ECONOMIC EFFECTS ON INVESTMENT IN HEALTH

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Abstract: *Can health influence economic growth of a country? Starting from this question, this paper intends to show the relationship between health and economic growth. Health is a direct source of human welfare and also an instrument for raising income levels. Empirically, high levels of population health go hand in hand with high levels of national income. Higher incomes promote better health through improved nutrition and increased ability to purchase more and better-quality health care. However, health may be not only a consequence but also a cause of high income.*

Key words: *growth, investment, health.*

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INTRODUCTION

Health is an important priority for Europeans, who expect to have a long and healthy life, to be protected against illnesses and accidents, and to receive appropriate healthcare. Health issues cut across a range of topics including consumer protection (food safety issues), workplace safety, environmental or social policies.

Health is a direct source of human welfare and also an instrument for raising income levels. The mechanisms through which health can affect income are children`s education, worker productivity, demographic structure, and savings and investment (Bloom and Canning, 2000).

From the fact that healthy workers lose less time from work due to ill health and are more productive when working, we can say that is the role of health on labor productivity. Childhood health can have a direct effect on cognitive development that is the effect of health on education.

The effect of health on savings refers to a longer prospective lifespan can increase the incentive to save for retirement, generating higher levels of saving and wealth, and a healthy workforce can increase the incentives for business investment.

Another mechanism is the effect of population health on population numbers and age structure.

Preston (1975) demonstrated a positive correlation between national income levels and life expectancy. One reason for this links is that higher income levels allow greater access to inputs that improve health, such as food, clean water and education, sanitation and medical care.

Pritchett and Summers (1996) use the relationship between income levels and he alth to argue for an emphasis on economic growth in poor countries as a method of increasing population health.

In practice, the major force behind health improvements has been improvements in health technologies and public health measures that prevent the spread of infectious d isease, and not higher incomes. This has been demonstrated by (Cutler, Deaton, and Lleras-Muney, 2006).

The idea of health as a form of human capital has a long history (for example, see Mush kin, 1962). Grossman (1972) develops a model in which illness prevents work so that the cost of ill health is lost labor time.

Although labor quality, in the form of human capital, clearly contributes significantly to economic growth most cross-country empirical studies identify human capital narrowly with education. This practice ignores strong reasons for considering health to be a crucial aspect of human capital and an ingredient of economic growth. Healthier workers are physically and mentally more energetic and robust. They are more productive and earn higher wages and are also less likely to be absent from work because of illness.

Health, in the form of life expectancy, has appeared in many cross-country growth regression and investigators generally find that it has a significant positive effect on the rate of economic growth.

It is widely agreed that education affects economic outcomes and health affects education through two mechanisms. The first is the effect of better child health on school attendance, cognitive ability and learning (Bloom and Canning 2008). The second mechanism is the effect of lower mortality and a longer prospective lifespan on increasing incentives to invest in human capital. This effect increases the benefits of education for the individual (Kalemli-Ozcan, Ryder and Weil, 2000).

In developing countries, the failure of children to learn in school is often attributable to illness. The most important causes of morbidity among school-age children include micronutrient deficiencies and chronic protein malnutrition. Globally, 4.4 million children and 6.2 million women of childbearing age manifest varying degrees of vision impairment from vitamin A deficiency (UN 2004). A year of education increases wages by about 10 percent in developing countries (Patrinos and Psacharopoulos 2004).

MATERIAL AND METHODS

This study focused on EU countries and analyzed the indicators that show a link between health and economic performance. Data were taken from the Eurostat database and thus we have created our own database.

In this paper we developed a panel of EU countries observed during the period 1990-2012.

The program used was Stata 12 and were processed data from our own database, compiled to demonstrate the effect of health on economic performance. Several models were run and the most significant of these is shown in this paper. To verify the results, the Hausman test was run for each model.

RESULTS AND DISCUSSION

In Table 1 is run a simple regression model used to show the relationship between health spending and other indicators. The dependent variable is the log of health expenditure and the independent variables are:

- in model 1 is log infant mortality
- in model 2 is log fertility rate
- in model 3 is log labor productivity rate

- in model 4 is log tertiary education attainment
- in model 5 is log second education attainment

Table no.1

Relationship between health and economic performance 1990-2012

	Model 1 b/se	Model 2 b/se	Model 3 b/se	Model 4 b/se	Model 5 b/se	Model 6 b/se
log_infant_mortality	0.055* (0.02)					
log_fertility_rate~t		1.038*** (0.21)				
log_LAB_PROD_EURO_~R			2.836*** (0.13)			
log_tertiary_edu_a~t				1.335*** (0.10)		
log_second_edu_att~t					-0.865* (0.40)	
log_gdp_growth_rat~e						-0.083** (0.03)
Constanta	6.848*** (0.25)	6.783*** (0.23)	-1.293*** (0.38)	3.232*** (0.36)	10.618*** (1.58)	7.314*** (0.22)
R-squared			0.766			
F			506.031			
N observations	172.000	160.000	178.000	122.000	122.000	92.000

* p<0.05, ** p<0.01, *** p<0.001

(Source: own processing in Stata 12)

Note. The dependent variable in this model is log health care expenditure. Robust standard errors are reported in parentheses.

The dependent variable used in all 6 models is log health care expenditure.

In model 1 is observed that infant mortality influences positively health expenditures, thus the model is statistically significant.

The fertility rate and labor productivity as presented in model 2 and 3 show that there is a positive and statistically significant relationship between them and health expenditures.

In table 4 was introduced the independent variable tertiary education attainment that shows a positive correlation, statistically significant with the dependent variable, namely a growth percentage of tertiary education attainment may influence an increase of 1.33 percent of health expenditures.

In model 5 the independent variable was secondary education attainment and the result obtained is statistically significant, demonstrating that 1 percent of the secondary education level lowers health expenditures by 0.86 percent.

In model 6 we also notice a statistically significant result between GDP growth rate and the level of health expenditures. We observe that an increase in the GDP growth rate decreases by 0.08 percent the level of health expenditures.

The verification of the results was performed using the Hausman test which was run for each model as shown below.

Hausman fe re (model 1)

```
               ---- Coefficients ----
             |    (b)        (B)         (b-B)    sqrt(diag(V_b-V_B))
             |    fe         re        Difference        S.E.
-------------+----------------------------------------------------------------
log_infant~y |  .057941   .0552161    .0027249      .0029822
------------------------------------------------------------------------------
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg
```

```
    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.83
                Prob>chi2 =      0.3609
```

Example **Random effects:**

```
Random-effects GLS regression                Number of obs      =       172
Group variable: country                      Number of groups   =        22

R-sq:  within  = 0.0457                      Obs per group: min =         3
       between = 0.0168                                     avg =       7.8
       overall = 0.0003                                     max =         9

                                             Wald chi2(1)       =      6.61
corr(u_i, X)   = 0 (assumed)                 Prob > chi2        =    0.0101
------------------------------------------------------------------------------------
 log_H_CARE_EXP_euro |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
log_infant_mortality |   .0552161   .0214759     2.57   0.010     .0131241    .0973082
               _cons |   6.847591   .2481714    27.59   0.000     6.361184    7.333998
---------------------+--------------------------------------------------------------
             sigma_u |  .97988032
             sigma_e |  .19434815
                 rho |   .9621507   (fraction of variance due to u_i)
------------------------------------------------------------------------------------
```

Hausman fe re (model 2)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
log_fertil~t |    1.029152     1.037782       -.0086295        .0318092
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.07
                Prob>chi2 =      0.7862
```

Hausman fe re (model 3)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
log_LAB_PR~R |    2.835527     1.254763        1.580764        .1166182
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      183.74
                Prob>chi2 =      0.0000
```

Example **fixed effects:**

```
Fixed-effects (within) regression            Number of obs      =       178
Group variable: country                      Number of groups   =        22

R-sq:  within  = 0.7655                      Obs per group: min =         3
       between = 0.9809                                     avg =       8.1
       overall = 0.9581                                     max =         9

                                             F(1,155)           =    506.03
corr(u_i, Xb)  = -0.9926                     Prob > F           =    0.0000
--------------------------------------------------------------------------------------
   log_H_CARE_EXP_euro |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------------+--------------------------------------------------------------
log_LAB_PROD_EURO_HOUR |   2.835527   .1260507    22.50   0.000     2.586528    3.084526
                 _cons |  -1.293353   .3803643    -3.40   0.001    -2.044719    -.541986
-----------------------+--------------------------------------------------------------
               sigma_u |  1.4436574
```

```
             sigma_e |  .09673577
                 rho |  .99553007   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(21, 155) =    23.97            Prob > F = 0.0000
```

Hausman fe re (model 4)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
log_tertia~t |    1.332219     1.335339       -.0031205        .0160914
------------------------------------------------------------------------------
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.04
                Prob>chi2 =      0.8462
```

Hausman fe re (model 5)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
log_second~t |   -1.088754    -.8649415       -.2238128        .2434183
------------------------------------------------------------------------------
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.85
                Prob>chi2 =      0.3579
```

Hausman fe re (model 6)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
log_gdp_gr~e |   -.0813106    -.0831997        .0018892        .0010516
------------------------------------------------------------------------------
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.23
                Prob>chi2 =      0.0724
```

Table 2 shows descriptive statistics of the model.

TABEL NO 2

Descriptive statistics of the model

```
Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
infant~y overall |  2258.906   6319.585         10      59956 |     N =     667
         between |             5002.368   29.54545    27896.7 |     n =      30
         within  |              3314.15   -25204.8    34318.2 | T-bar = 22.2333
                 |                                            |
fertil~t overall |   1.55545   .2484264    1.09012    2.47561 |     N =     626
         between |             .1645565   1.285319   1.799785 |     n =      30
         within  |             .1884291   1.106687   2.257409 | T-bar = 20.8667
                 |                                            |
LAB_PR~R overall |  26.02366   15.77455        2.6       64.9 |     N =     465
         between |              16.2712   3.733333   60.81818 |     n =      28
         within  |             2.302553   17.51032   32.81032 | T-bar = 16.6071
                 |                                            |
tertia~t overall |  20.27278   7.042641        4.9       35.3 |     N =     371
         between |              5.96765   9.923077   28.59167 |     n =      30
         within  |             3.846684    1.40611   35.79278 | T-bar = 12.3667
                 |                                            |
second~t overall |  47.13477   13.48487       12.3       72.2 |     N =     371
```

```
     between |           12.83524   16.80769   71.33846 |     n =      30
     within  |           4.367831   22.95977   62.98477 | T-bar = 12.3667
             |                                          |
gdp_gr~e overall |   2.06395   3.878758      -17.7         11 |     N =     319
     between |           1.351743       -.06   4.554545 |     n =      30
     within  |           3.638855  -19.58151   10.05395 | T-bar = 10.6333
```

(**Source:** own processing in Stata 12)

CONCLUSIONS

The aim of this paper was to show the connection between health and economic performance.

The model described above shows that there is a connection between health expenditures, which we have considered as being the dependent variable, and the economy of a country.

The most important result obtained in our analysis is the connection between health expenditures and the secondary education level which according to the results is significant and shows us that a percentage of the secondary education level decreases by 0.86 percent health expenditures.

We can state that it is only a beginning in this analysis and the results coincide with the ones from the specialized literature.

AUTHORS' CONTRIBUTIONS

As part of the authors' contribution we can mention the study of the specialized literature and of the studies in this field.

Also a database was drawn up, comprising EU countries and the indicators used in this paper to run representative models in order to demonstrate the connection between health and economic performance.

The program used for processing the indicators used was Stata 12.

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