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Does enterprise-level training compensate for poor country-level skills? Lessons from transition countries in central and eastern Europe

Joe Colombano and Libor Krkoska

Abstract

This paper explores the relationship between country-level skills and enterprise-level training, and the association of these with economic performance and enterprise behaviour. Country-level data on the quality of human capital, taken from several surveys conducted by the IEA and OECD during the last ten years, are used. Enterprise-level data from a survey conducted by the EBRD and the World Bank in a wide range of countries in Europe and Asia in 2004-05 are also used. The paper shows that qualitative measures of human capital are positively correlated with a country's GDP growth and with enterprise sales growth. In addition, enterprises are more likely to conduct training programmes in countries where the workforce is better skilled. Greater focus on enterprise training is positively related to company sales growth, but is not related to employment growth. The provision of training in smaller, locally owned companies outside the capital is shown to be on average significantly below national training levels.

Keywords: training, skills transfer, transition, economic performance

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Address for Correspondence: European Bank for Reconstruction and Development, One Exchange Square, London EC2A 2JN, UK.

Phone: +44 20 7338 6710; Fax: +44 20 7338 6110;

E-mail: colombaj@ebrd.com; krkoskal@ebrd.com

Joe Colombano is an Economist at the EBRD; Libor Krkoska is a Senior Economist at the EBRD.

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INTRODUCTION

The importance of human capital for economic performance has been widely acknowledged by the economic community for many decades. This paper contributes to the literature on the topic by analysing the relationship between human capital endowment at the country level and skills transfer at the enterprise level. In particular it investigates whether enterprise-level training may compensate for inadequacies in the formal education system, focusing on lessons provided by transition in central and eastern Europe.

Data from recent surveys conducted by the European Bank for Reconstruction and Development (EBRD) and the World Bank on enterprise behaviour and performance are used. Data from surveys conducted by the International Association for the Evaluation of Educational Achievements (IEA) and the Organisation for Economic Cooperation and Development (OECD) on human capital are also used. Over 30 countries in both Europe and Asia are covered (see footnotes 12, 13, 18 and 19 for the full list of countries included in the various surveys). The paper finds that enterprise training is more common in countries where the available workforce has above average skills, further enlarging the skills gap between countries with different human capital endowments.

To assess the quality of human capital, three different types of skill measures are used: school enrolment rates, academic competence and functional competence (see Section 2 for exact definitions). [1] School enrolment rates have been used in most of the literature on human capital to date as a standard way of measuring the stock of human capital. The latter two measures, academic and functional competence, have been introduced only recently and are available for a smaller number of countries. While the three measures are highly correlated, academic and functional competence appear to be linked to economic performance at the country level. A statistically significant relationship between school enrolment and growth, however, could not be identified. One potential explanation of these results is the fact that enrolment rates describe a flow of human capital while academic and functional competence assesses the stock of human capital. Variances in educational attainment and its impact on economic output are also discussed in the paper. A higher variance of functional competence is shown to be associated with lower GDP growth.

Particular attention has been paid to the impact of human capital on enterprise behaviour and performance in transition countries in central and eastern Europe. These countries are generally assumed to have highly skilled labour, compared with other countries at the same level of development (see, for example, Fischer *et al*., 1998). Analysis confirms this hypothesis. However, surveys of the quality of current curricula indicate that many of today's pupils in former communist countries continue to be trained in obsolete ways (World Bank, 2001). This may jeopardise the skill endowment of tomorrow's workforce and hamper the competitiveness of transition countries in the global market. The question of interactions between human capital endowment and enterprise behaviour, including the provision of employee training, is thus particularly important and may provide lessons not only for transition countries, but also for other developing as well as developed economies. Although literature suggests that enterprises in transition countries which have a lower level of human capital train their employees more often, on the basis of a model of optimal training investment which depends on both the stock of human capital and on an assessment of whether others meet the need to improve the stock of human capital, the analysis in this paper suggests otherwise.

[1] The school enrolment rate is the share of population in a relevant age bracket enrolled in formal education. Academic competence rates educational achievements in relation to their adherence to national curricula. Functional competence measures the ability to use skills to meet real life challenges.

A key part of the analysis concerns the impact of human capital endowment and enterprise training on economic performance, both at macro and micro levels. Economic development in general and transition from central planning to market economies in particular, involve major employment reallocation and significant changes in the skill content of jobs (Commander and Kollo, 2004). As a result, demand for new skills has emerged. Knowledge-based jobs have increased as a percentage of total jobs and employers' hiring decisions are beginning to reflect applicants' actual skills and knowledge, not just their formal job experience and years of schooling. Meeting such demand and filling the gaps in skills through enterprise training is essential for increasing enterprise productivity and competitiveness.

The paper also considers differences in the provision of training by enterprise characteristics, such as size, location and ownership. In order to be effective, government interventions to promote skills transfer at the enterprise level, particularly in transition and developing countries, need to be based on a deep knowledge of the existing skill gaps. This ensures instruments are targeted at the right type of enterprises and activities. This paper finds that mainly smaller, locally owned companies outside capital cities require greater support for the initiation of training activities.

This paper is structured in four main parts. The first section provides a brief review of the existing literature on the effects of education on economic growth and enterprise performance. It highlights recent progress in identifying proper measures of country-level skills and their relation to macroeconomic performance. The second section summarises the country-level data and the relevance of the findings of the literature in the time period considered. The empirical analysis of enterprise-level data is presented in the third part. This relates country-level skills, enterprise-level training and enterprise performance, controlling for enterprise characteristics and country differences. Finally, the concluding section offers policy recommendations and suggestions for further research. Annex 1 includes the description of the different human capital survey instruments. Examples of EBRD projects promoting skills transfer in the private sector are presented in Annex 2.

1. LITERATURE REVIEW

Over the past 50 years, literature on the role of human capital in economic development has grown extensively. Pioneered by Becker, Schultz and Mincer,[2] the first generation of human capital theory culminated by the 1970s with the hypothesis that income levels depend partly on human capital's rate of return.[3] Such a view was later challenged by a second generation of studies that questioned the virtuous circle of human capital and growth by focusing on labour market segmentation by categories of workers. However, little doubt was cast on the positive correlation between human capital and economic growth.

With the rise of endogenous growth models in the 1980s, human capital was first integrated in the new growth theory in several seminal papers. Romer (1986) presented a fully specified model of long-run growth in which human capital was assumed to be an input in production that has increasing marginal productivity. Similarly, in Lucas (1988) the economy's growth rate was endogenously determined by the accumulation of human capital. Romer (1990) further found that initial levels of literacy helped predict the subsequent rate of investment and the rate of growth. As for the policy effects of including human capital in growth equations, Rebelo (1991) explained cross-country disparities in rates of economic growth with differences in government policy, including on human capital allocation.

In the last decade, studies of labour markets in countries at different levels of development have generally concluded that individual earnings are a monotonically increasing function of education (Tilak, 1994 and Psacharopoulos, 1994). Since the pioneering work of Mankiw, Romer and Weil (1992) on conditional convergence, most cross-country and panel data analyses have concluded that countries reach their own steady state due to differences in stocks of human capital, in addition to rates of investments and population growth. World Bank (1993) ascribed the East Asian high growth performance to the unusually rapid accumulation of physical and human capital in the region. Benhabib and Spiegel (1994) found that the growth rate of total factor productivity was a function of the average years of schooling in the labour force, among other things. By means of panel estimations for 100 countries over three decades, Barro (1997) found that secondary and higher education had a significantly positive effect on real GDP growth per capita. Gross primary school enrolment rates are also included in the GDP growth regressions for 1960-1992 in Doppelhofer, Miller and Sala-i-Martin (2000).

Lately, data improvements have allowed for better specification of human capital variables. The literature discussed above concentrated on various measures of formal schooling as a proxy for human capital – mostly using enrolment rates and total years of formal education. Since the late 1990s different measures of human capital have been used by researchers. Barro (1991) and Barro and Lee (1993) questioned the comparability of years of education achieved across countries and considered country surveys and data on differences in school resources as a proxy for quality variation across countries. Similarly, the literature on the economics of education also considered the effects of increases in the quality of education. By comparing returns in the United States with education in the southern and the northern states of the country, Card and Krueger (1992), for example, showed that "quality inputs" into education, such as smaller classes and higher spending, positively affected wages.

However, it was not until the development of international student assessment tests and direct measures of cognitive abilities that cross-country comparisons of human capital quality became possible. By relying on the outcomes of six such tests of students' achievements in

[2] Becker (1962, 1964), Schultz (1961), Mincer (1974).

[3] The studies addressed the issue of the 'residual' growth left when the production function includes only changes in labour (hours worked per year) and physical capital. A better educated labour force was found to account for a 25 percentage point increase in the United States' output between 1930 and 1960 (World Bank, 1990).

science and mathematics, Hanushek and Kimko (2000) constructed a composite labour force quality measure for 31 countries covering four decades since the 1960s.[4] Remarkably, the study found that a difference of one standard deviation in test performance was related to a 1 per cent difference in annual growth rates of per capita GDP. (Initial levels of income, average years of education and population growth rates were controlled in these regressions.) Further studies relied on similar proxies of human capital quality. By using the same sources as Hanushek and Kimko (2000) to measure school quality, Barro (2001) regressed real growth per capita on measures of both quality and quantity of education, controlling for fertility rate, government consumption and rule of law indexes, among other things. While the coefficient on the quantity measure was positive but non-significant, the coefficient on the quality measure was a strong and significant predictor of real growth per capita.

A further development in the literature came with the emergence of yet more accurate ways to assess human capital relevance to economic development. Starting in the mid-1990s, the OECD in cooperation with several national statistical authorities developed international tests to measure a participant's master of key competencies required in adult settings, including the workplace, regardless of conformity to national curricula or formal educational qualifications. Given the almost-yearly regularity with which such tests were administered and the number of countries included, by the early 2000s a considerable amount of information was available to conduct panel data analysis. By using the results from the mid-1990s International Adult Literacy Survey of 16-65 year olds, Coulombe *et al*. (2004) estimated the quality of the labour force between 1960 and 1995. These results were included in a panel data analysis of cross-country growth in 14 OECD countries. The study found that direct measures of human capital based on literacy scores had a positive effect on growth. Specifically, a 1 per cent difference in test performance was associated with a 2.5 per cent relative increase in labour productivity. Including better data on the skill relevance of the labour force improves the growth regressions and emphasises the relevance of human capital to economic development.

An important subset of the literature on the impact of human capital on GDP growth covers the transition countries in central and eastern Europe (CEE) and the Commonwealth of Independent States (CIS).The time series are, however, short and the analyses of long-term relationships using these data give only indicative results. Nevertheless, the human capital endowment is expected to have a strong impact on long-run growth potential in transition economies (see Fischer *et al.*, 1998). Further papers relating GDP growth to human capital endowment in transition countries include Doppelhofer *et al.* (2000) and Doyle *et al.* (2001).

While literature on the relationship between human capital and economic performance at the macroeconomic level is relatively rich, very little work has been done to date on the relationship between country-level human capital and enterprise performance and behaviour. A good overview of empirical literature analysing, among others, links between human capital and enterprise restructuring in transition countries is provided by Djankov and Murrell (2002).

[4] Tests were administered by the International Association for the Evaluation of Educational Achievements (IEA) and the International Assessment of Educational Progress (IAEP).

2. COUNTRY-LEVEL EFFECTS

In this paper, the effects of human capital on economic performance and enterprise conduct is analysed against three main measures: school enrolment rates, academic competency and functional competency.

School enrolment rates are a standard measure of human capital endowment based on the share of population in a relevant age bracket enrolled in formal education. For the sake of this research, only secondary and tertiary levels are included as it is assumed that countries in the sample (advanced and middle-income countries) have universal primary enrolments. Enrolment rates are complemented by a combined measure of school enrolment estimating the average number of years of formal schooling.

As a measure of academic competence, the IEA's Trends in International Mathematics and Science Study (TIMSS) is used. TIMSS rates educational achievements in relation to their adherence to national curricula in mathematics and science. As such, this measure captures a qualitative outcome of the education system, that is, the mastery of academic subjects critical to economic development as per the national curriculum. It could also be seen as a proxy for the quality, or efficiency, of the public sector given that in most countries the provision of education is provided or regulated by the state.

The functional competency measure uses data from the OECD's Programme on International Student Assessment (PISA), which focuses on young people's ability to use their knowledge and skills to meet real life challenges, rather than on the extent to which they have mastered a specific school curriculum. In terms of human capital quality, this indicator is superior to the previous two as it measures the relevance of human capital to the country's level of development (see Annex 1 for more detail on measuring the quality of human capital, including a brief description of the individual surveys).[5]

It is important to recognise the issue of time lag between the acquisition of skills and their use in practice. The measures of academic and functional competency capture the achievement of young people who are in school at the time the test was given. However, these students will not affect economic outcomes until they join the workforce. The analysis in this and similar paper thus makes an important assumption of the rigidity of educational systems, i.e., there is a very high correlation between current test scores and the human capital of previous generations. This assumption thus introduces a further measurement error to the human capital variables.

As shown in Table 1, the three types of human capital measures described above are highly correlated. An interesting pattern in correlation coefficients between different types of human capital measures can also be observed. The correlations between secondary enrolment and measures of either academic or functional competency are between 0.50 and 0.60. The correlations between tertiary enrolment and measures of either academic or functional competency are between 0.60 and 0.70. And finally, the correlations between academic and functional competency are above 0.76. This observation seems to suggest that when reviewing the functional competence of the population – that is, whether employees have the skills required in the workplace – academic competence or the efficiency of the school system is a better proxy than tertiary enrolment which is in itself a better proxy than secondary enrolment.

[5] Data on academic and functional competency are available only from the mid/late 1990s onwards. As a result, data on enrolment, years of schooling, GDP per capita and GDP growth are calculated as a simple average over 1999-2004.

Table 1 – Correlation between human capital measures

	Secondary enrolment	Tertiary enrolment	Years of schooling	Academic competency: mathematics	Academic competency: science	Academic competency: average	Functional competency: mathematics	Functional competency: reading	Functional competency: science	Functional competency: average
Tertiary enrolment	0.79**	-	-	-	-	-	-	-	-	-
Years of schooling	0.86**	0.72**	-	-	-	-	-	-	-	-
Academic competency: mathematics	0.53**	0.66**	0.58**	-	-	-	-	-	-	-
Academic competency: science	0.57**	0.70**	0.57**	0.95**	-	-	-	-	-	-
Academic competency: average	0.56**	0.68**	0.58**	0.99**	0.99**	-	-	-	-	-
Functional competency: mathematics	0.54**	0.59**	0.35*	0.86**	0.88**	0.89**	-	-	-	-
Functional competency: reading	0.60**	0.69**	0.45**	0.76**	0.83**	0.81**	0.95**	-	-	-
Functional competency: science	0.50**	0.61**	0.33*	0.86**	0.90**	0.90**	0.98**	0.95**	-	-
Functional competency: average	0.55**	0.64**	0.38**	0.85**	0.89**	0.89**	0.99**	0.98**	0.99**	-
Training: country average	0.30	0.26	0.41*	0.37	0.51*	0.45*	0.31	0.16	0.19	0.22

Sources: Authors' calculations are based on WDI, OECD, IEA and BEEPS data. The data on enrolment and years of schooling are a simple arithmetic average of rates in 1999-2004 as reported by WDI. The data on academic competence are from IEA and the data on functional competence are from the OECD for the latest available year (2003). The data on training are from the BEEPS 2004-05.

Notes: * denotes the 5 per cent significance level; ** denotes the 1 per cent significance level.

The correlation between training provided by enterprises at the country level[6] and standard human capital measures is weak. Only formal schooling (the average number of years), academic competency in science and average academic competency are positively correlated at a statistically significant level with the average share of enterprises with a training programme. One possible explanation for this finding is the specific measure of training used,

[6] Throughout the paper training is a dummy variable indicating whether an enterprise runs a formal training programme for at least one category of employees. On a country level, training refers to a simple arithmetic average of the enterprise-level training dummy. That is, it is an indicator describing the share of enterprises with a formal training programme for at least one category of employees.

that is, the share of companies with a training programme. This measure is similar to enrolment rates and does not reflect the quality of the training provided. However, the positive signs of all simple correlations between share of companies with a training programme and all human capital measures do not support the main hypothesis investigated in the paper that enterprises in countries with worse skills train their employees more often.

Table 2 presents the relationship between GDP growth (GDP_growth_i) and the country-level average of main human capital measures ($human\_capital\_average_i$), controlling for the initial level of development ($GDP\_per\_capita_i$) and for the dispersion of skills in a population defined as the standard error of the measure of human capital ($human\_capital\_se_i$)[7] as in the following equation:[8]

$$GDP\_growth_i = \alpha + \beta \cdot GDP\_per\_capita_i + \gamma \cdot human\_capital\_average_i + \delta \cdot human\_capital\_se_i + \varepsilon_i.$$

The regression equation is similar to the growth regressions discussed in the literature above. The data span, however, is much shorter. The countries covered in the analysis are mostly transition countries and therefore data covering the period of initial transition recessions have been excluded. There is also a potential for omitted variable bias. This bias has been tested for by including variables from the growth regressions presented in the literature review section. However, none was statistically significant on a consistent basis for all regressions and their inclusion did not alter the results significantly.

One interesting result is that the regressions including school enrolment and total years of schooling do not give statistically significant results. One potential explanation for this is the shorter time period covered (1999-2004), which makes it difficult to establish the existence of a long-term relationship. In addition, the time period covered by this paper does not overlap with time periods considered in most of the human capital and growth literature published up to the end of the 1990s. A possible explanation for the insignificance of enrolment coefficients in growth regressions, also noted by Barro (2001), could be that by the late 1990s most countries had already implemented policies to boost student numbers. As a result, school enrolments do not create any further competitive advantages for economic growth, unlike the quality of the skills acquired by students.

The average share of enterprises with training programmes on a country level is not related to GDP growth performance, according to the data.[9] One possible explanation is that this result relates to participation in a training programme, not the fact that such a programme is established, which has an impact on country performance. Another potential explanation is that the benefits of having a training programme are captured at the enterprise level. (This question is investigated in greater detail in the next section.)

The impact of education is clear from the regressions with other measures of human capital. An increase in a country's average level of either academic competence (which can be interpreted as a measure of efficiency of the school system or be seen as a proxy for the performance of the public sector in general) or functional competence (that is, the ability of school graduates to use their knowledge in real life) by 10 percentage points is related to a 1.4 – 2.0 percentage point increase in the average GDP growth rate. This increase takes into account the level of development and the dispersion of skills.[10]

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[7] The latter variable, dispersion of human capital, is available only for the qualitative human capital measures, that is, academic and functional competency.

[8] It should be stressed that this equation provides only indicative tests of a partial correlation between GDP growth and human capital in a limited number of countries, particularly for qualitative human capital indicators and the training variable.

[9] Similar results are obtained when using the average share of employees enrolled in enterprise training programmes instead of the average share of companies with a training programme.

[10] The only human capital measure with insignificant coefficient is reading literacy, that is, interpreting the meaning of verbal text.

Table 2 – Relationship between GDP growth and human capital

Measure of human capital used	**Constant**	**GDP per capita (in logs)**	**Average level of human capital**	**Variance in human capital distribution**	**Number of observations**	**R^2**
Secondary enrolment	3.36 (3.06)	-0.31 (0.49)	0.02 (0.02)	-	152	0.03
Tertiary enrolment	2.48 (2.52)	-0.09 (0.34)	0.02 (0.02)	-	139	0.02
Years of schooling	0.90 (1.66)	-0.06 (0.32)	0.15 (0.12)	-	158	0.02
Academic competence: mathematics	8.78* (4.05)	-1.53** (0.47)	0.14** (0.04)	-0.06 (0.25)	59	0.30
Academic competence: science	9.31* (3.99)	-1.54** (0.50)	0.14** (0.04)	-0.13 (0.22)	59	0.28
Academic competence: average	9.12* (4.05)	-1.58** (0.49)	0.15** (0.04)	-0.11 (0.24)	59	0.30
Functional competence: mathematics	15.95** (5.60)	-2.30** (0.81)	0.17** (0.06)	-0.44* (0.17)	45	0.30
Functional competence: reading	13.87* (5.59)	-2.02* (0.85)	0.17 (0.08)	-0.55** (0.16)	45	0.27
Functional competence: science	11.06* (5.41)	-1.97* (0.74)	0.20** (0.07)	-0.43* (0.20)	45	0.28
Functional competence: average	13.86* (5.55)	-2.20* (0.82)	0.19** (0.07)	-0.47* (0.18)	45	0.29
Training: country average	15.37 (8.12)	-1.05* (0.46)	0.02 (0.04)	-0.05 (0.16)	33	0.13

Sources: Authors' calculations are based on WDI, OECD, IEA and BEEPS data. The data on enrolment, years of schooling and GDP growth are a simple arithmetic average of the rates in 1999-2004 and the data on GDP per capita are for 1999 as reported by WDI. The data on academic competence are from IEA and the data on functional competence are from the OECD for the latest available year (2003). The data on training are from the BEEPS 2004-05.

Notes: Standard errors are in brackets. * denotes the 5 per cent significance level; ** denotes the 1 per cent significance level.

Table 3 – Human capital in transition countries and its impact on GDP growth

	Average human capital across all countries	Average variance of human capital across all countries	Transition countries dummy for level of human capital	Transition countries dummy for variance of human capital	Impact of human capital on GDP growth in transition countries	Number of observations
Secondary enrolment	70.33 (33.25)	-	21.48** (3.63)	-	0.00	152
Tertiary enrolment	25.62 (22.02)	-	15.61** (3.21)	-	0.00	139
Years of schooling	11.06 (2.88)	-	1.64** (0.32)	-	0.00	158
Academic competence: mathematics	58.99 (8.72)	3.40 (0.98)	8.32** (1.58)	-0.15 (0.27)	1.16	59
Academic competence: science	59.90 (8.42)	3.34 (1.12)	8.69** (1.60)	-0.33 (0.34)	1.22	59
Academic competence: average	59.44 (8.45)	3.40 (1.02)	8.51** (1.55)	-0.24 (0.30)	1.28	59
Functional competence: mathematics	58.76 (7.91)	3.46 (1.62)	6.37** (1.57)	-0.66 (0.51)	1.08	45
Functional competence: reading	58.43 (6.55)	3.40 (1.52)	3.04 (1.58)	-0.74 (0.49)	0.00	45
Functional competence: science	59.34 (6.54)	3.43 (1.41)	5.37** (1.46)	-0.47 (0.45)	1.07	45
Functional competence: average	58.85 (6.91)	3.43 (1.51)	4.93** (1.49)	-0.62 (0.48)	0.94	45
Training: country average	38.72 (13.56)	46.74 (4.10)	10.68 (6.89)	2.60 (1.92)	0.00	33

Sources: Authors' calculations are based on WDI, OECD, IEA and BEEPS data. The data on enrolment, years of schooling and GDP growth are a simple arithmetic average of the rates in 1999-2004 as reported by WDI. The data on academic competence are from IEA and the data on functional competence are from the OECD for the latest available year (2003). The data on training are from the BEEPS 2004-05.

Notes: Standard errors are in brackets. * denotes the 5 per cent significance level; ** denotes the 1 per cent significance level. The impact of human capital in transition countries on GDP growth reports the coefficient from regressions in Table 2 multiplied by a coefficient for the transition countries dummy presented in Table 3.

The variance in functional competence, but not in academic competence, is negatively related to economic growth. This result can be interpreted such that it does not matter for GDP growth if there is a greater dispersion of academic competence as long as this does not lead to greater dispersion of functional competence. It should be noted that none of the dispersion measures of academic competence is statistically significant when correlated with the dispersion measures of functional competence (results are available on request).[11]

Transition countries make an interesting case as their human capital enjoys a reputation of high quality. As shown in Table 3, human capital endowment of transition countries exceeds human capital in non-transition countries at similar levels of development. The exceptions include functional competency in reading and the share of companies with a training programme. The share of human capital in transition countries is calculated by including a transition country dummy in the following regression:

$$human\_capital\_average_i = \alpha + \beta \cdot GDP\_per\_capita_i + \gamma \cdot transition\_country\_dummy + \varepsilon_i .$$

According to the calculations, transition countries have statistically significant, higher levels of human capital compared with non-transition countries at similar levels of development. Transition countries have achieved on average 68 percentage points for academic competence and 64 percentage points for functional competence, compared with an average of 59 per cent for all countries.

While the higher dispersion of human capital in transition countries is often noted in the literature (World Bank, 2001; Commander and Kollo, 2004), this paper's dataset does not reveal this feature. This is possibly because the standard error of skills attainment is the only available measure of dispersion of skills.

The estimates of above average skills in transition countries can then be used in the regressions presented in Table 2 to estimate the approximate impact of high-skill endowment of transition countries on GDP growth. According to the data, it could be concluded that the high level of human capital in transition countries is associated with the 0.9 – 1.3 percentage point higher GDP growth rate per annum in recent years. This rate would be lower if their human capital was at the levels of non-transition countries at similar levels of development.

[11] The standard error of the skills measure was used to estimate dispersion of academic and functional competence.

3. ENTERPRISE LEVEL SKILLS TRANSFER

New ways of measuring human capital have been developed to assess the relevance of skills acquired in formal education systems. This section looks at country-level human capital in relation to enterprise decisions to develop training programmes, managers' perception of skills of the available workforce and enterprise performance (focusing on sales growth and change in employment). Reviewing these factors should address how employers, that is, enterprises, adapt to different human capital endowments in the countries where they operate. Do they try to correct shortcomings of formal education systems by providing extensive training for their employees? Or, alternatively, do they adopt the prevailing approaches to skills transfer in the countries where they operate and provide greater training for employees in countries with an already high level of average human capital? This point is particularly important for transition countries where education systems were previously geared for central planning requirements and significant enterprise efforts may be needed to ensure their employees have necessary skills for market economy requirements.

Table 4 shows the extent of training programmes set up by enterprises in 34 countries covered by the Business Environment and Enterprise Performance Survey (BEEPS) in 2004-05. The BEEPS was undertaken jointly by the EBRD and the World Bank in 13,500 firms in 26 transition countries[12] in 1999, 2002 and 2005, and 8 non-transition countries[13] in 2004. In this paper, data on skills from the 2005 round for transition countries and the 2004 round for non-transition countries are used. The distribution of the sample between manufacturing and service sectors was determined according to the sector's relative contribution to the GDP in each country. Firms that operate in sectors subject to government price regulation and prudential supervision, such as banking, utilities and railways, were excluded from the sample, as were farms and other types of agriculture enterprises. Companies that had 10,000 employees or more were also excluded from the sample, as were firms that started their operations in 2002-05. There are several questions on skills and the labour force in the BEEPS. Responses to the following questions were used in this paper: i) did the surveyed firm offer training to their employees and ii) how problematic are skills and education of available workers for the operation and growth of the surveyed firm.

The share of enterprises having a training programme for individual countries and major regions, as well as sub-categories of companies by ownership, location and size are presented in Table 4. It is interesting to note that the highest share of companies with training programmes, at over 40 per cent of all enterprises, is in the new EU member states and Vietnam, exceeding the average for the pre-2004 EU member states. A partial explanation for the high share of companies with training programmes in the new EU member states, particularly among foreign-owned companies, may lie in the existence of public subsidies for skills transfer in those countries. The lowest share of enterprises with training programmes is in Turkey, early transition countries in the CIS and Russia. This finding may also explain why there is no significant difference in provision of training by enterprises between transition and non-transition countries. Enterprises in advanced transition countries train their employees more often than enterprises in non-transition countries, while enterprises in early transition countries train their employees less often.

[12] The countries covered include Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, the Kyrgyz Republic, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russia, Serbia, the Slovak Republic, Slovenia, Tajikistan, Ukraine and Uzbekistan. The survey was not conducted in Turkmenistan.

[13] The countries covered include Germany (distinguishing between former East and West Germany), Greece, Ireland, Portugal, South Korea, Spain, Turkey and Vietnam.

Table 4 – Extent of training by firm ownership, size and location

	New EU	SEE	CIS	Russia	EU	South Korea	Turkey	Vietnam
All enterprises	47.8	37.8	31.1	33.4	38.3	33.8	23.5	43.6
State-owned	67.5	44.1	41.8	49.2	52.6	0.0	61.8	68.6
Locally owned private	44.9	36.0	29.1	31.0	36.3	29.3	18.8	38.5
Foreign-owned	80.0	57.1	50.0	63.6	69.7	85.4	57.1	75.0
Capital city	50.8	44.0	33.4	27.4	39.4	52.1	29.3	64.2
Non-capital urban	44.5	36.7	32.7	40.1	39.1	26.3	20.6	48.1
Rural location	49.7	31.9	23.0	17.8	37.3	16.0	22.3	30.1
Large firm	80.3	60.4	52.0	53.5	79.4	90.8	58.3	74.6
Medium firm	73.4	49.1	46.3	47.1	63.7	64.0	35.7	61.25
Small firm	54.0	40.5	30.1	33.2	42.4	37.6	20.0	39.3
Micro firm	27.5	21.8	15.0	11.7	22.4	12.9	11.6	20.9

Source: BEEPS 2004-05.

Notes: The number presented in the table is the share of enterprises having a training programme for at least one category of employees with given characteristics and in a given country / region.

New EU refers to the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia. South-eastern Europe (SEE) includes Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYR Macedonia, Romania, Serbia and Montenegro (the data were collected before the split of the country). The Commonwealth of Independent States (CIS) includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan. EU countries covered by BEEPS include Germany, Greece, Ireland, Portugal and Spain.

Ownership refers to a majority stake; rural location is defined as a municipality with less than 50,000 inhabitants; large firms are those with more than 199 employees; medium firms are those with 50-199 employees; small firms are those with 10-49 employees and micro firms have less than 10 employees.

The differences between companies by ownership, location and size in Table 4 indicate that large, foreign-owned companies in the capital city are more likely to have a training programme while locally owned, micro enterprises are the least likely to engage in such activities. The results presented in Table 5 confirm these observations while controlling for various enterprise and country characteristics. A simple probit model is used:

$$training\_dummy_{i,j} = \alpha_i + \omega_k + \beta \cdot ownership_{i,j} + \gamma \cdot location_{i,j} + \delta \cdot size_{i,j} + \phi \cdot performance_{i,j} +$$

$$+ \varphi \cdot human\_capital\_average_i + u_{i,j},$$

where *ownership* is a vector variable with dummies for local private ownership and foreign ownership, *location* is a vector variable with dummies for the location of the company in the capital and rural area, *size* is a vector variable with the dummies for medium, small and micro-sized enterprises,[14] *performance* is a vector variable describing sales growth and employment growth, and *u* is a random term with a standard asymptotic multivariate normal

[14] In line with the literature, micro companies are defined as those with less than 10 employees, small companies as those with between 10 and 49 employees, medium-sized companies as those with 50-199 employees, and large companies as those with 200 and more employees.

distribution. Indexes *i, j* and *k* describe country, company and industry, respectively. Note that the regression equation includes a constant multiplied by a country-level variable on human capital as well as country dummies to control for the impact of other potential country-level explanatory variables.

Given the strong correlation between country-level measures of human capital, separate results for four main measures of human capital endowment are presented: secondary enrolment, tertiary enrolment, academic competency and functional competency. It is noteworthy that country-level variables explain between 20-30 per cent of data variability in the regressions. This leads to the conclusion that enterprise characteristics are more important for the existence of a training programme than country characteristics, including the country level of human capital endowment, although country-level variables do have a statistically significant impact.

When compared with state ownership, foreign ownership of a company significantly increases the likelihood of having a training programme, by about 15-16 per cent, depending on the specification of a human capital measure. One possible explanation is that foreign-owned companies acquire enterprises that already have a training programme. Another potential reason is that foreign-owned enterprises train their employees more often because the available skills and work practices are different from those in their home countries. An interesting issue, going beyond the scope of this paper, is the dynamic of the training provision in newly acquired companies. Does it increase in first years following the acquisition above the level of training provided in the parent company and converge towards the same level later on, or is the provision of training different across subsidiaries in different countries regardless of the time since acquisition?

The size of the company is also important for the existence of a training programme. The probability of having a training programme decreases progressively with the size of the company. Medium-sized companies are 14-18 per cent less likely to have a training programme compared with large companies, small companies are 29-32 per cent less likely to have a training programme, and micro-sized companies are 45-51 per cent less likely to have a training programme. This is not surprising as it is not very efficient for the smallest companies with less than 10 employees to conduct in-house training. However, this result also highlights the need for smaller companies to enrol their employees in outside training schemes in order to be competitive and ensure the same quality of skills as those of employees in larger companies. Another implication of this result is that the authorities need to adopt a different approach in encouraging enterprise-level skills transfer in small and medium-sized enterprises (SMEs) compared with larger companies.

Company performance is also shown to be related to the likelihood of having a training programme. Dynamic companies in terms of sales growth and – in some companies – higher employment growth[15] are more likely to have a training programme. However, the direction of the causality between sales growth and skills transfer is uncertain. More successful companies may feel the need to undertake a training programme as they expand. On the other hand, having a training programme may contribute to stronger sales compared with competitors without skills transfer mechanisms.

[15] The share of employees trained in the past 12 months is, however, positively associated with employment growth in all specifications.

Table 5 – Training by firm type and human capital

	Training dummy			
Locally owned private	-0.00	-0.00	-0.02	-0.07*
	(0.04)	(0.04)	(0.04)	(0.03)
Foreign-owned	0.16**	0.16**	0.16*	0.15*
	(0.05)	(0.05)	(0.07)	(0.06)
Capital city dummy	0.05+	0.05+	0.02	0.02
	(0.03)	(0.03)	(0.03)	(0.03)
Rural location dummy	-0.01	-0.01	-0.02	0.01
	(0.03)	(0.03)	(0.03)	(0.05)
Medium firm dummy	-0.14**	-0.14**	-0.16**	-0.18**
	(0.04)	(0.04)	(0.05)	(0.05)
Small firm dummy	-0.30**	-0.29**	-0.32**	-0.32**
	(0.04)	(0.04)	(0.05)	(0.05)
Micro firm dummy	-0.45**	-0.45**	-0.46**	-0.51**
	(0.03)	(0.03)	(0.04)	(0.03)
Sales growth	0.10**	0.10**	0.15**	0.16**
	(0.03)	(0.03)	(0.05)	(0.05)
Employment growth	1.03	1.04	2.59**	2.67**
	(0.78)	(0.78)	(0.93)	(0.96)
Secondary enrolment	1.01**	-	-	-
	(0.07)			
Tertiary enrolment	-	-0.18*	-	-
		(0.08)		
Academic competency	-	-	1.03**	-
			(0.05)	
Functional competency	-	-	-	0.99**
				(0.03)
Number of observations	4,166	4,166	2,752	2,495
R^2	0.15	0.15	0.15	0.17
R^2 for country variables only as a percentage of R^2 for full model	28.5	28.5	24.0	19.5

Source: BEEPS 2004-05.

Notes: Statistically significant differences from 0 are denoted by + for the 10 per cent significance level, * for the 5 per cent significance level and ** for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected. The benchmark categories are state-owned for ownership, non-capital city urban for location and industry for sector. Country and industry dummies were used in all regressions. Probit was used to estimate the coefficients.

The country level of human capital endowment, common for all enterprises, is shown to be strongly related to the likelihood of having a training programme. However, only secondary enrolment and academic and functional competency are shown to increase the likelihood of

having a training programme. Companies in countries with higher tertiary enrolment are actually less likely to have training programmes, possibly because they may interpret the higher share of tertiary education as a signal of labour quality. In addition, these companies may rely to a greater extent on the ability of their workforce to learn on the job than enterprises in countries with lower tertiary enrolment.[16]

The BEEPS database allows managers' perceptions of skills-related obstacles also to be investigated. Table 6 presents the analysis of the perception of workers' skills and education as a potential obstacle to enterprise operations and growth of business on a scale from 1 to 4, with 1 being the smallest obstacle (no obstacle) and 4 the largest obstacle. The following ordered probit regression has been estimated:

$$skills\_perception_{i,j} = \alpha_i + \omega_k + \beta \cdot ownership_{i,j} + \gamma \cdot location_{i,j} + \delta \cdot size_{i,j} + \phi \cdot performance_{i,j} +$$
$$+ \varphi \cdot human\_capital\_average_i + u_{i,j}$$

where *ownership* is a vector variable with dummies for local private ownership and foreign ownership, *location* is a vector variable with dummies for the location of the company in the capital and rural area, *size* is a vector variable with the dummies for medium, small and micro-sized enterprises, *performance* is a vector variable describing sales growth and employment growth, and *u* is a random term with a standard asymptotic multivariate normal distribution. Indexes *i, j* and *k* describe country, company and industry, respectively. The regression equation includes a constant multiplied by a country-level variable on human capital as well as country dummies to control for the impact of other potential country-level explanatory variables.

The data show clearly that the importance of country-level variables is much higher in forming managers' perceptions than in explaining enterprise behaviour, that is, the existence of a training programme. Country characteristics explain more than three-quarters of data variability in the perception regressions, while coefficients for most of the enterprise characteristics are insignificant. Sales growth is the exception in all specifications, with managers in more dynamic companies being more concerned about the skills of the available workforce. Employment growth and company size are also significant in the formation of skills perception but only in some specifications.

Analysis of the relationship between the country level of human capital and the perception of skills of the available workforce as a business obstacle by company managers give some interesting results. Functional competency does not seem to be related to the perception of the skills at the enterprise level. Higher academic competency and tertiary enrolment, both of which are relatively easily observable by managers, lead to skills being perceived as a smaller business obstacle, as could be expected. Higher secondary enrolment, surprisingly, actually increases the perception of skills as a business obstacle. One potential explanation is that higher secondary school enrolment beyond a certain threshold is not related to requirements of enterprises and the pool of potential skilled blue collar workers is smaller in advanced and middle income countries with higher secondary school enrolment. The investigation of this interesting hypothesis is, however, beyond the scope of this paper.

[16] The share of employees trained in the past 12 months is positively related to the country level of human capital for all measures used. This implies that in countries with higher tertiary enrolment, companies are less likely to have a training programme, but when they have one they train a higher share of their employees.

Table 6 – Skill perception by firm type and human capital

	Skill perception			
Locally owned private	-0.04	-0.04	-0.08	-0.13
	(0.07)	(0.07)	(0.10)	(0.10)
Foreign-owned	-0.02	-0.02	-0.03	-0.08
	(0.08)	(0.08)	(0.10)	(0.11)
Capital city dummy	0.01	0.01	-0.01	0.03
	(0.06)	(0.06)	(0.07)	(0.08)
Rural location dummy	-0.05	-0.05	0.06	-0.02
	(0.06)	(0.06)	(0.07)	(0.09)
Medium firm dummy	0.05	0.05	0.05	0.03
	(0.06)	(0.06)	(0.08)	(0.09)
Small firm dummy	-0.10	-0.10	-0.13+	-0.04
	(0.07)	(0.07)	(0.07)	(0.09)
Micro firm dummy	-0.12	-0.12	-0.15+	-0.09
	(0.09)	(0.09)	(0.08)	(0.11)
Sales growth	0.18*	0.18*	0.20*	0.25*
	(0.07)	(0.07)	(0.09)	(0.12)
Employment growth	1.62	1.62	4.07**	3.44*
	(1.36)	(1.36)	(1.41)	(1.71)
Secondary enrolment	2.48**	-	-	-
	(0.13)			
Tertiary enrolment	-	-1.84**	-	-
		(0.14)		
Academic competency	-	-	-0.20*	-
			(0.09)	
Functional competency	-	-	-	-0.10
				(0.08)
Number of observations	4112	4112	2719	2471
R^2	0.03	0.03	0.02	0.02
R^2 for country dummies only as a percentage of R^2 for full model	88.5	88.5	78.4	77.1

Source: BEEPS2004-05.

Notes: Statistically significant differences from 0 are denoted by + for the 10 per cent significance level, * for the 5 per cent significance level and ** for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected. The benchmark categories are state-owned for ownership, non-capital city urban for location and industry for sector. Country and industry dummies were used in all regressions. Probit was used for the training dummy as the dependent variable and ordered probit was used for the perception of skills as a business obstacle as the dependent variable.

The rest of this section focuses on the relationship between skills endowment, training of employees and enterprise performance. Table 7 presents the results of regressions of sales growth on enterprise and country characteristics, including training and the country level of human capital as per the following:

$$sales\_growth_{i,j} = \alpha_i + \omega_k + \lambda \cdot training\_dummy_{i,j} + \beta \cdot ownership_{i,j} + \gamma \cdot location_{i,j} + \delta \cdot size_{i,j} + \\ + \varphi \cdot human\_capital\_average_i + u_{i,j}.$$

In this equation, the training dummy describes whether a company *j* in country *i* has a training programme. *Ownership* is a vector variable with dummies for local private ownership and foreign ownership, *location* is a vector variable with dummies for the location of the company in the capital and rural area, *size* is a vector variable with the dummies for medium, small and micro-sized enterprises, and *u* is a random term with a standard asymptotic multivariate normal distribution. Indexes *i, j* and *k* describe country, company and industry, respectively. The regression equation includes a constant multiplied by a country-level variable on human capital as well as country dummies to control for the impact of other potential country-level explanatory variables.

As in the previous enterprise-level regressions, four different specifications are presented with the main four measures of the country level of skills. This section does not comment on the importance of non-skills related enterprise characteristics (such as ownership) for sales growth, but notes that the results for these are in line with the literature (see ERBD 2005, Chapter 4, for more detail).[17]

Training programmes are shown to have a strong positive relationship to sales growth, equivalent to 4.1 – 4.4 percentage point higher sales growth. All measures of the country level of human capital are also significantly related to sales growth. Tertiary enrolment, academic competency and functional competency are positively related to sales growth, with a 10 per cent increase in the respective measure of human capital associated with about a 2.9 – 3.6 per cent increase in sales growth. Secondary enrolment, on the other hand, is negatively related to sales growth, with the possible explanation similar to the one provided above on the potential shortages of blue collar skilled labour in countries with high secondary enrolment. This result can be also seen as the basis for higher secondary enrolment leading to managers perceiving the skills of the available workforce as an obstacle to business performance.

[17] The regressions show that locally owned companies grow by 4.2 - 6.4 per cent faster than state-owned companies. Foreign-owned enterprises grow by 6.9 - 9.0 per cent faster than state-owned companies, depending on specification. Other enterprise characteristics are not significantly related to sales growth, except for the size in one specification.

Table 7 – Relationship between sales growth, enterprise training and human capital

	Sales growth			
Training	4.37**	4.37**	4.11**	4.40**
	(0.98)	(0.98)	(1.43)	(1.48)
Locally owned private	6.43**	6.43**	5.66**	4.24**
	(1.25)	(1.25)	(1.20)	(1.26)
Foreign-owned	9.00**	9.00**	6.85**	7.13**
	(2.07)	(2.07)	(1.82)	(1.71)
Capital city dummy	0.95	0.95	-0.26	-0.71
	(1.14)	(1.14)	(1.41)	(1.48)
Rural location dummy	-0.99	-0.99	-1.34	1.27
	(0.73)	(0.73)	(0.98)	(1.07)
Medium firm dummy	-0.07	-0.07	-0.07	0.42
	(1.00)	(1.00)	(0.98)	(0.85)
Small firm dummy	-0.31	-0.31	1.63	1.61*
	(1.17)	(1.17)	(1.00)	(0.71)
Micro firm dummy	0.36	0.36	1.84	3.83*
	(1.54)	(1.54)	(1.38)	(1.30)
Secondary enrolment	-0.13**	-	-	-
	(0.02)			
Tertiary enrolment	-	0.29**	-	-
		(0.01)		
Academic competency	-	-	0.36**	-
			(0.03)	
Functional competency	-	-	-	0.33**
				(0.03)
Number of observations	12408	12408	7885	7177
R^2	0.09	0.09	0.09	0.09
R^2 for country dummies only as a percentage of R^2 for full model	90.0	90.0	90.4	87.5

Source: BEEPS 2004-05.

Notes: Statistically significant differences from 0 are denoted by + for the 10 per cent significance level, * for the 5 per cent significance level and ** for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected. The benchmark categories are state-owned for ownership, non-capital city urban for location and industry for sector. Country and industry dummies were used in all regressions.

Finally, the relationship between skills, training and employment growth is analysed as per the following:

$$employment\_growth_{i,j} = \alpha_i + \omega_k + \lambda \cdot training\_dummy_{i,j} + \beta \cdot ownership_{i,j} + \gamma \cdot location_{i,j} + \delta \cdot size_{i,j} +$$
$$+ \eta \cdot sales\_growth_{i,j} + \varphi \cdot human\_capital\_average_i + u_{i,j},$$

where the training dummy describes whether a company *j* in country *i* has a training programme, *ownership* is a vector variable with dummies for local, private ownership and foreign ownership, *location* is a vector variable with dummies for the location of the company in the capital and rural area, *size* is a vector variable with the dummies for medium, small and micro-sized enterprises, and *u* is a random term with a standard asymptotic multivariate normal distribution. Indexes *i, j* and *k* describe country, company and industry, respectively. The regression equation includes a constant multiplied by a country-level variable on human capital as well as country dummies to control for the impact of other potential country-level explanatory variables.

It should be noted that contemporary values on size and sales on the right hand side of the equation are used, which may create endogeneity problems. One way of addressing this issue is to use lagged variables. In this case, information on sales and employment 12 months prior to the survey is available, but no data on the change in training provision. Another approach is to estimate using a reduced form of the equation, eliminating all the potential endogenous variables. Such an approach leads to qualitatively the same results as estimates presented in this paper and are available on request.

Although enterprise level data explain about 50 per cent of data variability in these regressions, the explanatory power of the regressions is low and there are no enterprise level characteristics consistently significant, unlike in the previous regressions. In some regressions, having a training programme is associated with higher employment growth but the coefficients are not very high. The most consistent relationship, not surprisingly, is positive association between sales growth and employment growth. One may therefore conclude that there is no empirical evidence identifying a direct relationship between enterprise-level skills transfer on the one hand and job creation on the other hand.

Looking more closely at the relationship between country-level human capital variables and employment growth, again a negative relationship between secondary enrolment and employment growth appears, consistent with previous regressions. The positive association between tertiary enrolment and employment growth is also in line with previous results. The negative relationship between employment growth and academic as well as functional competency is noteworthy, particularly when compared with the result on academic competency and sales growth. The data show that in countries with better academic and functional competency, enterprises grow faster but their employment growth is slower, highlighting the links between the quality of the human capital and labour productivity at the enterprise level. One may therefore conclude that better qualified employees are associated with stronger sales growth, but enterprises need fewer of them to achieve such a performance.

Table 8 – Relationship between employment growth, enterprise training and country-level human capital

	Employment growth			
Training	0.06	0.06	0.11*	0.10*
	(0.04)	(0.04)	(0.04)	(0.04)
Locally owned private	0.20**	0.20**	0.14	0.13
	(0.06)	(0.06)	(0.09)	(0.10)
Foreign-owned	0.30*	0.30*	0.29	0.22
	(0.14)	(0.14)	(0.17)	(0.16)
Capital city dummy	0.15**	0.15**	0.15*	0.10
	(0.05)	(0.05)	(0.07)	(0.08)
Rural location dummy	0.02	0.02	0.02	0.03
	(0.04)	(0.04)	(0.04)	(0.05)
Medium firm dummy	0.01	0.01	0.02	0.15
	(0.09)	(0.09)	(0.12)	(0.09)
Small firm dummy	-0.04	-0.04	0.00	0.03
	(0.07)	(0.07)	(0.09)	(0.08)
Micro firm dummy	-0.21**	-0.21**	-0.14	-0.13
	(0.07)	(0.07)	(0.08)	(0.07)
Sales growth	0.24**	0.24**	0.22**	0.24
	(0.07)	(0.07)	(0.11)	(0.14)
Secondary enrolment	-0.51**	-	-	-
	(0.12)			
Tertiary enrolment	-	0.51**	-	-
		(0.12)		
Academic competency	-	-	-0.79**	-
			(0.06)	
Functional competency	-	-	-	-0.80**
				(0.07)
Number of observations	4166	4166	2752	2495
R^2	0.04	0.04	0.04	0.05
R^2 for country dummies only as a percentage of R^2 for full model	54.4	54.4	50.3	51.0

Source: BEEPS 2004-05.

Notes: Statistically significant differences from 0 are denoted by + for the 10 per cent significance level, * for the 5 per cent significance level and ** for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected. The benchmark categories are state-owned for ownership, non-capital city urban for location and industry for sector. Country and industry dummies were used in all regressions.

4. SUMMARY AND CONCLUDING REMARKS

This paper analysed the relationship between human capital – both at the country and enterprise level – and economic performance. It found that qualitative measures of human capital – that is, academic and functional competency – are strongly associated with GDP growth at the country level and sales growth at the enterprise level. It also found that enterprise decisions on skills transfer are mostly driven by enterprise characteristics, with ownership and size the two key features determining the likelihood of having a training programme.

The paper also established that the existence of a training programme is positively related to the level of skills in a country, controlling for other enterprise and country characteristics. This implies that skills transfer at the enterprise level cannot compensate for poor levels of human capital at the country level. Finally, there was no robust evidence to suggest a direct link between job creation and either better country-level skills or more frequent enterprise-level skills transfer.

Such findings lead to several policy implications:

- Policy makers should not rely on enterprises to rectify poor country-level skills. Furthermore, empirical evidence suggests that enterprises in countries where the overall level of human capital is higher train their employees more often than enterprises in countries with a less skilled workforce.
- Human capital endowment at the country level and training at the enterprise level are strongly associated with sales growth, job creation and the economic performance of the country. The quality of skills attained in the formal education system rather than the number of students enrolled, however, is what impacts economic performance. The reform of the education system should therefore ensure that improvements in qualitative outcomes, that is, academic and functional competency, are among the key objectives.
- There are significant differences in the provision of enterprise training. Smaller, locally owned enterprises outside the capital are less likely to offer employee training programmes. While governments may be willing to provide funds for skills transfer at the enterprise level, these funds are usually taken by large foreign-owned companies which are more likely to have training programmes already in place. The implication is that policy makers should prioritise public support for training employees in locally owned SMEs rather than in large foreign-owned enterprises.

Possible ways of meeting the training needs of small local companies is addressed in Annex 2. One example is the Ikea Shopping Centre University in Moscow, where a large foreign-owned company set up a training centre for small local companies. A second example is the EBRD's Business Advisory Services programme through which donor governments provide training to local SMEs in transition countries. Another example is the agribusiness company Chumak Ukraine, a large foreign company which has set up training programmes for its suppliers, mostly farmers, to improve their productivity. The importance of public intervention to support skills transfer also applies to the financial sector, which may be able to use its interactions with small private clients to provide training in financial management. The financial sector may also be able to assist smaller municipalities which have limited resources to establish training programmes, for example to train municipal officials in best procurement practices.

There are several potential extensions of this paper. One option is to look in more detail at training provided for different categories of employees, distinguishing between skilled, unskilled and non-production workers. Another potential extension could look at more detailed information on training, namely the share of employees trained in a given year. It should also be possible to measure more precisely the outcomes of enterprise training

programmes, and devise quality measures of enterprise training similar to academic and functional competency. It would be also useful to analyse the ownership variables by the country of origin of the foreign owner. Unfortunately the available data do not contain this information.

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ANNEX 1 – DESCRIPTION OF THE HUMAN CAPITAL MEASURES

Recent years have seen the development of improved schooling stock variables which allow for better proxies of human capital quality. Direct observations of cognitive skills relevant to economic development have been included in several tests administered by international organisations in cooperation with national statistical agencies around the world.

The Organisation for Economic Cooperation and Development (OECD) and the International Association for the Evaluation of Educational Achievements (IEA) have been among the first to develop international student assessment tests aimed at cross-country comparisons of cognitive skills. IEA's Trends in International Mathematics and Science Study (TIMSS) was first administered in 1995, while OECD's International Adult Literacy Survey (IALS) and Programme for International Student Assessment (PISA) started in 1994 and 2000, respectively.

The methodology for assessing and comparing cognitive skills across countries is continuously refined and other tests have been developed in the last few years, such as IEA's Progress in International Reading Literacy Skills (PIRLS) and OECD's Adult Literacy and Life Skills Survey (ALL). However, because of their limited country coverage or unavailability of final results, IALS, PIRSL and ALL are not included in this study.

IEA's TIMSS, used in the paper as a measure of academic competency, measures the conformity of educational achievement to national curricula in mathematics and science. As such, it focuses on the mastery of academic subjects critical to economic development, but not on their competent application to functional settings such as workplaces. The concentration on mathematics and science reflects the theoretical emphasis on the importance of quantitative skills in research and development activities as sources of growth (Romer 1990, quoted by Hanushek and Kimko 2000).

TIMSS tests are based on analyses of the curricular guides, textbooks, and other curricular materials of participating countries, as codified in the TIMSS Curriculum Frameworks for Mathematics and Science. TIMSS has had three rounds, in 1995, 1999 and 2003. Across the years, TIMSS involved some 50 countries, including up to fourteen from the EBRD's region of operations.[18] It measured performance at the conclusion of each of the three stages of pre-tertiary education: primary (grades 3/4), lower secondary (grades 7/8), and the final year of secondary school. Not all countries participated in all three levels, but all participated in the assessment of lower secondary (grades 7/8) (IEA and Boston College, 2000).

OECD's PISA, used in this paper as a measure of functional competency, focuses on young people's ability to use their knowledge and skills to meet real life challenges, rather than on the extent to which they have mastered a specific school curriculum. This reflects a change in the goals and objectives of curricula themselves, which are increasingly concerned with what students can do with what they learn at school, and not merely whether they have learned it.

The test is based on a dynamic model of lifelong learning, in which new knowledge and skills necessary for successful adaptation to a changing world are continuously acquired throughout life. PISA assesses reading, mathematical, and scientific literacy of 15 year olds, and focuses

[18] The transition countries covered are Armenia, Bulgaria, the Czech Republic, Estonia, FYR Macedonia, Hungary, Latvia, Lithuania, Moldova, Romania, Russia, Serbia and Montenegro (the data were collected before the country split into two separate entities), the Slovak Republic and Slovenia. Non-transition countries include Argentina, Australia, Austria, Bahrain, Belgium, Botswana, Canada, Chile, Colombia, Cyprus, Denmark, Egypt, Finland, France, Ghana, Germany, Greece, Hong Kong, Iceland, Indonesia, Iran, Ireland, Israel, Italy, Japan, Jordan, South Korea, Kuwait, Lebanon, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Norway, Philippines, Portugal, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Syria, Thailand, Tunisia, Turkey, the United Kingdom, the United States and Yemen.

on the mastery of processes, the understanding of concepts, and the ability to function in various situations within each domain. As a result, PISA depicts the profile of knowledge and skills of 15 year olds and identifies contextual indicators which relate students' performance to student and school characteristics. The test includes 32 participating countries, including 11 transition countries.[19] The first results from the test, which was administered in 2000 and 2003, are now available. One more round is expected in 2006 (OECD 2001).

[19] The transition countries included are Albania, Bulgaria, the Czech Republic, FYR Macedonia, Hungary, Latvia, Poland, Romania, Russia, Serbia and Montenegro (the data were collected before the country split into two separate entities) and the Slovak Republic. Non-transition countries covered are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Indonesia, Ireland, Israel, Italy, Japan, South Korea, Liechtenstein, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Peru, Portugal, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, the United Kingdom, the United States, and Uruguay.

ANNEX 2 – PUBLIC SUPPORT FOR SKILLS TRANSFER IN THE PRIVATE SECTOR

IKEA Kommunarka shopping centre in Russia

In September 2002 the EBRD approved a US$ 100 million corporate loan to IKEA MOS, the Russian subsidiary of the successful Swedish home furnishing company. The EBRD's proceeds were used for the development of a shopping centre in Moscow's Kommunarka district. As part of IKEA's strategy and brand building philosophy, the company trained not only its employees but also all tenants and subcontractors in its Mega Mall University. As a result, IKEA successfully promoted international standards of client management skills and its corporate and commercial marketing practices. Mega Mall University courses continue to be provided on a rolling basis. Some of the more advanced training courses are now offered at a charge to cover the costs of skills transfer.

TurnAround Management and Business Advisory Services (TAM/BAS) Programme

As part of the EBRD's non-financial enterprise support programme, the TurnAround Management and Business Advisory Services (TAM/BAS) Programme focuses on assisting and improving management skills in the EBRD's countries of operation. Started in 1993 with the support of the EBRD and funded by UNDP and several other donors, TAM targets medium to large enterprises with an average of 200-1,500 employees. BAS followed in 1994 with funding from the Nordic Council of Ministers, and focuses on micro, small and medium enterprises with up to 250 employees. The TAM Programme works directly with individual enterprises on a not-for-profit basis, advising on management skills, business planning, restructuring, improving products, reducing operating costs and developing local and export markets. By using local consultants, BAS combines the dual role of assisting SMEs in their business expansion with contributing to the professional development of local accredited business consultants. In over a decade of activities, TAM has developed some 1,100 projects in 27 countries with an aggregate turnover of US$ 18.5 billion and involving around 820,000 employees. Similarly, BAS has developed 3,400 projects in 15 countries with an aggregate turnover US$ 9 billion and involving over 217,000 employees. BAS has also engaged 1,550 local consultants for projects in 15 countries.

Chumak Ukraine

In June 2004 the EBRD approved a US$ 10 million term loan and a US$ 5 million revolving credit line to Chumak, a leading manufacturer of branded food products in Ukraine. The EBRD's funds financed extraction equipment and additional investments in Chumak's production facilities, working capital, marketing and brand development. The project had a strong upstream component and included support to local farmers by means of sourcing of agricultural inputs, provision of irrigation material and training. The training component was provided on a stand alone basis by Chumak and jointly with the Swedish International Development Agency (SIDA). SIDA set up an office with a permanent resident officer on Chumak's premises to facilitate pilot SIDA-funded programmes for Chumak's suppliers. The programme was highly successful and suppliers' yields for tomato growing, for example, increased up to 10-fold.