HUMAN CAPITAL AND THE FUTURE OF TRANSITION ECONOMIES[*]

By

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Abstract

Transition economies have an initial condition of high human capital relative to GDP per capita, giving them high growth potential. In the model, at a good equilibrium a large number of children of well-educated parents take advantage of their family backgrounds and invest substantially in their own human capital. At a bad equilibrium, past educational achievements are wasted as children fail to build upon their parents' achievements. Policies and economic conditions can be decisive in determining the outcome. The model provides a basis for distinguishing development economics from transition economics.

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1. Introduction

What is special about countries in transition from communism? They are unusual in many ways, but one vital fact is that educational achievements in transition economies are out of all proportion to per capita GDP. Educational levels are as high or even higher than in many rich countries yet the typical transition economy has a per capita GDP similar to that of a middle income developing country.[1]

Much of the empirical growth literature [e.g., Barro and Sala-i-Martin (1995) and Benhabib and Spiegal (1994 & 2002)] indicates that education is important for economic growth, so one might suppose transition economies are in great shape.[2] Further support for this view comes from the historical work of Sandberg (1979) and Williamson and O'Rourke (1979) that analyzes the spectacular growth of the Scandinavian countries as they joined the leading edge of Europe in the four decades before World War I. They found that above-average schooling in these countries played an important role in the catching up process. This historical analogy is encouraging for transition economies although, in our view, not decisive. We argue that human capital in some transition economies may fall to meet current living standards rather than living standards rising to meet human capital levels. In particular, our model can have two types of equilibria; a

[1] Gros and Suhrcke (2000) systematically investigate this question using cross-section regressions on 148 countries including transition countries and find that these countries have much higher secondary and tertiary enrollment rates than their per capita GDP would predict. The existence of a positive educational legacy of communism is documented in a variety of studies, e.g., World Bank (1995 & 1996).

[2] There is still much debate about exactly how important human capital is for growth and also about the relative impact of human capital levels versus human capital growth rates. However, Krueger and Lindahl (2001) and Temple (2001/II) are both extensive literature surveys that uphold the general notion that human capital is certainly important for growth.

good equilibrium can be associated with rapid growth while a bad equilibrium portends deterioration.[3]

The empirical literature provides support for the notion of two sharply different educational paths for transition economies.[4] Micklewright (1999) shows that enrollment rates in kindergarten, which is noncompulsory, have dropped sharply during the transition in the Caucasus, Central Asia, Southeast Europe and the Western CIS while falling only slightly in Central Europe and the Baltic States.[5] Noncompulsory general secondary education enrollment rates have held up more widely but have still dropped sharply in the Caucasus and Central Asia.[6] Educational expenditure figures are also roughly consistent with this pattern according to which the Caucasus and Central Asia are in collapse, Central Europe and the Baltic states are in reasonable condition and the rest of the European transition economies are marginal to bad.[7]

Diverging paths appear in other dimensions as well. Micklewright (1999) documents substantial differences in within-country educational opportunities based on

[3] Barry (2002) makes a strong case that EU Accession countries have very high potential growth rates if they follow good policies. My paper stresses much more than his does the potential for deterioration.
[4] Note one of the conclusions of a recent EBRD report: "...firms in transition economies lag behind advanced industrialized countries in terms of the quality of their workforce. Such quality gaps are larger in the CIS than in CEE. This finding qualifies the view that the region has abundant human capital resources, despite considerable achievements in formal education. Moreover, the lack of restructuring in the less reformed economies of the region means that many skilled workers are performing jobs that do not reflect their levels of education. Over time, there will be a continuing loss of skills, leading to an even greater gap in quality." (EBRD, 2000, p. iii of executive summary)
[5] The material in the next two paragraphs is based most closely on Micklewright (1999) but is also supported by UNICEF (2000) and UNICEF (2001).
[6] Enrollments rates in vocational education have plummeted throughout the transition world reflecting an extreme mismatch between the skills taught in these institutions and the needs of the labor market. Sabirianova (2000), Campos and Dabušinskas (2002), Druska, Jeong, Kejak and Vinogradov (2002) analyze the adjustment process of individuals whose human capital acquired under communism was not consistent with the needs of the new labor market.
[7] All the figures can be downloaded directly from the TransMONEE database at http://www.unicef-icdc.org/documentation/index.html.

family background and location, with rural locations particularly disadvantaged.[8] Thus, for example, some countries could plausibly consolidate into dual economies, with very poor education in rural areas and good education in urban areas, particularly in capital cities.

Below we present a very simple model that builds on common premises from the new growth theory plus an initial condition for human capital characteristic of transition economies. The model easily yields results consistent with the two human capital paths emerging in transition economies. We also argue that the good equilibrium of the model is natural for transition economies but not for typical developing economies. This is because of the importance of the initial condition on human capital. So, while transition economics and development economics surely have much to learn from each other, this work provides one plausible basis of separation between the two fields.

Alexeev and Kaganovich (1998) is one of the few theoretical papers on human capital and transition.[9] It uses an adverse selection argument to show how uncertainty over whether or not a major reform will be implemented can lead more able people, the "good guys", to prepare relatively little for the possible change compared to less able people. This is because the good guys do better in the unreformed system than the bad guys. If reform is actually implemented, good guys finish last due to their lack of preparation. In the present paper good guys will not finish last but the two papers share a general concern about possible underinvestment in human capital.

[8] These conclusions are supported by a wide variety of studies, including OECD (1998), UNICEF (2000) and UNICEF (2001) and World Bank (2000).
[9] Roland (2000) is an excellent general survey of theoretical work on transition but without any emphasis on human capital.

Fan, Overland and Spagat (1999) (FOS) argues that educational restructuring should have high priority early in Russia's transition process, emphasizing the potential for loss of human capital without such a policy. Like the present paper, FOS studies the dependence of children's human capital acquisition decisions on the human capital of their parents. However, FOS focuses on Russia rather than transition economies in general and does not allow for two types of equilibria.

On the empirical side, Münich, Svejnar and Terrell (1999), Newell and Reilly (1999) and World Bank (2001) all contain information on the returns to human capital for a variety of transition countries. These studies show a general pattern for the transition from communism of rising returns to human capital that, nevertheless, remain below US and Latin American levels. We study the potential of converting these premia plus high initial human capital into high human capital for a new generation.

Much of the modern growth literature has not explicitly considered transition economies but is, nevertheless, relevant and related to our model. First, there are the many models that have human capital externalities and in which human capital drives growth, notably Nelson and Phelps (1966) and Lucas (1988). We invoke these externalities below. Note, however, that by themselves these models do not explain the two types of human capital paths emerging in transition.

Second, there are models of human-capital-related development traps including threshold externalities in Azariadis and Drazen (1990), liquidity constraints in Galor and Zeira (1993) and complementarity between human capital investment by individuals and R&D by firms in Redding (1996). Our paper differs from these in that we focus specifically on transition economies, pointing to the initial human capital distribution as

the potential lynchpin for rapid development and considering factors that could undermine this outcome.

We do not present a full growth model. Rather, we consider whether or not the favorable initial human capital distribution in particular transition economies will carry forward to the next generation. Our analysis suggests, consistent with the empirical evidence, that there is the potential for much human capital loss in transition. It would be easy to append to our model another one [e.g. Lucas (1998)] in which human capital matters for growth. Then economies that carry forward much human capital would eventually grow faster than those that lose much of their human capital. But we do not perform this exercise, preferring to focus exclusively on the vital first generation of the transition process.

The plan of the paper is as follows. We present the model in section 2. Section 3.1 contains an example contrasting the economic problem facing transition economies from that of typical developing countries. Section 3.2 gives some general results. Section 4 studies when a high-investment equilibrium does and does not exist, focusing on the link with actual patterns in transition. We conclude in section 5.

2. The Model

There are N families indexed by i, consisting of a parent and a child. The human capital of parent i is denoted h_{i0} where $0 \leq h_{i0} \leq 1$ while his child's human capital is h_{i1}. There is intergenerational intellectual continuity, i.e., children of well-educated parents have a better chance of becoming well educated than children of poorly educated parents

have.[10] We take a particularly simple formulation. Each child will either chose education or not chose education. The human capital of child *i* is:

$$h_{i1} = \begin{cases} (h_{i0})^{\alpha} & \text{if i chooses education} \\ 0 & \text{otherwise} \end{cases} \qquad (1)$$

where $0 < \alpha < 1$. The main notion is that the better is the education of the parents the easier it will be for children to invest in human capital. There can be many reasons for this to be true. Well-educated parents might have more money to invest in their children than do poorly educated ones. Parents with good education might value education more than parents with poor education do. The former group might also know better how to transfer education to children than the latter group does. Those who do not make a special investment get 0 human capital, which is normalized to be the basic level of education prevalent in the society.

The parameter α can be interpreted as a measure of the quality of the educational system with quality decreasing in α.[11] The idea is that with a bad system (high α) children who invest in human capital end up with levels that differ little from parental human capital because the educational system is not a major influence on children. With a strong education system (small α) even children with little parental human capital can achieve high standards if they use the system. There are other ways that educational quality could be introduced into the model but the present one is simple and sensible.

[10] Many papers have demonstrated this for a wide range of countries (Heyneman, 1995). Micklewright (1999) offers evidence that parental effects on childrens' educational performance are especially strong in transition economies.

[11] Since initial human capital levels are normalized to be between 0 and 1 there is indeed an inverse relationship between the quality of the education system and α.

We now explain income determination. Since our main purpose is to explore the relationship between the initial human capital distribution in transition economies and their long-run prospects, we abstract from the details of wage formation and work with reduced forms. Our formulation largely follows Perotti (1993), allowing for spillover effects from human capital accumulation both for skilled and for unskilled workers.[12] There are two sectors: a skilled sector and an unskilled sector. Children who do not invest in education earn a wage of 1 in period 0 and a wage of $1+\frac{k^u N^s}{N}$ in period 2 for a lifetime income of $2+\frac{k^u N^s}{N}$ where $k^u > 0$ is a constant and N^s is the number of children who choose education. Thus, the work of educated people in the skilled sector leads to technological and organizational improvements that increase the productivity of the unskilled sector. Educated people earn nothing in period 0 when they are studying, while educated individual i earns $\left(w+\frac{k^s N_t^s}{N}\right)(h_{i1})$ in period 1 where $w > 0$ and $k^s > 0$ are constants. Note that skilled workers are directly productive as well as creating spillovers in both sectors.[13] The income of individual i is:

$$I_i = \begin{cases} \left(w+\frac{k^s N^s}{N}\right)(h_{i0})^{\alpha} & \text{if } i \text{ chooses education} \\ 2+\frac{k^u N^s}{N} & \text{otherwise} \end{cases} \qquad (2)$$

[12] Such spillover effects are, of course, common in the new growth theory. Easterly (2002, chapter 8) gives an excellent intuitive survey of the range of arguments for these effects that have been made in the literature.

[13] We could make wages depend on the total quantity of skills rather than the number of skilled agents and reproduce all the results of this paper with only a slight modification in Proposition 4.

Individuals make their educational choices to maximize their incomes, therefore individual i chooses education if and only if:

$$h_{i0} \geq \left(\frac{2 + \frac{k^u N^s}{N}}{w + \frac{k^s N^s}{N}} \right)^{\frac{1}{\alpha}} \equiv h^c\left(N^s\right) \tag{3}$$

that is, a child's human capital investment decision will depend on whether or not parental human is above a cut-off level that depends on the relative wages of skilled and unskilled workers and the parameter α.[14]

We assume $wk^u < 2k^s$, implying that the skill premium is increasing in the number of skilled workers and, therefore, the cut-off level of parental human capital, $h^c\left(N^s\right)$, is decreasing in the number of skilled workers. This assumption is important for what follows so we consider it in some detail. The new growth literature offers various arguments that can underpin it.[15] Indeed, from the beginning this literature has invoked increasing returns to human capital. The famous paper of Lucas (1998) did this by assuming that, in addition to being a standard factor of production, human capital was also a key input into the accumulation of further human capital. In this framework having a large stock of educated individuals eases the path of others to education, in effect raising the returns to investing in education. Nelson and Phelps (1966) modeled an economy's technological progress as driven by its human capital stock, more education

[14] This formulation implicitly assumes that the number of families is large enough that no one can affect wages through his educational choice, an extremely reasonable condition that we could derive more formally.

[15] Temple (2001/II) and Acemoglu (2003) both survey the theoretical and empirical support for such effects.

causing faster technology growth.[16] If, in addition, technological change is skill-biased than increasing the stock of skilled individuals will increase the skill premium. This as a particularly plausible scenario for transition economies for the following reasons. First, advanced countries have experienced considerable skill-biased technological change in recent decades [Autor, Katz and Krueger (1988)]. Second, to the extent that transition economies achieve rapid technological progress in the next two decades, it will be primarily on the basis of adopting and adapting established technologies during a catching up phase. Indeed, Campos and Kinoshita (2002) show that relatively fast growth in transition economies is largely a consequence of the technological catch-up associated with relatively strong foreign direct investment. Thus, successful transition economies should follow roughly the wage patterns of the advanced industrial economies of the last several decades, albeit within a compressed time period, as they enjoy the advantages of backwardness Finally, invoking Nelson and Phelps (1966), more human capital should mean faster catch-up and, therefore, higher returns to human capital. This effect is likely to be large in transition economies because the potential for technological catch-up is vast, especially with technology diffusion widely defined to include institutional and organizational development as well as narrow technology growth.

Finally, we define an equilibrium in the model using the standard Nash concept. This set-up can be viewed as a game in which every player has two strategies; "invest" or "do not invest". An equilibrium is a profile of strategies, one for each of the N children, such that each child is maximizing his own income taking as given what all the other

[16] Nelson and Phelps (1966) has enjoyed a big revival recently, e.g. in the work of Acemoglu (2003) and Galor and Moav (2000). In Aghion and Howitt (1998) the survey of education and endogenous growth chapter 10 emphasizes equally the Lucas (1998) approach and the Nelson and Phelps (1966) approach. Benhabib and Spiegal [2002 and 1994] provide empirical backing for the Nelson and Phelps idea.

children are doing. For convenience we will assume that any agent who is indifferent between investing and not investing will choose to invest.

3. Analysis

3.1. An Example

In this section we compare a stylized transition economy with a stylized developing economy and argue that there is a good equilibrium that is plausible for the former but not for the latter. An interpretation is that the typical transition economy has the potential, but not a guarantee, for rapid growth based on high human capital while the typical developing economy must rise gradually over a long period of time.

Consider the following illustrative example. At time zero there are three groups labeled "High", "Medium" and "Low". Each individual in the high group has parental human capital of 1, while those in the Medium and Low groups have parental human capital of 2/3 and 1/3 respectively. The sizes of the groups are 20, 60 and 20 respectively. Table 1 summarizes the initial conditions in this transition economy. This

Table 1. Human Capital Distribution for a Typical Transition Economy

	High	Medium	Low
Number	20	60	20
Human Capital	1	2/3	1/3

distribution is meant to reflect the idea that in a typical transition economy there are many people who have attained a good educational standard.

We contrast the transition economy with a developing economy at a similar per capita GDP. The latter stochastically dominates the former.[17] The difference between

[17] It is reasonable to consider these economies as experiencing similar per capita GDP. Much of the human capital in the transition economy would have low market value, having been acquired under communism when priorities (the military above all else) were very different from what they are now (footnote 6).

the two types of economies is simply that the developing country has significantly fewer individuals with medium education and more with low education.

Table 2. Human Capital Distribution for a comparable non-Transition Economy

	High	Medium	Low
Number	20	30	50
Human Capital	1	2/3	1/3

Fix the parameter values as in table 3.

Table 3. Parameter Values for the Transition and Developing Economies

α	w	k^s	k^u
.5	2.3	1.5	1

The transition economy has two equilibria, a good one and a bad one. In the bad equilibrium only the High group invests in human capital. In the good equilibrium both the High group and the Medium group invest. There is no equilibrium in which the low group invests.[18] There is only one equilibrium in the non-transition economy. In it, only the High group invests.[19] Thus, the transition economy has the potential to carry forward

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However, it is crucial to note that while a Russian rocket scientist might earn very low wages, he still can do much to facilitate his children's human capital acquisition.

[18] When only the High group invests we have $h^c = \left(\frac{2.2}{2.6}\right)^2 = .72$ so only the High group will want to invest. When both High and Medium groups invest then $h^c = \left(\frac{2.8}{3.5}\right)^2 = .64$ both of these groups but not the low group will want to invest. If all three groups invest then $h^c = \left(\frac{3}{3.8}\right)^2 = .62$ so investment by the low group will not be sustainable.

[19] When only the High group invests we have $h^c = \left(\frac{2.2}{2.6}\right)^2 = .72$ so only the High group will want to invest. When both High and Medium groups invest then $h^c = \left(\frac{2.5}{3.05}\right)^2 = .67$ so investment by the Medium group will not be sustainable. If all three groups invest then $h^c = \left(\frac{3}{3.8}\right)^2 = .62$ so investment by the low group will not be sustainable.

much more human capital than does the developing country, a significant advantage for the former over the latter.

The good equilibrium of the transition economy is, of course, robust to small changes in parameters and initial conditions. However, it can be eliminated by moderate changes that can, in turn, derive from government policy. For example, increasing α to .6, corresponding to deterioration in the educational system, will spoil the good equilibrium. Decreasing w to 2.2, a decrease in the wage premium perhaps due to increased macroeconomic instability driving away foreign investment, will have the same effect. The good equilibrium can also be eliminated by insufficient capacity of the educational system. Unless a mass of .46 of the population is allowed to invest in education it will not be optimal for the Medium group to invest. Liquidity constraints can produce the same effect, i.e., unless at least of .46 mass can afford education then the Medium group will not choose education regardless of whether or not individual members of the group can afford it. So the existence of a high-investment equilibrium in transition economies can depend on economic conditions and government policy. Thus, the example suggests that in the transition economy case, in contrast with the developing economy case, there is much at stake for human capital development over the next generation..

In this example the transition economy has an unambiguously better human capital stock than the developing country has. We believe this is the right comparison to make because it generally reflects reality. However, it is also interesting to isolate pure distribution effects. To this end, consider mean-preserving spreads on the human capital distribution of the transition economy of the form:

Table 4. Human Capital Distribution for a Typical Transition Economy

	High	Medium	Low
Number	20+X	60-2X	20+X
Human Capital	1	2/3	1/3

First note that in the good equilibrium a mean-preserving spread in the human capital distribution always decreases the number of individuals investing in education, i.e., human capital inequality is bad for human capital development. Also, it is easy to calculate that the good equilibrium disappears as soon as X exceeds 26. This suggests that inequality is bad for human capital carry through and that there can even be a discontinuous effect from increasing inequality, although for these numbers it appears only at an extreme level of inequality.

3.2. General Results

Now consider the general case, beginning with the following observations.

Proposition 1. At least one equilibrium always exists.

Proof. Consider the strategy profile in which no agent invests. If this is an equilibrium, the proof is finished. If not, there is at least one agent who wishes to invest even when no one else is investing. Consider now the profile in which all such agents invest. If this is an equilibrium, again the proof is finished. If not, at least one agent now wishes to invest. Continue this procedure until every agent is satisfied, something which might only occur when everyone is investing. Eventually this procedure will find an equilibrium.

Proposition 2. Every equilibrium can be characterized by a human capital level, h^e, with the property that every child with parental human capital weakly above h^e will invest and every child with parental human capital strictly below h^e will not invest.

Proof. Take any equilibrium and take the child with the lowest parental human capital who is still investing. Suppose there is another child with higher parental human capital who is not investing. That child must be able to earn at least as much income by investing as she currently earns by not investing so she must be investing.

The next result indicates that when there are multiple equilibria only the one with the lowest h^e is efficient.

Proposition 3. When there are multiple equilibria they are Pareto ranked. More children investing always means more efficiency.

Proof. Consider two equilibria with cut-off levels $h_1^e > h_2^e$ and strictly more children investing in the second equilibrium compared to the first. Then in the second equilibrium both skilled and unskilled workers earn higher wages than their counterparts in the first equilibrium. Moreover, some children who are unskilled in the first equilibrium are skilled in the second equilibrium so they also earn higher wages in the latter case than they do in the former case.

The last proposition shows there is wide scope for increasing human capital in the middle range while maintaining multiple equilibria in the model. Intuitively, increasing the human capital of individuals will not upset an equilibrium unless they move from one side to the other side of the cut-off point.

Proposition 4. Consider an economy with two equilibria characterized by $h_1^e > h_2^e$. Transform this economy into another one by increasing the human capital of all parents,

i, such that $h_2^e \le h_0^i < h_1^e$ while maintaining the inequalities $h_2^e \le h_0^i < h_1^e$. Then in the new economy there will still exist equilibria characterized by the same $h_1^e > h_2^e$.

Proof. Consider the equilibrium in the original economy characterized by h_1^e. In this equilibrium all the children who have different parental human capital in the new economy are not investing. If they still choose not to invest in the new economy, wages of both skilled and unskilled workers will be the same in the new economy as they are at the equilibrium characterized by h_1^e in the old economy. Therefore, the choices at this equilibrium will also be equilibrium choices in the new economy. A similar argument shows that the equilibrium characterized by h_2^e also survives the transformation from the old economy into the new one.

Proposition 4 indicates that the example of section 3.1 has some robustness. In particular, there is wide latitude to vary the parental human capital of the middle group, including dropping its homogeneity, while maintaining both the good equilibrium and the bad equilibrium.

Proposition 4 does not show that increasing the bulk of middle range human capital cannot add new equilibria. The example of section 3.1 has already shown that, starting from an economy with a single equilibrium, increasing the number of children with moderate parental human capital can add a new Pareto-superior equilibrium.

4. IMPLICATIONS

The possibility of multiple equilibria suggests that two transition countries with similar initial conditions may get distinctly different results with one preserving and enhancing its human capital and the other experiencing significant deterioration. The determining factor could merely boil down to whether or not agents are able to coordinate their beliefs on a high-investment equilibrium. There may be some insight here but it is

limited. At the country level it has generally been the countries with the best overall conditions where education has done the best. If coordination of expectations were a key factor we would not expect human capital paths in top-performing countries to outshine those in the other countries so systematically. Similarly for urban-rural differences. If we break up a country into a set of relatively closed urban and rural areas we might expect some areas to flourish and others to perform badly, and indeed this is the case in many transition economies. However, good performance occurs overwhelmingly in urban and not rural areas, i.e., observed differences are too systematic to be explained by flukes of expectation coordination. Therefore, for the rest of this paper we will assume that when there are multiple equilibrium the economy will solve the coordination problem and realize the best one.

4.1. Bad Equilibria in the Basic Model

Consider now the extent to which the simple model above can account for the observed variation in transition economies. Assume, following the pattern of section 3.1, that the parental human capital distribution has three levels, low, middle and high. The fraction μ^k of the population has parental human capital h_0^k with $k = l, m, h$ and $h_0^l < h_0^m < h_0^h$. We focus on two equilibria; the one where only offspring of high human capital parents invest (the bad equilibrium) and the one where offspring of both high and middle human capital parents invest (the good equilibrium). Since we are not allowing coordination problems the issue is whether or not the good equilibrium will exist. Using equation (3) this requires:

$$h_0^m \geq \left(\frac{2 + k^u \left(\mu^m + \mu^h \right)}{w + k^s \left(\mu^m + \mu^h \right)} \right)^{\frac{1}{\alpha}}. \qquad (4)$$

Condition (4) points to three possible reasons why a good equilibrium may fail to exist. These are pure considerations and the good equilibrium can fail for a combination of the three.

First, the skill premium might be inadequate to sustain a good equilibrium. This could arise due to w not being sufficiently larger than 2, k^s not being sufficiently larger than k^u, $\mu^m + \mu^h$ being too small or a combination of the three. Münich, Svejnar and Terrell (1999) summarize research on returns to education in Central and Eastern Europe (CEE) and Russia in transition as showing that they have risen roughly to West European levels while remaining below those in the US and Latin America. World Bank (2001) surveys a larger set of studies covering the full range of income levels for transition economies and draws the same general conclusion (p. 17). It also suggests (p. 17) that wage premia for education are smaller in the Former Soviet Union (FSU) than in CEE, although the fragmentary evidence offered in their Table 6 (p. 18) is somewhat mixed. However, while this information is useful it is potentially misleading since the variation in wage inequality in transition is only very loosely related with education in these countries. For example, Newell and Reilly (1999) found that university education only explained 13% of the variance of wage inequality in a sample of CEE and the FSU. World Bank (2001) summarizes a set of five studies in which education explains substantially more of the variation in earnings in Hungary and Poland, where human capital development is proceeding positively, than it does in Armenia, Georgia and Russia, where human capital is deteriorating, strongly in the first to and more mildly in Russia. This suggests that risk-adjusted education premia are quite low in the non-Baltic

FSU and much higher in CEE. So the available evidence is roughly consistent with our model. There does seem to be a leading-edge group of countries in which human capital is carrying forward nicely to the next generation and the returns to education are relatively strong. There is also a laggard group where human capital levels are declining amid poor risk-adjusted returns. Moreover, note that what matters for human capital investment decisions are not instantaneous returns but rather anticipated lifetime returns. It is quite possible that current comparisons underestimate the difference between the leading-edge countries, where educated young people probably expect their wages to rise sharply, and laggard countries where young people are unlikely to be so optimistic.

Second, the good equilibrium may fail to exist because the distribution of parental human capital is inadequate. Specifically, $\mu^m + \mu^h$ might be too small, or in other words perhaps the human capital distribution in some transition economies is really closer to that of middle income developing economies than it appears to be at first glance. This could easily be the case in some countries, particularly in the Caucasus and Central Asia. Several of these countries have seen large emigration of skilled workers, often victims of wars or ethnic discrimination. Moreover, Central Asia had less than the average amount of human capital at the beginning of the transition.[20] These negative factors may have eliminated the possibility of establishing a good equilibrium.

Finally, the good equilibrium can fail because of the inadequacy of the educational system as captured by α being too small. This is a real issue because,

[20] In addition, as stressed in Campos and Dabušinskas, (2002) and Druska, Jeong, Kejak and Vinogradov (2002) and Sabirianova (2000), transition economies have the wrong mix of skills for a modern market economy, implying that standard human capital measures based on years of education overvalue the human capital stock of transition economies. However, in our model parental human capital functions only as a facilitator for children to acquire human capital and it is not obvious that the devaluation of the former would lower the quality of parenting performance (footnote 17).

despite the educational achievements of the past, educational structures in transition economies require major reforms as documented, e.g., in World Bank (1995), OECD (1998) and World Bank (2000). All three publications criticize the education systems in transition economies for producing the wrong mix of specialties (footnote 19), i.e., primarily scientists and engineers to serve the Soviet military-industrial complex, for overemphasis on specialization and for overreliance on rote learning. One need not accept all of these points in order to agree with our general point that the education system is not suited to the needs of a modern market economy and that reform can unlock much underlying potential. Other transition economies are in a similar situation.

Recall also the evidence presented previously about growing urban-rural educational gaps [Micklewright (1999)]. Thus, average educational provision might be reasonably high in some countries but if quality is well below average in rural areas these places can become ghettos from which it is difficult to escape. Similarly, reasonably high national skill premia may be of little relevance to residents of desolate areas if there is little regional mobility in the society.

4.2. Educational Capacity Constrains

Small extensions of the model allow us to investigate the effect of other educational problems in eliminating good equilibria. First, consider educational capacity constraints, which can easily be introduced as an upper limit on $\mu^m + \mu^h$ in condition (4). Clearly such a constraint can eliminate a good equilibrium, causing a substantial loss of human potential. Note that, due to its role in destroying the good equilibrium, the effect of this constraint is leveraged, making its impact much greater than might be expected. If enough agents from the middle group are forced out of educational

investment, then the remaining ones will drop out voluntarily. In this situation there would seem to be insufficient demand for education while potentially there is excess demand. This is important because one often encounters the view that returns to education are reasonably high in transition economies and therefore there is no problem with human capital accumulation. But people must have both the incentive and the opportunity to accumulate human capital if they are to do so.

Recall the evidence from paragraph three of section 1 on enrollment rates for pre-school and noncompulsory secondary schools showing a pattern of severe declines in Central Asia and the Caucasus and reasonable performance in CEE with more mixed results elsewhere. Of course, these outcomes reflect both supply and demand but surely supply is a significant factor, given the fact that funding cuts have been the strongest where enrollment has declined the most. The collapse of vocational secondary education in many transition economies is another reason to believe that capacity constraints have played a role in declining enrollments. These schools were often merely appendages of particular factories that now have no market outlet for their products. There is very little demand for this type of education and substantial investment would be required to convert these schools into more useful ones [Micklewright (1999), UNICEF (2000 &2001)].

4.3. Financial Constraints

Another simple but important extension is to introduce financing constraints. Suppose each child has a money endowment m_i in addition to her parental human capital endowment h_{0i}. Suppose further that educational investment requires a money expenditure c. Then investment in human capital requires both that $m_i \geq c$ and that

$$h_{i0} \geq \left(\frac{2 + \frac{k^u N^s}{N} + c}{w + \frac{k^s N^s}{N}} \right)^{\frac{1}{\alpha}} \tag{5}$$

and even children who would maximize his lifetime income by investing might still not invest due to insufficient resources in the short run. The effect in eliminating the good equilibrium would be similar to that of a constraint on educational capacity

This may be the most vital extension of the model since financing constraints appear extremely important in practice as shown in great detail in OECD (1998) and UNICEF (2000 & 2001). OECD (1998, pp. 78-79) gives graphic examples of the importance of family resources and connections in Russian education including the rise of private schools, state teachers charging tuition for private tutorials, state schools allocating spaces to paying students and the emergence of special clubs on a paying basis.

5. **Conclusion**

This paper is about the long-run future of countries in transition from communism. Unfortunately, there has been very little analytical economic work along these lines. These countries are undergoing major structural transformations while creating a large array of new institutions from scratch. Making mistakes at the beginning of the transition process can cause problems a long time. More positively, getting things right now can pay large dividends for decades. Rich countries have already established workable if not always optimal institutions and can survive an overemphasis on the short run. Transition economies must think about the future.

The communist world stressed education, mainly in pursuit of military goals. At the beginning of the transition, human capital stocks were highly distorted from the

perspective of the world market economy. Nevertheless, this legacy is something positive that can underpin a long period of rapid economic growth. At the same time, the great human potential of transition economies can easily be lost.

Some countries, notably those from Central Europe and the Baltic countries seem to be well on their way to converging with Western Europe. Other countries, particularly those from Central Asia and the Caucasus appear to be losing their human potential, sliding into the status of middle income developing country with a long road to prosperity. Moreover, there is reason to believe that various countries may be dividing into high-human-capital urban areas, often concentrated in capital cities, and backward rural areas with little potential for growth.

The analysis give various reasons why the human capital of a transition country or region may deteriorate. They include a poor education system either in terms of quality or capacity, inadequate returns to education, financial constraints impinging on people's ability to benefit from education and an insufficiently strong initial distribution of human capital. All of these factors, including even the last one, depend on government policy. Initial human capital conditions in some countries have been hurt by government policies that that discriminate against minorities causing emigration of well-educated people. Governments policies directly affect all aspects of schooling including quality, capacity and the cost of attendance. The returns to education depend on the development of a good market environment that protects contracts, minimizes corruption, attracts foreign investment, etc.. Thus, while initial conditions are less favorable in some countries than in others, policy also matters and can be decisive.

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