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Policy Brief

# The European Human Capital Index: The Challenge of Central and Eastern Europe

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Innovation

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Left to right,
Schuller, Ederer and Willms

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The European Human Capital Index is part of the Lisbon Council's human capital project – a multi-year effort to define and measure the role of human capital in economic growth and social prosperity. The analysis focuses on long-term economic and social trends and devises policy recommendations on that basis. Future editions of this study will look at the way individual countries, regions, corporations and small businesses manage and develop their human capital potential.

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# ‘Nowhere in Europe has economic growth been as impressive and durable as in the countries of Central and Eastern Europe.’

Nowhere in Europe has economic growth been as impressive and durable as in the countries of Central and Eastern Europe. These countries, many of which acceded to the European Union in 2004, have been the engine of dynamism, mobility and flexibility that were often blatantly absent from the EU-15. Their extraordinary turnaround – moving from state-controlled economies and political dictatorships to social-market economies and pluralistic democracies – has been a boon to Europe at large, providing a much-needed economic stimulus to the EU-15. Indeed, the addition of 10 Central and Eastern European countries plus Cyprus and Malta to the EU has helped to elevate and reposition Europe itself, creating an attractive market of some 493 million consumers and giving greater heft to Europe’s economic and political ambitions in the world.

However, a continuation of the good economic performance and rise in prosperity in Central and Eastern Europe is not to be taken for granted. To the contrary, adverse demographic developments and under-utilisation of human capital, as well as a persistent brain-drain and inadequate investment in education and skills, are starting to threaten the prospects of the region. These looming problems could lead to spill-over effects on Western Europe and Europe’s position in the global economy, if urgent measures are not taken today. There is a very real risk that in coming decades Central and Eastern Europe could become a sparsely-populated area with a declining workforce that will have to shoulder the burden of a population set to experience unprecedented levels of ageing and decline. At stake is nothing less than the long-term sustainability of these remarkable countries, which have added so much to Europe’s history, economy and diversity.

In 2006, the Lisbon Council set out to define and measure human capital, seeking to quantify numerically the way human capital is developed over the course of a person’s lifetime in different countries.[1] The project was undertaken to shed important public-policy light on the many economic and social tradeoffs which go into developing human capital – ranging from the amount of time a parent spends with

## A special case: Turkey

In the second edition of the European Human Capital Index ranking, Turkey achieves overall second position due to its vastly brighter demographic prospects compared to other Central and East European countries. This is a real advantage – not a statistical outlier. Turkey can count on a youthful working-age population and need not fear failing retirement systems. Its working-age population in the year 2050 will be almost as large as all other Mediterranean countries taken together – along with the political and economic clout that comes with such a position. Without the demographic component, Turkey would rank No. 9 on the list.



[1] See Peer Ederer, *The European Human Capital Index* (Brussels: The Lisbon Council, 2006).

[2] The analysis was conducted for 13 countries, made up of the EU-15 minus Greece and Luxembourg. The 13 countries were Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and United Kingdom. Greece had to be excluded since there are too few historical data points available to make any meaningful statement. Luxembourg was excluded because its economy is so interdependent with its neighbours’ that the historical data provides an insufficient picture of the domestic interaction between human capital and economic development.

a child to the long-term costs of high levels of workforce exclusion to the devastating effects of a declining population on a country's human capital standing. In the end, the European Human Capital Index assigned countries a specific score based on their ability to develop and sustain their human capital, then ranked those countries according to their performance.[2] Specifically, it looked at countries' ability to develop and nurture their human capital in four separate categories – human capital stock, human capital utilisation, human capital productivity and demographic outlook, assigning a score to each country in each category. Then, it brought those scores together to form a composite ranking, allowing us to compare and contrast human capital development strategies across countries and regions. Given the vital role that human capital plays in a country's long-term economic prospects, the analysis shed much useful light on future sustainability of the surveyed countries' way of life and social system – and contained valuable lessons regarding the levers policy makers could reach for if they want to increase and expand their nations' human capital.

In this study – the second volume of The European Human Capital Index – we seek to deepen and extend the analysis – most notably by looking for the first time at the human-capital situation in Central and Eastern Europe. In particular, the study profiles 10 of the 12 new EU member states[3] plus Croatia and Turkey, assigning each country a human capital score based on the four criteria described above. For benchmarking purposes, it also includes the "EU-14" (i.e. the weighted average of the 13 countries survey in 2006 plus Switzerland). Croatia and Turkey were

**Table 1: The European Human Capital Index for Central and Eastern Europe**
Slovenia and Turkey lead the ranking but for very different reasons. The overall ranking is based on each country's scores in each of four individual human capital categories. Zero is the best possible score; 48 is the worst.

| Rank | Country | Score |
|---|---|---|
| 1 | Slovenia | 22.3 |
| 2 | Turkey | 24.9 |
| 3 | Lithuania | 25.6 |
| 4 | Czech Republic | 26.3 |
| 5 | Estonia | 26.8 |
| 6 | Latvia | 28.2 |
| 7 | Romania | 29.9 |
| 8 | Hungary | 30.6 |
| 9 | Slovakia | 31.7 |
| 10 | Bulgaria | 32.7 |
| 11 | Poland | 34.0 |
| 12 | Croatia | 35.0 |



[3] The 10 Central and Eastern European countries surveyed in this study are Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Cyprus and Malta – which joined the EU in 2004 – were not included for reasons of data availability problems and data inconclusiveness, respectively.

Table 1. Source: Lisbon Council

## ‘A continuation of the good economic performance and rise in prosperity in Central and Eastern Europe is not to be taken for granted.’

chosen because both of these countries stand a reasonable chance of joining the EU in coming decades, and both have important lessons for Europe’s human capital standing. Turkey proved especially interesting, because uniquely among the 12 countries surveyed, it boasts a positive demographic outlook (for more, see the box on page 2).

The study produces several important results. Some countries – such as Czech Republic, Estonia, Slovenia – have already caught up to or even surpassed the living standards of some EU-15 regions.[4] But there remains a glaring challenge over the next two decades for all Central and Eastern European countries to master: to close a yearning and widening gap with the rest of the world – including Western Europe – in human capital investment and human capital utilisation. The gap is widening due to three circumstances:

1) All of the countries surveyed (with the notable exception of Turkey) have very low birth rates, thus shrinking working age populations, with far reaching consequences on the labour market and society;
2) All of the countries surveyed are suffering from an exodus of their young and skilled to better pastures within the European Union or beyond – while it is unclear how these same countries could be attractive for either immigration or return of former emigrants;
3) All of the countries surveyed (even Estonia, the relative leader in this category), risk landing on the wrong side of the digital divide – and thus precluding their citizenship from accessing future channels of knowledge dissemination.

What’s more, the countries we surveyed must address these human capital challenges in the face of stiffening competition for talent and skills from all corners of the world. These days, China and India are engaging Europe not in a race to the bottom, but in a race to the top – where the goal is to become the fastest adopters of innovative technology and processes. Africa is awakening, Latin America is shedding its past poor management of the economy – and the established innovation power houses in the Asian Far East, Western Europe and North America are likewise seeking to expand their standards of living through innovation, driven by technology and skills.

This raises the stakes higher for the countries of Central and Eastern Europe. They can no longer limit themselves to the goal of simply “catching up” with the West in economic terms. Instead, they must focus on competing globally and citizens are expecting results. They want policy makers to implement measures to keep up with the global pace – even as they continue working to shake off the legacy of economic autocracy. Being able to find the right answers to these challenges will determine the future of Central and Eastern Europe more than anything else – and with it the prosperity and social peace of all of Europe.



[4] According to Eurostat, Prague has surpassed Communidad de Madrid in terms of purchasing-power adjusted GDP per capita, and is closing in on the Ile- de-France. Slovenia is on par with Languedoc or Nord-Pas de Calais in France; Estonia is on par with Northern Greece, Southern Italy, Spanish Extremadura and most of Portugal. See Eurostat, *Regional Gross Domestic Product in the European Union 2004*, Statistics in Focus 104/2007.

'The countries of Central and Eastern Europe lag Western Europe considerably in human-capital acquisition or deployment and even worse – given Central and Eastern Europe's stagnation in these areas – that gap stands to widen over time.'

For the countries that did well in the European Human Capital Index, Volume II – namely, Czech Republic, Estonia, Lithuania and Slovenia – there beckons the realistic chance of fully achieving West European standards of living within the next two decades – if the societal consensus for sound macroeconomic management and continuing orientation towards rapidly developing human capital is maintained. For the countries that scored poorly – namely, Bulgaria, Croatia and Poland – there is a realistic chance of being stuck in relative poverty to the European average – since no other resource but human capital can lift them out of the situation they are in today.

## Components of the European Human Capital Index

The term human capital is well understood in economic circles, but it fares less well in policy circles, where some analysts believe it looks too rigidly at the inherently dynamic process of innovation in a modern economy. However, the fact that the decisive economic resources of the future will be knowledge and education is widely understood and broadly accepted in most policy-making circles.[5] In using the term human capital, this paper aims to develop an analytical framework allowing the measurement and comparison of investment in knowledge and education between countries.

Specifically, the index identifies and defines four types of human capital and analyses the way those types of human capital collectively contribute to the wealth of European citizens:

1) Human capital endowment. This figure measures the cost of all types of education and training per person active in the labour force.
2) Human capital utilisation. This figure looks at how much of a country's human capital stock is actually deployed.
3) Human capital productivity. This figure measures the productivity of human capital by dividing a country's overall consumption by all of the human capital employed in that country.
4) Human capital demography and employment. This figure looks at existing economic, demographic and migratory trends to estimate the number of people who will be employed in 2035.[6]

We chose these four components for the European Human Capital Index because they each represent one aspect of how human capital contributes to the generation of economic activity.[7] In subsequent pages, each component will be analysed in detail. To compile the ranking, we first scored 10 of the 12 new EU member states plus Croatia and Turkey in each of these four areas. Then, we compiled the four scores into a single composite index giving each country a relative score for its current ability and future outlook in developing and deploying human capital (See Table 1 on page 3). The result gives a figure which is indicative of these countries long-term economic potential relative to one another.



[5] See Andreas Schleicher, *The Economics of Knowledge: Why Education is Key to Europe's Success* (Brussels: The Lisbon Council, 2006).
[6] For more on the methodology and data assumptions, see page 22.
[7] Each category represents one term of a conceptual mathematical formula to forecast economic potential: (The amount of human capital per capita available) x (how much of that human capital is utilised for the economy) x (how productively the human capital can be deployed) x (the growth or decline of working age population in a country) = forecast total economic activity of that country.

‘The task is how to evolve from boasting merely efficiency-driven growth towards being genuinely innovation-driven economies.’

For comparison, we have included a calculation and comparative ranking of the EU-14 in each of the four categories. It should be noted in passing that only two countries ever surpass the West European average in this survey – Slovenia in human capital endowment and Turkey in demography. The countries of Central and Eastern Europe lag Western Europe considerably in human-capital acquisition or deployment and even worse – given Central and Eastern Europe’s stagnation in these areas – that gap stands to widen over time. Already, in most cases, the gap between the leading country in a category and the EU-14 weighted average is greater than the gap between the best and worst performing Central and Eastern European country in that category, meaning the region as a whole has a much harder challenge in catching up with Western Europe than the winners and losers in the region face in catching up with each other.

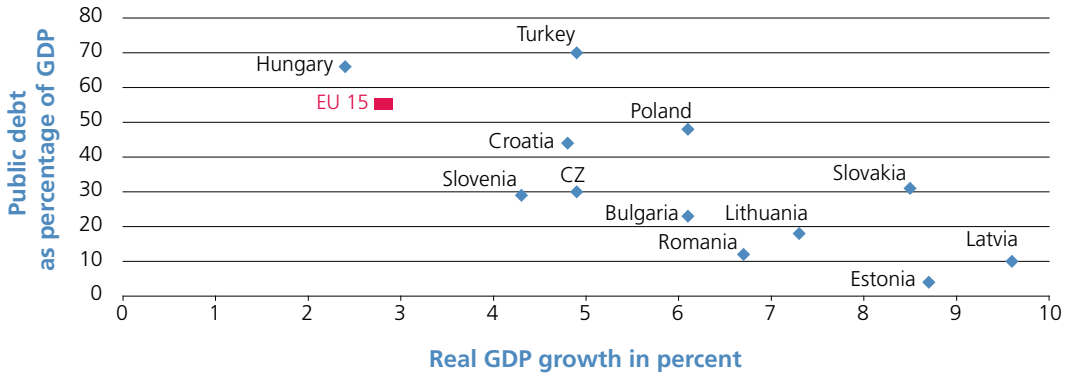
As economists have shown, wealth is the result of several things – natural, financial and human capital – and the productivity (or efficiency) with which these inputs are used, including innovation. The role financial capital can play in stimulating growth rates is well documented. Ireland and Estonia, for example, have demonstrated well how countries can grow richer by attracting high levels of inward financial capital investment.

But the development of the internal market, the adoption of the euro, the accession of 10 Central and Eastern European countries to the EU and the implementation of other measures to lift barriers to cross-border commerce have made financial capital more or less freely available on equal terms throughout Europe. Financial capital can and does flow to the places where the prospect of returns is largest.

Most Central and Eastern European countries have taken advantage of this fact – and, by providing solid macroeconomic performance and beneficial taxation schemes, they have attracted large amounts of capital which has in turn given them a rising standard of living (see Figure 1 on page 7 for an illustration of countries’ relative performance on growth and fiscal consolidation). The problem is, these levers are no longer available to these countries to secure future growth. Instead, the largest lever for Central and Eastern European countries to pull for further economic advancement is to focus on investment in and deployment of human capital. In an era of globalisation, financial capital can and will go the places where macroeconomic conditions and human-capital development have created attractive opportunities for investment. Having mastered the art of attracting resources, and thereby having moved beyond being essentially factor-driven economies, Central and Eastern European countries are now faced with the task of mobilising and deploying the remaining resources they have. The task is, how to evolve from boasting merely efficiency-driven growth towards being genuinely innovation-driven economies (see Figure 2 on page 7 for more).

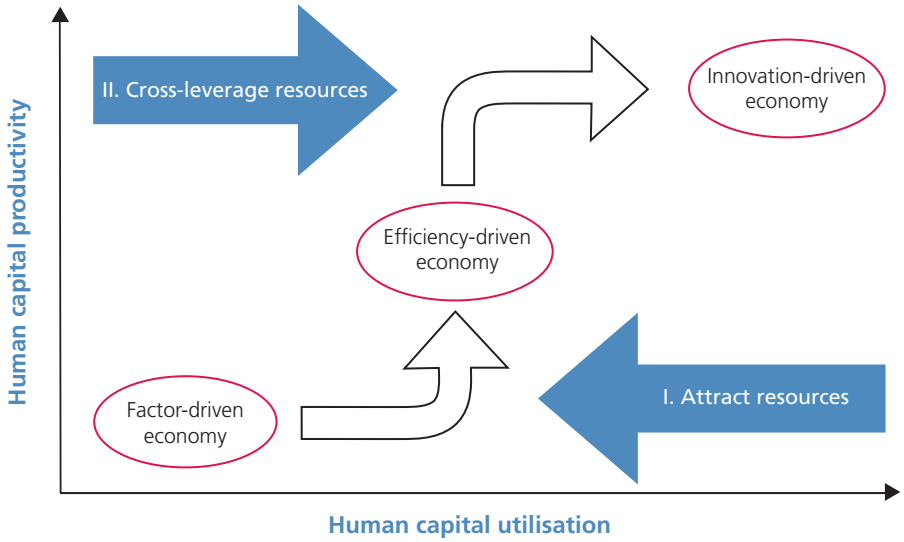
## Figure 1: On the whole, Central and Eastern European countries show vigorous macroeconomic performance

GDP real growth rates and public debt/GDP 2006, in percentages




## Figure 2: The key to an innovation-driven economy is re-enforcing and cross-leveraging locally available human capital towards competitive advantage

Framework for linking human capital utilisation and productivity to innovation and growth




## Figure 3: Secondary schooling in Central and Eastern Europe is on par with or better than many West European countries

Quality of secondary schooling education as derived from international comparison tests (Pisa, Timms)
Composite indexed for most recent year; education spending in percent of GDP (2002-2004)

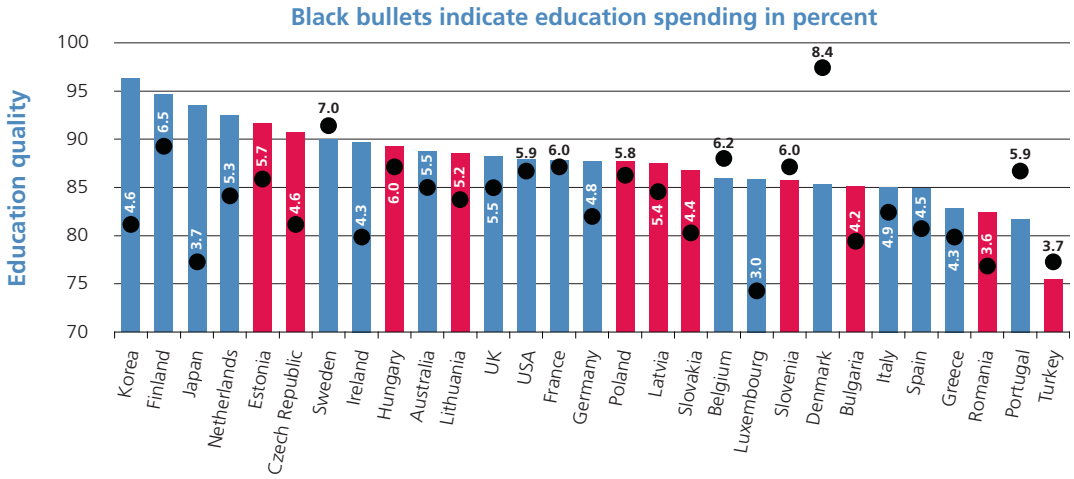





Figure 1. Source: Eurostat
Figure 2. Source: Lisbon Council
Figure 3. Sources: Eurostat; Altinok, Murseli (2007): International Database on Human Capital Quality, UNDP

## I. Human capital endowment

Human capital endowment measures the cost of all types of education and training a person receives. The human capital stock of an economy is made up of the human capital endowment of an average person multiplied by the number of individuals participating in the economy. In this study, the average human capital endowment per capita is measured by calculating the level of investment in five different kinds of investment in skills used in the economy:

1) Informal parental education: General skills and cultural adaptation taught by parents;
2) Formal school education: General skills which children learn mostly up to secondary school;
3) Formal university and higher education: Specific skills that students learn in university and upper vocational training institutions;
4) Formal and informal adult education: Skills which adults acquire outside of their daily work environment, which are nevertheless either directly or indirectly job-related such as management training;
5) Informal learning on the job: Skills acquired incidentally as part of the daily job activity and continuous adaptation to new requirements.

The figure is subsequently depreciated to account for obsolescence in the existing knowledge base and some level of forgetting. As the direct cost and opportunity cost of creating this human capital is dependent on a country's wage levels, economies that have been wealthy for longer tend to have higher human capital endowments than countries that were poorer.
In terms of human capital endowment, the 12 countries surveyed can be easily grouped into four categories of performers:

a) Slovenia towers above the others and, in terms of human capital accumulation, is approaching the levels of Greece, Italy and Portugal in both the quantity and structure of its human capital;
b) The Czech Republic, Estonia, Hungary and Lithuania are runners-up in the amounts of human capital they have been able to accumulate among their employed work force; they still lag Western European levels, but together with Slovenia lead the pack;
c) Croatia, Poland and Latvia occupy the middle ground;
d) Bulgaria, Romania, Slovakia and Turkey trail behind. Their low public investments in education and consistently poor showing on international educational achievement comparisons suggest that they won't be showing improvement in this area in the near future (see Figure 3 on page 7 for more).

And yet the data also reveals certain interesting anomalies among the countries surveyed. For starters, most of the human capital endowment in Central and Eastern European countries has been created through their schooling systems and in parental education at home (see Figure 4 on page 9). By contrast, many decades of substandard technology deployment and low economic development

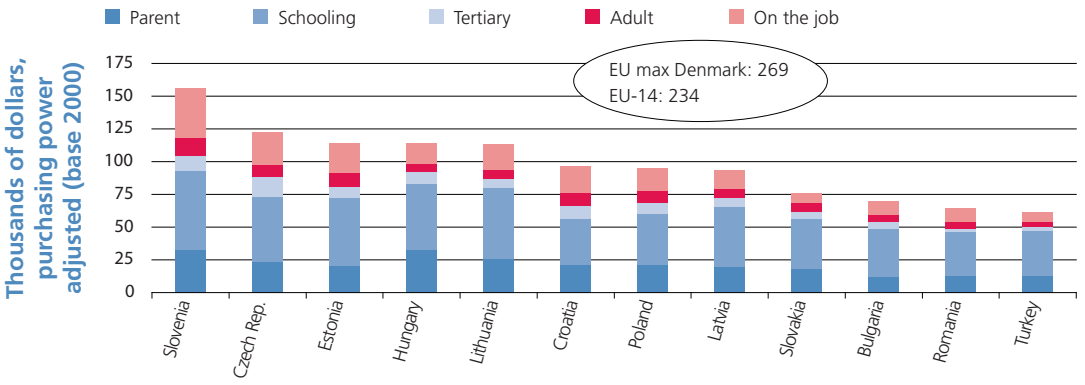
## Table 2: Human capital endowment ranking

Amount invested per average person employed in dollars, purchasing power adjusted (2006)

| Rank | Country | Human capital endowment |
|---|---|---|
| 1 | Slovenia | 156,081 |
| 2 | Czech Republic | 122,263 |
| 3 | Estonia | 114,021 |
| 4 | Hungary | 113,888 |
| 5 | Lithuania | 113,566 |
| 6 | Croatia | 96,465 |
| 7 | Poland | 95,338 |
| 8 | Latvia | 93,463 |
| 9 | Slovakia | 75,468 |
| 10 | Bulgaria | 69,443 |
| 11 | Romania | 64,379 |
| 12 | Turkey | 61,375 |
| | EU-14 average | 242,772 |

## Figure 4: School education is the primary component of human capital in Central and Eastern European countries

Composition of human capital endowment per average employed person by type of education received (2006) in thousands of dollars, purchasing power adjusted




## Figure 5: A nation's standard of living and its human capital endowment are related

Human capital endowment (in thousands of dollars, adjusted for purchasing power) compared to consumption per capita (in dollars, purchasing power adjusted)

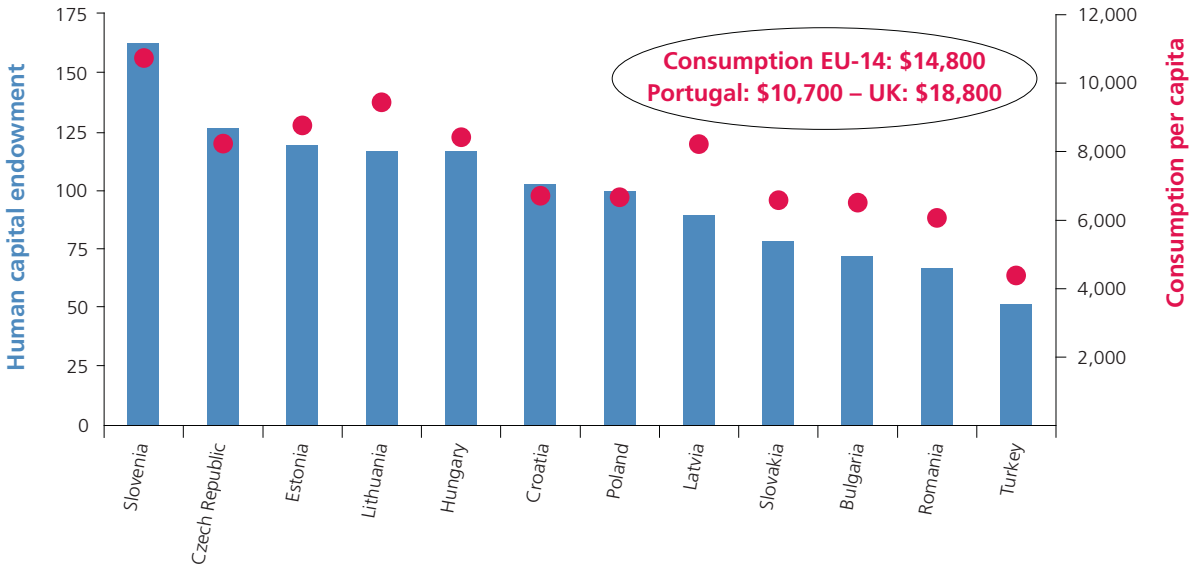





Table 2. Source: Lisbon Council
Figure 4. Source: Lisbon Council
Figure 5. Sources: Eurostat, Lisbon Council

‘Many decades of substandard technology deployment and low economic development have left the working population bereft of the chance to build up human capital on the job.’

have left the working population bereft of the chance to build up human capital on the job – an important source of human capital development in West European countries.[8] Since investment in human capital has long payback cycles of 20 to 30 years, the work-place investments in human capital which Central and Eastern Europe failed to make during the 20th century will be missed for another two or three decades. Therefore, even if the schooling systems in the countries surveyed are mostly on a good course, the legacy of the past dictates that these countries must invest more in human capital and training among the generation of people who are 35 years and older. For more on the relative standing of Central and Eastern European schools and the role of these schools in developing human capital, see Figure 3 on page 7.

One determinant of human capital endowment is the amount parents invest in their children by spending time with them, which we calculate for purposes of this study through opportunity costs based on missed wages. Because wages and wage levels differ in different countries, the opportunity costs for time invested are higher in wealthier economies. The result is, in a calculation of this type, there is a clearly demonstrable relationship between a country’s level of consumption and its human capital accumulation. For more on the relationship between consumption levels and human capital accumulation in the countries surveyed, see Figure 5 on page 9.

## II. Human capital utilisation

Human capital utilisation looks at how much of a country’s human capital stock

### Schooling in Central and Eastern Europe

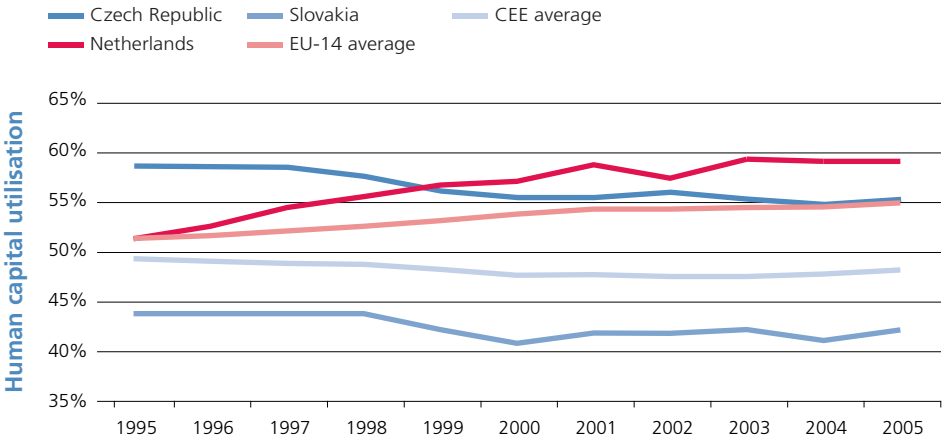
In a review of the secondary schooling systems of seven Central and East European countries, Ludger Woessmann (2003) analysed data from the 1995 Trends in International Mathematics and Science Study (TIMSS) and clearly distinguished two groups of countries within the region: One group had moved decisively towards the features of Western European countries while the other could not yet demonstrate successful results of transition. The more advanced group, consisting of the Czech Republic, Hungary, Slovakia and Slovenia, outperformed most EU countries and had many traits similar to West European schooling systems. The schooling systems of the less advanced group, including Latvia, Lithuania and Romania, still featured characteristics of communist times and seemed not yet to educate a new generation to be competitive in EU labour markets. The results as measured in educational attainment between these two groups were dramatic for the students in the 1990s. In the “reformed” group of countries the students achieved TIMSS math scores ranging from 519 to 544, and TIMSS science scores ranging from 527 to 553. The “unreformed” group achieved math scored between 454 and 477 and science scores between 441 and 469. For comparison: the West European average TIMSS math score was 505.



[8] For more, see Ederer, *The European Human Capital Index* (2006).

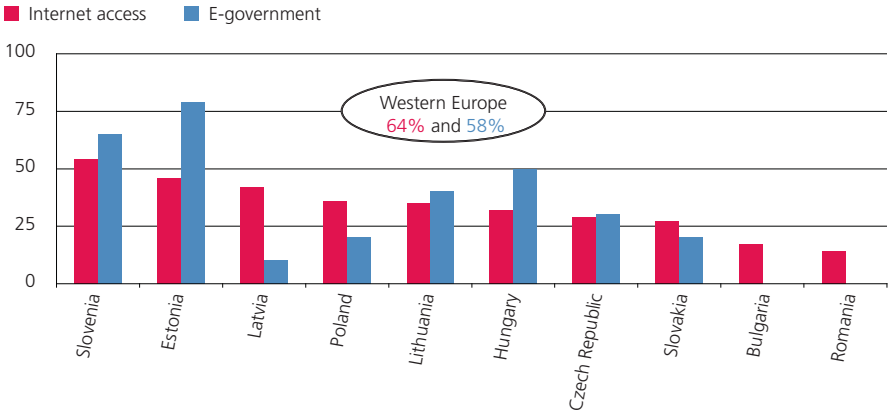
## Figure 6: Central and Eastern European human capital utilisation is lower than the EU average and keeps stagnating

Utilisation of human capital stock (1995-2005) in percent




## Figure 7: Central and Eastern European countries lag behind in connecting their citizens to multimedia-communications networks

Internet access of all private households and e-government availability of 20 basic services (2006) in percent




## Figure 8: High unemployment is one reason so many Central and Eastern European Countries have low human capital utilisation rates

Human capital utilisation compared to official unemployment rate (2006)

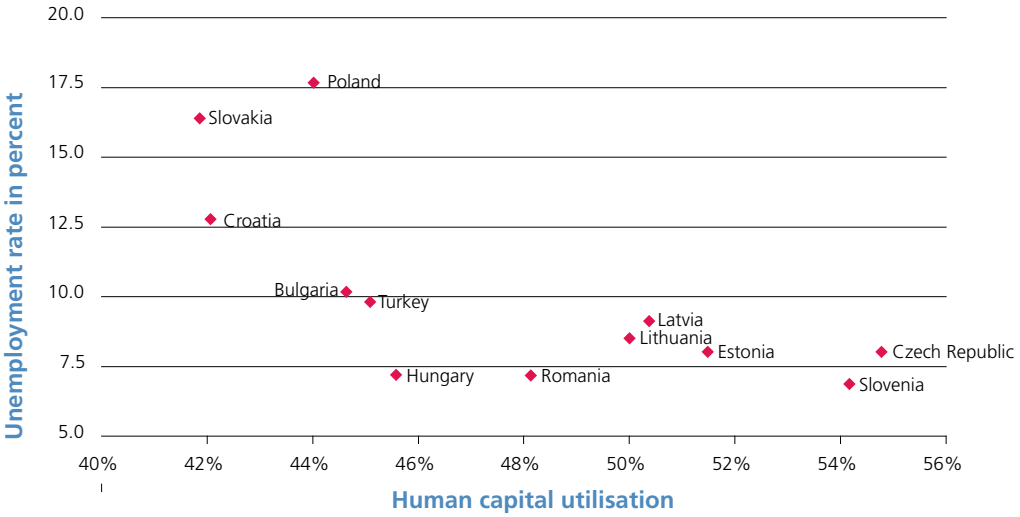





Figure 6. Source: Lisbon Council
Figure 7. Source: Eurostat
Figure 8. Source: Lisbon Council

is actually deployed. It differs from traditional employment ratios in that it measures human capital as a proportion of the overall population, and includes an inter-generational component to acknowledge that different age groups may have different human capital endowments.

The non-utilised portion of a country's human capital is comprised of children and university students, the unemployed, non-working housewives and retirees. Poor human capital utilisation hits the economy – and the individuals excluded from the workforce – in two ways: it means that people do not contribute to the output of the economy and – by dint of being excluded from the workforce – are also shut out from the most effective means of acquiring new human capital, which is learning on the job. Bereft of this most important source of acquiring and mastering the new skills required by continuous innovation, they will find re-entry into the labour market and participation in the benefits of modern society increasingly difficult.

Among the countries surveyed, the utilisation of human capital is exceptionally low; on average, it falls fully 7% lower than the EU-14 average. The spread between some of the worst performers in human capital utilisation – such as Croatia, Poland and Slovakia – and Western Europe's best utilisers of human capital – such as Denmark and the Netherlands – amounts to around 17 percentage points. The inability to integrate this invested human capital into the value-creation cycle is a severe waste of economic development potential in these countries.

The countries making best use of their human capital in this survey are the three Baltic states, the Czech Republic and Slovenia. By contrast, Croatia and Slovakia trail far behind the pack. A key reason for the low human capital utilisation in these countries is their chronically high unemployment rates, which prevents them from developing and adding to their human capital as quickly as countries with full employment (for more on this relationship, see Figure 9 on page 13). But even the leading countries in this survey have little to cheer about: their human capital utilisation levels do not even approach West European averages. Moreover, West European countries are continuously increasing their utilisation, while the trend in most Central and Eastern European countries is stagnation (see Figure 6 on page 11).

The poor record of human capital utilisation is mirrored in many countries by their equally poor record of connecting the citizenship to modern communication technologies. This represents a waste of resources as access to multimedia networks allows more efficient processes to develop. It also makes advanced services and products impossible to disseminate widely. Central and Eastern European countries that lag in this area – such as Bulgaria, Romania and Slovakia – are in danger of falling into a digital divide.

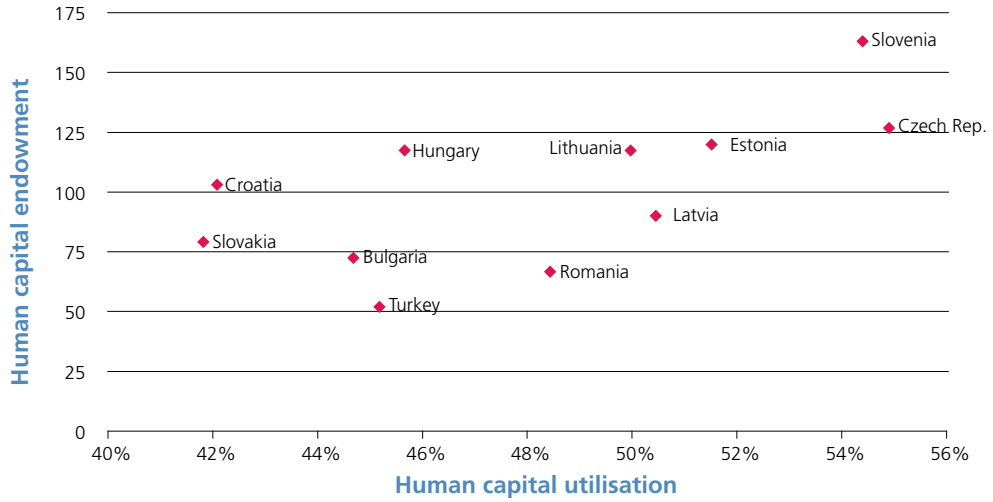
## Table 3: Human capital utilisation ranking

Human capital utilisation as a percentage of human capital stock (2006)

| Rank | Country | Human capital utilisation |
|---|---|---|
| 1 | Czech Republic | 55.2% |
| 2 | Slovenia | 54.8% |
| 3 | Estonia | 52.0% |
| 4 | Latvia | 50.5% |
| 5 | Lithuania | 50.3% |
| 6 | Romania | 48.5% |
| 7 | Hungary | 45.8% |
| 8 | Turkey | 45.8% |
| 9 | Bulgaria | 44.9% |
| 10 | Poland | 44.2% |
| 11 | Croatia | 42.5% |
| 12 | Slovakia | 42.0% |
| | EU-14 average | 54.8% |

## Figure 9: Countries with high levels of human capital endowment often utilise it better, too

Human capital endowment and human capital utilisation (2006)




## Figure 10: High human capital utilisation leads to lower human capital productivity and vice versa, but some countries manage the trade-off better than others

Performance in managing trade-off between human capital utilisation and human capital productivity (2006)

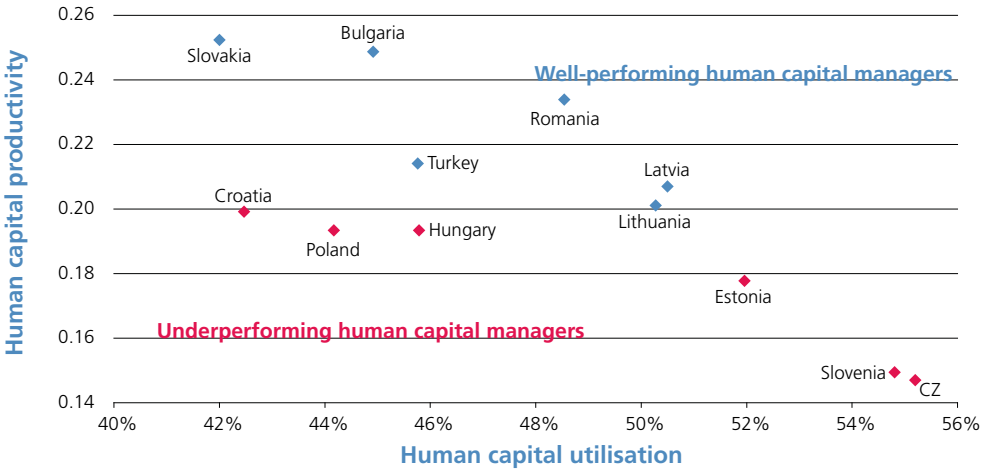





Table 3. Source: Lisbon Council
Figure 9. Source: Lisbon Council
Figure 10. Source: Lisbon Council

Table 4: Human capital productivity ranking
Consumption per human capital employed in dollars, purchasing power adjusted (2006)

| Rank | Country | Human capital productivity |
|---|---|---|
| 1 | Slovakia | 0.25 |
| 2 | Bulgaria | 0.25 |
| 3 | Romania | 0.23 |
| 4 | Turkey | 0.21 |
| 5 | Latvia | 0.21 |
| 6 | Lithuania | 0.20 |
| 7 | Croatia | 0.20 |
| 8 | Poland | 0.19 |
| 9 | Hungary | 0.19 |
| 10 | Estonia | 0.18 |
| 11 | Slovenia | 0.15 |
| 12 | Czech Republic | 0.15 |
| | EU-14 average | 0.14 |

Human capital endowment and human capital utilisation are also intricately related, as is illustrated in Figure 9 on page 13. Countries with higher levels of human capital endowment find it easier to provide jobs and utilise their human capital better, which in turn helps those countries develop even more human capital to deploy. This is a clear indication of the fact that the competitive advantage of Central and Eastern European countries' labour forces is not anymore their low labour costs. Today, they must compete in world markets on the basis of skills, talents and competences.

## III. Human capital productivity

Economic theory typically looks at labour productivity as output per hour worked, which has been increasing at a long-term pace of around 2% per year across most of the industrialised world thanks to ongoing technological change and increasingly available financial capital.[9] For Europe in the 1990s, the growth was 1.95% per year. Various studies show that much of this increase in labour productivity is due to the improved quality of labour – or put differently, that this labour has been endowed with increasing amounts of human capital and therefore became ever more productive.

### Central Europe's fast-growing companies

The Deloitte Technology Fast 500 EMEA Ranking lists the 500 public and private technology, media and telecommunications companies based in Europe, the Middle East and Africa that have achieved the fastest rates of annual revenue growth during the past five years. Six of the countries surveyed in this study come out in the top 20-ranked nations: Turkey at No. 9, Poland at No. 11, Czech Republic at No. 12, Slovakia at No. 13, Russia at No. 14, Hungary at No. 15 and Latvia at No. 16. The fastest growing Central and East European companies both came from within Poland: Blue Media Sp, a software maker which reported 7600% growth over five years (giving it an overall ranking of No. 13 on the Fast 500 list) and Travelplanet.pl, an Internet company with 7400% growth over the same five-year period (giving it the rank of No. 14). Among the top 100, five were Polish Internet, software or semiconductor companies, and two were Czech companies. The top three countries with the highest number of Fast 500 companies per capita were Norway, Israel and Ireland, respectively.

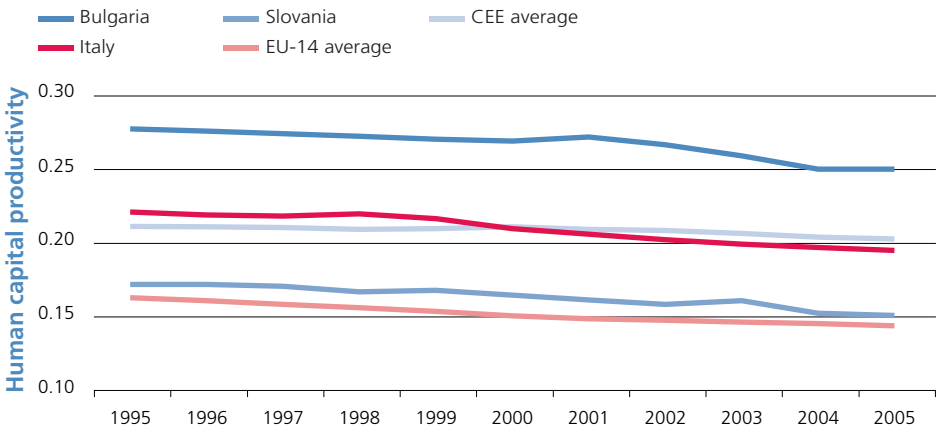


[9] See Robert J. Gordon, NBER Working Paper 7752 (2000): *Interpreting the One Big Wave in US Long-Term Productivity Growth 1870 to 1995;* also Paul Conway et al in Regulation, Competition and Productivity Convergence (Paris: OECD, 2006).

Table 4. Source: Lisbon Council

Figure 11: Human capital productivity is higher in some Central and Eastern European countries than among the EU-14

Consumption share of GDP per employed human capital stock (1995-2005) in dollars, purchasing power adjusted




By contrast, our measure of human capital productivity compares the consumption share of gross domestic product (GDP) to each dollar of human capital invested (adjusted for purchasing power parity). Its growth rate is stable because it effectively incorporates the rate of change in technology.

By this measure, human capital productivity can be influenced in two ways:

1) Raising input efficiency: Improving education and informal learning that provides more readily employable skills for the economy.
2) Improving output efficiency: Increasing the quality of a country's institutional framework to allow factors of production, e.g. human or financial capital, to trade more efficiently within the economy.

As a result, human capital utilisation and human capital productivity are closely linked. The higher a country's human capital utilisation, the more likely that it will have relatively low human capital productivity, a relationship which conforms to the law of diminishing returns as the countries grow more and more prosperous. Nonetheless, some countries manage this trade-off better than others (see Figure 10 on page 13 for a comparison). For the average citizen, what counts is how much wealth he or she can consume – in other words, what is the level of living standard that is available to them? For that reason, we take the consumption share of GDP into consideration when measuring how productive the investment of human capital is.

Among the countries of Central and Eastern Europe, Bulgaria, Romania and Slovakia have the highest human capital productivity, while Czech Republic and Slovenia have the least. This is almost the reverse of the human capital utilisation results. This is due to the fact that human capital deployment suffers from diminishing returns, and thus there is an inherent trade-off between utilising as much human capital as possible and deriving high productivity returns from it. This is one reason why Bulgaria, Romania and Slovakia – while trailing in human capital endowment – do not fare so badly in the overall ranking. By contrast, Croatia and Poland underperform in the trade-off between utilisation and productivity, meaning they get relatively poor results across the board with the human capital that they have. This helps to drag those two countries' standing down to the bottom of the ranking.

The rate of R&D expenditure in an economy is also indicative of the deployment rate of technology – and thus of the opportunities for fully exploiting the productivity potential of human capital. By this measure, most



Figure 11. Source: Lisbon Council

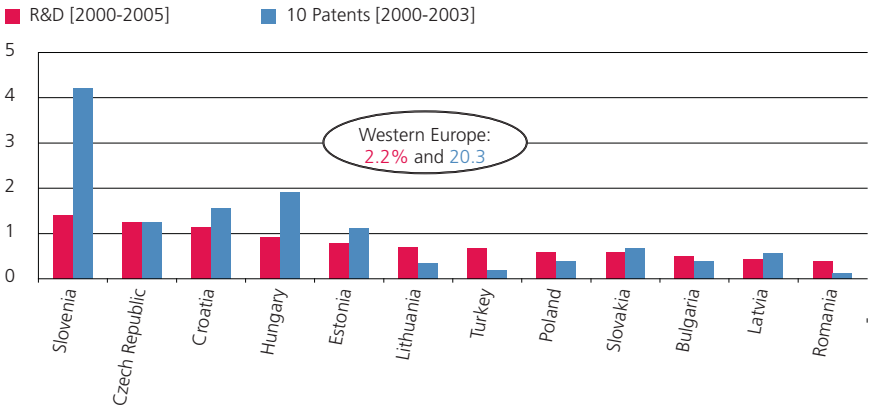
## Table 5: Human capital demography ranking

Projected change in employed people (2005-2035) absolute percentage change

| Rank | Country | Projected change 2005-2035 |
|---|---|---|
| 1 | Turkey | 37.3% |
| 2 | Slovakia | -13.0% |
| 3 | Poland | -13.3% |
| 4 | Croatia | -14.6% |
| 5 | Lithuania | -15.0% |
| 6 | Hungary | -15.2% |
| 7 | Czech Republic | -15.5% |
| 8 | Estonia | -16.0% |
| 9 | Romania | -16.0% |
| 10 | Slovenia | -16.8% |
| 11 | Latvia | -19.4% |
| 12 | Bulgaria | -26.1% |
| | EU-14 average | -9.9% |

## Figure 12: Central and Eastern European countries must increase investment in R&D and science

R&D expenditure and patent applications in percentage of GDP (2000-2005) and 10 patents per one million inhabitants (2000-2003)




## Figure 13: Only thanks to Turkey will the working population of Europe grow slightly over the next 30 years

Projection of working age population (2005-2035)

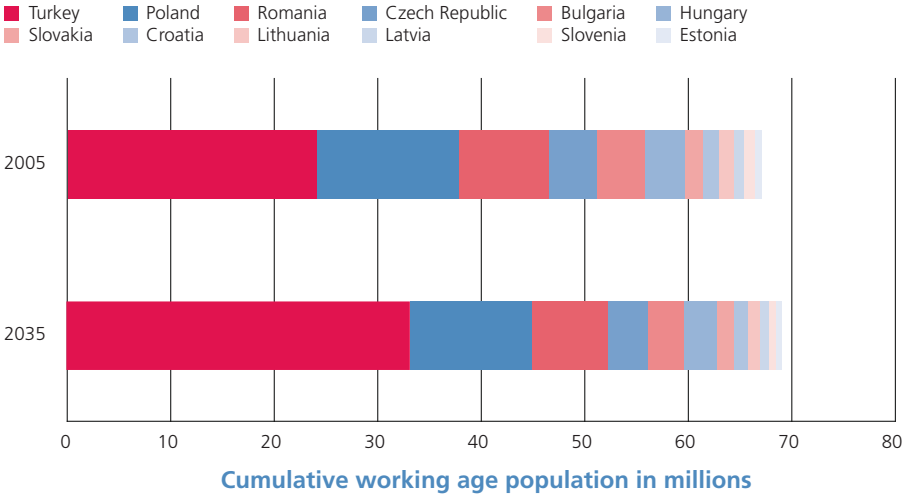





Table 5. Source: Lisbon Council
Figure 12. Source: Eurostat
Figure 13. Source: Lisbon Council

'A realistic opportunity for Europe, and in particular for Central and Eastern Europe, to compensate for its demographic shortfall is to enter into a close partnership with Turkey.'

Central and Eastern European countries are lagging far behind their European peers. As an urgent matter, they need to identify approaches to increase the knowledge and research intensity of their economies. Otherwise they risk not being able to close the technology and economic productivity gap they face with Western Europe – and with much of the rest of the world. For more on Central and Eastern Europe's relative standing in R&D spending, see Figure 12 on page 16.

## IV. Human capital demography

Human capital demography looks at existing economic, demographic and migration trends to estimate the number of people who will be employed (or not employed) in the year 2035 in each country. While human capital endowment describes the various types of education received by an average employed person in a particular country, human capital demography looks at how many citizens and potential workforce participants there will actually be in these countries and how old those people will be.

Central and Eastern European countries suffer from a double handicap in their demographic outlook:

1) All of the countries surveyed (with the exception of Turkey) have very low birth rates; in fact theirs are among the lowest birth rates in all of Europe;
2) Short of attractive employment opportunities at home, many people with easily mobile skills leave the country and deploy their human capital elsewhere.

Figure 13 on page 16 illustrates how demographic forces are reshaping Europe. The Central European and Baltic nations who today make up 20% of the European

### Emigration to Ireland and Sweden

When 10 Central and Eastern European countries became member states of the EU in 2004, only Ireland, Sweden and the UK agreed to provide immediate full access to their labour markets for emigrants from these countries. The experience in Ireland and Sweden with these flows is remarkably different. Immigration into Sweden has averaged around 60,000 people per year since 1987. Historically around two-thirds of these have been from outside the EU, with the remainder split between Swedish returnees and emigrants from other EU countries. Emigrants from Central and Eastern Europe used to be five percent of the total, but the figure rose to nine percent after 2005. The three most popular industries for Central and Eastern European workers in Sweden are manufacturing, trade/communications and health care. Meanwhile, immigration into Ireland has risen to 60,000 people per year, up from around 20,000 people per year in 1987. Most of the rise since the year 2001 – and especially since 2005 – can be attributed to emigrants from Central and Eastern European countries, amounting to 26,000 net immigrants to Ireland in 2005. The three most popular destination industries are production industries, construction and hotels/restaurants.

‘No country in Central and Eastern Europe can afford to leave any of its citizens behind.’

work force, will in 2050 only represent 16%. In the meantime, Turkey which today has 13% of the European workforce, will in 2050 have 19% of Europe’s eligible workers. The other region to lose demographic significance will be the Mediterranean, whose share will drop from 25% to 21% and Germany falling from 14% to 13%. UK/Ireland, France and Scandinavia will each gain up to 12%, 11% and 5%, respectively. Continent-wide the workforce will shrink from 319 million working age to 274 million working age citizens, an overall drop of 14%. The scramble for the hearts and minds of the skilled is about to begin.

In most Central European countries, the working age population is forecast to shrink by around 15%; in Bulgaria, it is projected to shrink by 26%. It will be difficult for these countries to reverse this decline, since the mothers who could have given birth to more children have themselves not been born. Furthermore, it is unlikely that these countries are interesting immigration destinations. Central and Eastern European countries are therefore already sharing the fate of Germany, Italy and Spain of having to extend retirement ages closer to 70 years old if they want to maintain their living standard in the long term, let alone increase it.

A realistic opportunity for Europe, and in particular for Central and Eastern Europe, to compensate for its demographic shortfall is to enter into a close partnership with Turkey – as it is the only country near or far that has a strongly rising population in combination with espousing and sharing many elements of European culture and history. The often feared size and cultural distance of this large nation are in fact one of the best opportunities for economic growth, cultural diversity, creativity, and generational youth from which European nations would greatly benefit.

## Conclusions and policy recommendations

Human capital is an organic entity, made up of a wide variety of components. At its core are basic issues such as access to education, workforce participation and demography – areas which are affected by widely and broadly different policy areas. Using the European Human Capital Index methodology as a guide, this section puts forward concrete policy recommendations that could help Central and Eastern European countries better develop and deploy their human capital.

### 1) Improve public investment in education and skills

Some Central and Eastern European countries have successfully revamped their secondary and tertiary education systems and are reaping the rewards in terms of higher educational quality for their young generations. However, for those countries that are lagging behind, they have no time to lose to redress their shortcomings in that area. Beyond educating the young generations, it is equally necessary and mandatory not to give up on the 35 year olds and older – for them too, even if they

‘Central and Eastern European countries have investment rates in technology development and knowledge creation that are much too low.’

are already in their mid 50s, ways must be found to invest in and upgrade their skills and competencies to integrate them more fully into the work and social reality of the 21st century.

**2) Leave no socio-demographic group behind**

The reasons for the poor utilisation rates differ a lot per country – but are typically the result of high unemployment, overly protected segments of the labour market, early retirement due to lack of employable skills and excessive factor costs for a given level of productivity. Whatever the reasons are, no country in Central and Eastern Europe can afford to leave any of its citizens behind. The low birth rate, and the brain drain that has already occurred, make it mandatory to expend every possible effort to integrate everybody into modern labour markets and society. Any worker younger than 65 is far too young to be ignored or given up on – and their human capital is far too precious to Central and Eastern European countries for them to be simply retired early. Besides creating incentives for mid- and late-life education, particular attention should be given to providing multimedia access to this generation via the Internet as this is the main conduit for knowledge dissemination in the 21st century.

**3) Link the economy to the knowledge networks of the world**

Central and Eastern European countries have investment rates in technology development and knowledge creation that are much too low. In order

**Scanbalt: A competence cluster in life sciences around the Baltic**

Networks of networks are tying European regions into competence clusters that are transcending national borders. These networks are an important entry point and conduit for regional knowledge centres to link themselves into the global pace of technology progress. Scanbalt is such a network of networks in life sciences and biotechnology in the Baltic Sea Region with vibrant participation from Eastern Europe. It facilitates and coordinates the work of all initiatives and networks to promote internal collaboration, cooperation and development within the Nordic-Baltic area enabling the region to compete with other global biotech and life science clusters, sharpen the region’s competitive edge towards global markets, and fulfil the region’s great potential as one of Europe’s leading biotech megaclusters. The region boasts more than 60 universities and over 1000 life sciences or biotech companies. There are 24 regional bio-networks established in the region with nearly 40,000 employees and 1,920 PhD’s in biotech companies. Members from Eastern Europe in Scanbalt are the Estonian Biotechnology Association, Biomobil in Polish Gdansk, Sunrise Valley in Lithuania, and the Genome Database Project of the Latvian Population.

‘Central and Eastern European countries need for their markets, their labour forces and their societies to be closely linked and integrated with the more populous and wealthier markets of the West.’

to jumpstart this process, governments should be creative. They must support the participation of their universities, research institutions and R&D departments of their companies in any sort of technology and research networks that are being created around Europe and in the world. For an example of a success story in this area, see the box on Scanbalt on page 19.

4) **Prepare for the ageing society**
Poor demographic prospects make it nearly inevitable for every Central and Eastern European country to deal with a rapidly ageing society (among the surveyed countries, Turkey is a notable exception). If preparations are undertaken now, then the impact of this demographic shift – which will see the starkest and most precipitous drop in the percentage of working people in the European population since the Black Death in the Middle Ages – may be lessened, or even be reversed. However, ignoring the problem will not make it go away. The key levers here are to adjust retirement schemes towards late exit, and to promote work in sectors where older aged employees can be cost and value competitive in the global environment.

## Whither Central and Eastern Europe?

The various human capital challenges of Central and Eastern European countries are not a matter which those countries can solve on their own. Investing in human capital endowment, raising human capital utilisation, promoting human capital productivity and finding solutions to the demographic gap will require a pan-European mandate, if Central and Eastern Europe are to continue the path of development on which they have begun.

This is not only for reasons of solidarity with Central and Eastern Europe because of its past. To the contrary, Europe must take a leading role in the process because it wants and needs strong and vibrant member nations in what constitutes the European Union. The next 20 years will be a critical juncture in the history of this continent. They will determine whether the integration of Europe’s economic system, its socio-political fabric, and the peaceful respect for preservation of local custom and tradition can be cemented for good – or whether the forces of difference will make these nations drift apart again.

Since the fall of the Iron Curtain, Central and Eastern European countries have essentially completed the political and economic transition towards pluralistic, market-oriented and self-confident nationhood. But today the challenges are different. More than EU budgetary funds, Central and Eastern European countries need for their markets, their labour forces and their societies to be closely linked and integrated with the more populous and wealthier markets of the West, and in fact with the rest of the world. There is only one way to stem the tide of brain drain from the region, which is to encourage capital of all kinds to flow freely and thus to encourage

‘Human capital is an organic entity made up of a wide variety of components. At its core are basic issues such as access to education, workforce participation and demography – areas which are affected by widely and broadly different policy areas.’

companies and entrepreneurs to create and develop jobs that are relevant to the world economy and fit the local profile right at home. In the meantime, policy makers, businesses and citizens should focus on developing and raising their human capital in ways that will make it easier for businesses to offer ever higher value-added products at ever more competitive prices – and thereby unleash the power of innovation to raise living standards and create even more jobs. The EU should also continue helping poorer countries catch up with the richer ones. Its assistance is an important part of the process, and will continue to play a vital role in the months and years to come.

The reward for successful achievement of this vision will be full participation in the 21st century global economy and access to the wonders of products and services which advanced technologies are serving up – such as quality-of-life improving health care, amenities in housing and transport, quality of food and vacationing options. Innovation works both ways – it creates more wealth, and it creates new goods and services on which this wealth can be spent. The flip side of this is that for those countries that tire out in the race towards more prosperity, the innovations of the future will not be readily available.

When looking at the human capital investment and deployment rates in Central and Eastern European countries, what is at stake is the question of whether these countries will be prosperous, sustainable and socially-cohesive societies in a position to take full advantage of the comforts of modern life – or whether they will condemn future generations to economic and social stagnation, resulting in an ever lower standard of living that will continue falling relative to the rest of the world. It’s a challenge for Western Europe as well, and one that we are best off facing together.

## A Note on Methodology

Since the 2006 edition of European Human Capital Index, two methodological changes have been introduced. First, the currency now used is the dollar, adjusted for purchasing power parity. Second, past human capital investment is now calculated at replacement cost, rather than at historical cost. Both of these changes were introduced to facilitate global comparability of the data. We are grateful for the many comments we received on the methodology after the first edition, and in particular to participants of the INES B network of the OECD's education department, who made many useful suggestions.

The analytical model deployed in this paper measures human capital in terms of the cost of its creation. Formal education can be measured directly in terms of the expenditures incurred – but informal education can only be indirectly inferred, in terms of the opportunity cost to the parent or the adult who is engaging in informal education. This is done by assuming an opportunity cost for the time spent corresponding to the average net salary per hour received in that country in that time.

As in the previous edition, all data sources for modelling human capital trends have been derived from international data sources such as Eurostat, ILO or OECD. Within the 12 countries analysed, data comparability is a significant problem. European data collection only began to be harmonized in the 1990s, and the process is still continuing. For instance, no officially agreed common definition of historical GDP for European countries exist for the time before 1995. The data for expenditures for schooling, universities, time usage and employment patterns all suffer from various compatibility issues. The European Human Capital Index was built on the best data available.

The human capital endowment referred to in this paper is the sum total of investment in five types of human capital development, including not only formal education but also, quite prominently, informal education of both children and adults. Each component is measured either in terms of direct expenditures or in terms of opportunity cost:

1) Parental education is measured in opportunity cost (lost wages) to the parent. This is especially high in the early years before formal schooling but continues until the children leave home. This type of education consists of essential cultural skills like speaking, trust, empathy, languages, taking responsibility, etc.
2) School education ranges from early childcare in formal settings such as kindergarten through primary and secondary school and consists of general skills such as reading, writing, quantitative reasoning, self-management and basic factual knowledge relevant to the economic participation in society. It is measured with an algorithm taking into account the output quality of education as measured by international

'The reward for successful achievement of this vision will be full participation in the 21st century global economy and access to the wonders of products and services which advanced technologies are serving up.'

comparative surveys related to the cost of providing this education.

3) Investments in higher education refer to university and other tertiary education that is measured in terms of input cost at the university, and the opportunity earnings of the student. It consists of the acquisition of sector-specific knowledge and skills that enable the student to participate in the discourse and mode of thinking of the chosen career.
4) Adult education is the formal and informal learning by adults and includes activities such as employer-sponsored management courses or the learning of a new software programme on one's own time. It is measured primarily in opportunity cost of lost wages. Unfortunately, transparency of this kind of human capital investment is much lower than for the categories listed above although a number of empirical studies exist.
5) Finally, adults re-invest in human capital when they perform their work. Every new technology, every new market requires investment into skills that may later produce returns. This type of human capital is also measured in opportunity cost.

The five component types of human capital differ in their respective longevity. Whereas the skills learnt as a child at home and in school can last a lifetime, those learnt on the job may become irrelevant after only a few years. As with every investment, the cost of investment must therefore be depreciated over time. Depreciation can occur in two ways: Either the skill has been forgotten over time, or it has become obsolete. In either case, its economic value has disappeared. The depreciation rates utilised in this analysis differ by the type of investment and are derived from empirically observed patterns of either forgetting skills, or the speed at which skills become obsolete in different industrial sectors. The maximum depreciation rates are respectively: 0%, 30%, 67%, 67% and 50%. Depreciation periods for parental education, school education, tertiary education, adult education and learning on the job are respectively: na, 30y, 20y, 10y and 10y.

For more on the methodology, contact Peer Ederer at peer.ederer@lisboncouncil.net.

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