The human capital and development. The Romanian case study

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Abstract

The human capital is the main driver of development and economic growth. This paper is focused on human capital and tries to show how the human capital, as an important economic factor contributes to the growth of the economy. Romer (1969) identified a positive relation between the initial level of literacy and its rate of growth and the increase of income per capita. Benhabib, and Spiegel (1994) showed that the growth rate of total factor productivity depends on the human capital stock level. Wilson and Briscoe (2004) in a literature review of relation between human capital and economic performance at macroeconomic level highlighted that the increases in economic growth across the EU are associated with increases in both education and training. This paper is focused on the relation between human capital and development in Romania and uses econometric techniques to highlight the role of human capital in increasing the country's wealth.

Keywords: *human capital, development, inovation*
JEL Codes: *E24, J24,F63, O15,O31*

Introduction

The role of human capital in economic growth and wealth has capture the attention of many economist from neoclassical theory (see Solow, 1956) to endogenous growth theory highlighted by Romer (1986, 1990), Lucas (1988) and Rebelo (1991). If in the Solow function the technical progress is viewed as a residual factor, in the new growth theory the human capital is viewed as factor of production like physic capital and labor capital.

Education and health as key pillars in forming the human capital are also linked to economic growth. Human capital is usually measured in literature as enrolment rate or literature rate. This paper is focused on the relation between human capital, expressed both as education capital and health capital, and development in Romania. We applied the regression technique in order to highlight the role of human capital in increasing the country's wealth.

This paper is organised into three sections. The following section introduces the literature review, section three present the methodology and the data and the last section presents the models results and the conclusion.

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Literature review

There are many studies that tried to explain the impact of human capital on development and wealth. Romer (1989) studied the connection between human capital and its growth rate variation in different countries. He started his analysis from theoretical division of human capital into three skills: physical skills like eye-hand coordination and strength, educational skills acquired in primary and secondary school and scientific skills acquired in post-secondary education, but, because of the difficulties in interpreting the results, he expressed human capital as basic literacy (very narrow measurement of human capital). In the microeconomic studies, that imply *Mincerian* estimates, the impact of human capital on development is less strong compared to models that treat human capital as exogenous variable.

Acemoglu, Gallego and Robinson (2014), argued that these differences could be explained by the measurements of the variable, by usual omitted and variable bias problems. Using a cross country model they showed that the effects of human capital on long run development are consistent with micro estimates when they took into consideration the long run effects of institutions that supported mass schooling in the countries. In this case the effect of human capital was in a range between 6-10%, less as compare to 25-35 % in terms of the contribution of one more year of average schooling to GDP per capita like in Glaeser et al. (2004) but, similar with the results of the study based on the survey realized by Card, 1999 and traditional Mincerian (micro) estimates (see Acemoglu, Gallego and Robinson, 2014, p.879-880).

Erosa and all (2010) tried to explains the importance of human capital differences in explaining the variation of GDP per capita as a measure of nation wealth. Based on the heterogeneous model of individuals they highlighted that the benefits of human capital is proportional with TFP but the cost of education relative to the price of output isn't, and the lower human capital stock discourage the physical capital accumulation. They find that that human capital accumulation strongly amplifies TFP differences across countries.

Klenow and Rodriguez-Claire (2004) based on hybrid model of growth externalities show that the human capital and the physical capital contribute to the income differences between OECD countries, but the impact of R&D is more significant in explaining the income differences between countries. They demonstrate a positive relationship between the GDP growth and schooling years on OECD countries and the fact that the difference in knowledge investment may explained a significant part of income difference between countries.

Hanushek (2013) showed that without improving the school quality the performance of the developing countries couldn't' be improved. He demonstrates that the differences between countries in respect to economic growth could be the result of the differences in the cognitive skills measured by international level in science and mathematics. Also the paper showed that a large proportion of students with nine years of studding is uncompetitive in terms of international skill levels, and this result

rice a question related the distribution of the fund education in order to obtain a higher quality of human capital.
Holland et all (2013) synthetized the literature regarding the relation between human capital and growth and showed that in many studies these relation could be positive and significant even if the human capital is measure as stock (Mason at all, 2012, Cohen and Soto, 2007, Kruger and Lindhal, 2001, Barro and Lee, 2010), as flow (Bils and Klenow,2000, Gemmel, 1996, Barro,1991, Mankiw, Romer and Weal ,1992) or as investment (Aghion et al ,2009, Keller, 2006) but there are other study that highlight a negative and insignificant relation (Pichett, 2001, Benhabib and Spiegel, 1994). Pritchett (1996) explained this negative result based on tree deficiencies: the school do not create the human capital. Because education does not improve the aptitudes that increased productivity, the marginal productivity of education decreased, while the demand for educated labor stagnated and the supply of labor increased meanwhile the human capital is oriented in activities which are not productive.
Holland et all (2013) demonstrated that skill accumulation made show a positive contribution to output grow in all countries examined between 1982-2005, and that growth in high skills contributions was also positive in all countries, but in some countries (Finland, Germany, Italy, Japan, Netherlands, Sweden and the UK) these exceeded the positive contributions of growth of medium skills.
Bils and Klenow (2000, p.1177), tried to find how much of the relation between schooling initial enrolment and growth rate per capita of GDP reflect the causality relation and they highlight that “the channel from schooling to growth is too weak to plausibly explain more than one-third of the observed relation between schooling and growth…and part of the relation between schooling and growth may reflect omitted factors”.
There isn’t a large literature on the impact of human capital on output grow in Romania. Földvári and Leeuwen (2009) analyzing the relation between capital accumulation, including human capital and growth in Central Europe during 1920-2006 showed that Romania and Bulgaria, the poorest countries of Central Europe had a lower human capital stock per worker expressed in monetary value in 2000-2005 with a decreased tendency as compare to 1970-1990 (98,769 GK 1990dollars in Romania and 76,596 GK 1990 dollars in Bulgaria as compare 485,662 GK 1990dollars in Austria or 238,052 GK 1990dollars in Polonia) that could explain the slower per capita GDP growth. Ramos et all (2009) who analyzed the effect of over-educated workers on regional economic growth in the European Union, founded that using the traditional indicators of human capital: schooling years, the percentage of working population with secondary studies, the coefficient of the model of growth are positive but are not statistically significant. But the coefficient was significant when it was associated with the percentage of over-educated workers, which could means that over education could be seen as an investment and not as a cost.
Neagu, 2012, using a linear regression to model the relation of human capital to economic growth in Romania by incorporating in the model the both components: health and education, found a strong correlation between educational variables and

GDP, for 1990-2010, and that the highly educated people are influencing more the economic output than the secondary educated ones.

Varly at all (2014,p.14) highlight in their study regarding the effects of non-investment in education in Romania that a slight increase (by 1.7 percentage points) of the proportion with secondary education would generate an 0.52% increased of GDP, and raising by 5.4 percentage points of the proportion of 25-64 year old population attaining tertiary education would have an impact on GDP around 3.6%. Sandie Blanchet (2014, p.8[2]), concluded based on this study that "if the investment in education remain slow, Romania will lose 12-17 billion Euro between 2015-2025, but if the Romania will increased from 4.1% to 6% of GDP investment in education, the GDP economic growth will increase from 2% to 2.7-2.95%"

Munteanu and Maior (2015) analyzed the impact on human capital and creative industries on regional growth in Romania and found that the share of enterprises active in creative industries had a great impact on economic growth, followed by enrolment of secondary education, but the enrolment in tertiary education had a negative impact.

Pop-Silaghi and Medeşfălean (2014) using a augmented Cobb Douglas production function, in which they added as new variables patents and human capital (expressed as the secondary school graduates), proved that in Romania in the period 1990-2010, the impact of human capital on growth was negative and insignificant. The authors explained this result based on lack of correlation between skills offers by education and the requirement of labor market skills and by the proxy used as human capital.

Methodologies and date

In order to highlight the impact of human capital on growth, we followed the methodologies used by Baldacci et. all (2004), Benhabib and Spegel (1994), Földvári and Leeuwen(2009), starting with a production function similar to Mankiw, Romer and Weil (1992):

$$Y_t = A_t K_t^{\alpha} H_t^{\beta} L^{\gamma}{}_t \qquad (1)$$

We modified equation (1) in order to capture the impact of human capital including both education and health aspects. Taking into consideration the Lucas (1988) study that emphasized that changes in human capital promote growth we used in the first model as proxy for human capital three variable: he for health capital, and two variable for education capital: ratio of secondary enrollment to tertiary enrollment (eds/edt), taking into consideration the future needs for more educated labor forces, and the expenditure to education as percent of GDP (noted ed) that highlight the financial efforts (private and government) to improve the human capital in Romania.

So, we considered the following growth equations:

$$\Delta g = f\,(g\,(-1),\ s_k,\ \Delta emt,\ he,\ eds/edt,\ ed) \qquad (2)$$

$$\Delta g = f\,(g\,(-1),\ s_k,\ ems/em,\ he,\ eds/edt,\ ed) \qquad (3)$$

where : Δg is the annual change in real GDP growth per capita, expressed as GDP per

[2] *See Sandie Blanchet, the UNICEF Representative for Romania in the Foreword of Cost of non-investment in education in Romania, Varly at all (2014)*

capita chain linked volumes (2010), euro per capita;

log(g(−1)) is the lagged logarithm of GDP per capita used to control the expected reduction in growth rates as per capita incomes increase (as Baldacci et. all, 2004 used in their growth equation);

s_k is the investment ratio, measured as gross fix capital formation in percent of GDP like Baldacci et. all (2004);

Δ emt refers to the change in the employee with tertiary studies (levels 5-8); we choose to use these indicator as proxy for L in order to capture only the contribution of this high employee on the growth;

ems is the employee with upper secondary studies (levels 3and4);

em is the total employee (L in the equation 1);

he refers to the stock of the health human capital using as proxy the under 5 child mortalities, like Baldacci et. all (2004);

eds/edt refers to the stock of education of human capital proxies by the ratio of secondary enrollment in tertiary enrollment;

ed referes to the education capital expressed as ratio of annual expenditure on educational institutions on GDP.

We don't use both stock and flow variable for human capital variable as in the Baldacci et. all (2004) methodologies because our data series are too short (cover only 1995-2015 period). The sources of data are Eurostat data and Romanian statistical yearbook 2014, National Institute of Statistic.

Table 1 shows the results for statistical descriptions of the model variables: mean, median, the maximum and minimum value, standard deviation, skewness and kurtosis and J. Bera coefficient.

Table 1

Summary descriptive statistics of the data

	ED	EDS	EDT	EM	EMT	s_k	g	HE
Mean	5.0	775463.2	589361.7	15632.1	1260.7	24.8	5363.2	3.3
Median	5.4	773843.0	582221.0	15610.9	1279.0	24.3	5600.0	3.3
Maximum	6.0	888768.0	907353.0	17103.6	1716.1	38.4	7200.0	5.3
Minimum	3.0	687919.0	354488.0	14596.8	914.4	18.3	3600.0	2.0
Std. Dev.	1.0	53928.1	169385.6	842.7	256.3	5.2	1288.1	1.1
Skewness	-1.2	0.34	0.40	0.38	0.0	1.3	-0.2	0.3
Kurtosis	2.7	2.71	2.13	1.88	1.7	4.5	1.5	1.8
Jarque-Bera	4.4	0.42	1.11	1.45	1.4	7.3	2.0	1.5
Probability	0.1	0.81	0.57	0.48	0.5	0.0	0.4	0.5
Observations	19.0	19	19	19	19.0	19.0	19.0	19.0

Source: Author computation using the Eurostat data bases and Romanian statistical yearbook 2014

The statistical analysis of the model reveals significant differences with a relative large standard deviation. Also, there is an asymmetry on the right side for the data series, while Kurtosis increases from 1.5% (GDP per capita in real-g) to a maximum of 4.5 (fix capital formation as percent of GDP-noted s_k). The data in level were not stationary (Annex 1), being transformed by applying the logarithm to all variable while a differentiation of order one was applied for g, emt and he. By using the logarithm of the variable, we reduced the level of errors in assessing the impact of education on economic growth, according to the Fuente and Cicoone (2002).
The data were not stationary (Annex 1), so we applied the logarithm for all the variables and applied the following transformations : a differentiation of order one was applied for real GDP per capita, health capital and for labor expressed as employee with tertiary studies (levels 5-8).

The results and conclusions

A valid two OLS regressions models was estimated, considering as independent variable log Δ g and as dependent variable in model 1 log(g(-1)); log(Δemt), log (eds/edt) ,log(s_k), log(ed) and log (Δhe), and as dependent variable log(g(-1)), log(ems (-1)/em(-1)), log (eds/edt) ,log(s_k), log(ed) and log (Δhe).
The equations of the models are:

Model 1

$$\log(\Delta g) = c + \log(g(-1)) + \log(emt/emt(-1)) + \log(eds/edt) + \log(fix) + \log(ed) + \log(\Delta he)$$

The results of the model and the tests for residuals and coefficients are presented in Annex 2.

Model 2

$$\log(\Delta g) = c + \log(g(-1)) + \log(ems(-1)/em(-1)) + \log(eds/edt) + \log(s_k) + \log(ed) + \log(\Delta he)$$

The results of the model and the tests for residuals and coefficients are presented in Annex 3.

The results of the two models are presented in table 2.

Table 2

The results of the models

	Model1				Model 2			
	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
c	1.320538	0.246559	5.355873	0.0002	1.646535	0.294728	5.586617	0.0002
log(g(-1))	-0.28497	0.043849	-6.49886	0.0000	-0.238814	0.048198	- 4.954879	0.0004
log(Δemt)	0.145350	0.053185	2.732919	0.0195				
log (eds/edt)	0.100968	0.035307	2.859683	0.0155	0. 146686	0.045769	3.204901	0.0291

	Model1				Model 2			
$\log(s_k)$,	0.277999	0.053223	5.223342	0.0003	0.280480	0.055036	5.096337	0.0003
log(ed)	0.150308	0.046802	3.211584	0.0083	0.162507	0.047933	3.39028	0.0060
log (Δhe)	0.200485	0.09906	2.023877	0.0680	0.304139	0.101275	3.003102	0.0773
log(ems(-)/em(-1))					0.718344	0.286397	2.508213	0.0120
R-squared				0.84644	R-squared			0.835981
Adjusted R-squared				0.76268	Adjusted R-squared			0.746516
F-statistic				10.10556	F-statistic			9.344250
Durbin- Watson stat				2.275891	Durbin- Watson stat			2.278263

Source of data: Author computation using the Eurostat data bases and Romanian statistical yearbook 2014

As we can see the R-squared is 0.84644 and Adjusted R-squared is 0.76268 in the first model and 0.835981 and Adjusted R-squared is 0.746516, so the power of explanation of models variables are compare to model 1, and all the test for coefficients and residuals show that models are valid. Statistically, the data model indicates a positive and significant correlation between the real change in GDP per capita and the explanatory variables, except for the lag variable of GDP per capita g(-1) which show a negative influence.

We can see that both education capital and health capital positively contribute to the growth GDP per capita in Romania, the result which is consistent with the results of other studies. For example, Baldacci et. all (2004, p.16) highlights that both education and health capital have a positive contribution on the GDP per capita growth but on the different routes and that "the impact of education capital on growth is more pronounced in low-income countries, where an increase of 1 percentage point in the composite enrollment rate is associated with 0.1 percentage point increase in per capita GDP growth. This effect is 1.5 times that registered in middle-income countries. Geographically, the impact is highest in sub-Saharan Africa and lowest in Eastern Europe and Central Asia."

The impact of high skilled workers with university degree on GDP per capita should be greater if we consider that they are employed in sectors with high value added, and the correlation coefficient between this variable in Romania is around 0.8536 for period 1997-2015.The results of the model 1 show that the coefficient for the change in the number of workers with university degree is statistically significant and positive (the level is 0.14), in explaining the GDP per capita change.

The model revealed a positive relationship, statistically significant between GDP per capita and qualification of employees (employer with upper secondary education as percent of total employee) or employee with tertiary education as expected according to economic theory, in according with the results obtained in other studies (Pelinescu, 2015). More, this conclusion is important if we consider the Lucas (1988) and Romer

(1990) new theory of growth that highlights human capital as the main source of long run growth.
As the Benhabib and Spiegel (1994, p.146) demonstrate in their study, in our models a limits could be generated by the fact that the physical and human capital are accumulated factors, they will be correlated with the error term. This would imply the possibility of biased estimates. Another limit comes from the length of the data series (only 19 data in the model 1 and 18 data after adjustment in model 2).

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Annex 1

The stationary test for variable

	Level			First Difference			Second Difference		
	None	Intercept	Trend& Intercept	None	Intercept	Trend& Intercept	None	Intercept	Trend& Intercept
g	3.0843	0.1978	-1.9017	*-2.4028***	*-3.1593***	-3.1792	**-6.7158***	**-6.5503***	**-6.3569***
s_k	-0.1571	-1.8262	-1.9372	**-4.2842***	**-4.1625***	*-4.0670***	**-5.5485***	**-5.3563***	**-5.1986***
Em	**-1.5600**	-1.5684	-2.5710	**-3.2133***	**-3.4289****	**-3.4396*****	**-5.4764***	**-5.3000***	**-5.1153***
Ems	-0.7647	-0.5273	*-3.9467***	**-5.1159***	**-5.8400***	**-5.2724***	**-6.5439***	**-6.2157***	**-5.9549***
Emt	0.3418	-0.5721	**-11.9261***	**-7.5526***	**-10.0691***	**-9.4724***	**-4.8866***	**-4.7569***	*-4.3023***
Ed	0.9406	-1.1940	-2.2494	**-2.9856***	**-3.0618***	**-4.8681***	**-4.2806***	**-4.0819***	*-3.9873***
He	**-3.0174***	-0.7857	-1.3927	-1.4219	*-3.5483***	***-3.6474*****	**-6.1414***	**-5.9199***	**-6.4716***

Nota: * Stationary hypothesis is accepted with probabilities de 1%, respective, ** 5% and *** 10%.

Annex 2

Model 1 and the testes for model 1

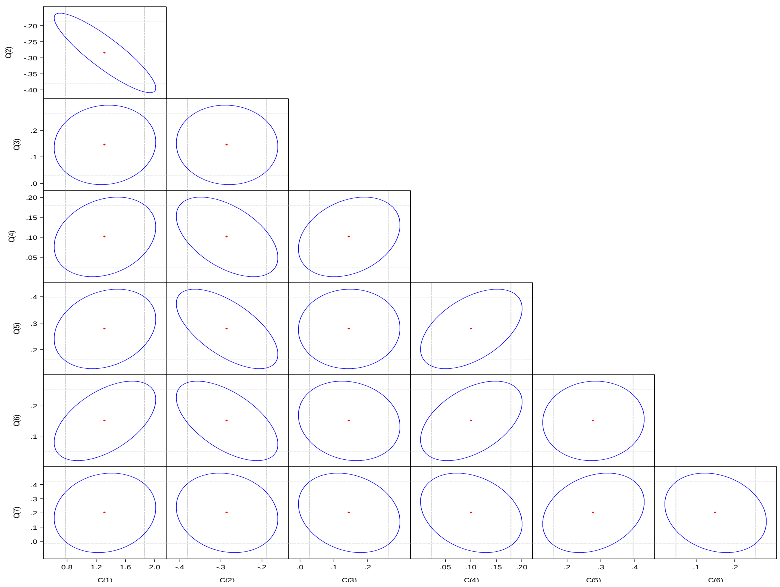
Dependent Variable: LOG(Δg)
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.320538	0.246559	5.355873	0.0002
LOG(g(-1))	-0.284967	0.043849	-6.498859	0.0000
LOG(EMT/EMT(-1))	0.145350	0.053185	2.732919	0.0195
LOG(EDS/EDT)	0.100968	0.035307	2.859683	0.0155
LOG(FIX)	0.277999	0.053223	5.223342	0.0003
LOG(ED)	0.150308	0.046802	3.211584	0.0083
LOG(HE/HE(-1))	0.200485	0.099060	2.023877	0.0680

R-squared	0.846440	Mean dependent var	0.036986
Adjusted R-squared	0.762680	S.D. dependent var	0.044575
S.E. of regression	0.021715	Akaike info criterion	-4.536349
Sum squared resid	0.005187	Schwarz criterion	-4.190094
Log likelihood	47.82714	Hannan-Quinn criter.	-4.488605
F-statistic	10.10556	Durbin-Watson stat	2.275891
Prob(F-statistic)	0.000618		

Test for coefficients

Confidence ellipse



Tests for residuals

Test of Autocorrelation of residuals

Sample: 1995 2015
Included observations: 18

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *| . |	. *| . |	1	-0.142	-0.142	0.4277	0.513
.**| . |	.**| . |	2	-0.219	-0.244	1.5083	0.470
. *| . |	.**| . |	3	-0.155	-0.248	2.0829	0.555
. |**. |	. |* . |	4	0.309	0.201	4.5341	0.339
***| . |	***| . |	5	-0.352	-0.416	7.9718	0.158
. *| . |	.**| . |	6	-0.187	-0.298	9.0161	0.173
. | . |	.**| . |	7	-0.001	-0.253	9.0161	0.252
. |**. |	. | . |	8	0.343	-0.061	13.252	0.103
. *| . |	. | . |	9	-0.076	-0.049	13.482	0.142
. | . |	. *| . |	10	-0.061	-0.164	13.648	0.190
. |* . |	. | . |	11	0.087	-0.043	14.041	0.231
. | . |	.**| . |	12	0.024	-0.308	14.076	0.296

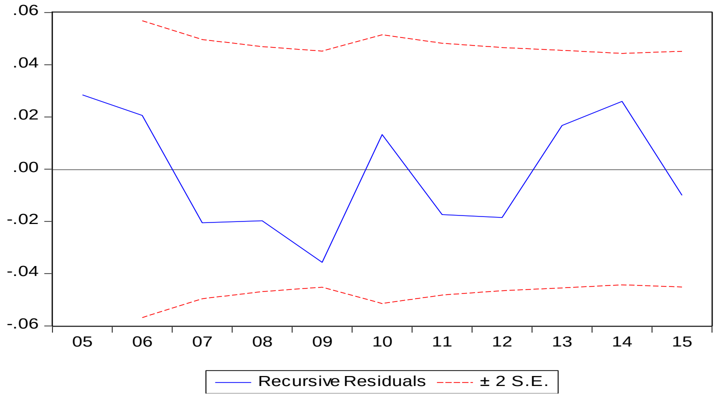
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.702440	Prob. F(2,9)	0.2360
Obs*R-squared	4.940624	Prob. Chi-Square(2)	0.0846

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.363815	Prob. F(6,11)	0.8871
Obs*R-squared	2.980529	Prob. Chi-Square(6)	0.8113
Scaled explained SS	1.598346	Prob. Chi-Square(6)	0.9527

Recursive estimate OLS for stability diagnostic



Annex 3

Model 2 and tests

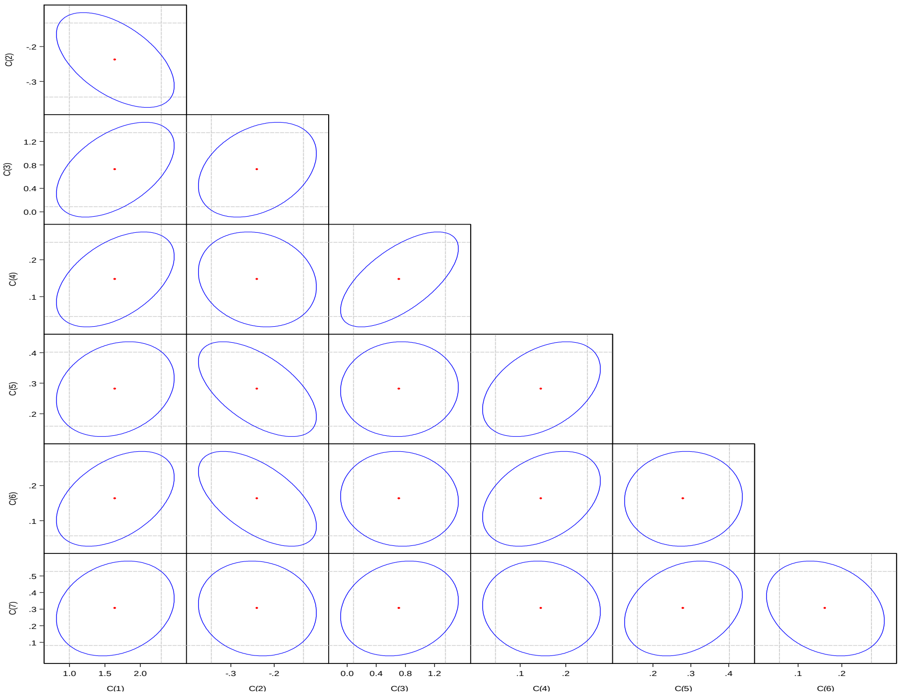
Dependent Variable: LOG(VIT_G)
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.646535	0.294728	5.586617	0.0002
LOG(G(-1))	-0.238814	0.048198	-4.954879	0.0004
LOG(EMS(-1)/EM(-1))	0.718344	0.286397	2.508213	0.0291
LOG(EDS/EDT)	0.146686	0.045769	3.204901	0.0084
LOG(FIX)	0.280480	0.055036	5.096337	0.0003
LOG(ED)	0.162507	0.047933	3.390284	0.0060
LOG(HE/HE(-1))	0.304139	0.101275	3.003102	0.0120

R-squared	0.835981	Mean dependent var	0.036986
Adjusted R-squared	0.746516	S.D. dependent var	0.044575
S.E. of regression	0.022442	Akaike info criterion	-4.470458
Sum squared resid	0.005540	Schwarz criterion	-4.124202
Log likelihood	47.23412	Hannan-Quinn criter.	-4.422714
F-statistic	9.344250	Durbin-Watson stat	2.278263
Prob(F-statistic)	0.000870		

Test for coefficients

Confidence ellipse



Tests for residuals

Test for autocorrelation o residuals by corellogram

Sample: 1995 2015

Included observations: 18

<table>
<tr><th>Autocorrelation</th><th>Partial Correlation</th><th></th><th>AC</th><th>PAC</th><th>Q-Stat</th><th>Prob</th></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>1</td><td>-0.144</td><td>-0.144</td><td>0.4365</td><td>0.509</td></tr>
<tr><td>.**| . |</td><td>.**| . |</td><td>2</td><td>-0.220</td><td>-0.246</td><td>1.5288</td><td>0.466</td></tr>
<tr><td>***| . |</td><td>****| . |</td><td>3</td><td>-0.438</td><td>-0.557</td><td>6.1227</td><td>0.106</td></tr>
<tr><td>. |**. |</td><td>. | . |</td><td>4</td><td>0.339</td><td>0.071</td><td>9.0835</td><td>0.059</td></tr>
<tr><td>. | . |</td><td>. *| . |</td><td>5</td><td>0.058</td><td>-0.153</td><td>9.1762</td><td>0.102</td></tr>
<tr><td>. *| . |</td><td>***| . |</td><td>6</td><td>-0.109</td><td>-0.369</td><td>9.5301</td><td>0.146</td></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>7</td><td>-0.160</td><td>-0.116</td><td>10.370</td><td>0.169</td></tr>
<tr><td>. |* . |</td><td>.**| . |</td><td>8</td><td>0.112</td><td>-0.206</td><td>10.826</td><td>0.212</td></tr>
<tr><td>. |* . |</td><td>. *| . |</td><td>9</td><td>0.155</td><td>-0.182</td><td>11.791</td><td>0.225</td></tr>
<tr><td>. | . |</td><td>. *| . |</td><td>10</td><td>-0.016</td><td>-0.084</td><td>11.803</td><td>0.298</td></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>11</td><td>-0.084</td><td>-0.113</td><td>12.169</td><td>0.351</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>12</td><td>-0.006</td><td>-0.054</td><td>12.171</td><td>0.432</td></tr>
</table>

Normality test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.553258	Prob. F(2,9)	0.2633
Obs*R-squared	4.618775	Prob. Chi-Square(2)	0.0993

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.325889	Prob. F(6,11)	0.9097
Obs*R-squared	2.716718	Prob. Chi-Square(6)	0.8435
Scaled explained SS	1.574213	Prob. Chi-Square(6)	0.9544

Recursive estimate OLS for stability diagnostic