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**UNDERSTANDING THE LONG-TERM  
GROWTH PERFORMANCE OF THE EAST  
EUROPEAN AND CIS ECONOMIES**

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## Abstract

*The paper analyses the determinants of long-term economic performance of east European and CIS economies in two periods: 1960-1989 (the era of central planning) and 1990-2005 (the transition to the market economy system). Throughout the 1960s and 1970s economic growth in eastern Europe progressively weakened and during the 1980s most of these economies plunged into a prolonged stagnation or recession, which contributed to the collapse of communism and central planning. The transition from plan to market began with the transformational recession, which persisted until the mid-1990s in eastern Europe, but was longer and deeper in the CIS. Since then, the east European and CIS economies have embarked on a path of strong economic growth. The recovery has been accompanied by a surge in fixed investment, often complemented by large inflows of FDI. Despite robust output growth, however, there has not been – at least so far – a noteworthy recovery in employment. The main feature of the recent strong economic growth in the region has been a remarkable upturn in both labour productivity and total factor productivity. The considerable gains in productive efficiency and rapid technological change were triggered by wide-ranging market reforms and the modernization of the capital stock. Gains in aggregate output per person employed have outpaced by a large margin increases in real GDP per capita. In terms of average productivity and real per capita income levels relative to those of the more developed, industrialized countries, the east European and CIS economies still face a long catching up process.*

## I. Introduction

Analysing long-run economic growth in a turbulent region as that of eastern Europe and the Commonwealth of Independent States (CIS) is a challenging research problem. The twentieth century was marked by deep turmoil and far-reaching changes in this part of the world, including revolutions and wars, transformation in political and social order, and frequent redrawing of national borders. The period addressed in this study (from 1960 onwards) witnessed the rise of communism in eastern Europe and its peak in the Soviet Union (in the first postwar decades), its gradual decay in the 1970s and 1980s and finally its fall and the transition to democracy and market economy after 1989.

There are a number of difficulties that need to be addressed in this context. The first one is the absence of reliable economic output statistics for the period of central planning. The official growth statistics were systematically biased upwards due to the poor quality of the statistical data and deliberate distortions introduced by the authorities in an attempt to present a more favourable picture of the state of the economy. The second one is related to the major changes in the geographical landscape of Europe after 1989: the existing nine postwar countries with centrally planned economies (including the Soviet Union) were broken up into 27 successor states: 15 in eastern Europe and 12 in the CIS, while one (the German Democratic Republic) ceased existing as a country. In terms of long-term trends these are “natural” points of structural break: discussing long-term trends covering the whole period for entities that did not exist throughout this period is methodologically questionable. Besides, in most new (or re-established) states, historical statistical series of economic performance simply do not exist, and in the few where they have been compiled retrospectively they only cover a very short period or refer to different national boundaries.

This study attempts to address some of these problems and proposes possible ways of coping with the related difficulties. In order to deal with the structural break related to the fall of communism, we offer a sequential chain of two stories: one related to the period of central planning (1960-1989) and

another one dealing with the period of transition to market economy (from 1989 to date). The methodological problems related to the adequate measurement of economic growth in the centrally planned economies (CPEs) are also addressed in the first part of the study. But due to the still questionable quality of the available data this part does not go into much detail and just provides a broad-brush picture of the long-run developments. The second part of the study is devoted to economic growth after the start of political and economic transformation. One of the achievements in this period – among numerous others – has been the remarkable improvement of the quality of statistical data. Thus we not only look at the aggregate trends but also make an attempt to analyse some of the main factors of economic growth in the east European and CIS economies.

One of the central policy goals of the economic transformation in the former CPEs was to bring about a better resource allocation and, related to that, greater efficiency in the use of resources. The more advanced reforming countries in the region have already made notable progress in this direction. The initially strong popular support for radical reforms in these countries reflected the hope that incomes and living standards would rise fairly quickly to levels similar to those prevailing in the developed market economies of western Europe. Catching up, by definition, requires sustained stronger growth of per capita incomes than in the more advanced region/country by a sufficiently large margin for a given time horizon. Given the existing large real income gaps, this catching-up process will only be possible in the medium and long term and will require that the east European and CIS economies achieve sustained improvement in factor productivity and productive efficiency.

## **II. Economic growth in eastern Europe and the former Soviet Union, 1960-1990**

### **A. Economic growth in the centrally planned economies: methodological and measurement issues**

There are numerous methodological and practical problems surrounding the actual data that are used in the measurement and analysis of long-term growth performance. Long-run rates of economic growth are a theoretical abstraction and their information content does not necessarily relate to the current growth performance of a country. Nevertheless, the long-run rate of growth is a useful concept as it sets the economic dynamics of a country in a specific and unique perspective. However, assessing these trends requires consistent long-term data series on aggregate output performance.

Large data sets of comparable real income level data and covering a sufficiently large number of countries over long periods of time have started to be compiled only recently.<sup>1</sup> Despite continuing efforts, the quality of data is in general far from satisfactory, a fact which weakens the conclusions that can be drawn from them. These data problems are especially acute with respect to eastern Europe and the CIS region, even abstracting from the difficulties related to changes in geographic borders.

The quality of past statistical data referring to the period of central planning imposes serious limitations on the analysis of long-run economic growth. During the 1970s and, especially, in the 1980s it was becoming increasingly obvious to most observers and analysts that the performance of the former CPEs was progressively weakening despite the desperate efforts of politicians and technocrats. Most independent analysts tend to believe that the last two decades of communism in eastern Europe and the former Soviet Union were generally a period of prolonged stagnation (or of deep recession in the case of Poland, because of the debt crisis of the 1980s), when living standards fell even further behind those in the western industrialized countries. However, the true picture of these developments

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<sup>1</sup> The most widely used data for this type of analysis are the so-called Penn World Tables (PWT) which contain comparable per capita GDP data for more than 130 countries from 1950. R. Summers and A. Heston, "A new set of international comparisons of real product and price level estimates for 130 countries, 1950-1985," *The Review of Income and Wealth*, Series 34, No. 1, March 1988, pp. 1-25 and "The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985", *The Quarterly Journal of Economics*, Vol. 106, No. 2, May 1991, pp. 327-368. Another widely used set of data that cover a smaller number of (mostly industrialized) countries but for a longer period of time is available in A. Maddison, *Monitoring the World Economy, 1820-1992*, Development Centre Studies (Paris, OECD, 1995).

was distorted in most of the former centrally planned countries by the official statistics through which the authorities tried to conceal or minimize the fact of the relative decline of their economies.

Despite numerous efforts by outside observers and analysts to construct alternative measures of output growth in the former CPEs (discussed below), there is still a lack of reliable long time series of output in central and eastern Europe and the CIS. Consequently, there has been relatively little research on their long-term growth trends. The starting point of the analysis is thus a critical assessment of the available estimates of the long-term growth rates of these countries.

The present level of understanding of economic growth in the former centrally planned economies during the decades of the command economy still remains unsatisfactory. It is widely acknowledged that the official statistics of that period did not reflect accurately actual economic growth and, as such, do not provide a sound basis either for comparisons over time or across countries. As a rule the official growth statistics were systematically biased upwards, reflecting both the poor quality of the statistical data, and the deliberate distortions introduced by the authorities in an attempt to present a more rosy picture of the state of the economy. In particular, since inflation was for a long time an ideological taboo in many of these countries, the reported real data often contained an upward bias due to the “underestimated” inflation. Other difficulties are related to the statistical methodology of the past: the statistics of the former CPEs were based on the Material Product Balance System (MPS), which was not directly comparable to the System of National Accounts (SNA) used in the western market economies. Moreover, even within the MPS system, economic statistics were often rendered meaningless by highly distorted relative prices. Finally, cross-country comparisons require internationally comparable national data which are not only statistically consistent but are also expressed in the same numeraire.<sup>2</sup> The absence of market exchange rates in the planned economies was a major impediment not only to the direct conversion of national statistical data into internationally comparable denominations but also to the implementation of other approaches, such as those based on purchasing power parities (PPPs).

One of the practical problems related to the use of alternative estimates made in the past for the assessment of long-term trends is that they were usually point estimates, reflecting outcomes for a given year or years. This is understandable, given the high cost of such exercises. However, while the results of such efforts were helpful for comparisons in a given period they were not sufficient for analysing the longer-term growth performance of these economies.

Computing new, alternative estimates of past economic activity would obviously be a very ambitious task, which is in any case beyond the scope of this paper. Instead, this section revisits the set of previously compiled estimates in an attempt to reconstitute a more general picture of the past performance of CPEs of eastern Europe and the USSR. In addition, an attempt has been made to use the scattered point estimates in order to generate estimates for longer time periods on the basis of extrapolation and other statistical manipulations.

Past estimates of alternative, internationally comparable GDP figures for the former CPEs have been based on a number of approaches, the most common being:<sup>3</sup>

- *Calculation of purchasing power parities for groups of countries*

This is probably the most soundly-based approach which – despite the inevitable caveats – in principle yields international comparisons that are widely accepted. However, it is data and resource demanding and usually requires the direct involvement of national statistical offices.<sup>4</sup> Due to resource

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<sup>2</sup> Per capita GDP levels expressed in “international” dollars have become the standard operational indicator of most international comparisons.

<sup>3</sup> For a critical assessment of the approaches used to compose internationally comparable estimates of income levels of the former CPEs and a summary of some of their results see E. Lancieri, “Dollar GNP estimates for central and eastern Europe 1970-90: a survey and a comparison with western countries”, *World Development*, Vol. 21, No. 1, 1993, pp. 161-175.

<sup>4</sup> The Statistics Division of the United Nations has initiated the most comprehensive international PPP-based studies. The International Comparison Project (ICP) was launched in 1968 but its practical implementation started at the end of the 1970s.

constraints and, often, politically motivated reluctance of some CPEs to participate in these international comparisons, such studies have only been made for some benchmark years. Indeed, only a few of the former CPEs were involved in the early rounds of the studies undertaken within the United Nations system.<sup>5</sup>

- *Use of physical indicators (PI) as a basis for computing internationally comparable GDP levels*

The underpinning of this method is the observation (supported by considerable empirical evidence) that there exists a strong statistical association between the level of aggregate output (GDP) and the level of output of certain key products. This relationship can be estimated on the basis of data for countries with reliable statistics (sample of market economies where both types of data are available). The reported output data, measured in physical units, for a selection of key products in a country with unreliable GDP statistics are then used to estimate an alternative value for the level of GDP, which corresponds to the output of such products in that country. This method assumes that the reported physical quantities of output, relatively well recorded by the statistical offices of the former CPEs, were not subject (or, at least, not to the same degree) to the distortions mentioned above.<sup>6</sup> The PI method was employed extensively by the UNECE secretariat for the calculation of internationally comparable GDP estimates for the former CPEs.<sup>7</sup>

- *Re-evaluation of national accounts*

The idea behind this approach is to introduce adjustments directly into the national accounts data reported by the statistical offices of the former CPEs. It aims to eliminate, or at least sufficiently reduce, the inherent distortions in the basic data by, for example, converting MPS into SNA, making proper deflation, imposing different price structures, etc.). In a second step – to make the results internationally comparable – the “adjusted” data are converted into dollars by applying conversion factors emulating market exchange rates.

The best-known piece of research that relies on this approach (which – if properly followed – is even more resource demanding than the calculation of PPPs) is that of Paul Marer.<sup>8</sup> This work, however, contains only one benchmark estimate for 1980. Reportedly, the GDP estimates for the former CPEs published in the *Handbook of Economic Statistics* of the United States CIA are based on a similar approach.<sup>9</sup>

- *Hybrid approaches, combining elements of the above (or similar) methods*

A typical hybrid approach is that of Robert Summers and Alan Heston to compute “PPP-compatible” GDP estimates for those former CPEs for which PPP-based figures were not directly available. They start with the PPP-based GDP estimates for a control group of countries in order to compute a cross-country structural relationship between the PPP of a country and its exchange rate.

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<sup>5</sup> The first European Comparison Programme (ECP) within the ICP covered 17 European countries and provided benchmark estimates for 1980 (Hungary, Poland and Yugoslavia participated in this exercise). Four more rounds of the ECP have been implemented since then providing benchmarks for 1985, 1990, 1993 and 1996, and covering an increasing number of countries. The 1996 round comprised 52 countries, including most of the ECE transition economies. UNECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980 and *International Comparisons of Gross Domestic Product in Europe, 1985, 1990, 1993, 1996* (United Nations publications, Sales Nos. E.88.II.E.28, E.94.II.E.23, E.97.II.E.2, E.99.II.E.13).

<sup>6</sup> Despite its sound rationale, this method still tends to yield a systematic upward bias in the estimates. The reasons for this include: the fact that it does not take into consideration quality differences; the implicit assumption (which obviously does not hold in reality) of identical productive efficiency in the former CPEs and in market economies (since the statistical coefficients that were applied to project GDP levels for the former CPEs were estimated on the basis of data for market economies); the implicit assumption of identical price structures; etc.

<sup>7</sup> Three phases of this study were carried out, producing GDP estimates for selected benchmark years. UNECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980; UNECE, *Comparative GDP Levels, Physical Indicators, Phase III*, 1993 (United Nations publication, Sales No. GV.E.93.0.5).

<sup>8</sup> P. Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore, The John Hopkins University Press, 1986).

<sup>9</sup> A. Maddison, “Measuring the performance of a communist command economy: an assessment of the CIA estimates for the USSR”, *The Review of Income and Wealth*, Series 44, No. 3, September 1998, pp. 307-323 and E. Lancieri, op. cit.

This relation is then used to compute methodologically compatible PPPs – and hence GDP estimates – for countries for which only regular national accounts data (or even a proxy for them) are available.<sup>10</sup> The comprehensive study of long-term economic development by Angus Maddison (which includes GDP estimates for some central and east European countries) is based on a similar methodology.<sup>11</sup>

## B. The empirical evidence

Table 1 summarizes alternative estimates of per capita GDP levels for the former CPEs (relative to the corresponding per capita GDP level in the United States) for the period 1960-1990.<sup>12</sup> These estimates are the result of large research projects based on different methodologies and made at different times. Although probably not exhaustive, the table includes some of the best known and most widely used results, which can be regarded as representative of the main strands of research in this field.

One striking feature of the pre-transition figures presented in table 1 is the large dispersion in the alternative estimates of the GDP level in the former CPEs. Indeed, large discrepancies – resulting from different methodologies – are present even for countries such as Hungary that were considered to have had relatively more reliable statistics. These discrepancies illustrate the considerable difficulties of analysing long-term growth trends in these countries.

Another problem is the partial character of the estimates: with the exception of the Maddison data set (which contains continuous annual time series for the postwar period), practically all the other projects have been limited to selected benchmark years. Even when more than one benchmark is available, the period covered is in general quite short.

An attempt has been made to cope with these difficulties by grouping the available estimates and manipulating the source data so as to compile sets of benchmark estimates for the whole period 1950-1990 with an acceptable degree of internal consistency. Some selected results of this exercise are shown in table 2, where per capita income levels in the former CPEs are shown relative to that of the United States. The simplest statistical manipulation is the computation of simple averages of all the available estimates for a given benchmark year (“estimate A”). The Maddison data, where available, are left unchanged (“estimate C”). Some of the estimates (such as the PI estimates but also some of the PWT ones) are widely considered to be upward biased. To counter this, a selection of more “conservative” estimates has been made, the average of which is shown as “estimate D”; the missing data points in this latter estimate have been extrapolated on the basis of the average measured distance from other estimates in other benchmark years. “Estimate B” is the weighted average of all the available estimates, with a larger weight being given to the more conservative estimates. “Estimate E” is a backward extrapolation based on the results of the European Comparison Programme of 1996 (ECP’96) using the officially reported growth rates in the period since 1989.<sup>13</sup>

Given the nature of the source data and the subsequent statistical manipulation, the results shown in table 2 can only be regarded as rough and tentative. Moreover, the ambiguity arising from the multiplicity of results does not allow any ranking of the different estimates according to reliability. The four long-term series in table 2 (from A to D) reflect different degrees of “conservatism” and hence define lower and upper bounds for the absolute levels of per capita GDP in the former CPEs.

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<sup>10</sup> R. Summers and A. Heston, “Improved international comparisons of real product and its composition: 1950-1980”, *The Review of Income and Wealth*, Series 30, No. 2, 1984, pp. 207-262 and “The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985”, op. cit.

<sup>11</sup> A. Maddison, *Monitoring the World Economy, 1820-1992*, op. cit.

<sup>12</sup> For more details see chapter 5, “Catching up and falling behind: economic convergence in Europe”, in UNECE, *Economic Survey of Europe, 2000 No. 1* (United Nations publication, Sales No. E.00.II.E.12), pp. 155-188.

<sup>13</sup> UNECE, *International Comparisons of Gross Domestic Product in Europe, 1996* (United Nations publication, Sales No. E.99.II.E.13). ECP’96 provides a benchmark PPP-based estimate of GDP in 1996 for almost all ECE transition economies: the only ones not present are Bosnia and Herzegovina and Yugoslavia.

TABLE 1

Per capita GDP in the former centrally planned economies relative to the United States: summary of available estimates, 1960-1990  
(Per capita GDP in the United States=100)

	1960	1965	1970	1975	1980	1985	1989	1990
<b>Albania</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	..
ECP'96 .....	..	..	..	..	..	..	12.2	10.8
Physical indicators .....	..	..	15.2	16.8	16.1	15.1	..	..
Penn World Tables .....	..	..	..	..	..	..	..	..
Maddison .....	..	..	..	..	..	..	..	..
World Bank .....	..	..	12.2	..	..	..	6.6	..
Marer .....	..	..	..	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	6.0	5.8
WEFA .....	..	..	..	..	..	..	..	..
CIA .....	..	..	..	..	..	..	..	..
Alton .....	..	..	..	..	..	..	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	2.9
<b>Bulgaria</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	..
ECP'96 .....	..	..	..	..	..	..	23.7	22.1
Physical indicators .....	27.7	36.0	35.2	40.2	41.2	43.0	..	..
Penn World Tables .....	31.8	36.3	41.3	47.1	43.0	40.8	..	..
Maddison .....	26.0	29.0	32.1	36.1	32.7	30.7	28.0	25.9
World Bank .....	..	..	..	28.8	36.5	..	23.5	..
Marer .....	..	..	..	..	31.3	..	..	..
PlanEcon .....	..	..	..	..	31.1	28.9	27.3	25.0
WEFA .....	..	..	..	..	..	30.2	..	25.5
CIA .....	..	..	36.9	42.6	39.3	38.7	38.0	..
Alton .....	..	..	..	..	29.9	..	..	24.3
Fischer-Sahay .....	..	..	..	..	..	..	..	26.5
<b>Czechoslovakia</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	..
ECP'96 .....	..	..	..	..	..	..	44.5	43.7
Physical indicators .....	50.8	55.6	48.6	54.9	54.9	52.3	..	..
Penn World Tables .....	61.4	56.6	60.7	64.6	61.4	59.2	..	..
Maddison .....	45.6	41.7	43.5	45.7	43.3	41.1	39.3	38.0
World Bank .....	..	..	45.2	49.3	51.2	..	38.8	..
Marer .....	..	..	..	..	41.7	..	..	..
PlanEcon .....	..	..	..	..	41.6	39.7	38.2	37.8
WEFA .....	..	..	..	..	..	39.5	..	35.8
CIA .....	..	..	51.0	55.0	52.7	52.5	51.3	..
Alton .....	..	..	..	..	40.3	..	..	36.3
Fischer-Sahay .....	..	..	..	..	..	..	..	36.0
<b>German Democratic Republic</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	..
ECP'96 .....	..	..	..	..	..	..	..	..
Physical indicators .....	57.0	60.5	51.0	59.2	60.1	57.9	..	..
Penn World Tables .....	57.9	57.8	61.8	69.0	69.2	69.7	..	..
Maddison .....	31.7	32.6	37.3	38.6	40.0	38.7	38.6	..
World Bank .....	..	..	50.5	53.3	63.2	..	..	..
Marer .....	..	..	..	..	52.0	..	..	..
PlanEcon .....	..	..	..	..	47.9	48.0	46.3	39.1
WEFA .....	..	..	..	..	..	50.7	..	42.6
CIA .....	..	..	53.5	60.6	61.1	62.9	63.1	..
Alton .....	..	..	..	..	46.4	..	..	48.1
Fischer-Sahay .....	..	..	..	..	..	..	..	..
<b>Hungary</b>								
European Comparison Programme .....	..	..	..	..	38.2	33.3	..	28.0
ECP'96 .....	..	..	..	..	..	..	38.9	37.6
Physical indicators .....	33.4	38.9	39.3	43.4	45.6	43.8	..	..
Penn World Tables .....	43.7	44.4	46.4	49.9	48.3	46.0	..	..
Maddison .....	32.6	33.3	33.8	35.9	34.2	32.3	30.6	28.5
World Bank .....	..	..	32.4	34.6	36.8	..	32.0	..
Marer .....	..	..	..	..	38.6	..	..	..
PlanEcon .....	..	..	..	..	32.8	31.2	29.2	27.2
WEFA .....	..	..	..	..	..	37.5	..	31.5
CIA .....	..	..	43.0	46.9	45.5	45.1	43.8	..
Alton .....	..	..	..	..	34.1	..	..	28.0
Fischer-Sahay .....	..	..	..	..	..	..	..	28.1

(For source and notes see end of table.)



TABLE 1 (concluded)

Per capita GDP in the former centrally planned economies relative to the United States: summary of available estimates, 1960-1990  
(Per capita GDP in the United States=100)

	1960	1965	1970	1975	1980	1985	1989	1990
<b>Poland</b>								
European Comparison Programme .....	..	..	..	..	35.6	26.2	..	22.5
ECP'96 .....	..	..	..	..	..	..	26.1	21.9
Physical indicators .....	34.2	38.7	34.7	39.0	38.9	34.0	..	..
Penn World Tables .....	38.4	38.2	41.2	50.4	43.9	39.2	..	..
Maddison .....	28.8	28.4	29.8	35.9	31.1	27.9	25.6	23.0
World Bank .....	..	..	28.4	35.5	34.3	..	24.2	..
Marer .....	..	..	..	..	32.8	..	..	..
PlanEcon .....	..	..	..	..	27.1	24.4	21.9	18.0
WEFA .....	..	..	..	..	..	28.4	..	23.4
CIA .....	..	..	38.3	47.4	41.9	38.8	36.8	..
Alton .....	..	..	..	..	27.5	..	..	19.9
Fischer-Sahay .....	..	..	..	..	..	..	..	26.3
<b>Romania</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	15.3
ECP'96 .....	..	..	..	..	..	..	26.9	25.3
Physical indicators .....	22.1	29.1	26.4	31.7	33.8	30.2	..	..
Penn World Tables .....	23.2	24.9	27.2	33.5	34.6	34.1	..	..
Maddison .....	16.5	18.0	19.2	23.3	22.4	20.3	17.5	15.5
World Bank .....	..	..	18.8	16.9	20.6	..	16.3	..
Marer .....	..	..	..	..	23.6	..	..	..
PlanEcon .....	..	..	..	..	19.4	18.1	16.5	13.6
WEFA .....	..	..	..	..	..	22.8	..	16.9
CIA .....	..	..	25.3	31.5	32.6	32.7	27.8	..
Alton .....	..	..	..	..	26.9	..	..	18.2
Fischer-Sahay .....	..	..	..	..	..	..	..	16.3
<b>SFR of Yugoslavia</b>								
European Comparison Programme .....	..	..	..	..	33.3	31.2	..	24.1
ECP'96 .....	..	..	..	..	..	..	31.0	27.8
Physical indicators .....	23.0	28.3	26.8	32.9	34.3	30.4	..	..
Penn World Tables .....	24.2	26.1	30.6	36.3	41.5	40.4	..	..
Maddison .....	21.5	22.7	24.6	29.0	31.9	29.8	26.7	24.5
World Bank .....	..	..	13.2	18.8	23.1	..	31.0	..
Marer .....	..	..	..	..	23.1	..	..	..
PlanEcon .....	..	..	..	..	31.1	28.9	27.3	25.0
WEFA .....	..	..	..	..	..	21.0	..	17.1
CIA .....	..	..	27.7	31.2	35.1	33.4	33.0	..
Alton .....	..	..	..	..	32.8	..	..	23.9
Fischer-Sahay .....	..	..	..	..	..	..	..	..
<b>Soviet Union</b>								
European Comparison Programme .....	..	..	..	..	..	..	..	30.4
ECP'96 .....	..	..	..	..	..	..	33.7	32.4
Physical indicators .....	37.2	43.7	39.6	42.6	42.6	40.0	..	..
Penn World Tables .....	40.1	41.1	47.4	51.0	49.3	50.0	..	..
Maddison .....	35.2	34.9	37.5	37.9	34.9	33.1	31.9	30.9
World Bank .....	..	..	36.3	34.8	40.1	..	30.3	..
Marer .....	..	..	..	..	36.9	..	..	..
PlanEcon .....	..	..	..	..	30.9	29.1	26.1	23.7
WEFA .....	..	..	..	..	..	35.4	..	32.0
CIA .....	37.6	39.1	42.8	48.5	46.3	44.0	44.2	..
Alton .....	..	..	..	..	48.1	..	..	41.9
Fischer-Sahay .....	..	..	..	..	..	..	..	22.3

**Source:** European Comparison Programme: UNECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980 and *International Comparisons of Gross Domestic Product in Europe*, 1985, 1990 (United Nations publications, Sales Nos. E.88.II.E.28, E.94.II.E.23); ECP'96: UNECE, *International Comparisons of Gross Domestic Product in Europe*, 1996 (United Nations publication, Sales No. E.99.II.E.13); Physical indicators: UNECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980; UNECE, *Comparative GDP Levels, Physical Indicators, Phase III*, 1993 (United Nations publication, Sales No. GV.E.93.0.5); Penn World Tables: R. Summers and A. Heston, "Improved international comparisons of real product and its composition: 1950-1980", *The Review of Income and Wealth*, Series 30, No. 2, 1984, pp. 207-262; "A new set of international comparisons of real product and price level estimates for 130 countries, 1950-1985", *The Review of Income and Wealth*, Series 34, No. 1, 1988, pp. 1-25; and "The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985", *The Quarterly Journal of Economics*, Vol. 106, No. 2, May 1991, pp. 327-368; Maddison: A. Maddison, *Monitoring the World Economy, 1820-1992*, Development Centre Studies (Paris, OECD, 1995); World Bank: E. Lancieri, "Dollar GNP estimates for central and eastern Europe 1970-90: a survey and a comparison with western countries", *World Development*, Vol. 21, No. 1, 1993, pp. 161-175; M. de Melo, C. Denzler, A. Gelb and S. Tenev, *Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies*, World Bank Policy Research Working Paper, No. 1866 (Washington, D.C.), December 1997; Marer: P. Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore, The Johns Hopkins University Press, 1986); PlanEcon: J. Vanous (ed.), "How big are the Soviet and east European economies?", *PlanEcon Report*, Vol. 6, No. 52 (New York), December 1990; WEFA: The WEFA Group, *World Economic Outlook 1991* (Washington, D.C.), 1991; CIA and Alton: *Handbook of Economic Statistics*, as quoted in UNECE, *Comparative GDP Levels ...*, op. cit.; Fischer-Sahay: S. Fischer and R. Sahay, "The transition economies after ten years", paper presented at the conference *Ten Years After: Transition and Growth in Post-communist Countries* (Warsaw), 15-16 October 1999.

TABLE 2

Per capita GDP in the former centrally planned economies and their successor states relative to the United States: averages of various estimates, 1960-1990  
(Per capita GDP in the United States = 100)

	1960	1965	1970	1975	1980	1985	1989	1990
<b>Albania</b>								
A. Simple average of all estimates .....	..	..	13.7	16.8	16.1	15.1	8.3	6.5
B. Weighted average of various estimates .....	..	..	..	..	..	..	..	..
C. Maddison data .....	..	..	..	..	..	..	..	..
D. Extrapolation of conservative estimates .....	..	..	..	..	..	..	9.1	6.5
E. ECP'96 .....	..	..	..	..	..	..	12.2	10.8
<b>Bulgaria</b>								
A. Simple average of all estimates .....	28.5	33.8	36.4	39.0	35.6	35.4	28.1	24.9
B. Weighted average of various estimates .....	24.6	30.0	31.7	36.2	34.7	34.9	29.3	28.6
C. Maddison data .....	26.0	29.0	32.1	36.1	32.7	30.7	28.0	25.9
D. Extrapolation of conservative estimates .....	21.3	25.9	27.3	31.2	30.5	29.6	25.5	24.7
E. ECP'96 .....	..	..	..	..	..	..	23.7	22.1
<b>Czechoslovakia</b>								
A. Simple average of all estimates .....	52.6	51.3	49.8	53.9	48.4	47.4	42.4	37.9
B. Weighted average of various estimates .....	46.3	46.3	45.1	49.3	47.1	46.9	46.6	44.3
C. Maddison data .....	45.6	41.7	43.5	45.7	43.3	41.1	39.3	38.0
D. Extrapolation of conservative estimates .....	39.7	39.7	38.7	42.2	41.0	39.6	41.4	37.9
E. ECP'96 .....	..	..	..	..	..	..	44.5	43.7
<b>German Democratic Republic</b>								
A. Simple average of all estimates .....	48.9	50.3	50.8	56.1	55.0	54.7	49.3	43.3
B. Weighted average of various estimates .....	49.5	51.0	48.6	55.3	54.4	56.4	53.2	49.7
C. Maddison data .....	31.7	32.6	37.3	38.6	40.0	38.7	38.6	..
D. Extrapolation of conservative estimates .....	43.2	44.4	42.4	48.2	47.2	49.4	46.3	43.3
E. ECP'96 .....	..	..	..	..	..	..	..	..
<b>Hungary</b>								
A. Simple average of all estimates .....	36.6	38.9	39.0	42.1	39.3	38.5	34.9	29.9
B. Weighted average of various estimates .....	33.1	35.8	36.8	40.1	39.3	39.5	37.8	34.3
C. Maddison data .....	32.6	33.3	33.8	35.9	34.2	32.3	30.6	28.5
D. Extrapolation of conservative estimates .....	29.0	31.3	32.2	35.1	35.0	34.0	34.1	30.1
E. ECP'96 .....	..	..	..	..	..	..	38.9	37.6
<b>Poland</b>								
A. Simple average of all estimates .....	33.8	35.1	34.5	41.6	34.8	31.3	26.9	22.1
B. Weighted average of various estimates .....	31.0	32.8	32.3	38.1	34.5	32.0	27.9	25.9
C. Maddison data .....	28.8	28.4	29.8	35.9	31.1	27.9	25.6	23.0
D. Extrapolation of conservative estimates .....	26.3	27.8	27.4	32.3	30.1	26.3	24.0	22.0
E. ECP'96 .....	..	..	..	..	..	..	26.1	21.9
<b>Romania</b>								
A. Simple average of all estimates .....	20.6	24.0	23.4	27.4	26.7	26.4	21.0	17.3
B. Weighted average of various estimates .....	18.1	21.5	21.4	26.0	26.5	26.4	24.6	21.4
C. Maddison data .....	16.5	18.0	19.2	23.3	22.4	20.3	17.5	15.5
D. Extrapolation of conservative estimates .....	14.9	17.7	17.6	21.4	23.2	20.5	21.7	17.6
E. ECP'96 .....	..	..	..	..	..	..	26.9	25.3
<b>SFR of Yugoslavia</b>								
A. Simple average of all estimates .....	22.9	25.7	24.6	29.6	31.8	30.7	29.8	23.8
B. Weighted average of various estimates .....	20.3	23.4	24.7	29.8	32.4	30.7	31.6	25.1
C. Maddison data .....	21.5	22.7	24.6	29.0	31.9	29.8	26.7	24.5
D. Extrapolation of conservative estimates .....	19.1	22.0	23.3	28.1	32.4	27.0	29.2	23.6
E. ECP'96 .....	..	..	..	..	..	..	31.0	27.9
<b>Soviet Union</b>								
A. Simple average of all estimates .....	37.5	39.7	40.7	43.0	41.1	38.6	33.3	30.5
B. Weighted average of various estimates .....	33.9	37.2	38.2	41.1	41.5	38.4	33.8	33.9
C. Maddison data .....	35.2	34.9	37.5	37.9	34.9	33.1	31.9	30.9
D. Extrapolation of conservative estimates .....	30.5	33.4	34.3	36.9	39.5	32.3	30.0	30.5
E. ECP'96 .....	..	..	..	..	..	..	33.8	32.5

Source: UNECE secretariat calculations, based on the data presented in table 1.

As a following step, the estimated benchmark levels of per capita GDP measured in international 1990 dollar prices and 1990 PPPs were used to compute the implied average annual rates of growth of GDP and GDP per capita in the former CPEs during the period 1960-1990. These results, broken down by subperiods, are presented in tables 3 and 4, respectively (for the four estimates, from A to D). For

comparison, in the bottom panel of the tables we show the corresponding GDP growth rates for the United States, Germany (west) and the European Union member states prior to the 2004 enlargement (EU-15).

According to these results, the picture of long-run growth performance during these three decades was broadly similar across the CPEs. The 1960s was still a decade of relatively strong economic growth in some parts of eastern Europe (especially in the less advanced economies) and the Soviet Union (following very robust growth performance during the 1950s). Economic growth throughout the region slowed down considerably but still remained positive during the 1970s. The 1980s was obviously a period of pronounced economic weakness: some of the CPEs merely stagnated for a decade; others (such as Poland and Romania) plunged into a recession. Notably the alternative estimates of economic growth in the CPEs are substantially different, and much lower (often, by several percentage points), than the corresponding official figures on economic growth for the same periods.

We now look briefly at some of the main factors that shaped this trajectory of economic performance. One of the important sources of growth during the 1960s was the ongoing process of industrialization which was associated with the reallocation of resources from the less productive agricultural activity to more productive mining, manufacturing and utilities. This type of “extensive growth” involved both ample (probably excessive) accumulation of fixed capital in industrial activities and relocation of labour from rural/agricultural areas to urban/industrial sites. But being ideologically imposed and enforced through the system of central planning, the process of industrialization was clearly suboptimal and did not result in efficient resource allocation. With prices being administratively fixed and investment decisions directed by the central plan, the economic restructuring and industrialization reflected in the main the arbitrary decisions by the political elite, often void of economic rationale. Thus, it was only a matter of time before these inefficiencies translated into poor aggregate growth performance.

During the 1970s, the process of extensive resource reallocation gradually came to an end and with it the growth momentum that it had generated. At the same time the built-in inefficiencies of the system of central planning started to affect economic performance and numerous macro- and microeconomic distortions translated into growing wastefulness of the economies.<sup>14</sup> Besides, the CPEs were largely insulated from the international markets through their non-convertible currencies and the managed trade within the Council for Mutual Economic Assistance (CMEA). In the absence of competitive pressure and adequate economic incentives, the quality of potentially tradable goods was progressively falling behind international standards. Ironically, the CPEs were temporarily spared the need for a major adjustment caused by the two oil shocks of the 1970s, as they got most of their oil from the Soviet Union, with prices based on a moving average of world prices for the previous five years. This cushioned them from the severity of these shocks for several years. At the same time, it was a missed opportunity to restructure their economies and make them more efficient, especially with respect to the use of energy.

In the 1980s, all of the problems that had been accumulating over time surfaced in full force. The CPEs were faced with huge amounts of sunk capital invested in highly inefficient industrial giants incapable of producing competitive goods that were sellable in the international markets. At the same time, the buffering effect of CMEA on oil trade was gradually phased out and eastern Europe had to pay much higher prices for oil imported from the USSR. With the *perestroika* in the USSR, all the remaining implicit subsidies to other CPEs in the trade with the Soviet Union were removed. Faced with mounting economic difficulties, the CPEs were forced to cut back fixed capital accumulation, which further reduced their growth potential. But the economic stagnation also meant that politicians could not deliver on their promises for continuously rising living standards. Some east European countries sought to compensate the dwindling domestic resources for consumption and investment by reverting to foreign borrowing. The outcome, especially after the skyrocketing of interest rates in the international financial markets after the mid-1980s was disastrous: four east European countries

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<sup>14</sup> The built-in inefficiencies of the system of central planning have been widely described and discussed in the literature so we do not go into more detail here. See, e.g. J. Kornai, *Economics of Shortage* (Amsterdam/New York, North-Holland, 1980).

TABLE 3

Estimates of the implied long-run rates of growth of GDP in the former centrally planned economies, 1961-1990  
(Annual average rates of growth of real GDP measured in 1990 dollar prices and 1990 PPPs)

	1961-1970	1971-1980	1981-1990	1961-1980	1971-1990	1961-1990
<b>Albania</b>						
A. Simple average of all estimates .....	..	6.2	-3.9	..	..	..
B. Weighted average of various estimates .....	..	..	..	..	..	..
C. Maddison data .....	..	..	..	..	..	..
D. Extrapolation of conservative estimates .....	..	..	..	..	..	..
<b>Bulgaria</b>						
A. Simple average of all estimates .....	6.2	2.4	-1.2	4.3	2.8	2.4
B. Weighted average of various estimates .....	6.3	3.6	-0.1	4.9	3.4	3.2
C. Maddison data .....	5.9	2.8	-0.2	4.3	2.9	2.8
D. Extrapolation of conservative estimates .....	6.3	3.8	-0.2	5.0	3.3	3.2
<b>Czechoslovakia</b>						
A. Simple average of all estimates .....	2.8	2.6	0.3	2.7	2.2	1.9
B. Weighted average of various estimates .....	3.1	3.3	1.7	3.2	2.7	2.7
C. Maddison data .....	2.9	2.8	1.0	2.8	2.5	2.2
D. Extrapolation of conservative estimates .....	3.1	3.5	1.8	3.3	2.6	2.8
<b>German Democratic Republic</b>						
A. Simple average of all estimates .....	3.2	2.8	0.1	3.0	2.5	2.0
B. Weighted average of various estimates .....	2.6	3.1	1.2	2.9	2.6	2.3
C. Maddison data .....	4.4	2.7	...	3.6	2.9	...
D. Extrapolation of conservative estimates .....	2.6	3.1	1.3	2.8	2.6	2.3
<b>Hungary</b>						
A. Simple average of all estimates .....	3.9	2.6	-0.4	3.3	2.3	2.0
B. Weighted average of various estimates .....	4.3	3.2	0.7	3.8	2.9	2.7
C. Maddison data .....	3.6	2.7	0.1	3.1	2.2	2.1
D. Extrapolation of conservative estimates .....	4.3	3.4	0.7	3.9	2.8	2.8
<b>Poland</b>						
A. Simple average of all estimates .....	4.1	3.2	-0.9	3.6	2.4	2.1
B. Weighted average of various estimates .....	4.3	3.8	0.1	4.0	2.9	2.7
C. Maddison data .....	4.2	3.6	0.1	3.9	2.9	2.6
D. Extrapolation of conservative estimates .....	4.3	4.1	-0.1	4.2	2.7	2.7
<b>Romania</b>						
A. Simple average of all estimates .....	5.2	4.5	-1.0	4.9	3.6	2.9
B. Weighted average of various estimates .....	5.6	5.4	0.9	5.5	4.1	3.9
C. Maddison data .....	5.5	4.7	-0.7	5.1	3.7	3.1
D. Extrapolation of conservative estimates .....	5.6	6.0	0.7	5.8	3.8	4.1
<b>SFR of Yugoslavia</b>						
A. Simple average of all estimates .....	4.7	5.8	0.7	5.2	4.0	3.7
B. Weighted average of various estimates .....	6.0	5.9	1.1	6.0	4.5	4.3
C. Maddison data .....	5.4	5.8	0.2	5.6	4.5	3.8
D. Extrapolation of conservative estimates .....	6.0	6.6	0.4	6.3	4.1	4.3
<b>Soviet Union</b>						
A. Simple average of all estimates .....	5.0	3.2	0.1	4.1	2.9	2.8
B. Weighted average of various estimates .....	5.4	4.0	0.6	4.7	3.2	3.3
C. Maddison data .....	4.8	2.4	1.6	3.6	2.8	2.9
D. Extrapolation of conservative estimates .....	5.4	4.6	0.0	5.0	2.9	3.3
<i>Memorandum items:</i>						
United States .....	4.2	3.3	2.8	3.7	3.3	3.4
Germany (west) .....	4.4	2.7	2.2	3.6	2.6	3.1
European Union (west Germany) .....	4.8	3.0	2.3	3.9	3.1	3.4

Source: UNECE secretariat calculations, based on the data presented in table 1.

(Bulgaria, Hungary, Poland and Romania) were faced with severe debt crises and two of them (Bulgaria and Poland) ended up by defaulting on their foreign debt.

The results shown in table 2 are evidence of the fact that there was virtually no catching up by the former CPEs with the developed market economies for the period between 1960 and 1990 as a whole. There was a relatively brief catch-up phase which continued roughly until the middle of the 1970s but afterwards the gap started to widen again. The dismal economic performance of the east European economies and the Soviet Union, which started in the 1970 and became especially evident during the 1980, was one of the main pushes for the largely peaceful revolutions in the region and the start of economic and political transformation.

TABLE 4

Estimates of the implied long-run rates of growth of GDP per capita in the former centrally planned economies, 1961-1990  
(Annual average rates of growth of real GDP per capita measured in 1990 dollar prices and 1990 PPPs)

	1961-1970	1971-1980	1981-1990	1961-1980	1971-1990	1961-1990
<b>Albania</b>						
A. Simple average of all estimates .....	..	3.9	-5.7	..	..	..
B. Weighted average of various estimates .....	..	..	..	..	..	..
C. Maddison data .....	..	..	..	..	..	..
D. Extrapolation of conservative estimates .....	..	..	..	..	..	..
<b>Bulgaria</b>						
A. Simple average of all estimates .....	5.4	2.0	-1.1	3.7	2.4	2.1
B. Weighted average of various estimates .....	5.5	3.1	0.1	4.3	2.9	2.9
C. Maddison data .....	5.1	2.4	-0.1	3.7	2.4	2.4
D. Extrapolation of conservative estimates .....	5.5	3.3	-0.1	4.4	2.8	2.9
<b>Czechoslovakia</b>						
A. Simple average of all estimates .....	2.3	1.9	0.0	2.1	1.8	1.4
B. Weighted average of various estimates .....	2.6	2.6	1.5	2.6	2.2	2.3
C. Maddison data .....	2.4	2.1	0.8	2.3	2.1	1.8
D. Extrapolation of conservative estimates .....	2.6	2.8	1.6	2.7	2.1	2.3
<b>German Democratic Republic</b>						
A. Simple average of all estimates .....	3.3	3.0	0.2	3.1	2.6	2.1
B. Weighted average of various estimates .....	2.7	3.3	1.3	3.0	2.7	2.4
C. Maddison data .....	4.5	2.9	..	3.7	3.0	..
D. Extrapolation of conservative estimates .....	2.7	3.3	1.4	3.0	2.7	2.4
<b>Hungary</b>						
A. Simple average of all estimates .....	3.5	2.3	-0.1	2.9	2.1	1.9
B. Weighted average of various estimates .....	4.0	2.9	1.0	3.4	2.7	2.6
C. Maddison data .....	3.3	2.3	0.4	2.8	2.0	2.0
D. Extrapolation of conservative estimates .....	4.0	3.0	1.0	3.5	2.6	2.7
<b>Poland</b>						
A. Simple average of all estimates .....	3.1	2.3	-1.6	2.7	1.6	1.2
B. Weighted average of various estimates .....	3.3	2.8	-0.6	3.1	2.0	1.8
C. Maddison data .....	3.2	2.6	-0.6	2.9	2.1	1.7
D. Extrapolation of conservative estimates .....	3.3	3.1	-0.8	3.2	1.9	1.9
<b>Romania</b>						
A. Simple average of all estimates .....	4.2	3.6	-1.4	3.9	2.6	2.1
B. Weighted average of various estimates .....	4.6	4.4	0.5	4.5	3.2	3.1
C. Maddison data .....	4.5	3.7	-1.1	4.1	2.8	2.3
D. Extrapolation of conservative estimates .....	4.6	5.0	0.2	4.8	2.9	3.3
<b>SFR of Yugoslavia</b>						
A. Simple average of all estimates .....	3.6	4.8	0.2	4.2	3.1	2.9
B. Weighted average of various estimates .....	4.9	5.0	0.5	5.0	3.5	3.5
C. Maddison data .....	4.3	4.9	-0.3	4.6	3.6	2.9
D. Extrapolation of conservative estimates .....	4.9	5.6	-0.2	5.3	3.2	3.4
<b>Soviet Union</b>						
A. Simple average of all estimates .....	3.7	2.3	-0.7	3.0	2.0	1.8
B. Weighted average of various estimates .....	4.1	3.0	-0.2	3.6	2.3	2.3
C. Maddison data .....	3.5	1.5	0.8	2.5	1.9	1.9
D. Extrapolation of conservative estimates .....	4.1	3.6	-0.8	3.9	2.0	2.3
<i>Memorandum items:</i>						
United States .....	2.9	2.2	1.9	2.5	2.2	2.3
Germany (west) .....	3.5	2.6	2.0	3.0	2.4	2.7
European Union (west Germany) .....	4.0	2.5	2.1	3.3	2.6	2.9

Source: UNECE secretariat calculations, based on the data presented in table 1.

### III. Economic performance during the transition from plan to market (1990-2005)

#### A. Transformational recession and post-recession recovery

One of the ultimate goals of the process of economic and political transformation that started in the former CPEs a decade and a half ago was – and still is – to improve the standards of living and the economic welfare of the population in these countries. The collapse of the political system in these countries mirrored the collapse of their economies, overburdened with inefficiencies, shortages, macroeconomic disequilibria and structural rigidities (accumulated over the decades), employing

obsolete technologies and supplying final goods of mediocre quality, and largely isolated from the main international markets. The start of transition to a market economy generated high hopes and expectations on the part of the peoples living in the eastern part of the continent. However, the process of economic and political transformation turned out to be extremely difficult.

The economic transformation in all former CPEs started with a sharp and prolonged output decline, a phenomenon that came to be known as the “transformational recession”.<sup>15</sup> Although it was expected that the radical systemic change would inevitably be accompanied by disruption in output performance, both the magnitude of the recession and its duration exceeded even the worst expectations. By now, there has been extensive research on the causes and nature of the transformational recession and these are well documented in the economic literature.<sup>16</sup> Some of the most important of these causes are:

#### **Supply-related causes:**

- the institutional vacuum and disorganization after the breakdown of the previous institutional system: the system of central planning was abolished overnight but establishing a new market-based system took considerable time;
- the huge amount of obsolete fixed capital in inefficient enterprises: its systematic underperformance under market conditions was equivalent to the erosion of the aggregate capital stock;
- the erosion of human capital: many workers found out that their skills were no longer in demand under the new conditions;
- the low quality of domestically produced goods: they were difficult to sell not only in international goods markets but also in the domestic markets after the international opening up of the economy;
- the rudimentary financial system: it could not perform proper financial intermediation (which could have partly cushioned the external and internal shocks).

#### **Demand-related causes:**

- the breakdown of the previous administratively run “international market” (the CMEA) that used to absorb a significant share of the CPEs’ exports;
- the collapse in domestic consumer demand due to the erosion of purchasing power caused by the high inflation after the liberalization of prices and the sharp rise in unemployment;
- the sharp fall in investment activity as firms lost points of reference with respect to their future prospects.

The actual growth performance of the east European and CIS economies in the period 1990-2005 is reflected in table 5 and chart 1.

The process of economic and political transformation started with a recession which was unprecedented by its depth. Thus, between 1989 and 1993 eastern Europe as a whole lost some 23 per cent of its aggregate GDP. In the CIS region the recession was even longer and deeper: between 1989 and 1998 aggregate GDP in the CIS as a whole contracted by a cumulative 46 per cent. An economic contraction of this magnitude had never been seen before in peaceful times.

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<sup>15</sup> J. Kornai, “Transformational recession: a general phenomenon examined through the example of Hungary’s development”, *Economie Appliquée*, Vol. 46, No. 2, 1993, pp. 181-227 and “Transformational recession: the main causes”, *Journal of Comparative Economics*, Vol. 19, No. 1, August 1994, pp. 39-63.

<sup>16</sup> A comprehensive review of the related literature is available in N. Campos and F. Coricelli, “Growth in transition: what we know, what we don’t, and what we should”, *Journal of Economic Literature*, Vol. 40, No. 3, September 2002, pp. 793-836. See also C. Wyplosz, “Ten years of transformation: macroeconomic lessons”, CEPR Discussion Papers, No. 2254 (London), 2000.

TABLE 5

Real GDP in eastern Europe and the CIS, 1990-2005  
(Average annual percentage change)

	1991- 1995	1996- 2000	2001- 2005	1991- 2005	1996- 2005
Eastern Europe .....	-2.0	3.0	4.1	1.6	3.5
Albania .....	-2.1	5.5	5.5	2.9	5.5
Bosnia and Herzegovina .....	..	23.2	4.2	..	13.3
Bulgaria .....	-2.6	-0.8	4.9	0.4	2.0
Croatia .....	-6.2	3.4	4.3	0.4	3.9
Czech Republic .....	-1.0	1.5	3.3	1.3	2.4
Estonia .....	-6.2	5.6	7.1	2.0	6.3
Hungary .....	-2.4	4.0	3.8	1.8	3.9
Latvia .....	-11.9	5.4	7.7	0.0	6.5
Lithuania .....	-10.0	4.2	7.5	0.3	5.8
Poland .....	2.2	5.1	2.9	3.4	4.0
Romania .....	-2.1	-1.3	5.9	0.8	2.2
Serbia and Montenegro .....	-13.7	0.2	4.9	-3.2	2.5
Slovakia .....	-2.9	3.7	4.8	1.8	4.2
Slovenia .....	-0.6	4.3	3.3	2.3	3.8
The former Yugoslav Republic of Macedonia .....	-4.7	3.0	1.2	-0.2	2.1
CIS .....	-10.1	1.6	6.6	-0.9	4.1
Armenia .....	-12.0	5.1	11.7	1.1	8.4
Azerbaijan .....	-16.0	7.0	12.8	0.5	9.9
Belarus .....	-8.2	6.3	7.2	1.5	6.8
Georgia .....	-22.3	5.8	6.9	-4.2	6.4
Kazakhstan .....	-9.3	2.5	10.1	0.8	6.3
Kyrgyzstan .....	-12.7	5.6	4.0	-1.4	4.8
Republic of Moldova .....	-17.0	-2.5	7.2	-4.6	2.2
Russian Federation .....	-9.1	1.6	6.0	-0.7	3.8
Tajikistan .....	-18.6	0.0	9.2	-3.8	4.5
Turkmenistan .....	-8.8	4.5	3.5	-0.5	4.0
Ukraine .....	-13.7	-2.0	7.8	-3.0	2.8
Uzbekistan .....	-4.1	3.9	5.5	1.7	4.7
Eastern Europe and CIS .....	-7.4	2.2	5.6	0.0	3.9
New EU members (EU-8) .....	-0.9	4.1	3.6	2.3	3.8
Central Europe .....	0.1	4.0	3.3	2.5	3.6
Baltic states .....	-9.9	4.8	7.5	0.5	6.1
South-east Europe .....	-4.3	0.4	5.2	0.4	2.8
CIS without Russian Federation .....	-12.0	1.7	7.9	-1.2	4.8
European CIS .....	-12.8	0.0	7.6	-2.1	3.7
Caucasian CIS .....	-17.8	6.2	10.8	-1.1	8.5
Central Asian CIS .....	-8.7	3.3	7.6	0.5	5.4

Source: UNECE secretariat calculations, based on national statistics.

between east European countries and the CIS. In the latter region the establishment of such institutions was much slower and patchier than in eastern Europe, which continuously hampered the establishment of CIS countries as well-functioning market economies.<sup>17</sup>

But the bold economic and political reforms undertaken by the east European and CIS countries have borne their fruit. The fundamental market reforms unleashed the previously suppressed entrepreneurial spirit, injecting new dynamism into these economies. The overhaul of the institutional framework in the direction of market-based business incentives contributed to far greater economic efficiency and productivity (see sections C and D below). Business sentiment soared, reflecting the

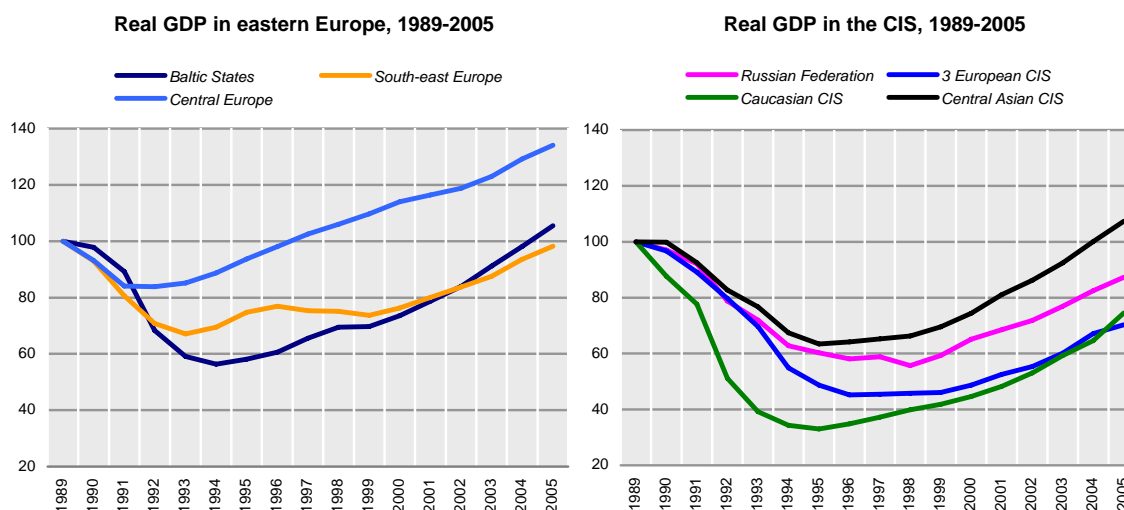
While all east European and CIS economies fell victim to the transformational recession, its duration and depth differed across countries. The differences in performance largely reflect region- and country-specific factors. Geographic location and proximity to/distance from important markets as well as historic and cultural tradition were among such factors. For example, the central European countries benefited from their geographic proximity to the large western European markets and their traditional economic and cultural links with these countries. Accordingly, they were the first to overcome the transformational recession. In contrast, the recession lasted much longer in more distant (from the European “economic core”) south-east European countries. Moreover, the legacies of the command economy were relatively less entrenched in eastern Europe (where it lasted for some 40 years) compared to the Soviet Union (where communism ruled for more than seven decades). The transformational recession was therefore the most severe in those successor states of the Soviet Union that formed the CIS.

A crucial factor in the success in the transition process was the sequencing and extent to which these countries successfully established the institutions that are necessary for the good functioning of a market economy. These institutions include the rule of law, property rights, corporate and non-corporate law, judicial system, competition regime, financial institutions and regulations, labour law and procedures for settling disputes, regulatory framework, etc. This factor also partly explains differences in performance

<sup>17</sup> The importance of institutions and of the sequencing of their establishment in the transition process was forcefully and repeatedly argued by the UNECE in its *Economic Survey of Europe*. See, for instance, “Economic reform in the east: a framework for western support”, in UNECE, *Economic Survey of Europe in 1989-1990* (United Nations publication, Sales No. E.90.II.E.1), pp. 5-26; and “The hard road to the market economy: problems and policies”, in UNECE, *Economic Survey of Europe in 1990-1991* (United Nations publication, Sales No. E.91.II.E.1), pp. 119-183.

CHART 1

Real GDP in eastern Europe and the CIS, 1989-2005  
(Indices, 1989=100)



Source: UNECE secretariat calculations, based on national statistics.

sharp upturn in expectations. Foreign direct investment poured into these dynamic emerging markets (especially in eastern Europe) adding further strength to their economies. The upturn in world commodity prices (particularly oil prices) in recent years contributed greatly to the overall strengthening of economic activity in the commodity exporting CIS countries.

With the emergence from the transformational recession, the east European and CIS economies embarked on a path of strong economic growth. In the period 2000-2005, the average annual rate of GDP growth in the CIS was 6.6 per cent, in south-east Europe this rate was 5.2 per cent and in the eight new EU members it was 3.6 per cent (table 5). By 2001, aggregate GDP in eastern Europe recovered to its pre-transition level and in 2005 it was already 19 per cent higher than its level in 1989. In the CIS as a whole, aggregate GDP still has not recovered to its pre-transition level: in 2005 it was still at 85 per cent of the 1989 level.

At present eastern Europe and the CIS are among the fastest growing regions of the world economy. At purchasing power parity rates the combined GDP of these economies is now greater than that of Japan and in recent years their aggregate output has been growing at an average annual rate close to 6 per cent. In fact, together with China, India and south-east Asia, these emerging market economies have become a new engine of growth for the global economy.

While their recent growth performance is an impressive achievement, east European and CIS economies still face important economic challenges. One of the key policy objectives for all these countries is to reduce the still existing large gaps in per capita income levels vis-à-vis the developed market economies. Despite the rapid economic growth since the mid-1990s, the average GDP per capita (at PPPs) even in the most advanced economies, the new EU-members, was in 2004 still only 36 per cent of that in the United States and 50 per cent of GDP per capita in the EU-15 (table 6). The average per capita GDP level in south-east Europe and the CIS is only one fifth of that in the United States and a quarter of that in the EU-15. Besides, the average figures mask considerable differences in per capita income levels within these subregions. For example, while GDP per capita in Russia is some 25 per cent of that in the US, the Caucasian and Central Asian CIS economies on average make up for just one tenth of the US GDP per capita (some of the underlying factors of these developments are discussed in more detail in section C).



TABLE 6

Per capita GDP in eastern Europe and the CIS at PPPs  
(USA=100)

	1996 (ICP)	1999 (ICP)	2002 (ICP)	2004 (WB)
<b>Eastern Europe</b>				
Albania .....	10.3	..	..	12.8
Bosnia and Herzegovina .....	..	..	..	18.7
Bulgaria .....	17.9	18.6	19.5	19.8
Croatia .....	22.6	24.7	29.2	29.4
Czech Republic .....	45.7	40.2	45.8	46.3
Estonia .....	23.9	25.3	31.1	33.2
Hungary .....	33.5	34.1	39.7	39.3
Latvia .....	18.2	19.6	26.4	29.8
Lithuania .....	20.7	22.5	28.7	31.8
Poland .....	24.7	26.7	30.9	31.8
Romania .....	23.7	16.1	19.4	20.6
Serbia and Montenegro .....	..	..	..	..
Slovakia .....	31.9	33.3	34.8	36.2
Slovenia .....	47.5	46.9	51.0	52.2
The former Yugoslav Republic of Macedonia .....	15.0	18.3	16.7	16.3
<b>CIS</b> .....				
Armenia .....	7.1	..	6.2	10.8
Azerbaijan .....	6.9	..	7.9	9.6
Belarus .....	18.6	..	15.1	17.4
Georgia .....	10.6	..	7.3	7.4
Kazakhstan .....	15.6	..	14.4	17.6
Kyrgyzstan .....	7.6	..	4.7	4.6
Republic of Moldova .....	7.5	..	4.8	4.9
Russian Federation .....	24.2	18.0	22.3	24.2
Tajikistan .....	3.3	..	2.6	2.9
Turkmenistan .....	10.7	..	13.4	17.4
Ukraine .....	11.9	11.0	..	15.7
Uzbekistan .....	7.2	..	..	4.7

*Source:* International comparison programs (ICP) and World Bank (WB) estimates (World Development Indicators database).

The process of economic transformation also had some negative social side effects that have not been fully overcome yet. The most acute among them has been the rapid increase in social inequality and the impoverishment of large segments of these societies. Both the incidence of poverty and income inequalities within countries rose sharply during the period of transformational recession. During the recovery these trends have been partly reversed in most of these countries but high poverty rates and sharp income differentiation remain widespread. These developments are not conducive to social cohesion. According to the latest World Bank estimates, the share of the population that lived below the internationally adopted (second) poverty line of \$PPP 4.30/day in 2003 was 96 per cent in Kyrgyzstan and Tajikistan, 86 per cent in Uzbekistan, 85 per cent in Georgia and the Republic of Moldova, 93 per cent in Armenia, 70 per cent in Azerbaijan, 66 per cent in Kazakhstan, 58 per cent in Romania, 41 per cent in Russia, and 33 per cent in Bulgaria.<sup>18</sup>

By the same estimates, the combined income share of the 20 per cent poorest families in Georgia and The former Yugoslav Republic of Macedonia was just 6 per cent of the economywide household income; in Estonia, Hungary, Latvia, Russia and Uzbekistan it was 7 per cent; in Lithuania, Poland, the Republic of Moldova and Tajikistan – 8 per cent; in

Belarus, Bulgaria, Romania and Ukraine – 9 per cent. Reducing inequality and the incidence of poverty – without diluting incentives to work – will not only improve social cohesion but should also have a positive effect on future growth prospects.

## B. Capital accumulation and employment dynamics during the transition

### *Fixed investment*

Capital investment plays a key role in promoting economic development and growth, especially as a carrier of technological change. Economy-wide fixed capital accumulation is a complex process of channelling domestically generated and/or externally mobilized resources into productive use. The intensity and speed of capital accumulation are driven by a multitude of factors related to the economic fundamentals as well as the institutional, political and social environment of a country. The experience of the east European and CIS countries that undertook the transformation from planned to market economies, notably through the creation of competitive economic structures, provides ample evidence of the fundamental role of productive investment in the process of economic development. The countries that were more successful in economic transformation and growth were also those that managed to make greater progress in restructuring their productive capacity on the basis of new capital investment.

<sup>18</sup> World Bank, *Growth, Poverty and Inequality. Eastern Europe and the former Soviet Union* (Washington, D.C., 2005).

TABLE 7

Gross fixed capital formation in eastern Europe and the CIS, 1996-2004  
(Average annual percentage change)

	1996-2000	2001-2004	1996-2004
<b>Eastern Europe</b>			
Albania .....	..	..	..
Bosnia and Herzegovina .....	..	..	..
Bulgaria .....	3.3	14.3	8.0
Croatia .....	10.5	10.0	10.3
Czech Republic .....	0.8	5.3	2.7
Estonia .....	7.6	11.1	9.2
Hungary .....	8.5	6.5	7.6
Latvia .....	19.6	13.1	16.7
Lithuania .....	8.3	12.7	10.3
Poland .....	12.8	-2.5	5.7
Romania .....	0.3	9.4	4.3
Serbia and Montenegro .....	..	..	..
Slovakia .....	4.2	3.4	3.9
Slovenia .....	11.1	5.0	8.3
The former Yugoslav Republic of Macedonia .....	-1.1	2.1	0.3
<b>CIS</b>			
Armenia .....	8.1	19.0	12.8
Azerbaijan .....	34.3	37.6	35.7
Belarus .....	5.0	10.9	7.6
Georgia .....	..	..	..
Kazakhstan .....	-3.2	14.0	4.1
Kyrgyzstan .....	-0.4	-4.7	-2.3
Republic of Moldova .....	-1.8	12.2	4.2
Russian Federation .....	-4.4	9.3	1.5
Tajikistan .....	..	..	..
Turkmenistan .....	..	..	..
Ukraine .....	-1.8	6.2	1.6
Uzbekistan .....	..	..	..

Source: UNECE secretariat calculations, based on national statistics.

Turning to the relationship between capital accumulation and economic growth, the conventional wisdom is centred on the view that capital accumulation drives growth. In the traditional, neoclassical, growth models, a rise in the investment rate does not affect the equilibrium rate of growth, but only the pace of transition from one steady state to another. The more recent “endogenous growth theory” subsumes a link between investment and the level of productive efficiency, and stresses the role of human capital. According to this strand of literature, the two main transmission channels through which fixed capital formation affects growth are: (i) the increased stock of physical capital in the economy (direct effect), and (ii) the technological upgrading associated with the investment (indirect effect).<sup>19</sup> However, capital accumulation is a necessary, but not sufficient, condition for long-term growth; the latter depends on other factors, such as the levels of human capital and technological knowledge in the economy as well as the quality and other structural characteristics of the new investment, in particular its potential to enhance productive efficiency.<sup>20</sup> The experience of the centrally planned economies until the late 1980s is a blatant example of wasteful accumulation of unproductive and environmentally hazardous physical capital.

The stylized facts presented below summarize some of the main trends in capital accumulation in eastern Europe and the CIS region since the start of their economic transformation. The patterns of capital accumulation in these economies have gone through different phases in that period. At the onset of transition, aggregate investment experienced a profound negative shock. The deep and prolonged transformational recession burdened most firms with excess capacity as huge sunk capital costs surfaced as a result of the knock-on effect of economic liberalization. The problems were further compounded by the inherited structure of the economy as all centrally planned economies were overindustrialized and the industrial structure was heavily concentrated in large state-owned firms. The inherited production facilities were generally obsolete and for firms to survive under market conditions, they had to undertake active restructuring and hence new productive investment. At the same time, the growth of the newly emerging private firms was conditional on their capacity to undertake large new investment. But in the early phases of transition equity and debt security markets were practically non-existent and virtually the only available source of external funding for most firms was domestic bank lending. The emerging financial markets (in the first place, the market for commercial credit) were inefficient and performed under considerable information asymmetries, as firms had no proper track record of creditworthiness. These market imperfections established additional barriers to the flow of financial resources to the enterprise sector, further limiting firms’ capacity to invest.

<sup>19</sup> A. Hatemi and M. Irandoust, “Investigating causal relations between fixed investment and economic growth”, *Economia Internazionale/International Economics*, Vol. 55, No. 1, February 2002, pp. 25-35.

<sup>20</sup> K. Schmidt-Hebbel, L. Serven and A. Solimano, “Saving and investment: paradigms, puzzles, policies”, *World Bank Research Observer*, Vol. 11, No. 1, February 1996, pp. 87-117.

TABLE 8

Share of gross fixed capital formation in GDP in eastern Europe and the CIS, 1990-2004  
(Period averages, per cent)

	1991- 1995	1996- 2000	2001- 2004	1991- 2004	1996- 2004
<b>Eastern Europe</b> .....	19.4	22.5	22.0	21.3	19.6
Albania .....	..	..	..	..	..
Bosnia and Herzegovina .....	..	..	..	..	..
Bulgaria .....	16.5	13.6	18.5	16.2	16.0
Croatia .....	13.6	21.4	24.8	19.9	23.1
Czech Republic .....	26.9	29.6	27.2	27.9	28.4
Estonia .....	23.7	26.9	27.7	26.5	27.3
Hungary .....	20.0	22.2	23.0	21.9	22.6
Latvia .....	13.8	19.2	24.8	19.3	22.0
Lithuania .....	23.8	22.4	20.4	22.2	21.4
Poland .....	16.8	21.3	20.0	19.3	20.6
Romania .....	18.3	20.3	21.1	19.9	20.7
Serbia and Montenegro .....	12.7	12.0	14.9	12.5	12.5
Slovakia .....	28.3	31.4	26.5	28.7	29.0
Slovenia .....	19.4	23.0	24.3	22.2	23.7
The former Yugoslav Republic of Macedonia .....	18.2	17.1	16.1	17.2	16.6
<b>CIS</b> .....	23.6	19.0	18.7	20.4	18.9
Armenia .....	24.4	16.6	20.6	20.5	18.6
Azerbaijan .....	20.1	29.2	37.4	28.9	33.3
Belarus .....	27.3	24.7	24.4	25.5	24.5
Georgia .....	14.4	21.6	26.4	20.8	24.0
Kazakhstan .....	29.5	17.7	22.2	23.1	19.9
Kyrgyzstan .....	15.5	16.8	15.4	15.9	16.1
Republic of Moldova .....	18.2	19.2	17.8	18.4	18.5
Russian Federation .....	23.4	17.9	17.8	19.7	17.8
Tajikistan .....	11.6	16.5	9.1	12.6	13.2
Turkmenistan .....	..	..	..	..	..
Ukraine .....	23.6	20.5	15.8	20.0	18.2
Uzbekistan .....	26.7	30.0	24.9	27.8	28.5
<b>Eastern Europe and CIS</b> .....	22.4	20.4	19.9	20.7	19.1
New EU members (EU-8) .....	20.9	24.1	22.8	22.6	23.4
Central Europe .....	20.9	24.2	22.8	22.6	23.5
Baltic states .....	20.7	22.5	23.4	22.2	22.9
South-east Europe .....	16.4	18.0	20.1	18.0	18.9
CIS without Russian Federation .....	24.1	21.9	20.8	22.2	21.4
European CIS .....	24.1	21.5	18.2	21.2	19.9
Caucasian CIS .....	18.2	23.6	30.0	24.1	26.8
Central Asian CIS .....	26.3	21.9	22.0	23.5	22.3

Source: UNECE secretariat calculations, based on national statistics.

reflecting the earlier start of recovery, but also the different sectoral composition of investment (as discussed below), the east European economies have been channelling since 1997, on average, 2 to 4 percentage points more of their GDP into fixed investment than the countries of the CIS.<sup>23</sup>

The importance of capital accumulation for economic growth in eastern Europe and the CIS is demonstrated in chart 2. The scatter diagram illustrates the correlation between fixed investment and

The trends in investment activity in the east European and CIS economies during the transition can be traced in the dynamics of their real gross fixed capital formation (table 7) and the corresponding investment ratios (reported in table 8).<sup>21</sup> These statistics in the main reflect the typical pro-cyclical pattern of fixed investment, which was especially pronounced in eastern Europe. As noted, the transformational recession in the initial phase of transition had a very large (more than proportionate) negative effect on investment activity, which is reflected in declining investment ratios. Conversely, the recovery was accompanied by a robust upturn in investment activity.

One of the differences between the patterns of economic performance in the two subregions during the transition is related to the phasing of the recovery of fixed investment. In eastern Europe as a whole, the transformational recession lasted for about five years; after 1994 economic growth in the region resumed and has continued to date (chart 1). In this subregion, the recovery of investment generally led the recovery of aggregate output: aggregate investment in some countries (notably in central Europe) started to pick up already in 1991-1992, to some extent pushed by the influx of FDI to the countries most advanced in the reforms. In the CIS, the period of transformational recession and weak investment activity was more protracted and continued throughout the 1990s, further aggravated by the Russian financial crisis in 1998. The recovery of investment activity in the CIS only followed the pickup of aggregate output with a lag, and it was only after the start of recovery in 1999 that investment started to pick up.<sup>22</sup> Partly

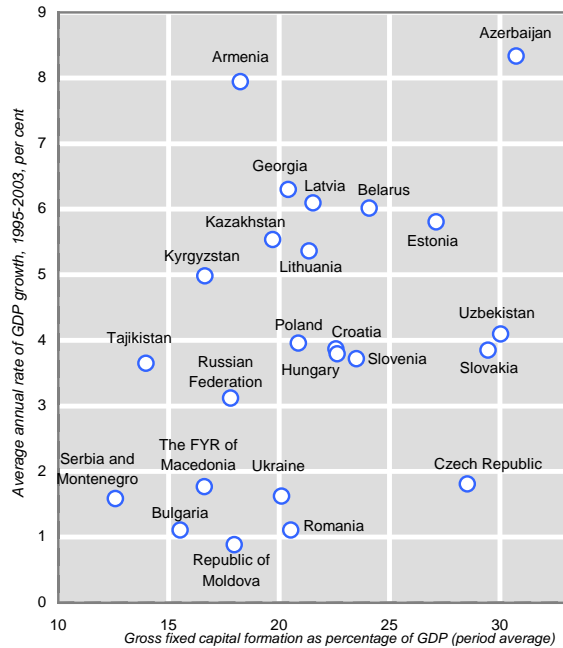
<sup>21</sup> The data on real gross fixed capital formation for the first half of the 1990s are rather patchy, so we have not presented them in table 7.

<sup>22</sup> The different patterns of FDI flows have contributed significantly to this differentiated dynamics of capital accumulation in the two regions. Thus at the end of 2003 the cumulative (since 1990) stock of FDI in eastern Europe amounted to more than 37 per cent of its aggregate GDP, while for the CIS as a whole this figure was just 16 per cent.

<sup>23</sup> The upturn of the average CIS investment ratio in 2003 was due exclusively to the very high investment rate in Azerbaijan that year.

CHART 2

Fixed investment and economic growth in selected east European and CIS economies, 1995-2003  
(Per cent)



Source: UNECE secretariat calculations, based on national statistics.

economic growth for these economies for the period 1995-2003. The relationship is positive – albeit rather weak – in line with the results of similar studies for other groups of countries.<sup>24</sup>

Chart 3 illustrates the sources of financing of gross domestic capital formation and highlights some important cross-country differences. On average the east European economies relied more than the CIS on national savings as a source of financing their domestic investment. Thus for the period 1990-2003 as a whole, on average 81 per cent of gross capital formation in the east European economies was backed by national savings, whereas the corresponding share for the CIS economies was 65 per cent.<sup>25</sup> At the same time, part of the gross capital formation was financed by mobilizing foreign savings in the form of capital inflows. This reliance on foreign savings increased during the 1997-2003 period compared to 1990-1996. This was, however, not the case in the CIS, where a number of countries financed their gross capital formation entirely by national savings.

Within the CIS, there was no uniform pattern with regard to the degree of reliance on national savings; indeed, it is possible to identify two extremes in the relationship between savings and investment in this region. On the one hand, some countries saved more than they invested domestically, and hence exported capital (in 1997-2003 these were Kazakhstan, the Russian Federation, Tajikistan and Ukraine). On the other hand, in countries such as Armenia and the Republic of Moldova, national savings in the same period were on average negative, which implies that gross capital formation was entirely financed by foreign capital inflows. Notably, during the second subperiod (1997-2003), the divergence in saving and investment patterns among the CIS economies increased compared to 1990-1996. This divergence largely reflects differences in the structural features of these economies. Those that exported capital are among the resource-rich economies, and their current account surpluses reflect large and increasing revenues from the export of natural resources. In contrast, the countries that relied exclusively on attracting capital from abroad are among the less developed and are poor in natural resources. Nevertheless, even the resource-rich CIS economies could, in principle, benefit from a higher degree of absorption of the national savings that they generate, if these were to be channelled into productive investment. Notably, policies targeting the establishment of an environment conducive to entrepreneurship could play a beneficial role in raising the level of domestic investment in these countries.

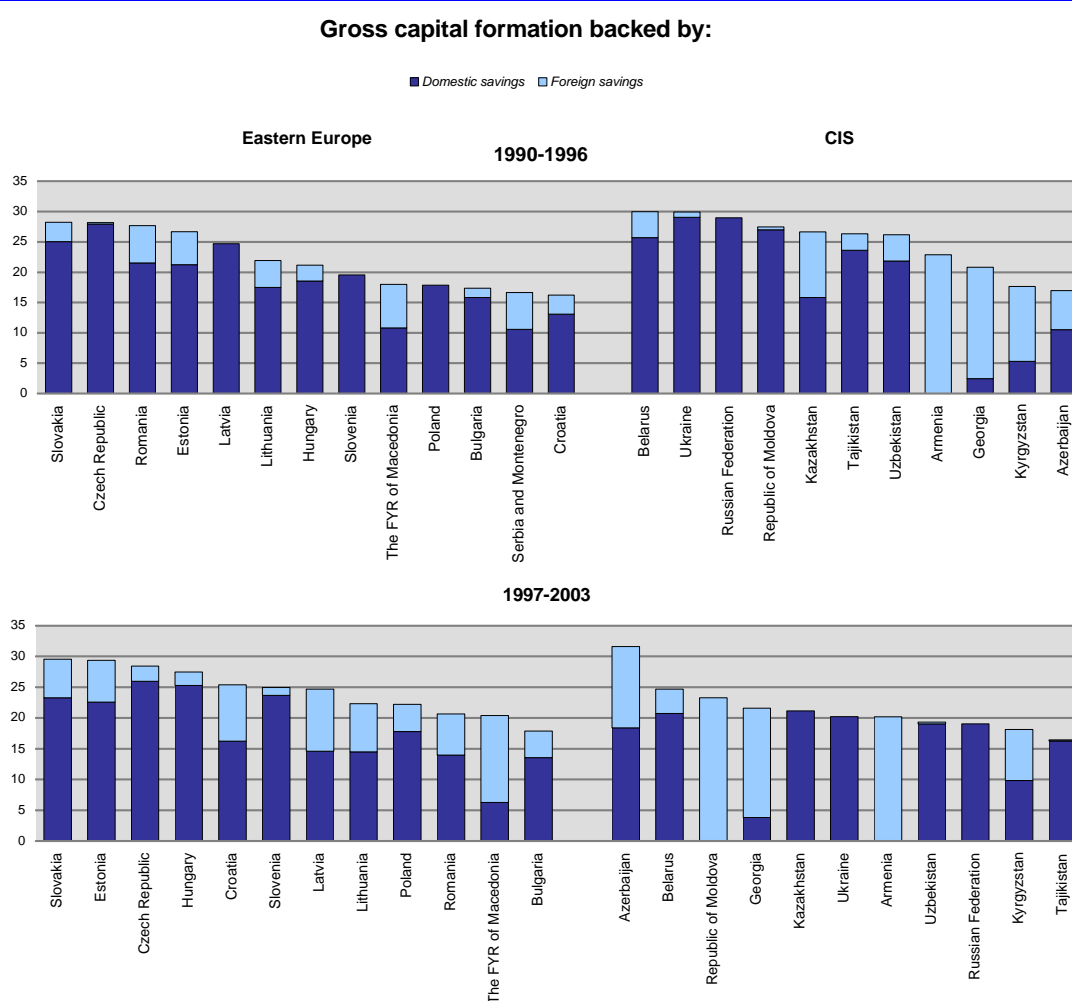
Table 9 and chart 4 present a rough picture of the changes in the sectoral composition of gross fixed capital formation in eastern Europe and the CIS during the period 1992-2002. These data illustrate the important structural changes that took place during the transition process. Again, the pattern of change in eastern Europe was somewhat different from that in the CIS. Throughout eastern Europe, over the 10-year period, there was a general shift in the direction of fixed investment from manufacturing towards services. While there were important specificities across countries (for example,

<sup>24</sup> The coefficient of correlation for the whole group of countries presented in the chart is only 0.13. The observed relatively high cross-country dispersion most probably reflects the still high output volatility in these immature markets.

<sup>25</sup> Unweighted averages for the corresponding groups of countries.

CHART 3

Gross capital formation and its sources of financing in selected east European and CIS economies  
(Per cent of GDP)



Source: UNECE secretariat calculations, based on national statistics.

Note: The countries in each subregion are shown in the descending order of their gross investment ratios.

related to the share of investment going to different types of service activities or to the agricultural sector), this general pattern of change in the composition of fixed investment could be observed in all east European economies. This shift mirrored the faster expansion of the tertiary sector activities during the transition period.

As for the CIS, the most striking feature of the compositional changes in fixed investment between 1992 and 2002 was the considerable increase in the share of industrial investment, on average by more than 10 percentage points (chart 4). This mainly reflects the dramatic fall in investment in agriculture, and only a slight increase, on average, in the share of investment in services. However, there were significant changes in the shares of investment going to different service activities, the largest increase being in transport and communications. The growing share of industrial investment mainly reflects the increasing and excessive reliance of these economies on the extraction of natural resources; it is these activities in the resource-rich CIS economies that have attracted the most investment (both domestic and foreign) since 1995. Compared to the east European economies, less investment has gone to business services and to higher value added manufacturing activities. Their strong reliance on natural resources, however, makes these countries vulnerable to downturns in world commodity markets.

TABLE 9

Gross fixed capital formation by major sectors of economic activity in eastern Europe and the CIS,  
1992, 1997 and 2002  
(Per cent of total gross fixed capital formation)

	1992	1997	2002		1992	1997	2002
<b>Bulgaria</b>				<b>Slovakia</b>			
Agriculture .....	4.9	2.9	2.5	Agriculture .....	4.5	3.3	3.5
Industry .....	51.2	35.5	33.9	Industry .....	47.7	36.1	39.0
Construction .....	3.4	7.0	6.0	Construction .....	3.3	2.7	0.8
Wholesale and retail trade .....	11.4	10.6	20.1	Wholesale and retail trade .....	4.6	8.6	6.3
Transport, communications .....	8.4	21.6	22.5	Transport, communications .....	9.1	11.7	14.3
Other services .....	20.8	22.5	15.0	Other services .....	30.8	37.5	36.0
<b>Croatia</b>				<b>Slovenia</b>			
Agriculture .....	6.7	3.0	3.3	Agriculture .....	2.3	1.2	1.0
Industry .....	30.6	32.0	26.6	Industry .....	36.8	37.1	35.8
Construction .....	1.7	4.0	8.9	Construction .....	1.8	3.2	3.1
Wholesale and retail trade .....	8.1	9.9	16.8	Wholesale and retail trade .....	12.6	13.9	14.1
Transport, communications .....	27.7	13.2	11.6	Transport, communications .....	15.5	12.7	12.2
Other services .....	25.2	37.8	32.6	Other services .....	31.1	31.9	33.8
<b>Czech Republic</b>				<b>Belarus</b>			
Agriculture .....	4.0	3.7	2.7	Agriculture .....	19.7	6.8	5.4
Industry .....	42.9	34.7	32.3	Industry .....	25.0	32.3	32.3
Construction .....	2.4	3.3	3.4	Construction .....	2.9	1.5	2.1
Wholesale and retail trade .....	3.9	8.7	9.1	Wholesale and retail trade .....	1.7	3.2	4.2
Transport, communications .....	11.0	17.3	18.2	Transport, communications .....	9.8	16.8	18.0
Other services .....	35.8	32.2	34.2	Other services .....	40.7	39.4	38.0
<b>Hungary</b>				<b>Georgia</b>			
Agriculture .....	3.4	3.6	3.0	Agriculture .....	17.1	–	0.3
Industry .....	30.9	31.6	29.4	Industry .....	31.5	30.5	21.0
Construction .....	1.8	1.9	2.2	Construction .....	3.0	2.6	22.9
Wholesale and retail trade .....	7.0	7.9	8.2	Wholesale and retail trade .....	2.6	2.3	5.1
Transport, communications .....	17.6	17.2	15.3	Transport, communications .....	12.4	42.9	38.6
Other services .....	39.4	37.8	41.9	Other services .....	33.4	21.8	12.1
<b>Lithuania</b>				<b>Kazakhstan</b>			
Agriculture .....	6.8	2.8	2.1	Agriculture .....	27.7	1.9	1.5
Industry .....	33.6	28.7	28.6	Industry .....	31.9	58.6	53.5
Construction .....	0.8	1.9	2.7	Construction .....	2.7	2.7	4.6
Wholesale and retail trade .....	4.9	8.7	16.9	Wholesale and retail trade .....	1.3	2.0	4.5
Transport, communications .....	17.4	30.9	20.1	Transport, communications .....	4.5	11.6	11.1
Other services .....	36.5	27.0	29.5	Other services .....	31.9	23.2	24.9
<b>Poland</b>				<b>Russian Federation</b>			
Agriculture .....	3.7	2.9	2.0	Agriculture .....	12.3	2.9	3.0
Industry .....	39.0	39.4	30.6	Industry .....	37.6	34.8	42.6
Construction .....	4.3	6.3	7.2	Construction .....	3.2	4.1	2.9
Wholesale and retail trade .....	6.5	9.3	11.5	Wholesale and retail trade .....	1.4	2.3	2.2
Transport, communications .....	8.8	12.1	11.5	Transport, communications .....	9.8	17.0	24.6
Other services .....	37.8	30.1	37.2	Other services .....	35.7	38.9	24.8
<b>Romania</b>				<b>Ukraine</b>			
Agriculture .....	9.3	8.3	9.0	Agriculture .....	20.5	7.0	5.3
Industry .....	53.7	44.9	39.3	Industry .....	31.3	40.4	40.6
Construction .....	2.5	7.2	6.5	Construction .....	3.2	1.6	4.9
Wholesale and retail trade .....	6.9	10.2	12.2	Wholesale and retail trade .....	2.1	1.5	6.6
Transport, communications .....	12.0	11.7	18.9	Transport, communications .....	6.9	15.4	18.8
Other services .....	15.7	17.7	14.1	Other services .....	36.1	34.1	23.7

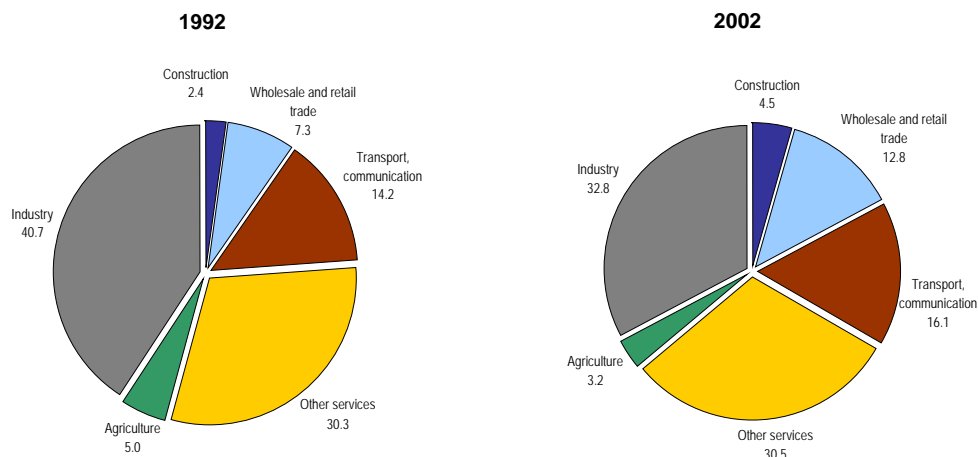
Source: UNECE secretariat, based on national statistics.

Note: Whenever available, three-year moving averages are shown for each year.

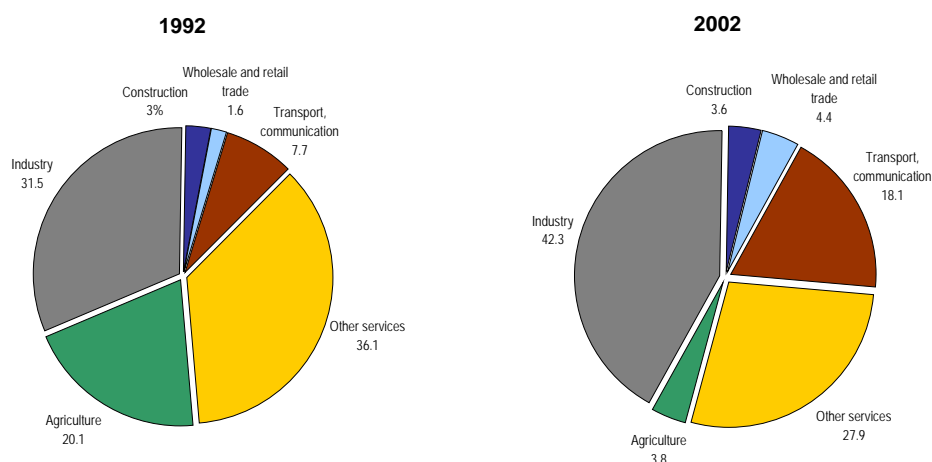
CHART 4

Breakdown of gross fixed capital formation by major sectors of economic activity in eastern Europe and the CIS, 1992 and 2002  
(Per cent of total)

**Eastern Europe average**



**CIS average**



Source: UNECE secretariat calculations, based on national statistics.

**Labour inputs**

We now turn to a brief overview of dynamics of employment in eastern Europe and the CIS during the transition from plan to market.<sup>26</sup> Section C below discusses in more detail some of the implications of the labour market adjustment for productivity and economic growth in eastern Europe in this period.

The transformational recession had a profoundly negative impact on employment in eastern Europe and the CIS. Between 1989 and 1993 total employment in eastern Europe contracted by 15 per

<sup>26</sup> For a comprehensive analysis of the main labour market trends during the transition, see S. Cazes and A. Nesporova, *Labour Markets in Transition: Balancing Flexibility and Security in Central and Eastern Europe* (Geneva, International Labour Office, 2003). The overview presented in this section partly draws from some of the conclusions of these authors.

TABLE 10

Total employment in eastern Europe and the CIS, 1990-2004  
(Average annual percentage change)

	1991- 1995	1996- 2000	2001- 2004	1991- 2004	1996- 2004
<b>Eastern Europe</b> .....	-3.1	-0.5	-0.4	-1.4	-0.4
Albania .....	-4.1	-1.6	-3.4	-3.0	-2.4
Bosnia and Herzegovina .....	..	..	-1.4	..	..
Bulgaria .....	-4.3	-1.9	2.1	-1.7	-0.2
Croatia .....	-5.3	-0.9	1.3	-1.9	0.0
Czech Republic .....	-1.6	-0.9	-0.1	-0.9	-0.6
Estonia .....	-5.2	-2.0	1.0	-2.3	-0.7
Hungary .....	-6.1	0.9	0.3	-1.8	0.7
Latvia .....	-5.8	-0.7	2.0	-1.8	0.5
Lithuania .....	-2.4	-1.1	0.7	-1.1	-0.3
Poland .....	-2.0	0.4	-0.6	-0.7	0.0
Romania .....	-3.2	-1.7	-1.7	-2.3	-1.7
Serbia and Montenegro .....	-2.6	-1.2	-0.5	-1.5	-0.9
Slovakia .....	-3.4	-0.4	0.8	-1.1	0.1
Slovenia .....	-3.8	0.5	0.5	-1.1	0.5
The former Yugoslav Republic of Macedonia .....	-6.8	-2.7	-4.5	-4.7	-3.5
<b>CIS</b> .....	-2.5	-0.6	1.1	-0.8	0.2
Armenia .....	-2.9	-4.1	-0.5	-2.6	-2.5
Azerbaijan .....	-0.5	0.5	0.7	0.2	0.6
Belarus .....	-3.1	0.1	-0.6	-1.2	-0.2
Georgia .....	-8.9	0.5	-0.8	-3.3	-0.1
Kazakhstan .....	-3.4	-1.1	3.7	-0.6	1.0
Kyrgyzstan .....	-1.2	1.5	1.8	0.6	1.6
Republic of Moldova .....	-4.2	-2.0	-3.5	-3.2	-2.6
Russian Federation .....	-3.2	-	1.2	-0.8	0.5
Tajikistan .....	-0.9	-1.2	1.9	-0.2	0.2
Turkmenistan .....	3.4	1.8	1.9	2.4	1.8
Ukraine .....	-1.4	-3.2	0.1	-1.6	-1.7
Uzbekistan .....	1.2	1.2	2.5	1.6	1.8
<b>Eastern Europe and CIS</b> .....	-2.7	-0.5	0.7	-1.0	0.0
<b>New EU members (EU-8)</b> .....	-2.9	0.0	-0.1	-1.1	0.0
Central Europe .....	-2.7	0.2	-0.2	-1.0	0.0
Baltic states .....	-4.1	-1.2	1.2	-1.6	-0.1
South-east Europe .....	-3.5	-1.3	-0.8	-2.0	-1.1
<b>CIS without Russian Federation</b> .....	-1.6	-1.2	1.0	-0.7	-0.3
European CIS .....	-1.8	-2.6	-0.2	-1.6	-1.5
Caucasian CIS .....	-3.6	-0.4	0.1	-1.4	-0.2
Central Asian CIS .....	-0.6	0.4	2.7	0.7	1.4

Source: UNECE secretariat calculations, based on national statistics.

labour force resulted in a sharp decline in labour force participation rates (the proportion of population at working age of 15-64 that is economically active) in all countries of eastern Europe and the CIS. Labour force participation fell particularly among the young (aged up to 24 years), (initially) among the elderly (the 50-64 age group) and among less competitive and more disadvantaged groups of workers. Separation from the labour force was due to forced retirement of working pensioners, early retirement schemes, voluntary withdrawals, workers' becoming discouraged and extended parental leave. Labour force participation also declined among the young because they extended their studies, thereby postponing their entry into the labour force, due to the bleak prospects of finding a job. For them the passage from studies to employment became more difficult because of mismatches between young people's skills and the changing structure of labour demand, partly due to the belated adaptation of educational systems to changing skill requirements that emerged in the labour market. The second alternative for exit from employment, i.e. unemployment, hit harder those groups of workers that combined different types of disadvantages, e.g. lower skills, higher age, geographical immobility, health problems or employer prejudice. It resulted in high and persistent unemployment in all countries of the region.

cent while the CIS as a whole lost some 17 per cent of its employed labour between 1989 and 1998 (see table 10 for details). Part of this decline, particularly at the onset of transition, reflects the need to reduce or eliminate overemployment, which was endemic in the centrally planned economies. Overemployment was a policy aimed at preventing open unemployment, which was achieved mostly through artificially low, centrally set wages. As a consequence, the traditional state-owned firms, especially the industrial giants, embarked on the process of transition burdened with large amounts of excess labour. Market liberalization (liberalization of prices and of the access to domestic and international markets) suddenly exposed domestic firms to strong competitive pressures and rationalizing of their workforce was therefore an essential ingredient of their adjustment. What remains, however questionable, was the speed of the process of market liberalization, especially in countries that opted for "shock therapy" reforms. Local firms were in fact not given sufficient time to adjust to the shocks of transition, with profound negative effect on the firms' survival rate. In the event, many potentially viable firms were forced into bankruptcy or into below-optimal downsizing. As a result, both the depth of the ensuing recession and the contraction in employment turned out to be excessively high.

Labour demand collapsed since 1990 and total employment shrank strongly throughout the transition process. Workers who lost their job took two different routes: withdrawal from the labour force or unemployment. The first alternative (i.e. flows into inactivity) generally involved more workers than the second one (unemployment). Massive withdrawal from the



It was widely hoped that the economic recovery would be accompanied by an upturn in the labour markets. But this has materialized only to a very limited degree so far. Thus between 1994 (the start of the recovery) and 2004, aggregate GDP in eastern Europe grew by almost 50 per cent while total employment continued to decline by a cumulative 5.6 per cent. In the CIS the recession and the accompanying downward adjustment in labour lasted longer, until 1998. Thereafter, between 1999 and 2004 aggregate GDP recovered by a cumulative 49 per cent and total employment grew by a cumulative 8 per cent. However, as noted, aggregate GDP in the CIS as a whole still has not recovered to its pre-transition level.

Several factors seem to have weakened the association between aggregate output growth and labour market outcomes in the countries that undertook the transition from plan to market. First of all, labour hoarding may still be widespread in some countries, implying that employment responses to output growth are weak or absent. Second, economic expansion in many countries has taken place in sectors that are not labour intensive, particularly in commodity exporting CIS economies. Third, labour mobility across sectors of production and regions is still relatively low in most of these economies, implying a low degree of labour redeployment from declining to expanding sectors or regions. This, in turn, tends to push up unemployment, especially to the extent that the economic restructuring and transformation involves “creative destruction” and the clustering of job opportunities in some sectors or regions. Last but not least, a more in-depth look at the relevant data<sup>27</sup> seems to suggest that labour markets have been relatively more responsive to economic growth in countries that have made more progress in enterprise and labour market reforms. Thus, active restructuring of inefficient firms (in particular, firms inherited from the era of central planning) reduces the incidence of labour hoarding, which, in turn, facilitates the transmission of labour demand associated with output growth into net job creation.

### **C. Changes in real GDP per capita in eastern Europe: the role of productivity, labour market performance and demographic structure**

This section focuses on the dynamics of labour productivity since the beginning of transition and the repercussions on labour utilization. It explores at the same time the linkages between labour productivity, labour utilization, and the demographic structure of the population on the one side and the evolution of real per capita incomes on the other side. While productivity growth is an indicator of economic performance, real per capita income is the best available summary gauge for international comparisons of living standards. We focus on 10 countries of eastern Europe,<sup>28</sup> leaving out – mainly due to data problems – other countries in the region, especially the CIS and other south-east European countries. The analysis covers the period 1990-2005.<sup>29</sup>

Our analysis seeks to illustrate the key role of labour productivity for understanding the evolution of real incomes over time and for the process of real convergence of lower income countries (in this case eastern Europe) to economically more advanced economies. At the same time it sheds some light on the important role of labour market and demographic factors for more fully translating gains in productivity into increases in real per capita incomes.

#### ***The analytical framework***

The basic analytical framework is provided by the following identity:

$$\text{GDP/POP} = \text{GDP/EMP} \times \text{EMP/POP}, \quad (1)$$

where GDP denotes aggregate real output/income, POP is total population and EMP is the total number of persons employed. Labour input is measured here by the number of persons employed, given the lack of (reliable) series for total annual hours worked for all countries.

<sup>27</sup> For more details see box IV.2 in *World Economic Situation and Prospects 2006* (United Nations, New York, 2006), p. 102.

<sup>28</sup> Eastern Europe-10 (EE-10) refers to 10 east European economies that have been divided into the following subgroupings: Central Europe (Czech Republic, Hungary, Poland, Slovakia, Slovenia: CE-5), Baltic states (Estonia, Latvia, Lithuania) and South-east Europe (Bulgaria, Romania: SEE-2).

<sup>29</sup> The data for 2005 are preliminary estimates.

Equation (1) indicates that the level of real income per capita is determined by the average labour productivity (GDP/EMP) and the proportion of the population that is actually working (EMP/POP). *Ceteris paribus*, an increase in the number of persons employed relative to the population will unambiguously raise total output and therefore income per capita. In case the productivity of the additional workers is lower than the average productivity of the existing workforce, there might, however, be a fall in the average productivity of the enlarged workforce, although this would in general be small.<sup>30</sup> This could be the case if the additional workers are less well educated, have below average or unsuitable skills or are less experienced. This points to a potential trade-off, at least in the short term, between raising aggregate productivity and the overall employment rate in the economy.

The level of employment can be raised from two sources, namely (i) the pool of currently unemployed persons in the total labour force (LF), and (ii) by increasing the overall labour force participation among the population at working age (i.e. from 15 to 64 years old) (POP<sub>15-64</sub>). The latter would target e.g. those groups of persons that are in principle interested in taking on work, but are discouraged by the existing obstacles. A case in point are women who stay at home to look after their children, in the absence of adequate childcare facilities.

Equation (2) takes these factors explicitly into account by a simple extension of the EMP/POP ratio:

$$\text{GDP/POP} = \text{GDP/EMP} \times \text{EMP/LF} \times \text{LF/POP}_{15-64} \times \text{POP}_{15-64}/\text{POP} \quad (2)$$

EMP/LF is the mirror image of the unemployment rate, which is defined as 1-(EMP/LF). The product of the second and third terms on the RHS of (2) is equal to the so-called employment rate, i.e. the proportion of persons employed as a percentage of the population at working age – EMP/POP<sub>15-64</sub>.<sup>31</sup> The fourth variable – POP<sub>15-64</sub>/POP – on the RHS of (2) is a kind of an inverse dependency ratio.<sup>32</sup> It points to the importance of the age structure of the population for real incomes per capita. An ageing population that increases the share of the population above 64 will *ceteris paribus* exert downward pressure on real incomes as will, at least temporarily, a “baby boom”.

Equation (2) can be analysed for a given country over time. It can also be employed for an international comparison of countries in a given year<sup>33</sup> or during a longer time period, as is the case here.

### ***Developments in eastern Europe-10***

As noted above, real GDP in eastern Europe fell abruptly during the first years of the reform process. But the transformational recession was followed by a long period of sustained and increasingly robust economic growth since the mid-1990s. This is also mirrored in the development of real incomes per capita, which fell between 1990 and 1995, but rose considerably thereafter. For the aggregate of the EE-10, real GDP per capita rose by some 45 per cent in 2005 compared with 1995. As compared to 1990, it had accumulated a gain of 38 per cent (table 11). The main factor behind the rise in real incomes has been the surge in labour productivity, which increased by some 70 per cent in 2005 compared with 1990, i.e. nearly twice as much as the increase in real incomes per capita.

The reason why the surge in productivity did not translate into a broadly similar large rise in real incomes is the adverse developments in the labour markets. There has not only been a sharp rise in

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<sup>30</sup> It is assumed that the additional workers do not have a negative impact on the productivity of the already employed persons.

<sup>31</sup> Raising the employment rate is one of the targets of the so-called Lisbon Agenda that member states of the European Union agreed upon in 2000. Another major objective is to raise productivity levels, which, as already noted, may be in conflict with the goal to raise employment rates, at least in the short run.

<sup>32</sup> The dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged between 15 and 64, expressed as a percentage. It can be shown that the inverse of the ratio POP<sub>15-64</sub>/POP is equal to 1 plus the dependency ratio.

<sup>33</sup> For an analysis of OECD countries see B. van Ark and R. Guckin, “International comparisons of labor productivity and per capita income”, BLS *Monthly Labor Review*, July 1999, pp. 33-41.

TABLE 11

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(main country groupings)

	GDP/Pop	GDP/Emp	Emp/LF	LF/Pop 15-64	Pop 15-64/Pop	Memorandum item: Emp/Pop 15-64
	Indices, 1990=100		Ratios (per cent)			
Central Europe						
1990 .....	100	100	96	73	65	71
1995 .....	100	116	89	67	67	59
2000 .....	122	143	86	66	69	57
2005 .....	145	172	86	64	71	55
Baltic states						
1990 .....	100	100	97	73	67	72
1995 .....	63	73	87	71	66	62
2000 .....	83	98	85	71	67	60
2005 .....	121	132	91	70	68	64
South-east Europe-2						
1990 .....	100	100	99	84	66	84
1995 .....	92	107	91	78	67	71
2000 .....	89	110	91	73	68	66
2005 .....	120	159	92	65	70	60
Eastern Europe-10						
1990 .....	100	100	97	77	66	75
1995 .....	95	110	90	70	67	63
2000 .....	112	134	88	68	68	60
2005 .....	138	169	88	65	70	57
<i>Memorandum items:</i>						
European Union-15						
1990 .....	100	100	93	70	67	65
1995 .....	106	112	90	69	67	62
2000 .....	121	120	93	71	67	66
2005 .....	128	125	92	73	67	67
United States						
1990 .....	100	100	95	75	66	70
1995 .....	107	107	94	75	66	71
2000 .....	124	120	96	76	66	73
2005 .....	134	131	95	75	67	71

*Source:* UNECE secretariat calculations, based on data from: UNECE, stat@unece Database; UNDESA, Population Division, *World Population Prospects: The 2004 Revision*; European Commission, AMECO Database.

*Note:* Indicators: GDP – gross domestic product; Pop – total population; Emp – total employment; LF – labour force; Pop 15-64 – population aged from 15 to 64; GDP/Pop – GDP per capita; GDP/Emp – total labour productivity; LF/Pop 15-64 – labour force participation rate; Emp/Pop 15-64 – employment rate.

Country groupings: Central Europe – Czech Republic, Hungary, Poland, Slovakia, Slovenia; Baltic states – Estonia, Latvia, Lithuania; South-east Europe-2 – Bulgaria, Romania; Eastern Europe-10 – all aforementioned 10 countries; European Union-15 – EU member states prior to the 2004 enlargement.

Real GDP expressed at constant prices of 2000 converted into dollars using 2000 PPPs.

unemployment (as reflected in a falling employment-labour force ratio) but also the labour force participation rate has fallen significantly. Thus, in the EE-10, the level of unemployment has remained high despite the robust economic growth since the mid-1990s. The labour force participation rate, moreover, fell to only 65 per cent in 2005, down from (a very high) 77 per cent in 1990 and 70 per cent in 1995 (table 11). The steady rise of the proportion of the population at working age in total population provided only some small offset to these negative effects on GDP per capita originating in the labour markets.

Enterprises initially reacted to systemic change by undertaking so-called “passive industrial restructuring”, reflected in massive labour shedding, which to a large extent was aimed at the elimination of over-manning inherited from the socialist period. This resulted in the immediate (albeit only partial) reversal of low productivity levels of that period, despite falling output levels.

Towards the mid-1990s eastern Europe recovered from the initial slump in output and entered the phase of “active industrial restructuring”, based on large-scale privatization, massive entry of FDI, upgrading of product quality, strong increase in exports and rapid gains in labour productivity thanks to the modernization of the capital stock but also additional rationalization measures, which led to further labour shedding. Throughout the 1990s total employment in the EE-10 was either declining or

stagnant and it was only in 2004 – i.e. 15 years after the beginning of transition – that the falling trend in employment started to be slightly reversed. In the event, in 2005 total employment was still one fifth lower than in 1990.

Labour force participation at the onset of transition was much higher than in western Europe and the United States (table 11), reflecting the already mentioned labour hoarding and associated overemployment and the resulting virtual non-existence of open unemployment. The sharp and persistent decline in employment in the EE-10 resulted not only in a strong increase in unemployment, but also in a strong exit from the labour force on the part of discouraged workers (section B). This is partly reflected in a strong rise in informal sector activity.

Unemployment started to be absorbed by net job creation since 2003, as unemployment started declining in all 10 countries (EE-10). The decline in labour force participation, by contrast, has been an even more lasting consequence of transition and it has started being reversed so far only in Hungary, Latvia and Slovenia (table 12).

The rise in unemployment and the exit from the labour force led to a sharp decline in the employment rate in eastern Europe. For the aggregate of EE-10, the employment rate fell to just 57 per cent in 2005, down from 75 per cent in 1990 and 63 per cent in 1995. This rate is well below that of established market economies, including even that of the EU-15 (table 11). The much lower employment rates of the EE-10 are due mainly to lower labour force participation rates (table 12).

The poor performance of labour markets in eastern Europe since 1990 has negated the potentially favourable demographic development that resulted in a rising working age population as a proportion of total population. This trend was common to the three subregions of eastern Europe and could potentially have raised labour supply and could thus have contributed to even stronger GDP growth. During the same period this ratio remained constant in the EU-15 and the United States (table 11).

Among the subregions of eastern Europe, the five central European countries (CE-5) achieved, on average, similar gains in productivity and real per capita incomes as the aggregate of EE-10 (table 12). This reflects the fact that the CE-5 account for the bulk of output and employment in the aggregate of the EE-10.

Developments in the CE-5 were driven by Poland, the largest economy in eastern Europe. Labour productivity almost doubled from 1990 to 2005, while real per capita incomes rose by 67 per cent over this period. The sizeable growth gap between these two variables is entirely due to the sharp fall of the employment rate, which amounted to only 51 per cent in 2005, the lowest in the region, and down from 66 per cent in 1990 (table 12). The general pattern of relative changes in productivity and real incomes is broadly similar in the other four central European countries. It is noteworthy that productivity gains were much smaller in the Czech Republic compared with the other countries, with a concomitantly smaller increase in real per capita income. This reflects to a large extent a more moderate rate of economic expansion, as its average annual GDP growth rate in 1995-2005 was at least 1.5 percentage points lower than that of the other CE-5 countries.

Among all east European countries, the Baltic states experienced the strongest variations in their output and productivity performance since 1990. At the same time, their labour market performance also diverged significantly from that of the other subregions. A slump in real GDP by some 40 per cent during the first half of the 1990s was accompanied by an equally sharp fall in labour productivity of nearly 30 per cent, given the only partial adjustment of labour input during the transformational recession. At the same time, real per capita income also fell sharply by about one third (table 11). But since the mid-1990s, the economies in the subregion have been on a solid upward trend, combining favourable gains in productivity with an improved labour market performance. The rate of exit from the labour force since 1990 was the lowest among the three subregions and the acceleration of economic growth since 2000 entailed robust job creation. The employment rate edged up from 60 per cent in 2000 to 64 per cent in 2005, almost 10 percentage points above the CE-5, although still somewhat lower than in the EU-15 (table 11). Against this background, labour productivity gains by 80 per cent between 1995 and 2005 translated into a sizeable rise in real incomes per capita by more than 90 per cent over the same period. Still, because of the sharp initial slump, its productivity in 2005 was just one third above the 1990 level and real incomes were only some 20 per cent higher than at the onset of transition.

TABLE 12

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(individual countries)

	<i>GDP/Pop</i>	<i>GDP/Emp</i>	<i>Emp/LF</i>	<i>LF/Pop 15-64</i>	<i>Pop 15-64/Pop</i>	<i>Memorandum item: Emp/Pop 15-64</i>
	<i>Indices, 1990=100</i>		<i>Ratios (per cent)</i>			
<b>Bulgaria</b>						
1990 .....	100	100	88	89	83	88
1995 .....	92	112	90	60	67	54
2000 .....	92	115	83	62	68	51
2005 .....	120	136	89	62	69	56
<b>Czech Republic</b>						
1990 .....	100	100	99	80	66	79
1995 .....	95	103	97	73	68	70
2000 .....	103	116	91	72	70	66
2005 .....	121	135	92	71	71	65
<b>Estonia</b>						
1990 .....	100	100	99	79	66	79
1995 .....	80	95	90	74	66	67
2000 .....	110	137	88	71	67	63
2005 .....	158	181	93	72	68	66
<b>Hungary</b>						
1990 .....	100	100	100	74	66	73
1995 .....	89	122	90	58	68	53
2000 .....	109	142	94	59	68	55
2005 .....	133	168	93	60	69	56
<b>Latvia</b>						
1990 .....	100	100	100	73	67	73
1995 .....	58	72	86	70	66	60
2000 .....	79	96	86	69	67	59
2005 .....	117	127	90	72	68	65
<b>Lithuania</b>						
1990 .....	100	100	95	72	67	68
1995 .....	60	67	87	71	66	62
2000 .....	77	86	83	72	66	60
2005 .....	112	119	91	69	68	63
<b>Poland</b>						
1990 .....	100	100	94	70	65	66
1995 .....	110	123	87	67	66	58
2000 .....	143	163	84	65	69	55
2005 .....	167	198	82	62	71	51
<b>Romania</b>						
1990 .....	100	100	99	91	66	90
1995 .....	92	106	91	84	68	77
2000 .....	88	108	93	77	68	71
2005 .....	120	167	93	66	70	61
<b>Slovakia</b>						
1990 .....	100	100	99	76	64	75
1995 .....	85	103	88	69	67	60
2000 .....	101	126	81	69	69	56
2005 .....	127	150	83	69	71	57
<b>Slovenia</b>						
1990 .....	100	100	97	84	68	81
1995 .....	95	118	93	69	69	65
2000 .....	118	143	93	70	70	65
2005 .....	139	160	94	72	70	68

*Source:* As in table 11.

*Note:* Indicators: as in table 11. Real GDP expressed at constant prices of 2000 converted into dollars using 2000 PPPs.

TABLE 13

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(main country groupings)  
(Benchmark: United States=100)

	GDP/Pop	GDP/Emp	Emp/LF	LF/Pop 15-64	Pop 15-64/Pop	Memorandum item: Emp/Pop 15-64
Central Europe						
1990 .....	34	34	102	98	99	100
1995 .....	31	37	94	89	102	84
2000 .....	33	41	90	87	104	78
2005 .....	36	44	91	86	105	78
Baltic states						
1990 .....	37	36	103	99	101	102
1995 .....	22	25	93	95	100	88
2000 .....	25	30	89	93	101	83
2005 .....	34	37	96	94	102	90
South-east Europe-2						
1990 .....	24	20	105	113	100	119
1995 .....	20	20	96	104	103	100
2000 .....	17	18	95	96	103	91
2005 .....	21	24	97	87	104	84
Eastern Europe-10						
1990 .....	31	29	103	103	100	106
1995 .....	27	30	95	94	102	89
2000 .....	28	33	91	90	104	82
2005 .....	32	38	93	86	105	80
<i>Memorandum item:</i>						
European Union-15						
1990 .....	75	80	98	94	102	92
1995 .....	74	83	96	92	102	87
2000 .....	72	80	96	93	101	90
2005 .....	71	76	97	97	100	94

*Source:* As in table 11.

*Note:* As in table 11.

In SEE-2 (Bulgaria and Romania), the process of economic reforms started in earnest only in the late 1990s. This contributed to a surge in productivity by, on average, some 45 per cent between 2000 and 2005. Real income per capita was on a declining trend between 1990 and 2000, but increased by 35 per cent in the next five years (table 11). It is noteworthy that the average favourable labour productivity growth during 2000-2005 reflects mainly developments in Romania, where there was an increase by some 55 per cent compared to only 19 per cent in Bulgaria (table 12). In Bulgaria, a rise in the employment rate actually entailed that growth of real income per capita exceeded labour productivity growth over this period. This contrasts with Romania, where a sharp fall in the employment rate significantly dampened growth in real per capita income relative to labour productivity.

### ***Performance relative to the United States and the EU-15***

The decomposition of the changes in real GDP per capita (equation 2 above) can also be used to analyse the relative effects of these factors on the progress in real convergence to performance levels in economically more advanced economies.

Tables 13 to 16 show that the limited progress in closing the sizeable real income gap with the United States and the EU-15 masks a much more favourable catch up as regards average labour productivity levels. Whereas real income per capita in eastern Europe-10 corresponded to only 32 per cent of United States levels in 2005, average relative labour productivity was much higher at 38 per cent. This gap reflects the much lower employment rate compared to the United States, which is only partly offset by the effect of a higher ratio of population at working age to total population (table 17).

TABLE 14

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(individual countries)  
(Benchmark: United States=100)

	GDP/Pop	GDP/Emp	Emp/LF	LF/Pop 15-64	Pop 15-64/Pop	Memorandum item: Emp/Pop 15-64
<b>Bulgaria</b>						
1990 .....	24	26	105	89	101	93
1995 .....	21	27	95	80	102	76
2000 .....	18	25	87	81	103	71
2005 .....	22	27	94	83	104	78
<b>Czech Republic</b>						
1990 .....	51	45	105	107	100	112
1995 .....	45	44	102	97	104	100
2000 .....	42	44	95	95	106	91
2005 .....	46	47	97	95	106	92
<b>Estonia</b>						
1990 .....	31	27	105	106	101	112
1995 .....	23	24	96	99	100	94
2000 .....	27	31	91	94	101	86
2005 .....	36	38	98	96	102	94
<b>Hungary</b>						
1990 .....	39	38	105	99	101	104
1995 .....	33	43	96	78	103	74
2000 .....	35	44	98	77	103	76
2005 .....	39	48	98	80	103	79
<b>Latvia</b>						
1990 .....	36	35	105	98	101	103
1995 .....	20	23	91	93	100	84
2000 .....	23	28	90	91	101	81
2005 .....	31	34	95	96	102	92
<b>Lithuania</b>						
1990 .....	41	42	100	96	101	96
1995 .....	23	26	92	94	101	87
2000 .....	25	30	87	95	100	83
2005 .....	34	38	96	92	101	88
<b>Poland</b>						
1990 .....	26	28	99	95	98	94
1995 .....	27	32	92	89	101	82
2000 .....	30	38	87	86	104	75
2005 .....	32	42	87	83	106	72
<b>Romania</b>						
1990 .....	23	18	104	123	100	128
1995 .....	20	18	96	112	103	108
2000 .....	17	17	97	101	103	98
2005 .....	21	23	98	88	104	86
<b>Slovakia</b>						
1990 .....	38	37	104	102	98	107
1995 .....	30	35	93	92	102	85
2000 .....	31	39	85	91	104	77
2005 .....	36	42	88	92	107	80
<b>Slovenia</b>						
1990 .....	51	43	103	112	103	116
1995 .....	46	47	99	93	106	91
2000 .....	49	51	97	92	106	90
2005 .....	53	52	99	97	105	96

Source: As in table 11.

Note: As in table 12.

TABLE 15

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(individual countries)  
(Benchmark: EU-15=100)

	GDP/Pop	GDP/Emp	Emp/LF	LF/Pop 15-64	Pop 15-64/Pop	Memorandum item: Emp/Pop 15-64
Central Europe						
1990 .....	45	43	104	105	97	109
1995 .....	42	44	99	97	97	96
2000 .....	46	51	93	93	103	87
2005 .....	51	59	93	88	106	82
Baltic states						
1990 .....	50	46	105	105	99	110
1995 .....	29	30	97	104	99	100
2000 .....	34	37	92	100	100	92
2005 .....	47	48	99	97	102	96
South-east Europe-2						
1990 .....	32	25	107	121	99	129
1995 .....	27	24	101	113	99	114
2000 .....	24	23	98	102	102	101
2005 .....	30	32	100	89	105	89
Eastern Europe-10						
1990 .....	41	37	105	110	98	115
1995 .....	37	36	99	103	98	102
2000 .....	38	41	95	96	102	91
2005 .....	45	50	96	89	105	85
<i>Memorandum item:</i>						
United States						
1990 .....	134	126	102	106	98	109
1995 .....	135	121	105	109	98	114
2000 .....	138	126	104	107	99	111
2005 .....	140	132	103	103	100	106

*Source:* As in table 11.

*Note:* As in table 11.

The discrepancy between the productivity gap and the real income gap is more pronounced for the CE-5, where average labour productivity corresponds now to 44 per cent of United States levels (up from 34 per cent in 1990) whereas the real income gap narrowed only marginally to 36 per cent of United States levels, still quite close to 34 per cent in 1990. The dominating explanatory factor remains the lower employment rate (table 17).

The gaps between relative productivity levels and real per capita income levels are smaller in the case of the Baltic states and in SEE-2, but also in these cases the discrepancy stems mainly from the low labour force participation rate (table 17).

A similar pattern prevails for comparisons with the EU-15 (tables 15, 16 and 18).

In summary, our analysis suggests that while productivity developments are largely technology driven and dependent on the accumulation of physical and human capital, R&D and innovation activities, macroeconomic stability, etc., the labour market performance can be improved by a specific set of policies aiming at creating better incentives for companies to hire new workers as well as establishing an education and training system that endows the workforce with adequate skills, especially those that are required to absorb innovation developed in more advanced economies. The absorption of more of the labour force into productive employment as well as the reversal of the fall in labour force participation can also be promoted by means of active labour market policies.

#### D. Total factor productivity

One of the key handicaps of the central planned economy was the built-in inefficiency of the system of central planning: the endemic distortions rooted in the administrative setting of prices and the arbitrary allocation of resources coupled with the lack of proper incentives translated into inefficient resource



TABLE 16

Per capita GDP in eastern Europe: the role of productivity, labour market performance and the demographic structure, 1990-2005  
(individual countries)  
(Benchmark: EU-15 = 100)

	<i>GDP/Pop</i>	<i>GDP/Emp</i>	<i>Emp/LF</i>	<i>LF/Pop 15-64</i>	<i>Pop 15-64/Pop</i>	<i>Memorandum item: Emp/Pop 15-64</i>
<b>Bulgaria</b>						
1990 .....	33	32	107	95	99	101
1995 .....	28	32	99	87	99	87
2000 .....	25	31	90	87	102	78
2005 .....	30	35	97	86	104	83
<b>Czech Republic</b>						
1990 .....	68	57	107	114	98	122
1995 .....	61	53	107	106	98	114
2000 .....	58	55	99	102	104	101
2005 .....	64	62	100	98	107	98
<b>Estonia</b>						
1990 .....	41	34	107	113	99	121
1995 .....	31	29	100	108	99	108
2000 .....	38	39	95	101	100	95
2005 .....	50	50	101	99	102	99
<b>Hungary</b>						
1990 .....	53	47	107	105	99	113
1995 .....	44	51	100	85	99	85
2000 .....	48	56	101	83	102	84
2005 .....	55	64	101	83	104	83
<b>Latvia</b>						
1990 .....	49	44	107	104	99	112
1995 .....	26	28	95	101	99	96
2000 .....	32	35	93	97	100	90
2005 .....	44	44	98	99	103	97
<b>Lithuania</b>						
1990 .....	55	53	102	102	99	104
1995 .....	31	32	97	103	99	100
2000 .....	35	38	90	102	99	92
2005 .....	48	50	99	95	102	94
<b>Poland</b>						
1990 .....	35	35	101	101	97	102
1995 .....	36	39	96	98	97	94
2000 .....	41	48	90	92	103	83
2005 .....	45	56	89	86	106	76
<b>Romania</b>						
1990 .....	31	23	107	131	98	139
1995 .....	27	22	101	123	98	124
2000 .....	23	21	101	108	102	109
2005 .....	30	31	101	91	105	92
<b>Slovakia</b>						
1990 .....	51	46	106	109	96	116
1995 .....	41	42	97	100	96	97
2000 .....	43	48	88	98	103	86
2005 .....	51	56	90	94	107	85
<b>Slovenia</b>						
1990 .....	69	54	105	120	101	125
1995 .....	62	57	103	101	101	104
2000 .....	67	64	101	99	105	100
2005 .....	75	69	102	100	106	102

*Source:* As in table 11.

*Note:* As in table 12.

TABLE 17

Labour productivity and the effects of labour force utilization and demographic structure on per capita GDP  
(Benchmark: United States)

	GDP/Emp (United States=100)	Emp/LF	Effects of:		GDP per capita (United States=100)
			LF/Pop 15-64 (Percentage point contributions)	Pop 15-64/Pop	
Central Europe					
1990 .....	34	+1	-1	-	34
1995 .....	37	-2	-4	+1	31
2000 .....	41	-4	-5	+1	33
2005 .....	44	-4	-6	+2	36
Baltic states					
1990 .....	36	+1	-1	-	37
1995 .....	25	-2	-1	+1	22
2000 .....	30	-3	-2	-	25
2005 .....	37	-1	-2	+1	34
South-east Europe-2					
1990 .....	20	+1	+3	-	24
1995 .....	20	-1	+1	-	20
2000 .....	18	-1	-1	+1	17
2005 .....	24	-1	-3	+1	21
Eastern Europe-10					
1990 .....	29	+1	+1	-	31
1995 .....	30	-2	-2	+1	27
2000 .....	33	-3	-3	+1	28
2005 .....	38	-3	-5	+1	32

Source: Authors' calculations based on the data presented in table 13.

Note: As in table 11.

TABLE 18

Labour productivity and the effects of labour force utilization and demographic structure on per capita GDP  
(Benchmark: EU-15)

	GDP/Emp (EU-15=100)	Emp/LF	Effects of:		GDP per capita (EU-15=100)
			LF/Pop 15-64 (Percentage point contributions)	Pop 15-64/Pop	
Central Europe					
1990 .....	43	+2	+2	-1	45
1995 .....	44	-	-1	-	42
2000 .....	51	-3	-3	+1	46
2005 .....	59	-4	-6	+3	51
Baltic states					
1990 .....	46	+2	+2	-	50
1995 .....	30	-1	+1	-1	29
2000 .....	37	-3	-	-	34
2005 .....	48	-1	-1	+1	47
South-east Europe-2					
1990 .....	25	+2	+6	-	32
1995 .....	24	-	+3	-	27
2000 .....	23	-	+1	-	24
2005 .....	32	-	-3	+1	30
Eastern Europe-10					
1990 .....	37	+2	+4	-1	41
1995 .....	36	-	+1	-	37
2000 .....	41	-2	-1	+1	38
2005 .....	50	-2	-5	+2	45

Source: Authors' calculations based on the data presented in table 15.

Note: As in table 11.

allocation and suboptimal economic performance. Thus one of the key policy objectives of the reform process was to improve resource allocation and raise productive efficiency by establishing well functioning market mechanisms and institutions. Rising productivity and productive efficiency are also the fundament for achieving sustainable and high rates of long-run economic growth and catching up with the more developed industrialized economies.

The analysis in the previous section provides useful insights in the role of labour productivity and labour utilization as important factors behind the evolution of GDP per capita in eastern Europe since 1990. But labour productivity growth can, in turn, be explained by the dynamics of other factors such as, for example, capital intensity and total factor productivity (TFP). The concept of TFP was developed in a neoclassical growth accounting framework by Solow using a standard two-factor input production function. Later this concept was developed and elaborated in various directions.<sup>34</sup> Despite the differences, most of the approaches based on the notion of TFP seek to distinguish between the variation in output which is caused by variation in factor inputs and those changes in the level of output that are assumed to be attributed to the efficiency of resource transformation per se, i.e. the efficiency of the underlying production technology. Hence TFP growth corresponds to the change in output that cannot be directly allocated to factor input accumulation.<sup>35</sup> The objective is then to fit a production function on the observed data and to filter out the above two components of output variation.

The traditional growth accounting techniques rely on a two-factor production function (based on labour and capital inputs). In this approach all variations in output unrelated to the changes in the product mix of these two factors are reflected in the estimated residual and are thus attributed to changes in productive efficiency (TFP). Some of the more recent growth accounting techniques employ more elaborate specifications of the underlying production technology, including additional production factors (apart from the traditional capital and labour), such as, for example, factors reflecting human capital endowments. Including additional factor inputs makes it possible to explain directly a larger share of the productivity changes as some of the otherwise unexplained variation in productivity (that remains part of the residual TFP in the two-factor production function) is attributed to these factors.

Moreover, the traditional growth accounting approach has been to assume a pre-determined functional form for the production technology, in which total factor productivity is usually treated as a separable factor and to estimate this function as the best fit on the observed data. Relatively recently, with the elaboration of more sophisticated econometric approaches, the focus of research has shifted to the attempts to estimate production frontiers expressing the “best practice”, or the maximum amount of output obtainable with a given technology from a given mix of input quantities. While the traditional growth accounting techniques identify TFP with the residual of the estimated production function, these techniques allow to distinguish between the components of the productivity dynamics such as technical efficiency and technological change.<sup>36</sup>

The applicability of growth-accounting techniques is dependent on the availability of reliable statistics on output and factor inputs. With reference to the east European and CIS economies, this poses serious constraints as to the applicability of some of these methods, and in effect prevents the application of more elaborate approaches, including those comprising multiple production factors. For

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<sup>34</sup> R. Solow, “Technical change and the aggregate production function”, *Review of Economics and Statistics*, Vol. 39, No. 3 (1957), pp. 525-551. For an overview of the evolution of the notion of TFP see C. Hulten, “Total factor productivity: a short biography”, NBER Working Paper No. W7471, January 2000; for a comparative survey of the different approaches in international TFP comparisons see N. Islam, “International comparison of total factor productivity: a review”, *Review of Income and Wealth*, Vol. 45, No. 4, 1999, pp. 493-518.

<sup>35</sup> In this framework, TFP growth reflects the cumulative outcome of two underlying developments: change in productive efficiency per se and technological change.

<sup>36</sup> Such an approach is used by A. Krüger, U. Cantner and H. Hanusch (“Total factor productivity, the East Asian miracle, and the world production frontier”, *Weltwirtschaftliches Archiv*, Vol. 136, No. 1, 2000, pp. 111-136) who estimate a “world production frontier” and evaluate the distance of individual economies from this frontier.

the purpose of sketching a rough picture of the TFP dynamics in eastern Europe and the CIS during the transition from plan to market we have performed a tentative growth accounting exercise for several of these countries based on a traditional two-factor production function. In view of the data problems mentioned above, our approach was limited to the traditional measure of TFP, the Solow residual.

Solow's approach is based on a Cobb-Douglas production function with constant returns to scale and autonomous and neutral technical change. The parameters of the production function are determined under the assumptions of profit maximizing behaviour and perfect markets which yield the well known condition of equality between factor prices and the marginal productivity of production factors.<sup>37</sup> Output is defined as real GDP and the factors are the inputs of labour and capital services. In this case the Solow residuals  $s_j$  (denoting the rate of change of TFP in country  $j$  at time  $t$ ) are defined as:

$$s_j(t) = d y_j(t) - \alpha d l_j(t) - (1 - \alpha) d k_j(t) \quad (3)$$

where  $\alpha$  is the share of labour income in nominal gross value added;  $d y_j$ ,  $d l_j$  and  $d k_j$  are the logarithmic differences of real GDP, real labour input and real capital input at time  $t$ , respectively.

An essential data requirement for implementing this approach is statistics on the primary distribution of income in the economy for the compensation of labour and capital. In the SNA framework, this corresponds to the breakdown of aggregate value added produced in the economy at factor costs (i.e. net of the item "indirect taxes less subsidies") into "compensation of employees" (labour income) and "gross operating surplus and gross mixed income" (capital income).<sup>38</sup> Table 19 presents the data on the primary distribution of income in the economy for some of these countries where relevant data are available for a sufficiently long period of time.

Another key data requirement is statistics on the inputs of labour and capital services. The relevant measure for labour input is the aggregate number of hours worked in the economy. However, due to the lack of such statistics for most of the east European and CIS countries we have used as a proxy the total number of persons employed in the economy.

The most problematic variable in applying any method of growth accounting is the input of capital services. No generally accepted statistical methodology exists for measuring the input of capital services, so empirical applications are usually based on proxies. Among the most commonly used proxy for capital services is the stock of productive/fixed capital in the economy. Even this variable is often problematic due to the absence of reliable estimates of the stock. It should be noted that the measurement of fixed capital stock is a general problem not only for the east European and CIS economies but also in industrialized countries. However, the problems are especially acute in the former centrally planned economies where statistical offices only recently started practical work in this area.

The most widely used method for measuring the fixed capital stock is the so-called "perpetual inventory method" based on the well known dynamic equation of capital accumulation:<sup>39</sup>

$$\text{Fixed capital}(t) = \text{Fixed capital}(t-1) - \text{depreciation}(t) + \text{fixed investment}(t) \quad (4)$$

It has been shown that if one starts from a reasonable level of the capital-output ratio in the initial year and applies consistently the perpetual inventory method over a sufficiently long period of time, this method provides reasonable estimates for the dynamics of the fixed capital stock in later years. This is the empirical rationale behind the application of the perpetual inventory method for estimating proxies of the fixed capital stock.

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<sup>37</sup> Admittedly, these may be considered as rather strong assumptions for countries undergoing transformation from plan to market. However, the empirical experience shows that deviations from these assumptions do not result in major changes in the estimated TFP.

<sup>38</sup> Note that these should be considered as proxies for the true values of factor remuneration due to some methodological specificities of SNA (for example the fact that the income of self-employed persons is included in the "mixed income" category).

<sup>39</sup> M. Mas, F. Perez and E. Uriel, "Estimation of the stock of capital in Spain", *Review of Income and Wealth*, Vol. 46, 2000, pp. 103-116. It is usually applied at lower levels of disaggregation and by differentiating between types of physical capital which then serves as the basis for deriving estimates of the aggregate stock of capital.

TABLE 19

Primary distribution of value added in selected east European and CIS economies, 1990-2003  
(Period averages, per cent)

	Labour income <sup>a</sup>					Capital income <sup>b</sup>				
	1990-1994	1995-1999	2000-2003	1990-2003	1995-2003	1990-1994	1995-1999	2000-2003	1990-2003	1995-2003
Bulgaria .....	55.0	42.6	38.7	45.9	40.8	45.0	57.4	61.3	54.1	59.2
Croatia .....	41.3	52.0	46.6	53.7	48.7	58.7	48.0	53.4	46.3	51.3
Czech Republic .....	49.7	51.2	50.4	47.9	49.7	50.3	48.8	49.6	52.1	50.3
Estonia .....	57.5	57.5	52.9	56.2	55.4	42.5	42.5	47.1	43.8	44.6
Hungary .....	66.5	53.0	59.7	53.1	57.8	33.5	47.0	40.3	46.9	42.2
Latvia .....	48.6	55.1	51.8	45.1	49.9	51.4	44.9	48.2	54.9	50.1
Lithuania .....	47.1	48.7	47.9	44.0	46.8	52.9	51.3	52.1	56.0	53.2
Poland .....	47.2	49.2	48.2	49.1	48.5	52.8	50.8	51.8	50.9	51.5
Romania .....	44.8	38.7	41.8	45.8	42.9	55.2	61.3	58.2	54.2	57.1
Slovakia .....	46.6	47.9	47.3	45.3	46.7	53.4	52.1	52.7	54.7	53.3
Slovenia .....	69.8	62.8	66.3	62.1	65.1	30.2	37.2	33.7	37.9	34.9
Russian Federation .....	50.3	55.2	52.8	53.0	52.8	49.7	44.8	47.2	47.0	47.2
Ukraine .....	51.2	57.1	54.1	50.8	53.2	48.8	42.9	45.9	49.2	46.8

Source: UNECE secretariat calculations, based on national statistics.

<sup>a</sup> Share of compensation of employees in aggregate value added net of indirect taxes and subsidies.

<sup>b</sup> Share of gross operating surplus and mixed income in aggregate value added net of indirect taxes and subsidies.

In our case we have computed long-term series for the fixed capital stock dynamics (understandably, rough estimates) in some of the east European and CIS countries by applying this method for a period of several decades starting in 1950.<sup>40</sup> For this purpose we use historic series of fixed investment (fixed investment ratios defined as the share of gross fixed capital formation in GDP) in these economies (before 1989, the former centrally planned economies)<sup>41</sup> as well as the results of the International Comparison Programmes, which provide internationally comparable GDP estimates at PPPs (table 6). The actual computation procedure was designed as follows. We start by computing long-term series (going back to 1950) for GDP in internationally comparable constant prices.<sup>42</sup> Then for the year 1950 we assume a reasonable value for the capital to GDP ratio<sup>43</sup> and compute the real stock of fixed capital for the years that follow through the dynamic equation of capital accumulation (4). The value of real fixed investment is determined by applying the fixed investment ratios<sup>44</sup> to the corresponding levels of real GDP (both GDP and the stock of real capital are measured in constant international dollars), while for depreciation we have used norms suggested in the literature.<sup>45</sup>

<sup>40</sup> The choice of 1950 as a starting year was based on the availability of appropriate statistical data.

<sup>41</sup> The historic investment ratios have been taken from various issues of *Economic Survey of Europe* published by the United Nations Economic Commission for Europe. The investment ratios of the then existing states (Czechoslovakia, the USSR and Yugoslavia) have been used for the countries that succeeded them.

<sup>42</sup> It is well known that the officially reported growth rates for the centrally planned economies were highly inflated. For this purpose we have used the estimates of the long-run GDP growth rates in the former centrally planned economies for the period prior to 1990 reported in section II to back-cast the dynamics of real GDP to the year 1950. The growth rates of Czechoslovakia, USSR and Yugoslavia have been used as proxies for the past GDP dynamics in the countries that succeeded them.

<sup>43</sup> The actual ratios vary between 1.5 and 2.5 and reflect: i) the historic differences in per capita income levels and ii) the investment ratios in countries with similar per capita income levels.

<sup>44</sup> We used investment ratios in current prices and applied them to real GDP series. This is equivalent to the additional assumption that the price deflators of GDP and gross fixed capital formation were identical.

<sup>45</sup> For example, Hulten and Wykoff suggest the following rates of capital consumption for the United States economy: 0.0361 for buildings and 0.1179 for machinery and equipment (C. Hulten and F. Wykoff, "The estimation of economic depreciation using vintage asset prices: an application of the Box-Cox power transformation", *Journal of Econometrics*, Vol. 15, No. 3, 1981, pp. 367-396). Mas, Perez and Uriel, op. cit., come up with comparable numbers for Spain. For the purpose of our exercise an average rate of capital consumption of 0.085 (for the total economy) has been used for the east European and CIS economies.

The results for the estimated average Solow residuals in several east European and CIS countries (a measure of the rate of change of their TFP), as well as the corresponding contributions of capital and labour inputs to GDP growth, are shown in table 20. These results shed some additional light on the effect of different factors, including the changes in TFP in explaining the variation in growth performance during the transition from plan to market.

Probably the most interesting insight concerns the differences in the composition of growth factors during the transformational recession, on the one hand, and those during the post-recession recovery, on the other. The transformational recession was in most east European and CIS countries a sweeping growth crisis, in which the two main factor inputs and the aggregate productive efficiency contributed negatively to GDP growth. As noted in the previous sections, this was a period of sharply falling employment and dramatic contraction in investment, reflected in most cases in negative factor contributions to the growth of aggregate output (in some cases the drop in labour input accounted for the largest share of the drop in the GDP growth rates). The period of transformational recession was in most cases also accompanied by a sharp drop in TFP, largely reflecting the disorganization and institutional hiatus that prevailed in the first phase of transition (the exceptions being Hungary, Poland and Slovenia).<sup>46</sup>

In contrast, the single most important factor contributing to the speed of post-recession recovery was the sharp rise in TFP during the later phases of transition. Moreover, in a number of countries, the average annual rise in TFP during the period 2000-2003 (and in many cases also during the period 1995-1999) was higher than the corresponding average annual rate of GDP growth. As already discussed, the process of enterprise restructuring and the accompanying relocation of resources (both capital and labour) was still underway during the later phases of transition, and the productivity-enhancing rationalization of production sometimes involved declining contributions of factor inputs. At the same time, capital accumulation in this period contributed to positive technological change, with new investment going into modern and highly productive capital equipment. Therefore, the positive growth in TFP likely reflected a combination of rising productive efficiency and technological change. Thus, while this process of economic restructuring undoubtedly involved a painful adjustment, especially in the labour market, the positive outcome has been a dramatic rise in overall productivity.

Admittedly, the reliability of the TFP estimates hinges to a large degree on the reliability of the estimated dynamics of the fixed capital stock. In our case, apart from the rough and approximate nature of the perpetual inventory method itself, there is another factor that needs to be taken into consideration, namely the knock-on effect of transition on the value of physical capital in the east European and CIS economies. As argued above, as a result of the disbanding of the CMEA market (that absorbed a large share of these countries' exports) and the abrupt exposure to the competitive pressures of international goods markets, the former CPEs suddenly were faced with a huge stock of sunk capital that was inoperative under market conditions. This erosion of the value of the available fixed capital stock was a de facto equivalent to a one-off write-off of a corresponding share of the stock.

There have been no systematic attempts to evaluate the magnitude of such a knock-on effect on the basis of actual empirical data. For the purpose of checking the sensitivity of the TFP results, we performed a simplified experiment by incorporating a one-off write-off effect in the year 1990. In practical terms, this can be emulated in the dynamic equation of capital accumulation (4) by subtracting a corresponding portion(s) of the fixed capital stock at a relevant point(s) in time. The actual level of the write-off was assumed to be 20 per cent of the 1989 fixed capital stock for the central European countries and 30 per cent of the stock for the south-east European economies and the successor states of the Soviet Union. The corresponding results for the resultant TFP growth are presented in table 21.

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<sup>46</sup> In these three countries, the average rate of TFP growth was positive both in the three subperiods and for the period of transition as a whole.

TABLE 20

Total factor productivity and contributions of factor inputs to GDP growth in selected east European and CIS economies, 1990-2003  
(Average annual rates of change, per cent)

	GDP, of which:						Contribution of:						Total factor productivity		GDP, of which:						Contribution of:		Total factor productivity								
	1990-1994			1995-1999			2000-2003			Labour			Capital			1990-1994		1995-1999		2000-2003		1990-2003			1995-2003			1990-2003		1995-2003	
	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003				
Bulgaria .....	-4.9	-1.2	4.7	-3.0	-0.4	0.3	-1.4	-2.1	-0.2	-0.5	1.3	4.6	-0.8	1.4	-1.1	-0.1	-1.3	-1.2	1.6	2.8											
Croatia .....	-8.4	4.2	4.2	-2.3	-0.4	0.3	-2.6	0.0	1.1	-3.6	4.6	2.9	-0.3	4.2	-0.9	-0.1	-0.6	0.5	1.2	3.8											
Czech Republic .....	-2.2	1.9	2.8	-0.9	-0.3	-0.1	0.4	0.9	0.6	-1.7	1.3	2.3	0.7	2.3	-0.4	-0.2	0.6	0.8	0.5	1.7											
Estonia .....	-8.5	5.0	7.1	-2.4	-1.8	0.3	-0.8	0.1	1.1	-5.3	6.7	5.6	0.8	5.9	-1.4	-0.8	0.0	0.5	2.1	6.2											
Hungary .....	-3.2	3.3	4.0	-4.3	0.1	0.4	-0.6	0.1	0.8	1.6	3.1	2.8	1.2	3.6	-1.4	0.3	0.0	0.4	2.5	2.9											
Latvia .....	-10.2	3.8	7.1	-2.5	-0.4	0.4	-2.4	-1.0	1.1	-5.3	5.2	5.6	-0.2	5.3	-0.9	0.0	-0.9	-0.1	1.6	5.4											
Lithuania .....	-11.2	4.5	6.9	-1.1	-0.3	-0.1	-1.0	-1.2	-0.6	-9.1	6.0	7.6	-0.4	5.6	-0.6	-0.2	-0.9	-0.9	1.1	6.7											
Poland .....	-1.4	6.0	2.6	-1.5	0.6	-0.7	-1.4	0.8	0.8	1.5	4.6	2.5	2.4	4.5	-0.5	0.0	0.0	0.8	2.9	3.7											
Romania .....	-4.4	-0.2	4.5	-0.9	-1.1	-0.9	-1.1	-0.4	0.2	-2.4	1.3	5.2	-0.3	1.9	-1.0	-1.0	-0.5	-0.1	1.1	3.0											
Slovakia .....	-4.2	4.5	3.7	-1.4	0.1	0.2	0.5	1.2	0.7	-3.3	3.1	2.9	1.2	4.1	-0.4	0.2	0.8	0.9	0.8	3.0											
Slovenia .....	-2.9	4.4	3.2	-3.2	0.1	0.4	-0.4	0.6	1.0	0.8	3.6	1.8	1.5	3.9	-1.0	0.2	0.4	0.8	2.1	2.8											
Russian Federation ....	-8.8	-1.1	6.8	-1.5	-0.5	0.7	-0.8	-1.7	-0.9	-6.5	1.2	7.0	-1.6	2.4	-0.5	0.0	-1.1	-1.4	0.1	3.8											
Ukraine .....	-11.9	-5.5	7.5	-1.0	-0.5	0.1	-0.7	-2.0	-1.7	-10.2	-2.9	9.0	-4.1	0.3	-0.5	-0.2	-1.4	-1.8	-2.1	2.4											

Source: UNECE secretariat calculations.

Note: The average annual rates of TFP and of the contributions of labour and capital to GDP growth are calculated as the arithmetic averages for the corresponding periods.

TABLE 21

Alternative estimates of total factor productivity and contributions of factor inputs to GDP growth in selected east European and CIS economies, 1990-2003  
(Average annual rates of change, per cent)

	GDP, of which:			Contribution of:						Total factor productivity			GDP, of which:			Contribution of:						Total factor productivity			
				Labour			Capital									Labour			Capital						
	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-1994	1995-1999	2000-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	1990-2003	1995-2003	
Bulgaria .....	-4.9	-1.2	4.7	-3.0	-0.4	0.3	-0.5	-1.4	0.7	-1.4	0.6	3.7	-0.8	1.4	-1.1	-0.1	-0.5	-0.5	0.8	2.0					
Croatia .....	-8.4	4.2	4.2	-2.3	-0.4	0.3	-2.0	0.7	1.5	-4.2	4.0	2.4	-0.3	4.2	-0.9	-0.1	0.0	1.1	0.6	3.3					
Czech Republic .....	-2.2	1.9	2.8	-0.9	-0.3	-0.1	1.4	1.4	0.9	-2.7	0.8	2.0	0.7	2.3	-0.4	-0.2	1.3	1.2	-0.1	1.3					
Estonia .....	-8.5	5.0	7.1	-2.4	-1.8	0.3	0.2	0.9	1.8	-6.3	5.9	4.9	0.8	5.9	-1.4	-0.8	0.9	1.3	1.3	5.5					
Hungary .....	-3.2	3.3	4.0	-4.3	0.1	0.4	-0.1	0.6	1.2	1.1	2.5	2.4	1.2	3.6	-1.4	0.3	0.5	0.9	2.0	2.5					
Latvia .....	-10.2	3.8	7.1	-2.5	-0.4	0.4	-1.6	-0.2	2.0	-6.2	4.4	4.7	-0.2	5.3	-0.9	0.0	-0.1	0.8	0.7	4.5					
Lithuania .....	-11.2	4.5	6.9	-1.1	-0.3	-0.1	0.3	-0.5	0.1	-10.4	5.3	6.9	-0.4	5.6	-0.6	-0.2	0.0	-0.2	0.2	6.0					
Poland .....	-1.4	6.0	2.6	-1.5	0.6	-0.7	-0.8	1.5	1.2	0.9	3.9	2.1	2.4	4.5	-0.5	0.0	0.6	1.4	2.3	3.1					
Romania .....	-4.4	-0.2	4.5	-0.9	-1.1	-0.9	0.2	0.7	0.8	-3.7	0.2	4.6	-0.3	1.9	-1.0	-1.0	0.6	0.8	0.1	2.1					
Slovakia .....	-4.2	4.5	3.7	-1.4	0.1	0.2	1.6	1.8	1.0	-4.3	2.5	2.6	1.2	4.1	-0.4	0.2	1.5	1.4	0.1	2.5					
Slovenia .....	-2.9	4.4	3.2	-3.2	0.1	0.4	0.0	1.1	1.4	0.3	3.1	1.5	1.5	3.9	-1.0	0.2	0.8	1.2	1.6	2.4					
Russian Federation .....	-8.8	-1.1	6.8	-1.5	-0.5	0.7	0.5	-1.3	-0.4	-7.8	0.7	6.5	-1.6	2.4	-0.5	0.0	-0.4	-0.9	-0.7	3.3					
Ukraine .....	-11.9	-5.5	7.5	-1.0	-0.5	0.1	0.4	-1.6	-1.2	-11.3	-3.3	8.5	-4.1	0.3	-0.5	-0.2	-0.8	-1.4	-2.8	1.9					

Source: UNECE secretariat calculations.

Note: The average annual rates of TFP and of the contributions of labour and capital to GDP growth are calculated as the arithmetic averages for the corresponding periods.



Taking into account the knock-on effect of transition on the stock of productive capital does not change the main results and conclusions of the growth accounting exercise outlined above. However, this exercise adds some further nuances to our interpretation. The assumption of fixed capital erosion is tantamount to an increase in the productivity of the remaining capital stock for a given level of output. In other words, the predominantly negative contribution of capital to GDP growth during the transformational recession is now smaller, while the positive growth contribution during the recovery is now correspondingly larger. This, in turn, is mirrored in correspondingly larger negative growth contributions of TFP during the recession and smaller positive growth contributions during the ensuing recovery period.

#### **IV. Concluding remarks**

The empirical analysis of the long-term growth performance of the east European and CIS economies, however rough and tentative it may be, provides some useful insights into the key determinants of growth during the past five decades. The period covered in this study was one of turbulent change: it witnessed the rise and peak of communism in the first postwar decades, its gradual decay in the 1970s and 1980s and then its fall followed by the transition to democracy and market economy system after 1989. Given that the collapse of the system of central planning marked a major structural break in the long-term economic performance of the east European and CIS economies we take a different approach to the analysis of growth performance during these two subperiods.

In the first part of the paper we present a broad overview of growth trends in eastern Europe and the Soviet Union in the period between 1960 and 1989. One of the practical problems in analyzing the growth performance in the former CPEs is the absence of reliable data as the official growth statistics were systematically biased upwards. We have compiled and constructed various alternative estimates, which systematically point to much lower growth figures in the CPEs than implied by the official statistics in this period. Moreover, these three decades marked three different phases in the CPEs' long-term economic performance. The 1960s were still a decade of relatively strong economic growth in some parts of eastern Europe and the Soviet Union, following a very robust recovery during the 1950s. During the 1960s the ongoing process of industrialization was accompanied by the reallocation of resources from the less productive primary sector activity to the more productive secondary sector. During the 1970s, economic growth slowed down considerably throughout the region but still remained positive. The process of extensive resource reallocation gradually came to an end while the built-in inefficiencies of the system of central planning surfaced in the weakening aggregate output growth rates. The 1980s were a period of economic regress as the CPEs plunged into a prolonged stagnation and, in some countries, even into recession. The highly distorted, inefficient and inflexible economic structures translated into technological backwardness. Besides, the CPEs turned out to be incapable of efficiently responding to the challenges of the major oil shocks incurred during the 1970s and 1980s.

One of the key policy objectives in the process of economic transformation in the east European and CIS economies since the beginning of the 1990s has been to improve resource allocation, raise productive efficiency and achieve sustained high rates of economic growth, so as to catch up with standards of living of developed market economies. In the second part of the paper we examine the main factors of their growth performance during the transition from plan to market and assess the available empirical evidence on the dynamics of productivity and GDP per capita in this period.

Ironically, the start of economic transformation in eastern Europe and the CIS was marked by a deep transformational recession. All these countries thus paid a heavy one-off toll for the preceding decades of wasteful economic performance and mismanagement. Since the mid-1990s, however, the east European and CIS economies have embarked on a path of strong economic growth and at present they are among the fastest growing regions in the world. The recovery has been accompanied by a surge in fixed investment, often complemented by large inflows of FDI. At the same time, there has not been – at least so far – a matching recovery in employment, partly an indication that labour adjustment (in the sense of eliminating the inherited slack of excess labour) in many of these economies is still under way.

Our analysis points to a remarkable upturn in productivity in the recovery phase, both in terms of labour productivity and in terms of TFP. In fact, the upsurge in productive efficiency and technological change – triggered by the bold and wide ranging market reforms – has been the main factor behind the recent strong economic growth in eastern Europe and the CIS region after the end of the transformational recession. This is an indication that, in the main, the difficult and painful reforms in these countries are starting to pay off. However, in terms of real per capita income levels relative to the more developed, industrialized countries, these economies still face a long catching up process.

Notwithstanding the ongoing debate in the literature related to the sources of long-term growth, there seems to be relatively wide agreement on the general importance of several proximate factors including, *inter alia*: human capital development; investment in physical capital, research and development and infrastructural development; demographic factors (population growth); well-organized labour markets stimulating high employment rates; efficient participation in the international division of labour; good governance based upon the rule of law along with appropriate regulatory institutions; financial systems performing efficient intermediation; a generally acceptable distribution of income and wealth within each country (maintaining social cohesion). Obviously, these factors should remain in the focus of economic policy in the eastern Europe and CIS region so as to establish and maintain an enabling macroeconomic and business environment for high and sustainable long run economic growth in these countries.