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Long-Term Growth and Welfare in Transitional Economies:

The Impact of Demographic, Investment and Social Policy Changes

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ABSTRACT

This paper analyses the long-term growth and welfare impact of the transition to the market economy in the countries of Eastern Europe. We define welfare as the average real net wage after payments of social security contributions to fund a paygo-type pension system, and of taxes to service the interests on the accumulated public debt.

We examine four sets of factors that will influence growth and the welfare of wage earners up to the year 2030. First, we argue that the accumulation of physical capital will be affected by a sharp initial fall in the capital stock, by a medium-term decline in savings and investments, and by efficiency gains following marketisation. Second, the human capital stock is expected to experience a similar short-term erosion because of the recent upsurge in human capital flights and the current decline in the quality and quantity of education being provided. Third, we also argue that the transition's population crisis, which has entailed large upswings in mortality and sharp drops in fertility, will affect negatively labour supply and dependency ratios, particularly over 1995-2020. Finally, we examine changes in pension policy and their negative inter- and intra-generational welfare effects. In the absence of policy changes, future generations will have to bear the consequences of growing government expenditure in the form of higher current pension transfers and of future debt-servicing costs.

The overall impact of these factors is simulated by means of a mini-model which calculates changes in potential output, gross average wage, pension bill and welfare over 1990-2030. The simulation results indicate that the long-term growth of potential output will remain modest until 2020 because of the slow accumulation of both physical and human capital, and the stagnation of labour supply. The situation will be especially critical in Russia, where output is not expected to reach its pre-transition level by 2030. Second, welfare is expected to grow at an even slower rate. In the worst cases, it will increase at below one per cent a year, after a very large fall over 1990-95. The model shows that even some increase in the saving rate would not affect growth significantly. The large and negative long-term impact of demographic changes on net wages can only be alleviated by decreasing the pension and tax burden on future generations. An increase in the retirement age, an early recovery in fertility rates, and a faster preservation/accumulation of production factors, will be decisive for the improvement of welfare in the medium and long term.

1. INTRODUCTION: CRISIS, WELFARE AND GROWTH IN THE EASTERN ECONOMIES IN TRANSITION

It is now amply documented that the transition to the market economy has entailed large *short-term* welfare losses for most population groups in Eastern and Central Europe and the former Soviet Union (henceforth referred to as 'Eastern Europe', unless otherwise specified) (UNICEF 1994, Cornia 1996). Welfare losses have been most evident in terms of traditional 'income-based indicators' (wage rate, income and consumption per capita, poverty rates and so on), as well as in terms of 'human capabilities' (Sen 1985) and demographic variables (Cornia and Paniccia' 1996).

In this paper we extend the analysis of the impact of the transition on growth and the welfare of wage earners to the *long-term*, i.e. over the arbitrarily chosen period 1995-2030. We define the welfare of wage earners (at times referred to as 'welfare' *tout court*) as the 'average real net wage' (expressed in terms of its 1989 level), that is the average real gross wage minus the 'quasi-taxes' needed to finance current pensions (by means of a 'paygo' system) and the taxes necessary to service the interests on the accumulated public debt (which in the model used in the paper is a rising function of the total pension bill over the preceding years). In the paper we examine the long-term impact on growth and the welfare of wage earners of four sets of factors, namely: (i) the mortality and fertility changes which have occurred over 1989-96 and that, in several Eastern European countries, are likely to continue over the foreseeable future; (ii) recent and future changes in the field of pension policy; (iii) recent and expected shifts in saving ratios and in the accumulation of physical capital; and, (iv) the expected changes in the stock of human capital. After discussing variations in each of these areas, we combine this information in a simple simulation model used to assess the inter-generational and intra-generational impact of pension policy, given the long-term changes in labour supply and dependency ratios triggered by the recent population crisis, and given alternative assumptions about saving behaviour and the accumulation of physical and human capital in the region. The results of a few simulations illustrating the combined growth and welfare impact of alternative

assumptions in these four areas are then presented. Tentative policy conclusions follow.

The analysis does not cover those transitional countries of the former Soviet bloc which have strong features of developing economies (Albania, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan and Turkmenistan), as well as those nations which have been affected by widespread conflicts (the former Yugoslavia, except Slovenia, and those of the Caucasus region). War and political instability did indeed affect - sometimes dramatically - the variables discussed in this paper, e.g. savings and investment, demographic changes, and social policy.

2. CAPITAL ACCUMULATION AND LONG-TERM GROWTH

Long-term growth and the welfare of wage earners in transitional economies will be affected by three changes in the field of capital accumulation, namely:
- the extent of the initial fall in the capital stock inherited from the socialist era,
- future saving formation and investment behaviour,
- the improvement in efficiency of the capital stock following marketisation.

(i) An initial sharp, one-off, fall in capital stock. One factor affecting negatively output and welfare over the long-term is the sharp decline in the stock of physical capital experienced during the initial reform years in all Eastern European countries. This 'disaccumulation' (a one-off fall in the capital stock) was mainly due to:

- The ***physical obsolescence and ecological hazardousness*** of a substantive part of the capital stock inherited from the socialist era. In many sectors of the economy, machinery and equipment was considerably older than in other industrial countries (Table 1), was often non-operational and demanded constant repairs. Thus, it was often in inadequate functioning conditions and was kept 'in service' due to the limited importance attached to production efficiency and safety at work. In addition, some of the equipment in 'good working conditions' was extremely hazardous, and its utilisation was allowed because of the lax environmental standards prevailing during the pre-transition era.

With the advent of liberalisation and democracy, part of this equipment has been withdrawn from service.

Table 1. Age profile of equipment in Soviet industry

	1970	1980	1985	1989
% of equipment with an age of:				
- less than 5 years	41.1	36.0	33.7	31.6
- 6-10 years	29.9	28.9	28.5	28.6
- 11-20 years	20.9	24.8	25.5	26.2
- over 20 years	7.8	10.3	12.3	13.7
Average age of equipment, years	8.3	9.3	9.9	10.3
Average service life, years	24.0	26.9	27.9	26.2
Accumulated depreciation as a % of gross (initial) value of capital stock	26	36	41	45

Source: *Narodnoye Khozyaistvo SSSR* (National Economy of the USSR).

- ***Price liberalisation and the removal of production subsidies*** rendered a substantial amount of the old capital stock non-productive, despite large falls in wage rates. Perhaps the greatest impact has been due to the (still incomplete) shift to international market prices for oil and raw materials. During the socialist era, energy and raw material inputs were heavily subsidised, a fact that allowed the survival for many decades of an uncompetitive industrial structure and of enterprises producing negative value added at international market prices. With large shifts in relative prices, and the gradual realignment of domestic inputs prices to international market prices, a large profitability crisis has surfaced: capital stock that could produce positive value-added at subsidised input prices became unprofitable.

Profitability was influenced also by the introduction of realistic exchange rates (which caused radical changes in export and import prices), the adoption of import regimes characterised by low rates of protection, low and uniform tariffs, the absence of quantitative restrictions and the vanishing of the preferential agreements accorded to the members of the Comecon. These changes sharply affected the structure by origin/destination/commodity composition of both exports and imports. Many enterprises with a strong export orientation towards the Comecon, suddenly lost their markets and were forced to compete on the international market. Altogether, entire industrial branches (such as light consumer goods) that were comparatively important in the planned economies suddenly became inefficient and unproductive.

Following liberalisation, part of the capital stock inherited from the former system started generating negative value-added at international market prices and was therefore retired from service (except where state subsidies were maintained). The estimation of the amount of such 'unproductive capital stock' is however problematic. Official statistics on real capital stock are not too good, as they are computed on the basis of the book value of assets deflated by little reliable price indices. A seemingly more logical way to assess the share of capital stock involved in inefficient production is to estimate for the socialist era "shadow profit rates" on the basis of input-output tables and world market prices. However, this approach yields results that are not much consistent with either common sense or the recent performance of particular industries. An analysis at the 110 branch level for the former Soviet economy by Senik-Leygonie and Hughes (1992) arrived at negative long-term "shadow profit rates" for agriculture, food and wood products industries, but positive rates for the machinery and equipment, textiles and footwear. Yet, the post-1992 output fall following price deregulation was most pronounced in light industry and in engineering, and the least in agriculture and the wood industry. Thus, this approach cannot be safely used to estimate the recent reduction in capital stock.

Data on capacity utilization provide better guidance to the evaluation of the actual reduction in the stock of fixed capital during transition. In the former Soviet Union, the measurement of capacity utilization suffered from considerable problems (Shmelev and Popov, 1989, chapter 5). Actual capacity utilization was far from the 85-90 per cent reported by official statistics (Table 2), and possibly reached 60-70 per cent. Whatever data source is used, it may be fairly safely assumed that the sharp decline in the capacity utilization registered in recent years reflects the actual decline of real capital stock due to inability to use it profitably under the new market conditions.

Table 2. Capacity utilization rate in Russian industry

	1980	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
- Goskomstat data*	87.3	86.1	78.6	63.9	54.2	39.8		
- Survey data			78.0#	73.0	74.0	61.0	60.0	55.0†

Source: Goskomstat (1996).

* 17 types of capacities, unweighted average; #December; † January-April.

Official statistics suggesting a decline of over 50 per cent in capacity utilisation (Table 2) may be more meaningful than the results of surveys of industrial enterprises (which suggest a decline of about 30 per cent), since managers are likely to consider non-working capital as 'non-existent capacity', whereas official numbers are still based on 'passport capacity'. We may therefore assume that - in the case of the countries part of the former Soviet Union - the initial fall in the industrial capital stock has ranged between 30 and 50 per cent.

This is obviously an extremely crude estimate, subject to considerable variation depending on the assumption made and the time series used. Yet, even this cursory analysis underscores that the systemic changes of the last few years have brought into the open some of the latent inefficiencies-hazardousness of the former system, depressed the stock of the economically viable physical capital, and affected negatively the prospects for growth, employment and output of these economies.

(ii) A medium-term decline in saving and investment rates. Capital accumulation and long-term growth have also been affected by the sharp fall in investment rates observed in practically all transitional economies during the first reform years. In centrally planned economies, investment rates (the ratio of gross fixed investment to GDP), were substantially higher than in the market economies: over 1980-89, the (unweighted) average investment rate in the socialist economies was 28.6, while it was 21.8 per cent in the OECD group, and 23.1 per cent in the middle-income economies (World Bank 1993).

Since the onset of the transition, these comparatively high investment rates have declined in all the region with the exception of the Czech and Slovak Republics (Table 3 and charts 1a to 1d in the Annex). For the 14 countries included in Table 3, the average decline in investment rate has been of 7.5 points. The fall was particularly sharp in the initial years of the transition. However, most Central European countries, even those that experienced the steepest initial declines, have been able to reverse this trend in 1994. In contrast, in most of the republics of the former Soviet Union, investment rates have continued falling (Table 3).

What explains this quasi-universal fall in investment rates? The main hypotheses dominating the literature are reviewed hereafter, with the aim of evaluating investment trends over the medium-long term:

Table 3. Real GDP, investment and saving rates in transitional economies

	Real GDP 1989=100		Gross Fixed Investments / GDP		Gross Domestic Savings / GDP	
	1993	1995	average 1980-89	average 1990-94	average 1980-89	average 1990-94
Czech Rep.	80	87	25.5	27.0	31.2	25.5
Hungary	81	85	24.1	19.8	27.8	17.4
Poland	88	99	20.7	17.9	29.3	21.7
Slovak Rep.	77	86	29.6	30.9	29.2	21.9
Slovenia	84	93	38.5	19.2	39.6	24.4
***Visegrad countries*[1]**	*82*	*90*	*27.7*	*23.0*	*31.4*	*22.2*
Bulgaria	73	76	26.9	15.7	34.0	22.6
Romania	75	84	30.4	18.2	36.6	24.8
***South-East Europe*[1]**	*74*	*80*	*28.7*	*17.0*	*35.3*	*23.7*
Estonia	66	66	27.6	21.5	23.6	27.2
Latvia	52	54	29.4	13.7	34.9	33.8
Lithuania	39	41	33.4	25.0	22.7	22.3
***Baltic states*[1]**	*52*	*54*	*27.1*	*20.2*	*27.8*	*27.1*
Belarus	76	54	26.3	25.8	35.6	28.6
Moldova	57	40	27.8	14.9	26.8	16.0
Russia	65	54	32.2	27.5	33.4	33.3
Ukraine	59	40	27.7	19.9	28.7	14.7
***Slavic FSU*[1]**	*64*	*47*	*28.5*	*22.0*	*31.1*	*23.2*
All countries	*69*	*69*	*28.6*	*21.2*	*31.0*	*23.9*

Sources: CCET-OECD (1996), EBRD (1996), World Bank (1995b) and (1996b), Economic Commission for Europe (1996).

[1] Unweighted averages.

- ***The fall of output***. The 'accelerator theory' explains changes in the level of domestic investment on the basis of changes in the level of aggregate output. As in the 1990s aggregate output declined sharply for several years, it could be surmised that the fall in investment is driven by this phenomenon. Empirical evidence for selected OECD countries for the post-war period confirms, for instance, that investment trends were highly correlated with changes in national income and output, but that the fluctuations in investment were 2.5 to 4.8 times greater than for output (see Burda and Wyplosz 1993, Kydland and Prescott 1990,

Blackburn and Ravn 1992 cited in Rostowski 1995). Rostowski (1995), however, demonstrates that this hypothesis does not explain satisfactorily the recent changes in investment rates in the economies in transition. Contrary to expectations, in most of Eastern and Central Europe, the decline in investment has been only moderately greater than the decline in output. This is true at both the aggregate and sectoral level. For instance, an analysis of sectoral investments in Poland and Hungary confirms that the 'accelerator hypothesis' does not explain satisfactorily changes in sectoral investment (ibid).

Our data point in the same direction for the majority of the economies in transition. If investments were determined according to the accelerator theory (including to its 'flexible accelerator' formulation), the investment/GDP ratio should show much more pronounced falls during the years of recession, and more pronounced increases during the years of recovery (see Table 3). Only in few countries (Latvia, Slovenia, Romania, and Ukraine in 1994) this more than proportional fall/rise of investments has been observed (ibid.). As this hypothesis finds little support in the data, other causes for the recent fall in investments must be sought.

- ***The fall of savings.*** In the neoclassical approach, the level of investments is determined by the level of savings. An empirical analysis of the relationship between these two variables provides interesting results. In spite of the liberalisation of the financial sector and the move to real interest rates, i.e. factors that should have led to an expansion in financial services and greater incentives to save (Khan & Zahler 1987), the fall in household incomes has led to large declines in saving rates in most transitional economies. Table 3 and Charts 2a to 2d in the Annex illustrate the decline in national saving rates in the region. Of the 14 transitional economies in Table 3 the saving rate has increased during the past six years only in Estonia[1]. In most cases, the

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[1] Changes in savings rates are calculated by comparing averages over the pre-transition decade (1980-89) with those for 1990-94. The use of averages over 1990-94, a period during which rates have often fluctuated widely, may not be the best way to gauge measure of the saving and investment changes during the transition period, but is a convenient way to estimate the total fall of investment over the medium-term. This approach entails also periodisation problems. For instance, the use of 1989 as baseline of the transition is in some cases inadequate,

decline of savings has been accompanied by a quasi-commensurate decline in investment, suggesting that the fall in the former has played an important role in the decline of the latter. Generally speaking, the decline in saving has not been as extensive as the decline in investment.

Charts 3a to 3d in the Annex illustrate graphically the relation between the saving rate and the investment rate during the pre-transition period (using the average over 1980-89) and during the transition (using the average over 1990-94). These charts tell an interesting story. As noted, in most cases, the two variables appear substantially correlated. However, the patterns of differential falls between savings and investment vary substantially across groups of countries. In a first group of countries (Romania, Bulgaria, Slovenia, Russia, Ukraine and Moldova) the decline in savings and investments is broadly proportional. In contrast, in a second group (the Czech Republic, Slovakia, Hungary and, to some extent, Poland) one observes a favourable shift from a pre-transition situation where savings exceeded investments - because of lack of confidence, monetary overhang, dollarisation, etc. - to a post-transition one in which investments exceed savings - possibly because of FDI inflows, the return from abroad of capital flights, etc. In a third group of countries (the Baltics and Russia) the opposite situation (a greater fall in investments than in savings) is observed (see Charts 3c and 3d in the Annex). In these cases, the decline in saving rate alone is either too small (or even positive) to explain the fall in investment, and other explanations must thus be found. These will enable us to formulate some plausible assumptions about future developments in investment behaviour in transition economies. Among the factors that may help explaining the differential patterns of change in investments and savings between the pre- and post-transition period, we discuss hereafter those related to the establishment of clear property rights, FDI and trade liberalisation.

- ***Uncertainty about property rights.*** Falls in investments greater than in savings can be explained by slow progress in establishing a new and clear property rights regime. Countries that proceed in a swift manner with the establishment of indisputable property rights and the

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as in the case of the FSU. However, although liberalisation started during 1991-2 in most of the FSU, the economic climate that influences savings and investment decisions had already started to change earlier.

promotion of a modern and properly regulated private sector are expected - *ceteris paribus* - to attract more investments than countries where these reforms occur more slowly, or not at all. This explains why the investment rates in Eastern Central Europe have on average maintained close to the pre-transition level despite a fall in savings.

Table 4. Differential changes in savings and investment rates, and indicators that influence the savings or investment behaviour, 1989-94

	ΔS - ΔI during transition°	Private sector development index[1]	Liberalisation of external markets[2]	Dollarisation of the economy (%)[3]
savings > investments over 1990-94				
Latvia	14.7	1.7	2.5	35
Estonia	9.7	2.3	3.1	¤10
Belarus	6.5	1.1	1.1	..
Russia	4.5	1.8	1.9	40
Slovenia	4.1	3.2	4.7	45
Moldova	2.0	1.2	1.8	..
Romania	0.5	1.6	2.5	^35
Bulgaria	-0.2	1.4	4.4	35
Poland	-4.8	3.6	4.7	¤30
investments > savings over 1990-94				
Lithuania	8.1	2.2	2.6	¤30
Hungary	-6.1	3.0	4.8	20
Ukraine	-6.2	0.8	0.6	35
Czech Rep.	-7.2	3.7	3.5	10
Slovak Rep.	-8.5	3.5	3.5	10

Sources: De Melo, Denizer & Gelb (1996), IMF (1994).

° The difference between changes in saving rate and investment rate averages over 1980-89 and 1990-94. A negative figure indicates, that savings have fallen more rapidly than investments.

[1] Sum of annual indicators (given as an index number between 0 and 1) measuring the development of private sector and the banking reform between 1990-94.

[2] Sum of annual indicators (given as an index number between 0 and 1) measuring the liberalisation of foreign trade regime and currency convertibility between 1990-94.

[3] The ratio of foreign currency deposits to broad money at the end of 1994 (IMF 1994, 70-71); ¤ indicates a falling trend of dollarisation; ^ indicates a rising trend of dollarisation.

The private sector development indices (Table 4, second column) are the highest in the Czech and Slovak Republics, where the investment

rate has risen. Also in Hungary and Poland, where private sector development has been comparatively positive, investment rates have declined slowlier than the saving rates. In other countries, in contrast, incentives to invest have been reduced by persisting uncertainty about property rights and overall lack of liberalisation. In these countries, investment rates have fallen faster than saving rates. In some of these countries the differential between the two rates has reached pathological levels (Table 4, first column, upper part). Also this hypothesis, however, is not completely satisfactory, and it does not adequately explain, for instance, the changes in investment and saving observed in Ukraine.

Table 5. Foreign direct investment in Eastern Europe

	1989	1991	1993	1995	1989-95	1995 as % of GDP[1]
Bulgaria	0	56	40	115	362	0.8
Czech Republic	316	511	517	2500	5881	6.9
Hungary	215	1459	2328	4410	11394	10.7
Poland	84	117	580	1134	2751	1.2
Romania	18	37	87	417	967	1.4
Slovak Republic	10	82	134	180	704	1.2
Slovenia	9	41	112	144	530	1.0
Belarus	0	0	7	7	33	0.6
Estonia	0	0	160	205	638	8.8
Latvia	0	0	49	216	587	6.3
Lithuania	0	0	31	41	113	1.0
Moldova	0	0	0	64	76	4.5
Russia	400	-100	682	920	5118	0.3
Ukraine	0	0	198	148	699	0.4

Source: Economic Commission for Europe (1996).

[1] Calculated as percentage to 1994 GDP.

- ***A smaller than expected inflow of Foreign Direct Investments (FDI).*** While during the socialist era FDI was almost irrelevant, the great hopes for their rapid increase following economic liberalisation appear to have been broadly betrayed. Failure to create a stable economic and political environment and institutional problems (see above) rendered the prospects for massive inflows of FDI in the region problematic despite the favourable 'economic fundamentals' (comparatively low wages, plentiful supply of skilled labour, relatively good infrastructure, closeness to Western markets and so on) of many

of these economies. Thus, expectations were hardly met (Table 5), with the relative exception of countries (such as Hungary) which have proceeded relatively faster on the road of privatisation and liberalisation, and of countries (such Estonia and Latvia) which have emerged as regional banking centres. In only these countries, the aggregate value of FDI since 1989 has exceeded 5 per cent of their 1995 GDP. When compared with the FDI flows in several countries of South East and East Asia, these values appear rather modest. In most of the other Eastern European countries, FDI have remained negligible.

- ***High foreign currency deposits and capital flights.*** In the Baltic countries and, to some extent Slovenia, privatisation proceeded expeditiously, the currency was stabilized rapidly and 'policy credibility' was attained faster than in most of the region. In spite of this, and of the comparatively modest decline of the saving rate, investments remained relatively depressed. This discrepancy might be attributed to the composition of savings in these countries. If a large part of total savings is held in foreign currency (a situation virtually identical to that of capital flights), domestic investments will - *ceteris paribus* - remain relatively depressed. The figures in the last column of Table 4 indicate that at the end of 1994 the 'dollarisation' of Slovenia, Latvia, Lithuania and Russia was exceptionally high, suggesting that a considerable share of the high saving rates recorded in these countries was held in foreign currency. In Estonia, the 1994 figure for dollarisation was low, but this level was achieved only in 1993/4 (expectedly, in the same year, the investment rate surged despite the stagnation of savings). In Poland, the 1989 peak of the saving rate can be explained by a similar peak in dollarisation: during 1989 the ratio of foreign currency deposits to broad money arrived at 80 per cent. The only country for which the extent of dollarisation does not explain the discrepancy between savings and investments is Ukraine.

- ***The impact of trade liberalisation on consumption.*** The level of savings and investments can be influenced also by trade liberalisation. In the former socialist economies, high savings where often the result of considerable shortages of consumer durables. Trade liberalisation, a policy followed by most Eastern European economies in transition, increases the supply of goods and thus affects consumer behaviour. Because of this, purchases of consumer durables, scarcely available during the socialist era, can increase sharply despite a fall in household

incomes, because of an increase in the marginal propensity to consume. The clearest example of this general pattern is given by the case of Poland over 1990-2. Indeed, the index of import liberalisation (Table 4, third column) is higher in those countries where the savings rate declined proportionately more in relation to the investment rate.

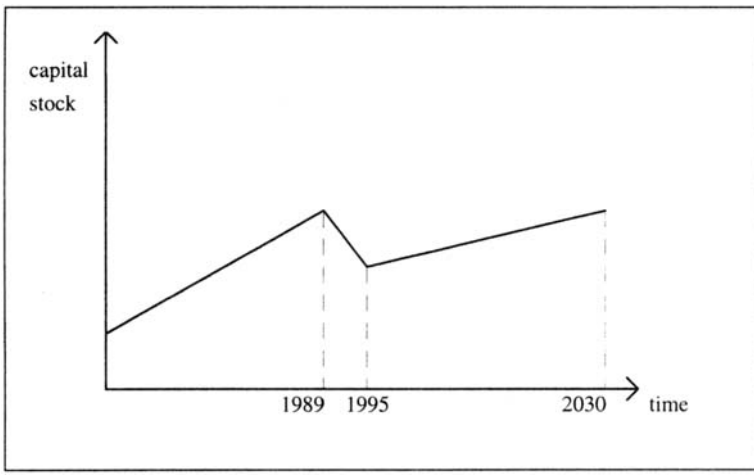
To conclude, the high savings and investment rates typical of the former socialist economies of Europe have fallen sharply in all the region, in some cases to extremely low levels. Evidence that this fall is due to the functioning of an accelerator mechanism is weak. In contrast, there seems to be some indications that the drop in investments is correlated with the decline in savings rate, trade liberalisation, lower than expected inflows of FDI, uncertainty about the property right regime and the credibility of the reforms underway. Except for the latter two, these factors seem to be of structural nature, thus suggesting that investment rates in the region will remain at a comparatively modest level in relation to the recent past.

- **A slow overall capital accumulation ?** As a result of the trends discussed above, it is likely that - after an initial sharp one-off fall (roughly estimated at close to 50 per cent in the former USSR and at about 30 per cent in the Visegrad countries) - the capital stock in most countries of the region will rise over the long term at a slower pace than in the past. In the countries of the former Soviet Union, gross investment ratios of around 15 per cent of GDP are likely to prevail for the next several years, and the pre-transition level of capital stock not to be reached soon (see Figure 1).

In contrast, the physical capital stock in the Central European countries suffered a less dramatic initial write-off and is expected to grow over the next three decades at faster rates than in the former Soviet Union due to higher saving formation, the declining impact of trade liberalisation and dollarisation, and the less pronounced 'crowding out' of financial savings for the financing of government deficits (see later). In these countries, the recent recovery of investment is an encouraging sign, and the ten points decline experienced in the first years of transition is not expected to last for ever. The high investment rates of the planned economies will not be recovered but, because of the need for the modernisation of the industrial structure, gross investment rates may rise to slightly higher levels than in Western Europe. Also in these

countries, however, the initial write-off and several years of low investments will keep the capital stock below its 1989 level for a considerable period.

Figure 1.
Past and expected evolution of capital stock in the economies in transition



(iii) Efficiency gains following marketisation. The above statements must be qualified on several accounts: first, the estimation of capital stock involves difficult choices concerning an appropriate 'set of prices' for the capital goods. Since the transition, these prices have changed drastically, though we do not know exactly by how much. Second, the issue of the destination of the capital stock can not be ignored. It may well be that part of the capital stock written-off after the transition was used for purely unproductive uses and that its scrapping (and the subsequent decline in the value of the capital stock) is only an accounting phenomenon with no impact on growth. Third, liberalisation is expected to bring about substantive improvements in capital and total factors productivity (see later), a fact that will be taken into account in our simulations. The estimates of the capital stock used in the paper are therefore purely illustrative. They only aim at stressing the key (but generally ignored) issue of capital accumulation in the debate about long-term growth and welfare in the region.

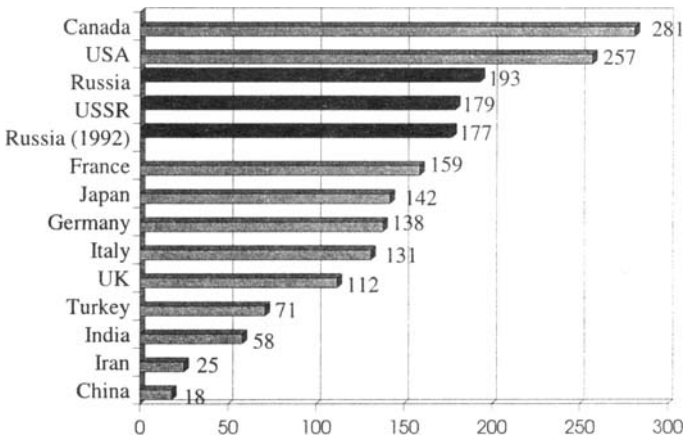
3. EROSION OF THE HUMAN CAPITAL STOCK AND LONG-TERM GROWTH

Few would argue that investment in human capital is a less important development factor than investment in tangible assets. In the Western countries, for instance, the stock of human capital is now no less significant than that of fixed capital: while in the 1920s, in the US, the value of the latter was over 2 times larger than the investment in education, health care and labour force programmes, in the 1970s the two stocks were valued roughly equally. In some sense, human capital appears to be as, or more, important for economic development than the stock of machinery and equipment, buildings and structures. The best prove of this statement is offered by the reconstruction in Germany (and other war-torn countries) after World War II. While by mid-1945, Germany had lost the major part of its fixed capital, its large stock of human resources had suffered much smaller losses and allowed in only five years to recover pre-war output levels. Both old and recent theoretical developments (we refer here to the 'human capital theory' and to the 'theory of endogenous growth') point in the same direction. Empirical estimates of the contribution of human capital to overall growth tend to suggest that the output elasticity of this factor is almost as high as that of physical capital, and that its importance tends to raise with the level of development (Mankiw et al 1992; see also Table 12).

How large was the human capital stock inherited from the socialist era by the new democracy of Eastern Europe? How much can it contribute to future growth and welfare? Prior to the transition, most countries of the former Soviet bloc enjoyed a relatively high international standing in this area. Undoubtedly, one of the achievement of the socialist system had been a considerable increase in the overall level of literacy and education. In the USSR, for instance, illiteracy was almost liquidated before World War II (in 1939, 87 per cent of the population aged 9-49 was literate, and this ratio rose to 98 per cent in 1959). Already in the late 1950s, was full enrolment in primary and secondary education achieved. As a result, the number of employees with 8 or more years of education per 1000 increased from 123 in 1939 to 921 in 1989, while the number of employees with university diplomas per 1000 increased over the same period from 13 to 143 respectively. Professional training was a high priority. The number of students in vocational training, technical colleges and universities, and under re-

training grew from 12 million in 1940-41 to 55 million in 1989-90. Meanwhile, the number of university students per 10,000 inhabitants rose to 177 in 1989-90 (Figure 2). Similar trends were observed also in the other Soviet republics and - *a fortiori* - in Central Europe.

Figure 2. Number of university students per 10.000 inhabitants, late 1980's



Source: Goskomstat of Russia.

Despite a decline in the resources allocated to education in the 1980s, in 1989-90 Russia had more university students per 10,000 inhabitants than most Western European countries and Japan, and substantially more than the developing countries. Only the US. and Canada had higher tertiary enrolment rates (Figure 2). Soviet school and university education in maths and physics was considered to be among the best in the world; while university education in chemistry, biology and social sciences did not meet world standards, it still had some strong points. The commission of the USA Congress that analysed the reasons of Soviet technological break-through (e.g. the satellite launch of 1957) came to the conclusion that the single most important contributing factor was the high standard of Soviet educational system.

Table 6. Education profiles in selected countries

	Full-time students per 100 people (age 5-29), 1992*	Secondary full-time net enrolment ratio, %, 1992*	Tertiary net enrolment ratio (as % of ages 18-21), 1992	Tertiary natural and applied science enrolment (as % of total tertiary), 1992	Expenditure on education - public (as % of GNP, 1992) and total (as % of GDP, 1991)**
USA	54	91 (98)	39 (81)	17	5.3 (7.0)
Japan	56	95 (96)	... (30)	22	4.7 (5.0)
Western Europe	49-61	76-97 (81-126)	20-42 (23-63)	16-39	3.1-8.4 (3.0-7.6)
Czech Rep.	51	87 (87)	... (16)	42	4.6
Hungary	49	75 (81)	10 (17)	29	7.0 (6.7)
Poland	53	85 (85)	13# (26)	28	5.6 (4.9)
Russia	45	60 (87)	... (45)	51	4.0
Ukraine	...	... (80)	... (46)	52	4.8
Developing countries	...	... (64)##	... (23)##	30	3.9
Eastern Europe & CIS	...	...	...	38	5.2

Source: UNDP (1996).

*First figure is for 1992 from Human Development Report (18-21 age group for tertiary education), figures in brackets - for 1993 from World Development Report (20-24 age group for tertiary education). **The first figure stands for public expenditure, the figure in brackets - for total expenditure. #Ages 22-25. ##Middle income countries.

As data in Tables 6 and 7 suggest, Eastern Europe still has higher secondary and tertiary enrolment indices than most developing countries - in fact, they are not considerably different from those of the mature market economies. However, many secondary institutions for vocational training provided skills now often considered obsolete. In addition, the high share of students in natural and applied sciences should not be necessarily viewed as an advantage, since it reflects primarily the weak emphasis on business and law education. Finally, the emphasis of education in the former socialist countries was substantially less oriented to problems-solving than in the market economies. While mathematics and science scores of children from the

former Soviet Union, Hungary and Slovenia were considerably above the international average, the scores concerning the application of academic knowledge to new circumstances were substantially lower.

Prospects for the future development of human capital in Eastern Europe are, however, uncertain. Since the onset of the transition, enrolment rates in pre-primary education (essential for school preparedness) have fallen. While primary education has been unaffected, rates in secondary education have eroded (though from high levels) outside Central and Eastern Europe.

The quality of education may have deteriorated even faster, due to largecuts in public expenditure which have led to widespread shortages of inputs and teaching equipment, and to large falls (often below 'efficiency wages') in teacher's salaries, which have likely adjusted downward the amount of time spent tutoring their pupils. However, the privatisation of the university system has led to rising enrolments in higher education in a few Eastern European countries.

Finally, during the last six years a considerable number of scientists (physicist, mathematicians, engineers, etc.) has left the region, thus causing a decline in the human capital stock somewhat similar to that observed in the case of the physical capital stock. For instance, the 'brain-drain' from Russia has immediately gained momentum as soon as restrictions to emigration were lifted and living standards deteriorated: a good 30 per cent of the new math professors hired by French universities in 1992 were from Russia; there were thirty thousand ex-Soviet specialists working in 1993 in the USA and Israel and 4 thousand in Germany. In 1991-92 alone 0.8 per cent of the R&D personnel of the Russian Academy of Sciences emigrated and by the end of 1992 another 2.8 per cent was employed on long-term contracts abroad. As a whole, over 5 per cent of R&D personnel of the Academy of Sciences is currently working abroad. In the field of mathematics, general and nuclear physics, astronomy, biophysics and biochemistry, the situation is much worse. Already by December 1992, 12 per cent of the researchers of the mathematics department of the Academy worked abroad.

Table 7. Secondary and tertiary enrolment rates in selected socialist countries and middle income market economies, 1990 (% of respective age group population)

	Secondary enrolment	Tertiary enrolment
Former socialist countries*	**83**	**22**
-Bulgaria	74	31
-Czechoslovakia	84	8
-GDR, 1988	79	34
-Hungary	79	15
-Poland	82	22
-Romania	92	-
-USSR	94	26
-Yugoslavia	79	18
-China	48	2
Middle income market economies*	**69**	**22**
-Argentina, 1987	74	41
-Brazil	39	12
-Chile, 1988	74	19
-Mexico	53	14
-Venezuela, 1989	35	29
-Hong Kong, 1985	72	13
-Israel, 1989	83	33
-South Korea	87	39
-Malaysia	56	7
-Singapore, 1980	58	8
-Greece	99	29
-Portugal, 1989	59	18
-Turkey	54	14
-India, 1987	38	7

Source: UNESCO (1992). * Unweighted average.

Whereas in the neo-classical approach the "brain drain" increases world income and welfare in the recipient countries without reducing welfare in the countries of origin, it has been shown that in the presence of externalities (such as losses of scarce skills) migration of skilled workers may reduce the welfare for the non-immigrants in donor countries (Haque and Kim, 1995). Thus, all in all, 'brain-drain' and the recognition of the obsolescence of the some of the skills imparted in the

school system for years have caused a 'one-off' reduction in the pre-transition stock of human capital, while the current qualitative and quantitative weakening of the educational system is likely to affect the future additions to such a stock. The liberalisation of the system may, however, in part correct for such a problem by allowing a more efficient use of the existing human capital stock.

Table 8. Changes in enrolment rates in Eastern Europe

	Pre-Primary		Primary		Secondary	
	1989	**1995**	**1989**	**1995**	**1989**	**1995**
Bulgaria	75.1	67.5	98.4	93.7	78.2	*65.0
Czech Republic	99.3	88.6	98.5	98.9	¤79.6	97.4
Hungary	85.7	86.9	99.0	99.1	74.9	91.1
Poland	48.7	*44.3	98.1	97.2	78.9	83.1
Romania	82.9	58.4	97.3	99.5	91.1	76.9
Slovak Republic	91.5	70.8	97.7	99.5	88.7	91.7
Slovenia	55.0	61.4	95.5	97.5	79.3	82.5
Belarus	83.3	82.1	91.4	94.3	88.7	84.4
Estonia	60.0	61.1	97.0	95.6	¤88.8	78.6
Latvia	62.7	47.1	....	95.6	84.7	81.0
Lithuania	63.9	36.2	91.3	94.9	¤93.4	85.4
Moldova	61.0	45.0	....	97.0	92.0	*82.0
Russia	69.3	54.0	97.1	**94.2	96.3	92.0
Ukraine	61.2	*44.0	98.7	96.9	62.2	*54.8

Source: UNICEF-ICDC (1996).
* 1994, ** 1993, ¤ 1990

In our simulations we assume that in Russia, the stock of human capital fell by about 20 per cent over 1989-95 and is likely to fall to about 66 per cent of its 1989 value by the year 2005. This assumption is dictated by the above data on brain drain and continued deterioration of the quality (and in some cases the quantity) of education, and by the duration (of about 10 years) of the current education cycle, which allows only for substantially lagged improvements in the stock of human capital, even if a more pro-active education-and-training policy were introduced immediately. After 2005, the stock of human capital is expected to recover gradually and to reach again its pre-transition level by the year 2020.

The assumptions made for the countries of Central and Eastern Europe are more favourable. Thus, for the Czech Republic, which experienced

an increase in secondary enrolment rates over 1990-95 (Table 8), we assume a reduction of the stock of human capital by about 6 per cent in 1989-95 and by another 4 per cent until the year 2003 (i.e., with a reduction of about 10 per cent over 1989-2003), mainly because of human capital flight. After 2003, the stock of human capital is expected to rise faster than in Russia.

4. THE TRANSITION'S DEMOGRAPHIC CRISIS AND LONG-TERM GROWTH

As amply documented, throughout the region, the transition has induced a demographic crisis of unprecedented proportions. Poland, Slovakia and the Czech Republic are partial exception to this rule. Between 1989-95, marriage and fertility rates in the region have fallen by up to 50 per cent (without giving yet sign of stabilizing), while standardised death rates have risen by up to 40 per cent (particularly in the countries of the former Soviet Union). The category most affected in absolute term by this surge in mortality is that of males in the 35-55 age group, though in relative terms the impact has been the greatest for the 25-35 years old males. The increase in mortality appears to have stabilized but not to have returned to its pre-transition levels.

What will be the welfare impact of these changes over the period 1995-2030? There are three channels through which changes in population levels and structure (see Annex Table 1) are expected to affect welfare over this period:

*(i) **The sharp fall in fertility*** which began taking shape in 1990 will lead to a shrinking of the cohorts entering the working age population from the year 2005. For instance, between 1989 and 1995, in Russia and the Czech Republic, the yearly number of births fell respectively from 2.15 to 1.39 million and from 128 to 96 thousand, and is expected to fall further in the years to come in both countries. Only in Poland, which suffered a more contained decline until 1995, is fertility assumed to remain broadly constant at the early 1990s level until 2010 and to decline slowly since then. In no countries, is fertility expected to recover its pre-transition levels. Part of the implicit decline (or slower increase) in the size of the labour force might be compensated in a few countries by the increase in migration from other parts of the region, as

in the case of Russia. Though migrations may make up for the shortfall over the short term, this cannot be assumed to last for ever. In addition, this is a phenomenon observed in Russia, but not elsewhere.

(ii) The 1989-95 increase in mortality (where this has occurred) will substantially alter the shape of the upper part of the population pyramid. In particular, from 2010 onwards, the number of elderly in the age group 65-85 will be smaller than that expected on the basis of pre-transition trends. In a similar way, the surviving cohorts of the 55-65 years old (then still part of the labour force) will be smaller, especially for men.

(iii) Dependency ratios and the ratio of pensioners to people in the labour force (20-59) may change in an unfavourable manner as a result of the mortality and fertility changes illustrated above. While the number of pensioners is likely to decline because of the 1990-5 increase in deaths of 35-55 years old males, the size of the labour force is likely to decline faster because of the fall in birth rates and the excess mortality for the 25-35 years old. Hereafter, we explore the changes in labour supply and in the population in pensionable age in three different country situations, i.e. in Russia (which suffered an unending recession and possibly the most severe population crisis in the region); the Czech Republic (where both these phenomena have been less intense, but where fertility is expected to continue declining, to stabilize only around 2010, and where population ageing is expected to become more pronounced); and Poland (which has been less affected by both mortality and fertility changes, but which has been affected by a large policy-induced increase in the pensioners population).

For these three countries, population projections obtained from the Central Statistical Offices of these countries (and reflecting the above information about changes in fertility and mortality) suggest somewhat different patterns in the evolution of the pensionable or post-productive population and in age dependency ratios (Table 9 and Annex table 1):

- **In Russia** (but the same argument could be extended to all Slavic states of the former Soviet Union and to the Baltic countries), the evolution of the population structure to the year 2030 is affected by the following historical events. The first is the mortality impact of World War II, which will wash out by 2010. This event has kept so far the

share of post-productive population and the dependency ratio at a lower level than in the other socialist economies. The second effect is due to the decline in fertility during, and immediately after, World War II (a fact which affects the cohorts 45-49 and 50-54, which will exit the working age population after 2005, causing then a decrease in the relative weight of this population group). This effect will be reinforced by the greater mortality rates among these age groups (together with the 55-59 group) during the 1990-95 mortality crisis.

Table 9. Changes in age dependency ratios and in the productive and post-productive age population in the Czech Republic, Poland and Russia, 1995-2030, assuming different retirement ages

Retirement age		1990	1995	2000	2005	2010	2015	2020	2025	2030
	Age dependency ratio[1]									
65	**Czech**	19.11	19.36	19.99	20.07	22.38	27.23	31.92	34.20	36.21
	Poland	15.53	16.93	17.62	18.03	17.62	20.63	24.70	29.12	31.05
	Russia	14.34	17.78	18.04	20.19	18.98	20.01	23.91	26.88	30.17
60	**Czech**	29.16	28.57	28.16	30.64	36.14	42.36	46.24	49.05	51.73
	Poland	24.77	25.75	25.62	24.80	28.46	34.03	38.60	40.80	41.89
	Russia	24.91	26.94	29.21	26.77	27.99	32.38	38.09	41.94	43.83
	Productive age population, 1995 = 100									
65	**Czech**	99.1	100.0	109.3	110.9	109.9	105.3	101.5	99.7	97.2
	Poland	96.1	100.0	111.6	114.0	115.2	112.6	110.4	108.6	107.8
	Russia	102.7	100.0	109.8	111.2	111.9	109.4	105.3	103.5	113.5
60	**Czech**	99.1	100.0	102.3	102.0	98.9	94.1	91.5	89.5	87.1
	Poland	96.1	100.0	104.5	107.9	105.5	101.3	99.3	99.6	99.8
	Russia	102.7	100.0	100.3	105.4	104.1	99.1	94.5	93.4	92.5
	Post-productive age population, 1995 = 100									
65	**Czech**	93.1	100.0	76.8	77.8	85.9	100.4	113.2	119.2	123.4
	Poland	93.4	100.0	76.4	79.8	78.8	90.2	105.9	122.9	130.0
	Russia	93.1	100.0	73.5	83.4	78.9	81.2	93.4	103.2	113.5
60	**Czech**	93.1	100.0	100.9	109.5	125.1	139.5	148.1	154.0	157.8
	Poland	93.4	100.0	103.9	103.8	116.7	134.0	148.8	157.8	162.4
	Russia	93.1	100.0	108.8	104.8	108.1	119.2	133.6	145.4	150.8

Sources: Russia: Centre for Demography and Human Ecology (1996). Poland: Central Statistical Office of Poland (1996). Czech Republic: Charles University, Department of Social Geography (1996). IDB, Bureau of Census, USA (1996).

[1] Given as a percentage of post-productive population to productive population.

Note: The 1990-95 figures always refer to 60 in retirement age.

The third effect is due to the 'baby boom' of the 1950s. These new entrants will remain in the working age population up to 2010. Fourth, the cohort of the 1980s mini baby-boom (attributed to *perestroika*) will enter the working age population in 2005, immediately followed by the two subsequent much smaller 0-4 cohorts (born in 1995 and 2000), which were affected by transition's fertility crisis (the drop started in 1992 and it is expected to continue at least up to 1997). These various offsetting trends explain the evolution of both the post-productive population and in the dependency rate.

- **In Czech Republic**, the evolution of population structure and dependency ratio is more straightforward and more evidently affected by the fall in the fertility rates which started during the transition and will carry on up to 2010 (and broadly stabilize since that year). The effect on fertility of World War II is smoother. In addition, the 'baby-boom' of the 1950s is not as significant as in Russia, and the transition's mortality crisis only marginal. In the case of the Czech Republic, therefore, the evolution of the dependency ratio is mainly driven by the recent and expected drop in fertility. In dynamic terms, this will mean a slight increase of the dependency ratio up to 2005, followed - since that year - by a sharper rise due to the decline in the smaller size of the cohorts entering the working age population. The result is a sharp deterioration in the dependency ratio from 2005 onward. As in Russia, the scenario assuming that the present norms retirement age will not be modified shows the less favourable evolution in dependency ratios. But even with more favourable assumptions about retirement age the situation does not improve too radically.

- **In Poland,** all these trends will be much smoother and the dependency ratio will be little affected until the year 2010. The ratio even improves marginally until 2005, if a retirement age of 65 is assumed.

5. SOCIAL POLICY, PUBLIC DEBT AND INTER-GENERATIONAL EQUITY

Growth and welfare over the period 1995-2030 will also depend on current and future policies in the field of social expenditure - particular in the field of 'pension generosity' (which we measure in this paper as the ratio of the average pension to the average wage) and retirement age. Assuming non inflationary financing, growing government expenditure on pensions (either because of an increase in the number of pensioners, pension generosity, or both) results - *ceteris paribus* - in rising deficits and to an accumulation of public debt, which - because of its future debt-servicing cost - have a negative *inter-generational* impact. In addition, high pensions for the final year (2030) have a negative *intra-generational* effect, as the pensions system are assumed to remain of the paygo type. Higher pensions will thus entail greater quasi-taxation of gross wages by means of higher social security contributions.

While few countries (Bulgaria and Poland) had non-negligible foreign debts in the pre-transition period, in the former centrally planned economies of Europe, domestic debt was generally modest or non-existent. In the post-transition period, however, most of the countries of the region have experienced large budget deficits and increases in their public debt/GDP ratios (Table 10). This seems to be the case, in particular, for Bulgaria, Hungary, Poland, Moldova, Russia and Ukraine. In the last three countries, however, the accumulation of debt has - in reality - been much less pronounced, as a large part of the deficits was financed through monetary emissions and not through an increase in government debt. While the monetary financing of deficits avoids major intra-generational and inter-generational problems, it does cause other unfavourable effects. Indeed, the increase in the price level caused by the recourse to monetary emissions imposes a heavy 'inflation tax' on the population (particularly the poor), and leads to macroeconomic instability, dollarisation of the economy, capital flights and policy uncertainty, i.e. all factors which also affect growth and welfare.

Table 10. Budget deficits and debt accumulation (as % of GDP) over 1989-95

	Government budget balance % of GDP							Debt/ GDP increment	Average deficit	Domestic debt/ GDP
	1989	1990	1991	1992	1993	1994	1995	1989-95[1]	1989-95[2]	1994
Belarus	..	3.5	2.2	0.1	-4.2	-2.8	-2.6	-7.64	-1.2	*12.4
Bulgaria	-1.4	-2.8	-14.7	-15.0	-15.7	-7.0	-6.0	-63.30	-9.4	50.6
Czech Rep.	-3.8	-0.6	-2.8	-2.2	0.6	-1.3	-1.6	-12.23	-1.7	12.1
Estonia	2.8	2.9	5.2	-0.3	-0.7	1.3	0.3	6.98	1.4	..
Hungary	-1.3	0.9	-3.0	-6.8	-6.7	-8.6	-6.7	-31.53	-4.3	..
Latvia	0.8	2.1	6.3	-0.8	0.6	-4.0	-3.4	3.38	0.5	..
Lithuania	-6.8	-2.6	1.8	2.2	-0.1	-2.0	-1.3	-19.60	0.5	..
Moldova	2.0	3.0	0.0	-26.2	-7.4	-9.0	-5.5	-62.45	-10.7	..
Poland	-8.0	3.3	-6.7	-8.0	-4.0	-2.0	-2.7	-25.52	-4.2	23.6
Romania	8.4	1.1	-1.7	-4.6	-0.1	-1.0	-2.5	2.00	0.4	‡11.3
Russia	..	..	-20.0	-18.9	-7.6	-10.1	-4.8	-80.24	-14.2	..
Slovakia	-3.8	-0.6	-2.8	-11.9	-7.1	-1.6	-0.4	-27.14	-4.6	..
Slovenia	..	..	2.6	0.2	0.3	-0.2	-0.5	2.19	0.7	..
Ukraine	5.8	2.6	-13.5	-29.3	-10.3	-8.8	-3.5	-109.71	-15.5	..

Source: EBRD (1996), IMF (1996).

[1] estimated as the sum of budget deficits accumulated over the 1991-95 period for the FSU and for 1989-95 for the other countries, expressed as % of 1995 GDP.

[2] 1991-1995 for FSU.

* 1992, ‡ debt in August 1996/1995 GDP.

Obviously there will be - in principle - ample room in the years to come to control and even reduce these deficits and public debts. However, as the experience of rapid pension-driven accumulation of debt in Italy in the 1980s, Finland in the 1990s and in Hungary and Poland in the post-transition years shows, political economic conditions do not always make it possible to quickly reverse these trends. One may argue that the desire of many of these countries (the Central Europeans, the Baltics, etc.) to join the European Union. would automatically limit the rise of pension transfers and public debts. Reality indicates, however, that trends in this area over the last six years have generally moved in the opposite direction (Table 11), with only few exceptions (such as the Czech Republic).

Table 11. Changes in the number of pensioners, population over 60 of age, pension generosity and public expenditure on pensions on GDP over 1989-94

	Number of pensioners			Popul. above 60 years	Average pension / average wage			Pensions / GDP	
	Mio		Ratio	Ratio	%		Ratio		
	1989	1994	1994/ 89	1994/89	1989 -90	1993- 94	1989/ 94	1989 -90	1993 -94
Czech Rep.	2.39	2.50	104.5	102.0	53.2	48.8	91.7	8.2	8.2
Hungary	2.29	2.59	112.9	99.6	62.8	58.3	92.8	9.4	‡10.7
Poland	5.47	6.87	125.6	108.5	*44.6	72.4	162.3	6.5	†14.9
Slovakia	1.07	1.17	110.2	104.2	50.1	45.0	89.8	7.7	9.2
Slovenia	0.37	0.45	123.8	111.3	*75.2	74.6	99.2	...	...
Bulgaria	2.21	2.42	109.8	106.2	52.7	45.5	86.3	8.7	9.4
Romania	3.35	4.99	134.2	109.7	50.7	49.2	97.0	5.7	**6.7
Belarus	2.30	2.64	114.6	109.4	^25.7	36.0	140.0	6.2	6.0
Moldova	0.76	0.75	97.9	103.4	42.0	58.6	139.5	...	...
Russia	32.2	36.1	112.3	108.2	34.6	34.3	99.1	5.9	†5.9
Ukraine	12.6	14.5	115.0	103.1	^31.6	†39.1	123.7	4.4	†7.7
Estonia	0.36	0.38	104.4	104.1	35.8	36.9	103.1	...	...
Latvia	0.60	0.66	110.7	103.0	33.7	32.1	95.2	6.1	10.9
Lithuania	0.84	0.90	106.9	107.8	42.3	47.7	112.8	5.2	6.0

Source: Authors' elaboration on the Transmonee database.
* 1989 only; ^ 1990 only; † 1993 only; **1991-2; ‡ 1992-3.

As shown in Table 11, the transition has been accompanied by a massive increase in the number of pensioners. A comparison between the third and fourth columns of Table 11 indicates that the increase in the number of pensioners has been much faster than that of the population of over 60 years of age, thus indicating that governments have massively promoted early retirement schemes (which - *ceteris paribus* - generate adverse intra- and inter-generational effects). Hungary, Poland, Slovenia, Romania and Ukraine are countries where this phenomenon has been most pronounced. Except in the case of Poland, Belarus, Moldova and Ukraine, pension generosity has slightly declined in relation to the 1989 level. The effect of large increases in the number of pensioners combined with a modest decline in pension

generosity has thus led in all countries to an increase in government expenditure on pensions (expressed as a share of GDP). In Poland, for instance, this ratio rose from 6.5 per cent to 14.9 per cent in only five years and it contributed heavily to the 25 points increase in the debt/GDP ratio noted in this country (Table 10). Obviously, continuation of this tendency to over the long term will entail large debt servicing burdens and lower levels of welfare.

6. A MINI-MODEL TO SIMULATE CHANGES IN WELFARE OVER THE LONG TERM

We now bring together into a mini-simulation model the various trends discussed above with the purpose to assess - in a very preliminary way - their combined impact on growth and welfare over the period 1995-2030. As noted at the beginning of this paper, welfare is defined as the real net average wage after the social security transfers needed for the 'paygo-type' financing of current pensions and of the payment of taxes needed for the servicing of the accumulated stock of debt, and is expressed in terms of its 1995 level. The growth and 'welfare effects' we intend to emphasize are:

- the long term effect of the immediate (1989-95) decline in human and physical capital, and of their expected slower accumulation in relation to the pre-transition period. The effect of this slow accumulation is offset, in part, by the increase in efficiency due to marketisation and liberalisation,

- the long term effect of the changes in dependency ratios and labour supply due to the population crisis of 1989-95, its continuation in the foreseeable future and other factors.

- the effect of policies in the social sphere, particularly the inter- and intra-generational effect of changes in the pensionable populations and in pension generosity. In our model, greater expenditure on pensions imply lower capital accumulation, growth and welfare over the long-term.

The model described hereafter includes the following four main blocks of equations:

- equations (1-6) define the growth rate of production inputs, i.e. the stock of physical capital, human capital and of the Hicks-neutral total factors productivity (TFP), indicated as ε in the model. The latter is assumed to take a value of 0.75 per cent a year for all three countries for which we perform simulations. In a sense, this assumption - which has a considerable influence about the growth rate of GDP computed by our model - can be considered as somehow optimistic, particularly in the case of Russia. Recent analyses (see for instance Easterly and Fisher 1994) indicate that - from the 1950s - the rate of growth of TFP in Russia (calculated by means of a Cobb-Douglass production function with labour and capital shares of 0.6 and 0.4) declined steadily to reach values of 0.4-0.7 for the material sector and of -0.8 to -1.2 for the whole economy (ibid., Table 4). The poor performance of TFP was particularly marked in agriculture, construction and the service sector. The value assigned to the parameter ε is also comparatively high when compared with the values found for the US economy (Denison 1988). Denison found that TFP rose by 0.34 per cent during the difficult 1929-41 period, by 1.11 per cent during 1941-48 and 1.38 during the 'golden age' of 1948-73. In the 1973-78 period, the rate of growth of TFP fell back to 0.11 per cent a year;

- equations (7) is an extended Cobb-Douglas production function with constant return to scale, where the growth rate of output depends on the growth in physical and human capital (defined in equations 1-6 on the basis of the discussion in parts 2 and 3 of the paper), on the expected changes in the size of the labour force (derived from the semi-endogenous population projections (which include information on changes in fertility and mortality over 1989-95) provided by the central statistical offices of the countries concerned, and on the growth rate of total factors productivity due to the move to the market (see above). The coefficients of the production factors are parametrised on the basis of the results found in the literature. Following the results of the traditional literature for the industrialized countries in this area, we have first run simulations using coefficients for β,γ and λ are equal to 0.2, 0.7 and 0.1.

These parameters tend to reflect the situation of countries affected by labour shortages and with a fairly abundant supply of capital. A review of the recent literature about 'endogenous growth' (Mankiw et al. 1992; Islam 1995) has estimated somewhat different sets of β,γ and λ parameters (Table 12) and vary according to the level of development. Their results assign a greater value to the parameter of human capital (λ), a lower one to that of labour (γ), and about the same to that of capital (β). In a second set of simulations therefore the values of the parameters selected are the average of those estimated by Mankiw et al (1992) for the 'intermediate countries' and the OECD. This implies that the countries of Eastern Europe will swiftly shift to a 'mode of production' similar to that adopted by the upper middle-income economies about to graduate into the OECD.

- equation (8) transforms the growth rates of output in levels (expressed in index numbers with 1995=100);

Table 12. Parameters of the enlarged Cobb-Douglas production function

	Non-oil	Intermediate	OECD	Our 1st estimate	Our 2nd estimate^^
	Mankiw-Romer -Weil (1992)				
-capital (β)	.31	.29	.14	.20**	.22^^
-human capital (λ)	.28	.30	.37	.10**	.33^^
-labour (γ)	.41	.41	.49	.70**	.45^^
-technical progress (ε)	1.30*	1.80*	2.00*	.75^	.75^
	Islam (1995)#				
-capital (β)	.68	.69	.54	.20**	.22^^
-human capital (λ)	.23	.13	.11	.10**	.33^^
-labour (γ)	.09	.18	.35	.70**	.45^^
-technical progress (ε)	1.10*	1.20*	1.90*	.75^	.75^

Source: Mankiw-Romer -Weil (1992), Islam (1995).

* refers to labour productivity; ^ refers to the total factors productivity;

** drawn from the traditional literature on the production functions;

^^ computed as the arithmetic average of the MRW parameters for the intermediate (middle income) and OECD countries; # refers to the cross sectional estimates.

- Inputs Definition

(1) $IGDP(t) = SGDP(t) - [\ PSBR(t)/GDP(t)\ ] - \delta$

(2) $INV(t) = IGDP(t) \cdot GDP(t)$

(3) $CAPITAL(t) = CAPITAL(t-1) + INV(t)$

(4) $CAPITAL\_H(t) = CAPITAL(t) / CAPITAL(t-1) - 1.$

(5) $HC(t) = \alpha_1 + \alpha_2 \cdot T + \alpha_3 \cdot T^2$

(6) $EFF(t) = EFF(0) * (1 + \varepsilon)^t$

- Growth of Potential Output

(7) $GDP\_H(t) = [CAPITAL\_H(t) \cdot \beta + LABOUR\_H(t) \cdot \gamma + HC\_H(t) \cdot \lambda] + EFF\_H(t)$

(8) $GDP(t) = GDP(t-1) * [GDP\_H(t) + 1.\ ]$

- Distribution and Debt Accumulation

(9) $WAGE(t) = [GDP(t) \cdot \gamma\ ] / LABOUR(t)$

(10) $PB(t) = WAGE(t) \cdot \pi \cdot PPPOP(t)$

(11) $PSBR(t) = \rho \cdot DEBT(t-1) + \tau \cdot [\ (PB(t) - 5./GDP(t)\ ]$

(12) $DEBT(t) = DEBT(t-1) + PSBR(t)$

- Welfare Definition

(13) $WELFARE(t) = [\ WAGE(t) \cdot LABOUR(t) - PB(t) - PSBR(t)\ ] / LABOUR(t)$

Legend:

*A suffix_***H** *means Rate of Change*

Endogenous Variables:

IGDP	= Net Investment/GDP ratio	INV	= Net Investment
CAPITAL	= Capital Stock	HC	= Human Capital Stock
EFF	= Factors Efficiency	GDP	= Maximum Produceable GDP
WAGE	= Average Wage	PB	= Pension Bill
PSBR	= Public Sector Borrowing Requir.	DEBT	= Public Debt
WELFARE	= Welfare Index		

Exogenous Variables:

SGDP	= Saving/GDP ratio	LABOUR	= Working Age Population
PPPOP	= Post-Productive Population	T	= Time

Exogenous Parameters:

δ	= Capital Depreciation Rate	π	= Pension generosity coeff.
ε	= Total Factors Efficiency (annual rate of growth)		
β	= Capital share;	ρ	= Interest rate
γ	= Labour share	τ	= % of Pension Bill financed by
λ	= Human Capital share;		Public Deficit.

- equation (9-12) define the wage bill (the labour share, γ, is assumed to be equal to 0.7), the pension bill (which depends on the simulated pension/wage ratio - π - and of the number of pensioners at time t obtained from the population projections and the assumed retirement age), the public sector borrowing requirements (which depend on the cost of the servicing the public debt given a fixed real rate of interest, ρ, and the current pension bill);

- equation (13), where the welfare index (1995=100) is computed by subtracting from the average gross wage rate (which is determined by GDP, the share of labour in GDP and the number of workers), the current social security transfers necessary for the payments of the pensions (equation 10) and the taxes due to the servicing of the stock of accumulated debt (equation 11).

7. SIMULATION RESULTS

Hereafter we present (Tables 13a to 13c) the results of the simulation of three main scenarios for the Czech Republic, Poland and Russia, i.e. countries which have shown, and are expected to show, pronounced and diverging variations in the areas discussed above. While the Czech Republic and Poland are generally included among the most successful transition cases, their speed of recovery, observed rates of investment and - above all - expected changes in population structures are quite different. Russia, in turn, has been more severely affected than these two countries in most areas.

The first baseline (control) scenario assumes for all three countries that 'pension generosity' (the ratio of the average pension to the average wage) remains the same as in 1994-5 (i.e. at respectively at 38, 45 and 70 per cent in Russia, the Czech Republic and Poland); that the retirement age remains at 60 years for both men and women (though at present most women retire at 55); that the saving rate remains at current levels, 20 per cent in the Czech Republic and Poland, and 17.5 per cent in Russia). Other assumptions (unchanged in all scenarios for all three countries) concern: the yearly rate of interest on the accumulated stock of debt (kept constant at 3 per cent); the financing of the public debt (half of the yearly pension bill in excess of 5 per cent of the GDP is

funded through the recourse to public borrowing); the 'marketisation dividend' (total factor productivity is assumed to grow at 0.75 per cent a year); and the rate depreciation of physical capital, δ (assumed to remain constant at 7 per cent).

In the favourable scenario, pension generosity is assumed to drop respectively to 30 (Russia), 40 (Czech Republic) and 50 (Poland) per cent of average wage while retirement age rises everywhere to 65 years. This scenario is tested under two assumptions, the first assuming saving rates similar to those observed in 1995, the second assuming an increase of this rate to 20 per cent of GDP in Russia and to 25 per cent in the other two countries. As noted, all other assumptions have remained unchanged.

The less favourable scenario assumes an increase in pension generosity in relation to the base year (to 60 per cent of average wage in the Czech Republic and Russia, 75 per cent in Poland), and no changes in retirement age (60 years). Also in this case the model is simulated assuming two different scenarios for the savings rate.

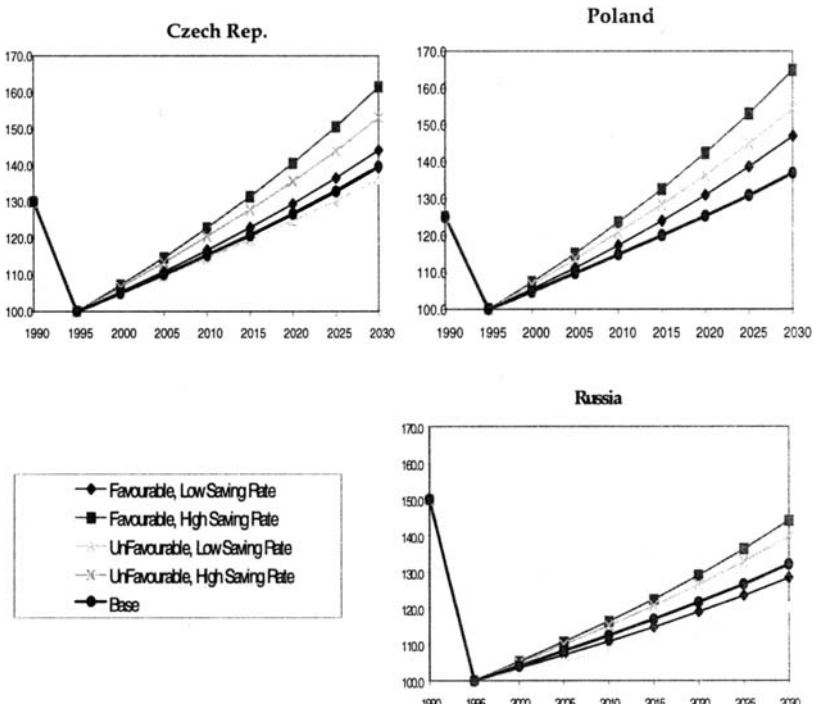
The results of the three simulations carried out using the second sets of values (.215, .45 and .335) for the β, γ and λ parameters point to:

(i) slow long-term growth of potential output. Though the model simulates only changes in the saving rate, it appears that in all scenarios potential output will increase at low-to-moderate rates, i.e. within the range of 1.5-2.6 per cent a year (Tables 13a to 13c). Only in Poland is potential GDP expected to rise a bit faster: in the most favourable scenario, by 2030 potential GDP will have risen to a level 2.5 times higher than its 1989 level and double than its 1995 level. Also in this case, however, the implied compounded growth rate of output per year over 1995-2030 is modest, around 2.6 per cent (however, this partially due to the use of compounded growth rates which tend to depress the rates of growth).

(ii) the especially difficult situation of Russia. In Russia, even under the most optimistic scenario (a comparatively higher saving ratio and retirement age, and a comparatively lower pension generosity), potential output is expected to rise at about 1.5 per cent a year, and to remain persistently below its pre-transition level (Table 13c). In the

worst case scenario, in the final year, potential GDP will be only 57 per cent higher than its 1995 level and 15 per cent below its pre-transition level. In the best case scenario, by 2030, potential GDP will be some ten percent below its 1989 level, though above its 1995 level. As in the other two countries, demographic changes are partially responsible for these unfavourable developments. The labour force (the production factor with the highest output elasticity in our production function) will grow slowly until 2010 and then start falling steadily until 2030.

Figure 3. Evolution of the stock of physical capital over 1990-2030 under different scenarios (1990 = 100)



Source: author's calculations based on the model.

Meanwhile, between 2010 and 2030, the pensionable population will rise by between one- third to one-half, depending on the assumptions made about the retirement age. Yet, in the Russian case, among the factors responsible for this unsatisfactory growth and welfare prospects one must include the fall-stagnation in the stock of physical capital, and the fall in human capital stock until 2015 (Figures 3 and 4). As Figure 3 shows, under no assumption will the capital stock in Russia reach by 2030 the same level of 1990 (while in Poland and the Czech Republic it will be 20-25 per cent higher). The economic and political implications of this four decades long stagnation of the Russian economy are difficult to assess.

Figure 4. Evolution of the stock of human capital over 1990-2030 (1995 = 100)

Source: author's calculations based on the model.

Even worse developments are evident for the welfare, i.e. the average real net wage (Table 13c). While the impact of demographic changes on welfare is noticeable also in the case of Russia, this is less marked than in the Czech Republic. In addition, the inter- and intra-generational effects of pension policy decisions in Russia is also less pronounced because of the lower generosity and coverage of the pensions system in this country. In Russia , the quasi-stagnation of welfare is largely due to the slow growth of output.

Table 13 a) Simulation results for 1995-2030 under five different scenarios - Czech Republic

Retirem. age	Pension Gener.	Saving Rate		1990	1995	2000	2005	2010	2015	2020	2025	2030
65	0.40	0.20	GDP	115.5	100	109.3	117.3	126.3	135.8	148.5	164.2	181.7
			Gross avg.Wage	108.2	100	100.0	106.0	115.5	129.4	146.2	163.8	185.1
			Pension Bill	88.9	100	76.6	82.5	98.3	126.0	158.7	186.7	217.3
			Welfare Index		100	118.5	126.5	133.2	138.5	147.6	161.8	178.5
		0.25	GDP	115.5	100	109.7	118.1	127.7	137.7	151.1	167.6	186.1
			Gross avg.Wage	108.2	100	100.0	106.0	115.5	129.4	146.2	165.2	188.4
			Pension Bill	88.9	100	77.0	83.2	99.5	127.9	161.4	190.5	222.5
			Welfare Index		100	118.8	127.4	134.7	140.6	150.3	165.3	183.2
60	0.60	0.20	GDP	115.5	100	106.6	113.9	121.9	131.2	144.4	159.8	177.1
			Gross avg.Wage	108.2	100	104.0	111.3	122.4	137.1	154.9	175.1	199.6
			Pension Bill	88.9	100	140.3	162.3	201.9	250.3	297.9	347.4	403.3
			Welfare Index		100	101.2	104.7	104.7	104.4	110.0	117.9	127.6
		0.20	GDP	115.5	100	107.0	114.7	123.2	133.0	146.9	163.2	181.4
			Gross avg.Wage	108.2	100	105.0	113.4	124.7	141.0	159.3	180.0	205.2
			Pension Bill	88.9	100	140.8	163.3	203.8	253.6	302.6	354.2	412.5
			Welfare Index		100	101.8	105.6	105.9	106.2	112.1	120.6	132.9
Base simulation												
60	0.45	0.20	GDP	115.5	100	106.7	114.0	122.1	131.5	144.8	160.5	178.0
			Gross avg.Wage	108.2	100	104.0	111.3	122.4	137.1	154.9	175.1	199.6
			Pension Bill	88.9	100	105.4	121.8	151.6	188.1	224.0	261.4	304.0
			Welfare Index		100	108.8	113.5	116.2	118.8	127.6	139.8	155.4

Source: author's calculations based on the model.

Table 13 b) Simulation results for 1995-2030 under five different scenarios - Poland

Retirem age	Pension Gener.	Saving Rate		1990	1995	2000	2005	2010	2015	2020	2025	2030
65	0.50	0.20	GDP	83.1	100	110.4	118.8	129.1	139.9	154.2	170.7	190.5
			Gross avg.Wage	132.6	100	99.0	104.0	112.3	124.6	139.6	156.3	175.1
			Pension Bill	46.4	100	101.8	111.9	119.0	148.8	193.0	247.5	292.5
			Welfare Index		100	122.2	127.8	136.7	143.3	153.3	164.4	181.1
		0.25	GDP	83.1	100	110.8	119.7	130.5	141.9	156.9	174.3	195.1
			Gross avg.Wage	132.6	100	99.0	104.9	113.3	125.8	142.2	160.6	181.5
			Pension Bill	46.4	100	102.3	113.0	120.5	151.2	196.6	252.7	299.7
			Welfare Index		100	122.2	128.9	137.8	145.6	156.7	167.8	185.6
60	0.75	0.20	GDP	83.1	100	107.1	115.6	123.6	132.8	146.0	162.5	181.5
			Gross avg.Wage	132.6	100	103.0	108.2	117.9	130.9	146.6	162.7	182.2
			Pension Bill	46.4	100	99.3	103.9	126.2	159.3	196.1	229.4	262.4
			Welfare Index		100	107.1	114.3	114.3	111.9	114.3	122.6	133.3
		0.25	GDP	83.1	100	107.5	116.4	125.0	134.7	148.6	165.9	186.0
			Gross avg.Wage	132.6	100	103.0	108.2	117.9	132.0	147.9	164.1	183.8
			Pension Bill	46.4	100	97.3	102.2	124.5	157.6	194.6	228.4	262.2
			Welfare Index		100	108.4	115.7	116.9	115.7	118.1	126.5	138.6
Base simulation												
60	0.7	0.20	Capital Stock	125.0	100	104.7	109.7	114.8	119.9	125.2	130.8	136.8
			Human Capital Stock	106.0	100	96.8	97.8	103.2	112.9	129.0	148.5	172.9
60	0.7	0.2	GDP	83.1	100	106.8	115.0	122.8	131.6	144.4	160.4	178.7
			Gross avg.Wage	132.6	100	102.0	107.1	116.7	129.6	145.1	161.1	178.8
			Pension Bill	46.4	100	106.3	111.0	134.5	169.4	208.3	243.0	277.4
			Welfare Index		100	107.1	111.8	111.8	110.6	112.4	119.6	136.2

Source: author's calculations based on the model.

Table 13 c) Simulation results for 1995-2030 under five different scenarios - Russia

Retirem age	Pension Gener.	Saving Rate		1990	1995	2000	2005	2010	2015	2020	2025	2030
65	0.30	0.15	GDP	185.2	100	104.1	107.3	114.2	124.1	137.5	149.0	165.9
			Gross avg.Wage	165.0	100	94.0	95.9	101.6	112.8	128.6	141.5	159.9
			Pension Bill	88.2	100	67.8	78.3	78.5	89.6	115.9	139.8	172.4
			Welfare Index		100	108.9	112.8	116.7	128.4	140.1	147.9	163.4
		0.20	GDP	185.2	100	104.4	108.0	115.4	125.9	139.9	152.2	169.9
			Gross avg.Wage	165.0	100	95.0	96.9	102.7	114.0	131.1	144.2	164.4
			Pension Bill	88.2	100	68.3	78.9	79.6	90.9	118.0	142.8	176.7
			Welfare Index		100	108.9	112.8	120.6	128.4	140.1	151.8	167.3
60	0.60	0.15	GDP	185.2	100	99.6	104.2	109.9	118.0	129.9	140.9	157.1
			Gross avg.Wage	165.0	100	99.0	99.0	105.9	118.6	136.4	150.1	169.6
			Pension Bill	88.2	100	108.3	103.7	114.1	139.6	177.0	209.6	243.5
			Welfare Index		100	96.2	103.8	107.7	111.5	115.4	119.2	130.8
		0.20	GDP	185.2	100	100.1	105.2	111.4	120.1	132.8	144.7	162.1
			Gross avg.Wage	165.0	100	100.0	100.0	107.0	120.9	139.0	153.0	172.8
			Pension Bill	88.2	100	107.5	103.7	114.4	140.4	178.7	212.7	248.2
			Welfare Index		100	96.2	103.8	107.7	115.4	123.1	126.9	136.5
Base simulation												
60	0.38	0.18	GDP	185.2	100	99.9	104.8	110.8	119.3	131.7	143.2	160.2
			Gross avg.Wage	165.0	100	100.0	100.0	107.0	119.8	137.8	151.6	171.3
			Pension Bill	88.2	100	107.3	103.2	113.8	139.4	177.4	210.5	245.4
			Welfare Index		100	97.3	105.1	108.9	112.8	120.6	128.4	144.0

Source: author's calculations based on the model.

(iii) time profile of growth. In all three countries under analysis, the problems caused by the slow growth of potential output and welfare will be particularly acute during the period 2005-2020 (in contrast, performance is expected to accelerate moderately over 2020-2030). In the less favourable, but plausible, scenario characterized by a retirement age of 60 years and an average pension equal to 60 per cent of the average wage, welfare will completely stagnate (or even decline marginally) in the Czech Republic (between 2005 and 2015) and Poland (between 2010 and 2020) (Tables 13a and 13b). The difficulties expected for this fifteen year period are due to the unfavourable evolution of the main production inputs (Tables 3 and 4), and by adverse demographic changes. For instance, between 2005 and 2020, the Czech population over 60 of age will rise by almost 40 per cent while the working age population will decline by 10 per cent (Table 9). In the other two countries, the phenomenon is only little less pronounced. While many 'mature economies' suffer from inter- and intra-generational equity problems caused by the rapid ageing of the population and fast increasing age-dependency ratios, few face this problem in a context of stagnation-slow growth of output.

In all three countries under consideration, unless drastic and unpopular changes in pension policy and other measures to step up human and physical capital accumulation are introduced (see later) during this period, the pension bill will increase rapidly, thus affecting negatively capital accumulation and labour supply. The demographic effect alone is expected to depress the yearly growth rate of potential output over 2005-2020 by 0.6 percentage points in relation to that projected for the years 2020-2030.

(iv) increases in saving rates have a modest effect on growth and welfare. In our model, the potential output elasticity of savings appears to be small, i.e. around 0.10, whereas the elasticity of welfare in relation to a one percentage point increase in savings is in the range of 0.23-0.42 (Table 14). Indeed, an increase in potential GDP and wages (triggered by an increase in savings) causes a simultaneous offsetting effect on capital accumulation, as pensions rise in line with wages. Thus, the parallel increase in the pensions which in the model (and in reality) accompanies an increase in output and wages depresses investment. The slow growth impact of capital accumulation is due also

to the relatively low value (0.215) of the output elasticity of the stock of physical capital in our production function. To increase the growth impact of an increase in savings, one would have to assure that government deficits rises slowlier, even in the presence of an increase in the pension bill, that the rate of depreciation of physical capital falls, and that the output elasticity of physical capital increases.

Table 14. Average percentage changes in welfare* in relation to a one percentage change in the number of pensioners, saving ratio and pension generosity

	Number of pensioners		Saving ratio		Pension generosity	
	Saving ratio		Retirement age		Retirement age	
	High	Low	65	60	60	65
Russia	-0.95	-0.86	0.23	0.27	-0.32	-0.17
Czech Rep.	-2.07	-1.99	0.30	0.46	-0.46	-0.30
Poland	-1.73	-1.66	0.28	0.29	-0.43	-0.28

Source: authors'calculations.

* Welfare is defined as the real average net wage after payments of social security contributions and taxes to service the interests on the accumulated public debt.

(v) welfare rises even slowlier than potential GDP. As one can see from Tables 13a, 13b and 13c, and from Table 15 below, in the 'control' scenario, welfare (the real net wage after social security transfers and taxes to fund pensions and debt servicing obligations) rises at about half the speed of potential GDP in the case of Poland, and at about 70 per cent in the case of the Czech Republic and Russia. In the less favourable scenario (high pension generosity and unchanged retirement age), welfare rises with an elasticity ranging between .36 and .59 for the entire 1995-2030 period in both Russia and the Czech Republic (i.e. at much less favourable rates than in the control scenario), and of .41-.45 (same as in the control scenario) in Poland where pension generosity is already very high in the baseline simulation.

In the most favourable scenario (where pension generosity declines and the retirement age increases to 65), welfare is expected to rise almost in line with potential output (which is itself increasing slowly) in all three countries. The largest gains in terms of welfare growth in relation to the control scenario are evident in Poland where pension generosity is

already very high. Thus, long term prospects are for an extremely slow growth in the net incomes of wage earners, and by their stagnation between 2010 and 2020 (Tables 13), unless - as noted above - changes are introduced in the pension policy.

Table 15. Average percentage changes in welfare* in relation to a one percentage change in GDP

	Control scenario	Favourable scenario		Unfavourable scenario	
		Low savings	High savings	Low savings	High savings
Poland	.46	.90	.90	.41	.45
Czech Republic	.71	.96	.97	.36	.41
Russia	.73	.96	.96	.54	.59

Source: authors' calculations based on the model.

* Welfare is defined as the real average net wage after payments of social security contributions and taxes to service the interests on the accumulated public debt.

(vi) long-term welfare impact of demographic variables. The recent mortality and fertility crisis experienced during the transition, and the changes in demographic variables expected in the years to come, appear to have a large long-term welfare effect, which will be especially evident over the medium-term. This is an important finding, rarely voiced in the debate about the short-term effect of the transition which is still dominated by rather optimistic expectations about the future economic performance. Indeed, it appears that the recent transition demographic crisis will continue to affect welfare also in the long-term (mainly through fertility declines, but also through the mortality impact on young adults), and that it will reduce in a non-negligible way the efficiency gains expected from the transition to the market economy.

(vii) social policy changes have a strong inter-temporal welfare effect. While slow growth and adverse changes in dependency ratios over the next thirty years will exert a negative influence on welfare, it is evident that the latter is also dependent upon current and future shifts in pension policy. In much of the region, in the initial years of the transition, inflation has destroyed the financial savings of the elderly. Unlike the young, the elderly will not have the opportunity to recoup their losses in the new market economy (World Bank 1996b). A case can therefore be made on equity ground for the preferential treatment of the pensioners in the initial transition years. This preferential treatment

has taken the form of a sharp increase in the number of early retirements, and of the preferential treatment of pensions in relation to wages, child allowances and other social transfers. However, in the years to come the pension systems inherited from the socialist era need major reforms, particularly so in view of the expected unfavourable changes in the structure of the population. As shown in Table 14, current and future decisions about pensions generosity are clearly correlated with the long term welfare of wage earners. However, the variable that has the greatest impact on welfare is not so much pension generosity, but the number of pensioners, which is closely affected by the retirement age.

This would suggest that, barring dramatic variations in pension generosity (like those which occurred in Poland in 1991-2), substantial gains in long-term welfare could be obtained through a gradual increase in the retirement age. However, with the steady increase in life expectancy and the continuos rise of the elderly population, over the very long term, even this measure will produce limited results unless it is accompanied by a recovery of fertility starting early next century. At the moment, however, there is no indication that fertility has stabilized or recovered after the its sharp contrction of 1989-94. Estimates for 1996 show that the total fertility rate of Russia and the Czech republic has fallen to one of the lowest levels (1.2-1.3) among the industrialized countries (UNICEF 1997). The decline is more moderate in Poland (ibid.).

(viii) sensitivity analysis. To test the robustness of the results presented above, we have re-run our model using a different set of parameters for the production function, namely 0.2 for β (physical capital), 0.1 for λ (human capital) and 0.7 for γ (labour) (see the fourth column of Table 12). The ε parameter (representing the Hicks-neutral technical progress) has been left unchanged at .75 and so have the δ and ρ parameters concerning the rate of depreciation of physical capital and the real interest rate.

The results of these new simulations are fairly similar to those conducted with the first set of parmeters for our extended Cobb-Douglass production function. The main difference concerns the growth of potential output. Indeed, the range of simulated growth rates over 1995-2030 falls from 1.5-2.6 per cent a year to 0.6-2.2 per cent a year,

mainly because the production impact of the fall in labour supply is amplified by the higher output elasticity attributed to the labour coefficient (0.7 versus 0.45) in this new test. As expected, the other variables (average gross wage rate, pension bill and welfare) move accordingly to the lower growth rate of potential output. The results presented in Tables 13a to 13c appear to be therefore rather stable.

8. IN LIEU OF CONCLUSIONS

The discussion, model and simulations presented in this paper are only a modest and vastly imperfect attempt to draw to the attention of policy makers the long-term implications for welfare of the recent changes in capital accumulation, population structure and social policy. The result tend to underscore that even under the most favourable scenarios, the real average net wage might growth at a maximum rate of 1.9-2.3 per cent a year, after a very large fall in the initial phase of the transition. In the less favourable scenario, the real average net wage would rise at a maximum rate of close to one per cent. While depending on a number of assumptions, these results underscore the modest prospects facing the region, and the social viability problems and distributive conflicts inherent to these growth scenarios.

While much of the empirical data - most obviously that relating to the future - is somewhat arbitrary, the direction of trends described in this paper is probably less disputable. In this paper, we illustrate not only the standard inter- and intra-generational trade-offs faced by countries with rapidly ageing populations. We also try to place this problem in the context of the sharp recession which has been witnessed by all countries of Eastern Europe, and of the currently uncertain prospects for physical and human capital accumulation in the region.

The results of the simulations presented only illustrate what would happen if the current trends are allowed to continue for long, particularly in view of the unavoidable and unfavourable changes expected in population structure. Especially in the case of Russia, a policy aiming at reducing these long-term large welfare losses will require major efforts in terms of accumulation of production factors (including in stimulating domestic and FDI by means of a more stable institutional environment), raising overall efficiency and in containing the growth of public debt through more persistent efforts at tax

collection. Faster growth in the net average wage can also be promoted by gradually rising the retirement age (especially if this is done in line with increases in life expectancy), which would improve the supply of labour and reduce the dependency ratio, and by stemming abuse in disability pensions. As noted immediately above, however, this solution merely postpones the problem. To provide a more permanent solution to the problem at hand, these measures need to be accompanied by a recovery in fertility. Gains may also be attainable by setting pensions in relation to past earnings and contributory history and not in relation to the current wage rate.

Annex table 1. Changes in population structure over 1995-2030

a) Czech Republic

		1990	1995	2000	2005	2010	2015	2020	2025	2030
Czech	0 - 4	6.22	5.81	4.75	5.07	5.15	4.89	4.41	4.44	4.41
	5 - 9	6.56	6.26	5.83	4.74	5.06	5.15	4.94	4.46	4.50
	10 - 14	8.06	6.76	6.29	5.83	4.74	5.07	5.21	4.99	4.52
	15 - 19	8.51	8.59	6.79	6.29	5.82	4.75	5.12	5.26	5.06
	20 - 24	6.70	7.94	8.61	6.78	6.27	5.83	4.80	5.17	5.32
	25 - 29	6.71	6.60	7.97	8.61	6.78	6.31	5.91	4.85	5.23
	30 - 34	6.51	6.49	6.64	7.97	8.60	6.81	6.39	5.96	4.91
	35 - 39	7.77	6.91	6.51	6.63	7.95	8.59	6.87	6.43	6.02
	40 - 44	8.15	7.87	6.90	6.48	6.60	7.93	8.64	6.91	6.49
	45 - 49	6.80	7.81	7.79	6.82	6.41	6.56	7.94	8.64	6.94
	50 - 54	5.18	6.23	7.65	7.62	6.68	6.32	6.52	7.89	8.62
	55 - 59	4.96	4.69	6.01	7.38	7.38	6.52	6.23	6.41	7.79
	60 - 64	5.17	4.87	4.42	5.68	7.02	7.09	6.34	6.02	6.22
	65 - 69	4.88	4.63	4.41	4.05	5.26	6.58	6.73	5.95	5.70
	70 - 74	2.74	4.05	3.97	3.83	3.58	4.73	6.00	6.05	5.40
	75 - 79	2.55	1.71	3.14	3.13	3.09	2.96	3.99	5.00	5.12
	80 - 84	1.71	1.81	1.12	2.13	2.18	2.21	2.16	2.96	3.79
	85 - +	0.82	0.97	1.20	0.95	1.44	1.70	1.80	2.41	3.12

Sources: Charles University, Department of Social Geography (1996). IDB, Bureau of Census, USA (1996).

Annex table 1. Changes in population structure over 1995-2030

b) Poland

		1990	1995	2000	2005	2010	2015	2020	2025	2030
Poland	0 - 4	7.73	6.29	5.95	6.95	7.19	6.59	5.88	5.58	5.54
	5 - 9	8.89	7.45	6.24	5.84	6.81	7.09	6.56	6.55	6.55
	10 - 14	8.48	8.74	7.37	6.11	5.71	6.72	7.05	7.04	7.04
	15 - 19	7.47	8.38	8.64	7.21	5.97	5.62	6.66	6.65	6.65
	20 - 24	6.47	7.45	8.26	8.43	7.02	5.85	5.55	5.53	5.52
	25 - 29	7.03	6.36	7.33	8.06	8.22	6.89	5.78	5.76	5.75
	30 - 34	8.57	6.74	6.26	7.15	7.85	8.07	6.83	6.79	6.78
	35 - 39	8.51	8.25	6.61	6.09	6.95	7.69	7.97	7.92	7.90
	40 - 44	7.01	8.31	8.05	6.39	5.88	6.77	7.56	7.50	7.45
	45 - 49	4.64	7.05	8.05	7.73	6.13	5.69	6.62	6.53	6.46
	50 - 54	5.15	4.36	6.75	7.64	7.34	5.87	5.51	5.39	5.30
	55 - 59	5.18	4.76	4.10	6.30	7.15	6.93	5.61	5.42	5.27
	60 - 64	4.80	4.65	4.36	3.73	5.76	6.60	6.47	6.15	5.88
	65 - 69	3.84	4.23	4.10	3.83	3.29	5.15	5.98	5.53	5.16
	70 - 74	2.13	3.24	3.53	3.41	3.21	2.80	4.45	3.94	3.53
	75 - 79	2.09	1.66	2.47	2.69	2.62	2.51	2.24	1.84	1.54
	80 - 84	1.31	1.27	1.08	1.62	1.79	1.78	1.75	1.27	0.95
	85 - +	0.70	0.84	0.87	0.84	1.13	1.38	1.53	1.57	1.83

Sources: Central Statistical Office of Poland (1996). IDB, Bureau of Census, USA (1996).

Annex table 1. Changes in population structure over 1995-2030

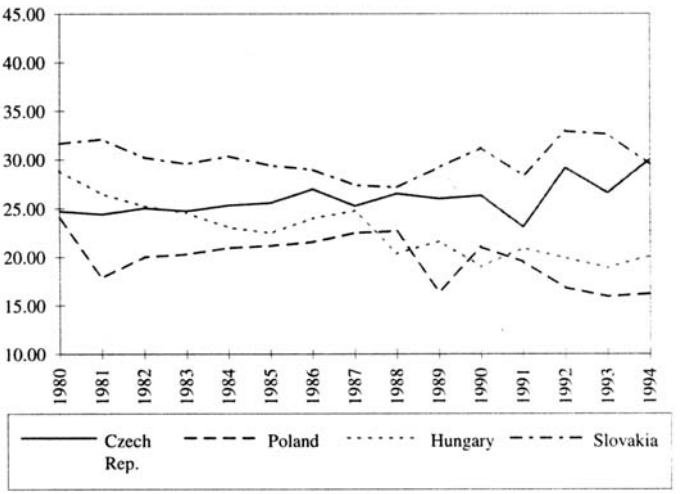
c) Russia

		1990	1995	2000	2005	2010	2015	2020	2025	2030
Russia	0 - 4	8.19	5.45	4.91	5.93	6.06	5.77	5.70	5.73	5.85
	5 - 9	7.73	8.01	5.58	4.94	5.96	6.10	5.79	5.80	5.80
	10 - 14	7.21	7.93	8.20	5.62	4.96	6.00	6.12	6.13	6.13
	15 - 19	6.78	7.29	8.09	8.22	5.63	5.00	6.02	6.03	6.02
	20 - 24	6.64	6.84	7.40	8.08	8.22	5.66	5.01	5.01	4.99
	25 - 29	8.55	6.40	6.91	7.37	8.06	8.24	5.64	5.64	5.62
	30 - 34	8.75	8.11	6.46	6.87	7.32	8.04	8.19	8.17	8.13
	35 - 39	7.95	8.65	8.12	6.39	6.80	7.28	7.95	7.90	7.85
	40 - 44	5.21	7.90	8.57	7.97	6.28	6.72	7.14	7.06	6.98
	45 - 49	5.41	5.96	7.70	8.29	7.73	6.13	6.49	6.37	6.26
	50 - 54	6.53	4.24	5.70	7.33	7.93	7.45	5.82	5.64	5.49
	55 - 59	5.72	6.54	3.96	5.34	6.90	7.53	6.92	6.61	6.34
	60 - 64	5.69	4.82	5.95	3.60	4.91	6.40	6.77	6.33	5.96
	65 - 69	3.07	5.13	4.18	5.23	3.17	4.40	5.51	5.01	4.58
	70 - 74	2.49	2.81	4.17	3.43	4.36	2.66	3.43	2.98	2.62
	75 - 79	2.27	1.70	2.10	3.14	2.60	3.40	1.82	1.46	1.19
	80 - 84	1.20	1.46	1.06	1.38	2.09	1.75	3.17	2.20	1.59
	85 - +	0.61	0.77	0.92	0.85	1.02	1.47	1.84	1.63	2.13

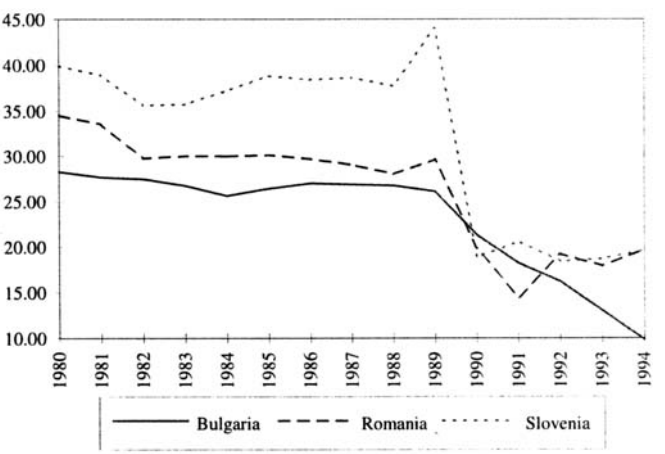
Sources: Russia: Center for Demography and Human Ecology (1996). IDB, Bureau of Census, USA (1996).

Annex figure 1. Gross fixed investment / GDP, 1980-94

a) Central Eastern Europe

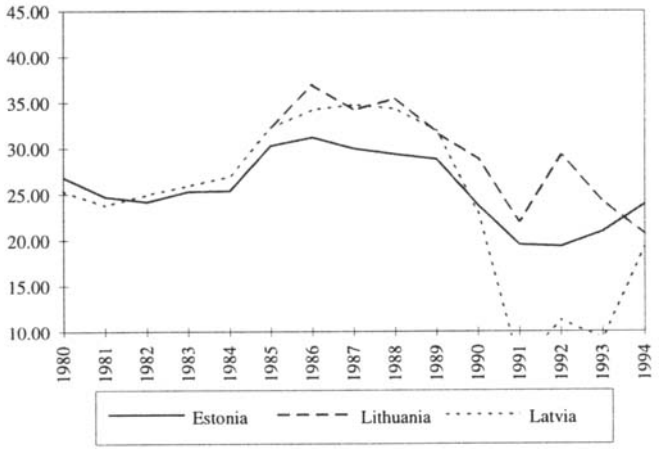


b) Southern Eastern Europe

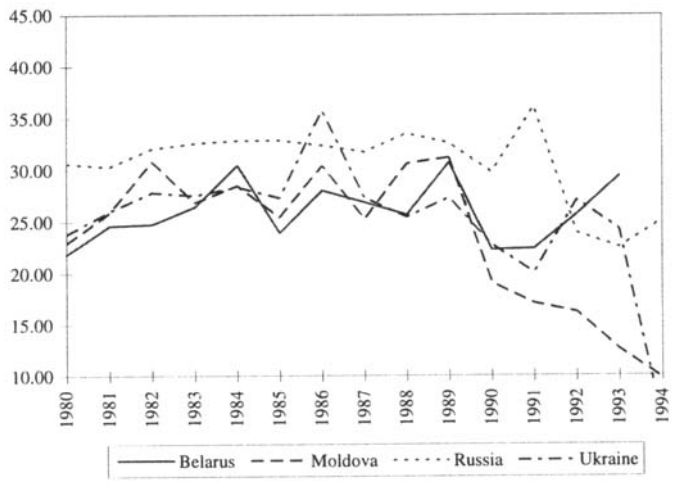


Annex figure 1. Gross fixed investment / GDP, 1980-94

c) Baltic States

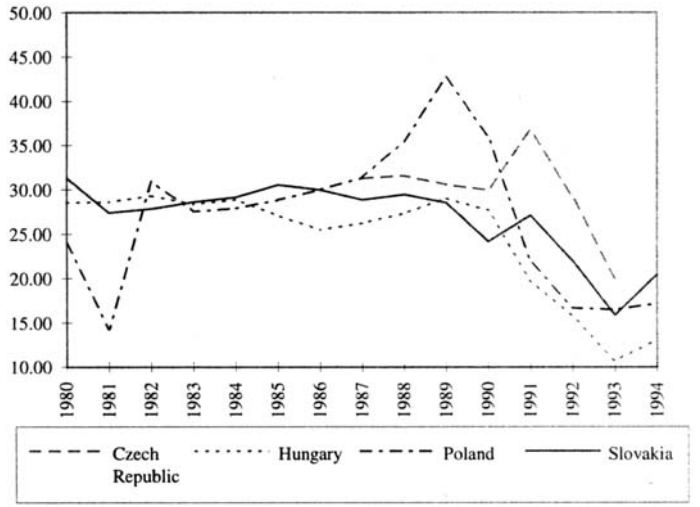


d) Slavic FSU and Moldova

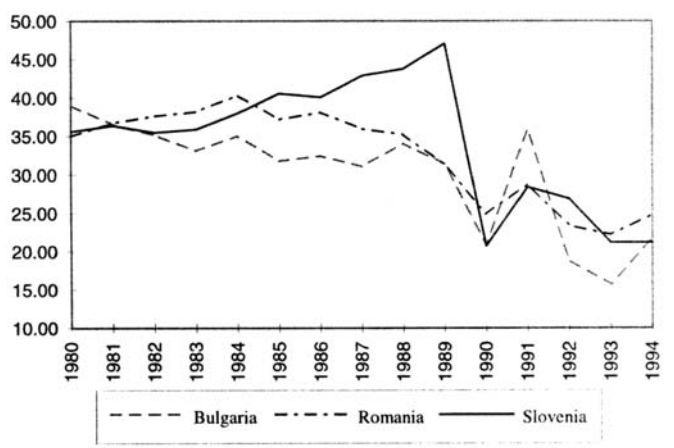


Annex figure 2. Gross domestic savings / GDP, 1980-94

a) Central Eastern Europe

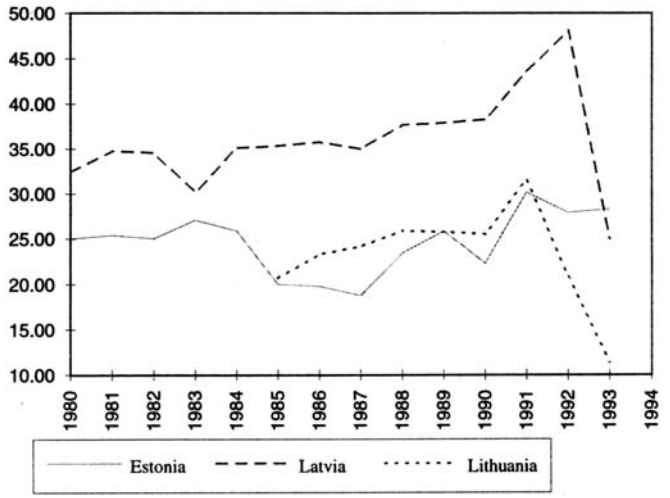


b) Southern Eastern Europe

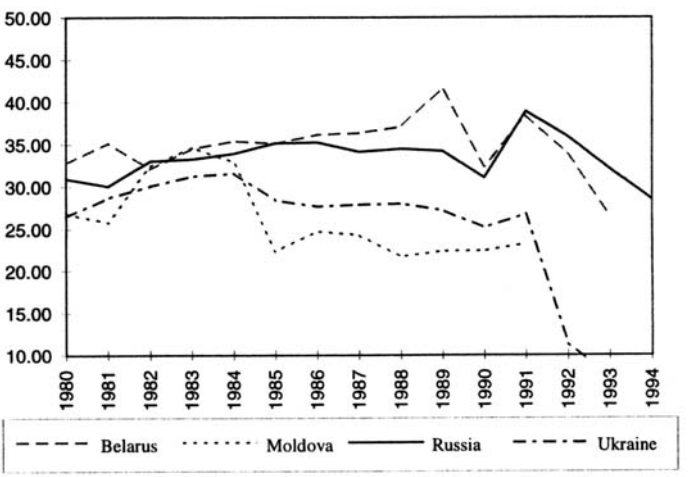


Annex figure 2. Gross domestic savings / GDP, 1980-94

c) Baltic States

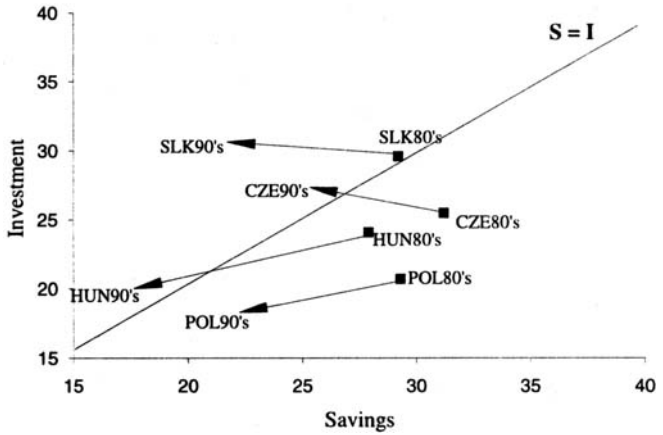


d) Slavic FSU and Moldova

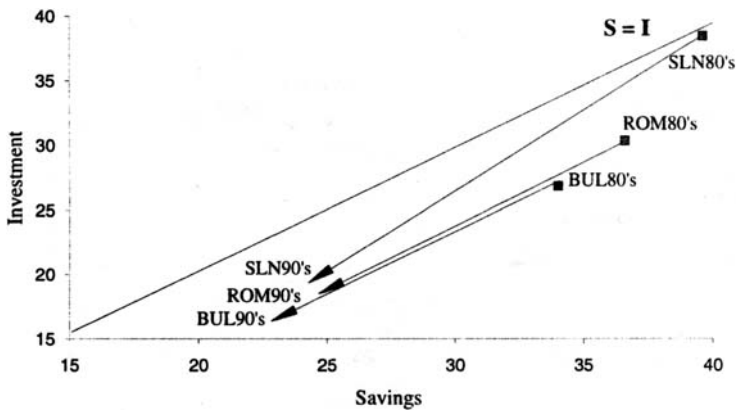


Annex figure 3. Savings and investment before and during transition

a) Central Eastern Europe



b) Southern Eastern Europe

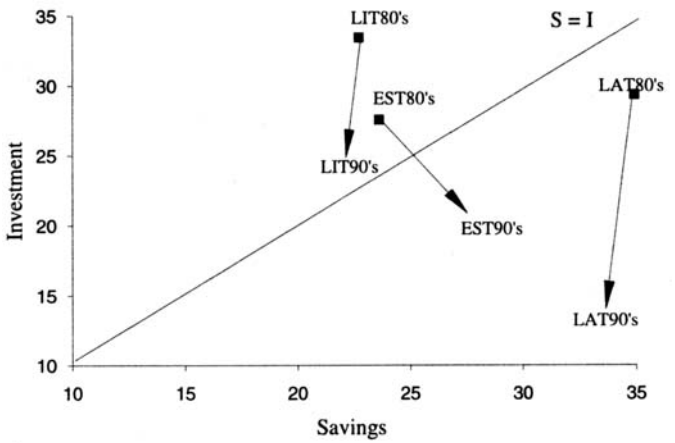


XXX80's = Gross domestic savings/GDP and Gross fixed investment/GDP, average over 1980-1989 for country XXX.

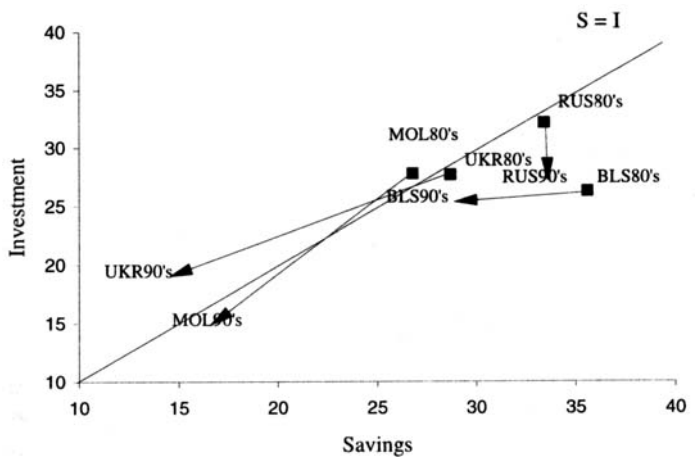
XXX90's = Gross domestic savings/GDP and Gross fixed investment/GDP, average over 1990-1994 for country XXX.

Annex figure 3. Savings and investment before and during transition.

c) Baltic States



d) Slavic FSU and Moldova



XXX80's = Gross domestic savings/GDP and Gross fixed investment/GDP, average over 1980-1989 for country XXX.

XXX90's = Gross domestic savings/GDP and Gross fixed investment/GDP, average over 1990-1994 for country XXX.

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