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An Analysis of the Relationship between Life Expectancy at Birth and the Total Public Revenues in Romania, during 1995-2013

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Abstract: This paper studies the nature of the relationship and the impact of the demographic phenomena (by life expectancy at birth indicator) on indicators of public finance (through analysis of total government revenue). In this respect, the analysis took into account the evolution of these indicators in Romania in the period 1995-2013 and the conclusions of the empirical analysis revealed positive link between those indicators.

Keywords: ageing; public revenues; life expectancy

JEL Classification: J11; E62; H53

1. Introduction

The phenomenon of the population aging has become one of the most important factors that affect the potential for developing of countries in many ways, generating the need for policy makers to adapt to changing demographics conditions. In this context, many studies examine the major impact on public finances (Auerbach, 2008, Bilan, 2014; Fehr, 2012; Jukka, et all., 2014; Torben, 2012; Zugravu, 2013).

Significant from this perspective are the costs revealed by age-related spending, but we need to remember that the population structure of a country can have repercussions even on the level of public revenues. In this regard, in this paper we analyzed how evolved the total public income in relation with life expectancy at birth, noting that in Romania, during the analyzed period, government revenues increased as a result of the influence generated by longevity.

This result can be explained by the fact that longevity determines an extension of time in which people contribute to public budgets. Also, we can admit that increase government revenue is determined precisely by the need to cover expenses related to age.

However, we must take into account that future developments will not resemble with everyday reality and the pressure on public finances will be extremely intense. Analysis on the sustainability of public

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finances is justified by the purpose of the governments to finance public services and transfers to the elderly in the future.

2. Data and Methodology

To determine how public finance indicators will be affected by the evolution of age-related variables, we took into account data on total public revenues in the period 1995-2015, as a percentage of GDP, in correspondence with the life expectancy of individuals in Romania, for the same period. The time series were adjusted using logarithm procedures and differentiation (Chirila & Chirila, 2011)

3. Estimating the Relationship between Life Expectancy at Birth and the Level of the Total Public Revenues

3.1. Stationarity

To be stationary, life expectancy variable values were logged and were calculated first difference. For public revenues we have calculated using logarithm procedures.

3.2 Model estimation

Table 1. Model estimation

Dependent Variable: L_GOVREVENUE

Method: Least Squares

Sample (adjusted): 1996 2013

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.475084	0.011573	300.2825	**0.0000**
DL_LIFEEXPECTB	3.965792	1.756611	2.257638	**0.0383**

R-squared	0.241596	Mean dependent var	3.491078
Adjusted R-squared	0.194196	S.D. dependent var	0.043249
S.E. of regression	0.038824	Akaike info criterion	-3.555139
Sum squared resid	0.024116	Schwarz criterion	-3.456208
Log likelihood	33.99625	Hannan-Quinn criter.	-3.541497
F-statistic	5.096931	Durbin-Watson stat	1.315360
Prob(F-statistic)	0.038298		

Source: own calculation

The model is: L_GOVREVENUE = 3.475 +3.965 DL_LIFEEXPECTB

The probabilities associated with the t test (to test the significance of the regression model parameters) are smaller than 0.05, so are the parameters of the regression model are statistically significant. The

model shows that government total revenues depend on DL_LIFEEXPECTB . The relationship between variables is strong, DL_LIFEEXPECTB explain a proportion of 24.16 of L_GOVREVENUE

3.3. Hypothesis Testing

*** Testing the lack of autocorrelation of errors**

Table 2. Errors correlogram

Sample: 1996 2013
Included observations: 18

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |**. |	. |**. |	1	0.249	0.249	1.3180	0.251
. | . |	. *| . |	2	-0.038	-0.107	1.3513	0.509
.**| . |	.**| . |	3	-0.283	-0.265	3.2745	0.351
. *| . |	. | . |	4	-0.176	-0.047	4.0696	0.397
. |* . |	. |* . |	5	0.088	0.141	4.2851	0.509
. |* . |	. | . |	6	0.164	0.040	5.0913	0.532
. |* . |	. | . |	7	0.114	0.006	5.5162	0.597
. |* . |	. |* . |	8	0.152	0.201	6.3468	0.608
. *| . |	. *| . |	9	-0.130	-0.155	7.0203	0.635
.**| . |	.**| . |	10	-0.292	-0.253	10.845	0.370
. *| . |	. | . |	11	-0.151	0.053	12.022	0.362
. | . |	. | . |	12	-0.019	-0.022	12.045	0.442

Source: own calculation

Since all probabilities associated with Ljung-Box test (Q state) are greater than 0.05 (risk assumed) the estimated model errors are auto correlated.

***Testing the errors homoscedasticity**

Table 3. Correlogram of squared errors

Sample: 1996 2013
Included observations: 18

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |**. |	. |**. |	1	0.283	0.283	1.6981	0.193
. |* . |	. | . |	2	0.078	-0.002	1.8350	0.400
. *| . |	. *| . |	3	-0.163	-0.201	2.4740	0.480
.**| . |	.**| . |	4	-0.281	-0.207	4.5070	0.342
. | . |	. |* . |	5	-0.029	0.141	4.5302	0.476
.**| . |	.**| . |	6	-0.222	-0.285	6.0143	0.422
. *| . |	. *| . |	7	-0.172	-0.168	6.9773	0.431
. *| . |	. *| . |	8	-0.160	-0.104	7.8945	0.444
. *| . |	. *| . |	9	-0.103	-0.074	8.3224	0.502
. |* . |	. |* . |	10	0.191	0.088	9.9560	0.444
. |**. |	. |**. |	11	0.319	0.228	15.187	0.174
. |* . |	.**| . |	12	0.097	-0.227	15.746	0.203

Source: Own calculation

Since all probabilities associated Ljung-Box test (Q state) applied squared errors are greater than 0.05 (risk assumed) the estimated model errors are homoscedastic.

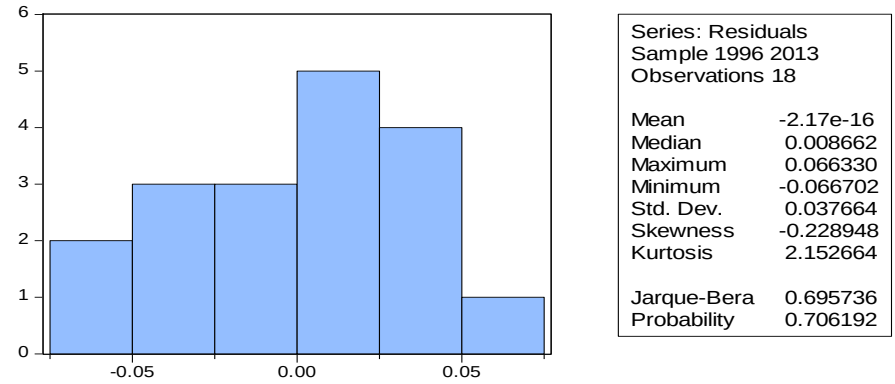

Figure 1. The distribution of the estimated error of the regression model

Since the probability associated Jarque-Bera test is greater than 0.05 errors follow a normal distribution law.

4. Conclusion

Therefore, the regression model assumptions are met. Thus, in the analyzed period, in Romania public revenues depend on the life expectancy. We finds that there is a positive relationship between these two parameters, which leads to the conclusion that public revenues increased as life expectancy at birth has increased. This conclusion leads us to the idea that in the analyzed period total public revenues increased because of the longer life of the taxpayer, which is consistent with other research findings in.

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