Investment, Financial Markets, New Economy Dynamics and Growth in Transition Countries[1)]

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The paper highlights some international differences in fields relevant for growth in selected transition economies, in particular eastern European countries and in Russia. Initial problems of transition were natural in a sense that systemic transition to a market economy has effectively destroyed part of the existing capital stock that was no longer profitable under the new relative prices imported from world markets; and there was a transitory inflationary push as low state-administered prices were replaced by higher market equilibrium prices. The papers focuses in particular on the role of structural change, financial services and the New Economy, analyses how those factors affect economic growth. The paper discusses theoretical aspects of growth in transition countries, presents policy conclusions and some historical data.

1. Introduction

The transition to a market economy in the former CMEA area is more than a decade old and one can clearly distinguish a group of relatively fast growing countries – including Estonia, Poland, the Czech Republic, Hungary and Slovenia – and a majority of slowly growing economies, including Russia and the Ukraine. Initial problems of transition were natural in the sense that systemic transition to a market economy has effectively destroyed part of the existing capital stock that was no longer profitable under the new relative prices imported from world markets; and there was a transitory inflationary push as low state-administered prices were replaced by higher market equilibrium prices. Indeed, systemic transformation in eastern Europe and the former Soviet Union have brought serious transitory inflation problems and a massive transition recession; negative growth rates have continued over many years in some countries, including Russia and the Ukraine, where output growth was negative throughout the 1990s (except for Russia, which recorded slight growth in 1997). For political and economic reasons the economic

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performance of Russia is of particular relevance for the success of the overall transition process. If Russia would face stagnation and instability, this would undermine political and economic stability in the whole of Europe and prospects for integrating Russia into the world economy.

Russia has achieved sustained growth under president Putin, part of which must be attributed on the one hand to systemic reform and economic policy reforms – including the introduction of a low uniform income tax rate of 13% – and on the other hand to high oil prices that stimulate the energy sector and generate high tax revenues. During the 1990s, the overall economic performance of Russia was weak by historical standards and from an international comparative perspective; compared to the Visegrad countries economic development in Russia at large was disappointing. Various explanations for slow growth in Russia and the Ukraine have been offered in the literature, including insufficient foreign direct investment, widespread corruption and high transaction costs plus inefficient financial markets [34, 41].

With regard to the acceptance of market economy and democracy in Eastern Europe and Russia, it is quite obvious that sustained economic growth is a key requirement for the legitimacy of the new system. Sustained growth in turn mainly depends upon:

- a high investment output ratio in the private sector;
- sustained adequate public investment which often raises deficit financing problems as tax receipts and tariffs receipts are rather small;
- mobilizing gains from trade through a broad diversified trade network;
- organizing an efficient innovation process;
- stimulating the diffusion of new knowledge and innovations, respectively;
- avoiding excessive exposure to negative external shocks.

This list of growth-enhancing factors is not much different than a century ago. However, there are several side-constraints that have to be considered at the beginning of the 21st century:

- Structural change in industrialized countries implies that not only the manufacturing industry but also the services sector plays an important role for private investment; in Germany, the services sector has become the leading ordering sector for investment goods in the late 1990s. In eastern Europe, the first stage of post-socialist transition has been characterized by a massive reduction of the share of manufacturing industry in overall output, in a second stage the share of industry has increased in many countries.
- The issue of deficit financing problems often is associated with external imbalances or exchange rate instability which means that the IMF could become involved if there are serious and recurrent problems.
- Sustained gains from trade cannot simply be mobilized through liberalization of trade, rather the respective country must be a WTO member because it will otherwise become subject to selective protectionism in phases of an international recession, especially considering that the US is the most influential country in the WTO and the dominant influence on the international business cycle economic and political relations with the US are of special relevance. Moreover, trade in services has become more important after the creation of the WTO and the GATS, respectively. Liberalizing trade in financial services in turn is often associated with the liberalization of foreign direct investment in banking and insurance, which in turn

means that countries face adjustment challenges and potential problems in politically and economically-sensitive sectors. Hence the trade liberalization issue has become a rather complex issue; moreover, trade expansion is partly linked to FDI inflows and multinational companies since about 1/3 of trade of leading OECD countries is intra-company trade of multinational companies.

• With respect to innovations – measured in terms of patent applications at the European Patent Agency – eastern European countries and Russia have shown modest performance in the early 1990s. In the late 1990s, patent applications of some transition countries have increased; this holds in particular for Hungary and the Czech Republic, which are also leading countries in terms of FDI per capita inflows. However, few transition countries have established a new efficient national innovation system.

• There is no doubt that the internet and modern telecommunications, respectively, have strongly contributed to accelerated diffusion of new knowledge. Jungmittag/Welfens [22] have shown in empirical work – based on time series analysis for Germany – that the use of telecommunications has contributed considerably to economic growth; and that the broader use of the internet could create several hundred thousand additional new jobs as the use of the internet accelerates diffusion of knowledge and hence can stimulate growth in the New Economy. The New Economy can be defined by an economy in which investment in information and communication technology (ICT) represent a considerable part of overall investment, in which there is a rapid expansion of digital services.

• Achieving sustained growth in transition countries in the 21st century requires the ability to cope with economic globalization in the sense that capital flows relative to GDP have strongly increased after the 1970s, with foreign direct investment accelerating in particular after 1985. Economic globalization basically means an intensified international quest for mobile capital and therefore intensified systemic competition, at the same time it means to face problems that could emerge from the potentially large volatility of short term capital flows and divergence of adjustment speeds in ever faster financial markets and relatively slow goods and factor markets – the latter problem was first discussed in the literature in the Dornbusch model [10].

In the following analysis we highlight the international differences in fields relevant for growth in selected eastern European countries and in Russia. We will focus in particular on the role of structural change, financial services and the New Economy, on economic growth where our main interest is in the second half of the 1990s when the transition recession had phased out in most ex-CMEA countries. The paper also gives some basic statistics, section 3 discusses theoretical aspects of growth in transition countries and section 4 presents policy conclusions.

2. Fundamental Data on Eastern Europe and Russia

Taking into account broad macroeconomic data for transition countries in the 1990s, development can be characterized by transitorily high inflation; beginning in Poland in 1990, stabilization policies had been adopted by 1995 in all transition countries except for Turkmenistan. Depending on delays in monetary stabilization and the size of initial monetary overhang the 12-month pre-stabilization inflation rates

varied widely: from 57,000 % p.a. in Georgia to a rather modest 26% in Hungary [12, p. 14). Moreover there was a strong transition recession in the early stages of transformation. The main exceptions were Russia and the Ukraine, which suffered from a very protracted and long-lasting output decline: While the average number of consecutive years of output decline was 3.8 in central and southeastern European countries plus the Baltic countries, the consecutive years of output decline was 6.5 years for the CIS, where Moldova, Russia, Tajikistan were negative leaders – with 7 years – together with Turmenistan and the Ukraine which had 8 and 10 years, respectively (see Tab. 1). Cumulative output decline was 22.6% on average for the countries in central and southeastern Europe plus the Baltics, but in the former CIS it was 50.5% with the largest economy, Russia, facing a cumulative output decline of 40%. The latter figure was slightly more than 1/3 higher than in the Great Depression in the US, compared to Germany's output development in the Great Depression, Russia's cumulated output decline was 2.5 times as high. This clearly points to enormous economic problems for Russia (and several other CIS countries) in the 1990s. At the same time there was an enormous variation in output dynamics. Among the 24 transition countries in the list only four had achieved or exceeded the output level of 1990 in 2000, namely Albania, Hungary, Poland and Slovenia.

In explaining the different economic developments across countries Fischer/ Sahay [12] follow a similar approach as Berg at al. [5], who emphasize that growth can be explained by the initial conditions, the degree of structural reforms – eg privatization – and macroeconomic variables. In a panel regression, Fischer/Sahay [12] show in three alternative regression equations, using data up to 1998 (with starting years of transition for individual countries differing), that inflation had a significant negative impact on growth, while liberalization as measured by an index computed by De Melo et al. [8] had a positive impact on output growth. The small scale privatization index as measured by the EBRD also had a significant impact on output growth in one of the regression models. The fiscal variable – the deficit-GDP ratio – included in each of the three equations showed a significant negative value in only one equation; from a simple theoretical perspective a negative value could be expected since a high deficit-GDP ratio might crowd out private investment via higher real interest rates; or such deficits could reflect a rise of the relative size of government (possibly including higher subsidies for ailing industries that would impair economic efficiency), which in turn might undermine overall economic flexibility and innovation and through this output growth. However, the unclear impact of the fiscal variable is not surprising since from a broader theoretical perspective one should control for the impact of the structure of public expenditure: A rising deficit-GDP ratio that reflects a higher ratio of public investment; including the field of education and R&D subsidies, could even raise the private investment-GDP ratio and hence long-term growth.

If one assumes that a certain output decline can be compensated for in terms of higher quality of goods and greater variety of products, one might argue that countries which almost had returned to 1989 output levels by 2000 stood for a rather successful transition process: Three countries had achieved between 90 and 99% of the 1989 output level in 2000, namely Uzbekistan, Kyrgyz Republic and the Czech Republic. Given the fact that Russia and the Ukraine as the largest economies in terms of population stood in 2000 at 64% and 43% of 1989 output levels, respectively, one may state that the 1990s essentially witnessed only very modest success in

terms of transition in the overall ex-CMEA area. From this perspective, it is all the more important that eastern Europe achieves sustained economic growth. Given the overall economic depression in the ex-CMEA area in the 1990s, it is also clear that achieving sustained and high economic growth in Russia and the Ukraine would stimulate regional trade and overall regional output growth considerably.

Table 1.

The Transition Recession

Countries	Consecutive years of output decline	Cumulative output decline (percent)	Real GDP, 2000 (1990 = 100)
CSB	*3.8*	*22.6*	*106.5*
Albania	3	33	110
Bulgaria	4	16	81
Croatia	4	36	87
Czech Republic	3	12	99
Estonia	5	35	85
Hungary	4	15	109
Latvia	6	51	61
Lithania	5	44	67
Poland	2	6	112
Romania	3	21	77
Slovak Republic	4	23	82
Slovenia	3	14	105
CIS	*6.5*	*50.5*	*62.7*
Armenia	4	63	67
Azerbaijan	6	60	55
Belarus	6	35	88
Georgia	5	78	29
Kazakhstan	6	41	90
Kyrgyz Republic	6	50	68
Moldova	7	63	35
Russian Federation	7	40	64
Tajikistan	7	50	48
Turkmenistan	8	48	76
Ukraine	10	59	43
Uzbekistan	6	18	95
Output decline during the Great Depression, 1930–1934			
France	3	11	n.a.
Germany	3	16	n.a.
United Kingdom	2	6	n.a.
United States	4	27	n.a.

n.a. Not applicable

a Simple average, except for the index of 1990 GDP, which shows population-weighted averages.

Source: World Bank country office data; World Bank (2002).

While some countries have achieved a relatively quick u-turn after which output has increased at relatively high rates, other transition countries have recorded only slow growth (Tab. 1). The following table shows that one can indeed distinguish a group of slowly recovering countries versus a group a countries whose per capita GDP in 2000 had clearly exceeded 1990 levels.

Economic Growth in Transition Countries, EU-15 and Asian NICs

Long term economic growth differs across countries; however, from a neo-classical perspective one would assume that poor countries will catch up so that the hypothesis in many regression approaches on growth is that the per capita income of the respective country relative to US per capita income will enter with a negative value. With regard to transition countries, the first half of the 1990s did not show relatively high economic growth; rather negative growth rates were dominant across countries. However, the second half of the 1990s showed positive growth rates for almost all transition countries.

How much economic growth should one expect in transition economies whose per capita income in purchasing power parity figures is generally below that of Greece, Ireland, Spain or Portugal? With respect to these four relatively poor EU countries, one can clearly see that they all faced accelerating economic growth after EU membership, Greece obviously with a very long delay. With regard to transition countries, one should clearly expect relatively high growth in the medium term.

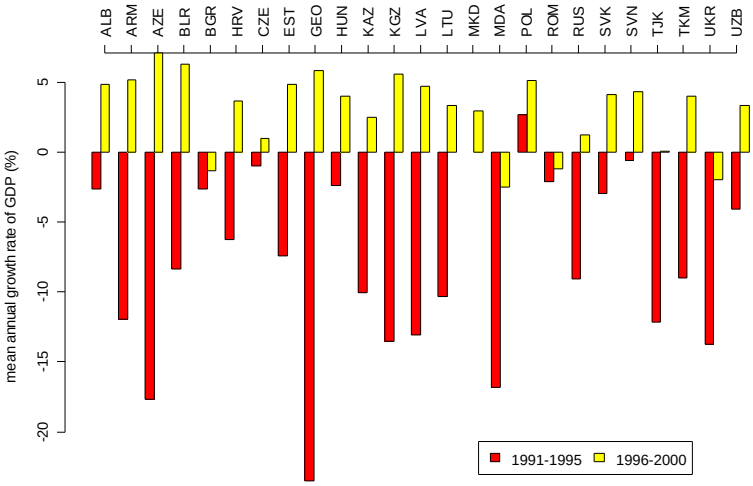

Fig. 1. Mean Annual Growth in Transition Countries

Data Source: WDI (2000), WDI (2002).

Structural conditions and macroeconomical policies as well as institutional shortcomings have played a crucial role for slow growth or negative growth rates in transition countries, including Russia [15]. Russia and several other CIS countries

have suffered not only from a lack of capital inflows; indeed, there was considerable capital flight in the 1990s. The enormous inequality in terms of income and wealth potentially contributes to the phenomenon of capital flight.

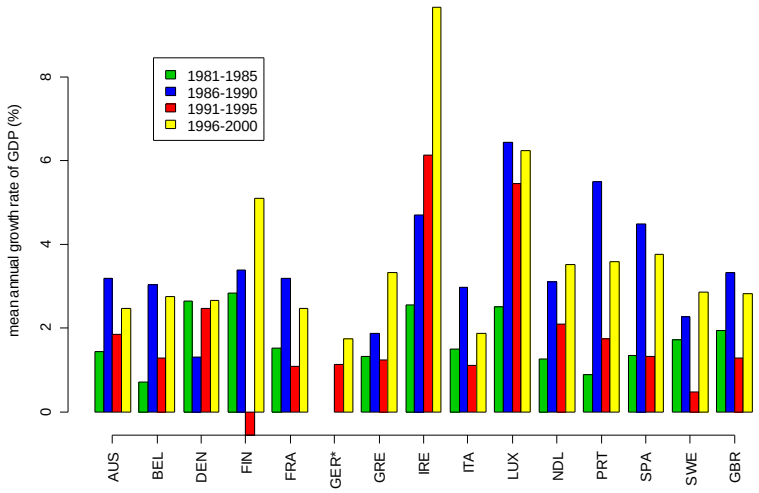

Fig. 2. Mean Annual Growth in EU Countries

Data Source: WDI (2000), WDI (2002).

Whether this potential economic growth is really exhausted – and indeed should be fully exhausted at any point of time – is doubtful. Asian Newly Industrializing Countries (NICs) have shown high growth rates of 5–9% over many years (except for the Phillipines), but the Asian crisis in the 1997/98 when growth rates became negative in many Asian NICs demonstrate that very dramatic swings in growth rates can occur under unfavorable circumstances and in the presence of structural domestic problems in the banking system. One may have to raise the question whether some countries would not have fared better in the long run if economic growth had been slightly more modest: government might not only have a role in nurturing economic growth in stagnating economies, it also might have a role in avoiding overheating and excessive bank lending – the latter often occurred in Asia in combination with two forms of balance sheet mismatches that led to problems later during the Asian crisis and indeed were part and parcel of the crisis sources [30]:

- Maturity mismatch: lending for investment projects was long term but refinancing through deposits and domestic financial market instruments was mainly short term; lack of long term domestic financing occurred because of underdeveloped domestic financial markets. While every standard textbook of finance suggests avoiding long term lending in combination with short term refinancing, this is exactly what could be observed in many Asian NICs and in many transition countries, except for Hungary, Poland, the Czech Republic and Estonia.
- Currency mismatch: banks and firms took – in an environment of de facto exchange rate pegging – foreign long term loans, mostly $-denominated, which were considered to be an ideal cheap substitute for the missing long term end of the

domestic bond market. With earnings of investment projects often accruing in domestic currency, any major depreciation of the currency was bound to undermine financial stability of banks and firms. If we normalize the initial exchange rate to unity one can show that a firm's (or bank's) overall debt-capital ratio will increase by 30% – assuming domestic debt is given – if the ratio of foreign debt to overall capital is 50% initially and the depreciation rate of the currency is 60%. Failure to hedge against the risk of currency depreciation – an hedging is unattractive if domestic interest rates are high and world interest rates are low while government is pegging the exchange rate de facto or formally – thus will bring about a major economic crisis once there is a large currency depreciation. Since financial market crises often have an element of regional spillover effects, as both the history of Latin America and Asia has shown, one should be worried about any medium-sized economy in eastern Europe, Asia or Latin America that is suddenly faced with a combination of strong currency depreciation and a banking crisis.

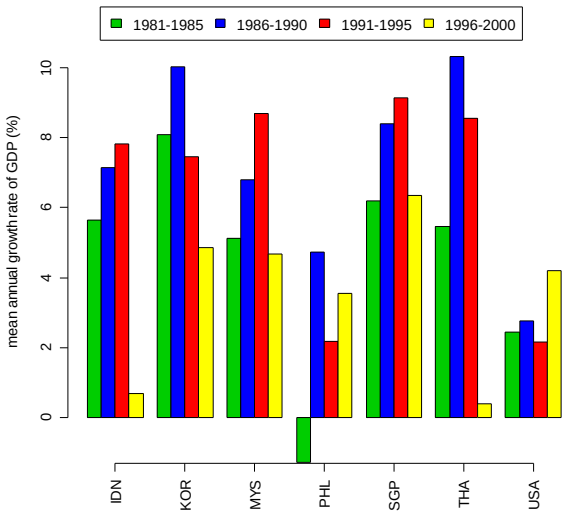

Fig. 3. Mean Annual Growth in Asian NICs, and US

Data Source: WDI (2000), WDI (2002).

As governments in Asian NICs supported economic growth even when it was very high, there was a natural incentive for banks to take fairly large risks: Assuming that domestic firms would grow at more or less the same rate as the aggregate economy, there was every incentive to step up loans to firms and refinance these loans through borrowing abroad long term or borrowing at home short term: both strategies were bound to fail once a confidence crisis either in domestic bond markets or in the foreign exchange market occurred. Looking at Asian NICs is thus encouraging for transition countries in the sense that poor countries that adopt adequate policies and institutional reforms can indeed have high or even very high growth rates over many years. Hence one might want to follow the model of Asian NICs that adopted various growth-enhancing strategies. At the same time, transition countries might want to avoid excessive growth in the short term and strive rather

to achieve a combination of high sustained growth and stable plus efficient institutions, including financial markets. What is surprising when taking a closer look at growth performance in transition countries is the enormous heterogeneity of growth rates, and this needs to be explained.

Investment Dynamics

When taking a closer look at selected macroeconomic indicators of transition countries, selected NICs and selected EU countries plus the US, we can identify certain key developments among transition countries. Relatively fast growth is experienced by countries with a high investment-GDP ratio, here defined as a range between 25 and 30%. Countries with low investment-GDP ratios such as Bulgaria or Russia have experienced low economic growth in the 1990s. We are particularly interested in the second half of the 1990s; that is, the period after initial distortions had been overcome and the transition recession had more or less phased out.

Table 2a.

Gross Fixed Investment in Transition Countries as Percent of GDP, 1996–2000

	1996	1997	1998	1999	2000	mean 1996–2000
TKM	NA	38.7	45.5	46.3	39.7	42.55
BIH	41.9	41.3	37.0	20.6	NA	35.20
SVK	37.1	36.6	36.1	31.9	30.1	34.36
CZE	34.2	32.6	30.2	27.9	29.7	30.92
HUN	27.2	27.7	29.7	28.5	30.6	28.74
AZE	28.0	34.2	33.4	26.5	17.5	27.92
EST	27.8	30.9	29.4	24.6	25.8	27.70
SVN	23.5	24.2	25.6	28.4	27.8	25.90
POL	21.9	24.6	26.2	26.4	26.5	25.12
BLR	23.5	26.8	26.7	23.7	22.8	24.70
LVA	18.8	22.8	27.6	27.0	27.1	24.66
MDA	24.2	23.8	25.9	22.9	22.2	23.80
HRV	21.9	27.5	24.0	23.4	22.0	23.76
LTU	24.5	26.5	24.4	22.7	20.7	23.76
MKD	20.1	21.0	22.3	19.7	24.5	21.52
UKR	22.7	21.4	20.8	17.5	18.9	20.26
ROM	25.9	20.6	17.8	17.0	19.4	20.14
KGZ	25.2	21.7	15.4	18.0	20.0	20.06
UZB	29.2	21.7	16.8	17.5	15.1	20.06
TJK	22.3	19.7	15.4	19.1	19.9	19.28

Continued

	1996	1997	1998	1999	2000	mean 1996–2000
ARM	20.0	19.1	19.1	18.4	19.2	19.16
RUS	24.6	22.8	16.1	14.7	16.6	18.96
ALB	15.5	16.0	16.0	16.8	18.6	16.58
KAZ	16.1	15.6	14.3	14.6	13.9	14.90
BGR	8.4	11.4	16.9	19.0	16.6	14.46
GEO	10.8	11.2	12.3	19.2	17.1	14.12

Source: WDI (2002), own computations.

ALB: Albania
ARM: Armenia
AZE: Azerbaijan
BGR: Bulgaria
BIH: Bosnia and Herzegovina
BLR: Belarus
CZE: Czech Republic
EST: Estonia
GEO: Georgia
HRV: Croatia
HUN: Hungaria
KAZ: Kazakhstan
KGZ: Kyrgyz Republic
LTU: Lithuania
LVA: Latvia
MDA: Moldova
MKD: Macedonia, FYR
POL: Poland
ROM: Romania
RUS: Russian Federation
SVK: Slovak Republic
SVN: Slovenia
TJK: Tajikistan
TKM: Turkmenistan
UKR: Ukraine
UZB: Uzbekistan

Table 2b.

Gross Capital Formation in EU-15 Member Countries as Percent of GDP, 1996–2000

	1996	1997	1998	1999	2000	mean 1996–2000
PRT	23.8	25.7	26.7	27.2	28.2	26.32
AUS	23.7	24.2	24.2	24.0	NA	24.03
SPA	21.9	22.2	23.2	24.6	25.9	23.56
GER	21.6	21.6	21.8	22.2	22.7	21.98
IRE	19.6	21.5	23.4	23.3	NA	21.95
NDL	21.3	21.6	21.9	22.0	NA	21.70
GRE	19.8	20.2	21.9	22.3	NA	21.05
LUX	20.2	20.4	19.5	22.8	21.2	20.82
BEL	19.9	20.4	20.9	21.2	21.5	20.78
DEN	18.9	20.8	21.7	20.2	22.1	20.74
ITA	18.7	18.9	19.3	19.8	20.5	19.44

Continued

	1996	1997	1998	1999	2000	mean 1996–2000
FRA	18.3	17.8	19.1	19.4	20.6	19.04
FIN	16.8	18.4	19.7	19.3	19.7	18.78
GBR	16.8	17.2	18.0	17.5	17.9	17.48
SWE	15.9	15.6	16.8	17.0	17.9	16.64

Source: WDI (2002), own computations.

AUS: Austria
BEL: Belgium
DEN: Denmark
FIN: Finland
FRA: France
GBR: Great Britain
GER: Germany
GRE: Greece
IRE: Ireland
ITA: Italy
LUX: Luxembourg
NDL: Netherlands
PRT: Portugal
SPA: Spain
SWE: Sweden

Table 2c.

Gross Capital Formation in Selected Asian Countries and the US as Percent of GDP, 1996–2000

	1996	1997	1998	1999	2000	mean 1996–2000
SGP	36.9	38.9	32.3	32.4	31.3	34.36
MYS	41.5	43.0	26.6	22.3	26.8	32.04
KOR	37.9	34.2	21.2	26.7	28.2	29.64
THA	41.6	33.3	20.3	19.9	22.6	27.54
PHL	24.0	24.8	20.3	18.8	17.8	21.14
IDN	30.7	31.8	16.8	11.4	14.6	21.06
USA	18.6	19.5	20.4	20.7	NA	19.80

Source: WDI (2002), own Computations.

IDN: Indonesia
KOR: Republic of Korea
MYS: Malaysia
PHL: Philippines
SGP: Singapore
THA: Thailand

Table 3a.

FDI Inflows in Transition Countries (Mill. Current US $), 1996–2000

	1996	1997	1998	1999	2000	mean 1996–2000
POL	4498.0	4908.0	6365.0	7270.0	9342.0	6476.60
RUS	2478.0	6638.0	2764.0	3309.0	2714.0	3580.60
CZE	1435.0	1286.0	3700.0	6313.0	4583.0	3463.40
HUN	2274.1	2167.0	2037.1	1976.5	1692.0	2029.30
KAZ	1136.9	1321.3	1151.0	1587.0	1250.0	1289.20
ROM	263.0	1215.0	2031.0	1041.0	1025.0	1115.00
HRV	506.0	529.6	932.0	1479.0	926.0	874.50
SVK	351.3	174.0	562.0	354.3	2052.5	698.80
AZE	627.0	1115.0	1023.0	510.3	130.0	681.10
UKR	521.0	623.0	743.0	496.0	595.0	595.60
BGR	109.0	505.0	537.0	806.1	1001.5	591.70
LTU	152.4	354.5	926.0	486.5	379.0	459.70
LVA	382.0	521.0	357.0	347.6	407.0	402.90
EST	150.2	266.2	581.0	305.2	387.0	337.90
BLR	105.0	352.0	203.0	444.0	90.0	238.80
SVN	194.0	375.2	247.9	181.2	175.5	234.80
GEO	40.0	243.0	265.3	82.0	131.0	152.30
UZB	55.0	285.0	140.0	121.0	100.0	140.20
ARM	17.6	51.9	220.8	122.0	140.0	110.50
ALB	90.1	48.0	45.0	41.0	143.0	73.40
MKD	11.0	16.0	118.0	30.1	175.6	70.10
MDA	23.6	75.7	85.9	33.5	128.0	69.30
KGZ	47.2	84.0	109.0	44.4	-2.4	56.40
TJK	16.0	4.0	30.0	21.0	24.0	19.00
BIH	NA	NA	NA	0.0	0.0	NA
TKM	108.1	107.9	130.0	NA	NA	NA

Source: WDI (2002).

Table 3b.

FDI Inflows in Transition Countries as Percent of GDP, 1996–2000

	1996	1997	1998	1999	2000	mean 1996-2000
AZE	19.7	28.1	23.0	11.1	2.5	16.90
EST	3.4	5.7	11.1	6.0	7.8	6.80
LVA	7.4	9.2	5.9	5.2	5.7	6.70
KAZ	5.4	6.0	5.2	9.4	6.8	6.60
CZE	2.5	2.4	6.5	11.6	9.0	6.40
ARM	1.1	3.2	11.7	6.6	7.3	6.00
BGR	1.1	5.0	4.4	6.5	8.3	5.10
MDA	1.4	3.9	5.1	2.9	9.9	4.60
GEO	1.3	6.8	7.3	2.9	4.3	4.50
LTU	1.9	3.7	8.6	4.6	3.3	4.40
HUN	5.0	4.7	4.3	4.1	3.7	4.40
HRV	2.5	2.6	4.3	7.4	4.9	4.30
POL	3.1	3.4	4.0	4.7	5.9	4.20
SVK	1.8	0.9	2.6	1.8	10.7	3.60
KGZ	2.6	4.8	6.6	3.6	-0.2	3.50
ROM	0.7	3.4	4.8	2.9	2.8	2.90
ALB	3.4	2.1	1.5	1.1	3.8	2.40
MKD	0.2	0.4	3.3	0.8	4.9	1.90
BLR	0.7	2.5	1.3	3.7	0.9	1.80
TJK	1.5	0.4	2.3	1.9	2.4	1.70
UKR	1.2	1.2	1.8	1.6	1.9	1.50
SVN	1.0	2.1	1.3	0.9	1.0	1.20
RUS	0.6	1.5	1.0	1.7	1.0	1.20
UZB	0.4	1.9	0.9	0.7	0.7	0.90
BIH	NA	NA	NA	0.0	0.0	NA
TKM	4.5	4.0	4.5	NA	NA	NA

Source: WDI (2002), own computations.

With respect to budget deficits and inflation rates, the situation has improved in the second half of the 1990s in many transition countries.

Table 4a.

Overall Budget Deficits in Transition Countries as Percent of GDP, 1996–2000

	1996	1997	1998	1999	2000
ALB	-12.3	-12.0	-8.5	NA	NA
AZE	-3.0	-2.2	-3.6	-2.5	NA
BLR	-1.8	-1.6	-0.9	-2.0	0.1
BGR	-15.4	2.1	2.8	1.5	0.6
HRV	-0.4	-1.3	0.6	-2.0	-4.9
CZE	0.1	-1.1	-1.6	-1.6	-3.0
EST	-0.8	2.5	-0.1	-0.2	0.2
GEO	NA	-4.5	-3.5	-4.4	-3.2
HUN	-2.6	-2.3	-6.5	-3.7	-3.6
KAZ	NA	-3.6	-4.1	-3.9	-0.6
KGZ	-5.4	-5.4	-3.0	-2.4	-2.2
LVA	-1.7	0.8	0.2	-3.8	-2.7
LTU	-3.6	-1.9	-0.4	-7.0	-1.3
MDA	-5.7	-7.6	-3.2	-3.4	-1.3
POL	-2.0	-1.8	-1.0	-0.8	0.3
ROM	-4.0	-3.9	-3.0	-1.7	NA
RUS	NA	NA	-5.2	-0.5	3.9
SVK	-1.4	-4.1	-4.2	-3.3	-3.2
SVN	0.0	-1.4	-0.8	-0.7	-1.3
TJK	NA	NA	-2.5	-0.8	-0.2
UKR	NA	NA	NA	-2.1	-0.6

Source: WDI (2002).

Table 4b.

Budget Balance in Selected Transition Countries (% of GDP)

	1995	1996	1997	1998	1999	2000
Belarus	-2.8	-2.0	-2.1	-1.5	-2.9	NA
Bulgaria	NA	-10.9	-39.0	-193.3	-1.2	NA
Croatia	-0.7	-0.1	-0.9	0.9	-1.8	-3.9
Czech Republic	NA	0.9	-1.9	6.6	-1.6	NA
Estonia	0.7	-0.3	2.9	0.0	-4.2	-0.1
Hungary	-2.4	-1.9	-4.0	-5.4	-2.9	-2.8
Latvia	-3.1	-1.4	1.2	0.3	-3.4	-2.8
Lithuania	-1.8	-2.5	-1.0	-1.3	-4.3	-1.0
Poland	-2.0	-2.0	-1.5	-1.2	-0.3	1.2
Romania	-4.1	-4.9	-3.6	-2.8	-2.6	NA
Russia	-5.2	-7.9	-7.0	-5.0	-1.7	-
Slovakia	NA	-4.4	-5.7	-2.6	-1.8	-3.1
Slovenia	NA	0.6	-1.1	-1.1	-0.8	-2.0
Ukraine	7.9	4.6	7.1	2.1	-1.4	NA

Note: aggregate across countries weighted using GDP in PPS.
Source: SITE (2002).

Table 5a.

Inflation Rates in Transition Countries, 1991–2000

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
ALB	35.5	248.0	114.9	37.1	9.8	14.6	30.8	25.0	2.5	-1.2
ARM	79.3	568.3	1391.3	4107.3	161.2	19.6	17.7	10.7	0.1	-1.3
AZE	82.8	1350.9	560.6	1428.6	545.7	26.4	9.2	-1.0	2.2	12.4
BLR	104.0	1072.2	1064.1	1967.3	650.4	53.7	71.6	76.6	316.8	185
BIH	NA	NA	NA	NA	NA	-17.1	8.6	9.0	3.2	4.6
BGR	226.6	59.6	51.1	72.7	62.8	121.0	949.1	22.2	3.1	5.6
HRV	99.3	594.9	1466.8	111.8	5.3	3.6	7.4	8.4	4.1	6.5
CZE	36.2	12.4	21.0	13.4	10.2	8.8	8.0	10.7	3.1	0.9
EST	132.6	873.6	80.3	39.7	31.7	24.0	10.9	8.9	3.9	5.3
GEO	60.2	1205.1	18032.5	9349.2	162.7	42.2	9.1	5.6	9.2	3.3
HUN	35.7	21.5	21.3	19.5	26.7	21.2	18.5	12.6	8.4	7.5

Continued

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
KAZ	87.5	1611.4	1249.7	1546.7	160.9	38.9	16.1	5.7	13.3	17.4
KGZ	137.9	846.3	763.3	180.8	42.0	35.3	19.3	9.1	37.6	27.2
LVA	156.2	975.9	71.5	38.3	16.0	16.5	6.6	5.5	7.4	4.1
LTU	227.9	943.0	306.2	61.6	38.0	25.1	13.2	6.7	3.2	2.1
MKD	NA	NA	NA	134.0	13.9	2.9	4.0	1.4	2.7	7.7
MDA	142.8	945.0	860.5	278.1	38.7	27.9	12.6	9.4	39.8	27.3
POL	55.3	38.5	30.6	28.4	27.9	18.8	14.0	11.8	6.7	7.1
ROM	195.0	199.9	227.3	139.0	35.3	45.3	147.2	54.2	47.8	44.1
RUS	128.6	1490.0	888.1	307.3	163.1	44.2	14.5	16.3	65.0	40.5
SVK	34.6	11.4	15.3	13.7	9.7	4.5	6.6	5.1	6.6	6.5
SVN	NA	208.0	37.1	22.6	15.2	11.1	8.8	7.8	6.6	5.7
TJK	56.9	630.5	922.7	236.2	285.0	430.6	65.2	87.8	26.5	24.0
TKM	103.0	1941.5	1736.9	1022.1	705.7	1174.3	61.6	17.7	5.0	13.3
UKR	96.2	1766.2	3334.6	953.5	415.5	66.2	18.1	12.1	27.4	23.2
UZB	90.7	712.1	1078.9	1238.6	370.9	81.6	70.5	39.0	44	47.1

Source: WDI (2000), WDI (2002).

Table 5b.

Standard Deviations of Inflation Rates of Transition Countries, Percent, 1991–1995 and 1996–2000

	1991–1995	1996–2000
ALB	97.2	13.8
ARM	1673.6	9.7
AZE	577.7	10.7
BLR	683.0	111.2
BIH	NA	10.8
BGR	74.2	410.3
HRV	610.3	2.1
CZE	10.6	4.1
EST	361.1	8.0
GEO	7875.0	16.0
HUN	6.6	6.1
KAZ	749.7	12.4
KGZ	379.4	11.8

Continued

	1991–1995	1996–2000
LVA	408.4	4.9
LTU	368.4	9.5
MKD	84.9	2.4
MDA	420.3	12.4
POL	11.5	5.0
ROM	76.4	44.6
RUS	586.0	21.1
SVK	10.1	1.0
SVN	92.0	2.1
TJK	346.6	171.9
TKM	753.2	514.7
UKR	1295.0	21.4
UZB	477.8	18.6

Source: WDI (2000), WDI (2002), own computations.

Table 5c.

Inflation Rates of EU-15, Percent, 1991–2000

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
AUS	3.7	4.3	2.8	2.8	2.3	1.3	1.2	0.7	0.9	1.1
BEL	3.1	3.7	4.0	2.3	1.5	1.2	1.3	1.6	1.0	1.2
DEN	2.5	2.2	0.5	1.4	1.7	2.5	2.2	1.9	3.0	3.7
FIN	2.5	0.7	2.4	1.3	2.4	-0.2	2.1	3.0	0.5	2.9
FRA	3.3	2.1	2.5	1.5	1.6	1.4	1.3	0.9	0.5	0.9
GER	NA	5.6	4.0	2.4	2.2	1.0	0.8	1.1	0.9	-0.4
GRE	19.8	14.8	14.5	11.2	9.8	7.4	6.8	5.2	2.9	3.5
IRE	1.7	2.4	4.5	1.2	0.5	2.3	4.4	5.8	3.8	4.2
ITA	7.7	4.7	4.4	3.5	5.1	5.3	2.4	2.7	1.6	2.2
LUX	2.3	2.6	0.6	4.7	0.3	1.7	3.3	1.5	2.2	4.1
NDL	2.7	2.3	1.9	2.3	1.8	1.2	2.0	1.9	1.3	3.5
PRT	12.2	10.0	6.7	6.3	5.1	3.0	3.7	3.8	3.3	3.2
SPA	7.1	6.9	4.3	4.0	4.8	3.5	2.2	2.3	2.9	3.5
SWE	7.6	1.0	2.6	2.5	3.7	1.4	1.7	0.9	0.5	0.8
GBR	6.6	4.6	3.2	1.6	2.4	3.3	2.9	3.0	2.3	1.8

Source: WDI (2000), WDI (2002).

Table 5d.

Standard Deviations of Inflation Rates of EU-15 Countries, Percent, 1991–1995 and 1996–2000

	1991–1995	1996–2000
AUS	0.8	0.2
BEL	1.0	0.2
DEN	0.8	0.7
FIN	0.8	1.4
FRA	0.7	0.4
GER	1.6	0.6
GRE	3.9	2.0
IRE	1.5	1.3
ITA	1.6	1.4
LUX	1.8	1.1
NDL	0.3	0.9
PRT	2.9	0.3
SPA	1.5	0.6
SWE	2.5	0.5
GBR	1.9	0.6

Source: WDI (2000), WDI (2002), own computations.

EBRD Transition Indicators

Looking at progress in transition according to the EBRD transition indicators – defined for a range form 1 to 4+ (4+ represents OECD standard) –, we find that considerable progress across the majority of transition countries has been made in the field of trade and foreign exchange regime, except for Belarus (2-), Russia (2+), Turkmenistan (1), and Uzbekistan (1); all other countries recorded 3 and above in 2000. It is noteworthy that competition policy indicators are weak across the board except for the Czech Republic and Poland. With respect to financial institutions, the EBRD has made a distinction between:

- banking reforms and interest liberalization;
- securities markets and non-bank financial institutions;
- and financial regulation.

With respect to financial liberalization, Hungary was the leading transition economy, followed by Poland, Slovenia, Lithuania and Estonia in 2000; leading is defined here as having achieved at least one 4 in one of the three categories and at least a 3- in the other two subcategories. We essentially find that financial regulation is fairly good across the majority of countries; in contrast, banking reforms have made insufficient progress across countries.

Table 6a.

Progress in Transition for Selected Transition Countries 2000*

Countries	Markets and Trade			Financial Institutions		
	Price liberalization	Trade & foreign exchange system	Competition policy	Banking reform & interest rate liberalization	Securities markets & non-bank financial institutions	Financial Regulation
Albania	3	4+	2-	2+	2-	2-
Armenia	3	4	1	2+	2	2+
Azerbaijan	3	3+	2	2	2-	2
Belarus	2-	2-	2	1	2	2+
Bosnia Herzegovina	3	3	1	2+	1	1
Bulgaria	3	4+	2+	3	2	3-
Croatia	3	4+	2+	3+	2+	3
Czech Republic	3	4+	3	3+	3	3+
Estonia	3	4+	3-	4-	3	3+
FYR Macedonia	3	4	2	3	2-	2+
Georgia	3+	4+	2	2+	2-	3-
Hungary	3+	4+	3	4	4-	4
Kazakhstan	3	3+	2	2+	2+	3
Kyrgyzstan	3	4	2	2+	2	3
Latvia	3	4+	2+	3	2+	3
Lithuania	3	4	3-	3	3	4-
Moldova	3+	4	2	2+	2	2
Poland	3+	4+	3	3+	4-	4
Romania	3	4	2+	3-	2	3+
Russia	3	2+	2+	2-	2-	3
Slovak Republic	3	4+	3	3	2+	3
Slovenia	3+	4+	3-	3+	3-	4
Tajikistan	3	3+	2-	1	1	2
Turkmenistan	2	1	1	1	1	n.a.
Ukraine	3	3	2+	2	2	3-
Uzbekistan	2	1	2	2-	2	2

* Range of Indicators: 1 (no or only minimal reform) to 4+ (OECD standard).

Source: EBRD (2000): Transition Report, London.

Table 6b.

Progress in Transition for Selected Transition Countries 2000*

Countries	Infrastructure				
	Telecom-munications	Electric power	Railways	Roads	Water and waste water
Albania	3+	2+	2	2	1+
Armenia	2+	3+	2	2+	2
Azerbaijan	1+	2	2+	1+	2
Belarus	2	1	1	2	1
Bosnia Herzegovina	3+	2	2	n.a.	1
Bulgaria	3	3+	3	2+	3
Croatia	3+	2+	2+	2+	3+
Czech Republic	4	2	2+	2+	4
Estonia	4	4	4	n.a.	4
FYR Macedonia	2	2+	4	n.a.	1+
Georgia	2+	3+	3	2	n.a.
Hungary	4	4	3+	3+	4
Kazakhstan	2+	3	2+	2	1+
Kyrgyzstan	2+	2+	1+	1	1
Latvia	3	3	3+	2+	3
Lithuania	3+	3	2+	2+	3+
Moldova	2+	3+	2	2	2
Poland	4	3	4	3+	4
Romania	3	3	4	3	3
Russia	3	2	2+	2	2+
Slovak Republic	2+	2	2+	2+	n.a.
Slovenia	2+	3	3+	3	4
Tajikistan	1+	1	1	n.a.	n.a.
Turkmenistan	1	1	1+	1	1
Ukraine	2+	3	2	2	1+
Uzbekistan	2	1	2+	1	1

* Range of Indicators: 1 (no or only minimal reform) to 4+ (OECD standard).

Source: EBRD (2000): Transition Report, London.

Taking a closer look at infrastructure, we are mainly interested in telecommunications – important for competition and price arbitrage, respectively – but also for national and international networking plus outsourcing in the business community. Here we find a broader group of leading countries (having 3 or better), namely

Albania, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Russia; thus 12 of 26 countries showed a fairly good record in 2000. Since Russia is the most populous country among transition countries, one can argue that modernization of telecommunications has made considerable progress in transition countries. With regard to railways, roads and water plus waste water, there is still broad need for modernization that, however, might be quite difficult if financial institutions remain underdeveloped. Indeed, financing restructuring and expansion of infrastructure is important for both growth and internationalization of the economy in eastern Europe and the CIS.

3. Growth Dynamics

3.1 Neoclassical Theory and New Growth Theory

From a theoretical perspective, the main sources of economic growth can be summarized rather easily as is shown in the following figure. We concentrate on three main pillars of economic growth, namely the impact of financial market efficiency and market stability, the role of human capital formation and the impact of innovation and diffusion. Lucas [27] has emphasized the role of human capital endowment in explaining international differences in capital flows: according to his view, human capital creates a positive externality that raises the productivity of skilled labor, at the same time human capital raises the productivity of physical capital. Relative abundance of human capital therefore can stimulate inflows of foreign direct investment, and the latter is part of overall capital inflows that might contribute to international economic convergence. The endowment of human capital is linked to the education system, financed mainly by governments in most countries. In leading OECD countries, between 6 and 7% of GDP is devoted to education while many transition countries allocate only 3 to 4% for education. Given the imperfections of human capital markets – overlooked in simple neoclassical growth models – investment in human capital must be mainly financed from domestic savings as emphasized by Barro et al. [3]. From this perspective, domestic savings and adequate public funds for education are crucial. Relatively low domestic savings and inadequate public (and private) funding of education could explain the lack of convergence in per capita income across countries.

While innovation and hence research and development have traditionally been emphasized in the literature, the role of diffusion for economic growth has been underestimated. An efficient system of diffusion of best practices and of new products or process innovations can strongly contribute to economic growth – in particular in the age of the software industry, digital telecommunications and the internet, all of which offer opportunities to exploit network effects at rather low costs. More rapid diffusion could raise the average level of knowledge and also stimulate innovation as well as reinforce earlier innovation dynamics on the one hand; on the other hand, the era of digital services offers new options for launching demand-enhancing novel services that in turn might stimulate investment. One also may note that an economy with $n + I$ sectors, where sector I initially faces a positive technology shock – with the innovation thereafter diffusing across sectors, – will experience transitory growth acceleration if more efficient diffusion technologies allows n sectors to adopt to the new technology at a faster rate than before.

As regards financing of investment, the savings rate – corrected for capital flight and the official current account position – is crucial in a simplified perspective; a broader perspective will have to take into account the efficiency of intermediation and the stability of financial markets. With respect to the latter two aspects, reducing inflation to single digit figures is a critical requirement. This was achieved by most transition countries in the mid-1990s. Moreover, competition plus FDI inflows in banking and insurance are important ingredients for ensuring efficient financial markets, as is effective prudential supervision. In this respect, there are enormous differences across transition countries. Hungary, the Czech Republic, Estonia, Slovenia and Poland are leading countries in this group. As regards the largest country, namely Russia, competition in the financial sector has been week, FDI inflows low and prudential supervision totally inadequate in the 1990s. After the crisis of 1998, this has changed only modestly. Russia has adjusted national policy to some extent; however, Russia is not yet a WTO member country and the liberalization of financial services is there not organized within a clear framework.

Another important aspect of economic growth is human capital formation crucial for raising labor productivity and for entrepreneurship – indeed many entrepreneurs in OECD countries, especially in knowledge intensive and technology intensive fields have some form of higher education. Cohen/Soto [7] present empirical evidence for a subgroup of 38 OECD member countries and non-member countries illustrating that human capital – adequately defined – has a significant impact on economic growth. It is noteworthy that total factor productivity in poor countries, defined as output growth net of the contribution of physical and human capital, is only about 45% of the level of wealthy countries.

Several Visegrad countries showed relatively high public expenditures on education in the 1990s; at the same time, education spending in several other transition countries, including Russia was reduced relative to GDP. Rising private expenditures on higher education can only partly compensate for this negative development. As regards the quality of schooling, the OECD's PISA study has not only shown remarkable international differences, it also points to the usefulness of benchmarking studies conducted by international organizations. Countries in the lower part of the ranking list will be eager to improve their relative positions by adopting adequate reforms in the medium term. There is clear empirical (cross-country) evidence that human capital formation has contributed to growth.

Since the 1980s and the 1990s, a third pillar of economic growth has become critically important in industrialized countries, namely investment in information and communication technology (ICT). A priori it is unclear whether it is mainly the production of ICT goods – that are technology intensive and knowledge intensive in terms of factor intensity – or the use of ICT goods, some of which allow the exploitation of productivity-enhancing network effects that stimulate growth. There are, however, many imperfections in digital information markets that impair prospects for a sustained new economy boom (some policy options for remedying these imperfections will be discussed in the final section). From a policy perspective, government can stimulate productivity growth not only through traditional R&D policy but also through adequate telecommunications regulation and internet policy.

From a narrow theoretical perspective, long term economic growth can be explained in basically three different supply-side approaches:

- Output growth can be explained by the product of the investment output ratio and the average marginal product of capital, where both variables have to be explained in terms of exogenous variables.

Output development can be explained on the basis of a neoclassical growth model with exogenous technological progress, where the rate of technological progress is equal to long term output growth; however, government policy can shift the level of the growth upwards or downwards and the level of per capita income – hence growth acceleration occurs as a transitory adjustment phenomenon. In the Solow model, steady state per capita income y=Y/L (with L representing labor) is determined under the assumption of a Cobb–Douglas function $Y = K^{\beta}L^{(1-\beta)}$ – with K standing for capital, β for output elasticity of capital, s for savings rate, δ for depreciation rate, n for the growth rate of population, a for the rate of labor-augmenting technological progress – as follows: $y = [s/(\delta+n+a)]^{\beta/1-\beta}$ .To the extent that transition brings about an increase in the depreciation rate or a fall of the savings rate, per capita output will fall.

- The new growth theory endogenizes the growth rate of technological progress in various models; e.g. productivity spillover effects from firms' investments as in Romer (1986) or Romer (1987) who emphasizes growth effects from product differentiation.

From a simple growth perspective it holds that output growth g_Y (g stands for growth rate and Y for real GDP) is equal to

$$(I) \qquad g_Y = [I/Y]\,[Y_K].$$

Growth simply is investment output ratio I/Y times the marginal product of capital Y_K. The business community and government policy plus international external variables jointly determine the investment output ratio. One may assume that the input output ratio depends on

- the real interest rate r, namely with a negative value – this in turn creates a link to the fiscal policy stance in the sense that high deficit GDP ratios could raise interest rates (unless deficits mainly reflect financing of public investment);
- the growth rate of product innovations θ, namely with a positive value: the higher the rate of product innovations, the more profitable will investment be;
- the corporate tax rate τ^c, which should carry a negative value;
- the expected growth rate of the population (n) which is a proxy for future demand growth;
- the inflation rate whose trend value for various reasons is positively linked with inflation variability and in this perspective reflect a negative impact of inflation uncertainty (depending on the tax system also cold bracket creep);
- the sectoral composition of output (V), which can be rather capital intensive – eg the case of Russia with a high share of the capital intensive resources, reflecting its natural endowments in terms of oil and gas sites – or only modestly capital intensive (eg the case of a services-oriented economy such as Estonia or Hungary);
- the degree of political instability y which negatively affects the investment output ratio.

(II) $I/Y = f(r, \tau^c, \theta, n, \pi, V, \sigma)$.

The marginal product of capital will typically render a negative effect on capital intensity (k=K/L) but a positive change on human capital intensity h=H/L (with H representing the stock of human capital); note that with a Cobb–Douglas production function $Y=K^{\beta}H^{\beta'}L^{(1-\beta-\beta')}$, the marginal product of capital is proportionate to the average product of capital. Moreover, we may assume that the stock of cumulated FDI inflows represents a higher level of technology, which implies thus that the ratio κ of the stock of inward FDI to national output should have a positive impact on the average marginal product of capital. In addition to this standard argument, we may assume that it positively depends on the scope of network effects (N) within or across core sectors of the economy; in a market perspective, network effects raise the demand for the respective goods or services, but in a technological perspective they facilitate the interaction of firms facing network effects so that there are implicit productivity spillover effects.

(III) $Y_K = f(K/L, N(...), \kappa)$.

The economy's average marginal product of capital is mainly determined by entrepreneurship, the depth of financial markets and the intensity of Schumpeterian competition in each sector and the overall economic system, respectively. Taking into account the role of information and communication technology ICT that often generates positive network effects N within an industry and across sectors, we may state the hypothesis that a high telecommunications or internet density will facilitate exploitation of network effects and also stimulate growth via other spillover effects.

Network effects can be expected to depend upon the density of the communication system and the speed of communication lines. From this perspective, investment in the telecommunications sector is particularly important.

3.2. Analyzing Growth Dynamics in a Cross Country Regression

The starting point of the empirical analysis was to take a closer look at a group of 78 countries and to decide on the basis of a cluster analysis for per capita GDP and growth in a specific period, in which two groups of countries can be ditinguished (for details see Appendix 1):

- relatively poor countries: group A; as a subgroup, 1a we have the post-socialist transition countries;
- industrialized market economies: group B.

For the purpose of accident compensation, we took 6-year means from 1994 to 1999 for the unlagged variables of regressions. The relation to the lagged variables, which are 6-year means from 1988 to 1993, can be interpreted as causality. We specify two linear regression equations for each group (for details and regression results see Appendix 2, for data sources see Appendix 3):

(1) $g_Y=\beta_0+\beta_1 \ln(Iq)+\beta_2 Infl+\beta_3 gTelD(-6)+\beta_4 \ln(SE.tert(-6))+\beta_5 \ln(FDI)$;

(2) $g_Y=\beta_0+\beta_1 \ln(Iq)+\beta_2 Infl+\beta_3 gTelD(-6)+\beta_4 \ln(SE.tert(-6))+\beta_5 \ln(FDI)+\beta_6 gUSPAT(+2)$.

Equation 2 takes into account the Schumpeterian innovation dynamics as proxied by the growth rate in patents granted in the US (to avoid distortionary effects we drop the US in equation 2 and 2B). The lead of two periods in the growth of utiliy patents at the US Patent and Trademark Office (USPTO) is due to the lag between development (and application, respectively) of an innovation in the innovator's home country and the year of patent grant at the USTPO.

From a theoretical perspective we expect the investment-output-ratio, the growth rate of telecommunication density, foreign direct investment, and human capital (proxied by gross tertiary school enrollment) as well as the growth rate of patents granted in the US to positively influence output growth; we expect a negative impact on the inflation rate, at least if inflation is relatively high.

The empirical findings can be summarized as follows:

As regards industrialized market economies, we find at a 10-percent-level significant coefficient – based on corrected t-results (white estimators) – for the investment-output-ratio, the inflation rate, and foreign direct investment that FDI is a significant variable in equation 1B and 2B points to the special relevance that multinational companies have on economic growth. The coefficient for the inflation rate is positive, which, however, is not very surprising in light of the traditional assumption that low inflation rates contribute to structural change that in turn translates into economic growth. Equation 2B brings an adjusted R^2 of 0.68 and shows a significant impact on the inflation rate, the growth rate of lagged telecom density, the lagged human capital variable, foreign direct investment, and the growth rate of patents granted in the US (with a lead of two years).

In equation 1A, the group of low income countries shows a significant negative impact on the inflation rate and on lagged human capital variable. The negative role of inflation for economic growth is not surprising since these countries have faced relatively high inflation rates. As regards the human capital variable, it is well known from the literature that a significant impact is often dependent upon a very careful specification of the variable – as an example for the OECD countries, see the recent study by Cohen/Soto [7].

For the subgroup 1a (post-socialist transition economies), equation 1aA shows only one significant parameter, namely a negative impact on the human capital variable on GDP growth. If we also take the growth of patent grants in the US for explaining the variable, the explanatory power of the model vanishes. With respect to the negative value of influence of the human capital variable in addition to the data given above, we want to point out the fact that for the period of transition the processes of economic growth (output declining and recovery) on the one hand and of human capital development (a slow but steady growth on average) on the other hand differ considerably (see fig. A1 in Appendix 2).

As regards transition countries, there is the problem of missing data for several countries. Particularly the handling of the granting of patents for inventions stemming out of the former Soviet Union – which cannot be assigned by several succeeding countries of the Soviet Union and so are simply omitted in our investigation – may lead to distortions of the influence of the GUSPAT variable in equation 2A*. Moreover, some of the initial distortions might still be relevant in transition countries to such a degree that investment decisions still are not reflecting efficient decision-making in the business community. Only after most firms have been privatized and

competition policy plus external liberalization strongly influence investment decisions could one expect results in cross country regressions which are similar to normal industrialized market economies. Moreover, efficient capital markets and bond markets are obviously important for achieving efficiency-enhancing investment decisions.

3.3. Role of Financial Sector Liberalization for Economic Growth

From a theoretical perspective, poor transition countries could raise investment-GDP ratios and hence growth if there would be efficient financial intermediation and high domestic savings; or if there were sustainable current account deficits and high long term capital inflows, respectively. Therefore financial markets play a critical role in eastern Europe and Russia.

As regards the banking system and stock markets economists, have for decades underestimated the crucial role of efficient financial intermediation; Goldsmith [16] and McKinnon [29] were early to point out that efficiently channeling investment funds to profitable investment projects can contribute to growth. The more recent literature (survey [13, 25] has brought up a rich array of theoretical and empirical arguments along this line of reasoning. Roubini/Sala-i-Martin [31] and Mattesine [28] find a negative link between real interest rate distortions and lending-deposit spreads and growth. Demetriades/Hussein [9] report a bi-rectional relationship between financial sector development (and depth) and growth. Levine/Zervos [26] find evidence – based on 49 countries – on the link between stock market activities and economic growth. Harris [18] in a cross-country study and Arestis/Demetriades/Luintel [1] – focusing on five countries using time-series evidence – present weak evidence for a positive link between stock market activity and growth, yet they find a more important role for a positive link between bank lending and economic growth. Benhabib/Spiegel [4] also present evidence that financial development fosters growth through a rise of investment and total factor productivity.

Francois/Eschenbach/Schuknecht [13] focus both on developing countries and OECD countries, whereby the latter have a rather liberal financial services markets; moving from the average level of openness among the poorest developing countries to the average among the higher income countries is associated with an increased degree of competition in the financial services sector and in turn with growth rates that are then higher – the mechanics emphasized by the authors concern dynamic effects of market structure and competition mechanisms. The basic equilibrium equation in their model is the following equation:

$$Y_K = \rho + \delta + \varphi.$$

Hence the marginal product of capital in equilibrium is equal to the sum of three elements: the subjective rate of time discount ρ, the rate of capital stock depreciation δ and the cost of financial intermediation φ. To the extent that international opening up of the financial sector and other policy measures reduce the cost of financial intermediation, the optimal capital stock is raised, thereby resulting in higher investment. Inherent distortions in the financial sector and in particular the lack of competition and adequate prudential supervision raise the cost of financial intermediation. Under standard theoretical assumptions the cost of intermediation

can be shown to be a negative function of the intensity of competition and the number of firms in the financial sector.

A critical issue for transition countries is whether they are moving towards sustained financial liberalization. There is no doubt that all EU accession countries will have to accept liberalization as part of EU rules (Acquis Communautaire). However, as regards other transition countries, one must raise the issue whether there are impulses for long term liberalization. Harms/Mattoo/Schuknecht [17] present a political economy model of financial trade liberalization and look into the issue of GATS commitments in the banking sector and in securities services. An underdeveloped financial sector, macroeconomic volatility, poor prudential regulation, weak representation of workers' interests, and low market penetration by foreigners are also correlated with less commitments to reduce protectionist barriers in financial markets; these findings indirectly suggest that Russia will be reluctant to liberalize financial markets and this in turn implies reduced prospects for long term economic growth. Another remarkable finding of the authors is that the potential for trading market access commitments in future trade negotiations, especially for countries with exports facing high barriers abroad, is a crucial reason to withhold market access commitments for financial services liberalization. From this perspective one may suggest that all countries of the former USSR that are not yet a WTO member country will be reluctant to undertake financial sector liberalization. Indeed, it is rational for these countries to adopt a wait-and-see attitude and postpone financial sector liberalization until they can trade such liberalization for better access to foreign goods markets.

Lessons from EU Southern Enlargement?

From the southern EU enlargement (Greece, Spain and Portugal in the 1980s) one may conclude that EU membership can help to achieve a higher ratio of FDI inflows in total gross capital inflows. Spain and Portugal raised relative FDI inflows and thus benefited from an external contribution to overall investment and technological progress. Greece recorded a slight reduction in the 1980s compared to the period 1975–1980, but this probably reflected both the fact that in 1975–1980 the share of FDI in total capital inflows already was rather high, namely 29.1%, partially reflecting perhaps an anticipation effect on the side of international investors. At the same time, one must take into account that both the Spanish and the Portuguese governments adopted broad internal liberalization and privatization measures that encouraged foreign investors to strongly take advantage of the fall in the political risk premium associated with EU membership; accepting the EU's set of rules (acquis communautaire) clearly implies a tying of government's hands in the sense that the scope for discretionary and protectionist intervention is much smaller than before.

Buch/Heinrich/Piazolo [6] argue that with the beginning of systemic transformation in Visegrad countries, the share of FDI inflows in total inflows reduced in Greece, Portugal and Spain. There was FDI diversion towards eastern Europe, but in terms of portfolio inflows, eastern European countries were and remained behind the poor EU countries in the early 1990s. They argue that domestic liberalization measures can indeed reinforce positive economic effects of EU membership. EU accession countries obviously differ in the ability of the political system to deliver

broad and consistent liberalization strategies. However, one may hope that benchmarking among EU accession countries and the impact of competing for global FDI sources will induce a long term institutional convergence process that should be followed by an economic convergence process.

With respect to EU outsiders among the transition countries, one can anticipate that they will suffer from both trade diversion effects and FDI diversion effects as a consequence of EU eastern enlargement in the medium term. However, to the extent that accession countries will benefit from increasing growth rates, outsider countries will benefit from regional trade creation in the long term. As regards FDI diversion effects, the situation looks less favorable for the EU outsiders unless very bold and consistent domestic liberalization measures – carefully phased in – would strongly raise the attractiveness of the outsider countries. The problem of FDI diversion is serious because both a lower political risk premium and higher growth rates in accession countries could stimulate FDI inflows. From this perspective it is all the more important that outsider countries seriously consider options for establishing special relations with the EU other than through direct membership; moreover, prudent domestic policy reforms and decisive moves towards WTO membership – in those countries that are not yet WTO members – are crucial. WTO membership would not only give domestic firms in the export sector reassurance that exports will not be discriminated. Additionally, potential foreign investors would appreciate it if the uncertainties of exporting from certain CIS countries, e.g. Russia, would be reduced via WTO membership.

Financial Markets and the New Economy

Given the enormous expansion of ICT investment in several OECD countries and the role of stock markets in financing digital firms, one should also take a look at the New Economy. The New Economy boom in the US and some EU countries in the 1990s – when stock markets played a crucial role for established high technology firms as well as dynamic newcomers in digital services – has reinforced the interest in the links between financial market dynamics, investment and growth [2]. While there has been some disappointment about the bursting of the apparent stock market bubble in 2001/2002, one should not overlook the fact that tangible assets in modern services are a smaller part of investment than in manufacturing industry, whereby bank financing naturally should play a rather limited role as a financing source of overall investment in the New Economy.

The internet and cheaper international telephony, stimulated by rapid technological progress and economic opening up of telecommunications markets, have contributed to increasing competition in financial services in OECD countries. One may ask which role the New Economy has for transition countries and to what extent policy makers could stimulate the internet and digital services as a basis for enhanced economic growth. Transition countries were facing high excess demand in fixed line telecommunications when broader transition policies were adopted in the early 1990s; certainly, prospective EU accession countries were rather eager to restructure and privatize the respective national operator – and competition was phased in both in national and international telecommunications. Local loop unbundling is very slow in eastern Europe, where the situation is similar to EU countries

in which very limited progress exists in local telephony that is so crucial for the internet. The technological innovation of mobile telephony has helped to some extent to cut the excess demand in telecommunications, but it has not helped to stimulate internet services since mobile internet under GSM and older standards is not user-friendly. In both eastern Europe and western Europe, broader progress with mobile internet applications can only be expected with the unfolding of UMTS networks that might have a broader customer base in 2004/5. As regards internet transaction, we can generally distinguish between B-2-B transactions and B-2-C (business to customers/households) transactions. The commercial relevance of the internet in OECD countries is mostly in the B-2-B channel.

In eastern Europe data security problems could undermine the growth of digital internet transactions; particular problems are expected for the former USSR. This could impair growth directly through lack of investment in digital services that are often an input to industry so that addition industrial expansion would be impaired indirectly. Moreover, internet-based transactions have increasingly become important in financial services where they account for 5–10% of overall transactions in western OECD countries.

Internet transactions in financial markets in Europe could become important in three ways in in the early 21st century:

- The internet generally raises market transparency and therefore stimulates competition.
- The internet could be an interesting niche for establishing a government bonds market in the short term; and market places for other bonds in the medium term. Most OECD countries have established some form of digital bonds marketplaces.
- The internet can be a platform for establishing a digital venture capital market in which experienced venture capital firms – with a proven track record – can organize the financing of innovative dynamic firms in a convenient way; this avenue has already been explored in the US and some other OECD countries. Since venture capital naturally plays a strong role for financing technology-intensive new firms, one might anticipate only a rather limited role for digital venture capitalists in transition countries in the former CMEA area. However, Hungary, the Czech Republic and Estonia as well as some other countries with a strong emphasis on innovation and technological modernization might want to explore this avenue. In principle Russia as a large country with a considerable high technological history could also pursue digital venture capitalism. However, as trust in partners in financial markets is at a high premium after the 1998 banking and financial market crisis, one might be rather pessimistic in this field. Lack of long successful track records of venture capitalists also undermines Russian prospects for internet-based venture capitalism.

3.4. New Economy Aspects of Growth

In the second half of the 1990s information and communication technology (ICT) has contributed between 1/5 and 1/3 in economic growth in leading OECD countries. The ICT sector consists basically of the computer and software industry, data services and telecommunications; the share of ICT value-added in GDP almost

doubled in the 1990s in the US – the global ICT leader – where it reached almost 10% in 2000. ICT growth has also been considerable in Scandinavian countries, the UK, the Netherlands, Spain and Portugal, although the starting levels of the ICT share in GDP were clearly lower than in the US.

In a modern society with digital services and broad computer networks combined with much human capital, one should emphasize that a broadly-defined investment output ratio must take into account many items under the heading investment:

- Investment In equipment, including computer hardware as well as factory buildings plus inventory (= "gross fixed capital formation" in the traditional sense);
- Investment in computer software that reached almost 3% in the US in the late 1990s;
- R&D expenditures that actually lead to accumulation of a stock of technology knowledge (which, of course, is subject to depreciation);
- Education expenditures, whereby expenditures on university education is of particular relevance (2.3% of GDP in the US in the late 1990s, close to 2% in the Scandinavian countries, 1% of GDP or lower in most other European EU countries, less than 1% in transition countries, except for Hungary).

As regards the link between ICT expansion and growth, there is a debate among economists as to the reasons for acceleration in growth in the US and some EU countries in the second half of the 1990s:

- Mainly to rising productivity growth in the computer producing sector (Gordon, 2000);
- Both to rising productivity growth in the sector producing ICT goods and the application of ICT goods and digital services. Van Ark [33] has provided empirical evidence that both ICT production and the use of ICT – often in the so-called Old Economy – raised productivity growth among many OECD countries in the 1990s. Welfens [38, 39] theoretically emphasized the two-pronged productivity-enhancing effect of ICT; Jungmittag/Welfens [20, 21] provided empirical evidence on the growth-enhancing role of the use of telecommunications and the internet for Germany. The hypothesis is that more powerful data communication networks stimulate the diffusion of new knowledge, which in turn raises growth. Jungmittag/Welfens [21] have also emphasized the trade-enhancing nature of modern telecommunications on the basis of gravity modelling and argue that trade creation could in turn stimulate economic growth. Freund/Weinhold [14] make a similar argument, namely that the use of the internet is trade-creating; they find that developing countries could benefit from a rising internet host density even more than industrialized countries. These authors thus suggest a "twin-growth bonus of ICT expansion".

If the Gordon hypothesis is correct, only those newly industrializing countries and transition countries that are major producers of ICT goods could hope to accelerate; countries such as Korea, Taiwan, Thailand, Malaysia and Hungary would be well positioned to benefit from a growth bonus of ICT expansion under this hypothesis; from this perspective a strong focus on ICT with respect to inward foreign direct investment would be useful to stimulate growth beyond the pure contribution of aggregate capital formation. By contrast, the twin growth bonus of ICT expansion suggests that even countries that have no large ICT producing sector can benefit from an increased use of ICT goods and services. What particularly matters here is that there is a rapid increase in fixed and mobile telecommunications density and

that competition plus privatization in the telecommunications sector help to stimulate the diffusion of knowledge and hence contribute to higher output growth.

The role of ICT has gradually increased in transition economies that, however, have suffered from poor fixed network telecommunications infrastructure and pent-up demand in telephony as well as problems with restructuring and privatization of state-owned telecommunications operators. From this perspective, it is not surprising that mobile telephony in the US and the EU has largely been considered a complementary to fixed network services, a true substitute for fixed telephony in eastern Europe, the Ukraine, Russia and other countries of the former Soviet Union. Mobile telephony is in technical terms a good substitute for fixed line voice telephony, but mobile internet applications clearly have a lower quality than fixed network access – including cable TV networks – with respect to internet services. With respect to the introduction of competition into long distance and international telecommunication, EU accession countries have adopted phasing-in schedules that will make sure the EU liberalization and framework regulation regime in fixed line telephony will be adopted within a few years. Eastern European non-accession countries as well as Russia and the Ukraine face problems here since there is no external pressure to liberalize network operation and digital value-added services. As regards Russia, there will be increasing external pressure on trade liberalization in telecommunications equipment and in telecommunications services once Russia is about to become a member of the World Trade Organization. It is unclear whether Russia will be able to use a transition period until WTO membership to build up a dynamic domestic computer and telecommunications sector.

In the following graphs and tables, we show selected indicators for telecommunication density in selected transition countries. We can clearly see that Hungary, Estonia, Slovenia and the Czech Republic are leading countries in eastern Europe; some of the other EU accession countries – above all the Slovak Republic in the field of fixed line density – also show relatively fast catching up in terms of telecommunications density (and also show an increasing use – in terms of minutes – of the telecommunications network). The picture is slightly different with respect to internet user density, whereby Estonia, Lithuania, Poland and the Czech Republic are leading economies among transition countries.

Table 7.

Telecommunication Indicators for Eastern Europe

a) Total number of lines per 100 inh. – Evolution 1996–2000

	1996	1997	1998	1999	2000
Albania	1.5	2.4	3.5	4.5	5.2
Bosnia	8.1	9.3	22.3	26.0	24.8
Bulgaria	32.2	33.0	35.1	38.9	44.3
Czech Rep	29.3	36.9	45.8	57.1	77.6
Estonia	34.9	43.7	53.9	64.1	2.0
Hungary	30.6	37.4	44.0	51.7	60.8
Latvia	30.6	33.2	37.3	42.6	46.9
Lithuania	28.4	35.8	39.0	39.4	43.0

Continued

	1996	1997	1998	1999	2000
Poland	17.5	21.8	26.7	36.9	44.5
Macedonia	38.9	39.7	40.4	42.2	45.6
Romania	14.2	16.4	19	23.5	32.3
Slovenia	35.6	41.0	48.7	76.1	104.7
Slovakia	23.7	29.6	37.3	47.9	52.9
CEEC Average	20.1	23.9	28.5	35.9	45.0

b) Number of mobile lines per 100 inh. – Evolution 1996–2000

	1996	1997	1998	1999	2000
Albania	0.1	0.1	0.1	0.3	0.9
Bosnia	0	0.2	0.5	1.4	2.6
Bulgaria	0.4	0.7	1.6	4	8.2
Czech Rep.	2	5.1	9.4	19.2	38.9
Estonia	4.8	10.5	17.4	26.8	41.1
Hungary	4.6	7	10.6	16.1	29.8
Latvia	1.1	3.1	6.9	11.9	15.9
Lithuania	1.7	7.5	8.9	8.1	10.8
Macedonia	0.5	1.3	2	3.5	8.3
Poland	0.6	2.1	5	10.6	15.5
Romania	0.2	1.1	2.9	6	12.5
Slovenia	2.1	4.6	9.8	33.3	57.3
Slovakia	0.5	3.7	8.7	17	21.5
CEEC Average	1.1	2.6	5	9.8	17

Source: ESIS II Report: Information Society Indicators in the CEEC countries.

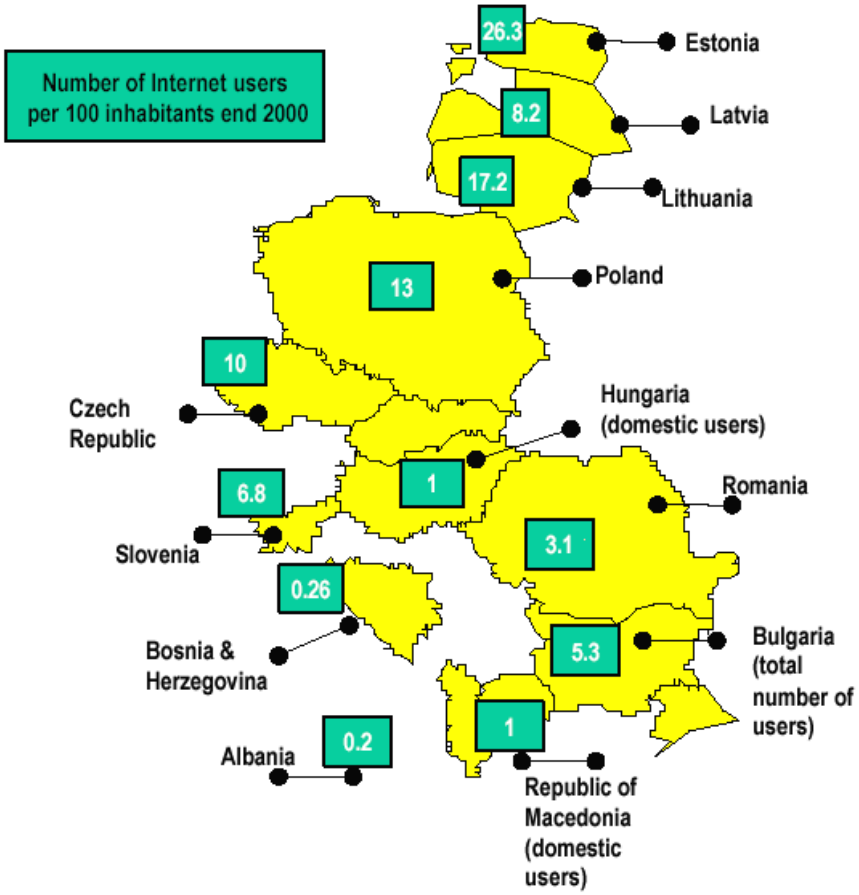

Fig. 4. Internet Density in Selected Transition Countries

Note: Russia in 2002: mobile communications density 7%, fixed network density 21%; according to our estimate internet user density was below 10%.
Source: ESIS II Report : Information Society Indicators in the CEEC countries.

As regards mobile telecommunications, Russia's MTS (Mobilnyje Tele-Systemy, of which Deutsche Telekom AG has a 40% share) has become the leading company among operators in transition countries in 2002; by mid-2002, they had 4.4 million subscribers, up from 3.6 million at the end of 2001. PTC (ERA GSM) and Polkomtel are No. 2 and 3 in absolute terms with 4.2 and 3.9 million subscribers in mid-2002 – up from 4.0 and 2.9 at end of 2002; Poland can thus be considered a relatively dynamic market. The Russian Vimpel-Com (Beeline), in which Telenor from Norway has a stake, had 3.7 million subscribers in mid-2002, up from 2.6 million at end of 2001. MegaFon is another Russia operator, in which the Swedish Telia and the Finnish Sonera each have a stake. In mid-2002, mobile telecommunication density was 7%

and in fixed line telephony 21% in Russia. Given the low overall telecommunication density in Russia one could anticipate a rapid medium term growth, in particular in mobile telephony. By 2010, Russia's mobile telecommunication density might reach 50%, with expansion driven by gradually increasing competition through newcomers and by falling prices. Russian telecommunication operators might indeed become international investors in the medium term as is already amply born out by Yukos' acquisition of the eastern European network of KPN Qwest in 2002. Yukos' mobile telecommunications subsidiary is thus active in Poland, Hungary, the Czech Republic, Romania and Slovakia. With regard to mobile telecommunication density, Hungary, Estonia and Slovenia are leading economies among the transition countries.

Table 8.

Leading Supplier Mobile Telecommunication Operating in Eastern Europe und Russia

GSM-standard Name	Country	Subscribers in Mill.		Change (percent of Subscribers at 12/31/01)
		12/31/2001	07/31/2002	
MTS	Russia	3.6	4.4	22.2
PTC (ERA GSM)	Poland	4.0	4.2	5.0
Polkomtel	Poland	2.9	3.9	34.5
Vimpel-Com (Beeline)	Russia	2.6	3.7	42.3
Euro Tel	Czech Rep.	3.2	3.6	12.5
Centertel (Idea)	Poland	2.8	3.6	28.6
RadioMobil (T-Mobile)	Czech Rep.	3.0	3.1	3.3
Westel Mobile	Hungary	2.8	3.0	7.1
Pannon	Hungary	2.1	2.3	9.5
MobiFon	Romania	2.0	2.3	15.0
Megafon	Russia	1.1	2.0	81.8

Source: Handelsblatt, 09/10/2002.

As regards computer density, eastern Europe and Russia is lagging behind western Europe, and this backwardness might continue for some time. With falling relative computer prices in world markets, the ICT modernization of eastern Europe and Russia will become easier in the long run.

Table 9.

PC Density (Personal Computers per 1000 inhabitants)

	1996	1997	1998	1999	2000
ALB	1.4	2.7	4.0	5.2	6.4
ARM	NA	2.4	4.2	5.7	7.1
BGR	19.1	21.7	24.0	26.6	43.9
HRV	33.4	44.6	55.8	67.0	80.7
CZE	67.9	82.5	97.3	107.2	122.0
EST	68.1	96.0	113.8	135.2	152.9
HUN	44.1	58.0	64.8	74.7	85.3
LVA	20.0	40.3	61.0	82.0	140.3

Continued

	1996	1997	1998	1999	2000
LTU	27.0	33.7	54.0	59.5	64.9
MDA	2.5	3.9	6.4	8.0	14.5
POL	31.1	38.8	49.1	62.0	68.9
ROM	15.5	17.7	21.4	26.8	31.9
RUS	23.7	29.9	34.6	37.4	42.9
SVK	46.5	69.6	87.2	109.3	136.9
SVN	125.9	188.9	210.7	251.4	275.9
UKR	10.0	11.8	14.0	15.8	17.6
IDN	6.6	7.9	8.2	9.1	9.9
KOR	131.7	150.7	168.8	181.8	237.9
MYS	41.6	46.1	59.8	68.7	103.1
PHL	11.6	13.4	15.1	16.9	19.3
SGP	263.0	331.8	375.1	436.6	483.1
THA	17.2	20.4	21.9	23.0	24.3
AUS	173.7	210.6	233.4	256.8	276.5
BEL	216.6	245.4	286.0	315.2	344.5
DEN	304.7	360.2	377.4	414.0	431.5
FIN	272.8	310.9	348.8	360.1	396.1
FRA	162.0	193.8	232.2	267.5	304.3
GER	208.5	238.9	279.1	297.0	336.0
GRE	35.3	44.7	51.9	60.2	70.5
IRE	209.6	240.4	272.6	315.1	359.1
ITA	92.4	113.3	132.5	157.0	179.8
LUX	370.5	377.6	384.4	390.2	453.2
NDL	231.3	281.1	323.6	359.3	394.1
PRT	67.4	74.3	81.2	93.0	299.3
SPA	78.9	96.6	109.2	119.4	142.9
SWE	294.0	339.1	395.3	451.4	506.7
GBR	216.0	238.9	268.4	302.5	337.8
USA	363.9	406.9	458.8	517.1	585.2

Source: WDI (2002).

Eastern Europe and the CIS countries are behind Western Europe in computer density. PC density is quite important for networking effects and productivity growth, at least if one accepts the basic hypothesis that the New Economy is associated with particular productivity growth effects that stem from the combined use of computers, modern telecommunications equipment and software.

4. Policy Implications

From a policy perspective, EU accession countries face favorable opportunities through EU membership that will not only stimulate institutional reforms but also encourage policymakers to embrace more transparency in fiscal policy – through Commission's surveillance; moreover, considerable funds will become available to some transition countries under the heading of EU structural funds. Under EU "twinship programs", EU accession countries will also enjoy support for upgrading public administrations in selected fields. These policy-related elements and full free access to EU markets should help accession countries achieve high and sustained growth. However, as the divergent experience of dynamics in Spain and Portugal in contrast to slow-growing Greece in the late 1980s and in the first half of the 1990s has shown, EU membership is no simple magic for achieving sustained high growth rates. If policymakers cannot deliver complementary domestic reforms – with adequate focus on liberalization, deregulation and competition-enhancing policies – EU membership will generate only limited benefits. Also, one should not overlook the fact that EU membership brings a rise in required regulatory and technological standards whereby the opportunities in terms of full EU market access and zero political risk for EU investors might be partly offset by stricter standards and more costly regulations in many fields.

One should not forget that even for accession countries there are considerable risks in terms of economic stability once international financial conditions become tenser in the sense that nominal and real interest rates in world markets increase or oil prices suddenly rise strongly. As the case of Mexico demonstrated in the mid-1980s, OECD membership was not the widely expected rubber stamp that would bring consistency and stability to Mexico. Indeed, Mexico faced a serious banking and confidence crisis just in the year of OECD membership. Against this background, one can only warn that financial stability will remain a crucial issue on the agenda.

For Bulgaria and Romania as well as for the Balkans countries there is at least a long term perspective for EU membership that might indeed encourage adequate long term restructuring and growth-enhancing policies. Other outsiders in the ex-CMEA area will face more problems that could undermine prospects for long term growth. Many CIS countries are likely to face serious problems in this respect.

As regards Russia, there are several specific aspects to be considered. Putin has brought political stability for Russia, and this will help the country's economic catching up process as the political risk premium in capital markets has reduced. However, there is not a firm basis for sustained high growth as long as competition policy is relatively weak in Russia and as long as the banking system and bonds markets have not been reorganized effectively. Moreover, high oil prices in 2001/2002 have reinforced the natural resources bias in Russia's economy that might face Dutch disease problems (biased structural change in favor of the natural resources sector combined with a declining share of manufacturing in overall output). There is some risk that rapidly falling oil prices in the near future could undermine stability and growth in Russia. Government indeed faces the challenge of using the petrodollar boom to carefully implement those reforms that are conducive to economic and technological modernization in all sectors of the economy.

Taking into account the decline of the Russian population in the 1990s, one may argue that the demographic factor is not supporting favorable growth prospects. However, there are other arguments that point to great opportunities for sustained growth in Russia:

- Russia has opened up toward trade and foreign investment and one should expect specialization gains from trade and higher investment-GDP ratios. It is, however, worrisome that Russia could not really attract much FDI inflows – relative to GDP – in 2001/2002. Russia's lack of FDI inflows will restrict trade expansion. This argument mainly refers to the well-known trade-expanding role of multinational companies: About 1/3 of international trade among leading OECD countries is intra-company trade; often in knowledge-intensive or technology-intensive products. From this perspective, Russia's trade intensity could still rise considerably once high FDI inflows occur over at least a decade or so.
- Russia had a serious financial market crisis in 1998 and is about to restructure banks. Given the rather imperfect restructuring process in the Russian banking market and taking into account underdevelopment of Russia's bonds market concentrated mainly around short-term maturities, one may anticipate rather inefficient intermediation that will come at a considerable cost to society. Investment-GDP ratios and hence growth rates will be lower than otherwise.
- Russia is embracing a market economy system in a period of high technological dynamics in industrialized countries. Many OECD countries, including the USA, Korea, Finland, Sweden, the UK and others have benefited strongly from the investment boom in information and communication technology. Russia as a country catching up in digital technology might benefit from being a digital latecomer. However, EU experiences have shown that only some liberalization and privatization of telecommunications will bring a wave of innovations and falling relative prices for digital services. At the same time, EU telecommunications firms have shown increased dependence on capital markets and bonds markets since firms have to finance innovation and UMTS mobile network expansion. Inadequate rules for awarding UMTS licences have undermined the financial stability of some EU telecommunications operators, which in turn has resulted in the cutting back of investment in network expansion. Russia, as well as other transition countries, could design superior auctioning rules for UMTS licenses that would ideally include secondary markets for licences whereby firms can sell licenses to competitors; a futures market for UMTS licences would also be quite useful. From this perspective, growth-enhancing ICT policies should not always simply follow EU models.

In Russia, there are substantial risks that considerable protectionism in the goods and services markets will continue in the early 21st century. Any future recession will naturally trigger various pressures in favor of external protectionism. If government seriously wants to protect some technology-dynamic sectors for a limited period of time – raising profits in the respective sector and thus strengthening accumulation of the capital necessary to finance innovations and certain investment projects – it should decide about the respective strategy in a period of non-recession. Otherwise one could anticipate that ailing old industries will be protected. If the latter strategy were adopted, this certainly would not be growth-enhancing; on the contrary. Finally, one may raise the issue that even limited sectoral protection of technology intensive or knowledge intensive sectors is bound to encourage the politi-

cal demand for protectionism in all other sectors. Further research must show whether and under which circumstances the adoption of modest forms of industrial policies that were popular and successful as a transitory strategy in some Asian NICs make sense.

Appendix 1.

Countries Included in Cross-Country-Regression

For the cross-country regression in subsection 3.2, we chose countries based on their status as post-socialist transition countries or advanced economies or a certain level of economic development. Further factors for the inclusion of a country were that it has not been heavily involved in war or civil war, and the independence of their economies of export in only one basic commodity.

ALB Albania
ARG Argentina
ARM Armenia
AUS Australia
AUT Austria
AZE Azerbaijan
BLR Belarus
BEL Belgium
(BIH Bosnia and Herzegovina)*
BRA Brazil
BGR Bulgaria
CAN Canada
CHL Chile
CHN China
COL Colombia
CRI Costa Rica
HRV Croatia
CYP Cyprus
CZE Czech Republic
DNK Denmark
ECU Ecuador
EGY Egypt, Arab Rep.
SLV El Salvador
EST Estonia
FIN Finland
FRA France
GEO Georgia
DEU Germany
GRC Greece
KOR Korea, Rep.
KGZ Kyrgyz Republic
LVA Latvia
LBN Lebanon
LTU Lithuania
LUX Luxembourg
MKD Macedonia, FYR
MYS Malaysia
MEX Mexico
MDA Moldova
MNG Mongolia
MAR Morocco
NLD Netherlands
NZL New Zealand
NOR Norway
PAK Pakistan
PER Peru
PHL Philippines
POL Poland
PRT Portugal
ROM Romania
RUS Russian Federation
SGP Singapore
SVK Slovak Republic
SVN Slovenia
ZAF South Africa
ESP Spain
SWE Sweden
CHE Switzerland

* Removed.

HKG	Hong Kong, China	TJK	Tajikistan
HUN	Hungary	THA	Thailand
ISL	Iceland	TUN	Tunisia
IND	India	TUR	Turkey
IDN	Indonesia	TKM	Turkmenistan
IRL	Ireland	UKR	Ukraine
ISR	Israel	GBR	United Kingdom
ITA	Italy	USA	United States
JPN	Japan	UZB	Uzbekistan
KAZ	Kazakhstan	VNM	Vietnam
KEN	Kenya		

The cross-section regressions over all countries have hardly come to significant results. This is not surprising in light of the different stages of economic development within the whole sample. To get homogeneous groups with respect to economic development and growth, we made a cluster analysis (partitioning method), resulting in two subgroups *A* and *B*:

Group *A*: Countries with low GDP per capita (and high or low economic growth):

"ALB" "ARG" "ARM" "AZE" "BLR" "BRA" "BGR" "CHL" "CHN" "COL" "CRI" "HRV" "CYP" "CZE" "ECU" "EGY" "SLV" "EST" "GEO" "GRC" "HUN" "IND" "IDN" "KAZ" "KEN" "KOR" "KGZ" "LVA" "LBN" "LTU" "MKD" "MYS" "MEX" "MDA" "MNG" "MAR" "PAK" "PER" "PHL" "POL" "PRT" "ROM" "RUS" "SVK" "SVN" "ZAF" "TJK" "THA" "TUN" "TUR" "TKM" "UKR" "UZB" "VNM" (54 countries).

Group *B*: Countries with high GDP per capita (and high or low economic growth):

"AUS" "AUT" "BEL" "CAN" "DNK" "FIN" "FRA" "DEU" "HKG" "ISL" "IRL" "ISR" "ITA" "JPN" "LUX" "NLD" "NZL" "NOR" "SGP" "ESP" "SWE" "CHE" "GBR" "USA" (24 countries).

We can characterize the first group as countries with low GDP per capita, and the second group as advanced economies with high GDP per capita. The dispersion of GDP per capita is compared with the dispersion of growth rates so much higher, that the resulting groups only depend on the GDP per capita vector.

Among the countries in group *A* we find the post-socialist transition countries:

"ALB" "ARM" "AZE" "BLR" "BGR" "HRV" "CZE" "EST" "GEO" "HUN" "KAZ" "KGZ" "LVA" "LTU" "MKD" "MDA" "MNG" "POL" "ROM" "RUS" "SVK" "SVN" "TJK" "TKM" "UKR" "UZB" "VNM" (27 countries).

This group we will name group *A**.

Appendix 2.

Regression Results

for i = group containing n_i countries,
j = last year of six-period-mean = 1999

Note: All variables are 6-year-means from (j−5) until j; for j=1999: from 1994 until 1999.

If time series data are not complete available, the variables can be (m+1)-year-means ($0 \le m \le 4$) from (j − m) until j; this refers particularly to the SE.tert[i, j−6] variable.

Signif. codes: `***' 0.01, `**' 0.05, `*' 0.1

Equation 1:

$$g_Y[i,j] = \beta_0 + \beta_1 \ln(Iq[i,j]) + \beta_2 Infl[i,j] + \beta_3 gTelD[i,j\text{-}6] + \beta_4 \ln(SE.tert[i,j\text{-}6]) + \beta_5 \ln(FDI[i,j])$$

Equation 2:

$$g_Y[i,j] = \beta_0 + \beta_1 \ln(Iq[i,j]) + \beta_2 Infl[i,j] + \beta_3 gTelD[i,j\text{-}6] + \beta_4 \ln(SE.tert[i,j\text{-}6]) + \beta_5 \ln(FDI[i,j]) + \beta_6 gUSPAT[i,j+2]$$

Table A1.

Regression results for equation 1 and 2

	Group	all		group A		group B		group A*	
		Eq. 1		Eq. 1A		Eq. 1B		Eq. 1A*	
k	Variable	β_k	t-value[1)]	β_k	t-value[1)]	β_k	t-value[1)]	β_k	t-value[1)]
0	1	2.886	0.79	3.422	0.73	-10.37	-1.643	11.841	1.506
1	ln(Iq)	0.581	0.493	0.626	0.412	2.659	1.831*	-1.116	-0.481
2	Infl	-0.03	-3.071***	-0.027	-2.668***	0.23	2.297**	-0.021	-1.515
3	$gTelD_{-6}$	0.052	0.998	0.052	0.932	0.558	1.681	-0.035	-0.307
4	$\ln(SE.tert_{-6})$	-0.583	-1.692*	-0.869	-1.857*	0.793	0.983	-1.895	-1.951*
5	ln(FDI)	0.568	2.352**	0.428	1.171	0.911	3.809***	0.635	0.802
n_{is}		74		52		21		25	
multiple R^2		0.3421		0.3662		0.5971		0.388	
adjusted R^2		0.2945		0.2988		0.4712		0.235	
		Eq. 2		Eq. 2A		Eq. 2B		Eq. 2A*	
0	1	1.295	0.315	1.451	0.27	-7.402	-1.629	8.99	1.131
1	ln(Iq)	1.082	0.808	1.232	0.68	0.185	0.117	0.236	0.078
2	Infl	-0.026	-1.776*	-0.023	-1.524	0.126	2.017*	-0.018	-0.748
3	$gTelD_{-6}$	0.042	0.798	0.037	0.625	0.653	2.419**	-0.054	-0.445
4	$\ln(SE.tert_{-6})$	-0.579	-1.682*	-0.798	-1.721*	1.668	2.72**	-2.148	-1.637
5	ln(FDI)	0.557	2.478**	0.382	1.106	0.586	2.265**	0.227	0.262
6	$gUSPAT_{(+2)}$	0.006	0.97	0.005	0.739	0.126	2.889**	0.014	0.62
n_i		68		47		20		20	
multiple R^2		0.2886		0.301		0.7756		0.3573	
adjusted R^2		0.2198		0.1987		0.6794		0.08179	

[1)] t-values are heteroskedasticity consistent (White-) estimators.

Eq. 1: all countries without GRC, HKG, LUX, SVN, TKM.
Eq. 1A: group A without GRC, SVN, TKM.
Eq. 1B: group B without HKG, LUX.
Eq. 1A*: transition countries without SVN, TKM.

Eq. 2: all countries without GRC, HKG, LUX, MKD, MDA, MNG, SVN, TJK, TKM, USA.
Eq. 2A: group A without GRC, MKD, MDA, MNG, SVN, TJK, TKM.
Eq. 2B: group B without HKG, LUX, USA.
Eq. 2A*: transition countries without MKD, MDA, MNG, SVN, TJK, TKM.

Note: The only reason for the exclusion of a country is the lack of data for this country in one or more variables.

Table A2.

Means and Standard Deviations of Regression Variables

		Eq. 1	Eq. 1A	Eq. 1B	Eq. 1A*	Eq. 2	Eq. 2A	Eq. 2B	Eq. 2A*
g_Y	mean	3.05	2.93	3.33	2.21	3.24	3.21	3.30	2.70
	sd	2.53	2.80	1.77	3.40	2.33	2.55	1.81	3.17
Iq	mean	22.77	23.29	21.56	22.83	22.73	23.20	21.67	22.55
	sd	5.08	5.46	3.94	4.94	5.19	5.61	4.01	5.18
Infl	mean	19.04	26.34	2.11	41.54	17.44	24.29	2.12	39.85
	sd	32.58	36.70	1.88	45.71	29.73	33.62	1.92	42.99
gTelD(-6)	mean	6.32	7.93	2.66	5.84	6.55	8.32	2.69	6.31
	sd	5.61	6.00	1.40	4.81	5.73	6.09	1.42	5.12
SE.tert(-6)	mean	27.72	21.02	43.26	24.91	27.35	21.01	41.54	25.64
	sd	16.62	11.81	15.90	11.99	15.82	12.09	14.03	12.49
FDI	mean	2.79	2.67	3.05	3.11	2.87	2.76	3.12	3.39
	sd	2.13	1.89	2.63	2.02	2.18	1.94	2.67	2.08
gUSPAT(+2)	mean	–	–	–	–	19.66	22.98	12.24	21.92
	sd	–	–	–	–	30.86	36.37	8.01	31.40

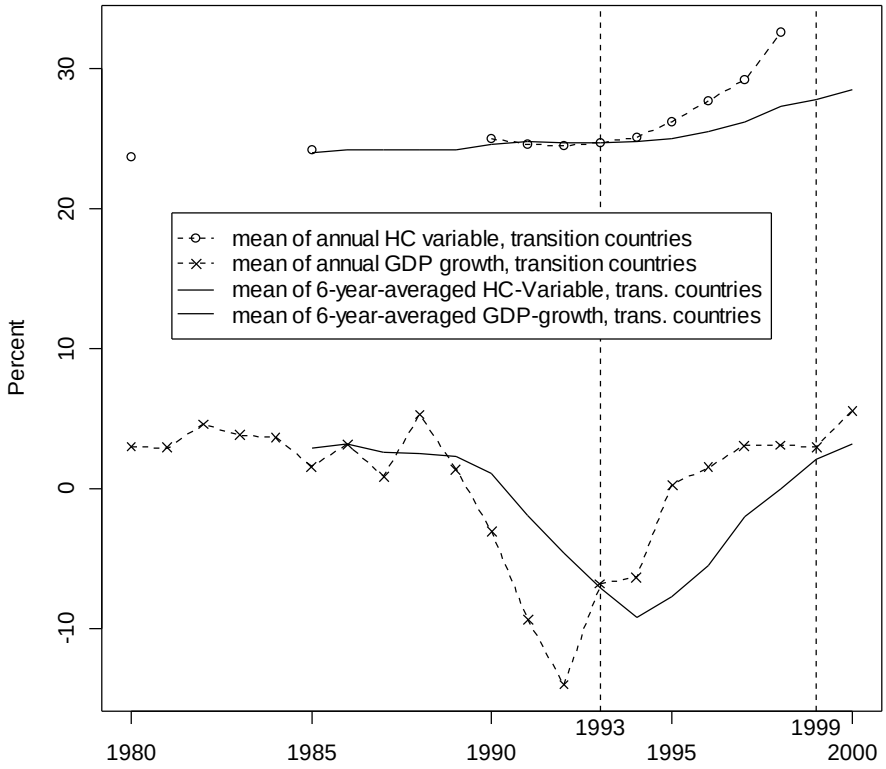

Fig A1. Means of Human Capital Variable and GDP Growth of Transition Countries

Appendix 3.

List of Variables in Regressions and Data Sources

The following Data are from the World Development Indicators Database CDROM [36]:

gY	Annual GDP Growth	NY.GDP.MKTP.KD.ZG
Iq	Gross Domestic Investment as Percent of GDP	NE.GDI.TOTL.ZS
Infl	Inflation (GDP Deflator, annual %)	NY.GDP.DEFL.KD.ZG
gTelD	Annual Growth of Telephone Mainlines Density calculated from Telephone Mainlines per 1000 people	IT.MLT.MAIN.P3
SE.tert	School Enrollment (% gross), tertiary	SE.TER.ENRR
FDI	Foreign direct investment, net inflows (% of GDP)	BX.KLT.DINV.DT.GD.ZS

The Variable gUSPAT is calculated as:

$$depUSPAT_{j,P} = \sum_{i=1}^{P} \frac{i}{P} USPAT_{j-i+1} \qquad \text{(USPAT depreciated over P years, P=6)}$$

$$depUSPATd_{j,6} = 1000000 \cdot \frac{depUSPAT_{j,6}}{POP_j} \qquad \text{(USPAT density)}$$

$$gUSPAT_j = 100 \cdot \frac{depUSPATd_{j,6} - depUSPATd_{j-1,6}}{depUSPATd_{j-1,6}}$$

with

USPAT: data from PATENT COUNTS BY COUNTRY/STATE AND YEAR, UTILITY PATENTS, JANUARY 1, 1963 – DECEMBER 31, 2001, February 2001, U.S. PATENT AND TRADEMARK OFFICE;

POP: data from WDI 2002: Population, total (SP.POP.TOTL).

Appendix 4.

Tables

Table A3.

Telecommunication Indicators for Eastern Europe

a) Number of mobile lines – Evolution 1996–2000

	1996	1997	1998	1999	2000
Albania	2 248	3 076	4 323	11 009	29 000
Bosnia	1 020	8 310	17 212	50 000	100 000
Bulgaria	36 000	55 522	127 758	331 438	670 000
Czech Republic	203 180	524 641	968 760	1 975 000	4 000 000
Estonia	70 000	151 000	249 000	388 000	604 594
Hungary	473 100	708 000	1 070 000	1 621 000	2 990 000
Latvia	28 500	76 000	168 000	282 220	377 500
Lithuania	62 000	276 370	328 000	301 000	400 000
Macedonia	10 000	25 000	40 000	70 000	170 000
Poland	230 000	812 200	1 928 000	4 080 000	6 000 000
Romania	50 000	250 000	650 000	1 350 000	2 813 000
Slovenia	41 205	90 641	194 855	660 855	1 140 000
Slovakia	28 658	200 141	465 634	918 039	1 158 000
Total	1 235 911	3 180 901	6 211 542	12 038 561	20 452 094

b) Total number of lines – Evolution 1996–2000

	1996	1997	1998	1999	2000
Albania	52 248	85 076	124 323	151 398	176 776
Bosnia	273 020	311 310	747 712	852 000	952 200
Bulgaria	2 683 459	2 736 596	2 885 748	3 186 533	3 619 800
Czech Republic	3 018 180	3 805 141	4 719 260	5 874 000	7 971 000
Estonia	509 016	629 082	770 478	929 336	1 166 964
Hungary	3 124 300	3 803 335	4 455 300	5 347 286	7 090 816
Latvia	759 500	816 000	910 300	1 013 770	1 111 700
Lithuania	1 055 000	1 324 370	1 439 328	1 458 312	1 606 589
Macedonia	770 000	791 614	807 709	855 371	934 997
Poland	6 762 400	8 432 412	10 348 000	14 256 216	17 200 000
Romania	3 225 553	3 705 976	4 298 845	5 278 925	7 267 625
Slovenia	706 107	812 685	965 265	1 510 855	2 085 000
Slovakia	1 275 129	1 592 005	2 007 713	2 586 805	2 853 430
Total	24 213 912	28 845 602	34 479 981	43 300 807	54 036 897

Source: ESIS II Report: Information Society Indicators in the CEEC countries.

Table A4.

Internet Hosts per 10000 Inhabitants in Transition Countries, 1994–1998

	1994	1995	1996	1997	1998
ALB	0	0.109	0.242	0.324	0.228
ARM	0	0.460	0.466	0.877	1.228
AZE	0.012	0.021	0.039	0.103	0.292
BLR	0.001	0.016	0.249	0.439	0.621
BIH	0	0	0.102	0.159	0.924
BGR	0.161	1.256	3.971	6.635	7.437
HRV	2.246	5.271	10.309	14.782	13.59
CZE	10.059	21.156	39.599	47.655	63.791
EST	7.698	24.111	54.323	45.035	130.702
GEO	0	0.105	0.391	0.549	1.161
HUN	6.652	15.437	29.275	33.302	73.153
KAZ	0.004	0.116	0.507	0.721	0.896
KGZ	0	0	NA	0.233	0.387
LVA	2.057	5.25	23.204	20.996	33.136
LTU	0.341	1.233	4.664	7.451	23.619
MKD	0	0.458	0.975	2.148	2.025
MDA	0	0.012	0.014	0.39	NA
POL	2.793	5.982	13.686	11.225	25.552
ROM	0.23	0.767	3.457	2.659	6.087
RUS	0.441	1.481	3.932	5.506	8.878
SVK	2.648	5.610	14.857	20.357	26.255
SVN	8.18	28.216	69.347	85.878	91.241
TJK	0	0	0	NA	0.093
TKM	0	0	NA	0.004	0.627
UKR	0.102	0.467	1.287	2.074	2.639
UZB	0	0.015	0.053	0.065	0.082

Source: [35].

Table A5.

Internet host per 10000 inhabitants in EU-15 Countries and the US, 1994–1998

	1994	1995	1996	1997	1998
AUS	34.0	66.3	110.2	108.3	163.7
BEL	17.2	30.2	64.0	84.6	150.7
DEN	35.4	96.7	202.8	259.3	359.0
FIN	134.1	422.3	613.0	653.6	996.6
FRA	14.4	26.0	40.6	49.8	73.2
GER	24.4	58.1	84.5	106.7	140.7
GRE	3.4	7.4	16.0	18.8	38.1
IRE	15.4	37.3	74.1	90.2	121.0
ITA	5.0	13.2	25.8	36.8	55.7
LUX	12.5	45.9	84.7	91.4	144.0
NDL	55.9	111.1	174.3	218.9	327.9
PRT	5.1	11.9	23.6	18.2	45.3
SPA	7.0	13.1	28.8	31.0	61.8
SWE	84.3	164	268.9	321.5	430.0
GBR	38.7	75.0	122.3	148.8	0.0
USA	122.1	230.4	381.3	441.8	975.0

Source: [35].

Table A6.

Share of Internetusers as Percent of Population in Transition Countries, 1996–2000

	1996	1997	1998	1999	2000
ALB	0.03	0.04	0.06	0.07	0.10
ARM	0.08	0.09	0.11	0.79	1.31
AZE	0.01	0.03	0.04	0.10	0.15
BLR	0.03	0.05	0.07	0.50	1.80
BIH	0.01	0.05	0.13	0.18	0.50
BGR	0.72	1.20	1.82	2.86	5.27
HRV	0.88	1.80	3.41	4.57	5.71
CZE	1.94	2.91	3.89	6.81	9.73
EST	3.45	5.61	10.67	14.42	28.6
GEO	0.04	0.06	0.09	0.4	0.46
HUN	0.97	1.95	3.91	5.87	14.5
KAZ	0.03	0.07	0.13	0.47	0.67
KGZ	NA	NA	0.07	0.21	1.05
LVA	0.8	2.03	3.27	4.36	6.32
LTU	0.28	0.98	1.97	2.92	6.42
MKD	0.08	0.5	0.99	1.49	2.46
MDA	0	0.03	0.26	0.58	1.23
POL	1.29	2.07	4.09	5.43	7.24
ROM	0.22	0.44	2.22	2.67	3.57
RUS	0.27	0.48	0.82	1.03	2.13
SVK	1.86	3.53	9.28	11.12	12.03
SVN	5.02	7.55	10.09	12.59	15.09
TJK	NA	NA	NA	0.03	0.05
TKM	NA	NA	NA	0.04	0.12
UKR	0.10	0.20	0.30	0.40	0.61
UZB	0	0.01	0.02	0.03	0.48

Source: [36].

Table A7.

Share of Internetusers as Percent of Population in EU-15 Countries and US, 1997–2000

	1996	1997	1998	1999	2000
AUS	3.10	4.46	8.79	15.45	25.89
BEL	2.95	4.91	7.84	11.73	22.69
DEN	5.70	11.35	18.86	28.20	36.54
FIN	16.78	19.46	25.44	32.27	37.22
FRA	2.59	4.29	6.34	9.16	14.43
GER	3.05	6.7	9.87	17.54	29.21
GRE	1.43	1.91	3.33	7.12	9.47
IRE	2.20	4.09	8.08	18.10	20.66
ITA	1.02	2.26	4.51	14.22	22.88
LUX	5.53	7.12	11.72	17.36	22.81
NDL	5.8	6.41	10.19	18.98	24.50
PRT	2.32	2.71	5.02	10.01	24.98
SPA	1.34	2.80	4.40	7.18	13.65
SWE	9.05	23.73	33.45	41.39	45.64
GBR	4.08	7.30	13.50	21.01	30.13
USA	11.19	14.73	21.83	26.63	33.87

Source: [36].

Appendix 5.

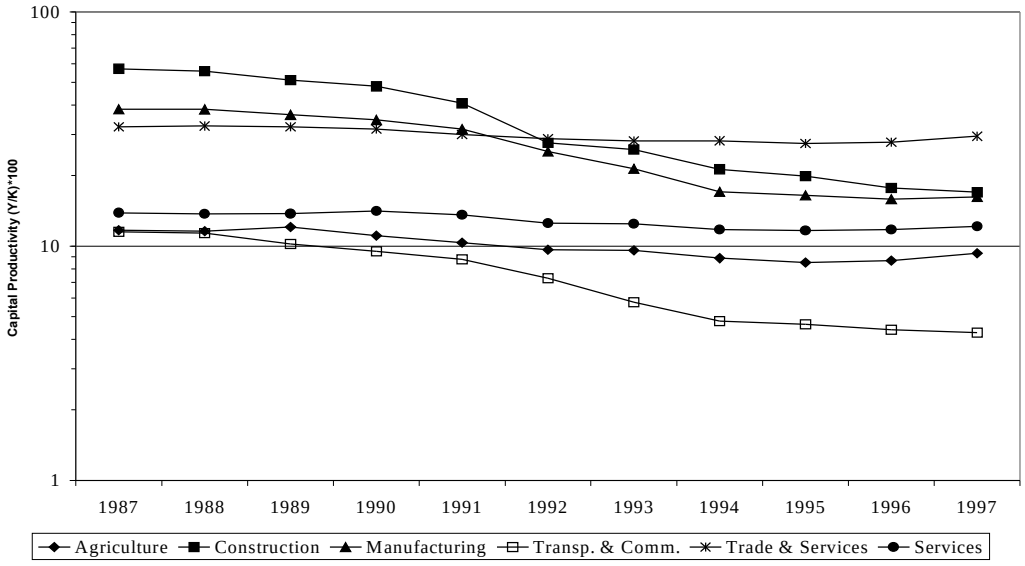

Fig. A2. Capital Productivity in Russia

Source: EBRD.

* *
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