratios of per capita income after a certain period of decline. As a result of this decline, none of the groups reached the level of 1989 by 2005. Additionally, the poorer the group of countries was, the deeper (or longer) this decline was. In the phase of growth, profiles for 3 groups of countries (EUR 1,001–2,000, EUR 2,001–5,000, and EUR 5,000–10,000) were almost parallel to each other. As a result, countries with lower per capita income achieved less progress compared to the 1989 level than richer countries. The poorest group of countries shows the least speed of convergence after the longest and deepest output recession. From this point of view, the idea of β convergence does not find empirical support, though in general 'middle-income' countries (in our case, with per capita GDP of EUR 1,001–10,000) catch up with both EU-15 and other countries with per capita GDP above EUR 10,000.

[46] Less than EUR 1,000: Kyrgyzstan, Moldova, Tajikistan, Uzbekistan; EUR 1,001–2,000: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Serbia and Montenegro, Ukraine; EUR 2,001–5,000: Belarus, Bulgaria, Macedonia, Romania, Russia, Turkey, Turkmenistan; EUR 5,001–10,000: Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia; above EUR 10,000: Cyprus, Malta, Slovenia.

[47] The last year of adaptation recession throughout the sample, see Table 3.4.

Figure 3.7. Ratio of the average per capita income in the analyzed groups of countries and EU-15 depending on the level of per capita income (index, 1989 = 100)

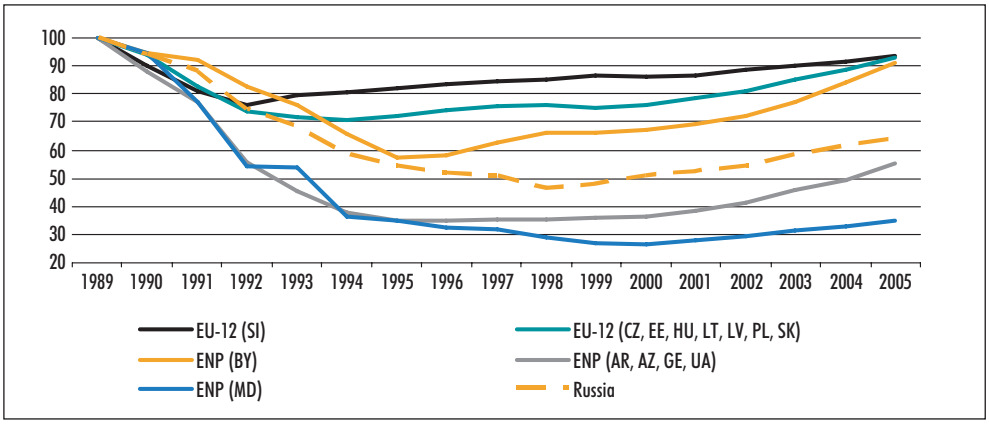


Source: Own calculations.

The results change drastically if we consider post-1998 sample. The richest countries (over EUR 10,000 per capita) have not caught up during this period. Per capita GDP in the group of countries between EUR 2,000 and 10,000 has reached approximately 120% of its 1998 level, while in poorer countries (EUR 1,000–2,000) it has approached 130% of the 'benchmark' level. The results obtained support the hypothesis of β convergence. The only exception is the group of countries with the lowest per capita income (less than EUR 1,000): in 2005, their per capita GDP achieved about 112% of the 1998 level.

Figure 3.8 represents the same set of countries divided into three groups: ENP countries, EU-12 countries, and Russia. It is evident that ENP countries with medium

Figure 3.8. Ratio of the average per capita income in the analyzed groups of countries (sub-groups: ENP countries, EU-12, and Russia) and EU-15 depending on the level of per capita income (index, 1989 = 100)

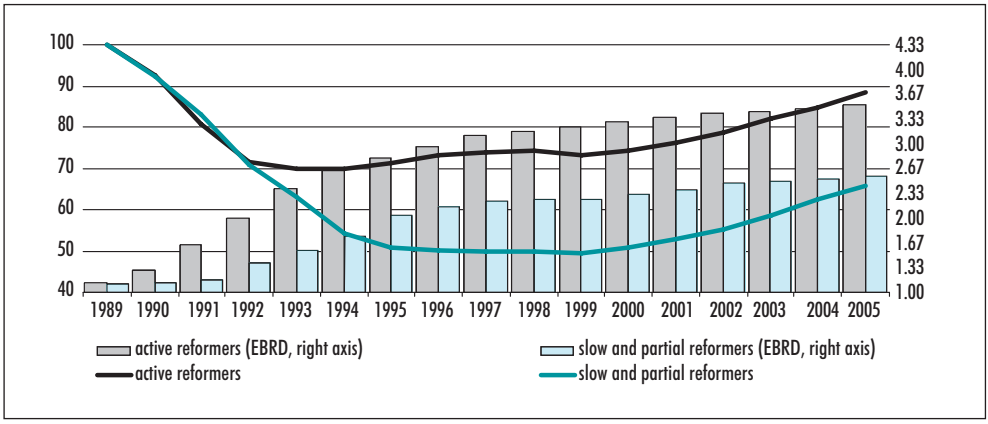


income (EUR 2,000–5,000, represented by Belarus alone) and EU-12 countries converged with the EU-15 in terms of 1989 level of GDP per capita. Other ENP countries and Russia attained much less progress in convergence with the EU-15. But again, for the sample of 1998–2005 convergence was observed for all country groups with the exception of Moldova, which has made the same progress in catching up with EU-15 as the richest of EU-12 have.

III.3.2. Determinants of catching up

The following explanations can be found for the output behavior in the mentioned groups of countries. First, 'rich' (i.e. middle income) and poor countries have different geographical position and different initial conditions (structural distortions). Low-income countries are mostly Asian and Caucasus CIS countries which had poor initial conditions and were situated "far from Brussels". That meant deeper and/or longer output decline and less likelihood of fast and comprehensive reforms compared to the countries of CEB region[48].

Figure 3.9. Ratio of the average per capita income in active and partial reformers and EU-15 (index, 1989 = 100)



Source: EBRD, own calculations.

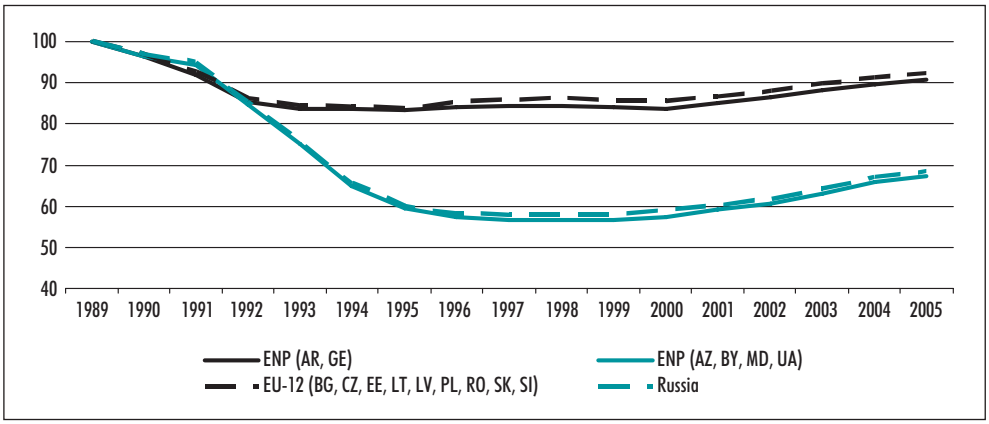
Since the set of countries analyzed includes 27 transition economies, we should take into account different speed of reforms as a determinant of catching-up speed. We subdivided these 27 countries into two groups (a first group of 'active reformers' with EBRD reform index[49] of 3 and above, and a second group of 'slow and partial

[48] Fischer, S., Sahay, R. (2000). "The Transition Economies after Ten Years", IMF Working Paper WP/00/30.

[49] Simple average of 9 EBRD transition indicators. See Falcetti, E., Lysenko, T., Sanfey, P. (2006). "Reforms and Growth in Transition: Re-examining the Evidence", *Journal of Comparative Economics* Vol. 34, No. 3, pp. 421–445.

reformers' with EBRD reform index less than 3)[50], and compared average per capita GDP in each of these groups to its average level of EU-15 as it was done before. The results are presented at Figures 3.10–3.11. According to these figures, the main problem of slow reformers was a deeper and a longer recession, while their recovery growth had almost the same speed as that in the group of active reformers. It should be noted that no significant differences within each of this groups are observed if we subdivide them into ENP countries and EU-12 countries.

Figure 3.10. Ratio of the average per capita income in active and partial reformers (sub-groups: ENP countries, EU-12, and Russia) and EU-15 (index, 1989 = 100)



Active reformers started catching up in 1994 (catching up 'record' covers 11 years), while partial reformers commenced this process only in 2000 (6 years of catching up). In 1994, average EBRD reform index for the group of active reformers amounted to 2.63 (which is close to EBRD rank "3–"); in 2000, this index in the group of partial reformers was equal to 2.34 (2+). Thus, per capita GDP in these groups of countries started to converge with the EU-15 level of per capita GDP after a certain set of reforms had been implemented. As partial reformers have made little progress in market reforms since 2000, it is likely that the current GDP growth in the groups of countries analyzed is determined by different factors: structural reforms in active reformers and favorable external environment[51] in countries that implemented partial reforms.

Second, a slow speed of catching-up of the poorest countries could be explained via different types of 'poverty traps'. Poverty trap means that production function of

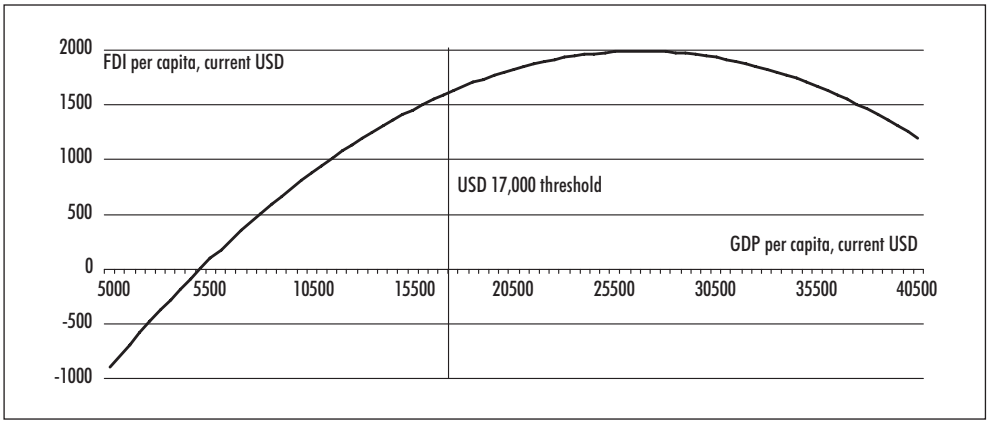
[50] Active reformers: Armenia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. Slow and partial reformers: Albania, Azerbaijan, Belarus, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, Macedonia, Moldova, Russia, Serbia and Montenegro, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

[51] Falcetti et al. (2006), op.cit.

an economy demonstrates diminishing returns to capital when the capital stock is low, increasing returns in the middle of the range of capital stock, and constant or diminishing returns when capital stock is high[52]. Thus, poor countries' production functions demonstrate diminishing returns on capital, which makes investment into these countries unattractive and brings such countries into a kind of a 'trap'. In order to make a decision about investment, an investor should expect certain returns on capital. In poor countries returns on inputs are low, making investment is unattractive and brings these countries to a 'vicious circle'[53].

These theoretical statements have empirical support. FDI inflow can be considered as an indicator of a country's attractiveness for a capital (in other words, as an implicit measure of returns on capital). According to the concepts of poverty traps and vicious circles, the poor countries should face smallest inflows of FDI per capita, middle income should get the largest inflows of FDI per capita, and high income countries – some medium inflows. This means some sort of an inverse U-shaped relationship demonstrated at Figure 3.9.

Figure 3.11. Inverse U-shaped relationship between FDI per capita and GDP per capita



This relationship has been estimated on the basis of the data on 50 economies[54] for 17 years (unbalanced sample). The following regression has been estimated:

$$FDIpc_{i,t} = \underset{(-3.04)}{-1014.69} + \underset{(3.78)}{0.22} \cdot GDPpc_{i,t} - \underset{(-2.84)}{0.0000042} \cdot GDPpc_{i,t}^2 + \alpha_i + \alpha_t + \varepsilon_{i,t}, \quad (9)$$

[52] Barro, R., Sala-i-Martin, X. (2001), op.cit.

[53] Easterly W., (2002) "Inequality does Cause Underdevelopment: New evidence", Working Paper No.1, January 2002, Center for Global Development; Easterly, W. (2001). *The Elusive Quest for Growth. Economists' Adventures and Misadventures in the Tropics*, the MIT Press.

[54] There is no data on FDI for Serbia, Turkmenistan, and Uzbekistan. Luxemburg has been excluded as an outlier (in 2005, per capita FDI in Luxemburg amounted to USD 240,608.

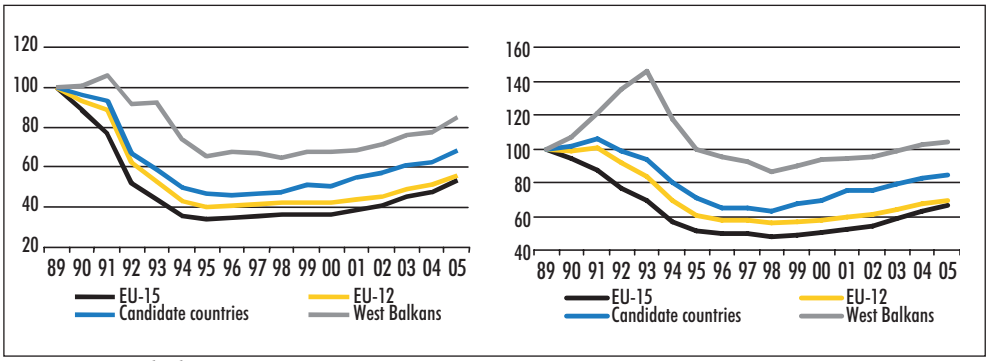
where *pc* denotes per capita indicators, *t*-statistics in parentheses are heteroskedasticity consistent, α_i and α_t are individual and period effects (both specified as fixed effects).

Additional empirical support can be provided with the analyses of fixed individual effects. These estimates are inconsistent, so usually they are not considered in the literature. But in our case they can provide a very clear evidence of a lower (compared to middle income countries) inflow of FDI to the rich economies. In all countries with per capita GDP in 2005 above USD 17,000 fixed effects (or dummies) were negative[55], i.e. they have lower-than-average starting point of per capita FDI inflow. All other countries have positive fixed effects and higher-than-average inflow of FDI per capita.

Finally, a hypothesis about the presence of convergence in terms of real per capita GDP (after the period of adaptation recession) is supported for all of the abovementioned pairs of the countries' groups (see Figures 3.12–3.13). For these figures, ratios of average per capita GDP for the groups of countries are calculated based on the formula similar to (9):

$$ratio_t^i = \frac{GDPPC_t^i / GDPPC_{1989}^i}{GDPPC_t^j / GDPPC_{1989}^j} \cdot 100. \qquad (11)$$

Figure 3.12: Ratio of the average per capita incomes index: CIS low income countries vs. others (1989 = 100)



Source: Own calculations.

Figure 3.13: Ratio of the average per capita incomes index: CIS middle income countries vs. others (1989 = 100)

Source: Own calculations.

[55] With the two exceptions: Belgium (positive dummy, per capita GDP in 2005 is USD 35,498) and Libya (negative dummy, per capita GDP in 2005 is USD 6,618).

III.4. Conclusions

In this section, an economic dimension of development gap between EU and ENP countries has been analyzed. For this purpose, convergence of per capita GDP has been tested. The two concepts of convergence have been analyzed: β convergence (do low-income countries tend to grow faster than richer ones) and σ convergence (does dispersion of per capita income tends to decline over time). Both of these hypotheses have been supported by empirical data.

Convergence testing has been made on the basis of the data on real GDP per capita in the analyzed countries for the period of 1989–2005. This indicator has been analyzed instead of commonly used GDP measured by PPP. Such a 'replacement' appeared to be possible because cointegration exists between these two variables. It was necessary for the following reasons: (1) the concept of PPP can hardly be applied to developing countries or transition economies, because their economic structures differ substantially from those of developed countries; (2) data on GDP (PPP) for most of the analyzed countries are available only for a limited time sample, which reduces reliability of the results.

The least progress in filling the development gap with EU-15 has been shown by the low income CIS economies, while EU-12 demonstrated a higher degree of catching up with EU-15. In general, in the course of the analyzed period countries with higher per capita income caught up faster than lower income ones. It has been explained by the impact of adaptation recession in 27 of analyzed countries (transition economies): for the post-recession sample we observed an evidence of β convergence between these countries. Another explanation relates to the 'poverty trap' concept, according to which poor countries have low attractiveness to investors because of the low level of returns to capital. This concept has also been empirically supported: per capita FDI inflows to the poor countries are lower than to the middle-income countries.

Market reforms have appeared to be another important determinant of closing the gap between the EU and the rest of countries of the region. A split of the sample into 'active reformers' and 'slow and partial reformers' demonstrated a clear positive relationship between the reform progress and the progress in catching up. Thus we can conclude that promotion of comprehensive market reforms is still very topical for most of the region's economies, where some progress in catching up could be attributed mostly to the favorable performance of the world commodity markets.

IV. GAPS IN SPECIFIC DIMENSIONS

Economic growth is a necessary but insufficient condition for economic development. Per capita GDP is used by many developmental economists as an approximation of general national well-being. However, this and similar measures have long been criticized as not measuring economic growth well enough. Nowadays it is not questionable that GDP *per se* is a narrow measure of economic development and does not take into account its complex multi-dimensional concept, important non-economic aspects such as income inequality and poverty, access to health and education, the environment, freedom, or social justice. Economists have long argued that development occurs with the reduction and elimination of poverty, inequality, and unemployment within a growing economy[56]; with producing more 'life sustaining' necessities such as food, shelter, and health care and broadening their distribution, raising standards of living and individual self esteem, expanding economic and social choice and reducing fear[57].

The concept of sustainable development advanced by the UN in the course of the past two decades encompasses, along with economic and social pillars, environmental sustainability implying economic growth together with the protection of environmental quality, each reinforcing the other. The essence of this form of development is a stable relationship between human activities and the natural world, which does not diminish the prospects for future generations to enjoy a quality of life at least as good as our own[58].

Further on, knowledge and information are decisive elements in all modes of development. However, a new development paradigm has emerged assigning technology and information a causal role in the social order, known as "Global village", "information society" or "knowledge society". This notion implies that "information generation, processing, and transmission are transformed into the fundamental sources of productivity and power", with knowledge becoming crucial not only for economic growth but also for empowering and developing all sectors of society[59].

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[56] Seers, D. (1969). "The Meaning of Development", *International Development Review*, Vol. 11, No.4, pp. 3-4.

[57] Todaro, M. (2000). *Economic Development*. 7th ed. New York: Addison-Wesley Longman, Inc.

[58] Mintzer, I.M., ed. (1992).*Confronting climate change: Risks, implications, and responses*. Cambridge: Cambridge University Press.

[59] Castells, M. (1996). *The Rise of the Network Society, The Information Age: Economy, Society and Culture*, Vol. I. Cambridge, MA; Oxford, UK: Blackwell.

A compelling body of research links primary, secondary and higher education to development and economic growth. This research recognizes people as a type of economic asset – "human capital" – and shows that increased investment in health, skills, and knowledge provides future returns to the society not just by raising labor productivity, but by equipping citizens with the skills and attitudes for economic and civic success in an increasingly knowledge-based economy[60].

Countries' development potential is also dependent on their openness to world economy (lack of trade barriers, ease of entry and exit into trade, available infrastructure, etc.), on the quality of life of their citizens (including availability of medical care, prenatal care and clean water, equality of income distribution and the scale of poverty). The notion of social capital preservation is also an integral part of this concept.

Following this very schematically presented overview of specific dimensions of development, we arranged our examination of major differences (gaps) between the analyzed countries and country groups across specific dimensions which in general follow the underlying logic of the sustainable development concept.

IV.1. Quality of life: Income, poverty, and health

Income and poverty

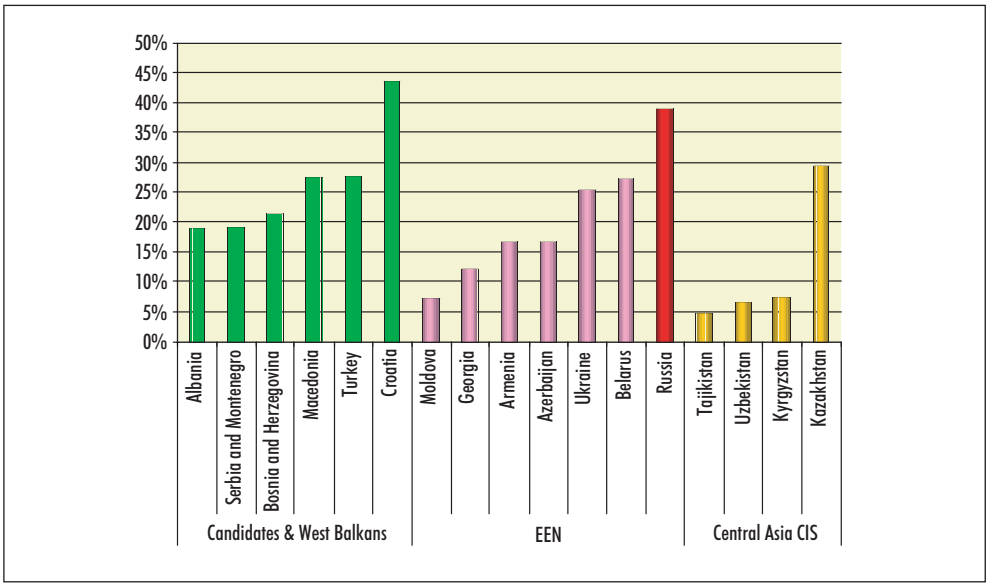
Major trends in per capita income convergence between the EU15, EU12, the candidates' group, EEN and Russia have been explored in the preceding section. This analysis, however, left aside major **income differentials** existing between individual countries within the groups analyzed (Fig. Q.1). These differentials are impressive indeed with their amplitude growing while moving eastwards from EU15. Even within the NMS group, the country with the highest income, Slovenia, has an income less than two-thirds of the Western European average.

With acquiring independence and under economic transition, differentials of GDP per capita among EEN have widened considerably with none of the countries reaching even a half of the EU27 average (Fig. Q.1). EEN countries also differ greatly when compared to Russia. Within the CIS, the two countries with the second highest incomes, Kazakhstan and Belarus, still have incomes only about two-thirds that of Russia, while Russian GDP per capita is eight times that of Tajikistan.

Process of transition has also brought about radical changes in income distribution within transition economies (Fig. Q.2). When assessing **income inequality** within FSU and candidate countries, we should account for the fact that under

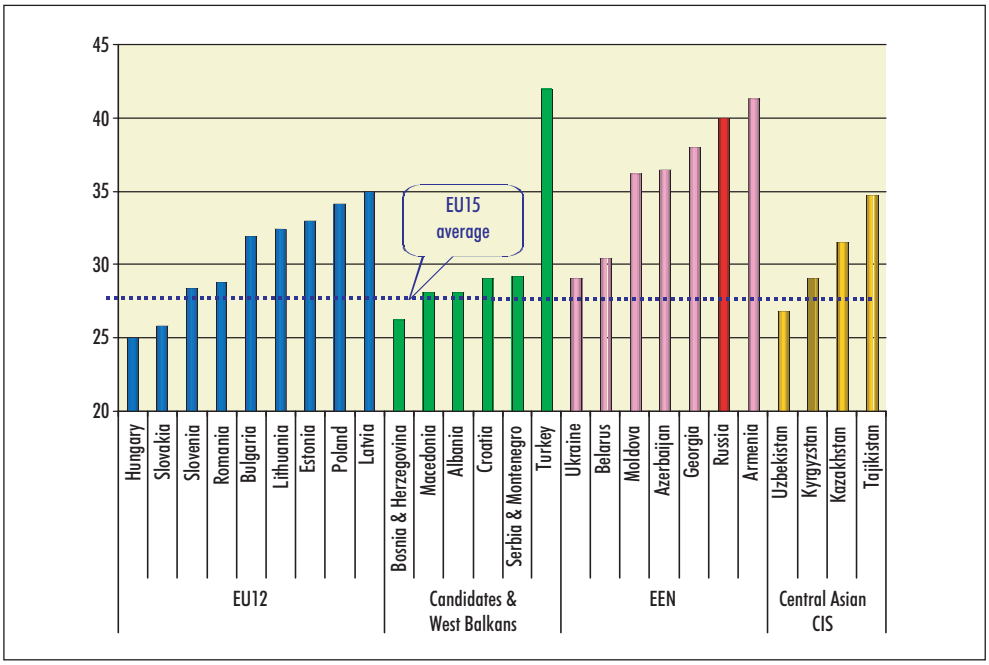
[60] Schweke, W.(2004). *Smart Money: Education and Economic Development.* Economic Policy Institute.

Fig. Q.1. GDP (PPP) per capita as % of EU27 average (2005)



Sources: WEO database, EBRD, EUROSTAT.

Fig. Q.2. Distribution of family income: Gini index (1996-2003)



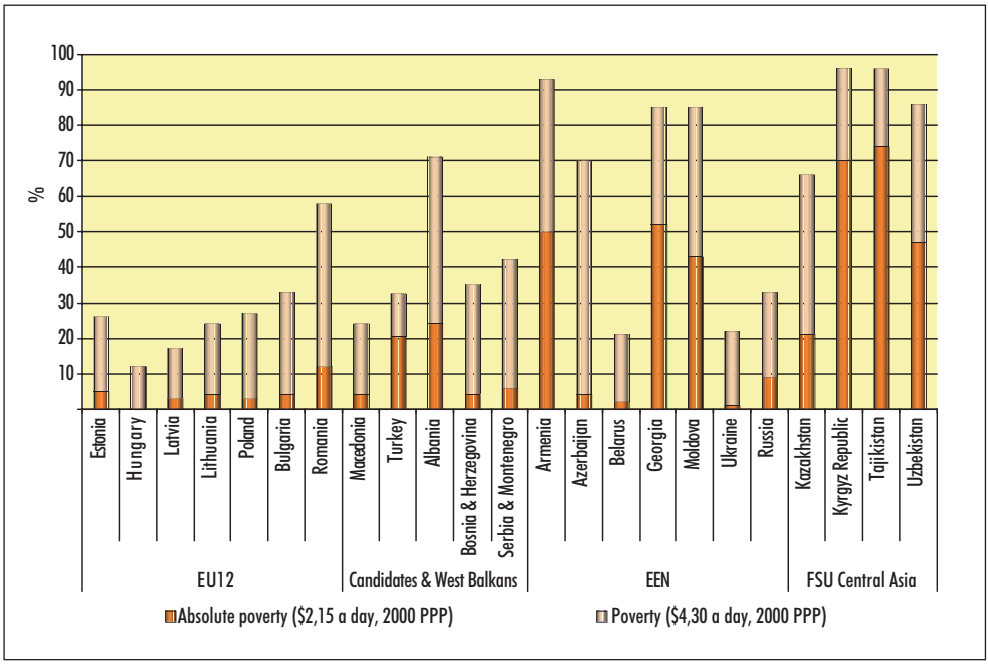
Source: World Bank. Growth, poverty, and inequality: Eastern Europe and the former Soviet Union. Washington, D.C., 2005

socialism an attempt was undertaken to equalize incomes among both social groups and geographic regions, which was accomplished through a massive and elaborate system of subsidies, transfers, and controlled prices. Initially rather egalitarian, these societies faced an abrupt increase in income inequality which radically changed relative positions of large layers of society. This process was closely associated with a sharp increase of **poverty** rates (Fig. Q.3).

Directly comparing poverty levels between the EU15 countries and EENs is a methodologically difficult, if not impossible, task. National poverty lines are basically useless, reflecting radically different approaches to poverty definitions. International poverty indicators (like population below $2 a day) are not easy to employ because relevant population numbers in Western Europe are vanishingly small.

Overall, for the EU15 countries, poverty levels are mostly low and confined to a few pockets. On the other hand, in FSU, despite a considerable decline since 1998, even better-off countries, such as Kazakhstan and Russia, have $2 a day poverty headcounts of 10–20 percent, and half of Georgia's people are poor by this measure. The middle-income quartet of Kazakhstan, Russia, Turkey, and Ukraine accounts for more than a half of the region's poor people.

Fig. Q.3. Poverty levels (2000-2003)



Sources: UNDP Human Development Report 2006; World Bank. Growth, poverty, and inequality: Eastern Europe and the former Soviet Union. Washington, D.C., 2005

Interrelations between income inequality and the spread of poverty under transition are analyzed in detail in extensive literature, including the role and importance of such factors as speed and comprehensiveness of social and economic reforms, as well as the role of initial conditions.

Here we should merely specify that: (1) initial lagging behind in overall conditions of households' living standards was translated into a spread of poverty under transition; (2) economic growth of late 1990s and in the beginning of the XXI century was not necessarily translated into respective poverty reduction in Russia and most of EEN, and (3) high inequality and low living standards were accompanied by a growth of unemployment and the spread of shadow (unregistered) unemployment that adversely affected the quality of life not only in the majority of FSU countries, but also in the West Balkans and to a lesser extent in some candidate countries. In several countries a deterioration of everyday life conditions was additionally aggravated by military and ethnic conflicts, the resulting refugees' and internally displaced persons' (IDP) mobility, etc.

Significant gaps in life quality become evident when looking at intensive **migration flows** across the region. Transition contributed to a rapid divergence of factors stimulating international migrations. This assumption stands in line with the widely accepted basic pull-and-push model, explaining these flows[61]. Initially mostly egalitarian socio-economic environment characteristic for FSU countries appeared to be quite different from the viewpoint of poverty and unemployment rates, real wages' growth and their purchasing capacity (see Table Q.1), poor health and education prospects, etc. in low-income countries, as compared to prospects of higher living standards in middle-income CIS countries (or transition countries to the West of the FSU border). Among

Table Q.1. Gross Average Monthly Wages, 2003-04 ($US, PPP-adjusted)

	EU15=100	EU10=100	Russia =100
Croatia	59.9	138.1	278.8
Albania	17.2	39.7	80.1
Bosnia and Herzegovina	60.2	138.8	280.1
Armenia	9.5	22.0	44.3
Azerbaijan	17.8	41.1	83.0
Belarus	19.4	44.8	90.5
Georgia	7.1	16.5	33.2
Moldova	8.1	18.7	37.7
Ukraine	n.a.	n.a.	n.a.
Russia	21.5	49.5	100.0
Kazakhstan	18.8	43.4	87.6
Kyrgyzstan	9.4	21.6	43.5
Tajikistan	2.5	5.8	11.7

Source: UNECE Statistical Database

[61] Smith, Paul J., ed. (1997). *Human Smuggling: Chinese Migrant Trafficking and the Challenge to America's Immigration Tradition*. Washington, D.C.: Center for Strategic International Studies.

sound factors that pushed migrations were also conflicts and insecurity, violence, poor governance and corruption, ethnic, religion and gender discrimination, etc.

Leaving aside huge flows of refugees and IDPs connected with war and ethnic conflicts, the dominant pushing factors in most of EEN countries were related to low income level in the home country, as well as low employment opportunities. The scale of outflow from candidate states and West Balkans is considerably lower (excluding Albania).

The volume of remittances could serve as an indicator of scale and intensity of the process. Thus, migrants' funds represent over 20 percent of GDP in Moldova and Bosnia and Herzegovina, and over 10 percent in Albania, Armenia, and Tajikistan. For Albania and Bosnia, the contribution of remittances is almost as large as that of exports. The EU and the resource-rich CIS are the main sources of remittances, with the EU accounting for three-quarters of the total and the better-off CIS countries for 10 percent[62].

In CEE and CIS, remittances play a significant role in poverty reduction: for some countries, remittances spurred a significant portion of total consumption. E.g., in Moldova or Albania, every fifth dollar spent in 2003 came from remittances. Additionally, the results of the analysis conducted by León-Ledesma and Piracha (2001)[63] for 11 transition economies of Eastern Europe during 1990–99 show support for the view that remittances have a positive impact on productivity and employment, both directly and indirectly through their effect on investment.

Health

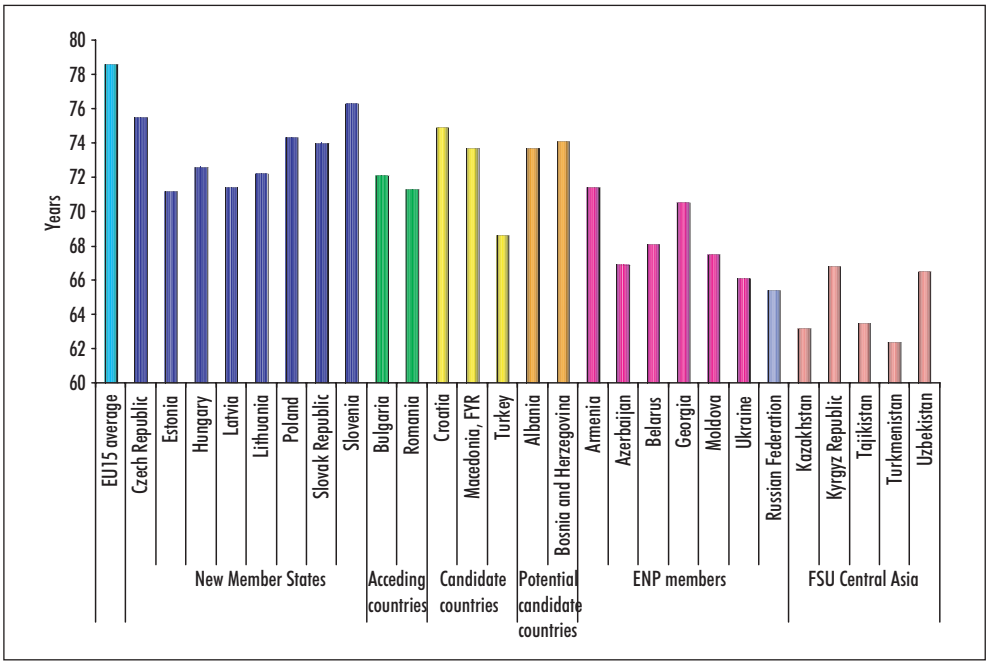
Growing poverty and inequality (which are in most cases related to reforms' inconsistency) seriously affect not only the everyday life of population, but the course of future development as well. Huge gaps between country groups analyzed and the developed world are evident in most of the spheres related to social development: demographic trends, health care, access to fresh water, sanitation, other infrastructural and environmental aspects.

Throughout the 20th century, national indicators of **life expectancy** were closely associated with GDP per capita, although this relationship does not explain the trends in transition countries, especially EEN: in the course of a single decade, the gap in average life expectancy dividing EENs and the EU15 has increased by three years, exceeding 10 years (Fig. Q.4). Furthermore, the situation looks striking if we compare the respective data on male life expectancy. At present, male life expectancy at birth in EENs is, on average, 12 years lower and female life expectancy – 7 years lower as compared to most of the EU15. The average difference in life expectancy between the Central Asian countries and Western Europe is respectively 11 and 10 years.

[62] Quillin A.M.B., ed. (2006). Migration and Remittances: Eastern Europe and the Former Soviet Union. World Bank.

[63] León-Ledesma, M., and P. Matloob (2001). "International Migration and the Role of Remittances in Eastern Europe." Discussion Paper 01/13, University of Kent, Canterbury.

Fig. Q.4. Life expectancy at birth (2003)

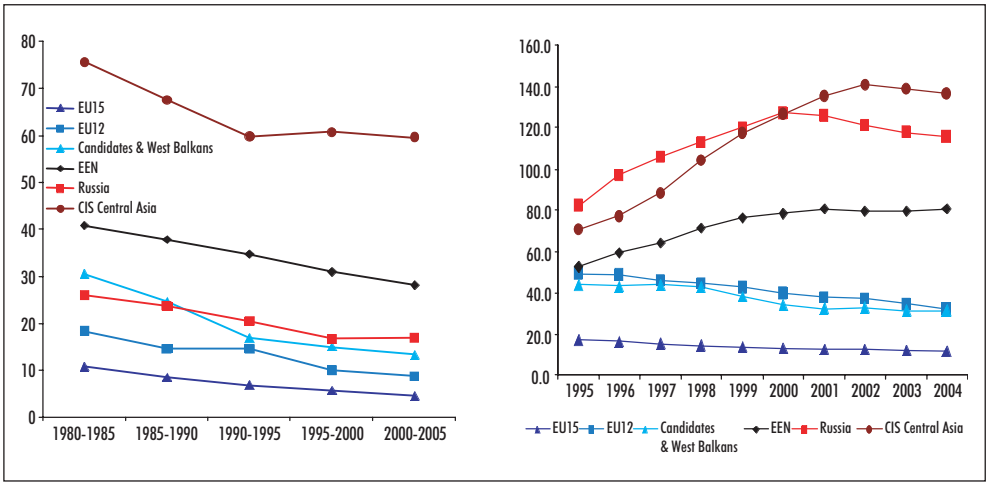


Sources: EUROSTAT database; 2006 TransMONEE database.

Infant mortality rates, albeit declining, still remain very high in the broader EU neighborhood, well above EU member countries average rates: on average, about 30 infants per 1000 live births die in the EEN regional bloc, while for EU countries the corresponding figures are at least three times lower (Fig. Q.5).

Fig. Q.5. Infant mortality rate, per 1000 births

Fig. Q.6. Incidence of tuberculosis, per 100,000 population

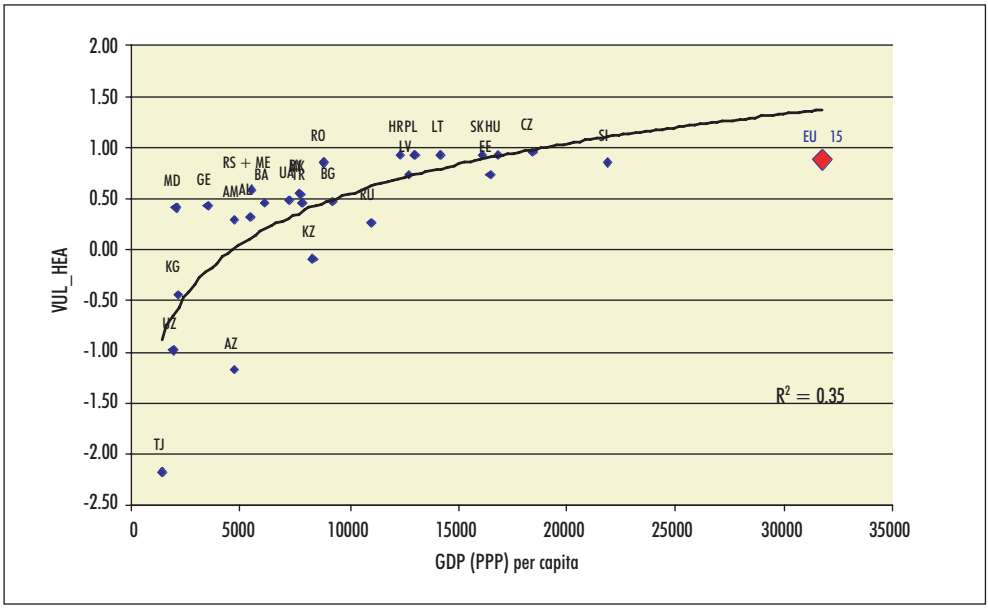


Sources: Human Development Report 2006; WHO. World Health Statistics 2006.

Death rates related to pregnancy and childbirth in the CIS region are estimated to be at least twice as high as those in Western Europe. In 2000, the maternal mortality rate adjusted per 100,000 live births averaged 15 in EU25 (24.5 in EU10, and 9,1 in EU15). At the same time, in EU candidate countries this rate amounted to 39.8, while in CIS countries (excluding Russia) it was almost five times as high compared to EU25 – 69.1.

There is also sound statistical evidence on the spread of dangerous infectious **diseases**, especially tuberculosis, that has become a serious problem in Russia and many EEN countries, where TB incidence has been growing at an annual rate of 5 percent during the last decade (Fig. Q.6). An alarming increase in multi-drug resistant tuberculosis rates in some FSU countries, an increase in HIV infection and the dramatic situation of TB in prisons pose additional threats to TB control in the region[64].

Fig. Q.7. Regression of 'Environmental Health' on GDP (PPP) per capita



Source: 2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship. Yale Center for Environmental Law and Policy (Yale University); Center for International Earth Science Information Network (Columbia University).

To illustrate relative positions of countries analyzed vis-à-vis EU15 averages in terms of several health- and disease-related variables simultaneously, we could use a composite indicator 'Environmental Health', one of 21 underlying indicators for Environmental Sustainability Index (see Section IV.C), integrating the following variables: 'Death rate from intestinal infectious diseases', 'Child death rate from

[64] UN Millennium Project (2005). *Investing in strategies to reverse the global incidence of TB*. Task Force on HIV/AIDS, Malaria, TB, and Access to Essential Medicine. L.: Earthscan.

respiratory diseases', and 'Children under five mortality rate per 1,000 live births'. This indicator, plotted against GDP (PPP) per capita (Fig. Q.7), demonstrates positive correlation to per capita income, indicating at the same time that all of the EENs perform significantly worse in terms of environment-related diseases compared not only to EU15, but to NMS as well.

A direct impact of **lifestyle** factors on human health is becoming considerable, noticeably affecting differences in life quality between European countries. The major risk factors contributing to the health gap include excess consumption of alcohol, smoking, obesity, lack of physical exercise and poor diet. Most of these factors are significantly more prevalent in Russia/EEN (especially in lower income countries) compared to Western Europe. Cigarette smoking is the single most prevalent cause of disease and death. CIS countries have one of the highest rates of smoking among males (ranging from 50 to 60 percent compared to below 40 percent in EU15), that could be explained by a widespread consumption of low-grade (high nicotine and tar) cigarettes and psychological stresses affecting men more than women. Increasing psycho-social problems (e.g. leading to stresses and cardiovascular diseases) were also brought on by the drastic changes under economic transition and reduction in social safety nets in the past 15 years.

Thus, notwithstanding an improvement in some indicators, we can observe a considerable gap between the EU15 and EEN/CIS countries in human health, especially within low-income households. There is ample anecdotal evidence on lower life expectancy in these households, their exposure to dangerous diseases, etc. Hence, the visible gap in health status between the analyzed country groups could be just a top of an iceberg. Significantly larger health gaps are most probably hidden inside intra-country inequalities in CEE and moreover in CIS countries, with their magnitude greatly exceeding that in Western Europe.

Major factors affecting the growing gap in human health between the EU and EEN/CIS countries are numerous and could be summarized as follows:

(1) Deterioration of health care services as a result of poor financing:

- Low government health expenditures in EEN/CIS – both as shares of GDP and of shrinking total government expenditures (Fig. Q.8). Low priority is given to health in profiles of government spending and insufficient public resources are allocated to this purpose.
- Strikingly low absolute per capita figures of total health expenditures in EEN/CIS, differing by an order of magnitude from the EU averages (Fig. Q.9).
- Misallocation of resources due to irrational structure of financing (e.g. preservation of a large number of outdated health care networks financed at a fraction of required support).

- Delays or failure in introducing social security principles; underdeveloped health insurance systems; limited and inequitable health risk protection and coverage. In the reforms of health insurance systems, Russia/EEN are lagging well behind NMS.

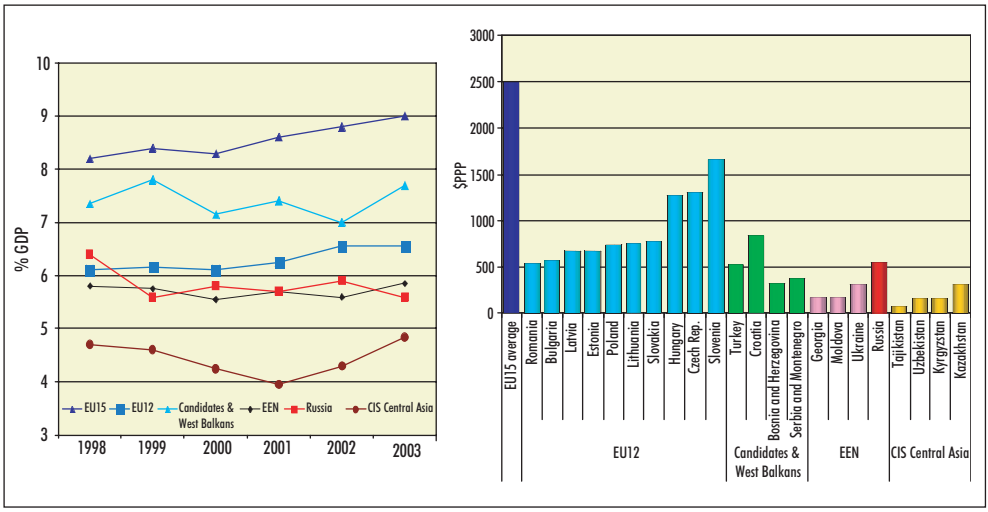
(2) Sound differences in the accessibility of health care services for population (especially low income population):

- Shrinking availability of numbers and quality of services within public sector due to deterioration of health infrastructure.
- Rapid 'marketization' of health services and growth of out-of-pocket payments stimulating escalation of health care costs for population. The structure of financing of medical services varies by country groups: poorer countries have larger (up to 50-80 percent) shares of private, out of pocket and informal financing, thus placing additional burden on poorer households. As a result, in most EEN countries health financing has become less equitable.

(3) Rapid growth of demand for health care protection in EEN and other CIS countries was connected with a growth of elderly population and prevailing demographic trends, as well as the expansion of health risks of different origin, including an increase of number of low income, poor and unemployed population, psychological problems of adaptation to transition, etc.

Fig. Q.8. Total expenditure on health, % of GDP

Fig. Q.9. Per capita total expenditures on health (2003), $ PPP



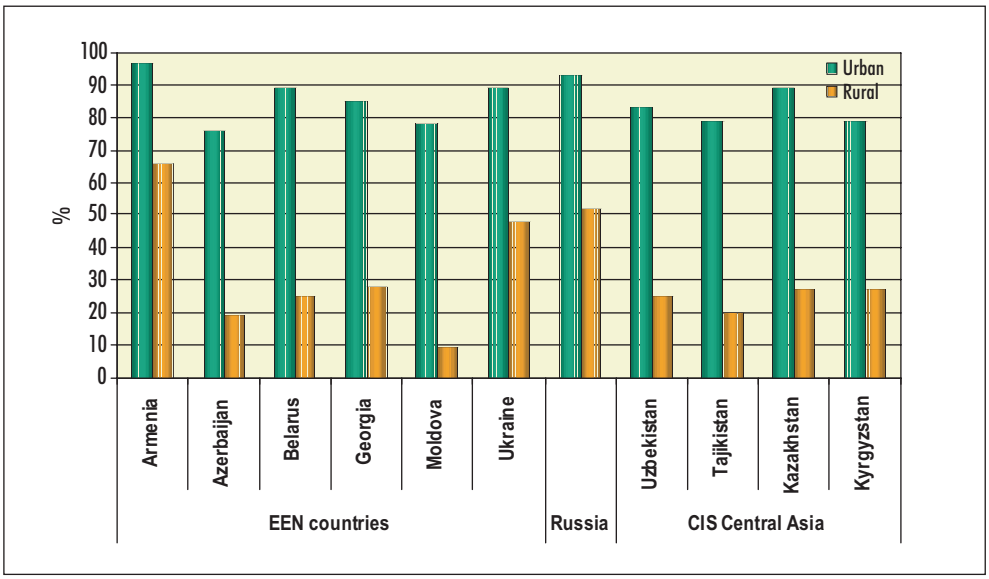
Source: WHO. World Health Statistics 2006.

Water supply and sanitation

The two human development issues closely related to human health are access to water supply sources and sanitation**.** Treated generally as a problem of developing world, **access to improved water supply**[65] remains one of the serious issues not only for low-income Central Asian CIS, but for some of the NMS as well (e.g. in Romania percent of households with water connection failed to improve during the last decade and amounts to 49 percent of households only, with particularly dramatic situation in rural areas, where it equals merely 13 percent). While in EU25 the gap between the two countries with the best and worst rates in terms of water access has decreased from 23 to about 20 percentage points between 1990 and 2004, within the CIS a similar gap (between Armenia and Tajikistan) has grown from 50 to 52 percentage points – with the disparity between the two groups of countries increasing accordingly.

For CIS countries, a huge discrepancy between rural and urban areas in terms of water supply remains typical (Fig. Q.10). Within this country group, the proportion of households with water supply in urban areas exceeds one in rural areas 2.7 times (in EU15 this gap is only 1 percentage point, and in NMS – 11 percentage points). Among CIS, only two countries (Armenia and Russia) can satisfy rural households' water demand by more than 50 percent, while in five out of 11 countries this rate is under

Fig. Q.10. Percent of CIS households having permanent water connection (2004)



Source: WHO - UNICEF Joint Monitoring Programme for water supply and sanitation.

[65] Access to an improved water source refers to the percentage of households with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, or rainwater collection. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within 1 km of the dwelling.

25 percent (Azerbaijan, Belarus, Moldova, Tajikistan, Uzbekistan). A very poor situation is in Moldova, where rural households with improved water supply accounted for merely 9 percent of the total[66].

In EU10 countries, access to **sanitation** averages about 70 percent, while among EEN this rate accounts for only 59 percent. Moreover, in the course of 1990-2004 access of CIS population to sanitation remained unchanged, despite some improvements in buildings' coverage. During the same time, in EU15 access to sanitation improved, reaching almost 100%, and the gap with CIS countries increased. The disparities in sanitation access between urban and rural areas in the CIS are even larger compared to water supply gap: in Belarus this gap is fourfold, in Georgia – 8.5 times, in Kazakhstan –19.5 times, etc.[67]

Measuring Quality of Life

One of the aims of social science research is to develop a comprehensive measure of quality of life in nations that is analogous to GDP in development economics. For that purpose, a multitude of multi-dimensional indexes have been proposed[68]. In addition to economic performance, these also acknowledge the nation's success in matters like education, health and social equality. The most well-known indicator of this type is the Human Development Index developed by UNDP. In this approach, quality of life is measured by input – the degree to which society provides conditions deemed beneficial ('presumed' quality of life). The basic problem, however, is that one never knows to what extent the conditions provided are really good for people, or at least perceived as such. An alternative is to measure quality of life in nations by output – subjective perceptions of life quality, commonly referred to by terms such as 'subjective well-being', 'life satisfaction' and 'happiness' in a narrow sense of the word. These subjective indicators would reflect 'apparent' quality of life, considering how well people actually flourish in the country[69].

Leaving aside many controversial issues, theoretical and methodological, related to subjective (vis-à-vis objective) measurements of well-being[70], we tend to admit that subjective perceptions and assessments of life quality are probably no less important than objective ones. People most often compare their present situation with that of others, with their own situation in the past or with their expectations for the future, thus introducing "a relative explanation" in their assessments. Importantly, in post-

[66] WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (http://www.wssinfo.org.html).
[67] UNDP (2006). *Beyond scarcity: Power, poverty and the global water crisis*. Human Development Report 2006, pp. 306-307.
[68] See Booysen, F. (2002). 'An overview and evaluation of composite indices of development', *Social Indicators Research*, Vol. 59, pp. 115-151.
[69] Veenhoven, R. (1996).'Happy life-expectancy', *Social Indicators Research*, Vol. 39, No. 1, pp. 1-58.
[70] See Easterlin, R. A. (ed.) (2002), *Happiness in Economics*, Cheltenham: Edward Elgar.

socialist countries both these factors – first, a dramatic break with past income and consumption habits, rights and guarantees, and, second, a significant rise in inequality and uncertainty, accompanied with the emergence of narrow groups of nouveaux riche on the top, and broad groups of very poor on the bottom – could have played an important role in subjective assessments of personal welfare and/or well-being[71].

The 'relative dimension' in subjective assessments of well-being could also prove crucial for formulating EU policies towards West Balkans/EENs. Perceptions do matter a great deal, creating a window for actors' interpretation of the environment. Thus, a perception of a more successful neighbor as a model for one's own country's future development could contribute to an evolvement of a sort of 'national idea' that can bring down disappointment with the reforms' results, enhance optimism, and prove material in shaping forward-looking expectations in the societies.

Fig.Q.11. Satisfaction with one's life

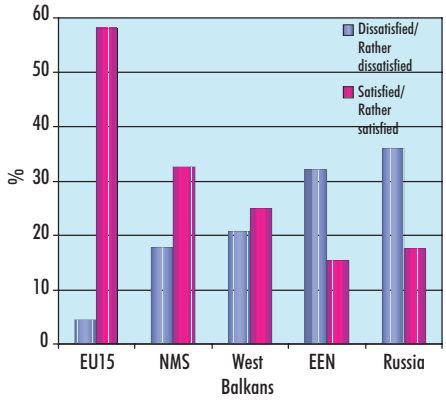
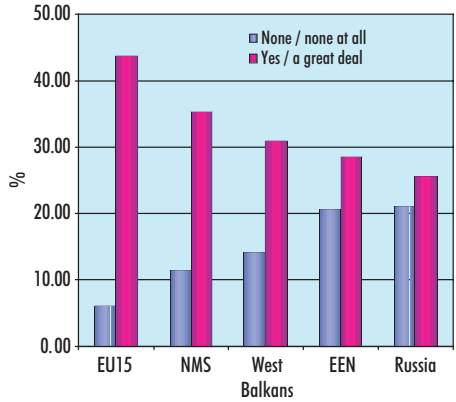


Fig. Q.12. Free choice and control over one's life



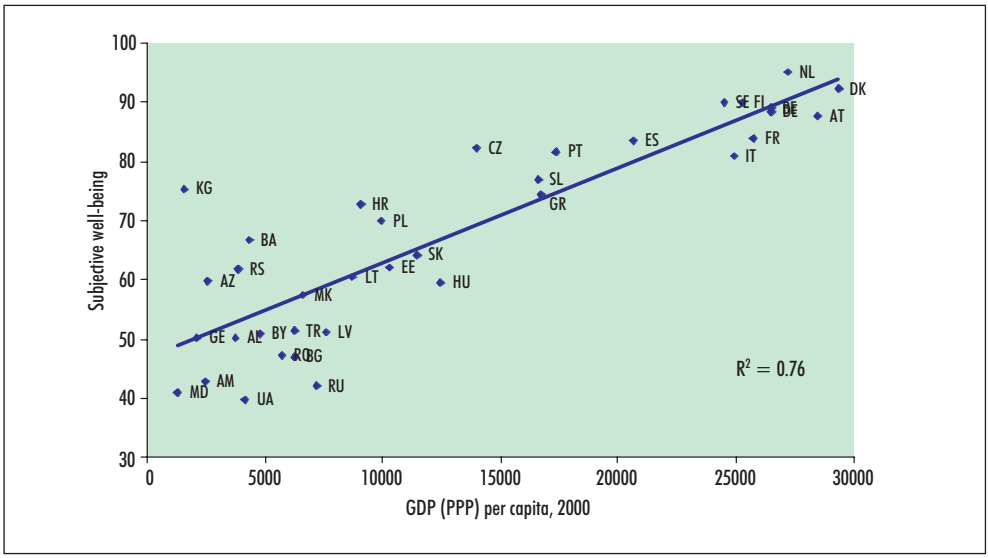
Source: World Values Survey (http://www.worldvaluessurvey.org/)

For a brief illustration of subjective measures of personal welfare, we used the data on "overall satisfaction with life as a whole" and "freedom of choice and control over peoples' lives" based on latest available series of World Values Survey[72] for the analyzed groups of countries (Figs. Q.11 and Q.12). As could be expected, they demonstrate a huge disparity in the percentage of satisfied with their lives between

[71] Franičević, V. (2003). "Real and Perceived Inequality, Poverty and Well-Being in South East Europe: Challenges of the Welfare State and Democracy", paper presented at the conference "Democracy and Market Economics in Central and Eastern Europe: Are New Institutions Being Consolidated?", Sapporo, Slavic Research Center, Hokkaido University, September 3-5 (http://src-h.slav.hokudai.ac.jp/sympo/03september/pdf/V_Franicevic.pdf).

[72] http://www.worldvaluessurvey.org/

Fig. Q.13. Regression of 'Subjective well-being' on per capita GDP (PPP), 2000.



Source: World Values Survey (http://www.worldvaluessurvey.org/), own calculations.

the EU15 and EEN/Russia, with the shares of dissatisfied and 'unable to control their lives' growing with the distance "from Brussels".

Fig. Q.13 demonstrates cross-national differences in 'subjective well-being', measured as a mean of percent 'Happy' and percent 'Satisfied with life as a whole', based on the latest available World Values Survey data for 1999-2004. The high correlation with per capita incomes is striking, once again implying that objective and subjective well-being indicators measure basically the same phenomena, albeit from slightly different angles.

The regression illustrates an important phenomenon, characteristic primarily of EEN/Russia – that of a comparatively lower subjective well-being compared to what could be expected judging by per capita incomes. This discrepancy between absolute measures of well-being, on the one hand, and subjective perceptions, on the other, could reflect societal trends not captured by income or poverty scores – a widespread pessimism, collapsing expectations, people's perception of inequality as not only about income, but also about wealth distribution, social exclusion, perceptions of being on the loosing side of reforms, and, last but not least, a low level of trust in political and public institutions, widespread corruption and state capture.

IV.2. Human capital: education and labor market

Human capital is usually defined as the knowledge, skills, and experience of people that make them economically productive. Human capital can be increased by investing in education, health care, and job training. This notion is closely related to the concept of sustainability: in conventional economic terms sustainable development might be translated as development that preserves or enhances initial capital endowments – both natural resources and human capital, i.e. the stock of skills and knowledge[73].

The conventional approach to measuring the quality of human capital usually includes indicators such as people's educational attainment and their potential of integration to the knowledge economy reflected in lifelong learning. However, the availability of comparable indicators across the selected country groups limits our analysis to:

(1) gross enrollment figures at various education levels (output side), and

(2) volumes of financial resources allocated to education (input side).

Outputs: Enrollment ratios

The level of human capital development inherited from the socialist past in all transition countries was generally considered high enough relative to other countries with similar levels of economic development. By 1990 in CIS, as well as in CEE countries the adult literacy rate was above 98 percent. During the socialist period, post-communist states had high enrollment rates and it was widely accepted that basic education was of high quality. Girls had equal access to education at all levels.

Despite a decline in the quality of life in the 90s, in many countries (especially in CIS), adult literacy was not radically impacted. As of 2004 adult literacy stood at about the same level as pre-1990. Moreover, in worse-performing countries it has noticeably improved: between 1990 and 2004, Albania has raised its adult literacy rate from 77 to 98.7 percent, while in Turkey it has increased from 77.9 to 87.4 percent[74].

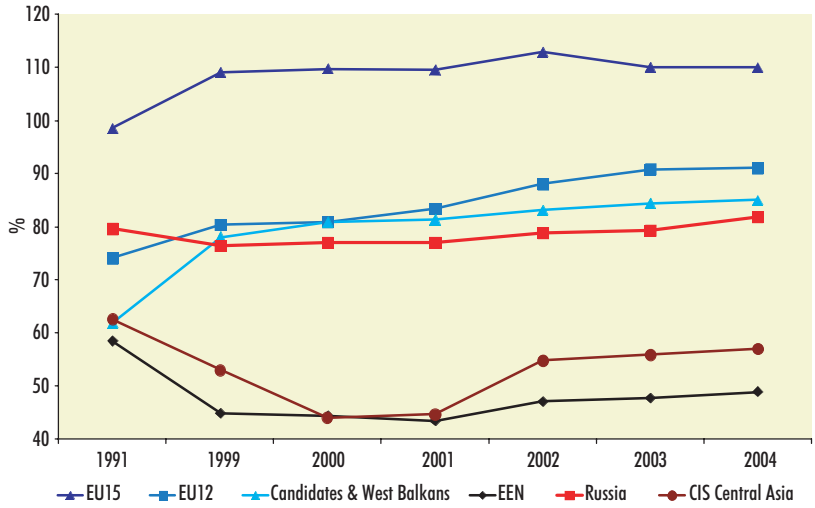
The universal primary and secondary education system in all countries analyzed was retained from the socialist period and remained actually free. However, during the first decade of transition, upper secondary enrollments in these countries have been following two divergent paths: in CEE and West Balkans, after a brief decline in the late 80s – early 90s, they have steadily increased to figures exceeding 80 percent by 2000 (Fig. H.1). On the other hand, virtually all CIS countries (except Russia) have demonstrated a marked decline in secondary enrollments until 2001, with enrollment

[73] Ekins, P. (1999) *Economic growth and environmental sustainability: the prospects for green growth*. L.: Routledge.
[74] http://hdr.undp.org/hdr2006/statistics/indicators/109.html/

figures in some lower-income EENs, where education system was disrupted by war and civil unrest (Azerbaijan, Georgia, Moldova), falling well below 40 percent in mid-90s. As a result, the East-West gap in secondary education has expanded: in 1989 the average fulltime school expectancy for the whole of CEE/FSU region was 11.21 years; by 1997 it had declined to 10.57 years. In contrast, the fulltime school expectancy for OECD countries in 1998 averaged 15.4 years[75].

After 2001, the EU15/EEN education gap has somewhat reduced: the attainment of positive economic growth rates in CIS countries was followed by a noticeable recovery in secondary enrollments: in Russia they have reached 82%, in Belarus – 78%, etc. In lower-income EEN, however, they still remain at about half the Western European level. At the same time, NMS and West Balkans recently witnessed a rapid growth in enrollment ratios, with only a few countries (e.g. Albania and Bosnia) exhibiting relatively poor education results.

Fig. H.1. Secondary education enrolments (median gross rates, percent of population aged 15-18)

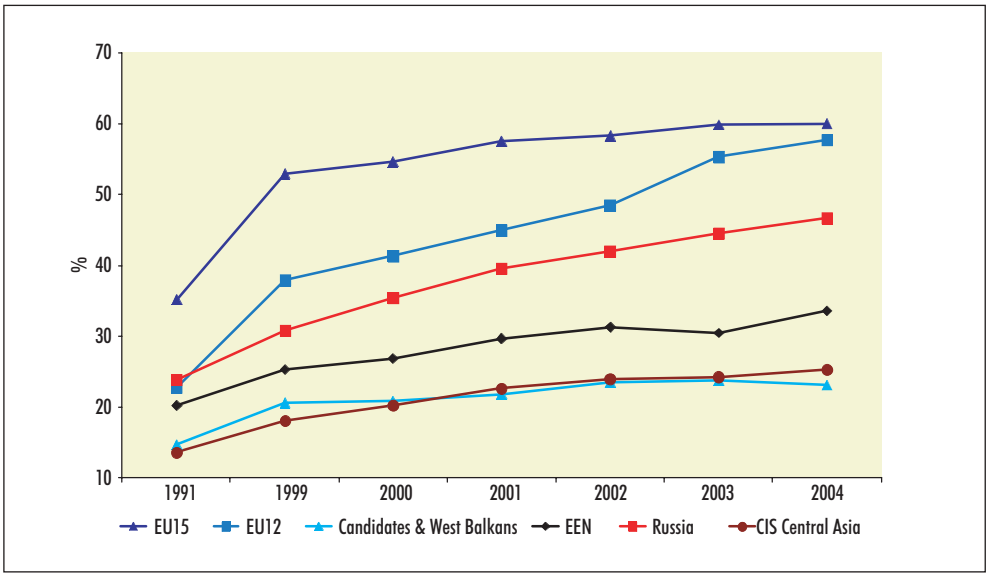


Sources: World Development Indicators database; TransMONEE 2006 database.

The reduction of enrollment gaps with the low-income CIS countries could also be observed across gender. Gender differences in enrollment existing at the secondary level appear to be continuing to shrink. In countries like Armenia and Moldova, where formal labor market opportunities are limited and migration, especially of young men, is common, girls tend to stay longer at school. At the same time in low-income Central

[75] Berryman, S. (2000). *Hidden Challenges to Education Systems in Transition Economies*. The World Bank, Europe and Central Asia Region Human Development Sector.

Fig. H.2. Higher education enrolments (median gross rates, percent of population aged 19-24)



Sources: World Development Indicators database; TransMONEE 2006 database.

Asian republics female enrollment in secondary school is lower because of lifestyles and cultural relations.

During the past decade, higher (tertiary) education programs were the fastest growing education sector not only in EU (and particularly in NMS), but in Russia and (to a somewhat lesser extent) in EEN countries as well (Fig. H.2). Despite the fact that the EU/Russia tertiary enrolment gap that existed in the early 1990s has remained and even a bit increased, the growth of the number of university students in Russia has been spectacular. After a heavy crisis of the early 1990s caused by a sharp (almost 3 times) reduction of government financing and the fall of youth's interest in higher education, the situation has changed in 1995 when the decline was replaced by a fast growth.

This change has been caused by an adaptation of population to new market conditions and the development of paid education (both in private and in government-owned higher educational institutions). In 1995, the quota of paid reception was 15 %, and the number of students studying on a paid basis has not exceeded 9 per cent; in 2003 the quota has reached 40 %, while enrolment has surpassed 54 %. Between 1997 and 2003, the number of students in Russian universities has increased almost twice and reached 6 million. Russia has even surpassed OECD countries in terms of the share of young people pursuing university education (leading to the equivalent of bachelor, master or diploma degrees). In OECD countries, every second young person begins these studies, while in Russia this proportion reaches 61 percent. Graduation

rates are also at or above OECD standards – 87, 29 and 33 percent for upper secondary, tertiary type B and tertiary type A education, respectively[76].

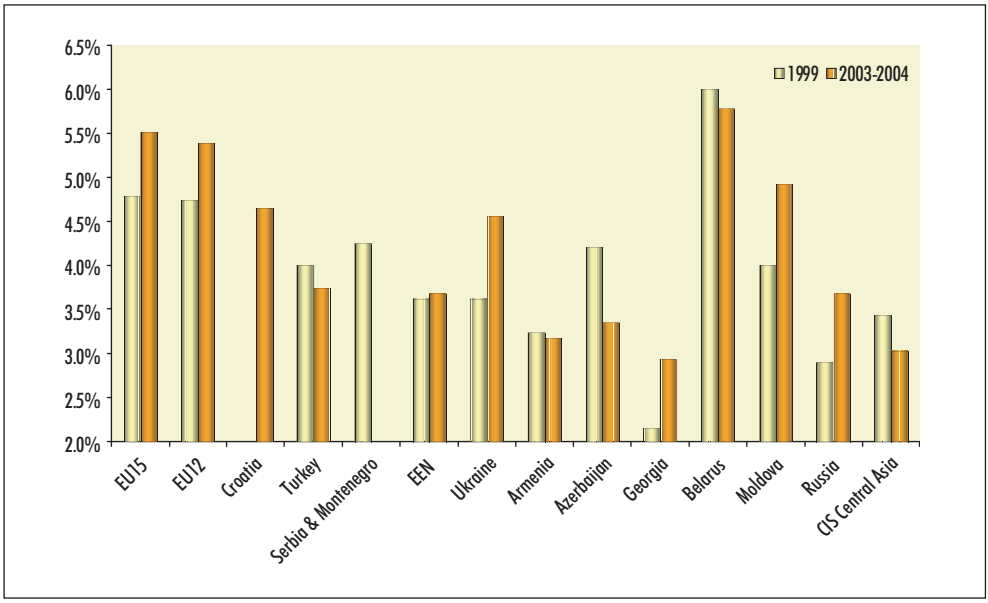
Inputs: Education expenditures

When assessing the nation's human capital from the input side, financial resources provided by the state for this purpose come to the forefront. Differences in public spending on education (relative to GDP) across countries reflect variation in government efforts to increase national stocks of human capital (Fig. H.3).

Overall, compared to EU15 and NMS countries, considerably fewer public resources are available to education in general, and particularly higher education in EEN/Russia. Post-Soviet education is habitually perceived as both one of the world's largest education systems in terms of scale and coverage, and one of the worst afflicted by a shortage of funds[77].

During the period from 1990 to 2002-04, when EU25 countries have increased their share of public spending on education as a percentage GDP by more than one percentage point, CIS countries on average saw a decline in this share of roughly 2 percentage points to below 4 percent. Against a backdrop of EU25 spending patterns on

Fig. H.3. Public expenditures on education as % of GDP



Source: UNESCO Institute for Statistics.

[76] Education Trends in Perspective - Analysis of the World Education Indicators 2005 Edition, UNESCO/OECD, Montreal, 2005.

[77] Kuzminov, Y. (2004). Challenges and Opportunities of Education Reforms: the case of Russia. Moscow: High School of Economics (mimeo).

education, only Belarus maintained government spending on education at high enough levels (5.8% percent in 2004); by contrast, Georgia with 2.9 percent and Kazakhstan with 2.4 percent are among the worst performers[78]. Although this trend (albeit on a lesser scale) is also characteristic for EU candidates and West Balkans, the CIS results are particularly striking in view of their lower GDP and thus a reduced spending on education in absolute terms. Even in more advanced EEN countries, public spending on education per student is an order of magnitude lower compared to EU15[79].

The ratio of expenditure per student to per capita GDP in Russia is about 27% compared to 34% in France and 42% in Germany. Middle-income countries usually maintain this ratio at much higher levels than affluent countries: around 50% of GDP per capita for medium professional education, and between 100% and 150% of per capita GDP per bachelor-type students. This enables such countries to reduce, if only partially, the gap in absolute financing between them and richer countries and to compensate for quality differences. In Russia, however, this indicator is even lower than in developed countries, with all the ensuing consequences[80].

Another dividing line between the country groups analyzed along this dimension lies in a huge growth of **private spending** on education in many FSU countries. This trend can hardly be associated with a similar worldwide tendency since differences between countries in public and private spending shares are enormous and do not seem to correlate with a country's average income.

Although comparable data on household spending on education in CIS and the EU are not available, anecdotal evidence demonstrates that this spending in EENs is already comparable to government expenditures allocated for this purpose. According to the official data, overall volume of paid education services in Russia has increased from 1.17 billion Euro in 2000 to 4.23 billion Euro in 2005, while the proportion of "budget" (i.e. government-financed) places in higher education institutions has fallen from about 90% in 1995 to 44% in 2005[81]. Russian household survey data also demonstrate that the cost of education for families is becoming huge: in 2003, households invested Euro 2.17 billion in compulsory (primary & secondary) education (compared to budget expenditures of Euro 7.5 billion), and Euro 2 billion in higher education (with budget expenditures of Euro 1.43 billion)[82]. This is in stark contrast with the situation prevailing both in EU15 and NMS, where household expenditures on education generally do not exceed 10-15 percent of total education expenditures[83].

[78] UNDP (2006). Human Develoment Report 2006. *Beyond Scarcity and the Global Water Crisis*.

[79] Lambert, Ń. (2006). "L'Enseignement supérieur en France et dans les pays de l'OCDE: état des lieux", Education & Territoires (http://txtnet.com/educter/pics/Intervention%20Lambert.pdf).

[80] UNDP (2004). Towards a Knowledge-based Society. Human Development Report for the Russian Federation 2004. Moscow.

[81] Gerasimova, Ye. (2005). "Illuziya kachestva", *Nezavisimaya Gazeta*, June 10.

[82] Kuzminov, Y. (2004), op. cit.

Private costs of education vary across EEN countries. Not surprisingly, those countries, which are under the greatest fiscal pressure seem to be shifting costs to families more than those that are less fiscally constrained. Unfortunately, it is just these countries that tend to have higher levels of family poverty. In Georgia, for example, education expenditures are the most unequally distributed item in the structure of family consumption. The charge of 10 lari per month for secondary education, an amount that is half of the average per capita consumption of poor families, is a factor heavily discouraging enrollment. Only 20% of individuals aged 16-17 from poor families are enrolled in school, compared with 78% from non-poor families; of all students enrolled in higher education, only 6 percent come from poor families[84]. Thus, it would be safe to conclude that the existing divergences in the overall accessibility of education (especially tertiary one) between the post-Soviet countries tend to expand.

Input/output interrelations: a paradox of universal education

The above paragraphs highlighted the two major features of post-Soviet education system prevalent in EEN countries: 1) a mass character of output – the scale of education (especially of higher education) that is even larger than in the world's richest countries, and 2) extremely low inputs – the levels of per capita financing which are among the lowest in the world. The consequence is the deterioration of the quality of education and its inability to meet society's growing needs[85].

A most obvious evidence of the declining quality of education in EEN/Russia is the inadequacy of the knowledge and skills acquired in the education system. Despite remarkable achievements, public education in these countries does not adequately provide students with the capabilities they need to compete in a market economy. The Soviet education system has stressed memorized factual and procedural knowledge – not learning skills that provide the basis for a flexible labor force able to adapt to changing markets and employer needs[86], and current education systems have fully inherited this bias.

Lately, Russia has repeatedly held closing positions in PISA (Program for International Student Assessment) ratings according to tests conducted by OECD among 15-year old pupils. In 2000, Russian teenagers ranked 27th among 32 countries in reading abilities (including comprehension, analysis and formulating own

[83] OECD (2006). Education at a glance 2006, www.oecd.org/edu/

[84] World Bank (1999). "Georgia Poverty and Income Distribution." Vol. I. Report No. 19348-GE. Europe and Central Asia Region, Poverty Reduction and Economic Management Sector Unit, Washington, DC.

[85] UNDP (2004). Towards a Knowledge-based Society. Human Development Report for the Russian Federation 2004. Moscow.

[86] World Bank (2000). *Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia*, Oxford: Oxford University Press.

viewpoint), were 26th in natural sciences and ranked 21st in math; in 2003, they ranked 32nd, 24th and 29th accordingly among 41 countries[87].

The same is true for higher education: according to 2006 Academic ranking of world universities published by the Institute of Higher Education at Shanghai Jiao Tong University, the top 500 list of world's best universities includes only two universities from Russia: The Moscow State, 70th in the world and 21st in Europe, and St. Petersburg State, world's 340th. To compare, the same rating includes 22 universities in France, 20 in China, four in Brazil, two in Poland but none from EEN[88]. International marginalization of Russian universities is also reflected in a declining number of international students studying in Russia: Russian share of the world education market currently does not exceed 0.5 percent[89]. This is due to several factors, but primarily to a low competitiveness of Russian higher education and its inadequate integration into global education processes.

Finally, a widely acknowledged evidence of the declining quality of education in EEN/Russia (which is actually a result of the two problems described above) is its inability to meet the demands of the labor market, with corresponding distortions in the structure of the human capital. The basis of Russian higher education system are newly-formed low-calibre universities (in fact, oversize colleges) and "diploma mills"[90], where 50 to 65 percent of students will not even dream of employment matching their qualifications. According to the polls among university graduates, over 50 percent of them are not using received competencies in their work[91], while the contents and complexity of this work quite often have little in common with the employee skills. Over a half of employers surveyed in 2004-05 thought that university graduates required additional theoretical and practical training, and according to recruitment agencies, only 13 to 20 percent of enterprises' managers are ready to employ college graduates offhand[92].

Labor market and changing job structure

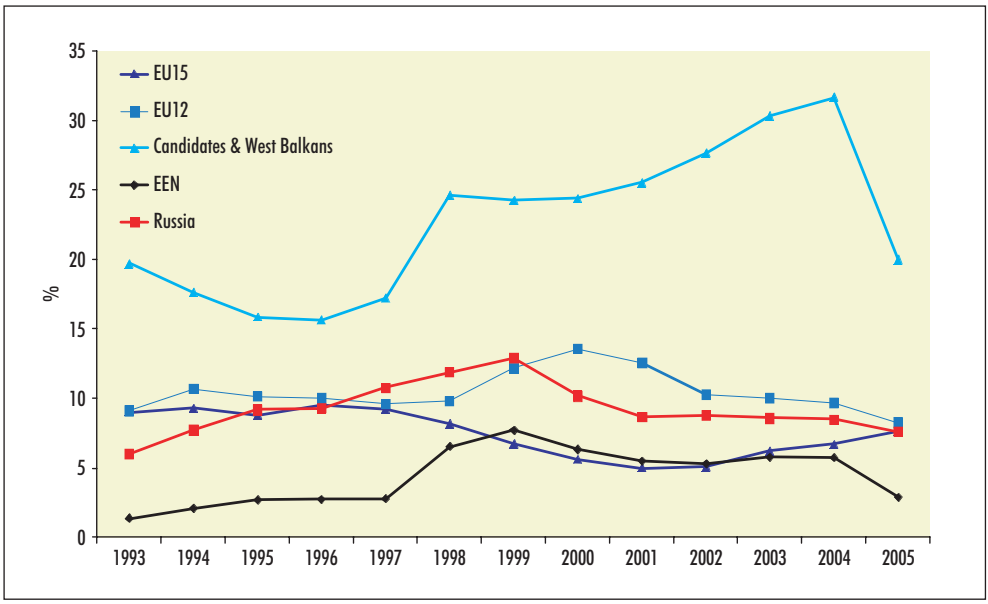
The labor market and education are among the two most important ways to build human capital. Labor market exclusion – the inability to generate a livable family income, lack of recognition for one's daily work, discrimination, lack of basic legal protections on the job – prompts a chain of social and economic effects that deepen

[87] http://pisa.oecd.org
[88] http://ed.sjtu.edu.cn/rank/2006/ARWU2006TOP500list.htm
[89] Sobolevskaya, O. (2005). 'La Russie pourrait exporter plus activement son enseignement', ROST, Décembre 29, www.rost.fr
[90] Tomusk, V. (1998). "Market as metaphor in Central and East European higher education", *International Studies in Sociology of Education*, Vol. 8, No. 2.
[91] Kuzminov, Y. (2004), op. cit.
[92] Gerasimova, O. (2006). "Degradatsiya vuzovskogo statusa", *Nezavisimaya Gazeta*, February 3.

and solidify social exclusion. On the other hand, improvements in human capital through education, training, and better quality jobs can contribute significantly to greater inclusion through higher income, greater social integration, and stronger cultural awareness and identity.

The employment levels of the central-plan period, when employment was not only a right but also a duty for most of those of working age, could not be sustained in a market-based system. Hence, actual labor market conditions in most countries in the region clearly indicate significant slack. Still, open unemployment is less of a problem in the slower-reforming countries of the former Soviet Union, such as Azerbaijan & Moldova, especially when compared to South-Eastern Europe and even most of EU12 (see Fig. H.4). On the other hand, official statistics tend to overestimate unemployment rates in the republics of former Yugoslavia which, when taking informal employment into account, are estimated to be closer to around 20%.

Fig. H.4. Unemployment (percent of labor force)



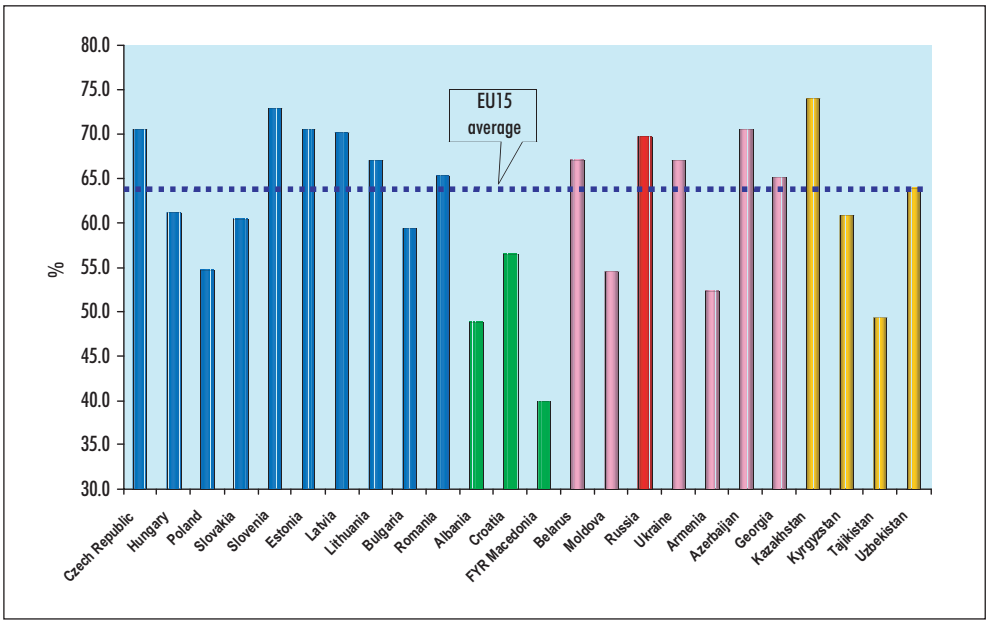
Sources: OECD, EBRD.

In NMS and West Balkan countries, high unemployment has been accompanied by a major fall in labor force participation rates, as workers became discouraged by lack of job opportunities and gave up their job search[93]. In these countries, both open unemployment and low labor force participation have led to a low ratio of

[93] Rutkowski, J., S. Scarpetta et al. (2004). Enhancing Job Opportunities. Eastern Europe and the Former Soviet Union. World Bank, Europe and Central Asia Region.

employment to working age population, below the EU average (Fig. H.5). At the same time, these ratios' reduction is less pronounced in the majority of EEN countries.(fig. H.5) and it actually stays at a higher level compared to EU15 and most of EU10 countries. However, much of the workforce in EENs is still stuck in low-productivity employment in unrestructured and probably nonviable enterprises or has had to move back to subsistence agriculture[94].

Fig. H.5. Employment ratio (number of employed as percent of population aged 15-59), 2004



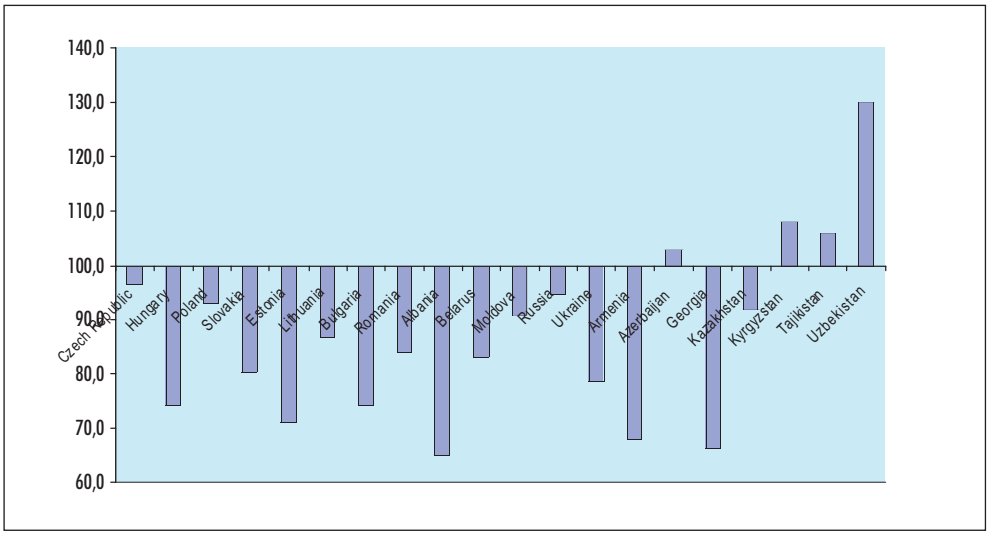
Source: TransMONEE database 2006.

This argument can be generally supported by data on overall employment levels as compared to late-80s (see Fig. H.6): although the overall employment in most CIS countries considerably reduced following the fall of prosduction, these reductions on average were smaller than in the majority on EU12 (even taking into account positive population growth trends in Azerbaijan and Central Asian CIS), despite the fact that the fall of production in EU12 was not that sharp compared to EENs.

This paradox reflects a persistent gap in relative *labor productivity* that exists between the analyzed country groups (see Table H.1). Average labor productivity among EENs is less than one third of the EU15 level. When compared to NMS (EU10), they demonstrate productivity just 10 percentage points higher than Central Asian CIS countries (38% and 28% correspondingly), and are lagging far behind the

[94] Rutkowski, J., S. Scarpetta et al. (2004), op. cit.

Fig. H.6. Employed population in 2004 (1989=100)



Source: TransMONEE database 2006 (for Azerbaijan, the base year is 1990).

Table H.1. Labor productivity*, 2003-2004 (EU15=100)

	2003	2004
EU10**	54.6	56.5
EU12**	47.3	49.1
Candidates and West Balkans***	38.1	40.0
EEN	28.4	30.1
Russia	32.8	34.4
CIS Central Asia	15.2	15.9

* GDP (2000 PPP) per number of employed
** excluding Cyprus and Malta
*** Croatia, Macedonia, Turkey and Albania
Sources: OECD, own calculations.

average level for Candidates and West Balkan states taken together (70,9% of the average for NMS). Russia stays at the level of about 34.5% in relation to EU15 and at 60.9% of the EU10 average.

In many CIS countries, low open unemployment figures and high employment rates conceal several significant employment problems:

- A delayed enterprise restructuring with persistent overstaffing, especially in low-income CIS countries. Thus, inflows into unemployment are likely to increase as restructuring progresses.
- The dominance of low-productivity jobs in the informal sector to earn subsistence income. The latter served as kind of sustaining strategy for all poor countries in the region and substituted scarce and ineffective social protection.

In the low-income CIS, casual and less formal jobs have increased dramatically: self-employment accounts for about 20 percent of total employment in EU12 and for about 50 percent of employment in low income CIS countries. Similarly, informal sector employment as a share of total employment is estimated at around 40–50 percent in the CIS[95].

It is hard to obtain comparable data on self employment across the countries analyzed. Still, the results of several surveys and anecdotal evidence lead us to a conclusion (supported by the World Bank studies) that the nature of self-employment also varies greatly. For some low-skilled workers, especially in the poorer CIS countries, own-account jobs in retail and agriculture are subsistence activities. But for other, more skilled workers, self-employment is sometimes a preferred alternative to formal sector employment because self-employment offers better earning opportunities and more scope for entrepreneurship[96].

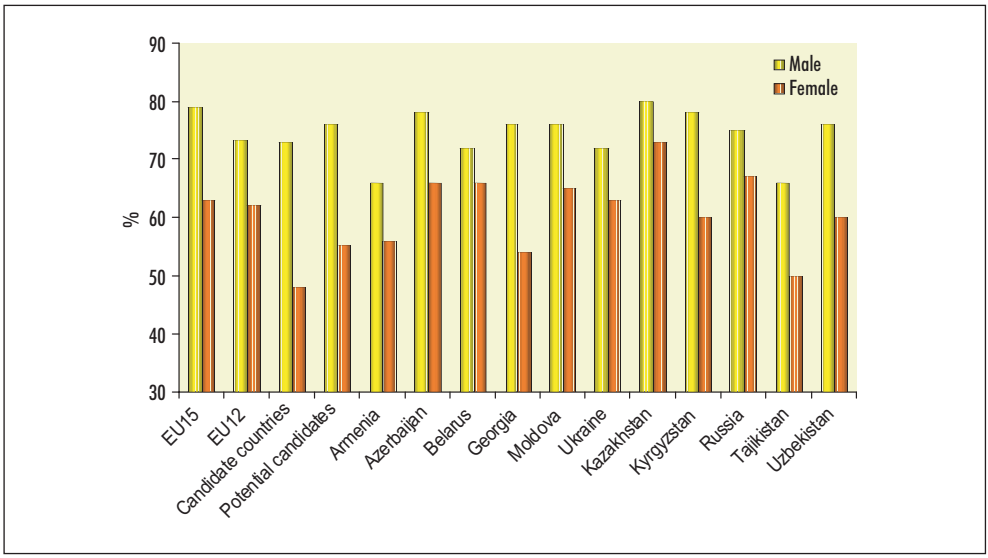
The nature of jobs has also changed because of sectoral shifts and deindustrialization. Most CEE countries have witnessed a fall in the number of blue-collar manufacturing jobs and an increase in white-collar service sector jobs. In contrast, in most CIS countries, deindustrialization was more often associated with an increase in agricultural employment[97]. Many jobs have been created not only in relatively more skilled activities but also in certain service activities that require low- and medium-level skills that are nonetheless different from those of the lost manufacturing jobs.

Changes in the nature of jobs have affected men more than women. Many jobs have been lost in sectors dominated by male employment – heavy industry and the extraction industry – while new activities have been created in services where women tend to have easier access. As a result, men have suffered relatively more job losses than women have during the transition. For example, the median female participation rate in EU12, at 62 percent, is very close to the EU15 average (63 percent), while the male ratio, at 73 percent, is significantly below the EU-15 average (79 percent). (Fig. H7). The average female participation in EEN (excluding Armenia and Georgia) is higher or at least at the same level (Ukraine), while male participation is lower compared to EU15. Respective indicators for female participation for RF and particularly Kazakhstan are considerably higher than averages for EU15 and NMS. At the opposite end is the low median female participation rate for EU candidates, explained by Turkey's extreme score of 29 percent.

Labor market development is greatly affected by the pace of job creation, on the one hand, and by labor protection regulations, on the other hand. Apparently strict employment protection legislation in the region might have contributed to a slow pace

[95] Rutkowski, J., S. Scarpetta et al. (2004), op. cit.
[96] Rutkowski, J., S. Scarpetta et al. (2004), op. cit.
[97] Rutkowski, J., S. Scarpetta et al. (2004), op. cit.

Fig. H.7. Labor force participation rate (2004), by gender



Source: World Development Indicators database.

of job creation. The first component is tightly dependent on a general quality of business and investment climate. Here we just outline the constraints that enterprises in most of EEN countries are facing. In low-income CIS these are policy unpredictability, insecure property rights, weak contract enforcement, and unreliable infrastructure. In the middle-income CIS countries (Belarus, Kazakhstan, Russia, and Ukraine), businesses face considerable administrative barriers (for example, numerous permits, inefficient regulations, and red tape). Doing business in CEE countries is generally hampered by high direct costs (for example, high taxation, instability and non-transparency of tax rules, arbitrary tax administration, etc.)[98].

Labor market regulations demonstrate large regional disparities in labor market conditions. Historically, employment protection legislation (EPL) has been particularly strict in CIS and South-Eastern Europe, and somewhat less strict in most CEE countries. This means that the costs of firing redundant labor in the CIS and SEE may be relatively high. This is likely to discourage them from hiring in the period of economic upturn, to avoid future firing costs in some subsequent downturn.

At the same time, labor market regulations, despite being quite tight in some countries, are rather formal since they are subjected to numerous cases of non-execution and non-compliance. In many CIS and SEE countries (e.g. Azerbaijan, Belarus, Bosnia, Moldova and Ukraine), EPL is stringent, but enforcement capacity is weak. On the opposite pole (mainly NMS, especially Baltic countries and Slovakia)

[98] Rutkowski, J., S. Scarpetta et al. (2004), op. cit.

enforcement capacity is strong, while EPL is relatively flexible. EPL is more binding in CEE because of stronger enforcement, despite more liberal regulations. This assessment is consistent with the perceptions of employers, who deem labor regulations a significant obstacle in the NMS (and also in Turkey), but not in the other parts of the region.

IV.3. Innovation, technological and infrastructural gap

A contemporary phase of global economic development is characterized by an ongoing transition of numerous catching-up countries, including EEN, to a post-industrial stage. This transition is essentially conditioned upon these countries' potential of building a knowledge economy, where the skills, experience, and innovation potential of the workforce have greater value than the capital equipment or even capital itself. These processes in turn raise questions about the role of innovations in development, including identification of relative innovation strengths and weaknesses of specific countries, of major challenges the countries are facing in innovation performance and innovational absorption, and the appraisal of policies in terms of their ability to contribute to overcoming these challenges. This is a very ambiguous research task indeed, and these issues are extensively studied by international organizations and renowned research institutions. Our research task here is much more simple. Since innovation potential is widely recognized nowadays as the most important prerequisite for both economic growth and human development, we see the goal of the current section within the broader framework of the ENEPO project in identifying those key bottlenecks and most visible gaps that hinder the process of innovation performance and development.

Indicators and methodology

Various research centers and international organizations have developed multiple methods and indicators to evaluate countries' innovation performance. A widely accepted one is the EU methodology (European Innovation Scoreboard, EIS) which was developed to assess and compare the innovation performance of EU member countries[99]. Within EIS, innovation development indicators are grouped into five key categories: innovation drivers; knowledge creation; innovation & entrepreneurship; application; intellectual property rights. The main disadvantage of this method for our analysis is a lack of data on EEN countries.

[99] http://trendchart.cordis.lu/tc_innovation_scoreboard.cfm

Results on country ranks (KEI index) produced by World Bank Knowledge Assessment Methodology (KAM)[100] are very close to those provided by the Summary Innovation Index (SII) constructed by the EIS, since both include a number of similar indices. The advantage of the World Bank composite indices (KI & KEI) for our study is the availability of comparable data for the whole range of analyzed countries.

In addition to KAM, an increasing number of indexes are used to assess a country's readiness for the knowledge economy. Among the most widely cited indexes we can find the Technology Achievement Index (UNDP), the Competitive Industrial Performance Index (UNIDO), the National Innovative Capacity Index (WEF), the Innovation Capability Index(UNCTAD)[101]. The different indexes put the emphasis on various aspects of the science and technology realm: some, such as UNIDO's, are more focused on outcome indicators, whereas others, such as UNCTAD's, place more emphasis on inputs into R&D. The rankings are therefore not always the same. For example, the "Economic Incentive and Institutional Regime" component included in the KEI resulted in a lower score, compared to other indexes, for countries such as Belarus, Georgia, or Ukraine.

UNIDO's index emphasizes outcome indicators (or revealed technological capacity), as shown in the high rankings of countries such as Portugal, Hungary, and Turkey, whereas UNCTAD's index (ICI) puts more emphasis on the inputs into innovation (underlying technological capacity) and therefore shows higher rankings for countries with well-functioning education systems (that, however, somehow failed to translate higher education into innovation - especially in Russia, but also Ukraine and Belarus). Very informative from the analytical point of view, some of these indices are of little value for our research task, since they do not provide any information for over a half of our sample of countries.

In our research we used the following data:

(1) Available raw data (indicators from the World Development Indicators database and ITU database).

(2) Knowledge Index (KI) and the Knowledge Economy Index (KEI) calculated in accordance with the World Bank Knowledge Assessment Methodology (KAM).

Inputs: Knowledge creation (R&D)

One of the most prevalent indicators of investment in innovation is the ratio of R&D to GDP. This has long been used as a key measure of inputs into the innovation system by enterprises and governments. By comparing this ratio across our sample of

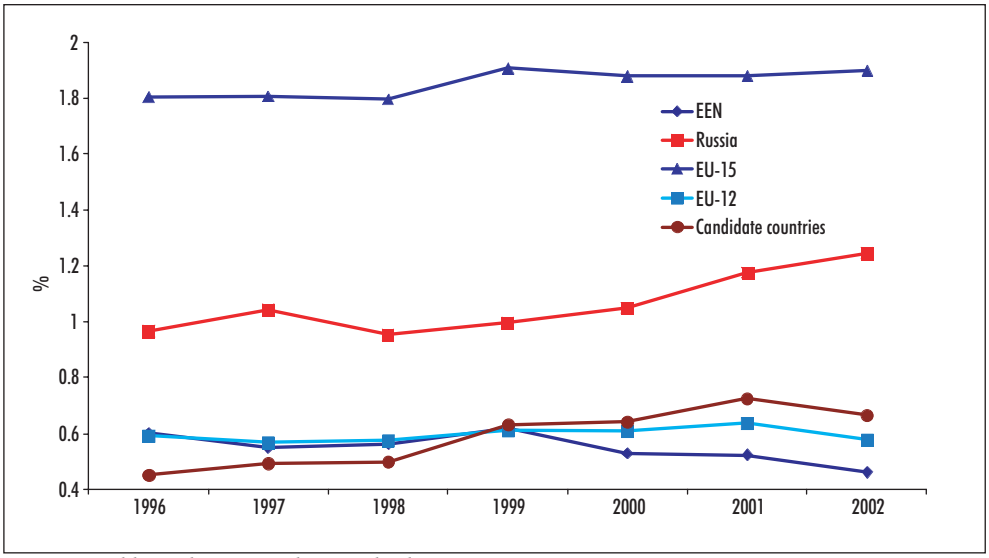
[100] www.worldbank.org/wbi/knowledgefordevelopment/k4dcommunity.html

[101] Attempts to provide a comparative analysis of the composite indices were made in: Soubbotina T.P. (2005). "The Challenge of Technological Learning for Developing Countries." Prepared for the World Bank Science and Technology Program.

countries we can conclude that these ratios in all sample countries tend to be relatively stable and not related directly to GDP changes.

Median R&D expenditures figures for EU15 countries far exceed corresponding values for all other country groups, staying at the level of about 2 percent, with considerably higher figures in most developed European countries – reaching 3 and even exceeding 4 percent. All other countries, including EU12, have considerably lower levels of expenditures. Only six of them had a ratio of 1 percent or more, including three NMS – Slovenia, Czech Republic and Hungary, Russia, one of EENs (Ukraine), and Croatia. If we exclude Ukraine from the sample, the median for the rest of EEN countries would stay at a level of just 0.3%.

Fig I.1. Total R&D expenditures as % of GDP



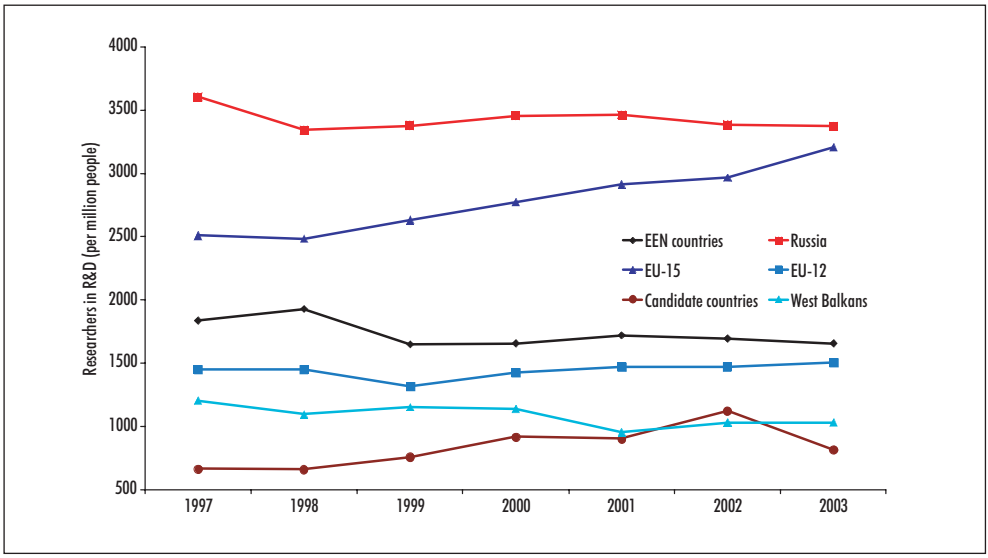
Source: World Development Indicators database.

Taking into account low ratios of R&D spending to GDP in EEN, as well as the fact that the respective values of GDP in these countries are generally much lower compared to developed countries, we could hardly question the fact that R&D sphere in Eastern EU neighborhood remains highly underinvested (see Fig. I.1). We should also take into consideration that these indicators do not provide any information on the efficiency of R&D investments.

Despite a tremendous fall in the number of researchers (more than twice from 1992 to 2002), Russia traditionally stands first in the number of researchers per million people, so far (albeit the gap is narrowing) surpassing the EU15 median level and exceeding the level of EU12 more than twice. These input numbers, however, are not

translated into high innovation outcomes (e.g. number of patent applications – see Fig. I.6), reflecting below average productivity of Russian R&D. Retaining an inherited from the USSR structure of R&D sphere, several EEN countries (particularly Georgia, Ukraine, and Belarus) also still preserve high employment in R&D, occupying a third (after EU15) position in the country groups' list (Fig. I.2). This feature comes in line with the mentioned above trend in human capital development.

Fig I.2. Researchers in R&D, per million people



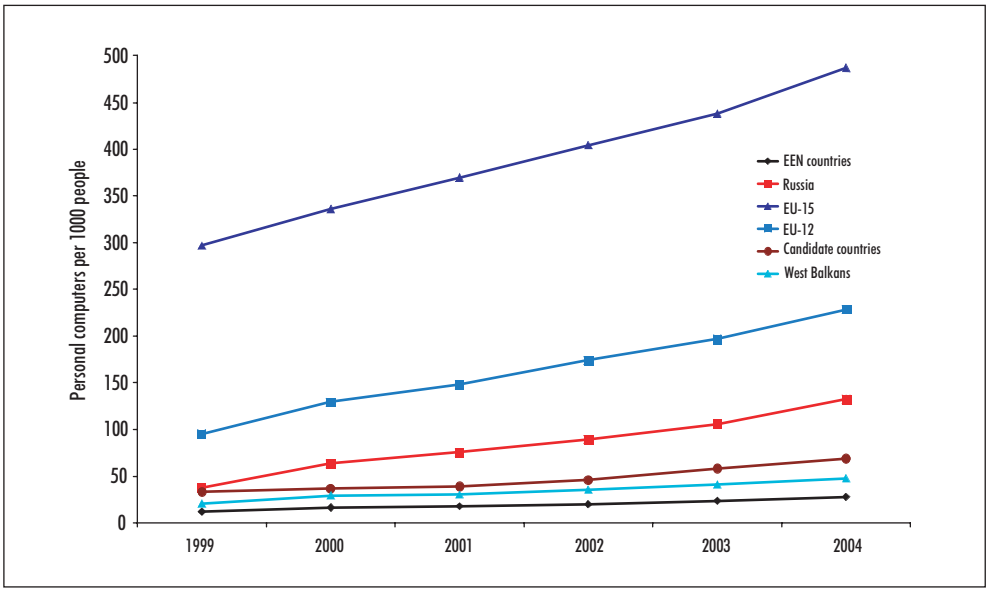
Source: World Development Indicators database.

Inputs: Innovation drivers (ICT)

Information and communication technology – blood vessels of innovation system – becomes an increasingly important infrastructural component of intellectual capital. The number of personal computers has been growing in all country groups, but the relative distances since 1999 remained almost unchanged: more than two times – between EU15 and EU12; EU12 / Russia – 1.7 times, Russia / Candidate countries – 1.9 times, and almost five times – between Russia and EEN (see fig. I.3).

The "digital divide" in international Internet bandwidth, characterizing accessibility of worldwide web, is tremendous: EU15 and the nearest group (EU12) differ by an order of magnitude; indicators for the next country group (candidate countries) are almost 2.5 times lower than in EU12. The distance from candidate countries to Russia (the next closest neighbor) is nearly twofold; the overall level of international Internet bandwidth in EEN countries is extremely low – three times lower than in the group of Balkan states (Fig. I.4). In 2003, Denmark alone had the

Fig. I.3. Personal computers, per 1 000 people

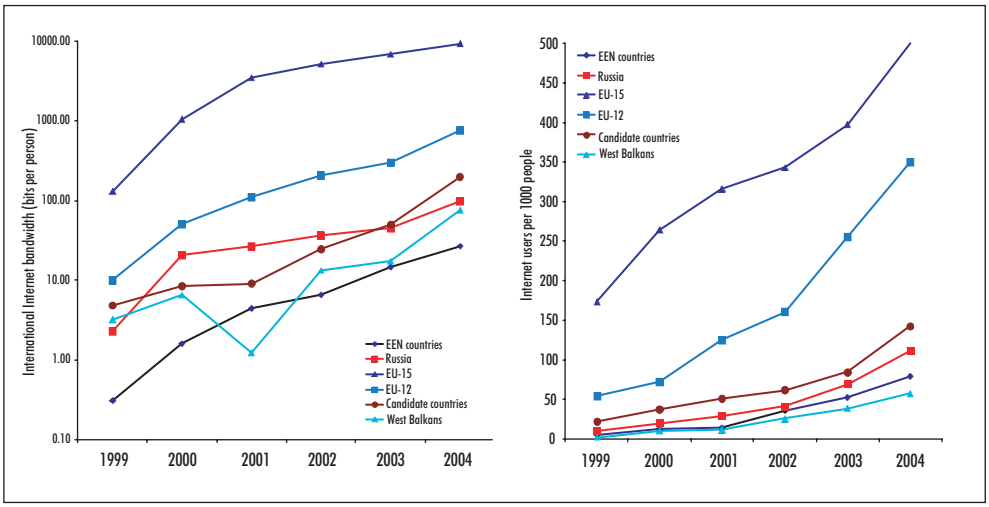


Source: World Development Indicators database.

international Internet bandwidth 11 times larger than the whole of CIS. The situation in individual EEN and candidate / potential candidate countries, however, varies: though lagging in average figures for the group as a whole, Internet access could vary by factor if we compare the highest level in EEN (Moldova) to the lowest level in potential candidates' group (Albania).

Fig I.4. International Internet bandwidth, bits per person

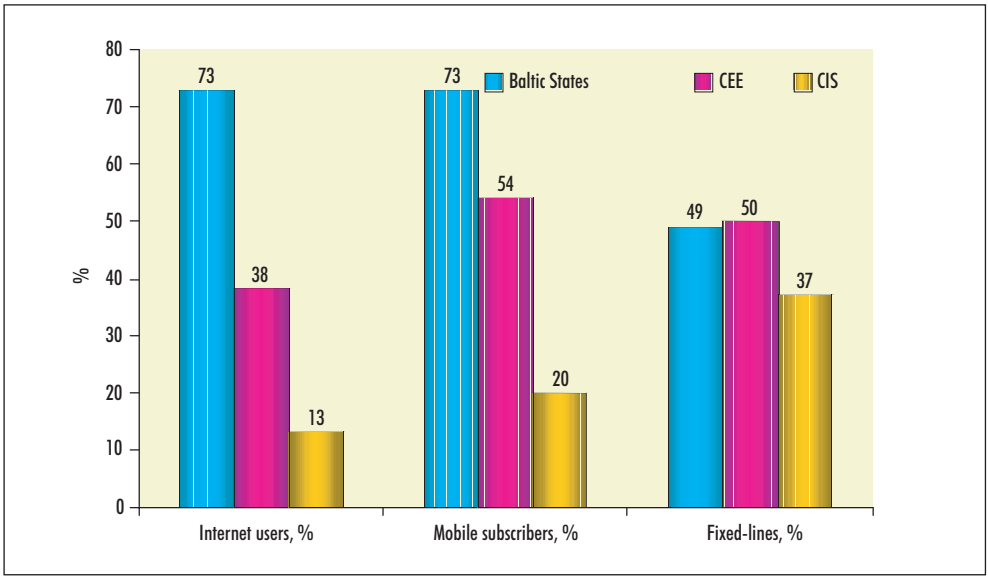
Fig. I.5. Internet users, per 1 000 people



Source: World Development Indicators database.

The numbers of Internet users and their trends of growth are closely correlated with the number of personal computers (see Fig. I.5). The gap between Western Europe and EEN/Russia in Internet penetration rates[102] is huge: in 2003, Western Europe led at a high 42.9 percent, followed by the Baltic States (31.4%), CEE (16.1%) and trailed by remaining CIS (5.6%). At the same time CIS, the region with the lowest penetration, had the second highest growth rate of close to 80 percent, a development that suggests that the "digital divide" is to some extent narrowing[103].

Fig. I.6. ICT penetration rates as a percentage of penetration rates in Western Europe



Source: ITU Database.

To characterize information infrastructure components, indicators on other communications infrastructure (mobile and fixed-line) are generally used. In mobile communications, the East-West gap in Europe, although somewhat smaller compared to Internet, still remains significant (Fig. I.6). The CIS average mobile penetration remains at a very low 17.1%: in 2003 almost half of the CIS countries – Armenia, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan – had penetration levels under five percent, and only in two CIS countries – Azerbaijan and Georgia – mobile had slightly overtaken fixed line penetration. At the same time this region with the lowest mobile subscribers rate has by far the highest growth rates, an average of 99.4 percent. European fastest growing mobile market, Russia, more than doubled the number of cellular subscribers during 2004, from 36.5 million to 74.4 million. During 2004,

[102] A percentage of Internet users among the population in an age group of 15 to 74 years old.

[103] ITU (2005). Europe & CIS's Telecommunication/ICT Markets and Trends, http://www.itu.int/ITU-D/ict/statistics/at_glance/Europe_RPM_2005.pdf

Russia overtook Germany, France, Spain and the UK to become the largest mobile market in Europe. Despite Russia's impressive subscriber numbers, it has its own digital divide, with the vast majority of subscribers located in large urban centers[104].

Overall, the "digital divide" that separated EEN/Russia from the rest of Europe is much greater in newer ICTs (mobile and Internet) than in fixed lines. Indeed, penetration levels for Internet use in CIS are only 13 percent of those in Western Europe (Fig. I.6). The gap is slightly smaller in the mobile sector, where CIS penetration rates stand at one fifth of those in Western Europe. The gap is smallest in the "traditional" ICTs of fixed lines where CIS' penetration level represents 37 percent of that of Western Europe. NMS have about half the mobile and fixed line penetration levels of EU15, but lag further behind in Internet use.

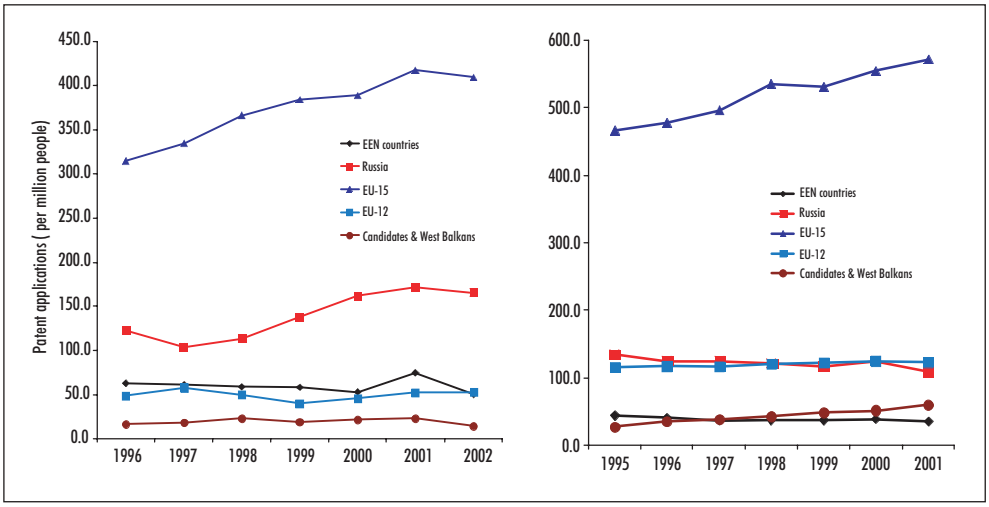
Outcomes: Patent Applications and Journal Articles

The two indicators reflecting the outcomes of innovation performance are "Patent applications filed by residents" and "Scientific and technical journal articles per million people". Both indicators point to huge gaps between EU15 and other country groups. In the case of patent applications they range from roughly 2.5 times between EU15 and Russia to 8-10 times between EU15 and other country groups (Figs. I.7-I.8).

At the same time, the gaps in the number of patent application between Western Europe and EEN/Russia are not as wide as could be expected judging by relative GDP

Fig. I.7. Resident patent applications, per 1 million people

Fig. I.8. Scientific and technical journal articles per million people



Source: World Development Indicators database.

[104] ITU (2005). Europe & CIS's Telecommunication/ICT Markets and Trends, http://www.itu.int/ITU-D/ict/statistics/at_glance/Europe_RPM_2005.pdf.

figures or R&D expenditures. Recent figures for 2004 published by World Intellectual Property Organization (WIPO) indicate that EEN countries such as Russia, Ukraine and Belarus also have relatively high rates of patent activity when compared with total GDP and with R&D expenditure. Russia ranks 6th in the world (after Japan, USA, Korea, Germany and China) in absolute number of resident patent filings, with Ukraine ranking 11th. The scores in patent filings per billion dollars of GDP (PPP) are 17.6 for Russia (6th rank), 16.9 for Belarus and 14.7 for Ukraine (8th and 9th rank accordingly), while ranking on patent filings per R&D expenditure has placed Belarus world's third, with Ukraine ranking 5th, and Russia ranking 6th[105].

Still, it would be premature making conclusions concerning changes in EEN/Russia's patenting intensity and moreover on prospects of bridging the gap in this area. First, in absolute numbers of patents issued these countries (even taken together) still lagging far behind, say, Germany. Second, and more importantly, the structure of Russian patent applications radically differs from that of developed countries: just 9% of applications in Russia were in telecoms, IT and electronics, against 40 to 50 percent for OECD countries, with a majority filed in 'food and agriculture' and 'materials and instrumentation' sectors[106]. There are no grounds to believe that other EEN countries would demonstrate a radically different patents' structure.

Weighted indicators on Scientific and technical journal articles demonstrate an even more bleak picture (Fig. I.8): a five-fold and growing gap between EU15 and NMS/Russia; the latter level, in turn, is twice the median for candidate countries (this gap would have been much larger if we excluded Croatia with a score 1.5 times higher than Russia).

Composite Indices

To present a more generalized picture of international differences in innovation performance we use composite indices developed in accordance with the World Bank Knowledge Assessment Methodology – KAM (Knowledge Index, KI, and Knowledge Economy Index, KEI), as well as their main components (pillars).

There are several reasons for using aggregate scores produced by this methodology. Country's national innovation capacity depends on a certain number of pillars (human capital, information infrastructure, the innovation system, as well as the economic incentives regime), which allow a country to articulate its transition into a knowledge economy and use its resources efficiently in the absorption and creation of new knowledge.

[105] WIPO (2006). WIPO Patent Report: Statistics on Worldwide Patent Activity (2006 Edition), http://www.wipo.int/ipstats/en/statistics/patents/patent_report_2006.html.
[106] Jaggi R. (2005). "Innovation in technology lags", Financial Times, October 11.

Three components of Knowledge Index (KI) represent key variables which characterize a country's ability to generate, adopt and diffuse knowledge. These are:

- Education and human resources (further on referred to as "Education") which includes three variables: adult literacy rate, secondary enrollment rate and tertiary enrollment rate;
- Innovation system (Innovation) which includes the following variables: Researchers in R&D, per million people, Patent applications granted by the USPTO, per million of population, Scientific and technical journal articles, per million of population;
- Information and communication technology (ICT), including Telephones (mainlines plus mobile phones) per 1,000 persons, Computers per 1,000 persons, and Internet users per 1,000 persons.

Knowledge Index (KI) is a simple average of the normalized performance scores of a country's key variables in three Knowledge Economy pillars. In addition, the Knowledge Economy Index (KEI) takes into account whether the environment is conducive for knowledge to be used effectively for economic development. This is achieved by adding one more pillar, that is "Economic incentive and institutional regime" (Institutions) which includes variables on tariff and non-tariff barriers, regulatory quality and Rule of law. Thus KEI takes into account whether the environment is conducive for knowledge to be used effectively for economic development.

The trend line in Fig. I.9 suggests that KEI scores (reflecting innovation performance) are closely correlated with per capita GDP levels, in particular for the "low-income" countries. The richest countries prove to have close GDP levels for significantly different innovation performance. More generally, the link between innovation and GDP remains difficult to establish at national level, considering the innovation is only one factor among other structural ones.

By comparing countries' (country groups') scores for each of the pillars as well as scores of KI and KEI indices we can:

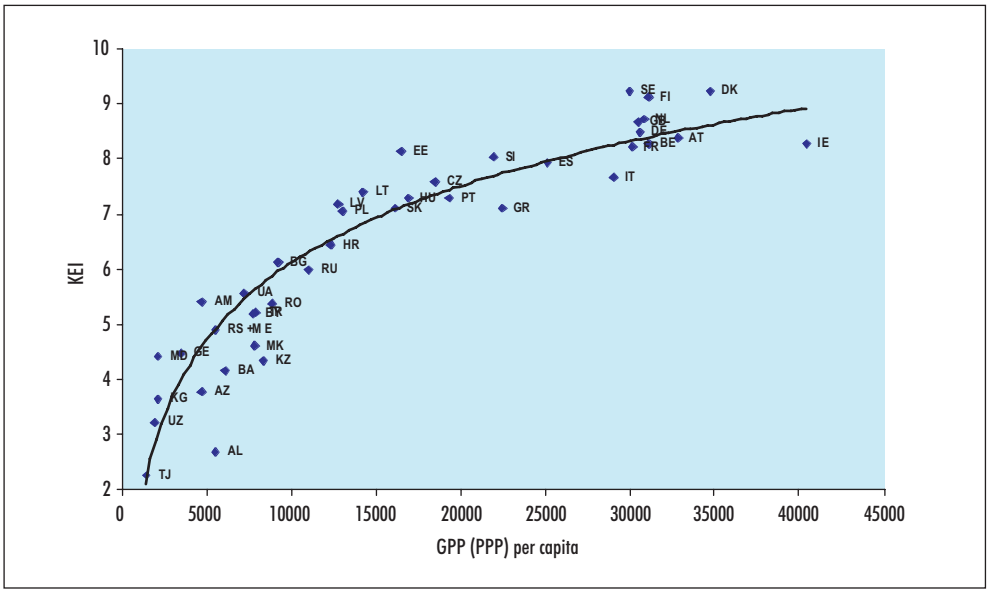
(1) evaluate differences (gaps) between countries (country groups) in innovation performance across specific pillars;

(2) assess overall differences in KI and KEI scores;

(3) identify specific gaps (bottlenecks) in innovation performance for each country (country group).

The results of such an exercise are presented in Figs. I.10 and I.11, where respective data are translated into radar diagram format (for each country group, we used median values as aggregate scores).

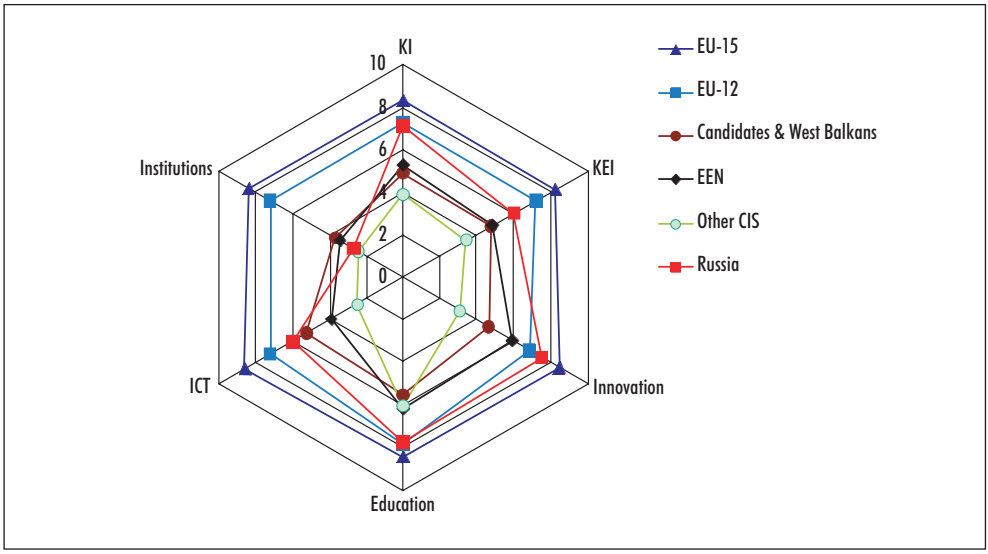
Fig. I.9. Regression of Knowledge Economy Index on GDP (PPP) per capita



Source: ITU Database.

Overall conclusions from Fig. I.10 could be summarized as follows:

Fig. I.10. KI, KEI and constituent pillars across country groups



As regards innovation infrastructure (ICT), country groups are distributed exactly in accordance with GDP per capita: EU12 are the nearest to EU15 group, next comes

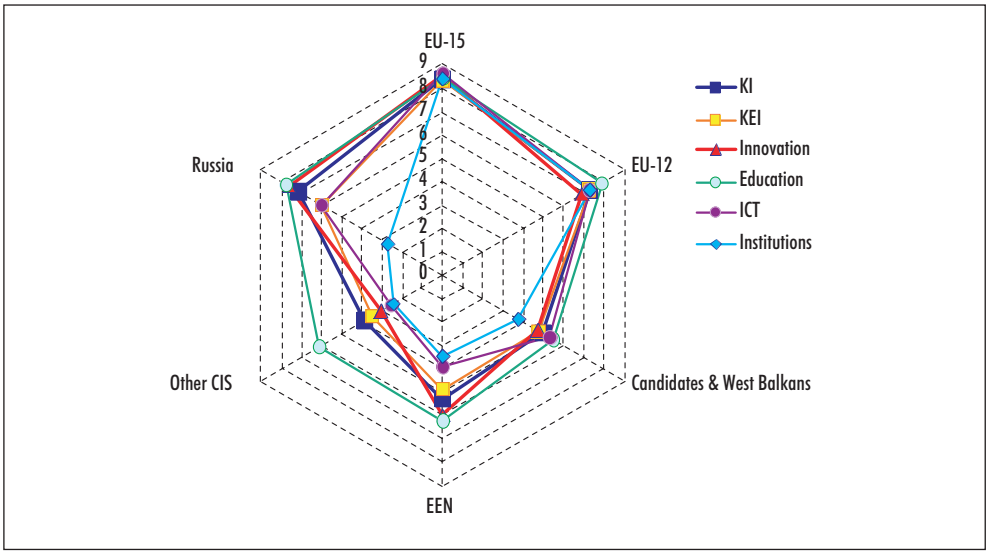
Russia, followed by Candidates and West Balkans, EEN and other CIS members. Differences within EEN group are significant: score for Belarus is as high as the Candidates' median, with Ukrainian scores also close to this country group. Within Candidates group, the general level is very low, with Croatia alone approaching the lowest scores in the EU12 group.

In "Innovation systems" relative positions of country groups change: the closest neighbor of EU15 is Russia, followed in turn by EU12, EEN, and Candidates & West Balkans' group, with the worst results demonstrated by Central Asian CIS. Individual country scores for most of EENs (excluding Moldova) stay quite close to some of the EU12 (e.g. Latvia, Bulgaria, Romania).

As could be expected, country groups' distribution within Education pillar demonstrates that scores for EU12 and Russia are almost equal, with EEN and other CIS countries also exhibiting lower, but very similar results, whereas the Candidates & West Balkans are only catching up (due to extremely low scores displayed by Albania and Turkey). Scores for individual EEN countries are rather aligned (excluding Moldova and Azerbaijan which have lower country scores) and are much the same as e.g. for Romania, Bulgaria, or Slovakia.

The Institutions pillar demonstrates a most diverse picture. After EU12, which are naturally located quite close to EU15, we can observe a gap of 3.5 points wide. Candidates & West Balkans appear to be the nearest neighbors to EU12, followed by EENs with very similar median score. Scores for Russia and other CIS are very close, but lag substantially behind. Naturally, scores for individual Candidates and EENs are

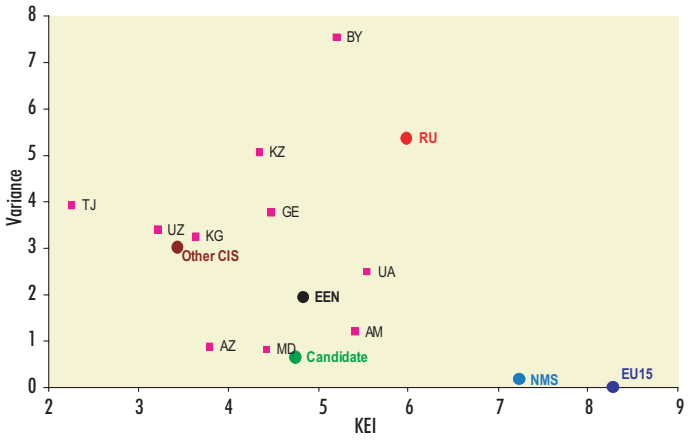
Fig. I.11. Country groups across KI, KEI and constituent pillars



quire different. If it were not for Croatia and Turkey (in the group of Candidate countries) and Armenia and Ukraine (EENs) that either exceed or are equal to respective scores for Bulgaria and Romania (EU12), the gap between the respective country groups would have been considerably larger.

Fig. I.11 provides a different angle of analysis by transposing the same analyzed variables across country groups. In particular, the figure vividly demonstrates that the least developed pillar in all FSU countries, and particularly in Russia, is "Economic incentives and institutional regime". This sphere appears to be least developed in the Candidate countries as well. This stands in contrast to EU12 where Institution pillar is the second most developed after Education.

Fig. I.12. KEI variance across countries and country groups

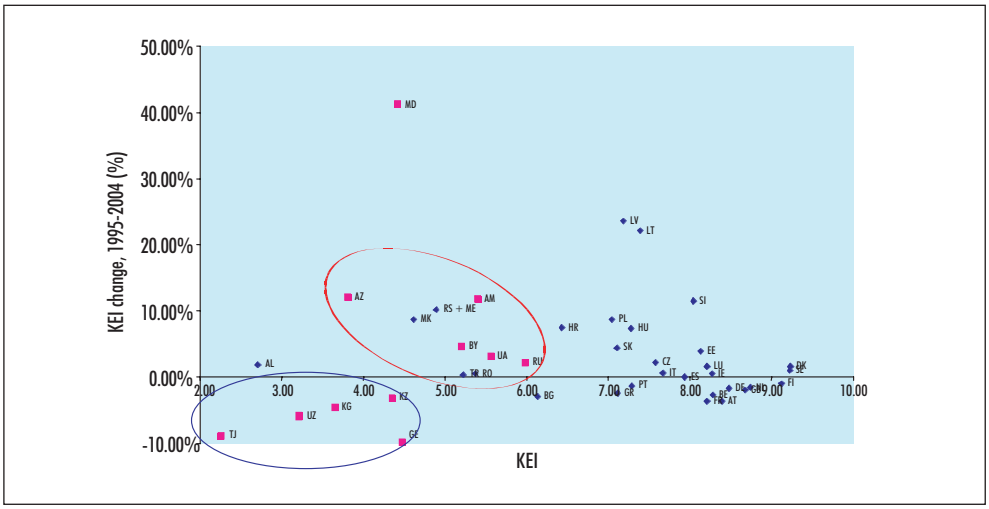


The four constituent pillars of KEI provide further insight into the relative innovation strengths and weaknesses of European countries. Many of these countries are characterized by an extremely uneven development of innovation dimensions. This is especially characteristic of Russia, Central Asia CIS and EENs (Fig. I.12). On the other hand, the spread of KEI pillars' scores is minimal for EU15 and EU12, and is just slightly larger for Candidate countries. Meanwhile, recent evidence suggests that countries with an even performance on each of the key innovation dimensions perform better overall than countries with an uneven distribution, since a 'blockage' in one field, such as poor knowledge creation, could prevent progress. This suggests, in particular for countries lagging behind, that given equal costs, policy would be more effective in improving overall innovation performance by concentrating on improving areas of weakness rather than on making further improvements to areas of strength[107].

[107] EC (2006). European Innovation Progress Report 2006. Luxembourg.

At Fig. I.13 KEI countries' scores are plotted against KEI percentage change over the preceding decade. That could introduce an intertemporal dimension into our analysis, providing some insight at the prospects of EEN catching up with EU in terms of innovation performance.

Fig. I.13. KEI trends



The figure shows the current innovation performance as measured by the KEI on the horizontal axis against the short-run trend performance of the KEI on the vertical axis. This enables us to select, from the viewpoint of the EU/EEN gap, at least two distinct groups of countries. The first one includes countries with below the average KEI scores but with an average or above average trend performance (Belarus, Ukraine, Russia, Armenia and Azerbaijan); the countries belonging to the second group have below average KEI values and a below average negative trend (Georgia and Central Asian CIS). It is evident that the first group members are more likely to catch up, at least in the long run, while another group is falling further behind.

Conclusions

(1) A comparison of differences in the four pillars underlying knowledge economy potential of the country groups analyzed drives us to a conclusion that in a number of FSU countries (e.g. Russia, Ukraine, Belarus), as well as in the former Yugoslav countries (Serbia, Croatia), the inherited research potential and human capital provide incentives for a revival of their innovation capacity. However, absorptive capacity remains low in all EEN (and moreover in FSU in general). A high variance in underlying pillar scores provides support for such a conclusion.

(2) An evident competitive advantage of Russia and EEN countries is a fairly high human capital stock. However, there is an obvious mismatch between the number of researchers employed in the region and the results of their activity (at least in the form of publications or patents registered), as well as low expenditures on R&D.

(3) A high variance of underlying pillar scores in EEN countries is to a great extent affected by striking gaps in institutional and economic incentives regime. It might well be that a country has a fairly high education level and a fairly well developed ICT infrastructure, but its institutional regime is so weak that it presents a severe bottleneck for a further innovation absorption and development. The evident shortcomings of the institutional framework, as well as inadequate governmental resources to support R&D and innovation are the major handicaps.

(4) Most general features of innovation performance that could be captured by the analysis of sets of available comparable indicators are only a top of the iceberg of serious problems and striking gaps existing in this sphere. Due to a lack of reliable and comparable data we could not provide any sound analysis on the structure of R&D expenditures (applied research vs. fundamental science, public vs. private expenditures, defense-oriented vs. non-military research, and especially on commercial investment potential). Still, anecdotal evidence leads us to believe that principle differences existing in different fields of research between groups of countries are not a reflection of the unique course in innovation process, but rather a reflection of inadequate reforming and restructuring of R&D sector. One of numerous examples is the proportion of applied research with a high commercial potential which is in fact tremendously low compared to developed countries. Poor institutional environment and low entrepreneurship potential discourage private R&D in companies; public participation in funding private industrial R&D and commercialization of innovative ideas are also low, which markedly reduces an overall national innovation capacity.

IV.4. Gaps in environmental performance

The state of the environment in the CEE and EEN countries is to a great extent affected by the common challenges these countries are facing, including *inter alia*: persistence of inefficient polluting production structures; relatively extensive but deteriorated environmental infrastructure; unenforceable regulations; enforcement systems focused on punitive actions; a culture of top-down environmental management[108].

[108] OECD (2005). Environmental Management in Eastern Europe, Caucasus and Central Asia.

The geographical region analyzed is far from being homogeneous. Countries differ in natural capital endowments, degree of urbanization, economic structure and response capacity. In the more urbanized CEE countries, pollution issues are generally more important, while in the poorer countries, like Azerbaijan[109] or Moldova, natural resources management linked to the productivity of agriculture tends to be more prominent. While assessing specific differences in the state of the environment and environmental management of the country groups analyzed we should take into consideration that, on the one hand, the more developed the country is the greater environmental pressure it usually produces (remembering about huge variations in per capita income). On the other hand, common sense and recent studies prove that increased wealth is a prerequisite for environmental improvements[110]. Several empirical studies have likewise shown that wealth is an important factor in explaining environmental policy results, but not alone determinative of environmental policy[111].

In theory at least, the transition process is consistent with an overall improvement in environmental quality. The above conclusion would most likely hold in the very long run[112]. However, in the short- and medium-run, the consequences of transition are far from being obvious. Major closely interrelated current trends in the state of the environment and environmental management in the CEE and EEN countries, identified by scholars and international experts, could be summarized as follows:

(1) Pollution (and environmental pressure in general) has sharply decreased in most CEE/NIS because of a deep decline of traditional industrial output (scale effect). The scale effect virtually dominates composition effects in all countries for all pollutants. The magnitude of this effect, however, is varied: in some countries (e.g. Russia and Ukraine) pollution was not reduced proportionately to the decrease in GDP, while in most CEE countries the trend was the opposite one[113].

(2) The new manufacturing specialization varies a lot by country, and no clear general pattern on transition and pollution can be easily identified (composition effect). In many countries, resources have been transferred from heavy manufacturing industries (iron and steel) towards lighter industries and less polluting sectors (food, beverage and tobacco products)[114]. Despite these heterogeneous patterns, two differential tendencies could be identified:

[109] An emerging important environmental issue in Azerbaijan is that of pollution of the Caspian Sea related to developing oil and gas production on the Caspian shelf and its impact upon the valuable marine biological resources.

[110] Grossman, Gene M. and Alan B. Krueger (1995). "Economic Growth and the Environment." *Quarterly Journal of Economics*, CX(2): 353-77.

[111] Esty, Daniel C. and Michael E. Porter (2005). "National Environmental Performance: an Empirical Analysis of Policy Results and Determinants." *Journal of Environmental Development Economics*, vol. 10, pp. 391–434.

[112] Vukina T., J.C. Beghin, E. G. Solakoglu (1999). "Transition to markets and the environment: Effects of the change in the composition of manufacturing output", *Environment and Development Economics*, Vol. 4, pp. 582-598.

[113] Golub A., D. Dudek, E. Strukova (2003). Environmental Protection in Transition Economies: The Need for Economic Analysis. Environmental Defense.

- a trend towards cleaner manufacturing (in Armenia, Hungary, Macedonia, Poland, and to a lesser extent Slovenia) that shows consistent environmental improvements in the composition of manufacturing output with respect to most pollution emission types, except for VOC and BOD;
- a shift towards dirtier sectors based on heavy manufacturing (Azerbaijan, Bulgaria, Kyrgyzstan, Latvia, Slovakia, and Ukraine). For these countries, the compositional changes of manufacturing output were mostly environmentally harmful[115].

(3) In several countries market reforms driving enterprise restructuring and privatization had a beneficial effect on reducing the energy consumption per dollar of GDP and pollution per unit of production (Hungary, Latvia, Poland, Armenia, Belarus). In other countries that expanded their energy and/or petroleum-refining activities, energy and pollution intensities of their industries have remained relatively stable or even increased (e.g. Russia, Azerbaijan, Bulgaria). This was the result of the two opposite and mutually canceling trends: (a) increasing shares of pollution-intensive sectors such as metal smelting and oil production vs. less pollution intensive manufacturing and (b) decline in pollution intensities within several industrial sectors[116].

(4) In some countries of the region, there is a legacy of soil contaminated by heavy metals and stockpiles of pesticides and hazardous toxic waste; fine particulate matter and lead are the main pollutants, and transport is responsible for up to 70% of emissions. Emission levels of fine particulate matter are not being monitored at present, but leaded gasoline has been phased out in five EEN countries and in Russia[117].

(5) Evident reduction of environmental pressures was accompanied by a budgetary crisis that affected the capacity to maintain environmental infrastructure, and induced environment agencies to focus on raising revenue rather than on changing the enterprises' behavior.

(6) In NMS, the desire to join the European Union acted as a powerful impetus for environmental improvement and adaptation of the Union's strict environmental standards. On the other hand, many CIS countries still have limited access to international experience on environmental management outside the region and

[114] These compositional changes towards lighter industries have been accompanied by increases in biological oxygen demand (BOD) and volatile organic compounds (VOC) emissions, but decreases in bio-accumulative emissions (e.g. toxic metals) released in soil and air.

[115] Vukina T., J.C. Beghin, E.G. Solakoglu (1999), op. cit.

[116] Cherp A., I. Kopteva, R. Mnatsakanian (2003). "Economic transition and environmental sustainability: effects of economic restructuring on air pollution in the Russian Federation", *Journal of Environmental Management*, vol. 68, No. 2, pp. 141-151.

[117] OECD (2005). Environmental Management in Eastern Europe, Caucasus and Central Asia.

place low priority to environmental issues in the political agenda. Environmental authorities have weakened considerably vis-à-vis powerful industrial interests. The regulatory framework is still poorly developed, municipalities cannot afford the required investments, and there are obstacles to inter-municipal co-operation. Likewise, public has generally lost interest to environmental issues, and these stay at the bottom of the public list of priorities, overshadowed by other more important concerns.

Selected Indicators

To quantify the existing gaps in the environmental dimension, we have selected **Environmental Sustainability Index** (ESI) which provides a composite profile of national environmental stewardship based on a compilation of 21 indicators that derive from 76 underlying data sets for 146 countries[118]. The 21 indicators are compiled into five constituent components of the ESI:

- Environmental Systems,
- Reducing Environmental Stresses,
- Reducing Human Vulnerability to Environmental Stresses,
- Societal and Institutional Capacity to Respond to Environmental Challenges,
- Global Stewardship.

These components, as well as values and rankings of the ESI itself provide a clear picture of natural resource endowments, past and present pollution levels, environmental management efforts, and the capacity of a society to improve its environmental performance.

To assess the quality of environmental systems in the countries analyzed, we have selected the two sets of indicators reflecting environmental issues important for most countries under review:

- *Air Quality* (SYS_AIR) indicator integrating the following variables: Urban population weighted NO2 concentration; Urban population weighted SO_2 concentration; Urban population weighted Total Suspended Particulates (TSP) concentration; Indoor air pollution from solid fuel use.
- *Water Quality* (SYS_WQL) indicator integrating the following variables: Dissolved oxygen concentration, Electrical conductivity, Phosphorus concentration, Suspended solids.

[118] *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*. Yale Center for Environmental Law and Policy (Yale University); Center for International Earth Science Information Network (Columbia University).

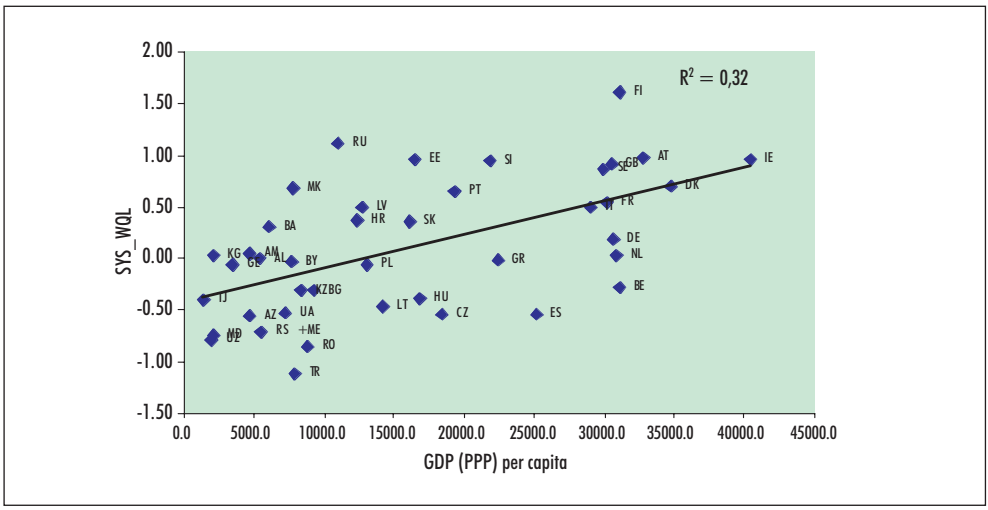
The other two indicators reflect efforts undertaken by countries to reduce environmental stress:

- *Reducing Air Pollution* (STR_AIR) integrating the following variables: Anthropogenic NOx emissions per populated land area; Anthropogenic SO_2 emissions per populated land area; Anthropogenic volatile organic compounds (VOC) emissions per populated land area; Coal consumption per populated land area; and Vehicles in use per populated land area.
- *Reducing Water Stress* (STR_WAT) integrating the following variables: Industrial organic water pollutant (BOD) emissions per available freshwater; Fertilizer consumption per hectare of arable land; Pesticide consumption per hectare of arable land; Percentage of country under severe water stress.

Main gaps revealed

The two selected variables reflecting the degree of environmental stress show considerable differences across countries and groups of countries. The regression of the two variables' scores on GDP (PPP) per capita provides an illustration of the relative position of different countries with regard to environmental quality and income (see Figs. E.1-E.2).

Fig. E.1. Regression of Water Quality indicator on GDP (PPP) per capita.



As Fig. E.1 suggests, water quality is well correlated with per capita income, and almost 1/3 of the variance of the water quality indicator is accounted for by per capita GDP. At the same time, some countries (notably Russia, as well as Estonia and Slovenia) perform much better in terms of water quality than their per capita income

would suggest. On the other hand, several EEN (Azerbaijan, Ukraine, and Moldova) and candidate (Turkey and Serbia) countries fall well below the regression line – indicating sub-par performance given their level of wealth. Most probably, these striking gaps are accounted for not only by variance in the degree of pollution combating efforts, but rather by natural differences in abundance (shortage) of water resources and correspondingly in the assimilative capacity of water environment.

Fig. E.2. Regression of Air Quality indicator on GDP (PPP) per capita

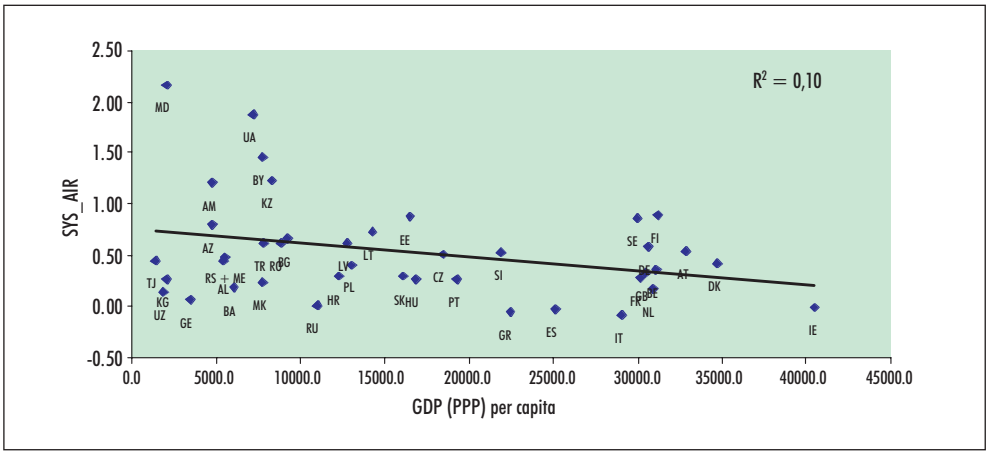


Fig. E.2 illustrates the case when no clear-cut causal relationship could be traced between the two variables – income and air pollution indicators. It is evident, however, that the state of atmospheric environment tends to be worse in the poorer FSU countries (Georgia, Kyrgyzstan, Uzbekistan) and lower middle income candidate countries (Turkey, Albania, Bosnia, etc.) – with some notable exceptions both on the positive (Moldova) and negative (Russia) sides.

Figures E.3 and E.4 exemplify the cases with a more or less pronounced inverse statistical relationship between wealth and environmental results. This correlation most probably stems from the nature of indicators themselves which are based on emissions (discharges) per unit of land area or volume of freshwater available. Since wealthier countries (EU15) tend to have much higher population (and economy) densities and lower water resources availability compared to their Eastern neighbors, even substantially decreased emissions could still result in low indicator scores. This is especially true in the case of air emissions, the major sources of which (automobiles and energy production) are to a much greater extent associated with GDP per capita in comparison to water discharges that mostly originate as a result of agricultural activities.

The above figures reflect an important fact that the EEN countries do not necessarily lag behind EU-15 or NMS in environmental results, primarily due to their

Fig. E.3. Regression of Reducing Air Pollution indicator on GDP (PPP) per capita

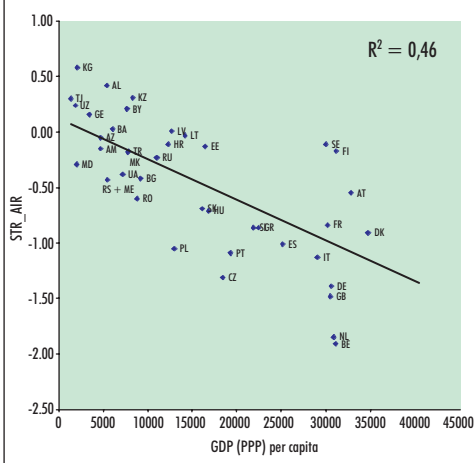
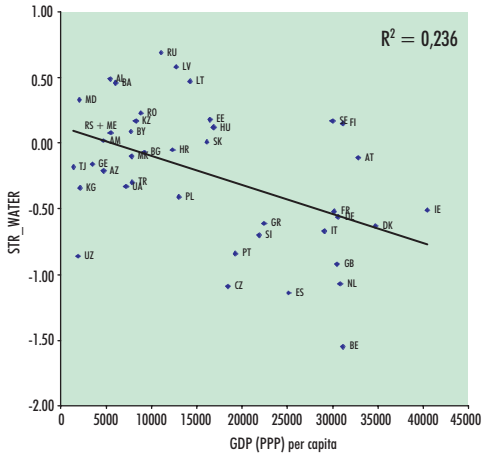


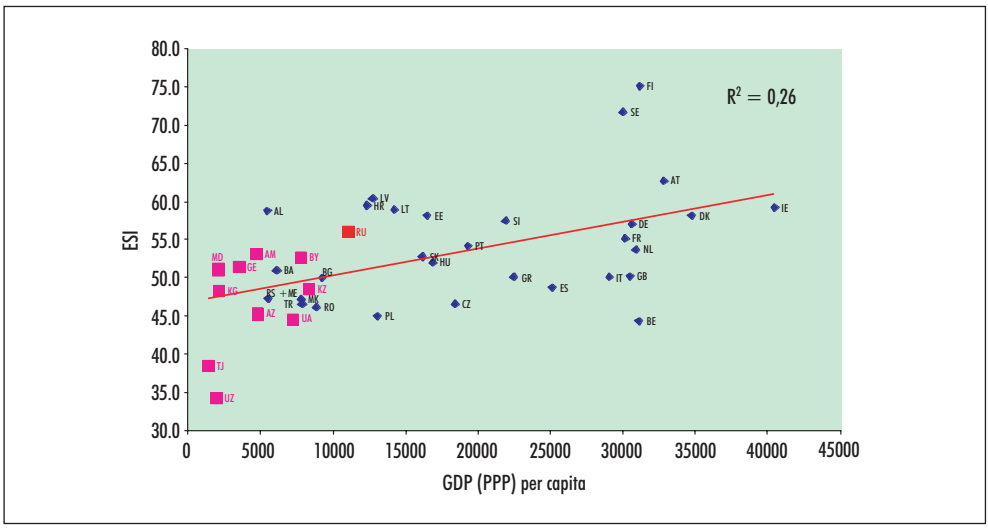
Fig. E.4. Regression of Reducing Water Stress indicator on GDP (PPP) per capita



lower population densities and higher environmental capacities. This observation, however, would probably not hold when we move to a lower (regional, subregional) level of generalization, since well-known pollution "hot spots" are highly concentrated in several industrial regions of FSU countries.

The composite index (ESI) score *per se* quantifies the likelihood that a country will be able to preserve valuable environmental resources effectively over the period of several decades. It enables us to make conclusions regarding and to compare the

Fig. E.5. Regression of ESI values on GDP (PPP) per capita



countries' potential to avoid major environmental deterioration. It is worth noting that ESI scores for the countries analyzed are positively (closer than in the world in general) correlated with GDP per capita (R^2 = 0.26 compared to R^2 = 0,23 for a set of 146 countries, see Fig. E.5). This result suggests that, overall, low incomes per capita do not stimulate environmental performance; on the contrary, high-income countries surpass low-income ones in this respect by investing more in pollution control and other environmental amenities.

Fig. E.6. Regression of Human Vulnerability component on GDP (PPP) per capita

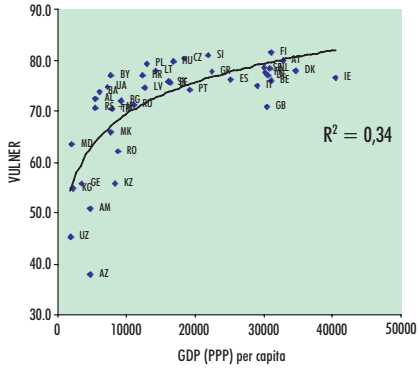


Fig. E.7. Regression of Institutional Capacity component on GDP (PPP) per capita

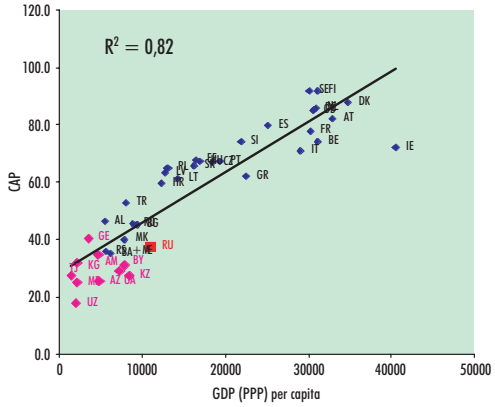
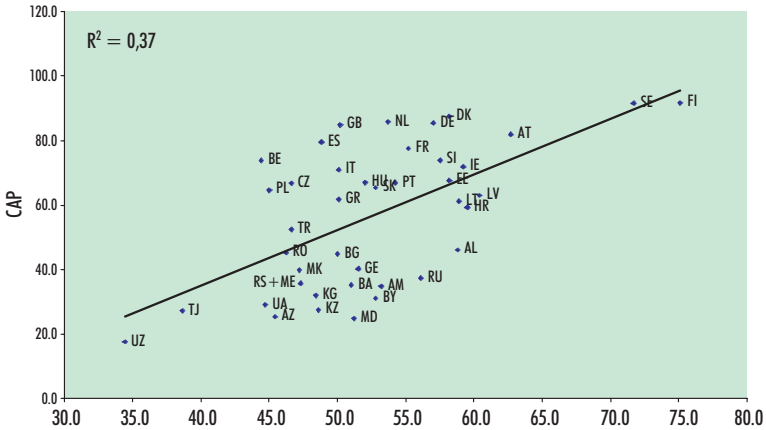


Fig. E.8. Regression of Institutional Capacity component on ESI



A more precise picture of the relationship to per capita income could be obtained by examining the five ESI components. The highest positive correlations are between GDP per capita and the ESI's Human Vulnerability (Fig. E.6) and especially Institutional Capacity (Fig. E.7) components. As was shown above (Figs. E.3-E.4), the correlation is negative for environmental stresses, meaning that high-income countries are likely to put more stress on their environments than low-income ones.

Analysis of available variables leads us to an important conclusion: the size of the gap in environmental performance and sustainability between EU-15 and EEN/Russia is most probably closely related to institutional factor. Overall ESI scores are positively correlated not only with Institutional Capacity component ($R^2 = 0.37$, Fig. E.8), but with its underlying variables as well – government effectiveness, rule of law, participation in international environmental agreements, civil and political liberties, democratic institutions, suggesting that countries where robust political debate takes place – facilitated by fair elections, free speech, engaged press, active NGOs, vibrant legislatures, etc. – are more likely to focus on environmental challenges. Striking is the fact that at Fig. E.8 virtually all of FSU countries could be seen well below the regression line – indicating that it is the governance factor that is critical for their below average environmental performance.

The statistical indicators analyzed go well together with anecdotal evidence of poor environmental legislation enforcement, inconsistent policies and inadequate environmental institutions in EEN/Russia. Across the region, legislation is extensive but largely inconsistent and unenforceable. Environmental policies are neither effective nor efficient in stimulating significant environmental improvements, and policy instruments still present serious shortcomings. Although a broad range of environmental management instruments is being used, the current policy packages are not aimed at achieving specific targets and are not streamlined. Weak, and weakening, institutions are deprived of incentives to achieve environmental objectives (weak authority, out-dated management and decision-making practices, scarcity of resources, high turnover of professionals and frequent restructuring, etc). Cooperation on the issues of mutual interest remains difficult, even in cases when the necessity is obvious (e.g. in the Aral and Caspian Seas)[119]. Public participation impact is of low significance, levels of public awareness and participation are low and many governments are still reluctant to allow for such participation.

Attempt at typology

Available ESI components' scores provide a possibility to identify the major bottlenecks in environmental performance of the countries. Following the logic of

[119] OECD (2005). Environmental Management in Eastern Europe, Caucasus and Central Asia.

analysis provided by the authors of the ESI Report, we can conduct a cluster analysis which identifies statistically related groups of countries based on the similarity of indicator scores. As a result of the analysis, five country groupings were outlined, revealing clear linkages between group membership and the average performance along the five ESI components (Table E.1).

Table E.1 Cluster Analysis Results[120]

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Low system & stress scores; low vulnerability & high capacity; moderate stewardship	Above average system score; low vulnerability; high capacity; moderate stress & stewardship	Moderate system, stress, & capacity scores; low vulnerability & stewardship	Moderate system, stress, & vulnerability scores; low capacity & stewardship	Low system score; moderate stress, vulnerability, capacity & stewardship
EU 15	Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Spain, UK, Portugal	Sweden, Finland	Greece		
NMS	Slovenia		Czech Rep., Estonia, Latvia, Lithuania, Slovakia, Bulgaria, Hungary, Romania, Poland		
Candidates and potential candidates			Bosnia and Herzegovina. Macedonia, Serbia & Montenegro, Croatia, Turkey		Albania
EEN & Russia				Russia, Armenia, Azerbaijan, Belarus, Moldova, Ukraine	Georgia
Other CIS				Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, Uzbekistan	

Cluster 1 represents relatively high population density industrialized countries (mostly EU-15) with above average social and institutional capacity, sharing high to moderately high ESI scores. Distinct from the first set, Cluster 2 is formed by developed (Nordic) countries with low population density, low levels of vulnerability and well-developed institutional capacity. Despite comparable per capita incomes and good environmental governance, the average ESI scores for cluster 2 are markedly higher than for cluster 1 due to a much higher absorptive capacity of the environments of the second country group.

Cluster 3 encompasses virtually all of the EU-12 and candidate countries which have moderate incomes and similar patterns of development with a moderate state of environmental systems but relatively high environmental stresses (which might be a legacy of their former economic systems as well as their high average population density), and relatively low human vulnerability.

[120] 2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship.

Cluster 4 includes Russia and most ecologically burdened of the former republics of the Soviet Union who have average state of environmental systems, average stresses and human vulnerability to environmental shocks, but very low Social and Institutional Capacity and Global Stewardship scores. As a result, this country group has the lowest average ESI scores across the five clusters.

Finally, Cluster 5 groups the least-developed countries of the region, which are experiencing relatively low environmental stress, but have very weak institutional capacity and are particularly vulnerable to natural disasters, undernourishment, and lack of sanitation and safe water supply.

IV.5. Institutional dimension of the development gap: analysis of indicators

The main purpose of this section is to benchmark the EU neighborhood countries across an array of institutional dimensions that are known to be critical determinants of economic growth and income convergence. These areas also served to define a "functioning market economy" and "capacity to withstand competitive pressures and market forces" mentioned in the Copenhagen criteria. The analysis thus should highlight the relative positioning of the EEN compared to the NMS, regarding their readiness for starting a convergence process with the EU.

Although the fact that institutions are the most important and universal determinant of economic and human development of nations was theoretically considered since Adam Smith, only recently scholars came to approaching a general answer on the question: what particular kinds of institutions are responsible for persistence and even widening of the development gap between a small group of countries that constitute the core of contemporary world economy, and the rest of the world[121].

The most clear and comprehensive approach was recently put forward by North, Wallis, and Weingast[122]. They have distinguished all contemporary constituent systems, composed of economic, political, military, and religious components (all together called *social orders*) – between those belonging to what they call a **"limited access order"**, and the ones belonging to an "**open access order",** that is the one based on competition in politics and economy[123].

[121] North, D. (1990) „Institutions, Institutions Change and Economic Performance", Cambridge University Press; Easterly, W. and R. Levine (2000). "It's Not Factor Accumulation: Stylized Facts and Growth Models", World Bank working paper series (http://www.worldbank.org/research/growth/pdfiles/fact%20final.pdf), and many other works.

[122] North, D., J.J. Wallis, and B.R. Weingast (2005). "The Natural State: The Political-Economy Of Non-Development" (http://www.international.ucla.edu/cms/files/PERG.North.pdf).

Under a "limited access order" the firms cannot be treated fairly (hence, uniformly), but always compete for various formal and informal privileges[124]. In statistical terms it means that the variations of responses concerning the business environment and some other parameters should be significantly higher under the limited access order, and this variation should decline under transition.

The theory predicts that "open access" countries should outperform the "limited access" ones at least in the following kinds of indicators:

1) Political: freedom of media; freedom, regularity, and fairness of election; trust in political system; plurality of political parties, transparency, accountability, and the like. These are standard democratic norms securing openness of the political system.
2) Competition and "fairness": easiness of starting a business; trade openness (as opposed to protectionism); competition policies, etc.
3) Business environment: complying with regulations; legal protection; access to capital; and other tools that potentially can be used for restriction of business entry in a broad meaning discussed above.
4) Corruption – in all of spheres mentioned above, and corruption *per se* (embezzlement, extortion, and so on) can characterize the integral effect of the quality of public service and burdensomeness of regulations (if applicable). Although corruption is not a necessary component of a "natural state", we can argue that such kind of state can sustain higher level of corruption than an "open access" one. For this reason, reduction in corruption to certain level is a necessary condition for joining a club of the most advanced countries.

When applying a concept of transition from a "limited access order" to an "open access" one[125] we should remember that the countries under analysis are undergoing a very special kind of transition and in fact neither the USSR nor other countries of the communist block were natural states in the full meaning, thus responds could be different. Besides, the countries analyzed are currently at different stages of transition from a limited access order to an open access one[126].

Proceeding from historically inherited differences in the culture of governance (see Section II), we hypothesize that the main gap in governance and related indicators should be observed roughly at the borders of USSR/Russian Empire.

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[123] North, D.C., J.J. Wallis, and B.R. Weingast (2006). "A Conceptual Framework For Interpreting Recorded Human History", NBER Working Paper #12795 (http://www.nber.org/papers/w12795).
[124] North, Wallis, and Weingast (2005), op. cit.
[125] North, Wallis, and Weingast (2006), op. cit.
[126] North, Wallis, and Weingast (2005), op. cit.

By the above listed criteria the EU15 countries should appear the most "open"; NMS should, on average, appear somewhat more "closed"; the "candidates" should occupy an intermediate position; and the CIS countries should in most cases close the list. The most intriguing questions are, however: (1) are the EEN significantly different from the rest of CIS; (2) are the EEN more or less "advanced" than the candidates; and (3) where the main "gap" is – between the NMS and EU15, or between NMS and candidates or EEN countries? In which of the abovementioned dimensions the institutional gap is most visible?

For empirical analysis we used the World Bank Institute's Governance Indicators (GI); the most recent (2006) data of the World Economic Forum's Global Executive Opinion Survey (GEOS); the World Bank/IFC Enterprise Survey (ES) (only five of the EU15 countries are covered); the World Bank's Cost of Doing Business (CODB) survey, and The Freedom House „Freedom in the World" ratings (FH).

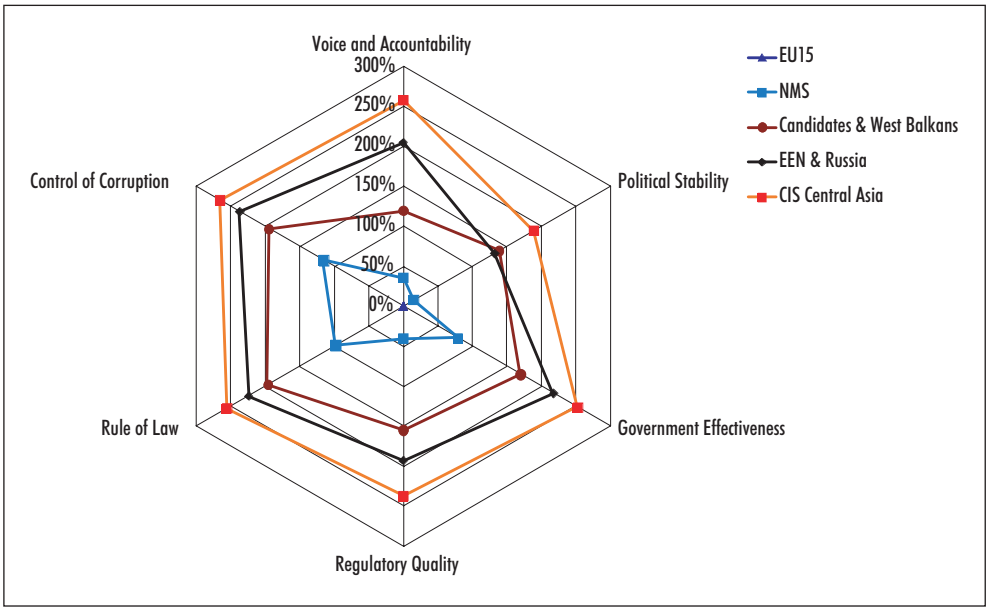
To produce a visual illustration of sound differences in specific components (responses) that characterize different aspects of institutional development for each of the country groups, we have chosen a uniform way of data procession. We have calculated averages of scores for each country group and then took their percentage ratios to EU15 score. The results reflect the "distances" between the specified country group and EU15, or the magnitude of the gap and are presented in a graphic (radar) form. Zero point corresponds to EU15 average, while locations of the respective country group scores are determined by their "distance" from the EU15 group.

The overall status quo of gaps existing in various components of institutional development could be drawn from the World Bank Institute's Governance Indicators (GI), where governance quality is measured according to six broad areas[127]. These areas are: voice and accountability, rule of law, control of corruption, regulatory quality, political stability and government effectiveness. The quality of governance determines to a great extent the attractiveness of the business environment for investment and production. Good governance makes it easier to start, run and close a business; it reduces transaction costs and improves the predictability in the application of government rules and regulations. Relative distances between the country groups are shown at Fig. D.1.

The results obtained seem to be fully in line with our hypothesis. Since this figure reflects an aggregate picture of "total" gaps existing in institutional dimension, across all spheres covered by these indices EEN countries occupy an intermediate position between the group of candidates and the group of Central Asian CIS which is most distant from the EU15. EEN/Russia group is the most "close" to EU15 in political stability, with the furthermost distances in rule of law and control of corruption.

[127] Kaufmann D., A. Kraay, M. Mastruzzi (2003). "Governance Matters III: Governance Indicators for 1996-2002". The World Bank. June 30.

Fig. D.1. World Bank Institute's Governance Indicators



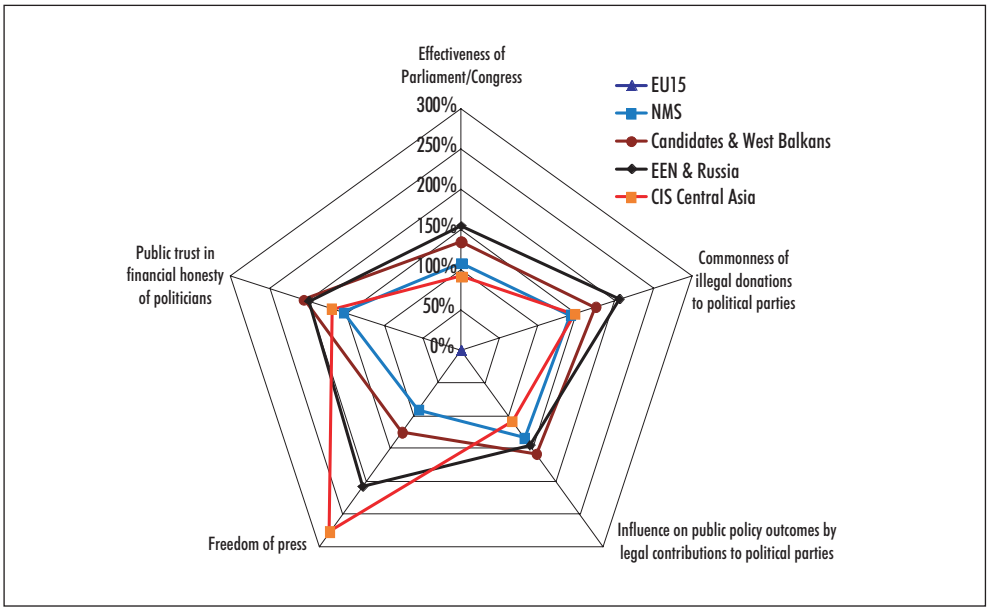
A more detailed incite could be driven from responses contained in World Economic Forum's Global Executive Opinion Survey (GEOS) and the World Bank/IFC Enterprise Survey (ES). The results are not entirely the same and relative distances between country groups in these datasets could vary a great deal. Still, the overall conclusions remain very similar. Further on, we discuss the results obtained by selected components of the institutional dimension, and provide illustrations of the existing differences between the groups of countries analyzed.

Political institutions

GEOS data on polity component are plotted at Fig. D.2. that reflects "distances" dividing the country groups analyzed from EU15 (EU15 = 0) across five specific polity areas (1) effectiveness of Parliament/Congress; (2) commonness of illegal donations to political parties; (3) influence on specific public policy outcomes by means of legal contributions to political parties; (4) freedom of press, and (5) public trust in the financial honesty of politicians.

In the Polity component, by all of considered indicators but freedom of press, the gaps between EU15 and NMS are nearly twice as wide as the ones between NMS and EEN/Russia, with Candidates appearing in the middle (having mostly insignificant differences to both groups). Differences between Candidates group, EEN, and Central Asian CIS are generally quite low. In the case of impact of legal political contribution, the NMS/EEN gap is statistically insignificant, while Central Asian CIS even have a

Fig. D.2. Political institutions



small but significant advantage over the EEN. However, this may be the case when the same formal institutions work in different ways.

The NMS and Candidates are closer to EU15 in freedom of press, and respectively the major (and the widest) gap lies on the border of the CIS. However, individual scores for Ukraine and Georgia are close to NMS. In public trust in financial honesty of politicians, the distance between EU15 and NMS is the largest, as well as the one between NMS and EEN/Russia.

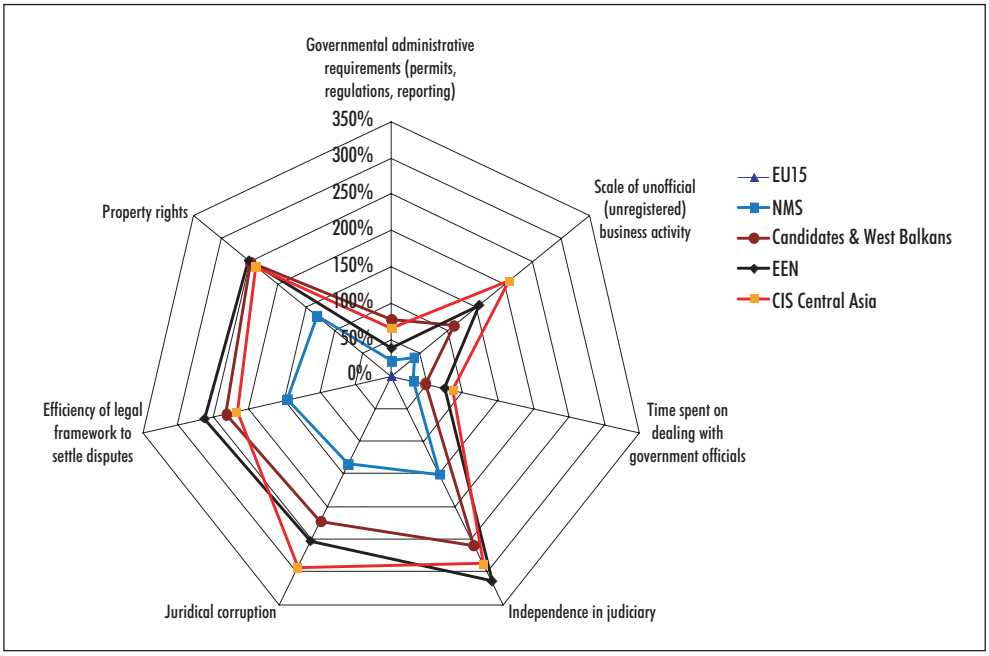
If we turn to GI "Voice and accountability" indicator (Fig. D.1) we would find that the outline of differences in the aggregate form is almost the same, although the gap between NMS and EU15 is much narrower than the one between NMS and EEN, with Candidates appearing in between (while for other indicators the differences between EEN and Candidates are much smaller). Also insignificant appear the gaps in political stability between EEN and Candidates. Overall, the most substantial gap here lies between the latter two and NMS.

Relative FH indices reveal a very similar picture: NMS and EU15 appear quite close, the EEN and CIS indistinguishable by most parameters, both significantly worse than the leaders; and Candidates in between these two groups. However, low scores of EEN are mostly caused by Belarus, with Ukraine, Georgia and Moldova being not worse than the EU Candidates.

Regulations & Legal protection

For **Regulatory Burden** component, we have selected from GEOS the following variables: (1) governmental administrative requirements (permits, regulations, reporting); (2) scale of unofficial or unregistered business activity, and (3) time spent on dealing/negotiating with government officials (see Fig. D.3)

Fig. D.3. Regulations and Legal protection components



Analysis shows that compliance with regulations is most burdensome in the EU candidates (as compared to EU15 average), with EEN being very close to EU12 average. In terms of the time tax EEN is still significantly worse than Candidates, and the rest are indistinguishable. Unregistered business activities are perceived to be almost equally rare in both parts of EU, while EEN and Candidates are statistically very close, both significantly worse than the EU.

By World Bank/IFC Enterprise Survey (ES), on the contrary, the main and really wide (more than twofold) gap in time tax appears between Candidates and the EU countries, with the EU15 and NMS being remarkably close; EEN are significantly worse than EU15, and 56% worse than NMS. The inconsistency in results between the two surveys should most probably be attributed to the differences in their methodologies. Predictability and consistency of interpretations of regulations is almost equally good in Central Asia, Candidates and EU15, while being significantly more problematic in the NMS and EEN.

According to WB CODB survey, dealing with licenses (the most relevant indicator with regard to business entry) takes significantly more time in Candidates and CIS than in EU15, and requires significantly more procedures in all other groups than in the EU15.

The selected GEOS **Legal Protection** variables, also displayed at Fig. D.3, include: 1) independence in judiciary, 2) juridical corruption, 3) efficiency of the legal framework for private businesses to settle disputes, and 4) protection of property rights, including over financial assets.

In courts' independence, no significant differences were found between EEN and Central Asian CIS, while the gap observed between the latter two and NMS is one of the largest. NMS countries generally appear almost in the middle between EEN and EU15, with an important exception of, again, independence in judiciary where the EEN/NMS gap is wider by half than the one between NMS and EU15. In juridical corruption, and notably in protection of property rights EEN countries are virtually indistinguishable in these characteristics from Candidates and CA CIS, while the largest gaps are between these and NMS, and NMS and EU15.

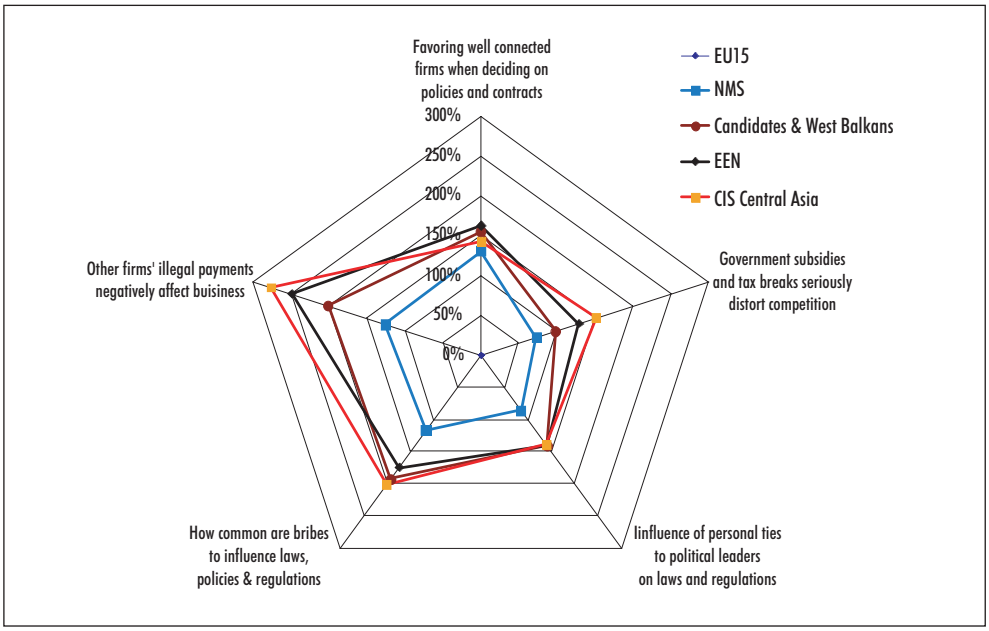
With respect to legal protection, CODB database focuses on contract enforcement. Here, differences between NMS and EU15, as well as between Candidates and NMS are insignificant; EEN have the same number of procedures as NMS (and about 20% more than EU15), but they take nearly twice less time in EENs than in both categories of EU countries, while bearing on average about 40% more in costs. In Central Asia, contract enforcement is almost equally costly as in EU15, but most burdensome in terms of procedures.

Fairness

For the analysis of the Fairness component, we have selected from GEOS questionnaire (and plotted at Fig. D.4) the following variables:

1) When deciding upon policies and contracts, government officials usually favour well connected firms and individuals, or stay neutral;
2) Distortion of competition by government subsidies and taxes;
3) Impact of personal ties to political leaders on laws and regulations that have a substantial impact on business;
4) In your industry, how commonly would you estimate that firms make undocumented extra payments or bribes connected with the influencing of laws, policies, regulations or decrees to favour selected business interests;
5) Do other firms' illegal payments to influence government policies, laws or regulations impose costs or otherwise negatively affect your firm.

Fig. D.4. Fairness



For most of indicators, EEN scores are statistically indistinguishable from Candidates and Central Asian CIS. Differences between NMS and Candidates are also insignificant in favoritism and distortions of competition. Most of indicators characterizing favoritism and state capture in the treatment of firms by the government demonstrate significant but not very wide gaps between EU15/NMS/EEN groups of countries, with the ones for EU15/NMS tending to be somewhat larger. The exception is the question on favoritism for well connected firms that relates also to procurement: the gap between EEN and EU15 is 3.5 times wider than the one between NMS and EEN. This corresponds well to the answers concerning corruption in procurement.

Corruption

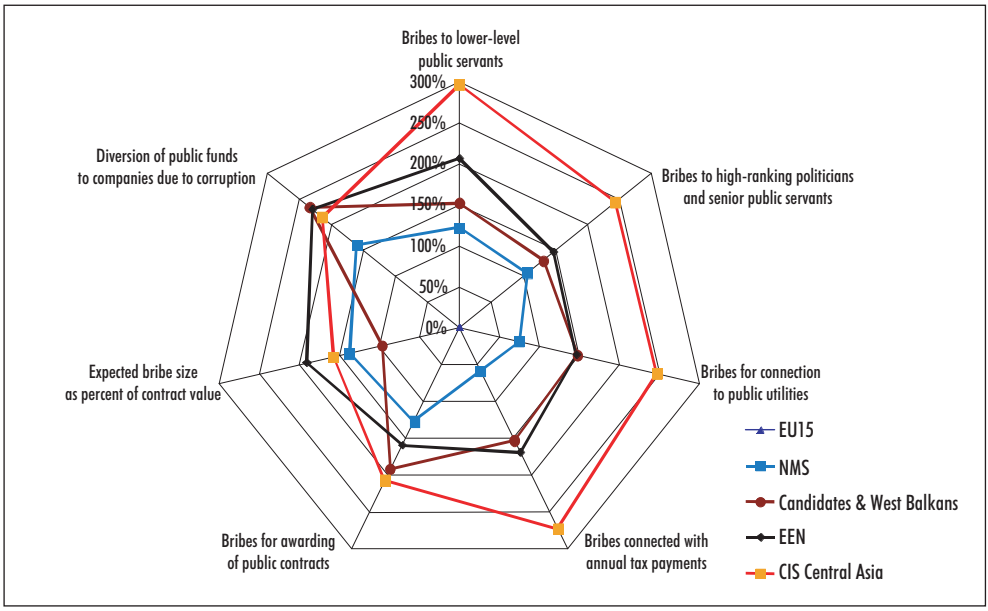
To analyze and display relative differences in the perception of corruption levels, we used the responds to several questions selected from GEOS database (Fig. D.5). These referred to: (1) commonness of extra payments (bribes) to lower-level public servants; (2) similar payments to high ranking politicians, political parties and senior public servants; (3) commonness of undocumented extra payments or bribes related to connection to public utilities (e.g., telephone or electricity); (4) similar payments connected with annual tax payments; (5) making undocumented extra payments or bribes connected with the awarding of public contracts or investment projects; (6) an expected size of „additional payments“ (% of the contract value) to government

officials for the bid to succeed, and (7) commonness of diversion of public funds to companies, individuals or groups due to corruption.

According to GEOS, as can be seen from Fig. D.5, EU15 and NMS significantly differ in all indicators, except the extent of corruption in taxation and utilities, while the largest differentials are observed in procurement and embezzlement. In the latter indicators, Candidates are significantly below NMS, while the gap between them is less significant in grand and petty corruption, and corruption in procurement. The scale of corruption in EEN, while far exceeding that of NMS, is generally fairly close to Candidates' scores. However, EEN are "well ahead" of the Candidates, as well of other country groups, in the expected bribe size. The smallest EEN/NMS gaps are in grand corruption and procurement with the largest gap observed in taxation.

According to **ES** data records, bribe tax (as percentage of sales) in NMS is three times higher than in EU15; in Candidate countries, the relative indicator is four times, in EEN – almost six times, and in Central Asian CIS – almost eight times higher. The distance between NMS and ENN countries is the most significant.

Fig. D.5. Corruption



According to WB Governance Indicators, the gaps between EU15/NMS and NMS/EEN are roughly equal, while the differences between Candidates, EEN and CIS are of much lower magnitude; however, all of them are statistically significant.

Analysis of standard deviations (GEOS) is even more revealing, because here the contrast between EEN and EU15 is much more profound: differences in values reach

two times and more. This means that corruption in the EU15 countries, to the extent it exists, is far more uniform, with much less "special" treatment that can be used for restricting business entry. Still, most of this difference is observed between EU15 and NMS, again with the exception of tax payment where both gaps are roughly equal to each other. At the same time, in this parameter the CA CIS and EEN are indistinguishable in all indicators. Candidates are similar to EEN in all of indicators but the embezzlement and size of kick-offs, where, however, they blur with NMS. In the case of kick-offs both gaps are relatively low, which means that this practice is well-established everywhere. However, "openness" of corruption in procurement is significantly less in NMS than in the EU15, while the differences between NMS and the rest of the groups are less profound.

Access to Capital and Competition

For the analysis of the **Access to Capital** component, the following variables were selected from GEOS: (1) easiness to obtain a bank loan with only a good business plan and no collateral; (2) entrepreneurs with innovative but risky projects can generally find venture capital, and (3) easiness of raising money by issuing shares on the local stock market (Fig. D.6).

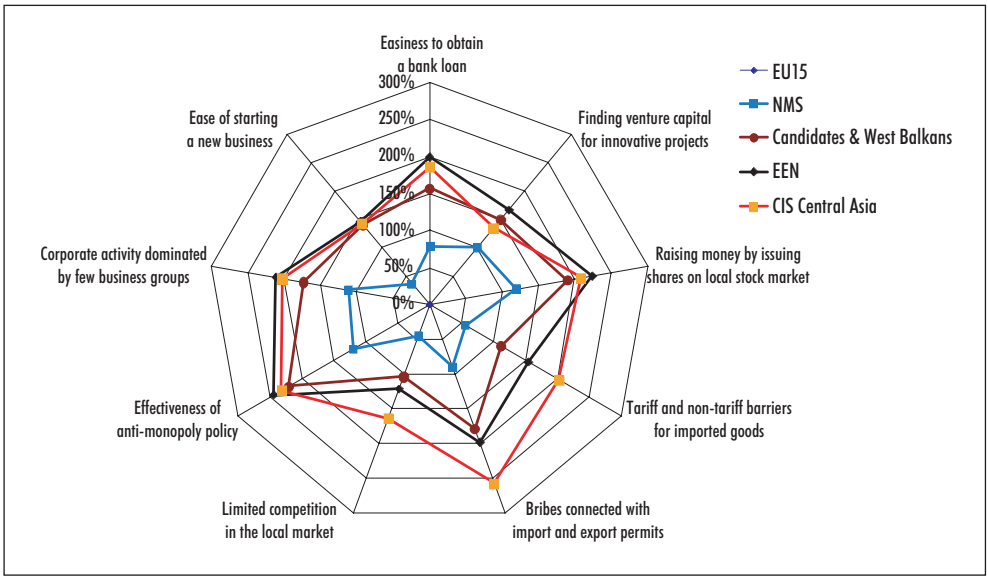
The analysis demonstrates that NMS countries are substantially closer to the EU15 than EEN to NMS only in one variable – more open access to banking loans not secured by collateral, i.e. the ones especially critical for startups. Notably, the unevenness in this set of indicators is generally low and rarely statistically significant. Access to bank loans is also the only point where there is a minor but significant difference between EEN and Candidates. Otherwise, Central Asian CIS, EEN, and Candidates are quite similar.

CODB, on the contrary, indicates significant and profound gaps between the CIS and EEN, on the one hand, and EU15 and NMS, on the other hand, in terms of credit information, particularly in private credit bureau coverage (which is simply zero for most of EEN and the whole of Central Asia), and protecting investors, particularly control over directors. The Candidate countries are in between. However, unlike GEOS and ES, these results refer rather to the maturity of financial institutions, than reflect accessibility of capital as such.

We consider three dimensions of **competition** covered by the surveys: trade barriers, business entry in the narrow meaning (setting up a business) and exit, and the level of competition and concentration as such.

According to GEOS (Fig. D.6), in terms of formal barriers to trade all of the groups differ from each other with a "step" of 8-10% of the EU15 score. However, in terms of corruption in the foreign trade, the gaps are more profound: Candidates are exactly

Fig. D.6. Access to capital and Competition



twice as worse than NMS compared to EU15, and are almost the same as EEN, while Central Asian CIS are almost three times as worse. Here the most speaking is unevenness of responses: while EEN are still indistinguishable from CA CIS and Candidates, the NMS differ from EU15 almost by a half, while EEN differ from NMS for another 30%.

Starting a new business is much easier in EU15 and NMS on the one hand, than in Candidates, EEN, and CIS, on the other hand, with blurred differences within both groups. Overall level of competition, as assessed by GEOS, supports the main hypothesis, while EEN is again indistinguishable from CA CIS and Candidates. In terms of fierceness of competition, the main gap lies between EEN and NMS; while in the effectiveness of antimonopoly policies and concentration the gaps are of roughly equal magnitudes.

CODB reveals large and mostly significant gaps in all dimensions, all in accord with the main hypothesis. The exemptions are costs of import and export that are roughly similar in NMS and Candidates, and in both cases insignificantly differ from those for EU15 – maybe due to geographical proximity to the main EU markets. In the rest of the parameters, Candidates are also close to NMS, being significantly different only in time for export, where they are rather closer to EEN. In the meantime, EEN are indistinguishable from Candidates and NMS in the number of documents needed for export and import. Finally, there are significant gaps between EEN and CIS Central Asia across all variables.

Conclusions

In general, our main hypothesis (that the main gap in governance and related indicators should be observed roughly at the borders of the former USSR) holds with one important reservation: the EEN countries are for most of the indicators statistically indistinguishable from EU candidates, on the one hand, and from Central Asian CIS, on the other hand.

Among the most characteristic instances where the EEN are on average significantly worse than Candidates we should specify judiciary independence, size of kick-offs (GEOS); time to pay taxes (CODB); voice and accountability, government effectiveness, and control of corruption (GI); consistency and predictability of legislation (ES); civic freedoms (FH); and freedom from government (HF). At the same time, the EEN have significant advantages in the cost of registration of property, and time spent on enforcing a contract (CODB).

Central Asian CIS countries are significantly worse than EEN in the spheres of corruption in public utilities, foreign trade (GEOS), and taxation (ES); all of the governance indicators but political stability and regulatory quality (GI). The latter is to some extent inconsistent with findings of the CODB (significantly worse in trade regulations), and FH, where the difference in rule of law is the only one that is significant within the whole CIS. As an integral result of some institutional differences, the role of internal financing is significantly more important in Central Asian CIS than in EEN.

Candidates appear the worst in terms of business regulations; EEN countries – in the administration of taxes (although CIS Central Asia are even worse in the corruption in taxation).

In terms of *political institutions*, the EEN countries express tremendous intra-group differences: from Belarus that has very low scores in all dimensions but political stability (that is not an advantage in this case, and hardly facilitates "openness of access", rather the opposite), to Ukraine and Georgia closely followed by Moldova that are approaching the NMS countries. The EEN are systematically much worse than NMS (comparing to NMS/EU15 gap) in the freedom of (international) trade and tax administration (but not the tax rates).

In corruption, however, the difference between NMS and EU15 is generally larger, except for corruption in taxation (although integral index provided by EFW still admits somewhat larger gap between NMS and EEN). In terms of business regulation the picture is mixed. In terms of legal protection and property rights, the integral indexes (EFW, HF) show that the NMS are much closer to EU15 than to EEN.

At the same time, the raw survey data (GEOS, ES, CODB) often demonstrate the opposite. In terms of "fairness", somewhat contrary to the hypothesis, the gap between

NMS and the EU15 appears of similar size or wider than the one between NMS and the EEN countries.

Thus our hypothesis that the main gap in governance and political institutions should be observed between CIS (including EEN) and the rest of countries to some extent comes into conflict with factual evidence. In fact, GEOS (that does not cover Belarus) reveals that the major gap in political institutions assessed by this survey lies rather between EU15 and NMS, with the EEN/NMS gap being approximately half as wide. By the GI and FH, the NMS are much closer to EU15, but the main gap is between them and the Candidates, although the EEN are still significantly worse than the latter.

Yet, the main gap between the NMS and the EEN most probably lies at the *informal* level. This most probably refers to foreign trade procedures (twice as much time needed to comply with nearly the same number of documents), taxation, business registration, and so forth. While there are no significant differences in business concentration, the gap in fierceness of competition is still twice as high between NMS and EEN, than between EU15 and NMS.

Should the informal patterns of unequal treatment of the firms (currently revealed in higher standard deviations) be eliminated, the rate of competition will increase and catch up in a few years; and access to capital could be made much easier – because in both cases the respective institutional changes could be driven by market forces, if just an appropriate framework would be in place. Foreign trade, capital and credit markets issues, and tax regulations remain the most problematic areas that prevent from such a catch-up most of all.

It is also possible that the analyzed business surveys just failed to capture some of the real differences, since they lay at the informal level. For example, it could happen that the surveyed CEOs understand the notions of "difficult", "often" and so on differently in different countries. Besides, the samples of CEOs are pre-selected, and hence biased, in all countries merely because they include only those who managed to survive in the respective business environment at least to the moment when the survey was held. Thus, for example, for them it was not too much difficult to run their businesses, otherwise they would hardly become CEOs. Such a bias should to some (unobservable and unpredictable) extent blur the contrasts between countries. The same refers to the problems of measurement of corruption, abuses of human rights, and other cultural-specific issues.

V. MEASURING THE GAP

The gap between the EU and the neighboring countries, being multidimensional, is characterized by a variety of indicators. We suggest utilizing the principal component approach to reduce dimensionality and to make the discussion of inter-country variation more tractable. Additionally, this approach allows identifying clusters of countries based on the distance to the EU along the chosen dimensions.

To measure the gap to the EU15 level, we distinguish between eight groups of variables that reflect the following dimensions of the gap: macroeconomic structure, openness, institutional development, demography and human capital, health, infrastructure, innovative potential and environmental sustainability. The list of variables that constitute each of the groups is presented in Table A5.1 in the Appendix. Additionally, we consider GDP per capita[128] as a separate ninth dimension.

To come up with a measure of a gap along each of the dimensions, we estimate the first two principal components based on the variables that characterize the dimension[129]. To remind, the principal components method allows mapping from the space of raw indicators (which are often highly correlated with each other) into a space of principal components (which are orthogonal to each other). The principal components, being the weighted sums of the raw indicators, allow reducing dimensionality. The first two components in the majority of cases explain the main variation in the raw indicators.

The components are then used to measure distances to the EU-15 average, which, in turn, are converted into ratings of the countries in terms of their closeness to the EU. As a result, the ratings along the nine dimensions characterize the EU-average gap of each of the neighboring countries.

V.1 Macroeconomic Structure

We characterize macroeconomic structure of the countries under consideration by a wide range of indicators (the full list of variables is presented in Table A5.1 in Appendix).

[128] GDP per capita is measured using purchasing power parity.
[129] To characterize innovation potential and environmental sustainability, we already use composite indices.

In particular, we use GDP growth rate (5-year average), sectoral composition of GDP, energy consumption indicators, estimates of informal economy, fiscal balance indicators, including gross external debt, CPI and real wage inflation rates, unemployment rate, employment and labor productivity growth rates, female and male labor force activity rates, and characteristics of income distribution, including gender income gap.

Principal component analysis is used to derive a set of orthogonal factors – principal components – based on initial indicators. The factor loadings for the first two components[130] and the corresponding significance ratios are presented in Table 5.1. The table also shows correlation, and its significance, between each individual indicator in the list and the respective principal component. The latter allows better understanding which indicators in the list are the major ones (the relevant correlation coefficients are in bold) that form the principal components – the weighted sums. This, in turn, helps coming up with some interpretation of the components, though the interpretation task is not easy as is always with this methodology.

As could be seen from the table, the further the countries are to the *negative* domain of the first principal component, the more they tend to have higher GDP growth rates, higher growth rates of labor productivity and higher labor force participation of males, but also lower employment growth, lower share of government in GDP, lower external debt and lower wages. The share of agriculture in GDP and that of informal economy are also relatively higher for these countries.

The allocation of countries along the second principal component is mainly driven by the difference in the share of manufacturing in value added, female to male ratio in earnings (the higher the indicators – the higher is the coordinate), unemployment rate and the rich-to-poor ratio (the higher the indicators – the lower is the coordinate).

Additionally, countries with relatively high inflation rates are to be seen in the right bottom part of the plane. Those with high efficiency of energy use are closer to the upper left part. High levels of income inequality based on Gini measure are observed among countries at the left bottom part of the plane. Finally, high per capita rates of electricity consumption and carbon dioxide emissions, as well as relatively high female labor force participation rates are characteristic for countries located closer to the upper right part of the plane.

The overall picture of the relative positions of the countries under study with respect to the EU-15 average in the plane of the first two principal components is presented at Diagram 5.1. The allocation of the countries is in line with the aforementioned interpretation of the principal components and is in comfort with the economic intuition.

[130] The analysis suggests that six principal components explaining 82% of variation in the factors used are to be retained. The first two components explain 52% of the variation. It is for the expositional benefit that we consider only two components.

Table 5.1. Factor Loadings and Significance of Factors in Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
GDP annual growth rate (per cent)	-0.10764	0.06017	**-0.8422**	0.1813
			(0.0000)	*(0.2972)*
Total general government expenditure, % of GDP	0.10491	0.06461	**0.8209**	0.1947
			(0.0000)	*(0.2624)*
General government balance, % of GDP	-0.00395	0.18943	-0.0309	**0.5708**
			(0.8602)	*(0.0003)*
Inflation, consumer price index	-0.06318	0.13503	**-0.4943**	**0.4069**
			(0.0025)	*(0.0153)*
Real wage, annual percentage change	-0.10946	0.10395	**-0.8564**	**0.3132**
			(0.0000)	**(0.0669)**
Unemployment, % of labor force	0.00285	-0.17460	0.0223	**-0.5261**
			(0.8989)	*(0.0012)*
Employment growth, annual percentage change	0.04072	0.00701	**0.3186**	0.0211
			(0.0621)	*(0.9042)*
Labor productivity, annual percentage change	-0.10465	0.05058	**-0.8188**	0.1524
			(0.0000)	*(0.3821)*
Agriculture, value added (% of GDP)	-0.09908	-0.01525	**-0.7752**	-0.0460
			(0.0000)	*(0.7932)*
Manufacturing, value added (% of GDP)	0.02135	0.12521	0.1671	**0.3773**
			(0.3374)	*(0.0255)*
Electricity consumption per capita (kW-h)	0.09688	0.13634	**0.7580**	**0.4108**
			(0.0000)	*(0.0142)*
Carbon dioxide emissions per capita	0.08003	0.11791	**0.6261**	**0.3553**
			(0.0001)	*(0.0362)*
GDP per unit of energy use	0.08054	-0.20025	**0.6302**	**-0.6034**
			(0.0000)	*(0.0001)*
Distribution of family income: Gini inde x	-0.04403	-0.13740	**-0.3445**	**-0.4140**
			(0.0427)	*(0.0134)*
Ratio of richest 10% to poorest 10%	0.01822	-0.17447	0.1426	**-0.5257**
			(0.4139)	*(0.0012)*
Estimated annual earned income, F/M Ratio, %	0.03177	0.20621	0.2486	**0.6214**
			(0.1499)	*(0.0001)*
Gross external debt, % of GDP	0.09435	-0.03729	**0.7382**	-0.1124
			(0.0000)	*(0.5205)*
Labour force activity rate (%females)	0.04647	0.20757	**0.3636**	**0.6255**
			(0.0318)	*(0.0001)*
Labour force activity rate (%males)	0.05790	0.03157	**0.4530**	0.0951
			(0.0063)	*(0.5867)*
Gross Average Monthly Wages	0.11686	-0.00510	**0.9143**	-0.0154
			(0.0000)	*(0.9302)*
Informal economy estimate	-0.11273	0.01438	**-0.8820**	0.0433
			(0.0000)	*(0.8048)*

The graph is then used to translate the relative position of a country into a distance from the EU-15 average. Table 5.2 presents ratings of the distances for each of the countries[131]. It comes from the table that Croatia and Slovakia form the closest to the EU-15 average group. Hungary, Poland, the Czech Republic and Slovenia are in the next shortest distance from the EU-average. The third layer is formed by Bulgaria, with Lithuania, Latvia and Estonia being in the fourth group. Kyrgyzstan and

[131] Note that the groups for each of the dimensions are based solely on the distances from the EU average and are very heterogeneous otherwise, as is clear from this and ensuing Diagrams.

Diagram 5.1. Allocation of countries in the plane of the first two principal components based on indicators of MACROECONOMIC STRUCTURE.

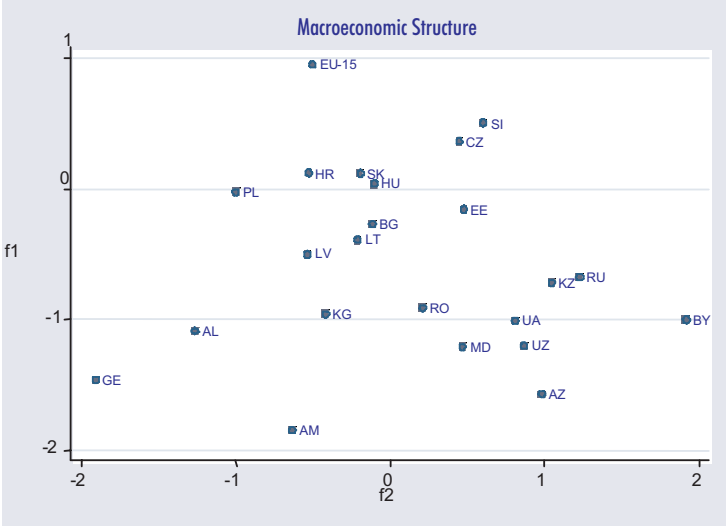


Table 5.2. Ratings of the Distance from EU-15 average, MACROECONOMIC STRUCTURE

Country	Distance[132] from EU-15 average, rating
EU-15[133]	0
Croatia	1
Slovakia	1
Hungary	2
Poland	2
Czech Republic	2
Slovenia	2
Bulgaria	3
Lithuania	4
Latvia	4
Estonia	4
Kyrgyzstan	5
Romania	5
Albania	6
Kazakhstan	6
Ukraine	7
Moldova	7
Russia	7
Uzbekistan	8
Georgia	9
Armenia	9
Azerbaijan	9
Belarus	10

[132] Distance from country to EU is calculated as follows: $\sqrt{(f_{1EU} - f_{1c})^2 + (f_{2EU} - f_{2c})^2}$, where f_1 and f_2 - estimated factors.

[133] EU average is calculated as population weighted average.

Romania are the next followed by Albania and Kazakhstan. Ukraine, Moldova and Russia are in the seventh group. Uzbekistan comes next. The next-to-last group is comprised of Georgia, Armenia and Azerbaijan. Belarus is at the largest distance from the EU-15 average.

V.2 Openness

We characterize openness of the economies by a set variables related mainly to the balance of payments. In particular, we consider exports and imports as percentage of GDP, proportion of visitors to population and expenditures of visitors as percentage of GDP, share of inward and outward flows of foreign direct investment in exports and imports and in gross financial capital flows, as well as share of remittances paid and received. Current account and capital account balances are taken into account. We also include characteristics of international telecommunication development in the countries. The full list of variables used is presented in Table A5.1 in Appendix.

Principal component analysis is then used to derive a set of principal components based on initial indicators. The factor loadings for the first two components[134] and the corresponding significance ratios are presented in Table 5.3. The table suggests that the larger is the coordinate of the first component the higher is the share of imports and exports in GDP, the proportion of visitors to the total population and the development of telecommunication. At the same time, the amount of remittances received is higher in those countries that belong to the negative domain of the first component.

Table 5.3. Factor Loadings and Significance of Factors Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
Openness of economy	0.42676	0.12236	**0.8787**	0.1723
			(0.0000)	*(0.3378)*
Merchandise exports	0.00000	0.00000	0.8945	0.1505
			(0.0000)	*(0.4032)*
Merchandise imports	0.01458	0.01881	**0.8086**	0.1892
			(0.0000)	*(0.2916)*
Arrivals of visitors	0.10564	0.02688	**0.6080**	0.0961
			(0.0002)	*(0.5946)*
Total expenditures of visitors	-0.00163	0.00945	-0.0094	**0.0338**
			(0.9587)	*(0.8518)*
Outgoing international calls per inhabitant	0.15106	0.03250	**0.8694**	0.1163
			(0.0000)	*(0.5194)*

[134] The analysis suggests that six principal components explaining 90% of variation in the factors used are to be retained. The first two components explain 55% of the variation. It is for the expositional benefit that we consider only two components.

Table 5.3. Factor Loadings and Significance of Factors Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
International Internet bandwidth	0.14760	0.03884	**0.8495**	0.1389
			(0.0000)	*(0.4407)*
FDI: outward flows, % GFCF	0.12196	0.15356	**0.7019**	**0.5493**
			(0.0000)	*(0.0009)*
FDI: outward flows, % of exports	0.03978	0.18089	0.2290	**0.6470**
			(0.2000)	*(0.0000)*
FDI: inward flows, % GFCF	-0.02703	0.20113	-0.1556	**0.7194**
			(0.3874)	*(0.0000)*
FDI: inward flows, % of exports	-0.03190	0.23236	-0.1836	**0.8311**
			(0.3064)	*(0.0000)*
Workers' remittances: Payments, % of trade	-0.04132	0.11620	-0.2378	**0.4156**
			(0.1827)	*(0.0161)*
Workers' remittances: Payments, % of GDP	-0.04038	0.17309	-0.2324	**0.6191**
			(0.1931)	*(0.0001)*
Workers' remittances: Receipts, % of trade	-0.08731	0.01882	**-0.5025**	0.0673
			(0.0029)	*(0.7097)*
Workers' remittances: Receipts, % of GDP	-0.08457	0.02851	**-0.4867**	0.1020
			(0.0041)	*(0.5723)*
Balance of payments: capital and financial account summaries	-0.07371	0.20672	**-0.4242**	**0.7394**
			(0.0139)	*(0.0000)*
Balance of current account	0.09502	-0.17664	**0.5469**	**-0.6318**
			(0.0010)	*(0.0001)*

Diagram 5.2. Allocation of countries in the plane of the first two principal components based on indicators of OPENNESS

The second principal component is related mainly to the amount of remittances paid, visitors' expenditures and inward and outward flows of foreign direct investment: the higher the level of these indicators, the further from zero the country will be located in the positive domain of the second component. Additionally, larger outflows of foreign direct investment are observed when moving to the north-east of the diagram. Larger and positive current account values (as % of GDP) are observed when moving to the north-west of the diagram, while larger and positive capital and financial account values (as % of GDP) could be seen when going to the south-east.

The relative positions of the countries to the EU-15 average in the plane of the first two principal components are presented in Diagram 5.2.

The allocation of the countries is in line with the aforementioned interpretation of the principal components and is in comfort with the economic intuition. The graph is then used to translate the relative position of a country into a distance from EU-15 average. Table 5.4 presents ratings of the distances for each of the countries. According to the characteristics of openness used, Slovenia is the country closest to the EU-15 average. Hungary and Croatia are the next closest, followed by the Czech Republic and Estonia. Next come Slovakia, Lithuania and Latvia, each forming a separate group. Poland and Bulgaria form the seventh group, Romania and Russia are in the eighth group, and Belarus and Macedonia each form the next two groups. Ukraine and

Table 5.4. Ratings of the Distance from EU-15 average, OPENNESS

Country	Distance from EU-15 average rating
EU-15	0
Slovenia	1
Hungary	2
Croatia	2
Czech Rep.	3
Estonia	3
Slovakia	4
Lithuania	5
Latvia	6
Poland	7
Bulgaria	7
Romania	8
Russian Fed.	8
Belarus	9
Macedonia	10
Ukraine	11
Kyrgyzstan	11
Kazakhstan	12
Armenia	13
Georgia	13
Moldova	14
Albania	15
Bosnia and Herzegovina	16
Azerbaijan	17

Kyrgyzstan form the eleventh group, followed by Kazakhstan. Armenia and Georgia are in the thirteenth group. Moldova, Albania, Bosnia and Herzegovina and Azerbaijan each form the group of countries most distant from the EU-15. Note that Azerbaijan is much further from the EU-15 indicators than the rest of the countries.

V.3 Institutions

To characterize a variation in institutional arrangements in the countries under study, we utilize the World Bank's indicators on institutional development (indices on voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption), as well as a set of EBRD's indicators from the Doing Business Survey. The indicators reflect fundamental differences in institutions from different sides. The full list of indicators used is in Table A5.1 in Appendix.

The first two components based on the list of variables that characterize institutes explain only 42% of the total variance[135], implying a significant heterogeneity in the indicators that characterize the institutional framework. For descriptive purposes, however, we will analyze only the first two components.

The factor loadings – the weights with which every indicator in the list enters the first and the second components respectively – are presented in Table 5.5. The table demonstrates that the further the countries are to the *negative* domain of the first principal component the higher are political stability index, credit information index, and private bureau coverage. Director liability index and recovery rate in case of closing business are also higher. Similarly, the further the country is to the negative domain of the first principal component, the easier it is to get a license, less time required to start business, less procedures to register property, lower number of payments is required and less time spent on paying taxes. Fewer documents are also required for exports or imports, and time spent for imports is also less. Numbers of procedures to enforce contracts, costs of contract enforcement and time and cost of closing business also diminish when one moves to the domain of negative coordinates of the first principal component.

The allocation of countries along the second principal component is mainly driven by the difference in labor market rigidity: indices of difficulty of hiring and firing, hiring and firing costs, rigidity of employment and hours of work all increase when one moves from the left to the right. In addition, the further the country is to the positive domain of the second principal component the larger is the minimum capital as percentage of per capita income needed to start business, the longer and more costly is to register property, the longer is the time to enforce contracts and the higher is the public registry coverage.

[135] It is suggested that six components explaining 65% of the variation are retained.

Table 5.5. Factor Loadings and Significance of Factors in Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
Voice and Accountability	-0.15394	0.11657	**-0.8897**	**0.2987**
			(0.0000)	*(0.0647)*
Political Stability	-0.03883	-0.00414	**-0.8680**	0.1160
			(0.0000)	*(0.4820)*
Government Effectiveness	0.00000	0.00000	-0.9640	0.1018
			(0.0000)	*(0.5375)*
Regulatory Quality	0.00000	0.00000	-0.9474	0.1389
			(0.0000)	*(0.3991)*
Rule of Law	0.00000	0.00000	-0.9615	0.1083
			(0.0000)	*(0.5115)*
Control of Corruption	0.00000	0.00000	-0.9528	0.0991
			(0.0000)	*(0.5485)*
Starting a Business: Procedures (number)	0.14854	0.06287	**0.6072**	**0.4265**
			(0.0000)	*(0.0068)*
Starting a Business: Time (days)	-0.01158	0.06963	**-0.3546**	0.2508
			(0.0268)	*(0.1236)*
Starting a Business: Cost (% of income per capita)	0.09087	0.08408	**0.4638**	**0.4540**
			(0.0029)	*(0.0037)*
Starting a Business: Min. capital (% of income per capita)	-0.05682	0.09305	0.1363	**0.2773**
			(0.4081)	*(0.0874)*
Dealing with Licenses: Procedures (number)	0.07445	-0.06147	**0.6055**	-0.1942
			(0.0000)	*(0.2361)*
Dealing with Licenses: Time (days)	0.03880	0.06258	**0.5816**	0.2383
			(0.0001)	*(0.1441)*
Dealing with Licenses: Cost (% of income per capita)	0.03346	0.01272	**0.3923**	0.0588
			(0.0135)	*(0.7220)*
Difficulty of Hiring Index	0.03073	0.25632	0.1515	**0.6370**
			(0.3572)	*(0.0000)*
Rigidity of Hours Index	0.01795	0.15804	-0.1184	**0.3303**
			(0.4727)	*(0.0400)*
Difficulty of Firing Index	0.00045	0.20486	0.1249	**0.4493**
			(0.4489)	*(0.0041)*
Rigidity of Employment Index	0.00000	0.00000	0.0881	**0.7370**
			(0.5939)	*(0.0000)*
Non-wage labor cost (% of salary)	0.07211	0.05744	0.2031	**0.3236**
			(0.2150)	*(0.0445)*
Firing costs (weeks of wages)	-0.07113	0.15382	-0.1547	**0.5214**
			(0.3469)	*(0.0007)*
Registering Property: Procedures (number)	0.03093	0.04015	**0.6103**	0.1406
			(0.0000)	*(0.3934)*
Registering Property: Time (days)	-0.02011	0.08856	0.2108	**0.2796**
			(0.1976)	*(0.0848)*
Registering Property: Cost (% of income per capita)	-0.02906	0.09150	-0.1565	**0.3364**
			(0.3413)	*(0.0363)*
Getting Credit: Legal Rights Index	-0.04538	-0.04126	-0.2029	-0.2183
			(0.2153)	*(0.1818)*
Getting Credit: Credit Information Index	-0.10967	0.07614	**-0.7130**	0.1950
			(0.0000)	*(0.2343)*
Getting Credit: Public registry coverage (% adults)	0.01095	0.06204	-0.2326	**0.3089**
			(0.1541)	*(0.0557)*
Getting Credit: Private bureau coverage (% adults)	-0.03078	-0.02422	**-0.6003**	-0.0614
			(0.0001)	*(0.7103)*
Protecting Investors: Disclosure Index	-0.07177	-0.18780	**-0.2613**	**-0.4115**
			(0.1082)	*(0.0092)*

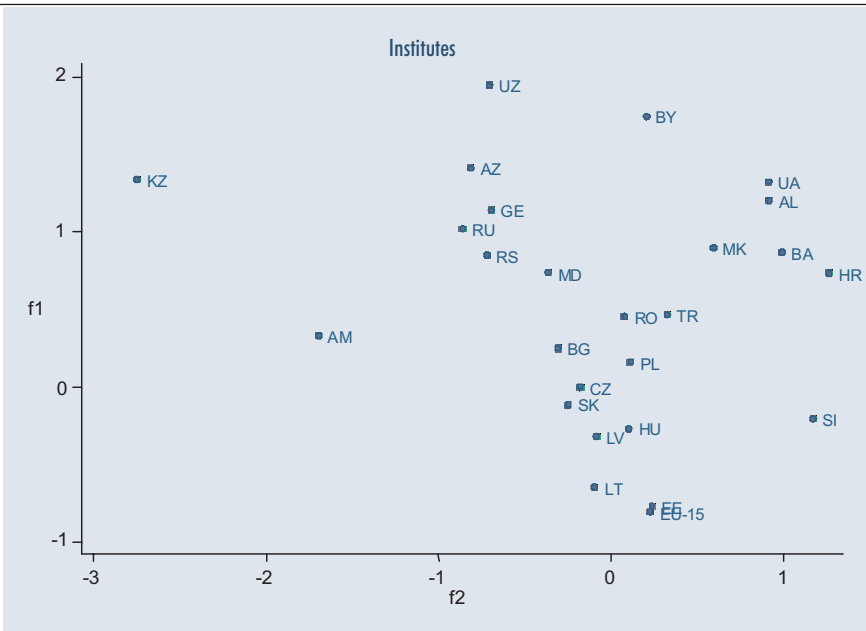
Table 5.5. cd. Factor Loadings and Significance of Factors in Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
			(0.1082)	*(0.0092)*
Protecting Investors: Director Liability Index	-0.00174	-0.02393	**-0.2884**	0.1941
			(0.0750)	*(0.2365)*
Protecting Investors: Shareholder Suits Index	-0.01083	-0.17715	**-0.2963**	**-0.4828**
			(0.0670)	*(0.0019)*
Protecting Investors: Investor Protection Index	0.00000	0.00000	-0.5023	-0.4636
			(0.0011)	*(0.0030)*
Paying Taxes: Payments (number)	0.10643	-0.03453	**0.7440**	-0.0047
			(0.0000)	*(0.9775)*
Paying Taxes: Time (hours)	-0.02901	0.03448	**0.2893**	0.0509
			(0.0740)	*(0.7583)*
Paying Taxes: Total tax rate (% profit)	-0.07453	0.10396	**0.2929**	**0.2833**
			(0.0703)	*(0.0805)*
Documents for export (number)	-0.00513	-0.03460	**0.7219**	-0.2245
			(0.0000)	*(0.1695)*
Time for export (days)	0.01328	-0.07040	**0.8063**	**-0.3435**
			(0.0000)	*(0.0323)*
Documents for import (number)	0.06196	0.00647	**0.7664**	0.0229
			(0.0000)	*(0.8899)*
Time for import (days)	0.15959	-0.09565	**0.8045**	-0.2561
			(0.0000)	*(0.1155)*
Enforcing Contracts: Procedures (number)	0.05062	0.01235	**0.5935**	0.0605
			(0.0001)	*(0.7143)*
Enforcing Contracts: Time (days)	-0.01956	0.12275	0.0649	**0.4659**
			(0.6948)	*(0.0028)*
Enforcing Contracts: Cost (% of debt)	0.05675	0.00133	**0.4351**	0.0467
			(0.0056)	*(0.7777)*
Closing a Business: Time (years)	-0.01030	-0.00232	**0.4884**	-0.0844
			(0.0016)	*(0.6096)*
Closing a Business: Cost (% of estate)	0.03617	0.05696	**0.4102**	0.2309
			(0.0095)	*(0.1573)*
Closing a Business: Recovery rate (cents on the dollar)	-0.18445	0.04937	**-0.8660**	0.0065
			(0.0000)	*(0.9685)*

Additionally, countries with higher costs of starting business and higher total tax rates are in the upper right part of the plane, while those with more time required for exports are at the upper left part of the plane. Voice and accountability index is relatively higher at the bottom and to the right, while disclosure index, shareholder suits index and investor protection index are higher at the bottom to the left.

Diagram 5.3 shows the positions of the countries analyzed in the space of the first two components, that, to remind, are the weighted sums of the initial indicators that characterize the institutional framework in the countries. The diagram allows getting an idea on the relative positions of each country in this space, as well as on relative positions of one country to another in terms of difference or similarities with respect to institutions.

Diagram 5.3. Allocation of countries in the plane of the first two principal components based on indicators of INSTITUTIONS



The distances of individual countries from the EU-15 average can be characterized as follows. Estonia has the closest position to the EU-15 average, with Lithuania being the next closest (Table 5.6). The third group of countries in the shortest distance from the EU-15 average includes Hungary and Latvia. A bit further is the group formed by Slovakia, Czech Republic and Poland. Slovenia, Bulgaria, Romania and Turkey are in the fifth group, which is followed by Moldova and Macedonia, each being a separate group. The Balkan countries of Bosnia and Herzegovina, Croatia and Serbia and Montenegro are in the next group. They are followed by a heterogeneous group of

Table 5.6. Ratings of the Distance from EU-15 average, INSTITUTIONS

Country	Distance from EU-15 average rating
EU-15	0
ESTONIA	1
LITHUANIA	2
HUNGARY	3
LATVIA	3
SLOVAK REPUBLIC	4
CZECH REPUBLIC	4
POLAND	4
SLOVENIA	5
BULGARIA	5
ROMANIA	5

Table 5.6. cd. Ratings of the Distance from EU-15 average, INSTITUTIONS

Country	Distance from EU-15 average rating
TURKEY	5
MOLDOVA	6
MACEDONIA	7
BOSNIA-HERZEGOVINA	8
CROATIA	8
SERBIA AND MONTENEGRO	8
ALBANIA	9
RUSSIA	9
GEORGIA	9
ARMENIA	9
UKRAINE	9
AZERBAIJAN	10
BELARUS	11
UZBEKISTAN	12
KAZAKHSTAN	13

Albania, Russia, Georgia, Armenia and Ukraine. Azerbaijan and Belarus each form a separate group. Uzbekistan and Kazakhstan are the most distant from EU-15 average.

V.4 Demography and Human Capital

To characterize demographic situation in the countries, we use natural growth rate of population, fertility and birth rates, net migration rate, population density and the share of urban population. The level of human capital accumulation in the countries is characterized by secondary and tertiary enrollment rates and adult literacy rate (the full indicators' list is in Table A5.1 in Appendix).

The raw indicators are then used to derive the first two principal components[136]. The resulting factor loadings and the corresponding significance ratios are presented in Table 5.7. The table suggests that the countries with the highest fertility and birth rates and the highest population increase are to be located in the bottom right corner of the first two components plane. The countries in the right upper corner are those with the highest enrollment rates and population density. Net migration tends to push the first component up hence implying that the countries in the upper part of the panel are net importers of labor. An increase in literacy rate tends to increase the second component.

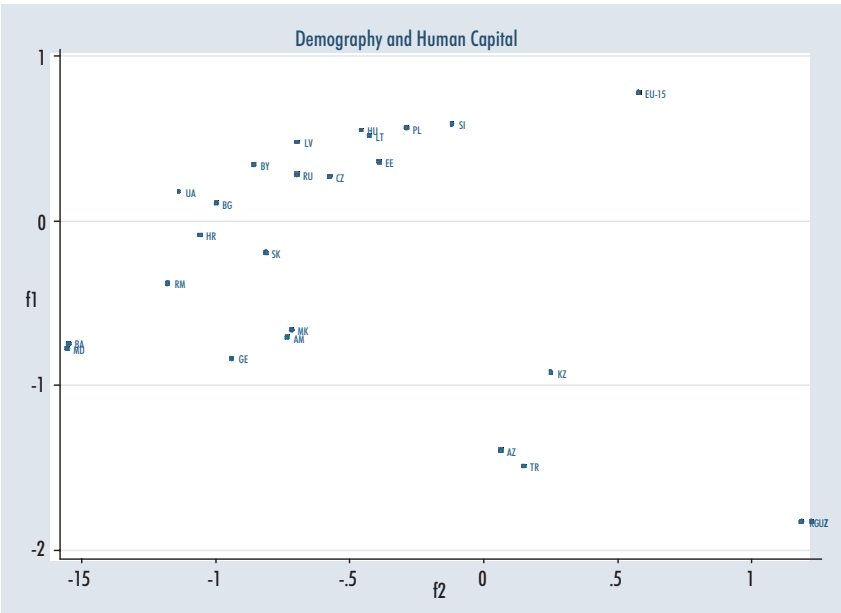
The relative positions of the countries with respect to the EU-15 average in the plane of the first two principal components are presented in Diagram 5.4. The allocation of the countries is as suggested above: EU-15 average is in the upper right

[136] The analysis suggests that three principal components explaining 80% of variation in the factors used are to be retained. The first two components explain almost 70% of the variation.

Table 5.7. Factor Loadings and Significance of Factors in Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
Urban population, proportion	0.18671	0.06465	**0.8276**	0.1544
			0.0000	*0.3351*
Population density	0.10126	0.13607	**0.4489**	**0.3250**
			0.0032	*0.0381*
Rate of natural population increase	-0.16145	0.27299	**-0.7156**	**0.6520**
			0.0000	*0.0000*
Net migration rate, average	0.13892	0.02152	**0.6157**	0.0514
			0.0000	*0.7496*
Birth rate, crude	-0.17179	0.26217	**-0.7614**	**0.6262**
			0.0000	*0.0000*
Fertility rate, total	-0.14794	0.30500	**-0.6557**	**0.7285**
			0.0000	*0.0000*
Gross secondary enrollment ratio	0.16145	0.26610	**0.7156**	**0.6356**
			0.0000	*0.0000*
Higher education enrolments	0.17024	0.08481	**0.7546**	0.2026
			0.0000	*0.2040*
Adult literacy rate	0.05288	0.11734	0.2344	**0.2803**
			0.1402	*0.0759*
Combined gross enrolment ratio	0.16089	0.25975	**0.7131**	**0.6204**
			0.0000	*0.0000*

Diagram 5.4. Allocation of countries in the plane of the first two principal components based on indicators of DEMOGRAPHY AND HUMAN CAPITAL



corner, while Azerbaijan, Turkey, Kyrgyzstan, Uzbekistan and Tajikistan are in the right bottom part of the plane. Moldova and Bosnia and Herzegovina, having relatively low adult literacy rates, are in the left part of the plane.

The relative positions of the countries are translated into distances from EU-15 average and the relevant ratings (Table 5.8). The countries could be grouped into 11 layers based on the distance to the EU-15 average. Slovenia is the closest to the EU-15 average country, Poland is the second closest. Lithuania, Estonia and Hungary form the next closest to the EU-15 average group of countries. The Czech Republic, Latvia, and the Russian Federation are in the fourth group, while Belarus forms the fifth. Slovakia, Bulgaria and Kazakhstan are in the sixth group. Next come Ukraine and Croatia followed by Macedonia, Armenia and Romania. Georgia, Azerbaijan and Turkey could be considered as the next, ninth, group. The most distant from the EU-15 average group (except Tajikistan which is even further) is formed by Bosnia and Herzegovina, Moldova, Kyrgyzstan and Uzbekistan.

Table 5.8. Ratings of the Distance from EU-15 average, DEMOGRAPHY AND HUMAN CAPITAL

Country	Distance from EU-15 average rating
EU-15	0
Slovenia	1
Poland	2
Lithuania	3
Estonia	3
Hungary	3
Czech Rep.	4
Latvia	4
Russian Fed.	4
Belarus	5
Slovakia	6
Bulgaria	6
Kazakhstan	6
Ukraine	7
Croatia	7
Macedonia	8
Armenia	8
Romania	8
Georgia	9
Azerbaijan	9
Turkey	9
Bosnia and Herzegovina	10
Moldova	10
Kyrgyzstan	10
Uzbekistan	10
Tajikistan	11

V.5 Health

We use health and life expectancy indicators to characterize variation in health across the countries. In particular, we use HIV and tuberculosis prevalence indicators, public and private health expenditure indicators, clean water accessibility indicator, infant mortality and low birth shares, and average female and male life expectancy rates. The full list of variables used is presented in Table A5.1 in Appendix.

The raw indicators are then used to derive the first two principal components[137]. The corresponding factor loadings and significance ratios are presented in Table 5.9. The table suggests that the more the country is to the positive domain of the first principal component the less is tuberculosis prevalence, the higher is expenditure on health as a proportion of GDP and the smaller are out-of-pocket health expenditures. The shares of population with access to improved water and female life expectancy at birth are also higher.

Table 5.9. Factor Loadings and Significance of Factors Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
HIV prevalence	-0.00832	0.38501	-0.0429	**0.6078**
			(0.8066)	*(0.0001)*
Tuberculosis cases	-0.16213	0.03474	**-0.8369**	0.0548
			(0.0000)	*(0.7543)*
Total expenditure on health, % of GDP	0.16563	-0.06291	**0.8550**	-0.0993
			(0.0000)	*(0.5703)*
Out-of-pocket expenditures, % of private expenditures on health	-0.12155	0.11924	**-0.6274**	0.1883
			(0.0001)	*(0.2788)*
Population with sustainable access to an improved water source (%)	0.13848	0.07113	**0.7148**	0.1123
			(0.0000)	*(0.5207)*
Newborns with low birth weight (%)	-0.08309	-0.41500	**-0.4289**	**-0.6552**
			(0.0101)	*(0.0000)*
One-year-olds fully immunized against measles (%)	-0.06019	0.40399	**-0.3107**	**0.6378**
			(0.0693)	*(0.0000)*
Contraceptive prevalence rate (%)	0.11656	0.20042	**0.6017**	**0.3164**
			(0.0001)	*(0.0640)*
Infant mortality rate	-0.15583	-0.19506	**-0.8044**	**-0.3079**
			(0.0000)	*(0.0719)*
Average life expectancy at birth for males	0.16151	-0.21490	**0.8337**	**-0.3393**
			(0.0000)	*(0.0462)*
Average life expectancy at birth for females	0.17750	-0.02995	**0.9162**	-0.0473
			(0.0000)	*(0.7874)*

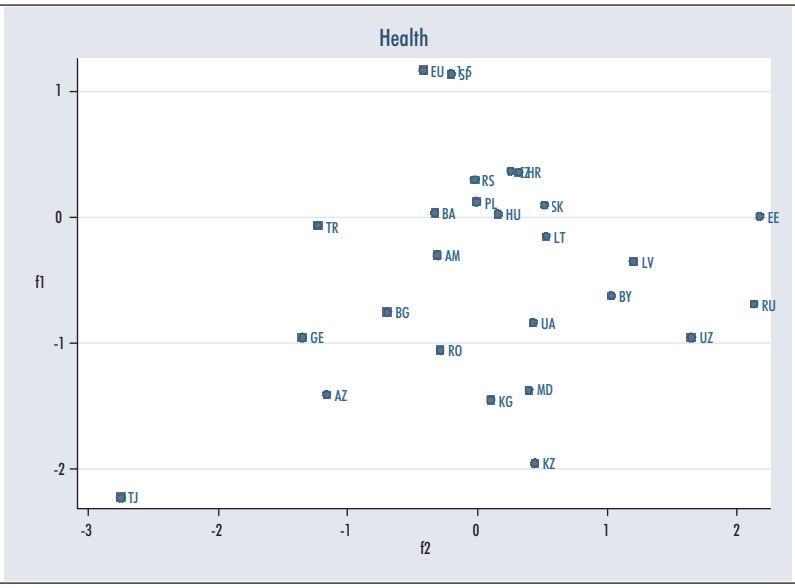
The allocation of countries along the second principal component is mainly driven by the difference in the HIV prevalence rate. Additionally, there is a group of indicators that enter both components. As a result, life expectancy at birth for males

[137] The analysis suggests that three principal components explaining 68% of variation in the factors used are to be retained. The first two components explain 59% of the variation.

increases when we move north-west in the diagram, contraceptive prevalence rate – when we move north-east. Proportions of newborns with low weight and infant mortality rates increase when moving to the south-west of the two-component plane, while immunization rate is higher to the south-east.

The relative positions of the countries to the EU-15 average in the plane of the first two principal components are presented in Diagram 5.5. Table 5.10 presents ratings of the distances to EU-15 average for each of the countries. Slovenia, again, is the closest to the EU-15 average when health indicators are considered. The Czech Republic comes next, followed by Croatia and Poland. Hungary forms the fourth group and Turkey, Slovakia and Armenia – the fifth group[138]. Lithuania and Bulgaria are the next closest, each forming a separate group. Ukraine and Romania are in the eighth group, followed by Latvia, Georgia and Belarus. The next shortest distance to EU-15 average is in Kyrgyzstan, Moldova and Azerbaijan. The last five groups each consist of one country and are in the following order: Estonia, Uzbekistan, Russia, Kazakhstan and Tajikistan, with the last one being much further from the others in terms of health situation.

Diagram 5.5. Allocation of countries in the plane of the first two principal components based on indicators of HEALTH



[138] We need to stress here again that the relative positions are defined as a distance from EU-average in the plane of the two main components, and countries in different parts of the plane could have the same distance to EU average.

Table 5.10. Ratings of the Distance from EU-15 average, HEALTH

Country	Distance from EU-15 average rating
EU-15	0
Slovenia	1
Czech Rep.	2
Croatia	3
Poland	3
Hungary	4
Turkey	5
Slovakia	5
Armenia	5
Lithuania	6
Bulgaria	7
Ukraine	8
Romania	8
Latvia	9
Georgia	9
Belarus	9
Kyrgyzstan	10
Moldova	10
Azerbaijan	10
Estonia	11
Uzbekistan	12
Russian Fed.	13
Kazakhstan	14
Tajikistan	15

V.6 Infrastructure

Infrastructure is characterized by a set of indicators reflecting density of paved roads, railroads and pipelines and passenger and cargo use of roads, railroads and aircraft. The full list of indicators used is presented in Table A5.1 in Appendix. The raw indicators are then used to derive the first two principal components[139]. The corresponding factor loadings and significance ratios are presented in Table 5.11.

The factor loadings imply that the countries with relatively high population density, high density of railroads and pipelines and high numbers of passengers carried by railroads in per capita terms should be expected in the right and upper part of the first two principal component plane. At the same time, the countries with a high ratio of passenger and cargo transportation by railroads to GDP should be positioned at the right and bottom part of the plane. Countries with a high number of passengers carried by air, both in per capita and GDP terms, are more to the upper left part. Also,

[139] The analysis suggests that five principal components explaining 85% of variation in the factors used are to be retained. The first two components explain 75% of the variation.

Table 5.11. Factor Loadings and Significance of Factors Principal Components

List of indicators	Factor Loadings		Correlation (significance P-values)	
	First Principal Component	*Second Principal Component*	*First Principal Component*	*Second Principal Component*
Population density	0.13543	0.13971	**0.7317**	**0.3324**
			(0.0000)	*(0.0444)*
Paved roads density	0.14803	0.10373	**0.7998**	0.2468
			(0.0000)	*(0.1408)*
Passengers carried per capita, cars	0.15759	-0.00518	**0.8515**	-0.0123
			(0.0000)	*(0.9423)*
Passengers carried per GDP, cars	0.07347	0.01202	**0.3970**	0.0286
			(0.0150)	*(0.8666)*
Goods hauled, cars	-0.05452	0.06464	**-0.2946**	0.1538
			(0.0767)	*(0.3634)*
Railways density	0.13461	0.15543	**0.7273**	**0.3698**
			(0.0000)	*(0.0243)*
Passengers carried, per capita, railway	0.07324	0.26228	**0.3957**	**0.6240**
			(0.0153)	*(0.0000)*
Passengers carried, per GDP, railway	-0.06347	0.26707	**-0.3429**	**0.6355**
			(0.0377)	*(0.0000)*
Goods hauled, per GDP, railway	-0.11362	0.15896	**-0.6139**	**0.3782**
			(0.0001)	*(0.0210)*
Pipelines density	0.11230	0.17831	**0.6067**	**0.4242**
			(0.0001)	*(0.0089)*
Passengers carried, per capita, air	0.08460	-0.26263	**0.4571**	**-0.6249**
			(0.0045)	*(0.0000)*
Passengers carried, per GDP, air	0.07339	-0.29939	**0.3965**	**-0.7123**
			(0.0151)	*(0.0000)*
Main telephone lines per capita	0.15407	-0.00321	**0.8325**	-0.0076
			(0.0000)	*(0.9642)*
Mobile phone per capita	0.14936	-0.07550	**0.8070**	-0.1796
			(0.0000)	*(0.2874)*

the higher is the paved road density, the number of passengers carried by cars, both in per capita and per GDP terms, and the number of fixed lines and mobile subscribers, the higher is the relevant coordinate at the first main component. At the same time, the higher is the volume of cargo transportation by cars the lower is the relevant coordinate of the first main component. The second component is independent of any of the paved roads characteristics and of fixed line and mobile phones density indicators.

The relative positions of the countries to the EU-15 average in the plane of the first two principal components are presented in Diagram 5.6.

The relative positions of the country translated into a distance from EU-15 average and the relevant ratings are presented in Table 5.12. There are twelve groups of countries according to their infrastructure gap from EU-15 average. First come the Czech Republic, Slovenia, Slovakia, Hungary and Poland, each being in a distinct group. The sixth group in the shortest distance is comprised of Lithuania, Bulgaria and Croatia, with Romania and Latvia following. The eighth group in terms

Diagram 5.6. Allocation of countries in the plane of the first two principal components based on indicators of INFRASTRUCTURE

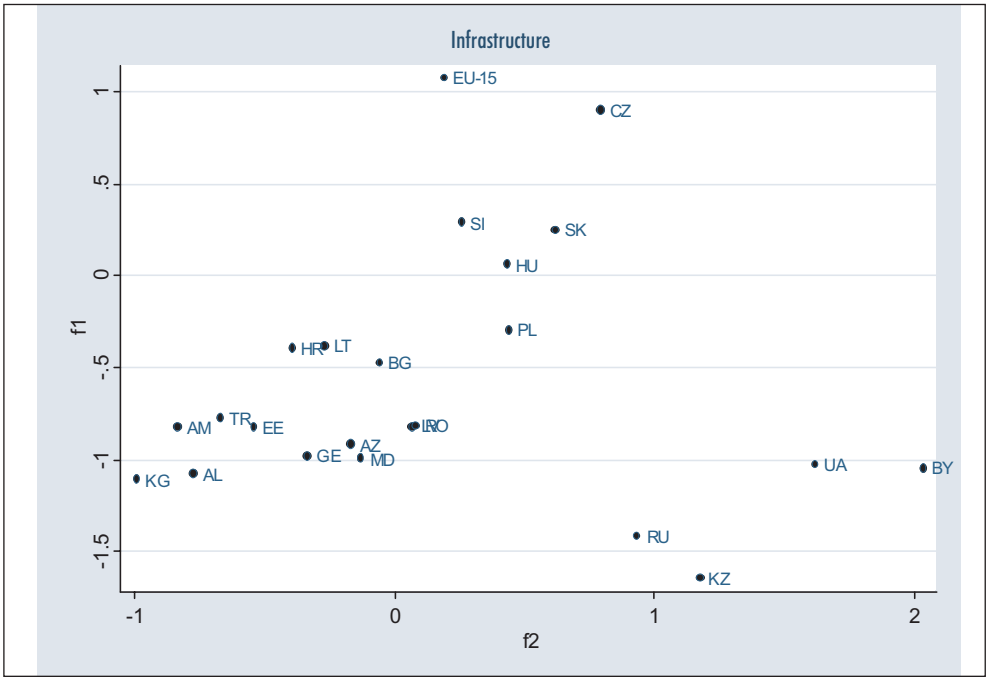


Table 5.12. Ratings of the Distance from EU-15 average, INFRASTRUCTURE

Country	Distance from EU-15 average(rating)
EU-15	0
Czech Rep.	1
Slovenia	2
Slovakia	3
Hungary	4
Poland	5
Lithuania	6
Bulgaria	6
Croatia	6
Romania	7
Latvia	7
Azerbaijan	8
Estonia	8
Turkey	8
Moldova	9
Georgia	9
Armenia	9
Albania	10
Kyrgyzstan	11
Ukraine	11
Russian Fed.	11
Belarus	12
Kazakhstan	12

of infrastructure development gap includes Azerbaijan, Estonia and Turkey. Then come Moldova, Georgia and Armenia, followed by Albania. Kyrgyzstan, Ukraine and Russia form the eleventh group, while Belarus and Kazakhstan seem to be the most distant from EU-15[140].

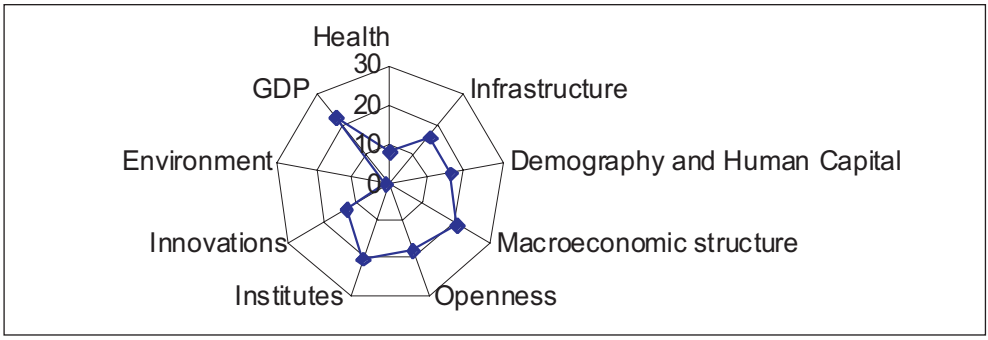
V.7 Characterization of the gap for the neighboring countries

The ratings of EEN/Russia in terms of their closeness to the EU generated in sections V.1-V.6 are used to characterize gaps between the neighboring countries and the EU. Additionally, the ratings of the countries based on their distance to the EU average in terms of GDP per capita, innovative potential and environmental sustainability (Table A5.2) are utilized to complete the picture.

Diagrams 5.7-5.13 plot the ratings of each of the countries along the nine dimensions, and Diagram 5.14 combines the positions of the seven countries.

Armenia has a very high rating in terms of environmental sustainability, rather high ratings along health dimension and the dimension of innovative potential, and moderate ratings along the rest of dimensions (Diagram 5.7). Armenia is not rated high according to GDP per capita.

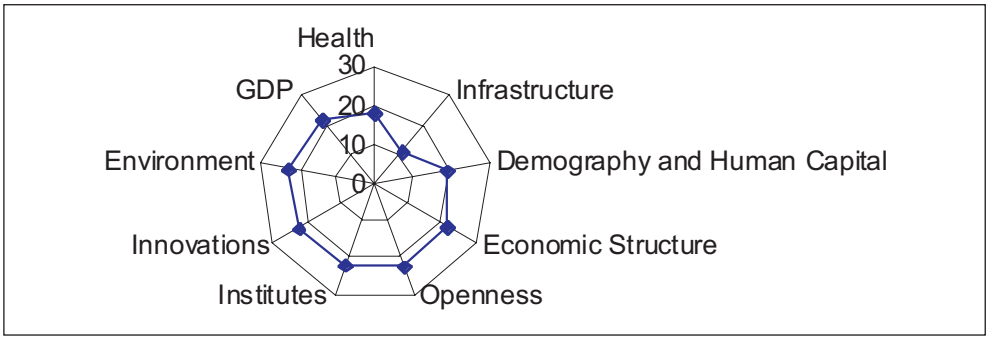
Diagram 5.7 Gap to EU-15: Armenia



Azerbaijan is rather distant from the EU-15 average. It is only in infrastructure where Azerbaijan is rated much closer (it is in the eighth group, see Table 5.12), while its ratings are pretty low along the other eight dimensions (Diagram 5.8).

[140] Note that Uzbekistan and Tajikistan are not included here due to gaps in some of the indicators.

Diagram 5.8. Gap to EU-15: Armenia



Belarus is in relatively short distance from the EU-15 average along environmental sustainability, demography and human capital dimensions (Diagram 5.9). Belarus is more distant from the EU along openness, health, innovation and GDP per capita. The largest distance from the EU is along infrastructure, macroeconomic structure and institutional development dimensions.

Diagram 5.9. Gap to EU-15: Belarus

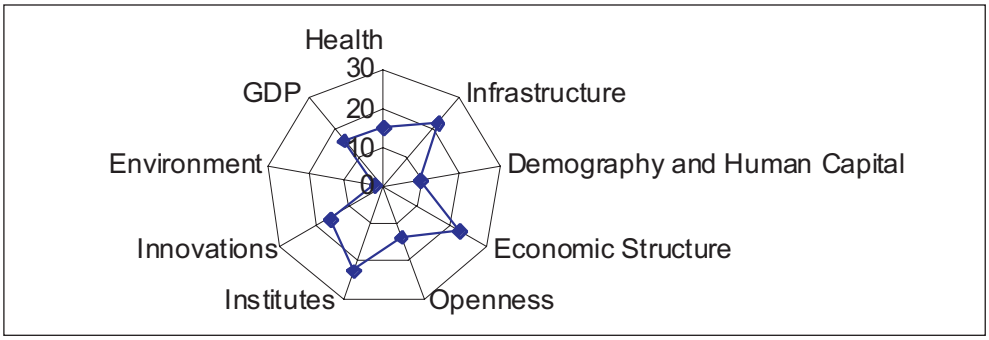
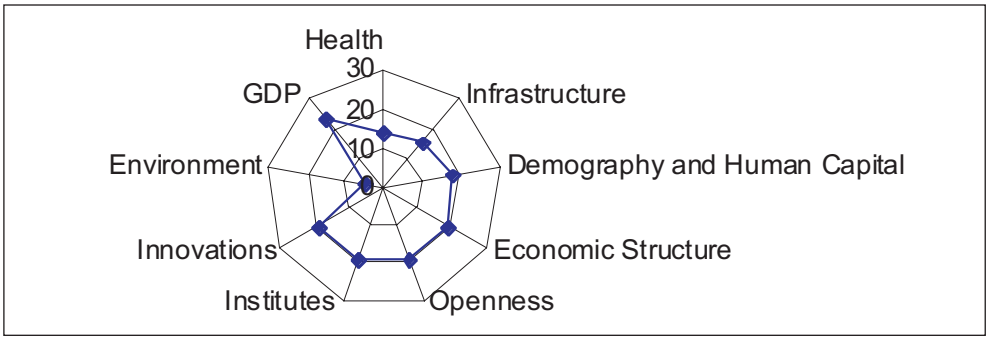


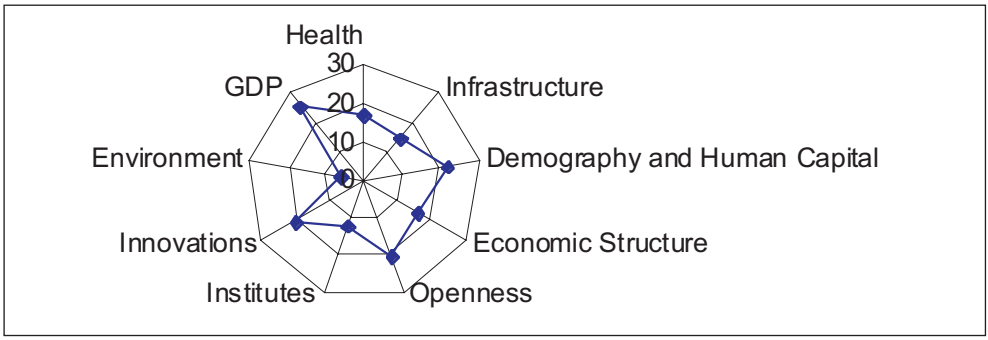
Diagram 5.10. Gap to EU-15: Georgia



Georgia is doing relatively well along the dimension of environmental sustainability (Diagram 5.10). Its developments in health and infrastructure show moderate distance from the EU-15 average, while along the rest six dimensions Georgia is among the farthest third of the countries.

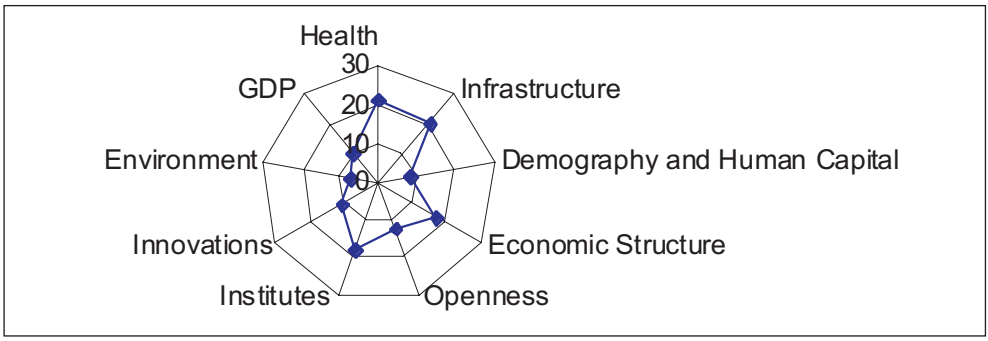
Moldova is rated high along the environmental sustainability, and rather high along the dimension of institutional development (Diagram 5.11). It is rated modestly in terms of infrastructure, economic structure and health. At the same time, Moldova's GDP per capita is the lowest in the group of countries analyzed.

Diagram 5.11. Gap to EU-15: Moldova



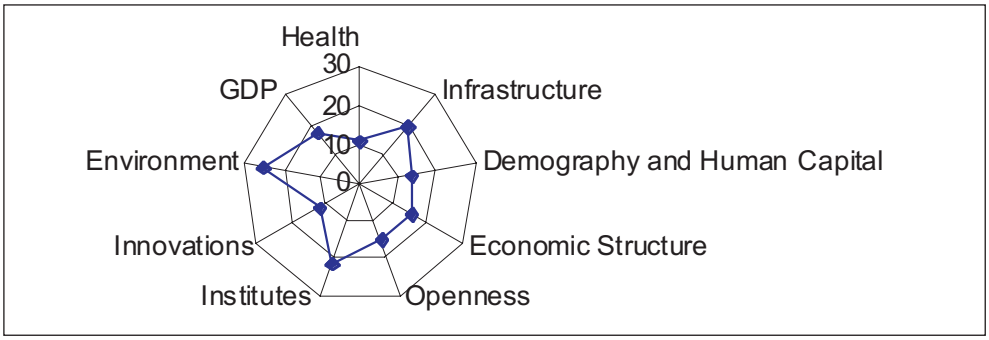
The Russian Federation is relatively close to the EU-15 average in terms of environmental sustainability, demography and human capital, GDP per capita, innovation potential and openness (Diagram 5.12). At the same time, the ratings along the rest of the dimensions – health, infrastructure, economic structure and institutional development – are rather low. The difference between the two groups of indicators is sizeable.

Diagram 5.12. Gap to EU-15: Russian Federation



Ukraine is moderately far from the EU-15 average in terms of health, demography and human capital, innovations, economic structure, openness and GDP per capita (Diagram 5.13). The level of development of infrastructure and institutions is much lower than in the EU-15. Ukraine has the lowest rating among the seven countries along the environmental sustainability dimension.

Diagram 5.13. Gap to EU-15: Ukraine

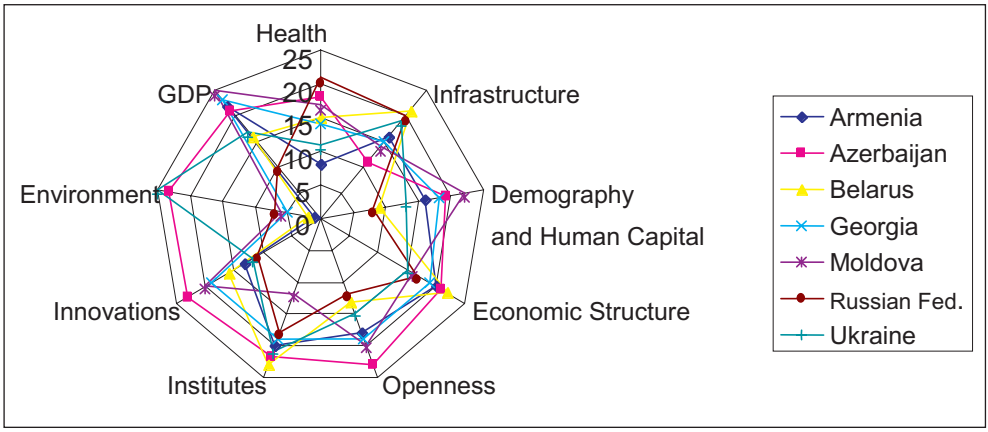


The relative positions of the seven countries-neighbors along the nine dimensions are presented at Diagram 5.14. It is clear that there is no country being the best along all the nine dimensions. Some countries lead along the health dimension (Armenia and Ukraine), others are at a shorter distance from the EU in terms of infrastructure (Azerbaijan), openness, demography and human capital (Belarus and the Russian Federation), institutional development (Moldova) and environmental sustainability (Armenia, Belarus and Georgia).

If simply averaged, i.e., averaged using equal weights for all the nine dimensions, the resulting order of the neighboring countries in terms of the shortest distance to the EU-average is as follows: the Russian Federation (14 rating points), Armenia and Belarus (15 rating points), Ukraine (16 rating points), Moldova and Georgia (17 rating points) and Azerbaijan (20 rating points).

To conclude, we have proposed an approach to measure the gap in development between the European Union and the neighboring countries. The gap is defined across the nine dimensions: economic structure, openness, institutions, demography and human capital, health, infrastructure, innovations, environmental sustainability and GDP per capita. Raw indicators in each of the dimensions are weighted to obtain the first two principal components. The coordinates of the countries under consideration in the space of the two principal components are then used to measure the distance of a country to the EU-15 average which is then converted into the ratings of the countries along the nine dimensions. The ratings provide a way to measure the relative development gap. Our results show that there is no single country which leads along the nine dimensions.

Diagram 5.14. Gap to EU-15: seven neighboring countries



Appendix

Table A5.1. List of variables[141] used to characterize the eight dimensions of the gap to the EU

Variable	Description
	MACROECONOMIC STRUCTURE
growth	GDP annual growth rate, per cent, 5-year average
gov_exp	Total general government expenditure, % of GDP
gov_bal	General government balance, % of GDP
infl	Inflation, consumer price index, 5-year average
wage	Real wage, annual percentage change, 5-year average
unemp	Unemployment, % of labor force
empl_gr	Employment growth, annual percentage change, 5-year average
labor_pr	Labor productivity, annual percentage change, 5-year average
agri_gdp	Agriculture, value added (% of GDP)
man_gdp	Manufacturing, value added (% of GDP)
electr_cons	Electricity consumption per capita (kW-h)
carb_em	Carbon dioxide emissions per capita
energy_gdp	GDP per unit of energy use (2000 PPP US$ per kg of oil equivalent)
gini	Distribution of family income: Gini index
rich	Ratio of richest 10% to poorest 10%
inc_mf	Estimated annual earned income (1,000 PPP US$) ,F/M Ratio, %
debt	Gross external debt, % of GDP
lfp_f	Labour force activity rate (%females)
lfp_m	Labour force activity rate (%males)
wage_ppp	Gross Average Monthly Wages ($US, at current exchange rates and PPP-adjusted)
inform	Informal economy estimate (%GNP)

[141] Data for 2002-2005 years are used. For each country the last available data point is used. Sources include EBRD, Heritage Foundation, IFS, OECD, WEO database, UN data, TransMONEE Database, Eurostat database, Human Development Report and World Development Indicators.

Table A5.1. cd. List of variables used to characterize the eight dimensions of the gap to the EU

Variable	Description
OPENNESS	
open	Openness of economy (merchandise exports plus imports as percentage of GDP PPP)
export	Merchandise exports as percentage of GDP PPP (2000)
import	Merchandise imports as percentage of GDP PPP (2000)
arrivals	Arrivals of visitors in percent to the population
visitor_exp	Total expenditures of visitors in per cent to GDP
intercalls	Outgoing international calls per inhabitant (minutes)
internet	International Internet bandwidth (bits per inhabitant)
fdi_outfl_gfcf	Foreign direct investment: outward flows[142], % GFCF
fdi_outfl_exp	Foreign direct investment: outward flows, % of exports
fdi_inwfl_gfcf	Foreign direct investment: inward flows, % GFCF
fdi_inwfl_imp	Foreign direct investment: inward flows, % of imports
work_r_pay_trade	Workers' remittances: Payments, % of trade
work_r_pay_gdp	Workers' remittances: Payments, % of GDP
wor_r_rec_trade	Workers' remittances: Receipts, % of trade
wor_r_rec_gdp	Workers' remittances: Receipts, % of GDP
bop	Balance of payments: capital and financial account summaries, % of GDP
bca	Balance of current account, %of GDP
INSTITUTIONS[143]	
x1	Voice and Accountability
x2	Political Stability
x3	Government Effectiveness
x4	Regulatory Quality
x5	Rule of Law
x6	Control of Corruption
x7	Starting a Business: Procedures (number)
x8	Starting a Business: Time (days)
x9	Starting a Business: Cost (% of income per capita)
x10	Starting a Business: Min. capital (% of income per capita)
x11	Dealing with Licenses: Procedures (number)
x12	Dealing with Licenses: Time (days)
x13	Dealing with Licenses: Cost (% of income per capita)
x14	Difficulty of Hiring Index
x15	Rigidity of Hours Index
x16	Difficulty of Firing Index
x17	Rigidity of Employment Index
x18	Non-wage labor cost (% of salary)
x19	Firing costs (weeks of wages)
x20	Registering Property: Procedures (number)
x21	Registering Property: Time (days)
x22	Registering Property: Cost (% of income per capita)
x23	Getting Credit: Legal Rights Index
x24	Getting Credit: Credit Information Index
x25	Getting Credit: Public registry coverage (% adults)
x26	Getting Credit: Private bureau coverage (% adults)
x27	Protecting Investors: Disclosure Index
x28	Protecting Investors: Director Liability Index
x29	Protecting Investors: Shareholder Suits Index

[142] Hereafter: FDI flows - three year averaged flows.

[143] Data for 2005 year are used. Source: EBRD (Doing business) and the World bank.

Table A5.1. cd. List of variables used to characterize the eight dimensions of the gap to the EU

Variable	Description
INSTITUTIONS	
x30	Protecting Investors: Investor Protection Index
x31	Paying Taxes: Payments (number)
x32	Paying Taxes: Time (hours)
x33	Paying Taxes: Total tax rate (% profit)
x34	Documents for export (number)
x35	Time for export (days)
x36	Documents for import (number)
x37	Time for import (days)
x38	Enforcing Contracts: Procedures (number)
x39	Enforcing Contracts: Time (days)
x40	Enforcing Contracts: Cost (% of debt)
x41	Closing a Business: Time (years)
x42	Closing a Business: Cost (% of estate)
x43	Closing a Business: Recovery rate (cents on the dollar)
DEMOGRAHY AND HUMAN CAPITAL	
ur_pop	Urban population, proportion
pop_den	Population density (persons per sq. km)
pop_incr	Rate of natural population increase
migr	Net migration rate, average (per 1,000 pop.)
birth	Birth rate, crude (per 1,000 people)
fert	Fertility rate, total (live births per woman)
enrol_sec	Gross secondary enrollment ratio (% of population aged 15-18)
enrol_high	Higher education enrolments (gross rates, per cent of population aged 19-24)
ad_lit	Adult literacy rate
gross_enrol	Combined gross enrolment ratio for primary, secondary and tertiary schools (%)
HEALTH	
hiv	HIV prevalence
tub	Tuberculosis cases per 100000
totexph	Total expenditure on health, % of GDP
outexph	Out-of-pocket expenditures, % of private expenditures on health
water	Population with sustainable access to an improved water source (%)
lwght	Newborns with low birth weight (%)
immeasle	One-year-olds fully immunized against measles (%)
contra	Contraceptive prevalence rate (%)
infmor	Infant mortality rate (per 1000 births), 5-year average
life_m	Average life expectancy at birth for males, years
life_f	Average life expectancy at birth for females, years
INFRASTRUCTURE	
Pop_den	Population density
road_den	Paved roads density per sq. km
pass_km_cap	Passengers carried, passenger-km per capita, cars
pas_km_gdp	Passengers carried, passenger-km per $1,000 GDP (PPP), cars
good_car	Goods hauled, ton-km, per $1,000 GDP (PPP), cars
rail_den	Railways density per 100 sq. km
pass_km_r_c	Passengers carried(railway), passenger-km per capita
pass_km_r_g	Passengers carried, passenger-km per $1,000 GDP (PPP)
good_rail	Goods hauled (railway), ton-km per $1,000 GDP (PPP)
pipes	Pipelines density per 100 sq. km

Table A5.1. cd. List of variables used to characterize the eight dimensions of the gap to the EU

Variable	Description
INFRASTRUCTURE	
pass_air_c	Passengers carried per 1,000 inhabitants (air)
pass_air_gdp	Passengers carried per $1,000 GDP (PPP) (air)
telephone	Main telephone lines per 100 inhabitants
mobtel	Mobile phone subscribers per 100 inhabitants
INNOVATION	
	Knowledge Economy Index (the World Bank), 2004
ENVIRONMENTAL SUSTAINABILITY	
	Environmental Sustainability Index (Yale University), 2005

Table A5.2 Distance from EU-15 average, ratings: GDP per capita, innovation and environmental sustainability

GDP per capita		Innovative potential		Environmental sustainability	
EU-15	0	EU-15	0	EU-15	0
Slovenia	1	Estonia	1	Armenia	1
Czech Republic	2	Slovenia	2	Belarus	2
Hungary	3	Czech Rep.	3	Slovakia	3
Estonia	4	Lithuania	4	Hungary	4
Slovakia	5	Hungary	5	Georgia	5
Lithuania	6	Latvia	6	Moldova	6
Poland	7	Slovakia	7	Russian Fed.	7
Latvia	8	Poland	8	Bosnia and Herzegovina	8
Croatia	9	Croatia	9	Bulgaria	9
Russia	10	Bulgaria	10	Slovenia	10
Bulgaria	11	Russian Fed.	11	Estonia	11
Romania	12	Ukraine	12	Kazakhstan	12
Kazakhstan	13	Armenia	13	Albania	13
Turkey	14	Romania	14	Kyrgyzstan	14
Macedonia	15	Turkey	15	Lithuania	15
Belarus	16	Belarus	16	Croatia	16
Ukraine	17	Serbia and Montenegro	17	Serbia and Montenegro	17
Bosnia and Herzegovina	18	Macedonia	18	Macedonia	18
Serbia and Montenegro	19	Georgia	19	Latvia	19
Albania	20	Moldova	20	Czech Rep.	20
Azerbaijan	21	Kazakhstan	21	Turkey	21
Armenia	22	Bosnia and Herzegovina	22	Romania	22
Georgia	23	Azerbaijan	23	Azerbaijan	23
Kyrgyzstan	24	Kyrgyzstan	24	Poland	24
Moldova	25	Uzbekistan	25	Ukraine	25
Uzbekistan	26	Albania	26	Tajikistan	26
Tajikistan	27	Tajikistan	27	Uzbekistan	27

VI. CONCLUDING REMARKS

The first year draft report does not yet allow us to draw final policy recommendations. Still, the current stage of data collection and their preliminary aggregation and evaluation enable us to make several important conclusions with regard to the gap origins, its evolution over time and across groups of countries, its structure and range across various dimensions of development.

Major findings

1. The current development gap between the EU and EEN/Russia has a strong historical background, one of the major factors being the level of development achieved by the turn of the XIX century. Broadly speaking, the European part of the former Russian Empire experienced the first stage of industrialization and capitalism before the First World War, while Central Asia was still feudal. Socio-economic feudal structures and relations as well as institutional and legal environment remained intact until the Bolshevik revolution. The socialist period further contributed to a divergence of country groups in terms of economic structure, efficiency, etc. The number of years spent under socialism could serve as a proxy for the extent of the current development lag.
2. The research has proved that in general, for the analyzed period, countries with higher per capita income tended to catch up faster than lower income ones. The least progress in filling the development gap with EU-15 has been shown by the low income CIS economies, while EU-12 demonstrated a higher degree of catching up with EU-15. This can be explained by the impact of adaptation recession in transition economies as well as by 'vicious circle' or 'poverty traps' theories, according to which poor countries have lower attractiveness to investors because of the low level of returns to capital.
3. Market reforms appeared to be an important determinant of closing the gap. A split of the sample of the analyzed transition countries into 'active reformers' and 'slow and partial reformers' showed a clear positive relationship between the reform progress and progress in catching up. Thus we can conclude that promotion of comprehensive market reforms is still very topical for the most of the region's economies.

4. The per capita income figures, not being able alone to measure the whole spectre of disparities in the quality of life among the region's countries, display a close to perfect correlation with subjective indicators reflecting people's perception of well-being. However, very low scores of subjective indicators in EEN/Russia are indicative of the societal trends not captured by income or poverty scores - a widespread pessimism, collapsing expectations, people's perceptions of inequalities, social exclusion, as well as low level of trust in political and public institutions, widespread corruption and state capture.
5. The education system in Russia/EEN is still characterized by: 1) a mass character of output – the scale of education (especially of higher education) that is even larger than in the world's richest countries, and 2) extremely low inputs – the levels of per capita financing which are among the lowest in the world. The consequence is the deterioration of the quality of education, its inability to meet the society growing needs and the inferior quality of human capital compared to the EU countries.
6. Despite several competitive advantages of EEN/Russia (a fairly high human capital stock and well-developed research institutions), their absorptive capacity for innovations on the whole remains low. There is an apparent mismatch between the large number of researchers employed in the region and the results of their activities, as well as low expenditures on R&D. As distinct from the EU, EEN countries also demonstrate a high variance in the development of the four pillars of 'knowledge economy' – innovation, education, ICT and institutional regime, with the latter presenting the major bottleneck for innovation absorption and performance.
7. The quantitative indicators analyzed go well together with anecdotal evidence of poor environmental legislation enforcement, inconsistent policies and inadequate environmental institutions in EEN/Russia. Across the region, legislation is extensive but largely inconsistent and unenforceable. Environmental policies are neither effective nor efficient in stimulating significant environmental improvements. Weak, and weakening, institutions are deprived of incentives to achieve environmental objectives (weak authority, scarcity of resources, high turnover of professionals, and frequent restructuring, etc.). Levels of public awareness and participation are low, and their impact is of low significance.
8. Although we have not included a study on foreign direct investments (FDI) as a separate section in the current draft report, our preliminary results show that:
   - per capita FDI inflows to the poor countries are lower than to the middle-income countries;

- important determinants of FDI location are institutions (especially quality of bureaucracy and the rule of law) that override the importance of other economic variables;
- in CIS countries, FDI are all the more hindered by poor infrastructure, both material and financial;
- progress in external liberalization also plays a large role, thus countries more open to trade and with fewer restrictions on FDI have special advantages;
- sound differences between CIS and non-CIS countries are related to the structure of FDI: non-CIS countries receive FDI mostly in the manufacturing sector, whereas in resource-abundant CIS countries (Azerbaijan and Russia) large FDI inflows were driven by investments in the oil sector.

9. A preliminary research in openness and infrastructure area produced the following tentative findings:
   - The new EU member states, and even candidate countries are significantly more integrated into the world economy compared to EEN. Despite a growth in oil exports, trade to GDP ratio in Russia also remains low;
   - In contrast to EU10 and the SEE economies, EEN/Russia failed to diversify their exports structure in the course of transition, continuing to rely mainly on primary products or basic manufacturing;
   - A clear trend has emerged that those countries that have performed more effectively in terms of economic reforms are also those that have integrated more effectively into global economy. On the contrary, 'slow performers' tend to remain relatively closed and are being left on the periphery of the contemporary international division of labor. Thus, relative openness (that tended to grow during the past decade among NMS and SEE) in most CIS countries actually decreased.
10. In institutional development, EENs/Russia overall occupy an intermediate position between EU candidates, on the one hand, and Central Asian CIS, on the other hand.
    - On average. EEN considerably lag behind Candidate countries in judiciary independence, size of kick-offs, time to pay taxes, voice and accountability, government effectiveness and control of corruption; consistency and predictability of legislation, civic freedoms and freedom from government. At the same time, EEN have significant advantages in the cost of registration of property, and time needed for enforcing contracts.
    - Candidates appear the worst in terms of business regulations; EEN/Russia – in the administration of taxes (although other CIS are even worse in corruption in taxation).

- The patterns of EEN/NMS gap versus NMS/EU15 gap are much less consistent. In terms of political institutions, the EEN countries express tremendous intra-group differences: from Belarus that has very low scores in all dimensions but political stability (that is hardly an advantage in this case), to Ukraine and Georgia closely followed by Moldova that are approaching the NMS. The EEN countries considerably lag behind NMS (compared to NMS/EU15 gap) in freedom of international trade and tax administration.
- In corruption, the difference between NMS and EU15 is generally larger than it is between them and EEN countries, except for corruption in taxation.
- In terms of legal protection and property rights, the integral indexes show that the NMS countries are much closer to EU15 than to EEN.

11. The approach used to measure the gap in development between the EU and EEN by means of principal components allowed to measure relative distances between the countries by weighting raw indicators in each of the dimensions via the first two principal components. The countries' coordinates in the space of the two principal components were then used to measure the distance of a country to the EU15 average which was then converted into the ratings of countries along the nine dimensions.
12. There is no country being the best (the nearest to EU15) along all the nine dimensions. Some countries lead along the health dimension (Armenia and Ukraine), others are at a shorter distance from the EU in terms of infrastructure (Azerbaijan), openness and demography and human capital (Belarus and Russia), institutional development (Moldova) and environmental sustainability (Armenia, Belarus and Georgia). If averaged using equal weights across all nine dimensions, the resulting order of EEN in terms of their shortest distance to the EU is as follows: Russia (14 rating points), Armenia and Belarus (15), Ukraine (16), Moldova and Georgia (17), and Azerbaijan (20 points).