

ECONOMETRIC ANALYSIS OF THE CORRELATIONS BETWEEN GDP, EDUCATION AND DEGREE OF CIVILIZATION IN ROMANIA

Janeta WEISZ

***Abstract:** The paper proposes a uni-factorial analysis of correlations between GDP as an indicator of macroeconomic development representative for the Romanian economy (resultant variable) and various indicators which it influences at a certain moment. The indicators were selected on the basis of available statistical data at the national level (National Statistics Institute) and international (World Bank), and in terms of methodology, we use usual statistical methods, such as Fisher test analysis of variables, Student test variable of the significance of the model parameters. The results obtained allowed interpretations in terms of economic influence on the factors such as the effort made to educational material or convicted persons or population trends or state of health on the economy in Romania in the considered period.*

***Keywords:** material effort for education, macroeconomic indicator, Romanian economy, degree of civilization*

1. INTRODUCTION. APPLIED METHODS

This paper presents an empirical analysis carried out with the aim of highlighting the main factors influencing the GDP as an indicator that represents the "mirror" of a country's economics. Such research shows its relevance and necessity in terms of recent economic developments, which have worsened conditions for the resources allocated to education, particularly in Romania (Jivan and Weisz, 2014).

The indicators were selected within the limit of available data and correlations results and grouped according to the logic correlations: positive / negative on the one hand, strong / moderate / weak on the other. For analysis were used statistical methods such as Fisher's exact test and Student test and the theoretical point of view and according to Sipoș Preda (2006: 78-79), Matthew (2013) and Chilarescu (2014), the two tests study the link between variable x and y resultant variable using stochastic function of the form:

$$y = \alpha + \beta \cdot x + \varepsilon ,$$

where the α and β are called parameters or model coefficients and represent unknown values that are to be estimated, and ε is a random variable (residual or disruptive). Since the used regression function is stochastic, parameters α and β are not unique values, but contained averages, which are estimated using specific methods offered by mathematics and statistics.

The indicators were chosen for the period 2000-2010 (see Table 1 and 2), focusing on the correlation between: indicators related to material and human effort by society to education (school units by level of education, school laboratories, kids in kindergartens, rate of enrollment in education, school age population: 19-23 years old and over%, school population, teaching staff, indicators related to the degree of civilization (minor persons sentenced by the courts on the types of penalties, persons convicted permanently in penitentiaries, persons sentenced under rehabilitation centers, crime rate, indicators related to population and its health (total number of infant deaths, stable population) and resultative indicator GDP.

Table 1. Used statistical data

Years	Schools (total)	Laboratories (total)	Kids in kindergartens (total)	Degree of school population: 19-23 years old and over %	School population (total)	Teaching staff (total)
2000	24481	20620	611036	32.9	4565279	294938
2001	24304	21103	616014	36.4	4554466	300108
2002	23679	22065	629703	41.09	4496786	286670
2003	18012	22459	636709	43.05	4472493	281272
2004	14396	22435	644911	45.33	4403880	285861
2005	11865	22689	648338	51.77	4360831	281034
2006	8484	23448	648862	59.59	4345581	277318
2007	8230	23730	650324	72.5	4404581	276849
2008	8221	25047	652855	78.3	4324992	275426
2009	8224	25755	666123	76.4	4176866	268679
2010	7588	26031	673736	70.1	4029226	252953

Sursa: <http://statistici.insse.ro/shop/?lang=ro>

Tabelul 2. Used statistical data (continuation)

Years	Long term unemployment (% of total unemployment)	Convicted Minors (number of persons)	Convicted persons in jails (number of persons)	Convicted persons in reeducation centres (number of persons)	Criminality rate (no. persons convicted in 100.000 inhabitants)	No. of infant deaths (total)	Stable population (number of persons)
2000	49.2	6738	36447	359	336	7000	22435205
2001	48.6	6726	37406	319	370	7000	22408393
2002	56.5	7005	37448	398	375	6000	21794793
2003	61.5	6820	36104	319	353	5000	21733556
2004	59	6341	33007	167	320	4000	21673328
2005	56.3	6796	31122	195	304	4000	21623849
2006	57	6145	29756	204	263	3000	21584365
2007	50	5019	26443	212	214	3000	21537563
2008	41.3	3624	23100	163	171	3000	21504442
2009	31.6	3035	22308	163	159	3000	21469959
2010	34.9	3263	23614	179	195	3000	21431298

Sursa: <http://statistici.insse.ro/shop/?lang=ro>, <http://data.worldbank.org/country/romania>

2. FINDINGS

Regarding strong positive econometric relations (see Table 3) we mention that we noticed one, between No. of school laboratories as factorial variable and the dependent variable of gross domestic product, which in economic terms means that a growing effort by society for educational material (more school laboratories) determines the positive evolution of GDP.

Table 3. Strong positive econometric correlations regarding GDP

No.	Factorial variable (of influence)	Correlation rapport (Multiple R)	Determination Coefficient (R Square)	T stat α	β	F	econometric model for 2000-2010 ($y = \alpha + \beta \cdot x + \varepsilon$)
1.	School laboratories	0, 838	0, 702	3, 94	4, 61	21, 283	GDP = - 1653868 + 83, 0248 · School laboratories

Table 4. Moderate positive econometric correlations regarding GDP

No.	Factorial variable (of influence)	Correlation rapport (Multiple R)	Determination Coefficient (R Square)	T stat α	T stat β	F	econometric model for 2000-2010 ($y = \alpha + \beta \cdot x + \epsilon$)
1.	Kids in kindergartens	0,782	0,611	3,54	3,76	14,192	GDP= -4390076 + 7,2473 · Kids in kindergartens
2.	Degree of school population: 19-23 years and over	0,687	0,472	0,85	2,83	8,046	GDP = -126040 + 7238,579 · Degree of school population: 19-23 years and over

From Table 4, it can be seen that from the correlations between variables factorial econometric carried. Children enrolled in kindergartens, rate of enrollment in education of the population of school age: 19-23 years and over, and variable resultant gross domestic product were obtained positive results moderate, as the ratios of correlation (between 0,687 and 0,782) and the coefficient of determination falls in the range 0,60 and 0,80, which means that the connection between the factorial variables mentioned, and the dependent variable Domestic product is moderate.

For weak positive econometric correlation we mention that we noticed one, namely that of Number of patients out of hospitals as a variable factor and the dependent variable GDP. Although the correlation is of low intensity, the result nonetheless stresses that the influence of the health of the population on the Romanian economy in the long term exists.

In the empirical analysis we observed a negative and strong correlation between school population as a factor variable and the dependent variable GDP. Thus, the uni-factorial model linearly as ($y = \alpha - \beta \cdot x - \epsilon$): GDP = 4368954-0,93587 · The school population suggests that in terms of economic logic is not significant, although the intensity of influence is strong (decreasing school population cannot increase GDP or vice versa).

Table 5. Moderate negative econometric correlations regarding GDP

No.	Factorial variable (of influence)	Correlation rapport (Multiple R)	Determination Coefficient (R Square)	T stat α	T stat β	F	econometric model for 2000-2010 ($y = \alpha - \beta \cdot x - \epsilon$)
1.	Schools	0, 678	0, 460	5, 32	-2, 77	7, 680	GDP= 516948, 1 - 16, 9918 · Schools
2.	Teaching staff	0, 754	0, 569	3, 76	-3, 45	11, 910	GDP= 3229707 – 10, 5534 · Teaching staff
3.	Minors convicted	0, 766	0, 587	5, 41	-3, 58	12, 823	GDP= 758246, 1 - 86, 6533 · Minors convicted
4.	Convicted persons in jails	0, 759	0, 577	4, 81	-3, 50	12, 291	GDP= 965087, 4 - 22, 5846 · Convicted persons in jails
5.	Convicted persons in reeducation centers	0, 687	0, 473	4, 85	-2, 84	8, 082	GDP= 613063, 9 - 1394, 03 · Convicted persons in reeducation centers
6.	Criminality rate	0, 718	0, 516	4, 86	-3, 09	9, 603	GDP= 709336, 1 - 1566, 08 · Criminality rate
7.	Infant deaths	0, 665	0, 443	4, 70	-2, 67	7, 160	GDP= 589668, 7 - 72, 4139 · Infant deaths
8.	Settled population	0, 646	0, 418	2, 64	-2, 54	6, 476	GDP= 7354953 - 0, 3256 · Settled population

Table 5 represents negative moderate correlations and moderate between variable factors *School*, *Teachers*, *minor sentenced persons*, *persons convicted under rehabilitation centers and prisons*, *crime rate*, *infant deaths*, *stable population size and GDP* resultant variable.

CONCLUSIONS

Taking into account the complexity of influences between different indicators and GDP, it is important that the material effort by society for education strongly influences our economy, namely increasing the number of school laboratories should be a priority measure in reducing the dropout rate.

Of course, this is the quantitative side in calculating overall productivity, but it contributes to educational qualitative output, as it offers many opportunities for practical study. Students with more opportunities to obtain high performance impact the economy as a whole. As shown methodologically, moderate correlations resulted in the extremely important role of the degree of civilization (expressed by indicators such as the number of people sentenced or crime rates etc.) that influence GDP in the studied period.

Overall, although the fact is ignored too often by those responsible in this respect, the effects of the national education system and the degree of civilization on a country's economy cannot be overlooked because it is far more difficult to stop the wave effects than adopting effective measures by the government to prevent or reduce these effects, especially on the long term.

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NOTES ON THE AUTHOR

JANETA WEISZ is a Teaching Assistant at “Dimitrie Cantemir” Christian University, Faculty of Management in Tourism and Commerce Timișoara. She holds a PhD. in Economics.

E-mail: janets_w@yahoo.com