CHAPTER 6

Aging and Education

Introduction

The transition to a market economy and political liberalization have presented major challenges to the education systems of Eastern European and former Soviet countries. Reforms have been initiated throughout the region to meet these challenges, but the reforms are by no means complete. The demographic changes taking place are now imposing additional stresses on the region's education systems. Lower fertility levels in general are reducing the demand for preschool, primary, and secondary education and are shifting demand toward higher education. To the extent that they have already affected education systems, these changes have exacerbated the problem of redundant capacity of staff and facilities at the primary and secondary levels and the problem of shortage of capacity in higher education. Only at the preschool level have education systems adapted themselves to reduced demand, and this adjustment occurred for entirely extraneous reasons.[1] Demographic change will lead to further inefficiencies in the use of budget resources for education unless there

are fundamental changes in the financing and management of these systems.[2]

Two unique features of the region affect how its education systems have responded to demographic change to date and will continue to respond in the future. The first—already emphasized in earlier chapters—is that the demographic transition occurred at lower levels of income than in other regions where this transition has occurred.[3] The second is that the poorest of the former Soviet republics inherited education systems that were far more extensive than they could have afforded to develop and could afford to maintain with their own resources. These features create special challenges for policy, especially in the poorest countries. A central conclusion of this chapter is that slowing population growth and aging are increasing the urgency of making the reforms in education that are needed in order to respond to needs of the market economy and to maintain growth and productivity as global competition intensifies. This finding applies equally to Turkey.

The education interventions that transition countries need to make to respond to the effects of aging and to address the global competitiveness agenda are similar to those that more industrial countries must make (box 6.1). However, such interventions are likely to be more challenging for the transition countries because they are starting further behind. At the same time, some aspects of the reform agenda may be easier for the transition countries. For example, in higher education, the less developed programs in the transition countries may carry less baggage and thus be easier to redirect. More generally, policy reform may be more tractable in the transition countries than in the founding member countries of the European Union (EU), because the transition countries may be more amenable to innovation and to taking a more fundamental approach to policy reform.

The rest of this chapter is organized as follows. The next section describes key features of education performance since the start of the transition, including developments attributable to demographic change. It also describes the special features of education systems in the transition countries that result from the legacy of the Soviet period and the effects of the transition to date.[4] The section that follows then presents an analysis of the effect of demographic changes on enrollment. The chapter next considers how improvements in education can contribute to productivity and growth, thereby helping old countries in the region counteract the negative economic consequences of aging. Finally, policy implications are laid out.

BOX 6.1

How Are Education Systems Implicated in the Process of Demographic Change?

The process of demographic change in the Eastern European and former Soviet countries is changing demand for schooling and calling on education systems to meet the challenge of preparing a higher-productivity population.

Changing Demand for Schooling

The aging of populations in countries of the region is leading to changes in the size of school-age cohorts and to shifts in the demand for education at various levels. Under the right circumstances, these changes could be a source of fiscal savings. Shrinking school-age populations could provide a demographic windfall by allowing increased enrollment ratios without expanded staff and facilities. Alternatively, it could allow a scaling back of staff and facilities—and significant budget savings—without reduced education coverage (again, in relative terms). These benefits will not occur spontaneously. Reaping the potential fiscal benefit of slowing population growth will require implementing a range of measures to allow and to encourage efficiency improvements.

Supporting Higher Growth and Productivity

Education systems could play an important role in offsetting the possible negative effects of demographic change on economic growth and productivity, while contributing to the productivity gains that will be needed in the global economic context. This imperative is not limited to the transition countries. It is also a serious challenge for the advanced EU countries, which are concerned about the possibility of being left behind as other countries move more quickly to upgrade and modernize their education systems and to make them more inclusive. The recent Lisbon Council Policy Brief summarizes this concern:

> "The time when Europe competed mostly with countries that offered low-skill work at low wages is long gone. Today, countries like China and India are starting to deliver high skills at low costs—and at an ever-increasing pace. This is profoundly changing the rules of the game. There is no way for Europe to stop these rapidly developing countries from producing wave after wave of highly skilled graduates. . . . Faced with a rapidly changing world, Europe's school systems will have to make considerable headway if they are to meet the demands of modern societies. Some of these changes will require additional investment, particularly in the early years of schooling. But the evidence also shows that money is not a guarantee for strong results. . . . In short, if Europe wants to retain its competitive edge at the top of the global added-value chain, the education system must be made more flexible, more effective, and more easily accessible to a wider range of people. (Schleicher 2006: 2)"

How Education Systems Have Changed Since Transition

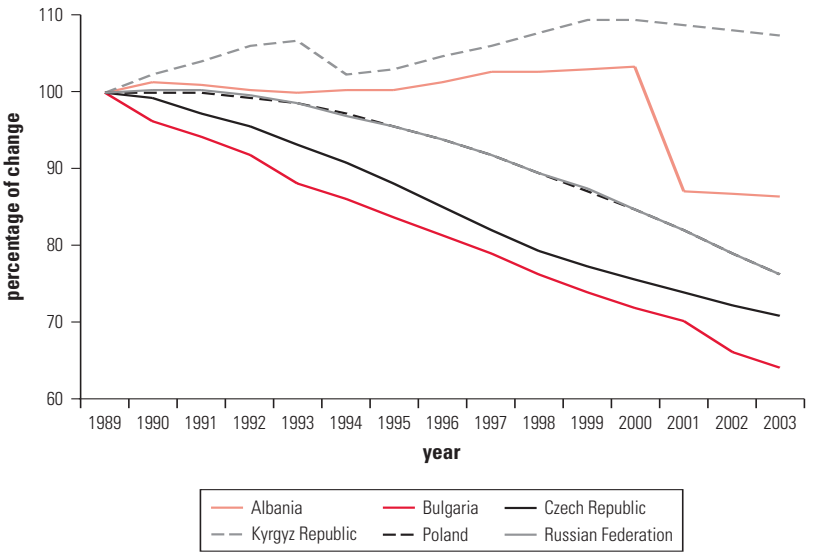
Education systems in the region were affected by a number of shocks in the first 15 years of transition. Demography has already had an impact and, of course, the political and economic transition has had fundamental effects throughout the region.

Changes in Cohort Sizes and Enrollments

Fertility declines were well under way in most of the region's countries by the start of the transition, and they had a dramatic effect on school-age populations, which declined throughout the 1990s in all transition countries except Azerbaijan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan.[5] In most other transition countries, the decline between 1989 and 2003 was at least 20 percent, and in Estonia, Georgia, and Moldova, it was more than 30 percent. School-age population figures for a selection of countries from different subregions and with different demographic profiles are shown in figure 6.1. In the Russian Federation, population in the 0 to 17 age group declined by almost 10 million during this period. Migration contributed to the decline in the poorer republics of the former Soviet Union and mitigated the decline in Russia itself. Because the fertility

FIGURE 6.1

Change in School-Age Population, 0 to 17 years, Eastern European and Former Soviet Benchmark Countries, 1989–2003



Source: UNICEF, 2004, table 1.2.

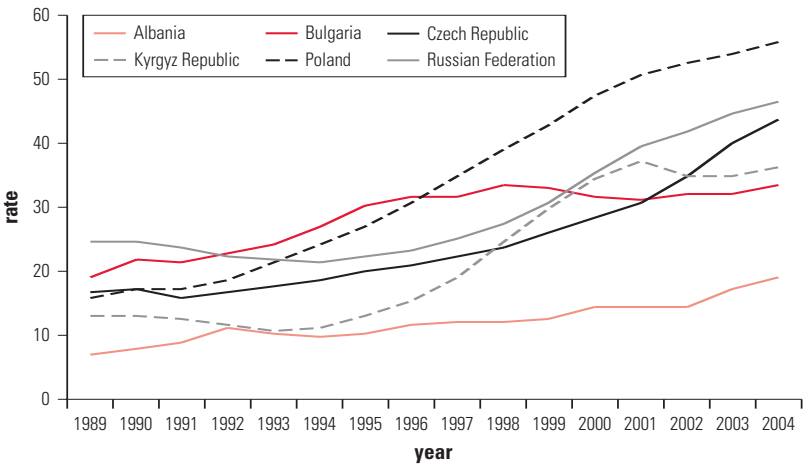
decline was greatest in countries with higher per capita income, expansion of the education system in the years after the transition had to take place in the countries that could least afford it.

Where school-age populations were shrinking and enrollment rates were appreciably below 100 percent at the start of the transition, the opportunity existed to expand enrollment coverage without expanding the teaching staff or facilities. In higher education, most countries experienced a surge in enrollments as the access restrictions of the former system were lifted (figure 6.2). Higher education enrollment rates improved steadily in all the transition countries of the region except Turkmenistan and Uzbekistan (annex table 6.A.1). But at all other levels, the transition initially led to falling enrollment rates, and for most countries, an even greater decline in absolute numbers of enrollments.

By the end of the 1990s, however, the expected pattern did emerge. Most countries with shrinking school-age cohorts experienced increases in enrollment rates that more than made up for initial declines. Countries with growing school-age cohorts—the poorest countries in the region—had difficulty keeping up with the increase and experienced continued declines in enrollment rates. This pattern was most pronounced in secondary education, where there was more room for improvement than in primary education. Several countries, however, did not conform to this pattern: Albania, Armenia, Belarus, Georgia, and Moldova experienced shrinking school-age cohorts and declining enrollment coverage—an outcome that could be attributed

FIGURE 6.2

Evolution of Gross Enrollment Rates in Higher Education in Eastern European and Former Soviet Benchmark Countries, 1989–2004



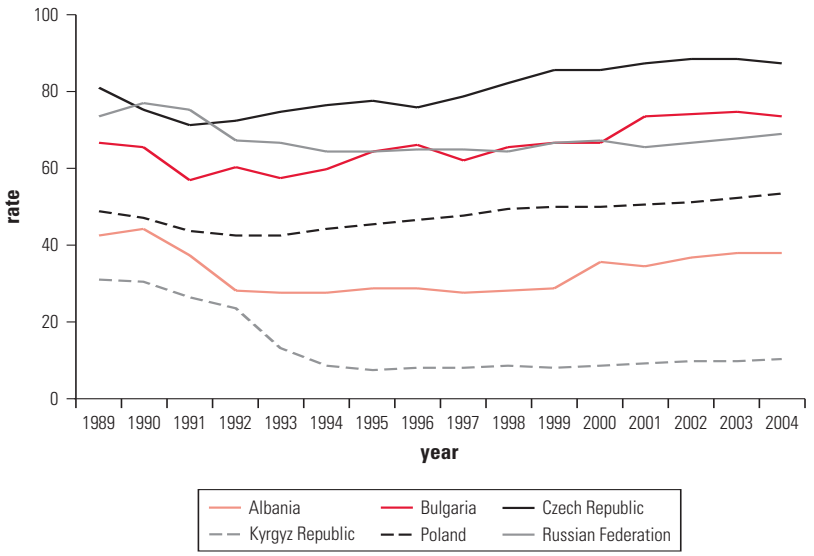
Source: UNICEF Innocenti Research Centre TransMONEE database.

in part to growing poverty. The fact that these enrollment declines were accompanied by growing poverty and excess capacity in terms of school places and teaching staff suggests that the decline resulted from demand-side constraints rather than supply-side constraints.[6] But in other countries with higher levels of income—notably, Kazakhstan, Lithuania, Russia, and Ukraine—factors other than poverty must also have contributed to declining enrollment coverage. Uzbekistan was the single country in the region with both a growing population and increasing secondary education coverage—the result of an extraordinary (and costly) presidential initiative to improve and expand secondary education.[7]

Preschool enrollments fell particularly steeply at the start of the transition in Albania, the Kyrgyz Republic, Russia, and other former Soviet republics, and they have stayed low in most of those countries (figure 6.3). The most severe decline in preschool coverage occurred in Kazakhstan (not shown in figure 6.3), where the preschool coverage rate of 53 percent at the start of the transition fell to 12 percent by 1997 and recovered to only 17 percent by 2004. Primary enrollments proved remarkably resistant to the shocks of the transition (figure 6.4). Although there were declines in primary school coverage rates in several countries (including Bulgaria, the Kyrgyz Republic, and Russia) early in the transition, most of those losses were made up

FIGURE 6.3

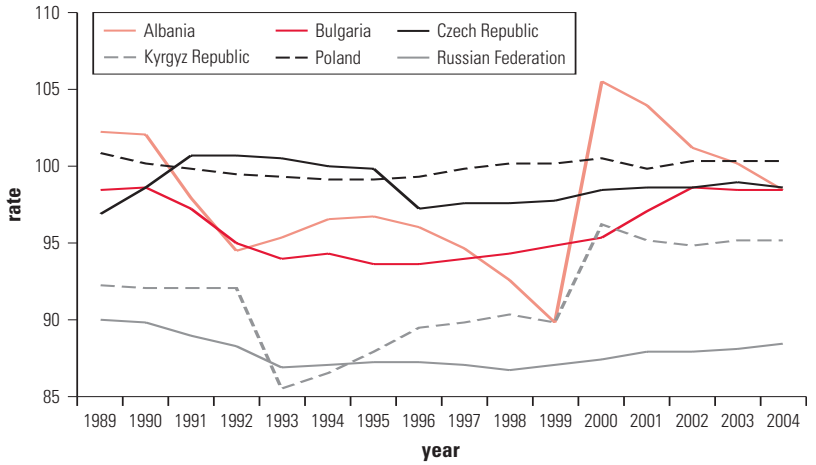
Evolution of Gross Enrollment Rates in Preschool Education in Eastern European and Former Soviet Benchmark Countries, 1989–2004



Source: UNICEF Innocenti Research Centre TransMONEE database.

FIGURE 6.4

Evolution of Gross Enrollment Rates in Primary Education in Eastern European and Former Soviet Benchmark Countries, 1989–2004



Source: UNICEF Innocenti Research Centre TransMONEE database.

by subsequent improvements. Even so, gross enrollment rates in primary education remained below 90 percent in Armenia, Bosnia and Herzegovina, and Russia as of 2004, indicating important unfinished business in addressing the causes of incomplete coverage.[8]

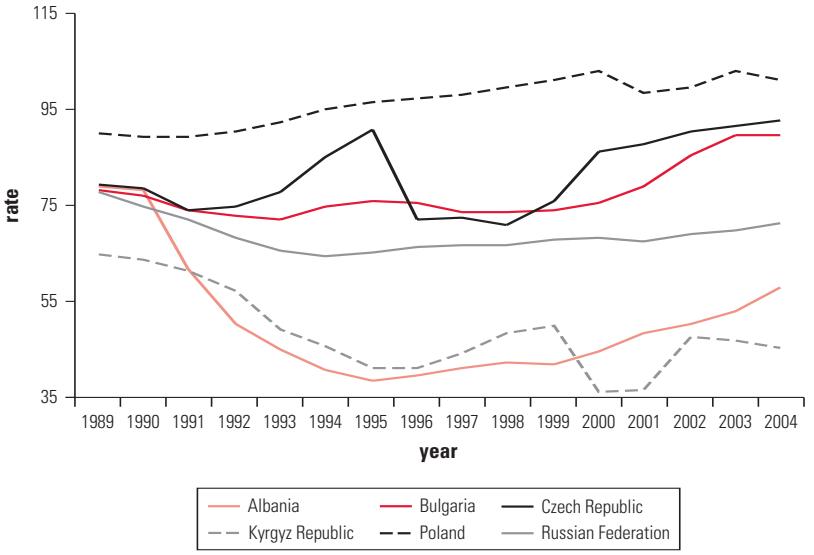
Secondary enrollment rates fell early in the transition by more than a third in Albania, Armenia, Azerbaijan, and Georgia and by at least a quarter in Kazakhstan, the Kyrgyz Republic, Lithuania, Romania, and Uzbekistan (see figure 6.5 for some benchmarks). In Tajikistan and Turkmenistan, secondary enrollment rates have fallen steadily since the breakup of the Soviet Union and remain well below half the coverage rates at the start of the transition. Collapsing enrollments in vocational and technical specializations account for most of the declines in secondary coverage. The most dramatic example is Albania, where enrollments in secondary vocational education and training fell from 54 percent of the age group in 1989 to less than 6 percent of the age group by the end of the decade.[9] As is discussed later, these declines reflect the declining relevance of vocational education and training to the skill needs of economies as they open up to international competition.

Education System Responses to the Economic and Political Transition

The economic and political aspects of the transition have fundamentally affected education systems. The rest of this section looks at these

FIGURE 6.5

Evolution of Gross Enrollment Rates in Secondary Education in Eastern European and Former Soviet Benchmark Countries, 1989–2004



Source: UNICEF Innocenti Research Centre TransMONEE database.

changes; at the governments' response to the changes; and at the combined influences of the transition, demographic change, and government policy on education outcomes.

Shrinking Output and Education Budgets

The disintegration of the Soviet Union created a number of new countries with first-world education systems and third-world levels of income and budget support. During the first decade of transition, cumulative declines in economic output averaged 50 percent in the countries of the Commonwealth of Independent States (CIS). The shock was not as severe in the Central and Southeastern European countries and the Baltic states, but gross domestic product (GDP) still fell, on average, by more than 20 percent in these countries (World Bank 2002, table 1.1). Almost everywhere, public revenues declined by an even greater amount than did economic output.

Budget allocations did not protect education budgets in the countries that experienced the most severe declines in output; instead, allocations favored other sectors. Details are provided in annex table 6.A.3, which summarizes the changes in national total output, per capita income, and education budgets since the start of the transition. Georgia presents the most extreme example. Its national output fell by 74 percent during the first four years of the transition, and public

revenues fell by a similar amount. During the same period, budget allocations for education declined from 6.1 percent of GDP to 0.6 percent, almost destroying the education system in the process. In 2004, real GDP had partially recovered to 42 percent of its 1989 level, but real public expenditures on education were just 20 percent of their 1989 level. Similarly, but to a lesser degree, budget allocations accentuated the cumulative effect of declining output and revenues in Armenia, Azerbaijan, Bulgaria, the Kyrgyz Republic, the former Yugoslav Republic of Macedonia, and Moldova. In some countries, including Latvia, Lithuania, and Tajikistan, budget allocations actually mitigated the effect of cumulative output and revenue declines. In Russia and Ukraine, they were neutral.

In most of the countries with rising GDP, budget allocations favored the education sector. This was the case for Belarus, Poland, and Slovenia. Budget allocations in Estonia favored education early in the transition, when output was falling, but favored other sectors in later years, when output was rising (although still allocating a larger share to the sector than most other countries in the region). The unusually high proportion of education sector spending in Uzbekistan reflects the expansion in secondary vocational education noted earlier.

Features of the Inherited Education Systems

In addition to these budget shocks, which had large and immediate impacts in many countries of the region, the transition also brought major changes in the role of education and in education governance. The Eastern European and former Soviet countries entered the transition with highly developed education systems that were closely aligned with the needs of a planned economy (see Berryman 2000; Laporte and Schweitzer 1994). Coverage of education at the preschool, primary, and secondary levels was close to universal. The structure of the economy emphasized manufacturing, and most secondary students were enrolled in vocational and technical programs that were oriented to the specific skill needs of local public enterprises. Access to university education was strictly controlled and largely limited to producing scientists and engineers for manufacturing industries. Wages and salaries were set normatively, rather than on the basis of educational qualifications and productivity, and played no role in allocating skills where they were most needed. Salaries for jobs that required highly educated workers were often lower than for jobs with minimal skill requirements. Services were neglected, and so were the skills—including humanities, business, and social sciences—associated with the service sector. The role of education as an instrument of personal growth and enrichment was entirely unrecognized.

The teaching and learning process emphasized accumulation of factual knowledge. Pedagogical methods emphasized discipline and respect for authority but tended to discourage student inquiry and initiative. Teaching effort and resources focused on the students who performed most highly on national academic competitions. Less attention was paid to low-performing students, who were routinely assigned to short, terminal programs of vocational training.

Transition Challenges: Changing Skill Requirements

The move to a market economy and the breakup of the Soviet Union and its alliances ended the internal consistency of the former system and launched three broad trends with mutually reinforcing effects on labor markets and skill requirements (Mertaugh and Hanushek 2005):

- First, market liberalization meant that production was driven by consumer choice rather than by central production targets. Prices of outputs and inputs were freed from administrative control. Wage and salary levels were no longer normatively set but were free to reflect differences in productivity and to signal emerging scarcities and redundancies in specific labor market skills.
- Second, the opening of the transition economies and the disappearance of subsidies and guaranteed markets required that enterprises compete to survive. This situation created powerful new incentives for efficiency in production.
- Third, freer flows of trade, of financial resources, of information, and of human capital interacted with an acceleration of technological change throughout the global economy, reinforcing the other demands for change in the new EU member economies.

Together, these developments led to a major reconfiguration of the structure of production; to the creation of entirely new industries, especially in the service sector; and to the accelerating pace of economic change. These trends fundamentally transformed skill requirements, making some skills—especially in the manufacturing sector—redundant and creating excess demand for others; they also made skill requirements more volatile and less predictable over time (see Commander and Kollo 2004; Peter 2003). It also led to major adjustments in the returns to skills, widening wage differentials between high-skill and low-skill workers. Open and sizable unemployment appeared (World Bank 2005a). Lifetime employment became the exception rather than the rule, necessitating a change in jobs—and often occupations—several times in the course of one's working life.

Government Policy Response

The collapse of output, income, and revenues early in the transition made it difficult to undertake the reforms needed to respond to this new environment (box 6.2)—or even to maintain education systems as they were in the pretransition era. That collapse also exposed the inefficiencies of the planned economy, in which prices did not reflect

BOX 6.2

Reforms Needed in Education Systems

The main reforms necessitated by the transition were the following:

- Secondary and higher education needed to become more demand driven rather than centrally directed.
- Vocational education at the secondary level needed to teach more generic skills for a few broad families of occupational specializations rather than highly specific skills for a large number of narrow occupations.
- Vocational education needed to give more emphasis to developing numeracy skills, problem-solving skills, communications skills (including foreign language proficiency), and teamwork skills and needed to give less emphasis to job-specific skills.
- Primary, secondary, and higher education needed to provide more opportunities for students and teachers to apply information technology throughout the curriculum, including use of computers to access and share information on the World Wide Web.
- Career counseling needed to be developed to provide students, teachers, and parents with up-to-date information on the implications of education choices for employment opportunities and options for further education.
- Higher education needed to be more flexible at entry and to offer easier transfer opportunities across programs and faculties.
- Higher education needed to provide stronger performance incentives to students and faculty.
- The legal and fiscal environment needed to change to encourage employers and local governments to develop lifelong learning programs to meet local (and global) skill needs.

At the same time, the sharp contraction of public resources for education called for diversification of financing, more efficient management of education, and a new formula for allocating public resources that rewarded efficiency, innovation, and responsiveness to the demands of students and the economy.

Source: Mertaugh and Hanushek 2005.

scarcity and incentives to hoard staff members, inventories, and infrastructure were strong. Implementation of education policy reforms to address the new needs of the transition economy was also hampered by the fragmentation of responsibilities—first during the breakup of the Soviet Union and then during a politically motivated rush to decentralization throughout the region. Decentralization also made it more difficult to address the growing problem of poverty, which was one of the earliest and most visible byproducts of transition (World Bank 2002, table 1.7).

Governments' initial response to collapsing revenues and collapsing education budgets at the start of the transition focused on reducing expenditures, as already discussed, and diversifying financing sources. Expenditure cutbacks occurred largely through sharply reduced budget outlays for preschool education, shortened durations of compulsory schooling, suspensions of expenditures for school maintenance and for renewal of teaching and learning materials, arrears in teacher salary payments at the start of the transition, and falling real salary levels thereafter. In many of the transition countries, the duration of compulsory education was shortened from 11 years to 8 or 9 years. Sources of financing were diversified through five sets of actions:

- Decentralizing (in principle, but rarely in fact) the responsibility for financing and managing most primary and secondary education programs from central to regional and local governments
- Introducing student fees and other user charges (including "contracted" provision of secondary and higher education within public schools and universities for students with entry scores below the threshold for budget-financed admission)
- Requiring parents to purchase textbooks and other educational materials that formerly had been provided free by schools
- Expanding private education
- Allowing schools to raise and retain funds through actions such as rental or sale of unneeded facilities and provision of paid extracurricular courses.

In addition, many teachers and school principals generated income through paid tutoring and solicitation of informal payments from students and parents. This practice very significantly augments teacher salaries in more affluent areas, where parents can afford these payments. It also exacerbates disparities in teaching and learning conditions and creates perverse incentives for teaching practices,

including withholding part of the curriculum in order to generate a demand for private tuition.

Decentralization has typically involved financing teacher salaries from the state budget but devolving responsibility for school maintenance and provision of educational materials (and often even teacher training) to local governments. In principle, the decentralization of responsibilities for education finance and management to local governments offers the potential to make the management of education more efficient and the content of education more responsive to local needs. It could also encourage the mobilization of additional resources for education. However, fundamental problems in the design of decentralization policy in the transition countries have blocked the attainment of these benefits. A widespread problem that prevents the actual implementation of decentralization is that the discretion of local governments to reconfigure schools and to reduce staffing or redeploy staff members to improve efficiency is constrained by centrally imposed norms on class size and teaching hours, as well as, in many cases, central constraints on hiring and firing teachers and school principals (see Fiszbein 2001; Godfrey 2004; Herczyński 2002; Kitaev 1996; Levačić 2003; Rysalieva and Ibraeva 1999).

In most countries in the region, decentralization was meant to be accompanied by a move from input-based to output-based financing. Per student or capitation-based financing was expected not only to provide a basis for determining the size of budget transfers from central to local governments for education financing, but also to provide an incentive for improved efficiency—including shedding teachers and consolidating schools in response to shrinking enrollments. The Czech Republic, Romania, and the Slovak Republic have adopted nationwide capitation financing schemes, and pilot schemes are under implementation on a small scale in the Kyrgyz Republic, Russia, and Uzbekistan. But practical problems associated with implementing this model have prevented its adoption in other countries in the region (box 6.3).

The most serious problem has been lack of agreement on a practical, output-based formula for central transfers to local governments. As a result, central budgets throughout the region continue to finance primary and secondary teacher salaries and often other essentials such as utilities and textbooks. Another fundamental problem is that centrally established norms for minimum and maximum class sizes, teaching hours, and the like, as well as prohibitions on closing schools, limit the flexibility of local governments to configure schools and deploy teachers more efficiently.

BOX 6.3

Fundamental Problems with Current Financing Formulas

The continued central financing of core education expenditures reflects the awareness on the part of central governments that education quality and coverage will fall to unacceptable levels in poorer localities if local governments have to rely on their own resources to finance these inputs. But current financing formulas have three fundamental problems:

- Many important educational inputs—such as equipment and materials, programs for poor students and at-risk students, and school maintenance—are usually financed locally, which leads to significant disparities in the quality and coverage of education. Unfortunately, these needs are greatest in localities with the lowest incomes, revenues, and educational performance. It is important to ensure adequate financing for these expenditures as well—preferably, through a central financing instrument that targets schools and localities that have the greatest needs.
- Teacher training, while included in principle in central transfers, is in reality not provided to any significant degree. Failure to fund teacher training is a high-risk and low-efficiency option because it means that an education system's most important assets—the teachers—are not equipped to perform their work effectively, especially in introducing the important innovations planned under ongoing and future reforms.
- There are no incentives for improved efficiency—and often not even the means to achieve it—because centrally established norms on minimum and maximum class sizes, teaching hours, and the like limit the flexibility of local governments to configure schools and deploy teachers more efficiently. The gap-filling transfer mechanism provides no incentive for local governments to move toward larger class sizes, because it does not allow them to keep any of the salary savings that such a move would generate. For this reason—and also because of the shrinkage of the school-age cohort—schools in rural areas and small towns tend to be at (or below) the minimum permissible class size. The situation for areas that have growing populations is the reverse. There, classes tend to be the maximum size permissible and to operate on multiple shifts because limited classroom capacity and the lack of investment budget resources to build new schools do not allow the luxury of smaller class sizes.

Consequences for Education Systems

Not surprisingly, decentralization and the actions taken by governments in response to shrinking budgets led to a number of adverse consequences for education programs, including the closure of many preschools and a sharp decline in preschool enrollment in many countries early in the transition. The increased reliance on financing from local governments and households with different capacities contributed to the emergence of sizable differences in education quality (described later). It may also have contributed to the declines observed in secondary education coverage (annex table 6.A.1). Reliance on

extrabudgetary sources of financing often created perverse incentives such as those already mentioned regarding teacher behavior as well as the incentive for production activities in vocational schools and service provision in general secondary schools (such as offering computer classes to the community) to displace educational activities.

Although it is difficult to document, corruption in the form of solicitation of informal payments for better examination scores and for admission to university programs also became (and remains) a serious concern in most transition countries. Legal ceilings on parental contributions to teachers have generally not been effective in reducing the scale of the problem, but the adoption of high-quality and high-security external examinations as the sole basis of university admission in Georgia, the Kyrgyz Republic, and Turkey has proven to be an effective tool for reducing the incidence of corruption in higher education.

Impacts of Transition on Education: Changing Quality

Transition has affected the quality of education in two important respects. First, the shrinkage of resources for education and the decentralization of finance and management of education have reduced the resources available to households and schools to support the education process and have contributed to a deterioration of the classroom teaching and learning environment in some schools, with adverse learning outcomes. Another factor that may have contributed to this outcome was the erosion of teacher salaries, which led to demotivation and the need for many teachers to work at other jobs in order to support their families. Second, the change in skill requirements has meant that even if the content of education programs had been relevant to skill needs in the economy at the start of the transition, it was less so under the transformed skill requirements of the market economy. One indication of this mismatch was the sharp decline in secondary vocational enrollments that occurred during the first decade of the transition. In Albania, for example, the secondary school–age group enrolled in secondary vocational programs declined from 55 percent to just 6 percent. Other countries also experienced declines: in Kazakhstan, from 44 percent to 20 percent; in Latvia, from 48 percent to 27 percent; in Romania, from 78 percent to 44 percent; in Russia, from 53 percent to 40 percent; and in Ukraine, from 40 percent to 28 percent (UNICEF 2004).

External assessments of student achievement are the preferred instrument for assessing the effects of transition-related changes in learning conditions on actual learning outcomes. The most direct evidence of changes in learning achievement over time in the transition

countries is provided by the Trends in International Mathematics and Science Study (TIMSS), which was carried out for a nationally representative sample of eighth-grade students in 24 countries in 1995, 39 countries in 1999, and 45 countries in 2003. Eight transition countries—Bulgaria, Hungary, Latvia, Lithuania, Romania, Russia, and the Slovak Republic—participated in all three assessments; Slovenia participated in the 1995 and 2003 surveys; the Czech Republic participated in the 1995 and 1999 surveys but not the 2003 survey; FYR Macedonia and Moldova participated in the 1999 and 2003 surveys; and Armenia and Estonia participated only in the 2003 survey.

Average assessment results show a mixed picture (table 6.1). Bulgaria registered the largest decline in combined math and science score. The Czech Republic and the Slovak Republic also experienced large declines. Average assessment results increased significantly in Latvia and Lithuania and to a lesser degree in Hungary. Assessment results were mixed in Moldova and the Slovenia (with a decline in average math score and an improvement in average science score), and there was essentially no change in Romania. Estonia, which first participated in 2003, outscored all other transition countries and was among the highest performing of all 45 countries participating in the survey. Armenia's mean scores were toward the bottom of the range for transition countries but still well above those of many of

TABLE 6.1

TIMSS Grade 8 Student Assessment Results for Math and Science for Participating Eastern European and Former Soviet Countries, 1995, 1999, and 2003

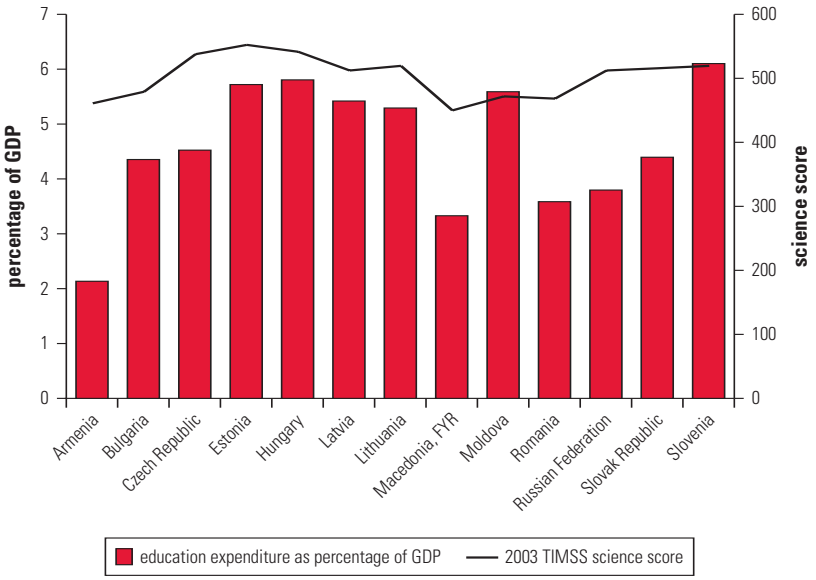
Country	Mathematics mean score			Science mean score		
	1995	1999	2003	1995	1999	2003
Armenia	n.a.	n.a.	478	n.a.	n.a.	461
Bulgaria	527	511	476	545	518	479
Czech Republic	546	520	n.a.	555	539	n.a.
Estonia	n.a.	n.a.	531	n.a.	n.a.	552
Hungary	527	532	529	537	552	543
Latvia	488	505	505	476	503	513
Lithuania	472	482	502	464	488	519
Macedonia, FYR	n.a.	447	435	n.a.	458	449
Moldova	n.a.	469	460	n.a.	459	472
Romania	474	472	475	471	472	470
Russian Federation	524	526	508	523	529	514
Slovak Republic	534	534	508	532	535	517
Slovenia	494	n.a.	493	514	n.a.	520
International average	n.a.	n.a.	467	n.a.	n.a.	474

Source: Mullis and others 2004, table 1.3; Martin and others 2004.

Note: n.a. = not applicable. Changes in schooling ages make the 1999 scores for Slovenia noncomparable to the 2003 scores.

FIGURE 6.6

Learning Achievement and Fiscal Effort in Education for Selected Eastern European and Former Soviet Countries Participating in 2003 TIMSS Assessment



Source: Data for 2003 mean science score from TIMSS. Expenditure data from UNICEF Innocenti Centre TransMONEE database. Expenditure figures refer to consolidated (central plus local) budget.

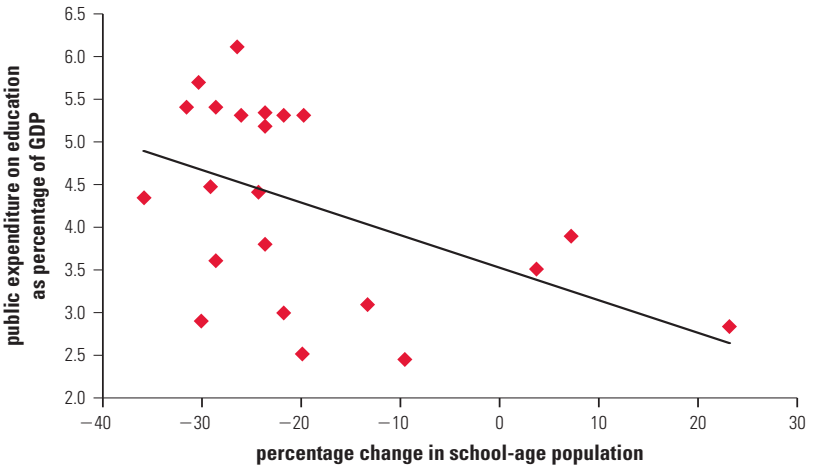
the developing countries in the survey including the Arab Republic of Egypt, Indonesia, Morocco, and Saudi Arabia.

Average learning achievement among the transition countries represented in the survey is still relatively high, but it is falling rapidly in the poorest ones. For this group of transition countries (see figure 6.6), as for the countries of the Organisation for Economic Co-operation and Development (OECD), average levels of learning achievement at the national level are positively associated with fiscal effort in education (see also OECD 2004b, figure 2.2). Most of the countries with the lowest student achievement, including Armenia, Bulgaria, and FYR Macedonia, devote the smallest share of GDP to education,[10] while most with the highest student achievement—including Estonia, Hungary, Latvia, Lithuania, and Slovenia—devote a relatively high share of GDP to education.[11] At the same time, the countries with the most rapidly shrinking school-age populations are also the ones that devote the highest share of GDP to education (figure 6.7).

The picture that emerges, then, is one in which the more prosperous transition countries are experiencing shrinking school-age cohorts but are making greater financial investments in their education systems to improve their human capital. They are using education as a deliberate instrument of self-improvement, while the least prosperous transition

FIGURE 6.7

Public Expenditure on Education and Change in School-Age Population in Selected Eastern European and Former Soviet Countries, 1989–2004



Source: UNICEF Innocenti Research Centre TransMONEE Database. Expenditure figures refer to consolidated (central plus local) budget.

countries are experiencing growing school-age populations, treating education as a residual area for public expenditure, and achieving lower educational performance. If this pattern continues, it will lead to increasing disparities in economic performance and will pose a serious threat to growth and competitiveness in the poorer transition countries, which are also the countries with growing or only slowly shrinking populations. These countries need to devote a larger share of their budgets—and their GDP—to education. They also need to use education policy as a proactive tool to improve growth, competitiveness, and earnings.

Impact of Projected Demographic Changes on Enrollments

Changes in Projected School-Age Population and Enrollment

As the school-age population in most of the transition countries continues to shrink, the failure to make necessary efficiency improvements in financing primary and secondary education will become more conspicuous.

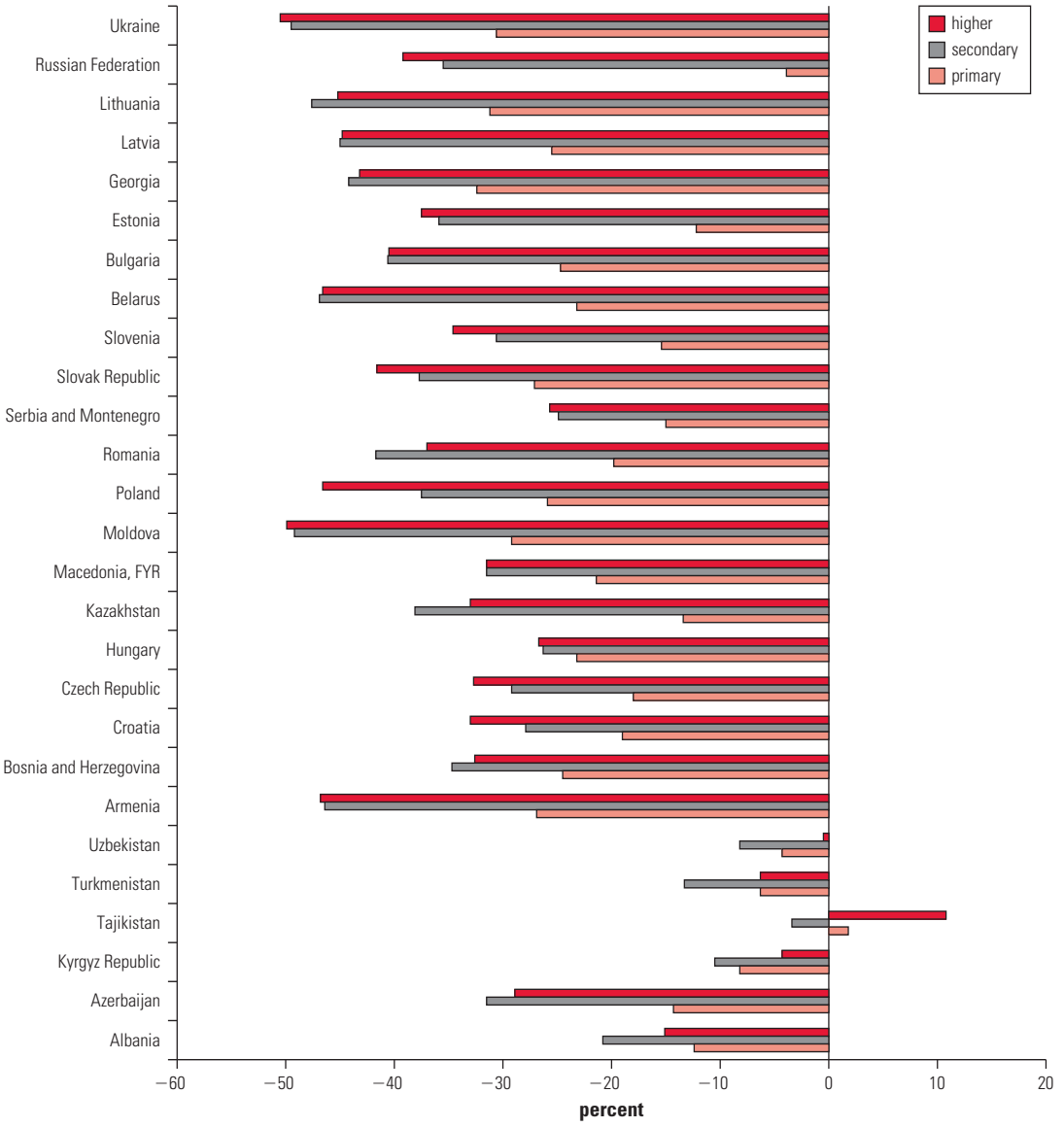
School-Age Population

By the beginning of the transition, most of the transition countries with aged and aging populations had attained less-than-replacement fertility levels. Throughout the first decade of the transition, fertility

levels continued to decline, and the size of the school-age cohort contracted at rates formerly seen only in times of war, famine, or epidemic. Throughout the region, the rate of contraction will taper off and the size and structure of the population will eventually stabilize, but the size of the school-age cohort will continue to shrink for at least the next two decades in all countries except Tajikistan (figure 6.8, with detailed data in annex table 6.A.4).[12]

FIGURE 6.8

Change in Projected School-Age Population by Level of Education in Eastern European and Former Soviet Countries, 2005–25



Source: United Nations Population Division database, adjusted for duration of schooling cycles in individual countries.

In most countries, the decline in school-age populations will be considerably larger than the substantial decline in the population age 0 to 17 that occurred between 1998 and 2004. The declines will be especially large, as would be expected, for countries that have old and aging populations. Even the countries with young populations are expected to see significantly smaller school-age cohorts. The single exception is Tajikistan, which is expected to experience a slight overall increase in primary school–age and university-age populations between 2005 and 2025. In general, the declines are very large—in some cases up to 50 percent from 2005 to 2025—reflecting the unprecedented pace of fertility decline in the region. The magnitude of the decline implies that there are major opportunities for savings, which could be used to improve the quality, relevance, and coverage of education. But harvesting those gains will require fundamental policy changes.

For most countries, the shrinkage of school-age populations will occur progressively over the coming two decades, but some will see sizable oscillations in cohort sizes as demographic changes work their way through the population pyramid. These oscillations will occur in all the countries that currently have young populations but also in Belarus, Bulgaria, the Czech Republic, Estonia, FYR Macedonia, and Russia.

Enrollment Projections

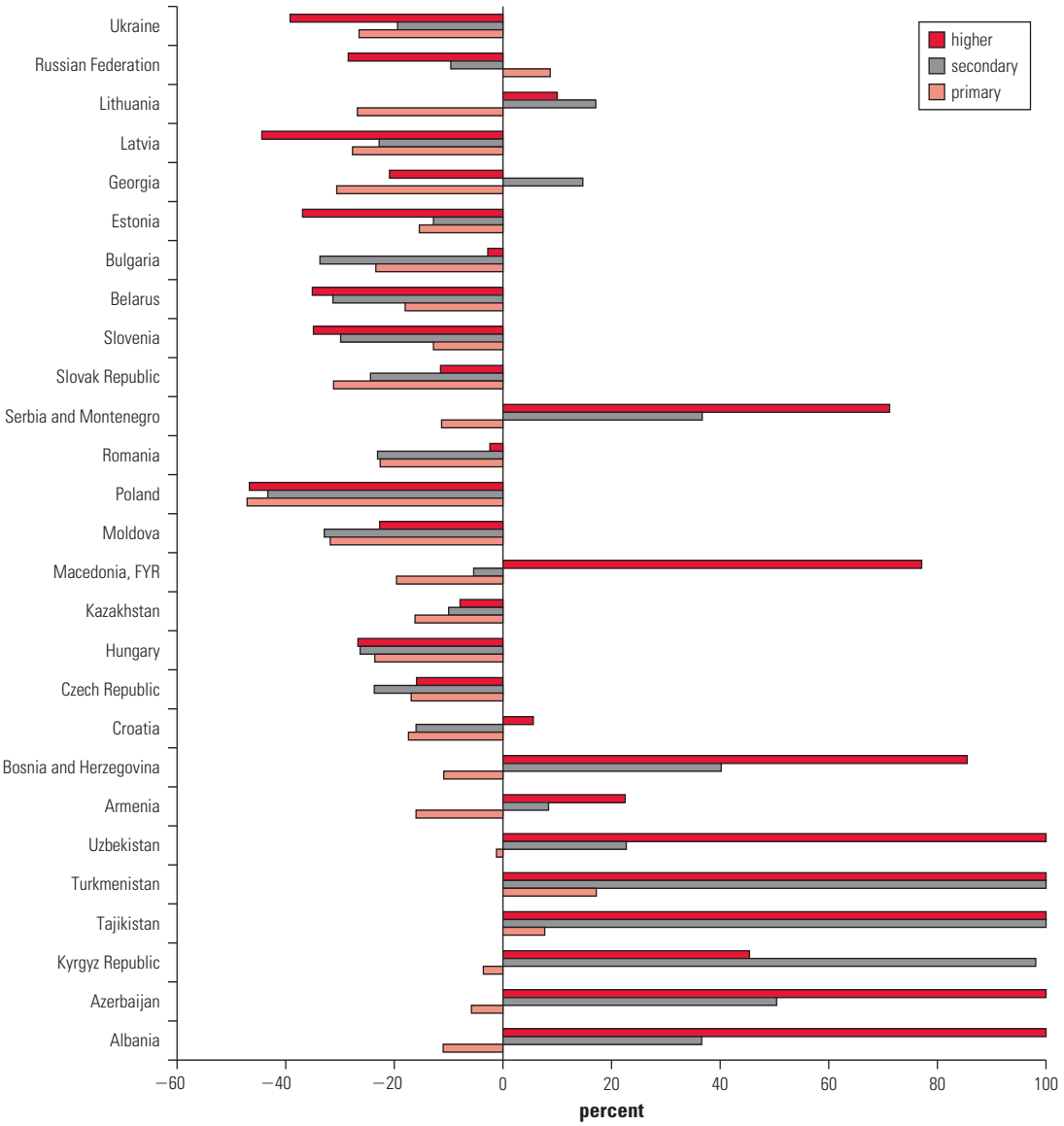
Coverage rates in education (annex table 6.A.5) leave significant room for improvement. The large declines in primary school coverage in Armenia, Bosnia and Herzegovina, and Turkmenistan during the transition have resulted in current gross enrollment rates in primary education that are well below 90 percent. Russia experienced a smaller decline but its starting point was also low, leaving its current coverage rate also below 90 percent. The larger declines in coverage that occurred at the secondary level have left current rates below 50 percent in eight transition countries: Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, the Kyrgyz Republic, Moldova, Tajikistan, and Turkmenistan. Secondary coverage is below 80 percent in all countries except Bulgaria, Croatia, the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia. Despite sizable increases in higher-education coverage rates everywhere except Turkmenistan and Uzbekistan, coverage remains low—particularly in the poorest of the transition countries (which are also the countries with the youngest populations).

To assess the enrollment implications of these cohort-size changes, we projected enrollments to 2025, assuming that current enrollment rates converge to full coverage in primary and secondary education by the end of the period and to the current OECD mean enrollment

rate for higher education (55 percent) by 2025.[13] This assumption is consistent with recent trends. The results of this exercise are summarized in figure 6.9 and annex table 6.A.6. Although school-age cohorts in most transition countries are shrinking, continued improvements in enrollment rates will lead to very high rates of growth in secondary and higher education enrollments in the countries with young

FIGURE 6.9

Change in Projected Enrollments by Level of Education in Eastern European and Former Soviet Countries, 2005–25



Source: World Bank projection model, based on assumptions described in text and population projections from the United Nations Population Division database, adjusted for duration of schooling cycles in individual countries. Enrollment increases exceeding 100 percent are truncated in this figure for presentation purposes.

populations, as well as in Bosnia and Herzegovina, Serbia and Montenegro, and (for higher education) FYR Macedonia. Georgia and Lithuania are projected to have modest rates of growth in secondary enrollments over the period. All other countries are expected to experience shrinking enrollments, even in higher education, where shrinking cohort size is likely to more than offset improved coverage rates.

Implications of Projections

These changes have three major implications: (a) flexibility is needed in allocating resources, (b) this flexibility must be motivated through finance and management reform, and (c) demand constraints must be addressed.

Allocating Resources with Flexibility

The capacity of education programs—especially in terms of infrastructure and staff—will need to respond to the sizable changes in enrollments that will occur over the next two decades. Most countries will need to progressively shed teachers and consolidate school infrastructure. Others, however, will need the flexibility to alternately expand and contract programs in order to respond to oscillations in enrollments at particular levels of education.

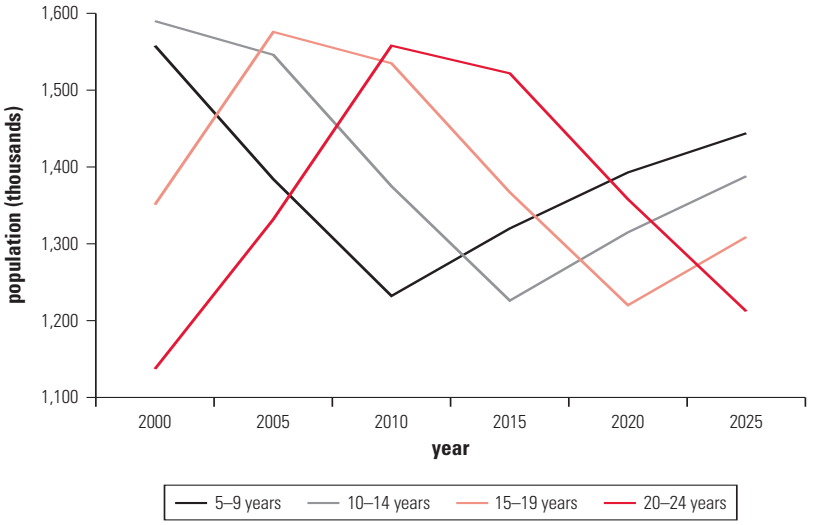
Uzbekistan provides a good illustration. Total population is projected to increase progressively over the next two decades.[14] But the recent fertility decline has pinched the base of the education pyramid in such a way that the size of specific school-age cohorts will fluctuate sharply for at least the next two decades. As shown in figure 6.10, the size of the secondary-school-age population grew rapidly starting in 2000. The government has responded to this increase with a major investment program to expand capacity and upgrade quality in secondary education. But just as this program is completed (in 2009), the size of the secondary cohort will start a sharp decline. New needs will arise in primary education, where cohort sizes will increase sharply after a decade of decline. These coming demographic fluctuations are not speculative; for the most part, they are the inevitable consequence of the aging of the existing population. The fluctuations in the size of school-age cohorts will have a major bearing on the need for school facilities, teachers, textbooks, and other educational inputs at each stage of education.

Motivating Flexibility through Finance and Management Reforms

The second implication of the projected enrollment trends is that reforms in education finance and management need to move ahead

FIGURE 6.10

Actual and Projected Trends in the School-Age Population in Uzbekistan, 2000–25



Source: United Nations Population Division database.

in order to provide the means and the incentives to carry out the changes required in staffing and infrastructure. The continued use of input-based financing formulas for primary and secondary education is the main reason the contraction of school-age cohorts has not been accompanied by a proportionate decrease in teachers and facilities.

A preferable method is capitation-based financing, which determines the amount of a local government's educational subsidy on the basis of the number of students it is educating at each level, differentiated to reflect variations in costs of different programs of education and possibly other sources of cost variation. This approach—already used in a few transition countries—is preferable for two reasons. First, basing funding on enrollment targets a central objective of education; basing it on school inputs (such as numbers of classrooms and teachers) does not. Second, this approach provides an incentive for providers to rearrange inputs in order to provide education more efficiently. To be effective, however, this financing approach must assume that central authorities will relax or remove constraints on school consolidation and teacher deployment such as imposition of class size and teaching load norms; direct involvement in hiring, firing, and assignment of teachers; and prohibition of school closings.

The capitation approach is not perfect. It does not, by itself, provide safeguards that ensure education quality or teaching effectiveness. Nor does it necessarily reflect full cost differences between programs,

place-specific cost factors, or cost differences arising from special learning needs of students. Finally, it does not provide for improvements in curriculum, teaching materials, or teaching practices—all of which are needed in the transition countries. Nonetheless, such cost differences can be built into a modified, or cost-based, capitation system without compromising the positive efficiency incentives that such systems provide.

Table 6.2 shows how a composite financing formula can address some of the limitations just discussed. The most advanced applications of this approach are in the Anglo-Saxon countries: Australia, Canada, New Zealand, the United Kingdom (England and Wales), and the United States (Ross and Levačić 1999). Among the new EU member countries, the Czech Republic, Lithuania, and the Slovak Republic are the most advanced. They finance primary and secondary education through capitation formulas, with some of the elements recommended in table 6.2 to reflect cost variations. The Czech Republic also uses a capitation formula to finance lifelong learning courses offered by universities. Bulgaria and Romania calculate per student costs but do so after the fact; the actual financing formula remains input based. Eastern European and former Soviet countries that have not yet adopted capitation-based financing should implement such reforms, financing education at all levels on the basis of the number

TABLE 6.2

A Composite Formula for Education Finance

Component	Dimensions	Indicators
Basic per-student allocation	Total enrollment, differentiated by grade and program	Full-time equivalent (FTE) enrollments by grade and type of program
School site needs	School size	Primary: < 200 FTE enrollments Secondary: < 600 FTE enrollments
	School remoteness	Kilometers to town of 50,000+ persons
	Operations and maintenance costs	Interior area of school in square meters
Student supplementary educational needs	Socioeconomic hardship	Percentage of students from households receiving social assistance
	Low educational achievement	Number of students below twentieth percentile assessment results
	Nonfluency in national language	Percentage of students below cut-off score in national language test
	Disabilities and special learning needs	Number of students formally assessed with special learning needs
Educational quality improvement	Specialized curriculum	FTE enrollments in specialized program
	Specialized school	Total FTE enrollments (if special curriculum school)

Source: Adapted from Levačić and Ross 1999.

of students rather than inputs and differentiating allocations to reflect intrinsic differences in the cost of education delivery, such as the higher cost of technical specializations and the greater population dispersion in rural areas.

The details of how the formula reflects cost differences do matter. If financing formulas simply mirror the current unit costs of different localities, the resulting schedule of coefficients will legitimate an inefficient delivery model. The same considerations apply to differentiation of costs for different programs of studies. In the Slovak Republic, for example, per student recurrent costs are 100 percent higher for upper secondary vocational education and sports education schools than for gymnasia. Per student costs in professional art schools are almost four times as high as in gymnasia (Canning 2001). These unit costs differ largely as a function of class size and teaching loads, but they are not differentials that should necessarily be encouraged to continue. Secondary art schools in the Slovak Republic typify the problem of unsustainably high costs that result from classes that are too small. The recurrent-cost financing formula for upper secondary and higher education should encourage institutions to rationalize course offerings. Doing so could take the form of moving toward more affordable class sizes or reconfiguring course offerings—for example, by providing art education as one of several options in comprehensive secondary schools rather than in freestanding art schools.[15]

A still more advanced approach is to finance educational results rather than enrollments. Some of the charter school contracts in the United States, for example, condition payments to private education providers on the achievement of agreed targets in terms of learning achievement. Similarly, some state accountability systems reward schools for large gains in student achievement. The Czech model for subsidizing private education embodies the same approach. It finances a higher proportion of recurrent costs for schools that meet higher quality standards. This approach is likely to grow in use as the tools for assessing school performance improve.

Addressing Demand Constraints

The third implication of the enrollment projections is that strategies to achieve full coverage of primary and secondary education need to address the demand-side constraints that are largely responsible for incomplete enrollment coverage. Surveys on the factors affecting school attendance point to income-related constraints as the main obstacle. At the compulsory schooling level, they include the inability of families to afford the cost of textbooks and other school-related necessities and the lack of resources at schools for heating.

Nonattendance in upper secondary education is more often related to the perception on the part of students and parents that education is of low quality and will not lead to better employment prospects or higher earnings. Improved quality and relevance of education programs should help induce higher attendance. But raising enrollment rates among the groups at greatest risk is likely to require additional efforts, including targeted initiatives, such as counseling and tutoring for students who have learning difficulties, and economic initiatives, such as targeted subsidies for poor students to defray the cost of school transportation and purchase or rental of textbooks and school supplies.

Improved Productivity through Better Education Systems

One of the themes of this chapter is that improvements in productivity are essential if the Eastern European and former Soviet countries are to counteract the potential negative consequences of aging for economic growth. Human capital growth and technological change are the main sources of productivity increases.[16] Education—including vocational training and lifelong learning—plays a key role in both. At the individual level, higher educational attainment is consistently associated with higher lifetime earnings. At the country level, the relationship between average educational attainment and economic growth is more elusive. But learning achievement, which captures both duration and quality dimensions of education, has been found to be consistently related to economic growth performance in the OECD countries (Coulombe, Tremblay, and Marchand 2004). A key lesson for the transition countries is not only that educational attainment must increase to the levels of the high-performing OECD countries but also that education must be of high quality and relevant to the actual skill needs in the labor market. This message is particularly relevant for the transition countries for two reasons: (a) because the transition itself led to a serious disconnect between the skills provided by education systems and the needs of the market economy and (b) because these education systems have only begun to respond to the new skill needs.

Education plays a key role in supporting the process of development from low-income, resourced-based economies to high-income, knowledge-based economies. A recent study of global competitiveness (Schwab, Porter, and Sachs 2001) identified three successive stages of economic development—factor-driven growth, investment-driven growth, and innovation-driven growth—and characterized the role of education in each of those stages as shown in table 6.3.

TABLE 6.3

The Role of Education in the Stages of Economic Development

Development stage	Key economic challenges	Focus of economic production	Education and labor-market requirements
Factor-driven growth	Get factor markets working properly to mobilize land, labor, and capital	Natural resource extraction, assembly, and labor-intensive manufacturing; dominant primary sector	Basic education, low-level skills, disciplined work habits
Investment-driven growth	Attract foreign direct investment and imported technology to exploit land, labor, and capital and begin to link the national economy with the global economy	Manufacturing and outsourced service exports; dominant secondary sector	Universal secondary education, improved secondary vocational and technical education, lifelong learning to retool and update skills, and flexible labor markets (easy entry, easy exit)
Innovation-driven growth	Generate high rate of innovation, adaptation, and commercialization of new technologies	Innovative products and services at the global technology frontier; dominant tertiary sector	Highly developed higher education, especially in science and engineering specializations; high rates of social learning, especially science-based learning; dynamic research and development sector linking higher education programs and innovating firms

Source: Adapted from Schwab, Porter, and Sachs 2001.

For Eastern European and former Soviet countries to move through the stages described in table 6.3 implies substantive improvements in their education systems. In one sense, these countries face a challenge in using education as a strategic intervention to promote growth and productivity because of the unfinished reform agenda. But incomplete reform could also provide an advantage for the transition countries insofar as redundancy of the teaching staff and facilities permits expanded coverage without expanded capacity and insofar as the introduction of performance incentives encourages more effective teaching without necessarily increasing resources.

As they complete the reforms in management and financing of their education systems during the next decade, the transition countries will need to give greater attention to substantive reforms that are needed to make their education systems more responsive to the needs of the global economy. These substantive reforms must expand coverage, improve relevance and quality, and achieve greater inclusiveness.

Expanding Education Coverage

Together with supportive macroeconomic and financial policy and infrastructure investments, education plays a key role in developing the human capital needed at each of these successive stages of development. The main challenge for education coverage in the transition

countries is to increase enrollment rates in secondary and higher education, which remain well below OECD levels. As described earlier, shrinking school-age cohorts will facilitate the task of improving coverage for many countries because the availability of redundant staff members and facilities will preclude the need for necessarily increasing resources.

Improving Relevance and Quality of Education

Challenges are more complex in terms of education content and structure. The Programme for International Student Assessment (PISA), carried out by the OECD for 15-year-old students in OECD countries and in a small number of other countries, indicates that education systems are not effective in producing students with the kinds of skills increasingly needed in modern economies.[17] Whereas the TIMSS assessment tests students' mastery of the formal curriculum, the PISA test instrument specifically aims to assess students' mastery of higher-order skills such as synthesizing knowledge across disciplinary boundaries, integrating uncertainty into analysis, monitoring their own learning progress, and knowing where to access relevant information. Because these are precisely the skills that are needed for most of the fastest-growing jobs in the global economy, the PISA results provide a better indication of how well education systems are doing in providing relevant skills for the future.[18]

The transition countries that participated in the PISA assessment in 2000 and 2003 generally performed poorly relative to other OECD countries (annex table 6.A.7)—a far less impressive performance than on the TIMSS assessment. In Russia, performance fell in both absolute and relative terms. In other countries, performance improved in absolute terms, if not in relative terms. This was the case for Latvia and Poland, for example: mean scores in mathematics and reading improved sharply, but Poland's ranking improved only slightly and Latvia's actually declined because of the gains registered by other countries. Hungary's mean scores improved slightly in both math and reading but slipped in both areas in the country rankings. The Czech Republic recorded an anomalous performance, with a marked improvement in math between 2000 and 2003 but deterioration in reading. In general, the performance of the transition countries in the PISA was weaker in reading than in mathematics. The two conspicuous exceptions were Latvia and Poland, where major improvements in 2003 brought the mean reading scores and country rankings well above the mean math scores.

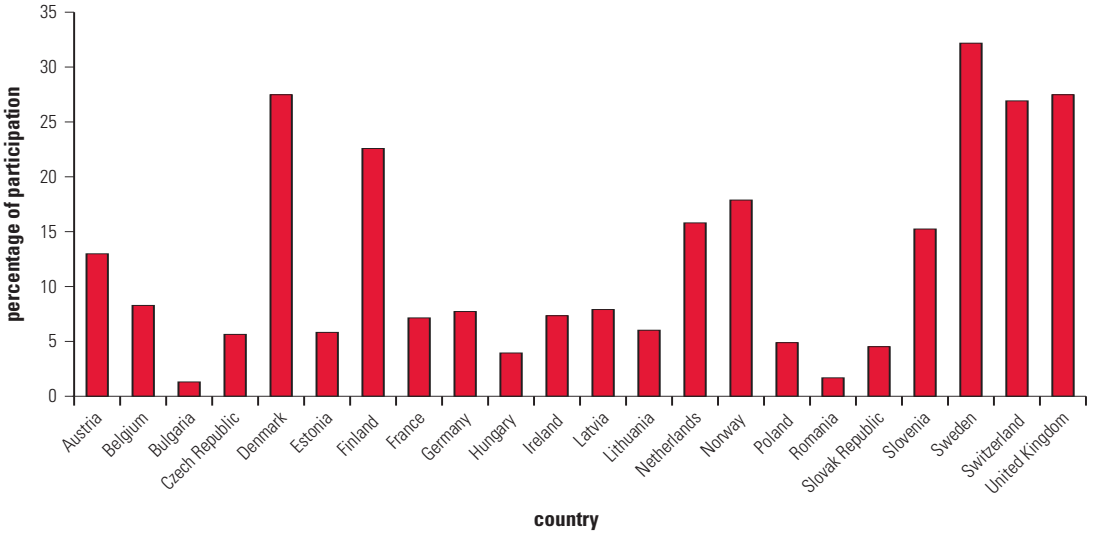
These findings from the PISA assessment indicate that the education systems of most Eastern European and former Soviet countries have a long way to go before they provide the skills that are most needed for improved economic performance, especially if they are to catch up to countries near the top of the scale. Raising learning achievement as measured in the PISA assessment to the average levels of the OECD would require a deliberate and sustained effort. Matching the performance of the high-growth Asian countries would require an even greater effort.

Moreover, these findings relate to the performance of students at the compulsory education level, where the transition countries have achieved essentially the same coverage levels as the other OECD countries. The need for improvement at the upper secondary and higher education levels is likely to be even greater—both because coverage levels are much lower than in the other OECD countries and because quality and relevance are likely to be lower as well. The imperative of expanding coverage of secondary and higher education has already been described. The only international study that sheds further light on the needs for improved quality and relevance in upper secondary and higher education in the transition countries is the International Adult Literacy Survey carried out by the OECD and Statistics Canada in the mid-1990s (OECD and Statistics Canada 1997). Covering 11 OECD countries, including Poland, this study examined adults' understanding of a range of concepts and their ability to apply those concepts effectively. It found that 75 percent of the Polish population age 16 to 65 performed below the level judged necessary by labor market experts and employers to function effectively in an information-rich workplace—far below the level recorded for the other OECD countries. The same study found much lower levels of unemployment and higher levels of earnings among workers with higher functional literacy proficiency in all the countries surveyed.

Follow-up work supported by Statistics Canada documented the deterioration of functional literacy skills over time unless those skills are maintained through subsequent training or work experience in an information-rich work environment (Coulombe, Tremblay, and Marchand 2004). An implication of those findings is that the education system of Poland at all levels—and presumably the systems of the other transition countries as well—does not convey effectively to students the ability to apply concepts. It also suggests that whatever practical skills the education system manages to impart deteriorate more rapidly than they would in a more information-rich working environment and an environment that offers more opportunities for lifelong learning.

FIGURE 6.11

Participation of Adults in Education and Training in Selected EU Countries, 2005



Source: Eurostat database.

Enabling Lifelong Learning

Lifelong learning is extremely limited in the transition countries even though economic liberalization strengthened the incentives for employers to provide training, while growing dispersion of productivity-related earnings strengthens the incentive for individuals to seek training. But legal proscriptions and onerous certification requirements, as well as the absence of positive inducements such as tax benefits for employer-provided training, inhibit the development of lifelong learning programs by private providers. By contrast, some EU member states have well-established policies and institutions to encourage employers to provide training for their employees and fairly high rates of adult participation in training and education (figure 6.11). A general conclusion is that the most effective strategy for promoting the development of lifelong learning may consist of a two-pronged approach involving the removal of legal and other impediments to training and the promotion of policies to strengthen the competitiveness of the business environment—and, hence, the incentives for individuals to seek training and for firms to provide it.

Improving the Inclusiveness of Education

Although education was accorded a high priority during the communist period, which was consistent with an egalitarian socialist ideology,

education policy retained important elitist aspects. Examples include the highly restricted access to higher education (not always based purely on merit) and the practice of streaming the bulk of students into terminal, occupation-specific courses relatively early in their studies. In education, as in athletics, the system was judged by the performance of the best, and disproportionate attention was devoted to developing the best performers. Extraordinary efforts and resources were devoted to the most gifted students, who were selected to compete in the academic equivalent of the Olympics and groomed for optimal performance.

Even today, a tendency prevails in the transition countries to judge the quality of education systems by the performance of the best students. This yardstick is not suited to the needs of the global economy. A comparison of growth rates of different countries indicates that all segments of the population need high-quality and relevant education if the economy is to prosper and grow (Hanushek and Kimko 2000). Educational policies that leave some groups of students behind lead to social fragmentation, risking cleavages that could undermine the core principles of the expanded European Union.

Concerns over the possibility that education could lead to greater social fragmentation are not limited to the transition countries. Annex table 6.A.8 shows mean mathematical literacy scores from the PISA 2000 for OECD countries and the differences in mean scores that are attributable to differences in socioeconomic status, starting with the highest level of mathematics proficiency. Some education systems achieve quality and equity together (for example, Finland, Japan, and the Republic of Korea); others achieve quality at the expense of equity (for example, Belgium, France, Switzerland, and the United Kingdom); still others have relatively low, but equitable, performance (for example, Italy, Mexico, and Poland); and some achieve neither quality nor equity (for example, Germany, Hungary, Luxembourg, and the United States). This last situation is a cause for serious concern and requires immediate corrective action.

One of the implications of the strong quality-equity trade-off in Germany is that education currently tends to perpetuate and reinforce socioeconomic differences rather than to mitigate them. In part, this outcome may reflect the early streaming of students into academic and vocational programs under Germany's dual system of vocational and technical education. This system is already under threat from the growing unwillingness of German employers to provide training for apprentices. German policy makers have responded to this development by exhorting employers to accept more apprentices. These findings on the equity outcomes of education suggest,

however, that this approach may be misguided. Recent international evidence suggests that early tracking in schools not only generally leads to wider variation in student outcomes but also does not offer clear gains in terms of overall levels of achievement (Hanushek and Wößmann 2005). Indeed, one of the factors behind the marked improvement in Poland's mean performance in the PISA 2003 may be the policy decision it made after the 2000 survey to delay differentiation of students in secondary education programs until after age 15 (OECD 2004a).

Policy Implications

Reform of education systems to meet the needs of the market economy is in progress in varying degrees throughout the region. Nowhere is it complete, and in some countries, it has barely begun. Initial policy efforts during transition focused on coping with collapsing output and education budgets and with the problems associated with the (politically motivated) devolution of responsibilities for preschool and basic education to parents and local governments.

Throughout the region, the transition led to immediate changes in enrollment patterns. Preschool coverage plunged early as a consequence of budgetary collapse and the devolution of delivery responsibility to local governments. Demand for higher education, which was rigorously limited in the former system, has maintained steady and impressive growth in all countries of the region except Uzbekistan. The main casualties of budget collapse early in the transition entailed a severe erosion of teachers' salaries and a general deterioration of teaching and learning conditions at all levels of education—from which all the countries in the region are still struggling to recover. Educational results, especially in science and math, used to be a source of pride. But learning achievement in those transition countries that have participated in international assessments is generally falling, especially in those competency areas that are most crucial to evolving labor market needs. In the countries that have not participated in such assessments, the picture is probably worse.

The major dislocation of trading patterns among the countries of the former Soviet bloc and the restructuring of many of the largest employers led to a growing disconnect between the skills produced by education and training systems and the evolving skill needs in the labor market. This disconnect is reflected in labor market developments, including rising unemployment for school leavers in many

programs of study and changing patterns of demand for specific education programs—including declining demand for most secondary vocational education programs. To the extent that education systems in the eastern part of the region have accommodated these challenges, their response has generally been passive, with little if any change in the structure of programs or the process for allocating students to specialized areas of study.

Within this context, the demographic transition has led to unprecedented swings in school-age cohort sizes. The need to adjust education systems to these swings has only added to the already daunting challenges facing education policy makers in the region. The incompleteness of reforms responding to the economic and political transition has limited the ability of education systems to respond to the demographic transition. In general, the education systems that were further down the path of dealing with the economic and political transition have made better progress in responding to the demographic transition. But here, too, reform is incomplete. Lower fertility levels are reducing the demand for preschool, primary, and secondary education and twisting the demand for education in favor of higher education. To the extent that they have already affected education systems, these changes have added to the problems of (a) redundant capacity of staff members and facilities at the primary and secondary levels and (b) shortage of capacity in higher education. Future changes in age structure will lead to further inefficiency in the use of budget resources for education, unless there are fundamental changes in the arrangements for financing and managing education systems.

Table 6.4 brings together some key parameters that illustrate the education policy challenges for the four groups of aging countries: European Union countries, Southeastern European countries, middle-income CIS countries, and low-income CIS countries. How they rank on these parameters reflects to some extent the education reform that has already been undertaken. It also reflects the nature and magnitude of the challenge of completing reforms to respond to the needs and opportunities of the economic, political, and demographic transitions.

Table 6.5 summarizes the reform priorities for the four groups of old countries. The most conspicuous education challenge arising from the demographic transition is to harvest the efficiency improvements made possible under the economic and political transition in order to complete the unfinished program of reform. The overall challenge is to build the capacity to develop human resources that can efficiently drive national economic growth in an increasingly competitive global

TABLE 6.4

Selected Population and Education Parameters by Country Grouping

Country grouping	Percentage change in 0–17 population 1989–2004	Percentage change in secondary school-age population 2005–15	Gross enrollment rate 2004[a] (%)			2004 Public expenditure on education (% of GDP)	2004 Primary student-teacher ratio
			Primary	Secondary	Higher		
European Union							
Bulgaria	−35.8	−40.6	98.4	89.6	33.6	4.3	14.1
Czech Republic	−29.2	−29.2	98.7	92.7	43.9	4.5	14.7
Estonia	−30.4	−35.9	104.4	72.9	62.9	5.7	9.9
Hungary	−23.7	−26.3	100.6	99.9	59.6	5.4	10.9
Latvia	−28.6	−45.0	103.1	71.6	63.6	5.4	11.2
Lithuania	−19.8	−47.6	103.8	69.0	65.9	5.3	11.6
Poland	−23.7	−37.5	100.4	101.0	55.9	5.2	13.0
Romania	−28.6	−41.7	103.6	75.8	35.5	3.6	13.3
Slovak Republic	−24.3	−37.7	105.9	82.7	36.3	4.4	15.7
Slovenia	−26.4	−30.6	103.5	99.6	79.5	6.1	10.5
Southeastern Europe							
Albania	−13.3	−20.8	98.5	58.1	19.0	3.1	18.5
Bosnia and Herzegovina	−26.6	−34.7	84.8	46.4	19.8	4.3	20.8
Croatia	−20.0	−29.2	97.9	85.7	35.1	4.5	13.9
Macedonia, FYR	−9.6	−31.5	97.8	72.6	21.2	2.4	16.8
Serbia and Montenegro	−12.8	−24.9	95.7	55.0	23.9	3.5	15.4
Middle-income CIS							
Belarus	−21.8	−46.0	93.6	77.5	45.4	5.3	8.7
Kazakhstan	−21.7	−38.1	103.3	68.8	40.0	3.0	10.7
Russian Federation	−23.7	−35.5	88.4	71.3	46.7	3.8	9.3
Ukraine	−26.1	−49.5	94.5	62.6	44.8	5.3	—
Low-income CIS							
Armenia	−19.9	−46.4	86.9	49.3	23.9	2.5	11.1
Azerbaijan	−14.1	—	96.0	59.4	13.2	3.4	8.8
Georgia	−30.1	−44.2	97.3	48.6	39.6	2.9	8.9
Moldova	−31.6	−49.2	94.1	44.6	27.7	5.4	9.3

Source: UNICEF Innocenti Research Centre TransMONEE database.

Note: — = not available.

a. The year is 2004 or the latest available year.

economy. Above all, meeting this challenge will require new policies to enable and motivate a nuanced contraction of capacity in primary and secondary education to respond to shrinking school-age cohorts. (Higher education cohorts are also shrinking rapidly, but much of the capacity liberated by those shrinking cohorts will need to be absorbed by continued increases in coverage rates.) For the education sector, the long-term shrinkage of school-age cohorts should be seen as a major opportunity to raise the quality of human capital by liberating budget resources (by shedding redundant staff members and facilities) and using those resources to improve the quality and relevance of education programs and to address the demand-side constraints

TABLE 6.5

Education Reform Agenda for Aging Countries by Country Grouping

Country grouping	Reform priorities for the education sector
EU countries	The EU countries are in the most favorable situation. They have experienced the greatest shrinkage of school-age cohorts, and have the lowest average student-teacher ratios—a measure of the potential resources that could be liberated by reducing teaching and nonteaching staff. Because these countries will continue to experience the greatest shrinkage of school-age cohorts, the scope for savings will grow over time. And because these countries have already attained quite high levels of secondary and higher education coverage, most of the potential efficiency gains would be available to support improvements in quality and relevance. Student-teacher ratios should be increased by at least 50 percent by eliminating unneeded teachers and other school staff. Budget shares are already high. Significant improvements in quality and relevance should be possible through improved efficiency, without additional budget resources.
Southeastern Europe	These countries have experienced less rapid shrinkage of school-age population and face slower future shrinkage. Current enrollment coverage is high at the primary level, but low for secondary and higher education. Teaching and nonteaching school staff members are already used more intensively than in the other groups. There is more limited scope for efficiency gains through higher student-teacher ratios and larger average class sizes. Whatever school staff may be liberated through larger class sizes will be needed to increase enrollment rates in secondary and higher education. Current budget expenditures for education are low. Budget outlays will need to be increased in order to improve quality and relevance of education, which is urgently needed (as suggested by the low TIMSS performance for FYR Macedonia).
Middle-income CIS	These countries have experienced rapid shrinkage of the school-age population and face rapid future shrinkage. Current enrollment coverage is low for the Russian Federation, even in primary schooling, and has ample room for improvement at the secondary and higher education levels in all four countries. Efficiency of teacher use is low. There is more moderate scope for efficiency gains through higher student-teacher ratios and larger average class sizes, because class sizes will need to increase significantly to support improved coverage. Current budget expenditures for education are conspicuously low in Kazakhstan and will need to be significantly increased to improve quality and relevance of education—especially to support the country's goal of strategic development of human capital in the petrochemical sector.
Low-income CIS	These countries have also experienced rapid contraction of school-age cohorts and face large future declines. But their gaps in primary school attendance and low coverage of secondary and higher education need to be addressed by judicious redeployment of resources. Student-teacher ratios should be increased by a combination of increased enrollment rates and eliminating teachers and other school staff where primary and secondary coverage is essentially complete. Budget shares in Armenia and Georgia are low and should be increased to help finance improved coverage together with efficiency improvements.

Source: Authors.

that lead to incomplete coverage of primary and secondary education. To a large extent, the effectiveness with which the Eastern European and former Soviet countries exploit this potential demographic dividend will determine future growth performance in the region.

Annex 6.A: Aging and Education: Data Tables

Annex tables 6.A.1 through 6.A.6 reflect the situation in Eastern European and former Soviet countries from 1989 to 2004. Annex tables 6.A.4 and 6.A.6 include projections. Annex tables 6.A.7 and 6.A.8 show PISA rankings and results.

TABLE 6.A.1

Change in 0 to 17 Year Population, 1989–2004; Gross Enrollment Rates in 2004; and Change in Gross Enrollment Rates, 1989–2004, Eastern European and Former Soviet Countries

	Percent change in population 0 to 17 years	Gross enrollment rates[a] (%)			Change in gross enrollment rates (%)		
		Primary	Secondary	Higher	Primary	Secondary	Higher
Young populations							
Kyrgyz Republic	+7.2	95.2	45.3	36.2	+3.0	−19.7	+23.0
Tajikistan	+23.1	95.4	28.8	14.4	+1.3	−31.3	+2.9
Turkmenistan	+33.3	80.0	28.1	2.5	−11.2	−38.7	−7.7
Uzbekistan	+16.3	96.8	74.8	8.3	+4.7	+5.4	−6.7
Aging populations							
Albania	−13.3	98.5	58.1	19.0	−3.7	−20.7	+17.1
Armenia	−19.9	86.9	49.3	23.9	−8.6	−18.2	+4.6
Azerbaijan	+3.7	91.0	45.6	13.2	+2.5	−17.2	+1.3
Bosnia and Herzegovina	−26.6	84.8	46.4	19.8	−8.7	—	+11.2
Kazakhstan	−21.7	103.3	68.8	40.0	+9.5	−7.3	+21.9
FYR Macedonia	−9.6	97.8	72.6	21.2	−4.2	+14.2	+1.9
Moldova	−31.6	94.1	44.6	27.7	0.0	−22.5	+11.5
Aged populations							
Belarus	−21.8	93.6	77.5	45.4	−2.3	−1.7	+10.9
Bulgaria	−35.8	98.4	89.6	33.6	0.0	+11.4	+14.5
Croatia	−20.0	97.9	85.7	35.1	+3.7	+7.6	+17.7
Czech Republic	−29.2	98.7	92.7	43.9	+1.8	+13.5	+27.3
Estonia	−30.4	104.4	72.9	62.9	+8.1	+8.8	+26.8
Georgia	−30.1	97.3	48.6	39.6	+2.3	−8.0	+20.8
Hungary	−23.7	100.6	99.9	59.6	+2.1	+27.2	+47.4
Latvia	−28.6	103.1	71.6	63.6	+7.4	+1.4	+43.0
Lithuania	−19.8	103.8	69.0	65.9	+8.8	−4.3	+38.3
Poland	−23.7	100.4	101.0	55.9	−0.4	+10.8	+39.9
Romania	−28.6	103.6	75.8	35.5	+7.8	−14.1	+28.3
Russian Federation	−23.7	88.4	71.3	46.7	−1.6	−6.5	+21.9
Serbia and Montenegro	−12.8	95.7	55.0	23.9	+0.6	—	+1.7
Slovak Republic	−24.3	105.9	82.7	36.3	+8.9	+3.7	+22.9
Slovenia	−26.4	103.5	99.6	79.5	+0.1	+19.1	+56.4
Ukraine	−26.1	94.5	62.6	44.8	+1.7	−3.0	+22.5

Source: UNICEF Innocenti Research Centre TransMONEE database.

Note: — = not available.

a. The rates are for 2004 or the latest available year.

TABLE 6.A.2

Change in Student-Teacher Ratios for Primary Education in Eastern European and Former Soviet Countries, 1989–2004

	Percentage change in population 0 to 17 years	Change in primary school gross enrollment rate (%)	1989 Primary education student-teacher ratio	2004 Primary education student-teacher ratio	1989–2004 Change in primary student-teacher ratio
Young populations					
Kyrgyz Republic	+7.2	+3.0	11.8	13.2	+1.4
Tajikistan	+23.1	+1.3	15.6	16.9	+1.3
Turkmenistan	+33.3	−11.2	12.2	13.8	+1.6
Uzbekistan	+16.3	+4.7	13.1	13.3	+0.2
Aging populations					
Albania	−13.3	−3.7	19.4	18.5	−0.9
Armenia	−19.9	−8.6	11.7	11.1	−0.6
Azerbaijan	+3.7	+2.5	10.9	8.8	−2.1
Bosnia and Herzegovina	−26.6	−8.7	24.0	20.8	−3.2
Kazakhstan	−21.7	+9.5	13.1	10.7	−2.4
Macedonia, FYR	−9.6	−4.2	20.8	16.8	−4.0
Moldova	−31.6	0.0	14.1	9.3	−4.8
Aged populations					
Belarus	−21.8	−2.3	11.8	8.7	−2.1
Bulgaria	−35.8	0.0	15.6	14.1	−1.5
Croatia	−20.0	+3.7	18.4	13.9	−4.5
Czech Republic	−29.2	+1.8	20.0	14.7	−5.3
Estonia	−30.4	+8.1	10.5	9.9	−0.6
Georgia	−30.1	+2.3	8.2	8.9	+0.7
Hungary	−23.7	+2.1	13.1	10.9	−2.2
Latvia	−28.6	+7.4	10.3	11.2	+0.9
Lithuania	−19.8	+8.8	12.6	11.6	−1.0
Poland	−23.7	−0.4	18.6	13.0	−5.6
Romania	−28.6	+7.8	20.0	13.3	−6.7
Russian Federation	−23.7	−1.6	14.1	9.3	−4.8
Serbia and Montenegro	−12.8	+0.6	19.1	15.4	−3.7
Slovak Republic	−24.3	+8.9	20.0	15.7	−4.3
Slovenia	−26.4	+0.1	14.9	10.5	−4.4
Ukraine	−26.1	+1.7	—	—	—

Source: UNICEF Innocenti Research Centre TransMONEE database.

Note: — = not available.

TABLE 6.A.3

Change in GDP and Public Expenditures on Education in Eastern European and Former Soviet Countries, 1989–2004

constant prices

	2004 gross national income per capita, (current US$)	1995 real GDP as percentage of 1989 GDP	2004 real GDP as percentage of 1989 GDP	Public expenditures on education		
				as percentage of 1989 level		as percentage of GDP
				1995	2004	2004
Young populations						
Kyrgyz Republic	400	54	85	52	55	3.9
Tajikistan	280	38	55	37	65	2.8
Uzbekistan	460	82	121	—	—	7.8
Aging populations						
Albania	2,070	104	325	99	252	3.1
Armenia	1,130	53	106	18	35	2.5
Azerbaijan	940	42	88	21	45	3.5
Bosnia and Herzegovina	2,040	—	—	—	—	—
Kazakhstan	2,250	61	103	94	148	3.0
Macedonia, FYR	2,390	79	93	69	38	2.4
Moldova	720	39	45	38	31	5.4
Aged populations						
Belarus	2,150	65	116	78	134	5.3
Bulgaria	2,750	80	92	64	80	4.3
Croatia	6,820	—	—	—	—	4.5
Czech Republic	9,170	95	115	121	128	4.5
Estonia	7,080	65	112	75	105	5.7
Georgia	1,060	24	42	4	20	2.9
Hungary	8,370	86	123	82	116	5.4
Latvia	5,650	53	93	81	111	5.4
Lithuania	5,840	58	96	72	113	5.3
Poland	6,100	111	160	120	174	5.2
Romania	2,960	85	101	131	165	3.6
Russian Federation	3,420	60	83	61	85	3.8
Serbia and Montenegro	2,680	—	—	—	—	3.5
Slovak Republic	6,480	84	120	80	104	4.4
Slovenia	14,820	97	136	117	173	6.1
Ukraine	1,250	45	57	46	57	5.3

Source: Output figures: World Bank SIMA database. Education budget figures: UNICEF Innocenti Research Centre TransMONEE database. Expenditure figures refer to consolidated (central plus local) budget.

Note: — = not available.

TABLE 6.A.4

Projected Change in School-Age Population by Level of Education in Eastern European and Former Soviet Countries, 2005–25

Population	Percentage change in population 0 to 17 years	Percentage change in projected school-age population		
		Primary	Secondary	Higher
Young populations				
Kyrgyz Republic	+7.2	−8.2	−10.5	−4.3
Tajikistan	+23.1	+1.8	−3.4	+10.8
Turkmenistan	+33.3	−6.3	−13.3	−6.3
Uzbekistan	+16.3	−4.3	−8.2	−0.5
Aging populations				
Albania	−13.3	−12.4	−20.8	−15.1
Armenia	−19.9	−26.9	−46.4	−46.8
Azerbaijan	+3.7	−14.3	−31.5	−28.9
Bosnia and Herzegovina	−26.6	−24.5	−34.7	−32.6
Kazakhstan	−21.7	−13.4	−38.1	−33.0
FYR Macedonia	−9.6	−21.4	−31.5	−31.5
Moldova	−31.6	−29.2	−49.2	−49.9
Aged populations				
Belarus	−21.8	−23.2	−46.9	−46.6
Bulgaria	−35.8	−24.7	−40.6	−40.5
Croatia	−20.0	−19.0	−27.9	−33.0
Czech Republic	−29.2	−18.0	−29.2	−32.7
Estonia	−30.4	−12.2	−35.9	−37.5
Georgia	−30.1	−32.4	−44.2	−43.2
Hungary	−23.7	−23.2	−26.3	−26.7
Latvia	−28.6	−25.5	−45.0	−44.8
Lithuania	−19.8	−31.2	−47.6	−45.2
Poland	−23.7	−25.9	−37.5	−46.6
Romania	−28.6	−19.8	−41.7	−37.0
Russian Federation	−23.7	−3.9	−35.5	−39.2
Serbia and Montenegro	−12.8	−15.0	−24.9	−25.7
Slovak Republic	−24.3	−27.1	−37.7	−41.6
Slovenia	−26.4	−15.4	−30.6	−34.6
Ukraine	−26.1	−30.6	−49.5	−50.5

Source: Data for 1998–2004: UNICEF Innocenti Research Centre TransMONEE database. Data for 2005–25: United Nations Population Division database.

TABLE 6.A.5

Gross Enrollment Rates for Eastern European and Former Soviet Countries, 2004

percentage

Country	Primary	Secondary		Higher
		Total	of which vocational	
Albania	98.5	58.1	9.7	19.0
Armenia	86.9	49.3	11.9	23.9
Azerbaijan	91.0	45.6	10.5	13.2
Belarus	93.6	77.5	17.7	45.4
Bosnia and Herzegovina	84.8	46.4	30.6	19.8
Bulgaria	98.4	89.6	49.3	33.6
Croatia	97.9	85.7	62.9	35.1
Czech Republic	98.7	92.7	73.5	43.9
Estonia	104.4	72.9	61.1	62.9
Georgia	97.3	48.6	13.2	39.6
Hungary	100.6	99.9	61.5	59.6
Kazakhstan	103.3	68.8	34.3	40.0
Kyrgyz Republic	95.2	45.3	12.7	36.2
Latvia	103.1	71.6	26.5	63.6
Lithuania	103.8	69.0	18.0	65.9
Macedonia, FYR	97.8	72.6	44.3	21.2
Moldova	94.1	44.6	16.1	27.7
Poland	100.4	101.1	53.9	55.9
Romania	103.6	75.8	49.7	35.5
Russian Federation	88.4	71.3	42.1	46.7
Serbia and Montenegro	95.7	55.0	41.2	23.9
Slovak Republic	105.9	82.7	51.1	36.3
Slovenia	97.1	99.6	62.3	79.5
Tajikistan	95.4	28.8	7.8	14.4
Turkmenistan	80.0	28.1	6.5	2.5
Ukraine	94.5	62.6	29.6	44.8
Uzbekistan	96.8	74.8	41.6	8.3
OECD average	103.4	100.1	49.1	55.0

Source: UNICEF Innocenti Research Centre TransMONEE database.

Note: The gross enrollment rate (GER) is defined as the number of students enrolled at a given level of education, divided by the population of the normal age group for that level of education. GERs typically overstate actual education coverage (and can exceed 100 percent) because they include over-age students and foreign students in the numerator, but not in the denominator.

TABLE 6.A.6

Shrinkage of School-Age Population, 1990–2000, and Change in Projected Enrollments by Level of Education, in Eastern European and Former Soviet Countries, 2005–25

	Percentage change in population 0 to 17 years, 1989–2004	Percentage change in projected enrollments, 2005–25		
		Primary	Secondary	Higher
Young populations				
Kyrgyz Republic	+7.2	−3.6	+98.1	+45.4
Tajikistan	+23.1	+7.7	+234.5	+322.3
Turkmenistan	+33.3	+17.2	+208.4	+1,923.1
Uzbekistan	+16.3	−1.2	+22.7	+559.9
Aging populations				
Albania	−13.3	−11.0	+36.6	+145.3
Armenia	−19.9	−16.0	+8.4	+22.5
Azerbaijan	+3.7	−5.8	+50.4	+195.5
Bosnia and Herzegovina	−26.6	−10.9	+40.2	+85.5
Kazakhstan	−21.7	−16.2	−10.0	−7.9
Macedonia, FYR	−9.6	−19.6	−5.4	+77.1
Moldova	−31.6	−31.8	−32.9	−22.7
Aged populations				
Belarus	−21.8	−18.0	−31.3	−35.1
Bulgaria	−35.8	−23.4	−33.7	−2.8
Croatia	−20.0	−17.4	−16.0	+5.6
Czech Republic	−29.2	−16.9	−23.7	−15.9
Estonia	−30.4	−15.4	−12.8	−36.9
Georgia	−30.1	−30.6	+14.7	−20.9
Hungary	−23.7	−23.6	−26.3	−26.7
Latvia	−28.6	−27.7	−22.8	−44.4
Lithuania	−19.8	−26.8	+17.1	+10.0
Poland	−23.7	−47.1	−43.3	−46.7
Romania	−28.6	−22.6	−23.1	−2.4
Russian Federation	−23.7	+8.7	−9.6	−28.5
Serbia and Montenegro	−12.8	−11.3	+36.7	+71.2
Slovak Republic	−24.3	−31.2	−24.4	−11.5
Slovenia	−26.4	−12.8	−29.9	−34.9
Ukraine	−26.1	−26.5	−19.4	−39.2

Source: Data for 1998–2004: UNICEF Innocenti Research Centre TransMONEE database. Data for 2005–25: World Bank projection model, based on assumptions described in the text and data from United Nations Population Division database.

TABLE 6.A.7

Country Rankings in Mean Scores of 15-Year-Old Students in OECD PISA Assessment, 2000 and 2003

2000		2003	
Mathematics	Reading	Mathematics	Reading
Hong Kong (China) (560)	Finland (546)	Hong Kong (China) (550)	Finland (543)
Japan (557)	Canada (534)	Finland (544)	Korea, Rep. of (534)
Korea, Rep. of (547)	New Zealand (529)	Korea, Rep. of (542)	Canada (528)
New Zealand (537)	Australia (528)	Netherlands (538)	Australia (525)
Finland (536)	Ireland (527)	Lichtenstein (536)	Lichtenstein (525)
Australia (533)	Hong Kong (China) (525)	Japan (534)	New Zealand (522)
Canada (533)	Korea, Rep. of (525)	Canada (532)	Ireland (515)
Switzerland (529)	United Kingdom (523)	Belgium (529)	Sweden (514)
United Kingdom (529)	Japan (522)	Macau (China) (527)	Netherlands (513)
Belgium (520)	Sweden (516)	Switzerland (527)	Hong Kong (China) (510)
France (517)	Austria (507)	Australia (524)	Belgium (507)
Austria (515)	Belgium (507)	New Zealand (523)	Norway (500)
Denmark (514)	Iceland (507)	**Czech Republic (516)**	Switzerland (499)
Iceland (514)	Norway (505)	Iceland (515)	Japan (498)
Lichtenstein (514)	France (505)	Denmark (514)	Macau (China) (498)
Sweden (510)	United States (504)	France (511)	**Poland (497)**
Ireland (503)	Denmark (497)	Sweden (509)	France (496)
Norway (499)	Switzerland (494)	Austria (506)	United States (495)
Czech Republic (498)	Spain (493)	Germany (503)	Denmark (492)
United States (493)	**Czech Republic (492)**	Ireland (503)	Iceland (492)
Germany (490)	Italy (487)	**Slovak Republic (498)**	Germany (491)
Hungary (488)	Germany (484)	Norway (495)	Austria (491)
Russian Federation (478)	Lichtenstein (483)	Luxembourg (493)	**Latvia (491)**
Spain (476)	**Hungary (480)**	**Poland (490)**	**Czech Republic (489)**
Poland (470)	**Poland (479)**	**Hungary (490)**	**Hungary (482)**
Latvia (463)	Greece (474)	Spain (485)	Spain (481)
Italy (457)	Portugal (470)	**Latvia (483)**	Luxembourg (479)
Portugal (454)	**Russian Federation (462)**	United States (483)	Portugal (478)
Greece (447)	**Latvia (458)**	**Russian Federation (468)**	Italy (476)
Luxembourg (446)	Israel (452)	Portugal (466)	Greece (472)
Israel (433)	Luxembourg (441)	Italy (466)	**Slovak Republic (469)**
Thailand (432)	Thailand (431)	Greece (445)	**Russian Federation (442)**
Bulgaria (430)	**Bulgaria (430)**	**Serbia and Montenegro (437)**	**Turkey (441)**
Argentina (388)	Mexico (422)	**Turkey (423)**	Uruguay (434)
Indonesia (387)	Argentina (418)	Uruguay (422)	Thailand (420)
Mexico (387)	Chile (410)	Thailand (417)	**Serbia (412)**
Chile (384)	Brazil (396)	Mexico (385)	Brazil (403)
Albania (381)	**Macedonia, FYR (373)**	Indonesia (360)	Mexico (400)
Macedonia, FYR (381)	Indonesia (371)	Tunisia (359)	Indonesia (382)
Brazil (334)	**Albania (349)**	Brazil (356)	Tunisia (375)
Peru (292)	Peru (327)		

Source: OECD 2003, 2004a.

Note: Eastern European and Former Soviet Countries are in bold.

TABLE 6.A.8

PISA 2000 Results: Mean Mathematical Literacy Scores and Score Gradient Attributable to Differences in Socioeconomic Status

Country	Mean score in mathematical literacy	Score gradient[a]
Japan	557	24
Korea, Rep. of	547	23
New Zealand	537	45
Finland	536	30
Australia	533	46
Canada	533	37
Switzerland	529	49
United Kingdom	529	49
Belgium	520	48
France	517	48
Austria	515	41
Denmark	514	42
Iceland	514	24
Sweden	510	36
Ireland	503	38
OECD Average	500	41
Norway	499	42
Czech Republic	498	49
United States	493	48
Germany	490	60
Hungary	488	54
Spain	476	32
Poland	470	38
Italy	457	32
Portugal	454	41
Greece	447	38
Luxembourg	446	46
Mexico	387	35

Source: OECD 2004b.

a. Score difference is associated with a one-unit increase in socioeconomic status (on a six-point scale).

Notes

1. Preschool enrollment declined because local communities and enterprises often could not afford to maintain preschools after the transition.
2. Although the region has seen some development of private education, including in public universities in the form of fee-paid "contract" places, education remains overwhelmingly a public sector activity.
3. China's situation is not comparable, because the population of China is expected to continue growing for at least 20 years, despite the success of the one-child policy, and because its rapid economic growth and its dualistic economic structure allow policy options that are not available to the poorest of the Eastern European and former Soviet countries, which have shrinking populations.

4. Other studies that have examined the effects of population aging on demand for education generally do not account for these differences. For example, recent studies of the fiscal effects of aging populations in countries of the European Union and the Organization for Economic Cooperation and Development include an examination of prospective impacts on education expenditures. This comparative-static analysis assumes that changes in education expenditures are directly proportional to changes in enrollments and gross domestic product per worker. As a result, it projects sizable fiscal savings from smaller school-age cohorts. This assumption and the conclusions derived from it are less appropriate for the transition countries, where education systems still embody much of the redundant capacity and inefficiency that they accumulated under the former socialist system, and where recent declines in school-age cohorts have led to increased inefficiency rather than to budget savings. See, for example, Dang, Antolin, and Oxley (2001) and the chapter on education in European Commission (2006).
5. The largest increase occurred in Turkmenistan, where the population age 0 to 17 increased by 33 percent between 1989 and 2003. Because of restrictions on emigration, this increase is attributable almost exclusively to natural increase. The increases in the size of the 0 to 17 age cohort in Azerbaijan, the Kyrgyz Republic, Tajikistan, and Turkmenistan would have been larger in the absence of net out-migration.
6. This conclusion is supported by findings from Living Standards Measurement Study surveys in a number of the transition countries—including Bosnia and Herzegovina, Bulgaria, the Kyrgyz Republic, Romania, Russia, Serbia and Montenegro, and Uzbekistan—that the most frequently reported reasons for secondary school–age children not attending school are that families cannot afford the costs of schooling and that the children need to work to supplement household income.
7. This effort was unique not only for its results but also for its cost. It was largely responsible for raising the education sector share of gross domestic product to 9 percent in 2002—among the highest in the world (World Bank 2005c). The share is projected to increase to 10.5 percent in 2009.
8. These gross enrollment rates overstate actual coverage because they include overage students in the numerator but not in the denominator.
9. These data are from the United Nations Children's Fund's Innocenti Research Centre TransMONEE database.
10. Although private sector education is developing in the region, coverage remains very limited.
11. Russia is an exception to this pattern. It recorded a moderately high level of learning achievement despite a relatively modest fiscal effort in education.
12. This projection is based on the medium-variant age-specific population projections of the United Nations Population Division (United Nations 2005). School-age groups are defined with regard to the structure of education programs in the respective countries.
13. In the few countries in which gross enrollment rates in higher education are already at or above the OECD mean, we assume continuation of current gross enrollment rates.

14. Population is projected to increase from just over 25 million in 2004 to 34 million in 2025.
15. In the Czech Republic, per student allocations in upper secondary schooling range from about CZK 24,000 for gymnasia and business academies to about CZK 29,000 for technical schools. This relatively narrow spread encourages more efficient delivery of technical education. Because any additional costs must be financed from local sources, it also encourages local authorities to consider very carefully whether technical education programs that cost more than this amount provide good value to the local community.
16. There is extensive research on the sources of growth in general and on the role of human capital investments in particular, using both macro-level and micro-level data on rates of return on education. See, for example, Barro and Sala-i-Martin (2003), Bils and Klenow (2000), and Hanushek and Kimko (2000).
17. The PISA surveys for 2000 included eight Eastern European and former Soviet countries: Albania, Bulgaria, the Czech Republic, Hungary, Latvia, FYR Macedonia, Poland, and Russia. In 2003, Albania, Bulgaria, the Czech Republic, Hungary, Latvia, Poland, Russia, and FYR Macedonia did not participate, but Serbia and Montenegro, the Slovak Republic, and Turkey participated.
18. This finding is revealed by the experience of the OECD countries and the transition countries themselves (OECD 2003; World Bank 2003).