

The Bidirectional Relationship Between Human Development Index and Economic Growth in Romania

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Abstract

Human development aims at expanding freedoms so that all human beings can live according to the choices they value. These freedoms have two fundamental aspects: freedom of well-being, represented by functionalities and abilities and freedom of mandate, represented by expression and autonomy. Human development has made tremendous progress in the last quarter of a century. Globalization has played an important role in this direction - it has integrated people, markets and the workforce, and the digital revolution has changed people's lives. This paper analyses the literature that deals with the subject, as well as a methodology of calculating the Human Development Index and Economic Growth, and an econometric analysis wishing to highlight the bidirectional correlation between HDI and Economic Growth, using data recorded in Romania during 2000-2018.

Key words: Human Development Index, Economic Growth, Human Resources, GDP, Per Capita GDP

J.E.L. classification: E60, O00, O11, C19

1. Introduction

Human development aims at expanding freedoms so that all human beings can live according to the choices they value. These freedoms have two fundamental aspects: freedom of well-being, represented by functionalities and abilities and freedom of mandate, represented by expression and autonomy.

In the last quarter of a century, the world has changed - and with it the development landscape. New countries have emerged and our planet is now home to over 7 billion people, one of four young people. The progress in human development has been impressive over the last almost 30 years. People are living longer, literacy has increased, and more people have access to basic social services. However, human development has been uneven, and human deprivation persists. Progress has bypassed groups, communities, societies - and some people have been left out. Some human have only touched on the basic elements of human development, and others have not even done so. And new development challenges have emerged, from inequalities to climate change, epidemics to desperate migration, from conflicts to violent extremism.

Since its launch in 1990, the Human Development Index (HDI) has been an important element / factor in attempts to expand progress measures. Published annually in the UNDP Human Development Reports (HDR), HDI serves several functions for both university staff and decision makers as well as activists. It has been recognized, from the beginning, as an ongoing activity, as well as an element of confidence for all those who seek inclusive and human societies, by evaluating past trends and models and assessing our current state (Sacchidananda M., Debashis C. 2010).

Many studies in the literature lead to the conclusion of a two-way relationship between economic growth and human development. At national level, this can mean either a virtuous circle of economic growth and human development, or a vicious circle of reductions in both areas. (Ranis, 2004). A high level of human development also has a positive impact on institutional

quality and, indirectly, on economic growth. (Costantini and Salvatore, 2008).

How a country is government and its institutions can play an important role in strengthening the relationship between HDI and EG. The role of the institutions in the economic growth of a country is to expand the capacities and to create an environment that ensures a normal functioning of the social, political and economic life of the respective society. The results of the study by Grubaugh S.G. (2015), lead to the same conclusion that good governance explains more HD results than EG, per capita investments or per capita income do. This study also noted that, although there are positive relationships between HD and EG, they may not be automatic in either direction.

The relationship between GDP (in USD PPP) and the level of the human development index, from an inter-country perspective, shows that, as per capita income, HDI scores increase to a level and then reach a plateau. The result indicates that in a multi-country setting, per capita income is necessarily an important element for achieving a higher level of human well-being. Cross-border analysis by Mukherjee and Chakraborty (2010) showed that HD is positively and linearly linked to both democracy and income level, indicating that countries characterized by higher levels of income and better democratic establishment are likely to witness greater HD achievements.

Also, the results of the regression on the relation between human development and corruption confirm the presence of non-linearity and suggest that, as corruption decreases, the level of human development increases, but marginally decreases for some countries characterized by a less corrupt regime (Mukherjee and Chakraborty, 2010).

The present article aims to analyse the bidirectional relationship between the economic growth and the human development index in Romania, between 2000 and 2018, using the regression technique. The article is divided into four sections, presenting one by one the existing studies in the literature related to the correlation between HDI and EG, the calculation methodology of the indicators taken into account (HDI and EG), the results of the econometric model regarding the nature of the correlation between the two variables and the measure in which they influence each other, and at last, but not least are presented both the conclusions and the limits of the study.

2. Research methodology

2.1. Human Development Index

The Human Development Index (HDI) is a summary measure of the achievements in three key dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. HDI is the geometric mean of the normalized indices for each of the three dimensions (Human Development Indices and Indicators: 2018 Statistical Update, 2018).

$$HDI = \sqrt[3]{I_{Education} * I_{Health} + I_{Income}}$$

Following the principle of the NHDR 2001 methodology, for the calculation of the Human Development Index (HDI) for Romania, the current work considers three variables, namely - per capita income; the composite index of the level of education and health respectively. The normalization of the indicators is done by dividing the difference between any variable (X_i) in these categories and the minimum value of the variable (X_{min}) respective to the difference between the maximum value (X_{max}) and its minimum value (X_{min}).

$$I_{xi} = \frac{X_i - X_{min}}{X_{max} - X_{min}}$$

The composite health indicator is calculated by taking into account two variables, namely the life expectancy at birth (LE) and the inverse infant mortality rate (IMR).

The composite indicator of the level of education is obtained by taking into account two variables, namely: expected years of schooling (EYS) and mean years of schooling (MYS). Both the expect years of schooling indicator and the mean years of schooling indicator are normalized by taking into account the minimum (in this case 0) and maximum (18 years) values. This indicator is calculated as an arithmetic mean between the two indicators, as follows:

$$I_{Education} = \frac{I_{EYS} + I_{MYS}}{2}$$

For the calculation of the human development indicator, the real value of GDP per inhabitant in PPP USD was taken into account for the determination of the standard of living. The calculation formula used is:

$$I_{Income} = \frac{\ln(GDP_{ti}) - \ln(GDP_{min})}{\ln(GDP_{max}) - \ln(GDP_{min})}$$

Where,

GDP_{ti} – is the value of per capita GDP in PPP USD in year t_i in USD PPP (constant 2011 international \$)

The human development indicator was calculated for Romania using data series for the 2000-2018 periods.

2.2. Economic Growth

The present article aims to determine the bidirectional correlation between the human development index and the economic growth in Romania for the period 2000-2018. Therefore, the second variable considered is the economic growth quantified by the growth index of the gross domestic product. The absolute value of the variable is expressed in USD PPP billion.

The growth index was determined according to the formula:

$$I_{GDP} = \frac{GDP_{t1}}{GDP_{t0}}$$

Where,

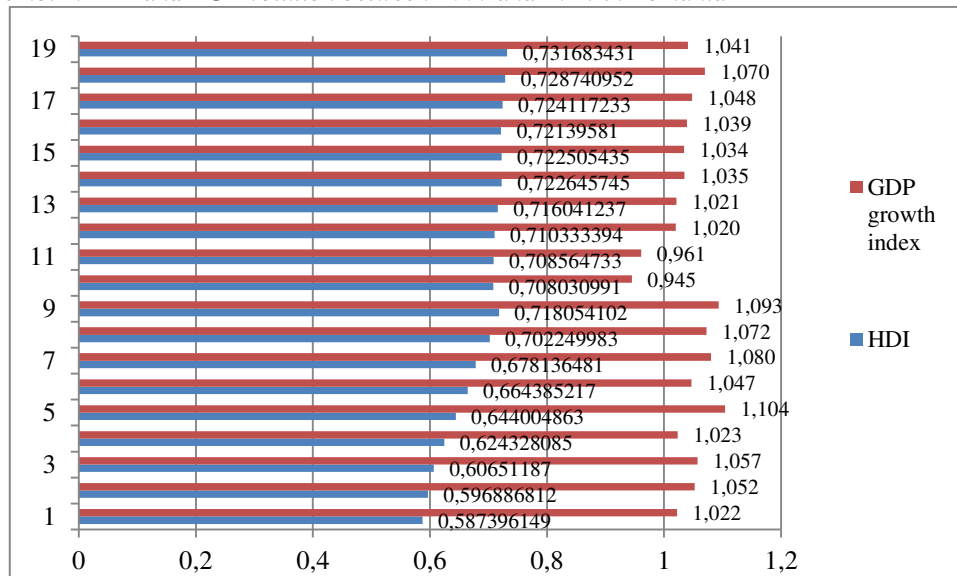
GDP_{t1} – is the value of GDP in PPP USD in year t_1 in USD PPP (constant 2011 international \$)

GDP_{t0} – is the value of GDP in PPP USD in year t_0 in USD PPP (constant 2011 international \$)

The growth index was used to make the analysis more relevant.

The figure below shows the evolution of the human development index and that of the GDP growth in Romania, between 2000 and 2018. The values of the indicators have been established, applying the above methodology to the empirical data related to our country.

Figure no. 1. HDI and EG Evolution between 2000 and 2018 in Romania



Source: Calculated by the author

As shown in the graph above, HDI experienced a relatively constant growth in the period 2000-2009, after which in 2010 it experienced a slight decrease from 0.72 to 0.71, followed by a subsequent period of one another constant growth, but not as spectacular as in the first analysis interval. The GDP growth index had a fluctuating evolution in the 19 analysed periods, registering smaller or greater growths, but only in two periods (2009 and 2010) it was characterized by negative growths.

3. Correlation between Human Development Index and Economic Growth

In order to understand the bidirectional correlation between Human Development Index and Economic Growth, in Romania in 2000-2018 we used an econometric study with a linear regression equation of the form:

$$Y = c(1) + c(2) * X$$

Where:

Y - is the dependent variable; X - is an independent variable; c(1),c(2) – are the regression equation parameters.

In order to understand the relationship between EG and HD Index, a regression analysis was performed, which involves the HDI level as a dependent variable and the GDP growth index as the independent variable. The regressions are estimated for the period 2000-2018.

$$HDI = c(1) + c(2) * EG$$

From the results presented in Table 1 it is observed that the process of HDI formation of Romania is positively influenced by the level of growth index of the gross domestic product, as reflected by the positive value and the significance level of the coefficients of the regression equation (c (1) = 0.68 ; c (2) = 4.73) for the analysed period.

Table no. 1. Correlation between HDI and EG in Romanian 2000-2018

| | | | | |
|---------------------------|-------------|-----------------------|-------------|------------|
| Dependent Variable: HDI | | | | |
| Sample: 2000 2018 | | | | |
| Included observations: 19 | | | | |
| | Coefficient | Std. Error | t-Statistic | Prob. |
| C(1) | 0.682414 | 0.011565 | 5.900.863 | 0.0000 |
| C(2) | 4.73 | 4.84 | 0.977323 | 0.3421 |
| R-squared | 0.053197 | Mean dependent var | | 0.685053 |
| Adjusted R-squared | 0.002497 | S.D. dependent var | | 0.048954 |
| S.E. of regression | 0.049015 | Akaike info criterion | | -3.094.074 |
| Sum squared resid | 0.040842 | Schwarz criterion | | -2.994.659 |
| | | Durbin-Watson stat | | 0.114440 |

Source: Calculated by the author

The result implies that the growth index of the gross domestic product (as an indicator of economic growth) directly influences the human development index, meaning that when modified with one unit, HDI will change in the same direction with 4.73 units. However, as shown in the table, this influence is not strong enough (Adjusted R² = 0.002497), the HDI change being explained only in 0.2% of the economic growth index change and this is explained by the fact that human development it depends on many more factors than those taken into account (those of social, institutional nature, etc. should not be neglected).

Regarding the impact of HDI on EG, a second set of regression was used involving the GDP growth index (to highlight the economic growth in Romania between 2000 and 2018) as a dependent variable and the HDI level of Romania as an independent variable, to understand the inverse dependency model.

$$EG = c(1) + c(2) * HDI$$

From the results presented in table 2 it is observed that the level of growth index of the gross domestic product is negatively influenced by the HDI formation process in Romania, as reflected by the negative value and the significance level of the regression equation coefficients (c (1) = -7142.75) for the analysed period.

Table no. 2. Correlation between EG and HDI in Romania in 2000-2018

| Dependent Variable: EG | | | | |
|---------------------------|-------------|-----------------------|-------------|-----------|
| Sample: 2000 2018 | | | | |
| Included observations: 19 | | | | |
| | Coefficient | Std. Error | t-Statistic | Prob. |
| C(1) | -7.142.751 | 7.898.209 | -0.904351 | 0.3784 |
| C(2) | 1.124.073 | 1.150.155 | 0.977323 | 0.3421 |
| R-squared | 0.053197 | Mean dependent var | | 5.577.489 |
| Adjusted R-squared | 0.002497 | S.D. dependent var | | 2.385.832 |
| S.E. of regression | 2.388.809 | Akaike info criterion | | 1.388.911 |
| Sum squared resid | 970089.2 | Schwarz criterion | | 1.398.852 |
| | | Durbin-Watson stat | | 1.111.012 |

Source: Calculated by the author

The results presented in the table show that there is a directly proportional correlation between the growth rate of the gross domestic product (as an indicator of the economic growth) and the HDI level. However, as shown in the table, this influence is not strong enough (Adjusted $R^2 = 0.002497$), the EG change being explained only by 0.2% of the EG change. This is explained by the fact that economic growth depends on many more factors than those taken into account when determining the index of human development. During the period analysed, the gross domestic product had inelastic growths (period 2008-2010), and for the greater relevance of the analysis results, the period analysed should have been divided into two sub-periods, as follows: 2000-2008 (before global down-turn) and 2008- 2018 (after global down-turn).

4. Conclusions

Economists have studied GDP, GDP per capita and GDP growth per capita for a long time. Alternative development measures, such as the human development index, are available for a much shorter period of time and accumulate a sufficiently complete set that we can begin to compare the behaviour of these measures with the behaviour of traditional economic measures of GDP. This study is an attempt to show the extent to which the two variables influence each other for a short time. However, the results show us that HDI does not provide too much additional information for GDP nor does it influence the other waters to such an extent, at least for the study conducted in Romania between 2000 and 2018. However, there is indeed a bidirectional relationship between the two indicators, as is shown in the previous section study.

The study presented in this article has its limits, in the sense that the process of formation and the level of human development is influenced by a multitude of factors of different natures - economic, social, political, institutional, and the economic growth of a state does not depends only on the level of human development, although there are studies in the literature that have shown that HD is positively and linearly linked to both democracy and income level, indicating that countries characterized by higher levels of income and better democratic establishment are likely to witness greater achievements of HD.

5. References

- Costantini, V., Salvatore M., 2008. Environment, human development and economic growth, *Ecological Economics*, 64(4), p. 867-880.
- Grubaugh S.G., 2015. Economic Growth and Growth in Human Development, *Applied Econometrics and International Development*, 15(2), p.5-16
- Mukherjee, S., Chakraborty D., 2010. Is there any Relationship between Environment, Human Development, Political and Governance Regimes? Evidences from a Cross-Country Analysis, *MPRA Paper 19968*. University Library of Munich, Germany.

- Ranis G, 2004. Human Development and Economic Growth. *Yale University Economic Growth Centre Discussion Paper No. 887*, Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=551662 [Accessed October 15, 2019].
- Romanian National Institute of Statistics. 2019. *Sustainable Development Indicators*. [online] Available at: <http://www.insse.ro/cms/en/content/sustainable-development-indicators>. [Accessed October 18, 2019].
- Sacchidananda M., Debashis C., 2010. Is there any relationship between Economic Growth and Human Development? Evidence from Indian States. *Munich Personal RePEc Archive*, [online] Available at: <https://mpra.ub.uni-muenchen.de/22997/> [Accessed September 30, 2019].
- The World Bank. 2019. *Insights from Disaggregating the Human Capital Index*, World Bank Group, [online] Available at: <http://pubdocs.worldbank.org/en/514331571771382419/Public-Human-Capital-Index-Insights-2019-10.pdf>, [Accessed October 12, 2019]
- United Nations Development Programme. 2018. *Human Development Indices and Indicators: 2018 Statistical Update*, [online] Available at: <http://hdr.undp.org/en/content/human-development-indices-indicators-2018-statistical-update> [Accessed October 8, 2019]