

The Contribution of Education to the Economic Development Process of the States

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The study on the contribution of education to economic development process measured by GDP per capita reveals that one of the main factors of influence is the training level of the human factor. Through statistical methods and econometric models, we analyzed the influence of education spending on gross domestic product level. Likewise, the study highlights also the issue of correlation between education spending and employment levels. At the end of the scientific approach, the authors analyze the dependence of education - human development - GDP per capita.

Keywords: education, economic development, education expenses.

JEL classification: Co, C1, I2, I25

Introduction

The education as an essential activity in the development of a society has undergone major mutations that establish themselves in new methods and models of modern education. In the society of the future the education will have an essential role in creating a new lifestyle specific for a society based on knowledge and learning.

In the present context, we considered necessary to study the influence of education on economic growth whereas the link between the two is obvious: the role of education in economic development increases and the quality of the

education system depends on the level of development of the country.

During the research we have studied and applied statistical methods and econometric models. With their help we have got, following the calculations, results on the manner in which the expenses regarding the action in the field of education influence GDP level and we interpreted the obtained results with caution. We also calculated and analyzed the dependence between GDP / capita and level of education.

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We analyzed the dependence of education - human development - GDP / capita and based on the results obtained we showed that both the variants have a statistically significant impact on human development.

Literature review

According to economists, Korca (2000), "Education as an essential activity in the development of a society has undergone major changes that establish themselves in new methods and models of modern education".

Another author, Amartya Sen (2002), say:” Development occurs when people are able to accumulate something that can make their life more valuable”

But we all know that development is the fundamental element of economic progress. Growth economic development is and an instrument for achieving the Millennium Development Goals whereas:

- it leads to poverty reduction through increased investment in specific human development activities;
- it leads to increased revenues enabling the implementation of policies in the field of human development.

In this regard, relevant is the statement of Michael Porter (1999) *“one of the growth engines is the business success, because at the level of the individual business the wealth is created, the products are created, the services are provided, the productivity increases and the wealth arises. Without business there will be no economic progress, there will be no human progress.”*

One of specialists in education, Jacques Hallak(1990), asserts that *“education is a human right because it leads to individual creativity, increases the participation in the economic, social, cultural activity in society, contributing as such effectively to the human development”*.

The authors, Tau Ming (1996) have pointed out that macroeconomic marginal impact on different levels of education varies greatly depending on the level of development of that country.

In their work Hanushek and Kimko (2000), analyzed the effect of education quality on economic growth, identifying that ”quality effect is much greater than that of the quantity of education, theory later confirmed by other authors”.

Description of the models and variables used in the regression model

In the scientific approach the authors took into account that the length of time series (number of observations), meets only in a certain measure the theoretical requirements due to lack of concrete data determined by the change of education funding in the years 1991-1992; therefore, we believe that the results are useful for understanding the role of education for the increase of GDP per capita.

The experts in economics: Capanu, Wagner, Secăreanu (1997) state

that “the option for an index of prices by which the nominal terms afferent to the variables should be deflated, must start from the content of the component elements of the terms of the series of the variables values, namely in the what the monetary expressions are materialized.” In this context, the statement that “*GDP consists of consumer goods and capital goods*” is totally true. In its turn the price index by which the nominal final production is deflated is the GDP deflator or the GDP price index. This index is a Paasche type index.

”The degree of development of a society depends to a large extent on the educational expenditure”, Câmpeanu, Chirilă, Manolică (2012).

The education related expenses represent money expressions meant to cover a portion of the expenses involved in carrying on this activity, which ultimately are intended mainly for consumption (mainly salaries). Another portion of the expenses allocated for education are meant for this segment of activity to be provided with capital goods.

Based on the destination of these expenses we opted, with a view the education related nominal expenditures to being deflated, for gross domestic product deflator. With respect to the collinearity of the factorial variables, respectively the expenditures allocated to primary, secondary and tertiary education, we assert that the collinearity is normal, because the size of spending allocated to a segment limits the size of the other segments. Aware of this situation, we recommend caution in drawing conclusions on the interdependence of these variables and GDP per capita.

Empirical data regarding higher education expenses (factorial variable) and real gross domestic product (outcome variable) confirmed that a lag exists between the cause (higher education expenses) and the effect occurrence. According to the cross correlations between higher education expenses and the real GDP, and the higher education expenses the highest correlation coefficients are recorded in the event that lags of at least 3-4 years are used.

This means that the effects of higher education expenditure (gross domestic product increase) begin to emerge with a delay of at least 4 years. Thus, the cross-correlation coefficients between real GDP and higher education expenditure have the following representation:

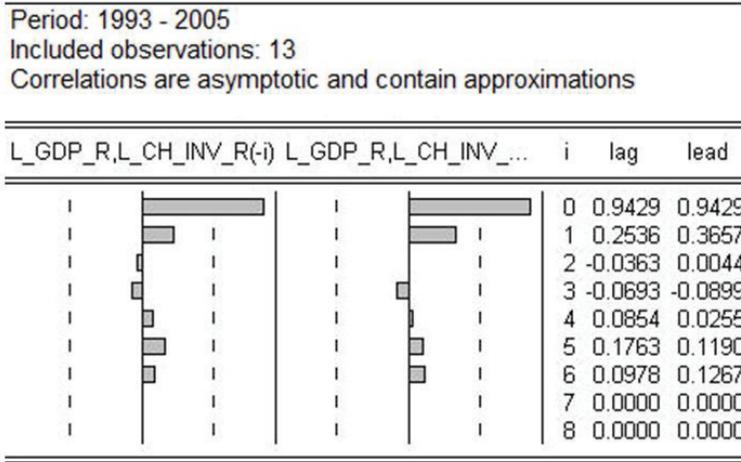


Figure 1: Coefficients cross correlation between real GDP and expenditures (in real terms) for education

The results regarding the intensity of the correlation must be interpreted with caution because of the length of the series available for the two variables.

From the analysis of cross correlation coefficients between the real GDP and expenditures (in real terms) for education the following representation results (Figure 2).

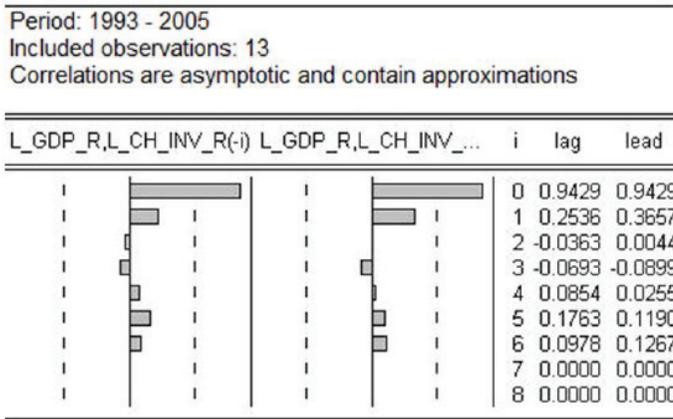


Figure 2: Coefficients cross correlation between real GDP and expenditures (in real terms) for education

The correlation analysis (Figure 2) has confirmed that between the two variables there is a mutual correlation: GDP change is accompanied, as a rule, by changes in education spending. The gap in the case of the correlation between education spending (Y) and real GDP (X) is of 1-2 years

The mutual dependence must be considered “normal” because the amount with which the “educational” activity contributes to GDP is represented at least partially, by the amount of the education expenses.

As with other activities that produce public goods, the final production is not determined starting from the activity „output” but from the related “input”.

In the study we have also included the issue of correlation between education spending and employment levels.

Thus, the empirical data on unemployment rates and the education spending confirm that the level and evolution of the unemployment rate are influenced by the education expenses (figure 3).

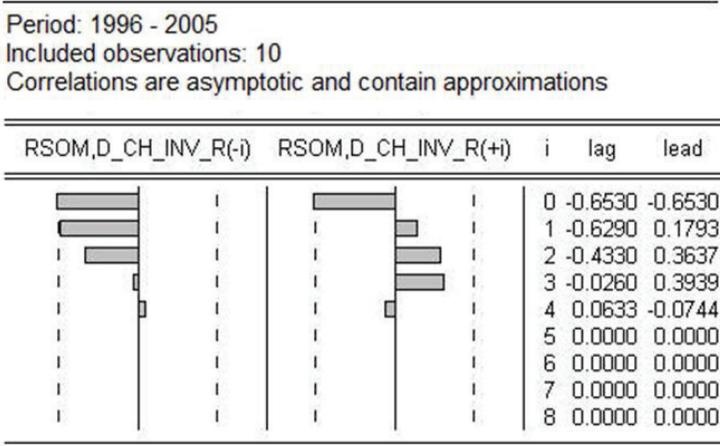


Figure 3: Cross-correlation coefficients between the unemployment rate and expenses (in real terms) in education

Similar results are obtained by calculating the unemployment regression rate depending on the education expenses developments (regression that is presented in table 1). The calculation method used is the method of the least squares.

Table 1: Unemployment rate calculation of the costs of education

Dependent variable: RSOM				
Method: Least squares				
Adjusted sample: 1996 – 2005				
Included observations: 10 after adjustments				
Variable	Coefficient	Margin of error	Statistical t-test	Prob.
D_CH_INV_R	-8.195568	3.269244	-2.506870	0.0406
D_CH_INV_R(-1)	-11.61832	2.945669	-3.944204	0.0056
C	9.462441	0.295051	32.07049	0.0000
R square	0.821996	Main dependent variable		8.700000
Adjusted R square	0.771138	Secondary dependent variable		1.735896
Standard error of regression	0.830444	Akaike information criterion related		2.709613
Residual sum of squares	4.827463	Crieteriul Schwarz		2.800388
Log likelihood	-10.54806	F statistic		16.16250
Durbin-Watson statistic	1.171242	Sample of F statistic		0.002380

The data presented highlights the fact that the increase of education spending is accompanied by reduction in the unemployment rate over the next two years. Starting from the fact that the influence of education level on GDP per capita is different, we analyzed the dependence of GDP per capita on the level of education: primary education (X_1), secondary education (X_2) and tertiary education (X_3). Correlation coefficients of the four series are shown in the table below.

Table 2: Dependence between GDP per capita and literacy

	GDP per capita	Primary studies	Secondary studies	Tertiary Education
GDP per capita	1.00	0.90	0.93	0.78
Primary studies	0.90	1.00	0.94	0.76

Secondary studies	0.93	0.94	1.00	0.78
Tertiary Education	0.78	0.76	0.78	1.00

The model that describes the interdependence between GDP per capita and the three factorial variables is the linear function.

Thus, the multiple linear regression function resulting from this calculation is:

$$PIB/locuitor = 8,760 + 0,163X_1 + 0,480X_2 + 0,127X_3$$

which leads to the following remark: the regression coefficients are those who emphasize the existence of a direct relationship between the increased spending allocated to the three levels of education and the growth of GDP per capita.

The regression coefficients are contained between 0,128 (tertiary education) and 0,480 (secondary education), and indicate that the expenditure on secondary education have the strongest influence on GDP per capita.

Likewise, in the study, the importance of secondary education expenditures on GDP per capita, is also supported by the results of the regression (GDP per capita) depending on the three components of education expenditure (table 3).

The increase of these expenses by one unit is followed by an average GDP per capita growth of 0,48 units. Intensity of correlation between mentioned factorial variables and GDP per capita was measured and analyzed by means of correlation coefficient.

Table 3: Correlation of secondary education expenditure and GDP per capita

Dependent variable: L_GDP_PC				
Method: Least squares				
Adjusted sample: 1 to 30				
Included observations: 25 after adjustments				
Variable	Coefficient	Margin of error	Statistical t-test	Probabiliy
C	8.670859	0.181785	47.69855	0.0000

L_ED_PRIM	0.163865	0.168249	0.973939	0.3412
L_ED_SEC	0.480358	0.184634	2.601680	0.0167
L_ED_TER	0.127995	0.115761	1.105684	0.2814
R square	0.872384	Main dependent variable		10.10044
Adjusted R square	0.854154	Secondary dependent variable		0.357501
Standard error of regression	0.136529	Akaike information criterion related		-0.998913
Residual sum of squares	0.391444	Crieteriul Schwarz		-0.803893
Log likelihood	16.48641	F statistic		47.85226
Durbin-Watson statistic	2.217774	Sample of F statistic		0.000000

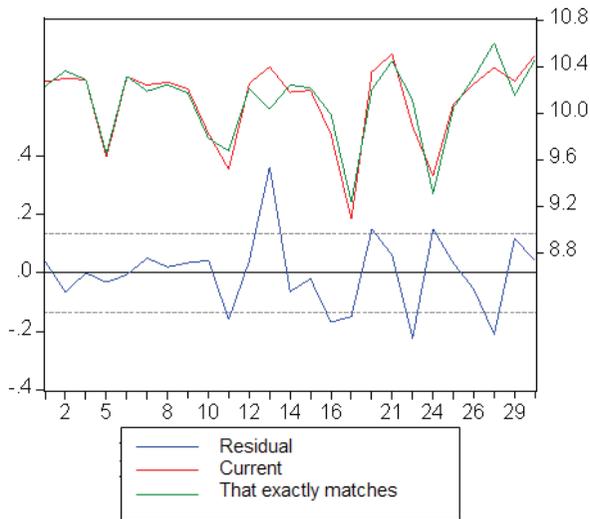


Figure 4: Influence of secondary education on GDP

The results confirm the conclusions based on regression in the sense that the most intense correlation is registered between GDP per capita and expenditure on secondary education (0,93). The correlation coefficients confirm that the factorial variables are not independent. The values of correlation coefficients are between 0,76 and 0,94, which requires caution in interpreting correlations due to collinearity of the three components of

education expenditures.

In the study we analyzed the dependence of education - human development - GDP per capita. The coefficient of correlation between the level of education and human development index is 0,93, and between the education index and GDP per capita the correlation coefficient is of 0,75.

These values suggest on the one hand, a strong relationship between level of education and human development, and on the other hand, a high correlation between the degree of economic development and education level.

Estimating a regression equation between human development index (the dependent variable) and the education index, i.e., GDP per capita (as independent variables) according to the econometric results, both variables have a statistically significant impact on human development (Table 4).

Table 4: Correlation education - human development - GDP per capita

Dependent variable: DEZVL_INDEX				
Method: Least squares				
Adjusted sample: 1 to 26				
Included observations: 25 after adjustments				
Variable	Coefficient	Margin of error	Statistical t-test	Probabiliy
C	-0.295768	0.031914	-9.267685	0.0000
ED_INDEX	0.388033	0.037835	10.25583	0.0000
L_GDP_PC	0.083350	0.005122	16.27419	0.0000
R square	0.985021	Main dependent variable		0.833520
Adjusted R square	0.983659	Secondary dependent variable		0.133643
Standard error of regression	0.017084	Akaike information criterion related		-5.189197
Residual sum of squares	0.006421	Crieteriul Schwarz		-5.042932
Log likelihood	67.86496	F statistic		723.3418
Durbin-Watson statistic	2.440844	Sample of F statistic		0.000000

According to R-squared indicator, the two independent variables represent 98% of the human development index.

CUSUM and CUSUM tests and as of Squares regression is stable (Figure 5 and 6).

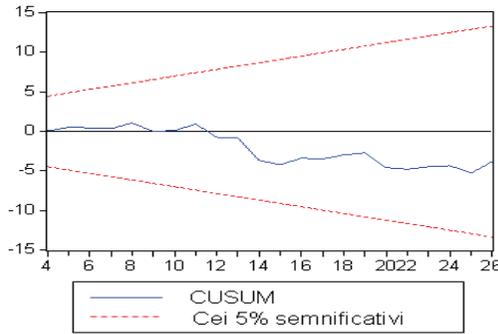


Figure 5: Graphical representation of the human development index, the index level of education and GDP per capita (CUSUM test).

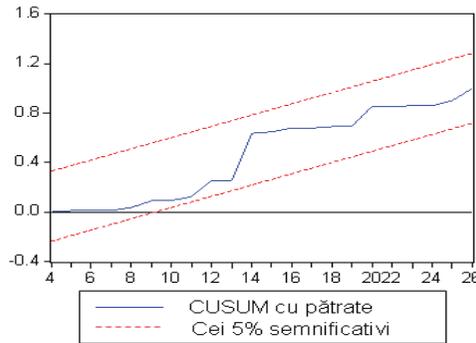


Figure 6: Graphical representation of the human development index, the index level of education and GDP per capita (CUSUM of squares test)

Consequently, the study highlights the importance of education level of individuals, leading as such to the increase of economic development levels and therefore to the increase of GDP / capita.

Also, the relation of education - human development - GDP / capita shows the interdependence of the three components, and that education play an important role in the economic development of a country.

Conclusions

In conclusion, the world has recognized the role of education and its many benefits in improving the economic and social world, education is called “the most important key to development and poverty reduction”. The role of education in human capital accumulation and human development is one of the foreground.

Consequently, the study highlights the importance of education level of individuals, leading as such to the increase of economic development levels and therefore to the increase of GDP / capita. Also, the relation of education - human development - GDP / capita shows the interdependence of the three components.

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