

HUMAN CAPITAL AND DEVELOPMENT: SOME EVIDENCE FROM EASTERN EUROPE

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The concept of development is not only referred to the level or to the growth rate of GDP of a country, but it concerns different aspects of individual life. Development leads to a changing of values, behaviours and attitudes of people interested in it and in the well-being of the whole society.

Since the second part of the last century, more and more economists always assert that human capital is a fundamental asset to promote economic growth and development. Health and education are the two principal ingredients of human capital. There is a strong positive bidirectional relationship between education and health; in fact, it is statistically supported that the two variables move together, so healthy people are more likely to achieve a higher level of education rather than sick people and, vice-versa, more educated people are more likely to enjoy good health status. This generates a virtuous cycle that can lead to greater development. Indeed, health increases people's capabilities allowing achievement in their well-beings, since healthy people can work longer and with higher productivity than poor health people. For this reason individuals' income rises allowing them major choices in terms of consumption, savings and investments. Considering the economic benefits that start from health and education, not only at microeconomic level but also for a country, it is important to pay attention to the role of this two variables in the economic development process. There are several channels through which health and education can be associated with better enhancement in economic results. They can be found in the labour market and in the participation in the labour market; worker productivity; human capital investments; saving capacity; availability of save to invest in physical and intellectual capital; fertility choices and structure of population.

The present paper analyzes the two-way linkage between education and health and their relationship with economic development identifying the conditions of some Eastern European countries. The methodology through which the results are obtained is the multidimensional scaling method which allows to define relations between countries in terms of proximity/distance with respect to the considered indicators, providing a spatial representation of them.

Keywords: human capital, education, health, economic development, multidimensional scaling.

JEL code: I15, O15, P46

1. Introduction

Increasing attention is been paid by researchers to the discussion on what are the principal determinants of economic growth but first of all on what are the most important drivers to achieve a growing level of development.

There are two different approaches to development. On one hand there is the income-centered approach that asserts that investments in human capital, including health and education, have to be promoted if the rate of return of the investment exceeds the capital

cost. On the other hand there is the capabilities approach (Sen: 1999) that argues that the enhancements of people's ability to read and write, or to be well-nourished and healthy, have to be encouraged even if the conventionally measured economic return to investment in literacy, or improved food intake and health care, is zero (Anand and Ravallion: 1993). This second approach is supported by the greater part of the literature on economic development that claims that investments in human capital are the main instrument to promote it. This evidence is concentrated on the role of health and education, and especially on the strong two-way link that occurs between these two determinants of human capital and why it is so important for development.

The major objective of this work is to examine the existence of relations among indicators of economic development, education and health in some Eastern European countries, with the aim of producing a clustering of them in terms of proximity/distance with respect to the examined indicators. The paper starts with a brief overview of the relevant literature on the topic of human capital and economic development (see par. 2). In the second section, it is provided a data analysis using a Multidimensional Scaling methodology, in order to identify groups of countries that show similar characteristics in relation to the chosen indicators (see par. 3). At the end, some brief concluding remarks, that summarize the results achieved by the analysis, are given (see par. 4).

2. Literature overview

The interest of economists towards non-economic dimensions of economic growth (such as education and health) becomes strong since the Sixties of the last century, when some researchers have noticed, contrary to what they believed, that economic growth was not only dependent on economic and quantitative factors, but it was also due to more complex and intangible factors, the first of which is human capital. As a form of human capital, health is increasingly considered as the driver of economic growth, of development and poverty reduction. Health is defined more generally as the income that can be received if you have the ability to employ your time at work rather than in care in case of illness. Grossman (1972) claims that health is viewed not only as a consumer good but also as an investment good and for this reason an investment in human capital and an output of household production processes. In fact, Grossman, who provided the first formal contribution to the objective study of the determinants of individual health status, argues that it is possible to observe a positive relationship between education and health; in particular, he supports the explanation of the link between education and health which claims that education has a positive impact on the likelihood of enjoying a good health because it increases the production of health technology, altering both productive efficiency and allocative efficiency. In addition, more educated people are more aware in terms of adopting prudent use of medical care, healthy responsible behaviours and conscience in the choice of work. In the same way, people that enjoy good health conditions are more interested to invest in education because they have greater cognitive capabilities that allow them to achieve good results. Furthermore, they have more time to spend in study rather than in care in case of illness. So, more educated people have great probability to have a good health status and to be more productive contributing to economic development of one nation.

The importance of education and health for the economic growth and development is due to the returns from investments in the two variables. These are two forms of human capital, the improvement of which should enhance worker's productivity. Several studies show that better health, special early in life, is associated with higher educational attainment. Conti et al. (2010) argue that more educated individuals, in turn, have better health later in life and better market prospects. According to the authors, education has an important causal effect in explaining differences in many adult outcomes and health behaviours (Conti, Heckman and Urzua: 2010).

An improvement of living conditions of an individual, and therefore an increase in the level of health, has effects both at a microeconomic level, thereby improving his welfare and that of the

communities in which he lives, and also at a macroeconomic level, allowing a further development of a country. The micro-level evidences are those that support the contribution of health on economic outcomes, like as wages and earnings, amount of hours worked, labour force participation and so on, analyzing for example the link between nutrition and productivity. Fogel (1997), in his analysis on distribution of the height and weight and on food supply and calorie intake across the population in Great Britain and France, estimates that improvements in health and nutrition contribute to about one-third of income growth in Great Britain between 1790 and 1980. The macro evidences concern the effect of population health on economic growth. However, the effects are different and they depend on the initial level of income. For example, Bhargava et al. (2001) believe that a better health is more important for wages, economic indicator of workers' productivity, in low-income countries than in high income ones. Indeed, in low and middle income countries a 1% increase in survival rate in adulthood is positively associated with the increase of 0.05% in the rate of economic growth, while above a certain income the adult survival rate has a negligible effect and in some cases a negative growth rate. Also Weil (2007) suggests that the positive effect of health on GDP is stronger among poor countries.

3. Data, methodology and results

To reach our purpose, which consists in identifying conditions of some Eastern European countries with respect to economic development, health and education, in testing the existence of correlations between the different aspects and in providing a classification of countries, we use the multidimensional scaling method.

Multidimensional scaling is a useful tool through which it is possible to produce a graphical representation of a pattern of objects, in this case the twelve Eastern European countries, based on the degree of similarity/dissimilarity between them.

The goal is to provide a representative map that best approximates the distances observed between countries, concerning economic development, health and education.

This statistical method attempts to build a configuration of the various entities, merged in a small number of dimensions. This is done by defining relations between countries in terms of proximity/distance with respect to the considered indicators. The resulting positioning map has the property to partition the countries into homogeneous groups, so as that the degree of association between two countries is maximal if they belong to the same group and minimal otherwise.

We considered a matrix of twelve Eastern European countries and nine indicators, representing three sets of variables: economic development, education and health. In particular, we have selected three indicators for each topic (Table no 1).

Data refer to the most recent period of five years for which we can find available data; specifically, the considered period usually runs from 2005 to 2009. In the analysis, we use the average value of each indicator over the considered period for each country (Table no 1).

Table 1. Data set

	GDP per capita (current US\$) (a)	Exports of goods and services (% of GDP) (a)	Unemployment (% of total labor force) (a)	Public spending on education (% of government expenditure) (b)	Pupil-teacher ratio, primary (c)	School enrollment, tertiary (% gross) (c)	Health expenditure (% of GDP) (a)	Life expectancy at birth (years) (a)	Mortality rate, infant (per 1000 live births) (a)
Bulgaria	5353,2	53,5	7,7	9,3	16,1	46,2	7,0	72,8	9,7

Cyprus	27480,2	47,6	4,6	13,4	16,4	36,3	6,1	79,6	3,6
Czech Republic	16356,2	75,1	6,3	9,9	17,1	50,8	7,1	76,6	3,1
Estonia	14081,0	75,4	7,5	14,7	11,9	65,0	5,7	73,3	5,0
Hungary	12843,9	76,2	8,0	11,0	10,3	64,4	7,7	73,3	5,7
Latvia	10975,5	43,8	9,3	14,2	12,0	72,8	6,3	71,7	7,7
Lithuania	10645,7	57,7	7,5	14,8	13,7	75,8	6,3	71,6	5,9
Malta	17758,8	82,5	6,7	12,7	13,6	30,7	7,8	79,4	5,8
Poland	10641,8	39,4	11,3	12,1	10,8	65,5	6,6	75,3	6,0
Romania	6981,8	31,5	6,7	11,5	16,7	52,3	5,3	72,5	12,6
Slovak Republic	14836,1	86,0	12,4	10,6	16,9	44,9	7,7	74,4	6,3
Slovenia	22272,4	65,0	5,5	12,6	16,1	81,4	8,4	78,4	2,9

Source: World Bank. (a) Average values refer to the period from 2005 to 2009. (b) Average values refer to the period from 2003 to 2007. (c) Average values refer to the period from 2004 to 2008.

The model's goodness of fit was assessed via the RSQ (0.89), that indicates the proportion of variability explained by the corresponding dissimilarity distances, and the Stress Index (0.14). As a general rule, results are found to be robust when the size k achieves an Stress Index value lower than 0,15. A two-dimensional model was judged to be acceptable according to the values of the Stress Index. Further investigation provided additional basis for choosing the two-dimensional solution: the "elbow" rule suggests to choose the number of dimensions in correspondence to where the diagram yields an "elbow", beyond which the broken line flattens (Fig. no 1).

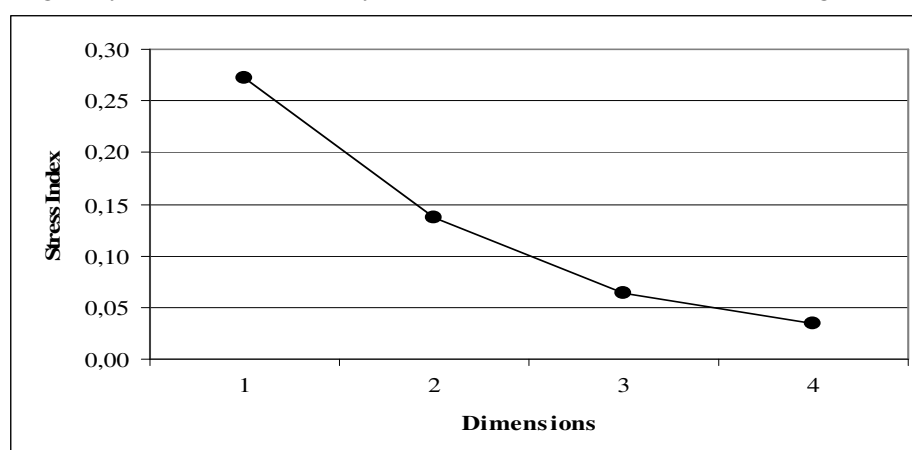


Figure 1. Scree plot

The correlations between dimensions and variables (Table no 2) were useful for naming the axes. The resulting two-dimensional image is shown in Fig. no 2. The horizontal axis represents the variables concerning economic and health indicators (so named Human Development); the vertical one is related to education indicators (so named Education Development).

Table 2. Correlations between variables and dimensions

Variables	Dimension 1	Dimension 2
GDP per capita (current US\$)	0,89	
Exports of goods and services (% of GDP)	0,54	
Unemployment (% of total labor force)		
Public spending on education (% of government expenditure)		0,85

Pupil-teacher ratio, primary	-0,63
School enrolment, tertiary (% gross)	0,50
Health expenditure (% of GDP)	0,63
Life expectancy at birth, total (years)	0,90
Mortality rate, infant (per 1000 live births)	-0,78

Through the multidimensional scaling method we summarize the nine considered indicators by only two dimensions. Specifically, in such a way we are able to obtain a graphical representation of the twelve Eastern European countries object of study, based on the degree of similarity/dissimilarity between them with respect to the value that they assume for the two considered dimensions. Countries are classified into different groups, which are more homogeneous into them and more heterogeneous among them (Fig. no 2).

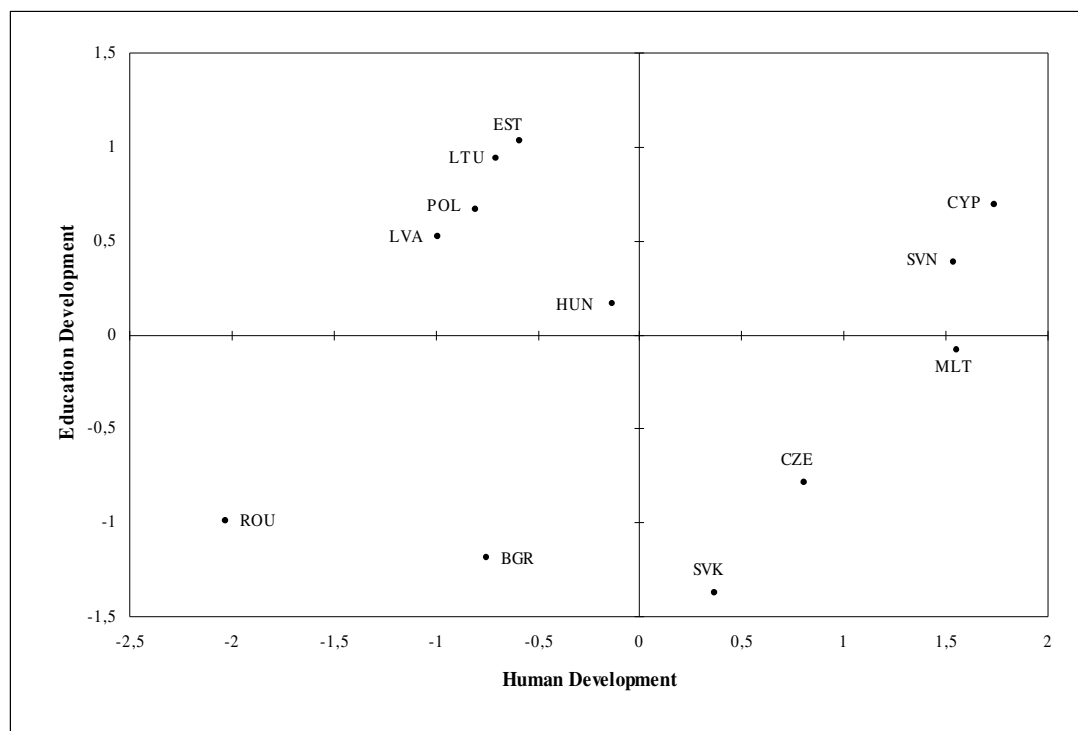


Figure 2. Cluster of countries in a two-dimensional space

Exactly, looking at Fig. no 2, we can see that countries that show a better status related to education, health and economic condition are positioned in the first quadrant (Slovenia and Cyprus). Countries that are located in the third quadrant are those having a lower level of education, health and economic condition (Romania and Bulgaria).

The Baltic Countries, Poland and Hungary show satisfactory level of educational development, but low levels of human development. Finally, Czech Republic and Slovak Republic show relatively high level of human development, but low level with respect to the educational indicators.

4. Conclusions

Human capital is one of the most discussed topics in economics. The initial hypothesis that moves the aim of the present paper is that the two principal components of human capital,

education and health, have a positive impact on economic growth and development. Therefore, in this preliminary analysis on some Eastern European countries, we adopt the multidimensional scaling method that allows us to summarize the nine indicators about the levels of education, health and economic conditions in only two dimensions that we named Education Development and Human Development. In such a way, we have made an attempt to identify how the chosen Eastern European countries are positioned with respect to the two important dimensions. The results suggest a partition of countries in four clear groups, across which particularly Slovenia and Cyprus could be identified as benchmark for the others. It is important to underline that this analysis represents a preliminary analysis and it needs further examinations.

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