Methodology of Examination the Effect of Health on Economic Growth

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Abstract: The main purpose of this article is to examine the effect of health on economic growth. Portion of the paper explains the different variables, as well as their constructions. In addition, it reveals the sources of datasets and the estimation tools that have been applied to compute the target. Despite the fact that life expectancy was considered to be the major variable that affects GDP, there are other independent variables that influence national income. The article also discusses the research design, data description, measurement and the method of data analysis.

Key words: Health · Economic growth · Variables of econometrics model · OLS model

INTRODUCTION

Although there are various academic studies on economic growth and its effect on different health indicators, only a few researchers have tried to empirically explain the linkage in the opposite direction: the influence of health on economic growth. This is due to the weak causality effect of health indicators on economic growth and development, which is actually considered the main topic in transition countries. Growth theories are assign an essential role to human ability; however, the connection of health to ability and to growth remains largely unexplored.

RESULTS AND DISCUSSION

As for the data collection, the World Bank was a major port of call; countries in transition were grouped into European and Central Asian (developing only) countries. All variables that were used in the econometrics model to come are represented in Table 1.

The variables in the table above were collected using the panel macro-dataset, covering all countries in transition in the period between 1995 and 2010. For the OLS regression model, carried out in formula 1, the data transformation was undertaken in order to improve linearity. The dependent variable, Gross Domestic Product (GDP), is transformed into the logarithm of GDP.

Concluding that the main determinants of health have an impact on the response variable, the statistical significance of determinants of health must be assessed. This could be obtained by comparing the computed p-value with the level of significance, á. Since it is significant at the 5% level, the null hypothesis is rejected, proving that the main determinants of health influence the response variable.

In order to examine the effect of health on economic growth, the following model shall be estimated by way of ordinary least squares:

$$LNGDP\text{-}C_{it} = \beta_0 + \beta_1 LEXP_{it} + \beta_2\, BR_{it} + \beta_3\, DR_{it} + \beta_4\, HEXP\text{-}GDP_{it} + u_i$$

$$(1)$$

Where: $LNGDP\text{-}C_{it}$ (log of GDP per capita) is usually considered an indicator of a standard of living of country i in period t, β_0 indicate the intercept of the regression line, $LEXP_{it} + BR_{it} + DR_{it} + HEXP\text{-}GDP_{it}$ is an capture Health indicators and u_i is an error term.

The Graphical analysis and correlations section outlines the relationship between the measurement of the economic growth log of GDP per capita and some of the other explanatory variables. First of all, the notable pattern can be seen in Figure 1, where the comparative variability of the log of GDP and life expectancy is very small and there is a strong and fairly positive correlation between

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Table 1: Description of variables

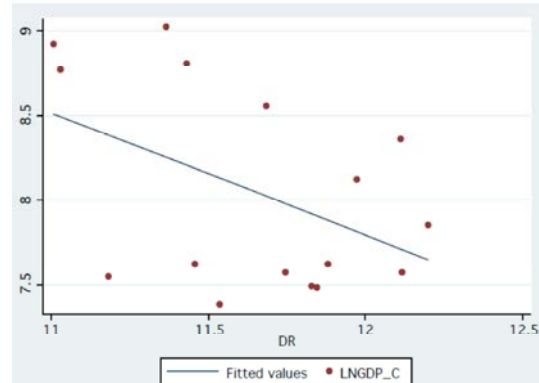| Variable	Description	Soure
	Description of Variable	
LEXP	It exhibits number of years, the newborn will live if prevailing structues of mortality at the time of his birth were to invariable thorughout his life	The world Bank
BR	It provides the number of live births, during the year, per 100 population	
DR	It indicated the number of death occurring during the year per 1000 population estimed	The world Bank
HEXP-GDP	Sum of public and privated health expenditure. It includes family planning activities, nutrition activities. It excludes provision of water and snaitation	The world Bank
GDP-C	Gorss domestic porduct divided by number of population. It indicates the sum of gross valus added by all deller porducers in the country adding porduct and subtracting excludes subsidies	The world Bank
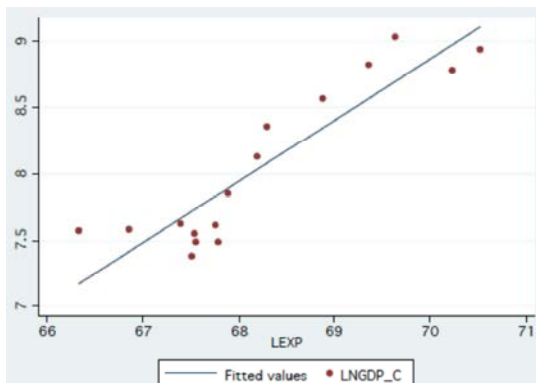
Fig. 1: Log of GDP per capita and life expectancy
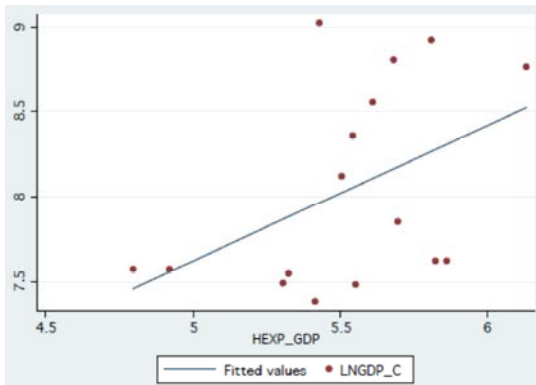

Fig. 2: Log of GDP per capita and health expenditure of GDP
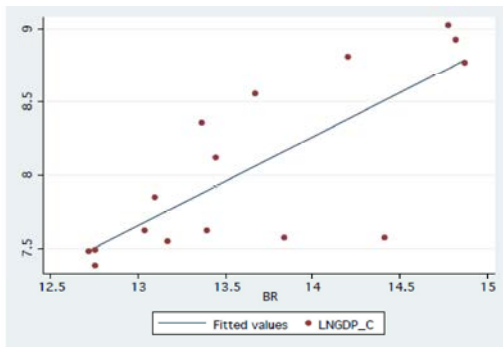

Fig. 3: Log of GPD per capita and birth rate

Fig. 4: Log of GDP per capita and death rate

life expectancy and the log of GDP. This relationship clarifies the fact that omitting life expectancy could lead to a biased result.

Figures 2 and 3 produce a positive, weak correlation between health expenditure and the log of GDP and birth rate and the log of GDP, respectively. However, the results are contrary to what was expected and it is not sufficient to conclude that there is a positive relationship, since this is inclined towards the omitted variable bias. Omitted variable bias takes place when other factors (determinants of health) that can influence GDP are not included.

Nevertheless, Figure 4 reveals the information that was forecast to occur and the slope of the relation is clearly negative. Thus, there is evidence to suggest that the greater the number of deaths, the lower the economic growth will be, or vice versa.

From Table 2 above the logarithm of GPD per capita is strongly correlated with life expectancy and birth rate, while with the rest variables it is moderate correlation.

The regression of the OLS model was fulfilled using the statistical software package STATA [1].

Source	SS	df	MS		
Model	5.19240922	4	1.2981023		
Residual	.309176114	11	.028106919		
Total	5.50158533	15	.366772355		

Number of obs = 16
F(4, 11) = 46.18
Prob > F = 0.0000
R-squared = 0.9438
Adj R-squared = 0.9234
Root MSE = .16765

LNGDP_C	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
LEXP	.4816066	.0762806	6.31	0.000	.3137142 .6494989
BR	.2612173	.0876766	2.98	0.013	.0682423 .4541923
DR	.4059626	.1500492	2.71	0.020	.0757064 .7362188
HEXP_GDP	-.1957355	.2053212	-0.95	0.361	-.6476443 .2561734
_cons	-12.2241	4.857702	-2.52	0.029	-22.91583 -1.53237

Fig. 5: OLS model

Table 2: Correlation between variables

(obs=16)

	LEXP	BR	DR	HEXP_GDP	LNGDP_C
LEXP	1.0000				
BR	0.6152	1.0000			
DR	-0.6312	-0.5045	1.0000		
HEXP_GDP	0.6719	0.0998	-0.4075	1.0000	
LNGDP_C	0.9107	0.7684	-0.4613	0.4534	1.0000

Overall, it may be concluded that the model is good. It is observe that Prob > F = 0.0000 and R-squared = 0.9438, meaning that 94% of the variation in LNGDP_C is explained by the independent variables. According to the results, with a 5% significance level, it is apparent that LEXP, BR and DR are important explanatory variables, i.e. the p-value is less than 0.05, but DR indicates a significant negative effect, because a decline in the death rate leads to a healthy economy in a country. The results, as expected, show that LEXP has a major influence among all of the determinants, as in this log-linear model, a per one unit increase in average life expectancy increase is associated with a 48% increase in LNGDP_C. Even though the HEXP_GDP does not show a significant effect on LNGDP_C, this may be because of the omitted variable bias, since there are other health determinants that affect LNGDP_C and correlated with one of the explanatory variable, it is argued that LEXP, BR and DR effect the measurement of economic growth. Therefore, it can be argued that health is one of the key factors in determining the economic wealth of a country [2].

The two-period, overlapping generation model was performed to determine the effect of life expectancy on economic welfare, but further studies are needed to make this model more deeply empirical [3].

For instance, the model can be prolonged by adding childhood as the third period of life, considering infant mortality.

CONCLUSION

The article also provides empirical evidence that life expectancy, birth and death rates are three of the main indicators of a nation's health and examines the influence of these explanatory variables on the measurement of economic growth. I have attempted to study the effect of health using the OLS log-linear model for better linearity and found that the life expectancy and birth rate have a positive and statistically significant influence on GPD, while the death rate has adverse and significant effect. [4] Even though health expenditure should also be one of the positive determinants of health, insignificance results were included, which might be due to omitted variables. Despite that, I tried to answer the question of my research and set up a response model, but the article was not able to examine the absolute significance, due to limited data and time constraints and this is an area that remains for future research.

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