Growth and Capabilities[1]

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[1] This paper pulls together the main arguments presented in EBRD's 2008 Transition Report and, as such, draws liberally on three background papers – Aghion et al (2008); Commander and Kelly (2008) and Hausmann and Klinger (2008)

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Introduction

The erstwhile planned economies entered transition with several characteristics that might have been expected to contribute to sustained growth. These were high educational attainments and economies that were relatively diversified in their production of goods. Yet, nearly twenty years later, the picture looks rather different. Growth has been slower in the coming than might have been predicted. A growing corpus of evidence also suggests that educational attainments – though certainly superior to many countries at comparable levels of income – were significantly lower than many expected, while the diversified production and trade structures of many transition countries were primarily dictated by the closed trading arrangements of the CMEA. Trade liberalisation and reform revealed many industries to be uncompetitive, unleashing a prolonged bout of restructuring and exit. Consequently, by the end of 1997 output levels in Central Europe were no more than 50% higher than in 1989, while in the CIS – including Russia - output was only marginally higher than in 1989. At the same time the rest of the world has not stood still. The productivity gap remains, and in many countries it has even increased. The scope for catch-up can be understood by the fact that labour productivity in all transition countries continues to be below 50% of the USA level[3].

It is, of course, evident that the growth performance of countries is driven by a wide variety of factors. The recent Spence Report, for example, has emphasised the common role that education, trade, competition and labour market mobility can play in fostering growth across a wide range of countries[4]. In this paper, we do not aim to provide any over-arching explanation of growth across the sample of transition countries. Rather, our objective is more limited. We argue that successful transition requires accumulating new capabilities. Central to this is education. This is because investment in education not only directly affects productivity, but also because it facilitates innovation and the adoption of new technologies. Creating the right sorts of human capital and skills – the quality of education - also permits economies to adapt and change their structures of production and trade. Without appropriate human capital it will, for example, be difficult – if not impossible – for an economy to shift into new, higher value activities, being locked instead into their current structures of output and patterns of resource utilisation. In a significant number of transition countries, these risks are not only present, but the consequences are likely to be long lasting. The paper considers some of the possible policy options open to governments to address these constraints.

[3] See EBRD, 2008
[4] See Spence (2008)

The paper is organised as follows. Section 1 looks at the broad structures of output and trade in the transition countries. These can be considered as the widest reflection of the underlying capabilities of economies. It is shown not only that there are large differences across countries but that a significant number of transition economies – notably Russia - have relatively restricted capabilities, as measured by their production and trade mix. Section 2 then picks up on a key component of these capabilities: investment in, and the quality, of the educational services provided in these economies. It is argued that, contrary to earlier opinion, many of the transition countries do not have a relative strength in education. Indeed, the evidence suggests that educational quality has tended to decline significantly. This has serious implications for the capabilities set of these economies and, in particular, for their ability of some of them to shift into new and higher value activities, as well as to innovate. Section 3 builds on these arguments to propose a set of policy responses to these shortcomings.

1. Structures of production and trade

The capabilities present in any given economy are summarised in the products and services that it generates. Since the start of transition, there have been major changes in the structure of output and trade in the transition countries. As trade barriers fell and product markets were opened to competition, many industries and firms found that, devoid of protection, they were unable to survive. As such, there has been a major shift in the composition of output, particularly in Central Europe. These changes also provide information about the relative advantages of an economy in terms of its natural, physical or human capital resources, as well as its level of technological development. Further, richer countries will be able to export a diverse range of more sophisticated or technologically advanced goods to external markets[5].

The evidence shows that the Central European countries have come to trade increasingly with the EU-15 and have been converging to the EU-15 export structure, hence increasing in product sophistication. In South Eastern Europe, exports have been more slowly re-oriented towards Western Europe but there is still limited capability to produce goods for advanced markets. In contrast, the CIS as a whole, dominated by the resource-rich countries, has become increasingly reliant on the export of petroleum and raw materials. There has been no increase in the sophistication of the export basket and no

[5] Hausmann, Hwang and Rodrik (2007) suggest that countries that have more sophisticated export packages tend to enjoy more rapid subsequent growth.

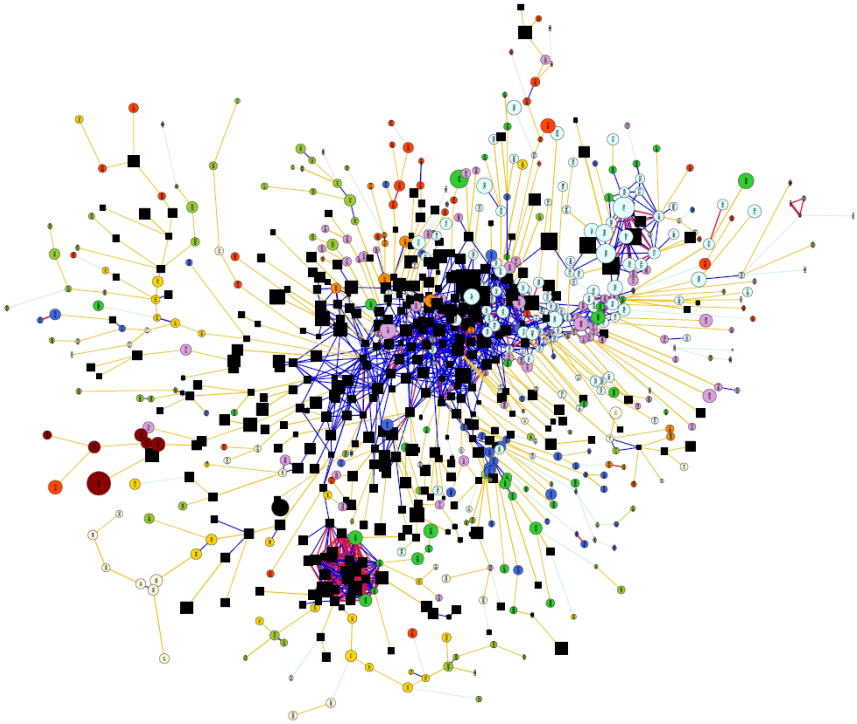
significant emergence of new industries[6]. Underlying these different evolutions have been very divergent outcomes in the development of new capabilities, part of which can be ascribed to variation in educational outcomes and investment, issues that dealt with in Section 2 below.

In a recent paper, Hausmann and Klinger (2008) have argued that changes in the structure of output are more likely to proceed when products can be developed nearby to those already produced, as such products will tend to require a similar set of inputs. This is because established industries will have resolved many of the potential failures involved in ensuring the presence of the necessary inputs, thereby reducing the costs of introducing and producing nearby products. Further, they argue that better performing countries tend to have a highly heterogeneous mix of products. A more diversified structure of production in turn presupposes a wider range of capabilities.

To illustrate this argument, *Figures 1 and 2* provide very contrasting product maps for two major transition regions: Central Europe and the Western CIS countries of Ukraine, Russia, Moldova and Belarus[7]. Each node in these maps is a product, with its size determined by its share of world trade and colour determined by its commodity group. A black square has been placed over each product in which the country has achieved comparative advantage. The links indicate proximity. If a country has few black squares concentrated in a peripheral part of the product space, there will be few products nearby and requiring similar capabilities to produce. Therefore, countries specialized in the periphery will face a harder time changing their export mix and moving to new products.

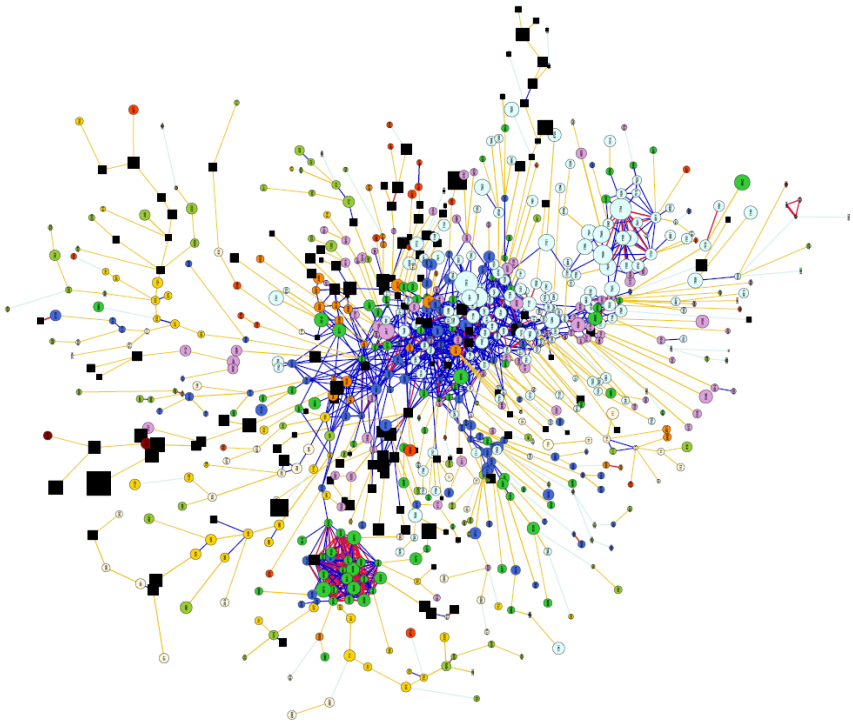
[6] See EBRD (2008), Chapter 4 for more documentation.
[7] These maps are taken from EBRD (2008) and Hausmann and Klinger (2008)

Figure 1: Central Europe, 2000



Countries: Czech Republic, Poland, Slovak Republic, Slovenia, Hungary. Source: Hausmann and Klinger (2008)

Figure 2: Western CIS, 2000



Countries: Belarus, Russia, Ukraine, Moldova. Source: Hausmann and Klinger (2008)

The differences between these two regional product maps stand out sharply. In Central Europe, countries with high and rapidly growing export sophistication, such as the

Czech Republic, Poland and Slovakia, have very well-connected export baskets, with large concentrations of activity in core manufacturing sectors as well as in textile and garments (the cluster in the south of the figures). While having products that are closely connected is not sufficient to ensure competitiveness – as the example of the garments industry indicates –it is nevertheless generally easier for economies with connected clusters to diversify and/or improve the quality of their products. Both attributes tend to be important in ensuring that an economy maintains its competitive advantage.

For the Western CIS countries, the product space is, by contrast, weakly connected. In Russia this is due to its concentration in hydrocarbons, which are a peripheral good in the product space. Oil pipelines, property rights, hydrocarbon engineers, and the other capabilities required for this sector are very specialized, and cannot easily be redeployed to new activities. More generally, if the current export package is intensive in capabilities that are not easily redeployed to alternative products, there will not be an obvious path to other parts of the product space. Among the transition economies, Azerbaijan, Mongolia, and Russia, for example, have export baskets that are unconnected and that consequently limit their opportunities to move to new products. At the same time, these countries have relatively unsophisticated export baskets and few opportunities to upgrade quality within existing sectors. This implies that they indeed need to develop new capabilities and move into new activities. The question of how this can be done is addressed in Section 3.

2. Education and growth[8]

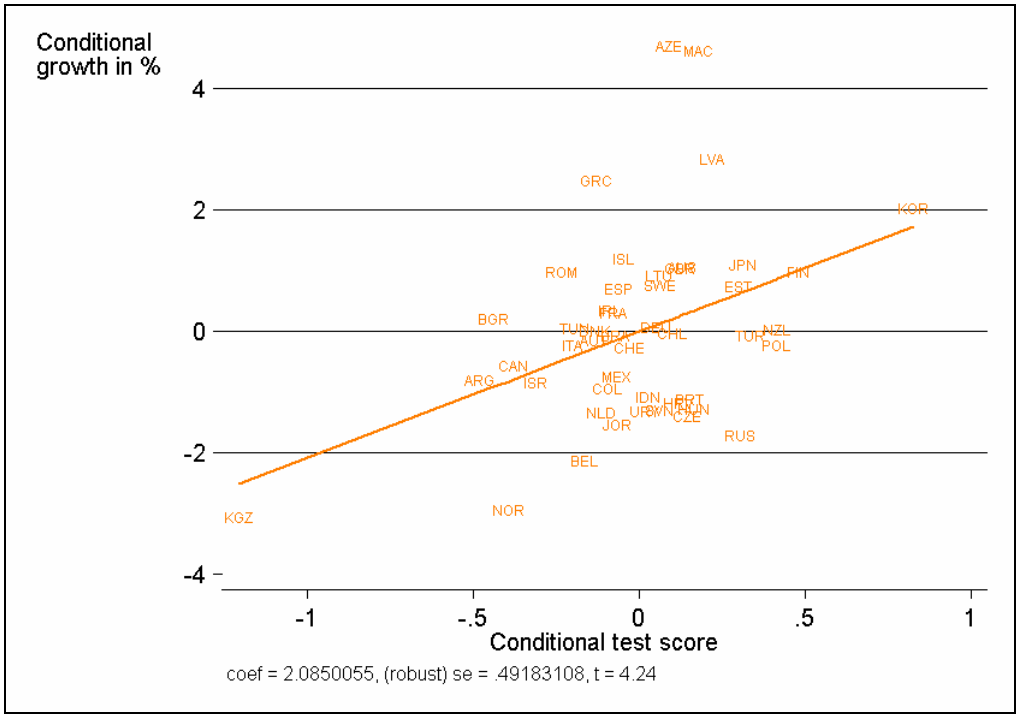
Underpinning what a country can produce is its stock of human capital which embodies its educational attainments and skills. Aside from influencing what a country can produce and trade, there is a growing body of evidence that educational outcomes have a significant impact on performance, as measured by growth[9]. Further, the evidence suggests that a higher level of education not only tends to enhance innovation, but that a higher average level of education is crucial for the successful imitation and faster adaptation of existing modern technologies. Extensive research shows that imitation, rather than genuine innovation, is particularly important for catch-up growth when a country lags substantially in productivity as compared to advanced markets.

Most existing studies on education and growth measure education in terms of spending (the fraction of aggregate GDP devoted to education) or in terms of attainment (the

[8] This section draws on Aghion, Harmgart and Weisshaar (2008)
[9] Benhabib and Spiegel (1994), drawing on seminal work by Nelson and Phelps (1966).

proportion of the working age population that has achieved particular qualifications). More recent research has been extended to include measures of the quality of education.[10] Using internationally comparable test scores measuring the quality of students' cognitive skills, a positive and significant correlation between long-term growth and the quality of education for a large sample of countries can be identified (see *Figure3*).

Figure 3: Real GDP per capita growth and average PISA[11] 2006 test scores



Source: World Development Indicators 2008 (World Bank 2008), OECD (2007), authors' own calculations (regression results).

Notes: PISA 2006 average country scores in reading, mathematics and science (in 100s). The graph shows the effect of an increase of 100 PISA points on long-term growth in per capita GDP (1998-2006), controlling for real GDP per capita in 1998, enrolment rates in higher education (1991), degree of openness to trade and regional differences.
Countries shown on the chart are: ARG-Argentina, AUS-Australia, AUT-Austria, AZE-Azerbaijan, BEL-Belgium, BGR-Bulgaria, BRA-Brazil, CAN-Canada, CHE-Switzerland, CHL-Chile, COL-Colombia, CZE-Czech Republic, DEU-Germany, DNK- Denmark, ESP-Spain, EST-Estonia, FIN-Finland, FRA-France,

[10] See Hanuschek and Kimko (2000), Hanushek and Woessmann (forthcoming).
[11] The PISA (Programme for International Student Assessment) study was carried out by the OECD in 2000, 2003 and 2006. It is one of the few sources of international comparative data on education across regions (including a number of transition countries), measuring educational quality by testing the mathematics, science and readings skills of a sample of 15-year-old students. The PISA surveys make a particular effort to assess students' skills in application and synthesis of concepts – the generic skills that are most relevant to the needs of the global economy. See M. Mertaugh and E. Hanushek (2005), "Education and training", in N. Barr (ed.), "Labor markets and social policy in central and eastern Europe: the accession and beyond", Ch. 7, World Bank .

GBR-United Kingdom, GRC-Greece, HKG-Hong Kong, HRV-Croatia, HUN-Hungary, IDN-Indonesia, IRL-Ireland, ISL-Iceland, ISR-Israel, ITA-Italy, JOR- Jordan, JPN-Japan, KGZ-Kyrgyz Republic, KOR-Rep.Korea, LTU-Lithuania, LUX-Luxembourg, LVA-Latvia, MAC-Macao, MEX-Mexico, NLD-Netherlands, NOR-Norway, NZL-New Zealand, POL-Poland, PRT-Portugal, QAT-Qatar, ROM-Romania, RUS-Russia, SVK-Slovak Republic, SVN-Slovenia, SWE-Sweden, THA-Thailand, TUN-Tunisia, TUR-Turkey, URY-Uruguay.

The same research (using information for 50 countries over the period 1960-2000) finds that countries with better test scores have significantly higher annual growth rates in GDP per capita. More specifically, an increase in test results by 100 points[12] is associated with an increase in annual growth rates of 1.3 to 2 percentage points. Furthermore, a reform that would improve students' outcomes by 50 points over a period of 20 years would, on average, increase GDP by around 5 per cent and over a period of 75 years by 36 per cent.[13]

Other complementary research has also analysed the relationship between growth and the composition of education spending.[14] Results show that the closer a country's or region's productivity is to the technological frontier, the more growth-enhancing it becomes to invest in higher education, and particularly in postgraduate education and research. The further a country or region is from the frontier, the more growth-enhancing it is to invest in primary, secondary and undergraduate education, which is more likely to make a difference in terms of the country's ability to imitate existing technologies.[15]

However, the complexity of the relationships and the differences among the transition countries calls for a careful, country-based interpretation of these results before drawing strong policy recommendations. Suggesting that transition economies focus on primary and secondary education simply because they are not near to the frontier would be problematic. For example, without a good tertiary education sector, India would not have been able to develop its dynamic service sector. Conversely, while the transition economies can increase their growth potential by investing more in quality of primary and secondary education, this should not be at the expense of undergraduate or maybe even postgraduate education. As the productivity gap decreases, university level skills will become increasingly important and building high-quality universities takes time. Moreover, improvements in primary and secondary education often require investments in tertiary education, at least in the training of teachers.[16]

[12] This is equivalent to one standard deviation in the PISA results for OECD countries.
[13] Hanushek and Woessmann (forthcoming). The long-term effects are based on simulations.
[14] See Aghion et al (2008).
[15] What is true between countries is also true between regions within a country; see Aghion et al (2005) and Vandenbussche et al (2006).
[16] See also the World Bank (2000, 2005 and 2006).

2.1 Education spending and quality in the transition countries

Turning to the actual evolution of education spending and quality in the transition countries, *Table 1* gives expenditure and enrolment rates across the different groups of transition economies as well as the OECD over the period 1999-2006.[17]

Table 1: Expenditure per student at different education levels & gross enrolment rates

		Primary education		Secondary education		Tertiary education	
Country groups	Period / Indicator	1999-2002	2003-2006	1999-2002	2003-2006	1999-2002	2003-2006
CEB	Expenditure per student (% of per capita GDP)	17.4	19.2	21.9	22.9	27.8	24.9
	Gross enrollment rates	*101.5*	*99.5*	*95.4*	*98.3*	*47.4*	*58.9*
SEE	Expenditure per student (% of per capita GDP)	13.0	16.4	17.5	18.7	31.3	26.6
	Gross enrollment rates	*100.2*	*99.7*	*83.2*	*87.4*	*28.3*	*33.8*
CIS, non-resource rich*	Expenditure per student (% of per capita GDP)	10.1	13.0	12.9	17.4	29.9	26.5
	Gross enrollment rates	*102.2*	*98.8*	*82.6*	*87.0*	*35.3*	*41.0*
CIS, resource rich**	Expenditure per student (% of per capita GDP)	8.2	8.2	14.7	9.9	14.6	10.0
	Gross enrollment rates	*100.6*	*104.5*	*86.5*	*90.9*	*22.7*	*34.6*
OECD***	Expenditure per student (% of per capita GDP)	18.7	19.7	24.1	25.0	35.8	34.8
	Gross enrollment rates	*103.2*	*102.9*	*109.8*	*107.6*	*54.1*	*61.6*
Selected countries							
Finland	Expenditure per student (% of per capita GDP)	17.6	18.5	25.9	29.4	38.8	37.2
	Gross enrollment rates	*100.7*	*101.0*	*124.2*	*118.7*	*83.6*	*88.3*
France	Expenditure per student (% of per capita GDP)	17.4	17.6	28.2	28.9	29.1	32.2
	Gross enrollment rates	*106.2*	*106.1*	*109.5*	*110.4*	*53.0*	*55.1*
United States	Expenditure per student (% of per capita GDP)	19.9	21.6	23.6	25.1	28.0	25.3
	Gross enrollment rates	*100.3*	*98.8*	*94.0*	*93.9*	*73.1*	*81.8*

Source: Word Development Indicators 2008 (World Bank)

* *CIS non-resource ri Armenia, Belarus, Georgia, Kyrgyz Republic, Moldova, Mongolia, Tajikistan, Ukraine*

** *CIS resource rich: Azerbaijan, Kazachstan, Russian Federation, Turkmenistan, Uzbekistan*

*** *excluding transition countries*

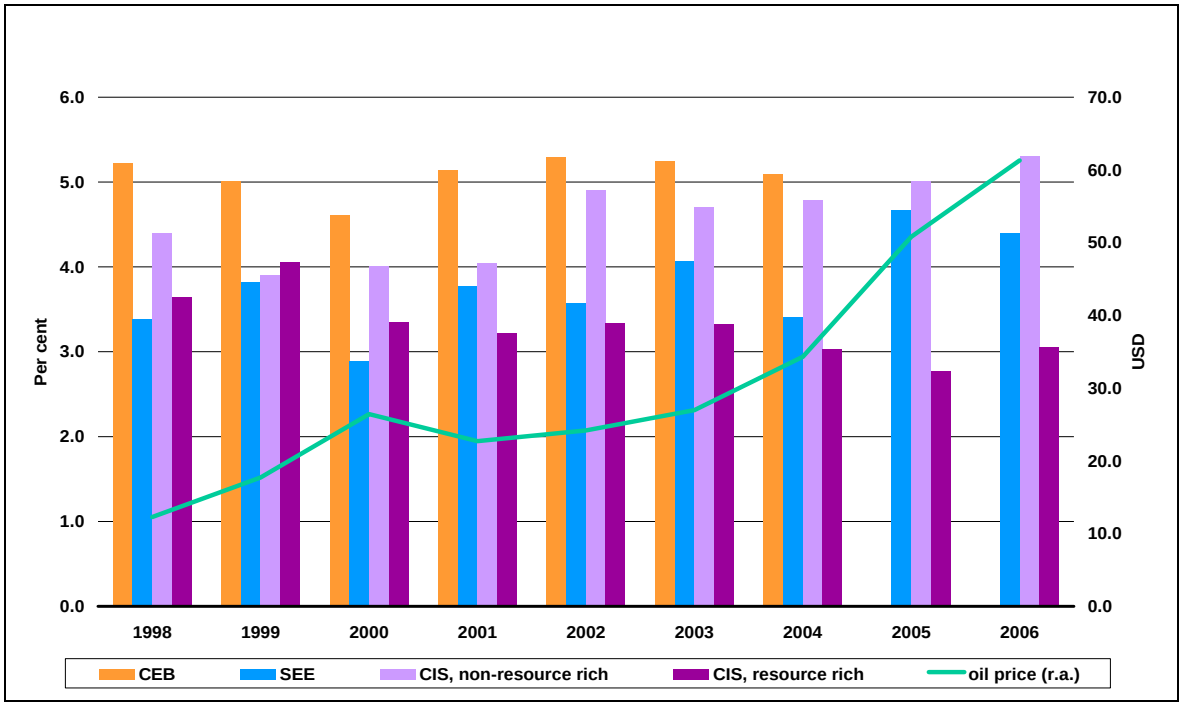
Source: World Development Indicators 2008 (World Bank).

[17] Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

The table shows that the proportion of expenditure on tertiary education has decreased over the past decade in all transition regions, but has remained virtually constant for OECD countries. Transition countries spend less per student than the OECD average, and also have lower enrolment rates. Expenditure per student in primary and secondary education (percentage of per capita GDP) has mostly remained the same or increased over the same period, although CIS+M resource-rich countries despite their rapidly expanding revenues reduced spending on each student between 2003 and 2006. There are also large differences across the transition sub-regions: resource-rich countries devote the least expenditure to tertiary and primary education, and they have also much lower enrolment rates at tertiary level than non-resource-rich countries. *Figure 4* shows that resource-rich countries decreased the proportion of total public expenditure on educational institutions precisely at a time when oil prices started to rise, while the non-resource-rich CIS+M and SEE regions increased their shares. This suggests that countries with sharply rising resource flows have failed to use those new resources to increase funding for education and address shortcomings in their educational systems.

Figure 4

Public spending on education (in per cent of GDP) and oil prices



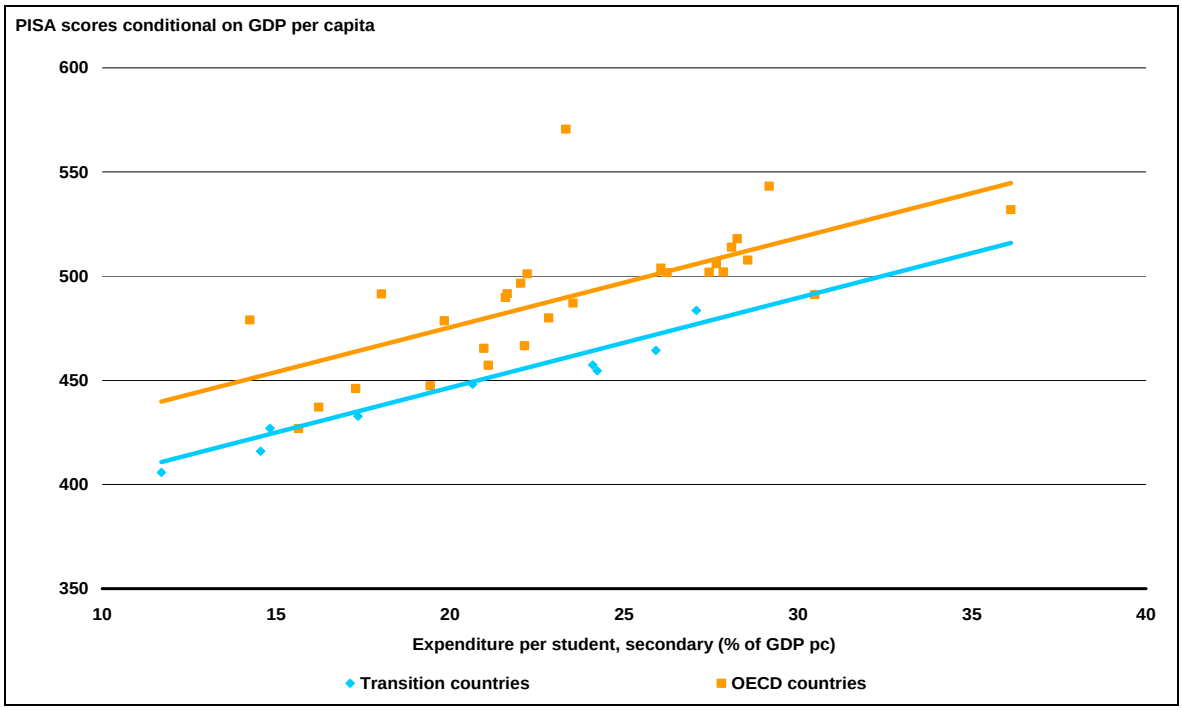
Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics; BP statistics.

Note: Data for a significant number of CEB countries are missing for 2005/2006.

Whatever the level of spending as a share of national income, a key question is whether these expenditures and student enrolment numbers actually achieve the intended educational outcomes. One indicator that is comparable over a large set of transition and non-transition countries is the PISA test score that measures reading, science and mathematics achievement in a standardised fashion. *Figure 5* links PISA test scores to education spending, and shows a positive and significant relationship, in particular for transition countries. Therefore, when taking account of income levels, increasing educational expenditure in the transition countries does appear to be associated with improved quality of education.

Figure 5

Expenditure per student in secondary education and PISA outcomes



Source: World Development Indicators 2008 (World Bank 2008), OECD (2007), authors' own calculations.
Note: PISA 2006 average country scores in reading, mathematics and science. Graph depicts predicted PISA 2006 results based on a regression of PISA 2006 results on mean expenditure on student (percentage of GDP per capita) 1998-2005 and mean real GDP per capita 1998-2005.

Nevertheless, the quality of education for all transition economies remains still well below the OECD average and has even decreased in Russia. Furthermore, there are significant differences across the transition region. While student performance in CEB countries in 2006 was close to the OECD average, the average test scores were relatively low in SEE and lowest in the CIS+M countries. However, when compared to countries with similar

GDP per capita levels, transition countries perform generally better than their peers. Some countries, such as Latvia and Poland, achieved substantial improvements in students' performance between 2000 and 2006.

The full scope for improvement in cognitive skills in the transition countries becomes evident when results are not only compared with those in the OECD, but also with top-scoring comparator countries such as Finland. *Table 2* shows the mean test scores of the PISA tests in mathematics, science and reading skills for the top performers among different groups of countries. For example, Finland's students achieved the highest score on the science scale with 563.3 points (that is, roughly 50 points above the OECD average). The top performer among the transition countries was Estonia, with average student test scores of 514.6 and 531.4 points for mathematics and science respectively. Russia was the leading country in the CIS+M and Central Asia, although the performance of the Russian students in mathematics and science were below the OECD average. The scoring gaps between Russia and the overall PISA leaders range from 73.7 points for mathematics up to 116.1 points on the reading scale, while the corresponding differences with the best performing transition countries (Estonia) are smaller but still amount to 38.9 and 67.7 points. The considerable gap between the transition and top-performing countries indicates the potential for improving educational quality and, ultimately, the growth potential of the transition region.

Table 2: Average PISA tests scores across regions, 2000-06

Average PISA scores in different regions (in 2006)

	CEB*	SEE*	CIS*	OECD**
Mathematics	498	426	421	498
Science	504	439	395	500
Reading	485	414	359	493

Source: OECD (2001, 2004, 2007)

**Transition countries participating in PISA 2006:*

CEB	Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia
SEE	Bulgaria, Croatia, Montenegro, Romania, Serbia
CIS+M	Azerbaijan, Kyrgyz Republic, Russia

***OECD countries excluding transition countries*

Trend over time: average PISA test scores for different subjects

Results for selected countries		2000	2003	2006
Estonia	Mathematics			515
	Science			531
	Reading			501
	Problem solving			
Finland	Mathematics	536	544	548
	Science	538	548	563
	Reading	546	543	547
	Problem solving		548	
France	Mathematics	517	511	496
	Science	500	511	495
	Reading	505	496	488
	Problem solving		519	
Latvia	Mathematics	463	483	486
	Science	460	489	490
	Reading	458	491	480
	Problem solving		483	
Poland	Mathematics	470	490	495
	Science	483	498	498
	Reading	479	497	508
	Problem solving		487	
Romania	Mathematics			415
	Science			418
	Reading			396
	Problem solving			
Russia	Mathematics	478	468	476
	Science	460	489	480
	Reading	462	442	440
	Problem solving		479	
OECD average	Mathematics	500	500	498
	Science	500	500	500
	Reading	500	494	492
	Problem solving		500	

Source: OECD (2001, 2004, 2007).

The significant differences in test scores reveal the potential for future improvements in the quality of cognitive skills in the transition countries. This in turn would have a strong impact on long-term economic growth. Russia, for example, could achieve higher long-term annual GDP growth rates in the order of between 0.065 and 1 percentage point, merely by catching up with the top PISA performers among the transition countries.

The final point that needs to be made is that economies with relatively undiversified and unsophisticated product mixes – such as Russia – also appear to have under-performed in terms of their educational outcomes. This suggests that there is a feedback process that between the product and trade mix and the level of investment and returns to investment in the core capabilities generated through education.

3. Building capabilities: some policy dimensions

The preceding analysis has shown that for a number of transition economies, particularly those dependent on hydrocarbons, a key policy challenge is to try and broaden their capabilities so as to facilitate diversification. In addition, the analysis in Section 2 has shown how improvements in the quality of education are required in most transition countries. However, policies aimed at creating the new capabilities that will be key to successful diversification and improved productivity come into a variety of possible forms. In the first instance, there are those that aim to improve the quality of education and the overall level of human capital in the economy. This is a challenge common to most of the countries, not just those with production structures dominated by few products. This section addresses how to achieve those objectives. But there may also be space for more unorthodox policies – sometimes rolled up under the rubric of industrial policy – that may be relevant, particularly in contexts where lack of product sophistication and connectedness may be present. These issues are also considered below.

Policies that aim to favour more dynamic and productive activities can be either horizontal or vertical in nature[18]. There is little debate about the relevance of good horizontal policies, such as protecting property rights and improving transparency. Other horizontal policies can be more specific, including incentives for foreign direct investment (FDI) and the development of national research strategies. However, the use of vertical policies is far more contentious. Vertical policies tend to be targeted at specific firms, industries or sectors. They can be pursued without necessarily abandoning market mechanisms[19]. For example, government support, in terms of both funding and non-pecuniary assistance, may be allocated to specific activities but distributed on the basis of some competitive process, such as auctions or co-financing[20]. However, experience with vertical policies has been mostly adverse, particularly when the focus has been on

[18] Rodrik (2007), Pack and Saggi (2006)
[19] As argued in Pelkmans (2006)
[20] Rodrik (2007) gives a wider perspective on industrial policy that embraces both horizontal and vertical policies and which portrays industrial policy in terms of a discovery process in which firms and governments learn about underlying costs and opportunities and engage in strategic coordination.

favouring products or sectors. Where there has been some success this has been because policy was targeted at sectors where, ex ante, a minimum core of capabilities had already been developed[21]. However, in the context of the resource rich transition economies - with their pathology of weak institutions and governance - the need to avoid targeting specific capabilities should be emphasised. Even so, given that these economies have little room to improve the quality of their existing products but also lack an easy ability to develop new capabilities, the question of what role government can play in helping develop new capabilities is central. Indeed, a common characteristic of countries – such as India or China - that have been able to move into new, higher value products and services has been a strong, sustained investment in human capital with much of that investment being made by the public sector. Increasingly, however, governments have adopted permissive strategies for the entry of private education and training providers. For example, in India the main contribution of the government to the rise of the software sector has been through its policy on human capital and, in particular, the earlier emphasis on building a strong tertiary sector around the natural sciences and management, as well as the later willingness to allow private training and educational services providers to enter the market for skills acquisition and up--grading[22]. Providing publicly funded scholarships for top students to study abroad has also helped build skills without necessarily leading to a brain drain, as graduates have increasingly returned home after studies or the commercial and other benefits of networks have been realised[23]. In some cases, scholarships for studying abroad have required students to return to their home country for a specific period of time after graduation.

In the case of the transition countries, the analysis above also indicates clearly the need for them to invest more overall in education, but in a way that links that investment to quality improvement. While maintaining their focus on primary and secondary education, they also need to invest more in higher (particularly undergraduate) education. Without such investment, countries will not be able effectively to imitate technological innovations produced elsewhere. Alongside this challenge, better monitoring and evaluation systems would increase the effectiveness of investment in education. Further participation in school-based, national and international assessments such as PISA will also help policy-makers by clarifying their countries' relative educational performance.[24]

[21] See Khavul (2005) who discusses Israeli experience in detail.
[22] The most commonly cited examples are the creation of the Indian Institutes of Technology and Management in the 1950s(?)
[23] Docquier et al (2004); Commander et al (2008)
[24] See also World Bank (2006).

Although the data indicate that higher expenditure per student tends to be associated with better student performance, the aggregate results mask considerable differences between countries. Studies analysing the effect of school inputs and resources – typically teacher-to-student-ratios, class sizes, textbook provision, teacher training and experience, monitoring of schools, school facilities and administration – provide mixed evidence on successful strategies aimed to improve educational outcomes that would apply to all countries. Overall, however, there needs to be better use and targeting of educational investment, improvements in teacher quality, increased accountability to parents, students and national educational authorities, and adherence to standards. Transparency through public participation and feedback mechanisms, not the least from potential future employers, is important for delivering and regulating the educational sector effectively. In the transition countries, there has been a notable lack of such consultation. One way to promote accountability in the education system is through decentralisation and improvements in local school management practices.

Another issue of concern to policy-makers relates to equal and good access to education. A student's background seems to be a predominant factor in educational performance in transition countries, and much more so than schooling resources or institutional settings.[25] Aside from promoting inequality, this result highlights the need for policy reforms to help secure funding and improve access to education (including pre-primary education) for children from less well-off families. Furthermore, poorer regions need to be assisted with financial transfers from central government. The sustainability of and equity in the financing of education can be improved through use of funding formulae based on expenditures per student. This can help combat poverty by targeting public educational resources on the poor.[26]

The PISA results show that students in transition countries lag behind in terms of problem-solving skills and applying knowledge in new areas. Changes in the schooling curriculum at primary and secondary level and in vocational education are therefore needed to enhance critical thinking and provide children with more general and relevant skills. In this context, the curriculum for secondary education plays a crucial role, since it has a dual purpose of linking directly to the labour market as well as preparing students for tertiary education.[27] The transition countries have a higher proportion of social science graduates at tertiary level than the OECD average. There is scope for giving more priority

[25] See Ammermueller, Heijke and Woessmann (2005).
[26] See World Bank (2000).
[27] See World Bank (2006).

to particular streams and institutions, notably science and technology skills. In terms of vocational training, transition countries have a legacy of a very narrowly defined curriculum that needs to be broadened and updated. Involving private businesses more in designing training programmes will also be essential. Further, providing tax incentives for workers and firms to take up training opportunities has generally proved more fruitful than attempts to set up publicly-managed training programmes. Investment in capabilities through education programmes that are broadly relevant to a range of sectors have a clear role in the policy armoury.

A complementary area where government intervention can be warranted relates to innovation. Policy can aim to act on both the supply and demand sides. For the former, this can take the form of direct spending on R&D by public or quasi-public institutions, providing tax incentives – either generally or for specific sectors – and ensuring adequate intellectual property rights protection or safeguards for innovators. Governments play a critical role by providing the commercial and legal framework, particularly through policies that foster product market competition and rivalry thereby creating incentives for innovation. Intellectual property rights protection (IPRP) has been shown to be particularly important.

A common strand of innovation policy concerns the financing of basic research through universities and other research institutions. For firms, the main role of universities is to provide trained graduates armed with new techniques and skills that firms are generally unable to provide themselves. However, cases where university researchers make a discovery, and the practical importance is then recognised by business, are relatively rare. The evidence suggests that publicly supported research at universities is most effective for basic and generic science and technologies where output has a large public good element[28]. Public funding of private sector research has often just substituted for private sector investment. Further, there are clear limits on the effectiveness of government funding of innovation. For example, in much of the CIS, R&D is still dominated by the public sector. There is a risk that private sector investment will be crowded out and that dynamic sectors will be deprived of necessary researchers and expertise. Furthermore, inadequate links between research organisations and the market will tend to limit the commercial applicability of output. The Chinese government has invested heavily in R&D, but innovative output has been low.

[28] OECD (2006b), OECD (2007 c)

With these experiences in mind, it is also increasingly recognized that the university research that governments support should be used better to generate economic returns. In the advanced market economies, universities have become increasingly involved in product development, with increases in university licensing, university-founded spin-offs and funding from the private sector. The scale of this activity has been affected by the extent of investment in innovative research – one widely cited example is the way in which defence spending had major, positive consequences for ICT related research and, ultimately, diffusion, in the USA. But it is also acknowledged that providing the incentives for the commercialisation of innovative ideas can play a crucial role. The Bayh-Dole Act (1980) in the USA was, for example, instrumental in helping researchers patent and commercialise research that had been supported by public resources[29].

There are also opportunities for governments for structuring markets through interventions that address specific market failures or problems with coordination. One such area is in the setting of standards where government intervention may be more efficient than market-based solutions. However, there is also scope for manipulation and abuse. The Chinese have, for example, often tried to use standard setting as a way of diluting competition in favour of preferred local companies and systems[30].

All OECD countries also provide measures to support to private innovative activity, despite controversy over their theoretical foundations and cost effectiveness. Measures include a mixture of direct support through grants, indirect support through tax concessions, and public-private partnerships. Direct support comes in the form of competitive grants and subsidised or guaranteed loans. Although this type of support remains important in many countries, the focus has shifted towards indirect measures, where the government has no role in choosing who obtains the support. Most indirect measures allow firms and the market to determine what research takes place and how funds are distributed. As such, governments do not face the informational constraints associated with direct public support measures. This is the path that the transition countries – with their generally poor record of fostering private sector innovation – should take.

In short, good framework or horizontal policies, particularly regarding investment in education and human capital where the state is likely to play a major – but not unique role – will be essential in improving the set of capabilities that the transition economies can deploy. But, particularly in economies where the current capabilities set is limited, there is likely to be scope for the selective provision of public financing to institutions that can

[29] See Lach and Schankerman (2003)
[30] Linden (2004)

respond to market discipline and where decision-making of resource allocation is as transparent as possible. Possible vehicles for such intervention can be publicly funded venture capital funds aimed at supporting R&D as well as innovative projects. Comparative experience suggests that for such interventions to work, it requires careful design, particularly with regard to governance and project selection, the timing of funding and the extent of activism by fund managers. Involving both private finance and management – albeit as minority partners - is more likely to address these key governance issues. Given the pervasive weaknesses in management and commercial implementation in many transition countries, active involvement by venture capital funds is also likely to be an important ingredient in ensuring success.

Conclusion

Our paper has examined the barriers to growth in a range of transition countries. It has done so through the prism of capabilities where emphasis has, in particular, been put on the links between educational investment and returns and what economies produce and trade. The evidence suggests that educational outcomes have a strong impact on a country's performance. But for that impact to be positive, depends not only on the level of investment but also on the quality of education. In these regards, it appears that the transition countries have had a very mixed record. Certainly, the evidence now indicates that the earlier assumption that education was a relative strength of the transition countries is mostly not warranted. Interestingly, educational performance has also tended to be particularly weak in countries that have a relatively undiversified and unsophisticated mix of products.

Improving capabilities – and in particular, creating new capabilities – is the central challenge of transition. Our paper argues that this requires a sustained attempt in almost all countries to improve the quality of education. Further, for those countries that suffer from a limited ability to upgrade the quality of their existing products, as well as problems in diversifying the mix of products – such as those that remain dominated by hydrocarbons - the right approach is not to focus on supporting specific products or sectors through vertical industrial policies but, rather, to using a mix of public and other finance to support extending and improving their capability sets. Such support could, in principle, involve direct government funding but should also look at more heterodox options – such as venture capital funds – that can absorb elements of private financing and market discipline in their decision making and governance. This sort of approach is far more likely to result

in improvements in educational outcomes – and hence ultimately in growth – than reliance only on public funding and management.

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