7. The Relationship between Health Care Expenditures and Income in the Selected Transition Economies: A Panel Smooth Transition Regression Analysis

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Abstract

The relationship between health care expenditure and income of transition economies which are members of the European Union are evaluated for the 1995 – 2011 period by Panel Smooth Transition Regression Model. In the study, a second model is established in order to evaluate the effect of age structure, which is an important factor in explaining changes in health care expenditures, by adding the ratio of population under 15 and the ratio of population over 65. In addition, the lagged value of the ratio of public expenditures on health care is added to the model. As a result of the study, there is only one relatively sharp transition observed if income and time are considered as explanatory variables in the related period, but actually by adding age structure variables this transition shows two rather smoother transition structures.

Keywords: extreme regimes, non-linear models, European Union, income elasticity, public expenditures on health

JEL Classification: I1, P20, C30

1. Introduction

After the disintegration of the Soviet Union, 29 transition economies emerged, based on the 2000 IMF report[3]. Then, several countries were added to list by World Bank subsequently. Health statistics demonstrated better results in the Soviet Union than

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[3] *http://www.imf.org/external/np/exr/ib/2000/110300.htm#I.*

Tsarist Regime. After the Soviet Union period, emerged countries' health statistics exhibited better results, especially because of the increasing allocation of GDP to health care expenditures. From 1995 to 2012, the average per capita health care expenditures increased four times in the transition economies which are members of the European Union and our sample countries in this study. There are increasing numbers of studies for explaining determinants of health care expenditure. In Kleiman (1974) and Newhouse (1977), income was stated as the most crucial part for explaining differences in health care expenditure. Apart from the income determinant, there are also some variables regarding the structure of society. For instance, in Leu (1986) and Culyer (1988), the age structure of the community is explained as an important component of the variation of health care expenditure. Furthermore, proportion of young (ages under 15) and old (above 65 or 75) people over the active and whole population were added in models for explaining the per capita health care expenditure. In addition to these variables, after Newhouse (1992), the technological progress is seen as an important factor as well. Some other studies added a time index to the model in order to observe the effect of technical change (Gerdtham and Löthgren, 2000).

The core question raised by authors is whether health care expenditure is luxury or necessary. The main point of our study is regarding this question. In order to meet our aims, a balanced panel data is used and the plan of our study is as follows: section two summarizes literature, section three explains the PSTR model, section four presents the empirical results and, finally, section five shows our conclusions.

2. Literature Review

The linkage between income and health care expenditures was examined by various types of studies. In Gerdtham and Löthgren (2000), panel cointegration analysis was used for 21 OECD countries for the 1960-1997 period and it was found that both health care expenditure and gross domestic product are non-stationary and cointegrated. Narayan and Narayan (2008) also examined 8 OECD countries for the 1980-1999 period by using panel cointegration analysis and they found that income was elastic and had statistically significant positive impact on health expenditures in the long run in these countries. Chakroun (2009) used panel smooth transition regression model for investigating the relationship between income and health care expenditures. According to the results of the study, he found that health expenditure and income relationship seems rather nonlinear and also that health care is a necessity good rather than a luxury one.

Similarly, Baltagi and Moscone (2010) found that health care is a necessity rather than a luxury by using panel analysis for 20 OECD Countries in 1971-2004 periods. Furthermore, Wang (2011) considered data for 1986-2007 periods for 31 countries. According to quantile-type panel analysis results, it was found that expenditure growth can lead to economic growth, however economic growth can reduce expenditure growth.

Table 1

Literature Summary

Authors Period Countries	Methodology	Main Result(s)
McCoskey and Selden (1998) OECD countries	Panel Unit Root Test	Using a test that exploits the panel nature of the data, it is possible to reject the unit root hypothesis for both series (HCE and GDP).
Nilgun Cil Yavuz, Veli Yilanci, Z. Ayca Ozturk (2013) 1975-2007 Turkey	ARDL Model	Per capita income and per capita health expenditures are cointegrated. Income has no effect on health expenditures in the long run.
Gerdtham and Löthgren (2000) 1960 – 1997 21 OECD countries	Panel Cointegration	Both health expenditure and GDP are non-stationary and cointegrated.
Jewell *et al*. (2003) 1960 – 1997 20 OECD Countries	Panel Unit Root Test	Health expenditures and gross domestic products are stationary around one or two breaks.
Silvestre (2005) 1960 – 1997 20 Developed OECD countries	Panel Unit Root Test	Panel data sets of real per capita HCE and GDP arestationary around a broken trend that exhibits multiple structural breaks.
Andoh *et al*. (2006) 1990 – 2000 All African countries	Multiple Regression Analysis	In addition to conventional determinants (development, sanitation, and education), other factors also affected mortalities in Africa in the 1990s (national net income per capita, HIV/AIDS and political status).
Hartwig (2008) 1971 - 2003 19 OECD countries	Baumol's model	The Baumol variable (the difference between wage and productivity growth) is found to contribute significantly to the explanation of HCE growth.
Narayan K. P. and Narayan S. (2008) 1980 - 1999 8 OECD countries	Panel Cointegration	Income had an elastic and statistically significant positive impact on health expenditures in the long run.
Chakroun (2009) 1975 - 2003 17 OECD countries	PSTR Model	Health care is a necessity rather than a luxury and health expenditure and income seems rather nonlinear.
Murthy and Okunade (2009) 2001 83% of African countries	OLS and Robust LAE Estimators	Positive effect of real per-capita foreign aid on real per-capita health expenditure also they found that health care is a need and a normal good.
Baltagi and Moscone (2010) 1971 - 2004 20 OECD countries	Panel Model	Health care is a necessity rather than a luxury, OLS elasticities are higher than one and CCE elasticities are lower than one also taking negative values for some countries.

Authors Period Countries	Methodology	Main Result(s)
Biggs *et al*. (2010) 1960 – 2007 22 Latin American countries	Panel Regression	During periods of increasing poverty or inequality public health improved only marginally with increases in GDP.
Duclos and Échevin (2011) Canada (1996 - 2005) USA (1997 - 2005)	Sequential Stochastic Dominance Procedures	Welfare for both Canadians and Americans has not unambiguously improved during the last decade over the joint distribution of income and health, in spite of the fact that the uni-dimensional distributions of income have clearly improved during that period.
Esmaeili *et al*. (2011)1996 - 2004 Selected Islamic countries	Regression Model	Income level has a positive effect on population health, but the level of income distribution is not significant.
Wang (2011) 1986 - 2007 31 countries	Quantile-type panel model	Expenditure growth can stimulate economic growth however; economic growth can reduce expenditure growth.
Amiri and Ventelou (2012) 1970 – 2009 20 OECD countries	Toda and Yamamoto test	Bidirectional Granger causality is predominant.
Allanson and Petrie (2013) 1999 – 2004 United Kingdom	Probit Survival Model	Health changes due to expected mortality and expected morbidity changes both had a disequalising effect over this period, with the overall effect dominated by health losses due to expected deaths.
Forget (2013) 1974 – 1979 Dauphin, Manitoba	Time Series Model	Hospitalization rates declined significantly after the introduction of a guaranteed income.
Lago-Peñas *et al*. (2013) 1970 - 2009 31 OECD countries	Panel Model	The relationship between healthcare expenditure and income is threefold. The estimated short-run elasticity is around 0.3 and the long-run elasticity is 1.1.
Wu *et al*. (2013) 1975 - 2009 16 OECD countries	PSTR Model	Health care behaves as a necessity good for the 16 OECD Countries and the income elasticity of HCE increases when the ratio of public expenditures on HCE rises.
Goode et al. (2014) 1991 – 2009 China	Linear Unbalanced Panel	Children from low income families are more likely to have several health problems than their wealthier counterparts, and some health problems can be more severe for low income children than high income children.
Kuehnle (2014) 2000, 2001, 2006, 2008 United Kingdom	Panel Model	Income has a significant but very small causal effect on subjective child health in the UK.
Ştefan (2008) France	Survey dataset	Compare this to the design-based estimationsobtained by INSEE in the case of the five regions with extra sample

Wu *et al*. (2013) examined 16 OECD Countries for 1975-2009 period using PSTR model. As a result of study it is found that health care behaves as a necessity good for these 16 OECD Countries and the income elasticity of HCE increases when the ratio of public expenditures on HCE rises. The rest of the studies are listed in Table 1 with their main results.Lastly, in Ştefan (2008), a survey dataset was used for French health for the number of times an individual visited a generalist in the last twelve months, for which we are interested in estimating the regional means and it was found that compare this to the design-based estimationsobtained by INSEE in the case of the five regions with extra sample.

3. The Model

The introductory PSTR model with two extreme regimes is explained below;

$$y_{i,t} = \mu_i + \beta_0' x_{i,t} + \beta_1' x_{i,t} g(p_{i,t};\, \gamma, c) + u_{i,t}$$

for*i = 1, . . . ,N,* and *t = 1, . . . , T,* where *N* and *T* denote the cross-section and time dimensions of the panel, respectively.(González *et al*., 2005). The dependent variable y_{it} is a scalar, x_{it} is a *k*-dimensional vector of time-varying exogenous variables, μ_i represents the fixed individual effect, and u_{it} are the errors. Transition function $g(p_{it};\, \gamma, c)$ is a continuous function of the observable variable p_{it} and is normalized to be bounded between 0 and 1, and these extreme values are associated with regression coefficients β_0 and $\beta_0 + \beta_1$(Nieh and Yao, 2013).
According to the work of Granger and Teräsvirta (1993), González *et al*. (2005) considered the following logistic transition function:

$$g(p_{i,t};\, \gamma, c) = \left[1 + exp\left(-\gamma \prod_{j=1}^{m}(p_{i,t} - c_j)\right)\right]^{-1} with \gamma > 0\ and c_1 \leq \cdots \leq c_m$$

where: $c = (c_1, \dots, c_m)'$ is an m-dimensional vector of the location parameters, and the slope of transition function is indicated byγ which determines the smoothness of the transitions (Nieh and Fan, 2012). Considering the two most common cases in practice in order to capture nonlinearity, they correspond to *m* = 1 (logistic) and *m* = 2 (logistic quadratic) (Coudert *et al*., 2014). For every value of m when $\gamma \to \infty$, the PSTR becomes a panel transition regression (PTR) model. Conversely, when $\gamma \to 0$, the transition function is constant and the PSTR estimation becomes a panel with fixed effects (Wu*et al*., 2013). Also, the three regime smoothing transition regression which is the topic of the current study can be modeled as below;

$$y_{i,t} = \mu_i + \beta_0' x_{i,t} + \beta_1' x_{i,t} g_1(p_{i,t}; \gamma_1, c_1) + \beta_2' x_{i,t} g_2(p_{i,t}; \gamma_2, c_2) + u_{i,t}$$

Similarly, parameters c_1 and c_2 are the thresholds giving the location of the transition function and parameters $\gamma_1$and γ_2 are the slope parameters of the transition functions, respectively (Giovanis, 2012).

In addition, it is possible to specify the PSTR model to more than two regimes:

$$y_{i,t} = \mu_i + \beta_0' x_{i,t} + \sum_{j=1}^{r} \beta_j' x_{i,t} g_j\left(p_{i,t}^{(j)};\, \gamma_j, c_j\right) + u_{i,t}$$

where: $r + 1$ is the number of regimes and the $g_j\left(p_{i,t}^{(j)};\, \gamma_j, c_j\right), j = 1, \dots, r,$ are the transition functions (Béreau *et al*., 2010).

In the PSTR model which has more than one regime, if the transition variable (*p*) is different from explanatory variable(s), the elasticities are calculated as below:

$$e_{i,t} = \frac{\partial y_{i,t}}{\partial x_{i,t}} = \beta_0 + \sum_{j=1}^{r} \beta_j g_j (p_{i,t}^{(j)};\, \gamma_j, c_j)$$

On the other hand, if the transition variable is a function of one of the explanatory variables, elasticties are calculated as below:

$$e_{i,t} = \frac{\partial y_{i,t}}{\partial x_{i,t}} = \beta_0 + \sum_{j=1}^{r} \beta_j g_j \left(p_{i,t}^{(j)};\, \gamma_j, c_j\right) + \sum_{j=1}^{r} \beta_j \frac{\partial g_j\left(p_{i,t}^{(j)}; \gamma_j, c_j\right)}{\partial x_{i,t}}$$

(Güloğlu and Nazlıoğlu, 2013).

4. Emprical Results

4.1. Data

In order to evaluate relationship between health care expenditure and income, annual data is used on 11 transition economies from 1995 to 2011. We obtained our panel data from the earliest possible year of 1995 until the last available year of 2011 and constructed a balanced panel of these economies, which consists of 187 observations for one variable. All variables are gathered from World Bank - World Development Indicators. The selected countries which are members of the European Union are Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia, Slovenia, Poland and Romania. The descriptive statistics of variables are shown below.

Table 2

Summary Statistics of Variables

	$lHCE_{it}$	$lGDP_{it}$	$POP15_{it}$	$POP65_{it}$	$RPEH_{it}$
Mean	2.92	3.89	16.70	14.77	74.56
Median	2.93	3.92	16.13	14.83	73.77
Maximum	3.40	4.32	22.86	18.61	91.68
Minimum	2.26	3.37	13.27	10.84	51.21
Std.Dev.	0.02	0.02	2.22	1.91	9.96
Skewness	-0.38	-0.38	0.76	-0.07	-0.20
Kurtosis	-0.29	-0.49	-0.14	-0.78	-0.64

Notes: This table shows variables' summary statistics which are used in the study. These variables are; Log. health care expenditure per capita(HCE_{it}), Log. gross domestic product per capita(GDP_{it}), Population ages 0-14(% of total, $POP15_{it}$), Population ages 65 and above(% of total, $POP65_{it}$) and Ratio of public expenditure on health($RPEH_{it}$).

Before testing variables' stationarities, cross-section dependence is checked for Pesaran, Frees and Friedman tests.

Table 3

Cross-section Dependence Tests			
	Test statistic	Critical value	Prob.
Pesaran	6.312*		0.0000
Frees	2.097	0.1996[a]	
Friedman	49.897*		0.0000
[a] The value is for %5. *%1sig. level **%5 sig. level ***%10 sig. level			

According to Pesaran, Frees and Friedman cross-dependence tests, the null hypothesis is rejected; therefore, there is a cross-section dependence in our model. Consequently, in order to check the variables' stationarities, the second generation Pesaran test is applied and the results are presented in Table 4.

In Table 4, we can reject the null hypothesis for some results. After choosing the most suitable models according to AIC, SIC and economic significance, it is possible for our model to apply PSTR analysis after rejecting the null hypothesis for both of models. The second step for PSTR model is testing H_0: PSTR with r=1 against H_1: PSTR with at least r=2 (r denotes transition function number). We continue testing until we cannot reject the null hypothesis.

Table 4

Pesaran (2003) Unit Root Test		
Level	Test statistic	Prob.
$lnHCE_{it}$	-1.326***	0.092
$lnGDP_{it}$	-4.923*	0.000
$POP15_{it}$	-2.118**	0.017
$POP65_{it}$	-3.770*	0.000
$RPEH_{it}$	-1.109**	0.029
*%1sig. level **%5 sig. level ***%10 sig. level.		

As a result of Pesaran test results, $lnGDP_{it}$ and $POP65_{it}$ variables are stationary at %1 significance. Likewise, $POP15_{it}$ and $RPEH_{it}$ variables are stationary at %5 significance. Lastly, $lnHCE_{it}$ is stationary at %10 significance.

4.2. Estimation Results

After checking our variables stationarity, the first step of PSTR analysis is testing linearity. Our hypothesis is H_0: Linear model, H_1: PSTR model with at least one threshold variable.

In Table 5, we cannot reject the null hypothesis for model 1. Therefore, model one has one transition function and indicates two extreme regimes. But the null hypothesis can be rejected for model 2. So, after this step, our hypotheses are H_0: PSTR with r=2 against H_1: PSTR with at least r=3. In this step, we cannot reject the null hypothesis at %1 significance level. Thus, model 2 exerts two transition functions and three extreme regimes.

Table 5

Linearity Test					
Lag length of transition variable	Fisher test stat.	Number of location parameters			
		m=1		m=2	
		Model 1[a]	Model 2[b]	Model 1	Model 2
d=0	LM_F	2.311[0.102][c]	3.384[0.011]	3.689[0.007]	7.599[0.000]
d=1	LM_F	3.507[0.032]	1.920[0.109]	1.883[0.116]	1.718[0.098]
d=2	LM_F	5.022[0.008]	4.266[0.003]	3.278[0.013]	2.359[0.020]
d=3	LM_F	4.564[0.012]	5.447[0.000]	4.129[0.003]	3.191[0.002]
d=4	LM_F	3.812[0.024]	6.649[0.000]	4.284[0.002]	4.164[0.000]
d=5	LM_F	4.697[0.010]	6.407[0.000]	4.113[0.003]*	4.025[0.000]*

[a] $HCE_{it} = \mu_{it}+\theta_1 GDP_{it}+\theta_2 T_{it}+(\theta_1' GDP_{it}+\theta_2' T_{it})\ G(RPEH_{it-d};\gamma, c)+\varepsilon_{it}$

[b] $HCE_{it}=\mu_{it}+\theta_1 GDP_{it}+\theta_2 T_{it}+\theta_3 POP65_{it}+\theta_4 POP15_{it}+(\theta_1' GDP_{it}+\theta_2' T_{it}+\theta_3' POP65_{it}+\theta_4' POP15_{it})G(RPEH_{it-d};\ \gamma, c)+\varepsilon_{it}$

[c] The digits in brackets are the p values(For all tables)

* The most appropriate models according to AIC, SIC and economic significance.

Table 6

No Remaining Non-linearity Test					
Lag length of transition variable	Fisher test stat.	Number of location parameters			
		m=1		m=2	
		Model 1	Model 2	Model 1	Model 2
d=0	LM_F	3.011[0.052]	3.817[0.005]	4.266[0.003]	4.088[0.000]
d=1	LM_F	2.496[0.085]	2.431[0.050]	3.499[0.009]	3.715[0.001]
d=2	LM_F	0.713[0.491]	1.072[0.372]	4.372[0.002]	3.272[0.002]
d=3	LM_F	0.087[0.917]	2.166[0.075]	5.435[0.000]	4.639[0.000]
d=4	LM_F	3.804[0.024]	4.208[0.003]	3.577[0.008]	5.442[0.000]
d=5	LM_F	0.405[0.667]	4.602[0.002]	2.765[0.029][a]	5.489[0.000][b]

[a] Model 1 has one transition function for %1 sig. level.

[b] Model 2 has two transition function for %1 sig. level.(For H_0: r=2 against H_1: PSTR with at least r=3 test statistic and prob. is 2.450[0.016]).

According to the linear model results, firstly, after adding only the income variable to the model, the income elasticity of health care expenditure is 1.006, so that health care expenditures behaves like a normal good. Secondly, after adding time variable to the model the elasticity value decreases to 0.8001. Thus, it is clear that neglecting time variable can cause overestimation of the elasticity value, and it also shows that technological progress has occurred in health care services in the mentioned period. Moreover, HCE is not a normal good; it actually behaves as a necessity good. However, capturing the age structure causes a minor value change in the elasticity, according to linear model 3 results. Therefore, the age structure changes the relationship between income and health care expenditures.

Based on AIC, SIC and economic significance, the first model has one transition function (r=1) and the slope parameter value is 2.8179, but the second model has two transition functions (r=2) and the slope parameters' values are 0.1368 and 0.2269, respectively. According to the first model results, one relatively sharp transition occurred in the 1995-2011 period. However, looking at the second model results, the age structure increases our model specification, and one may clearly see that actually there are two relatively smoother transitions emerged in that period for the related countries.

Table 7

Estimation Results						
Parameters	Linear Model			PSTR Model		
	L.M. 1	L.M. 2	L.M. 3	Model 1 r=1 m=2 d=5	Model 2 r=2 m=2 d=5 First transition	Second transition
θ_1	1.0056[0.000]	0.8006[0.000]	0.7949[0.000]	0.6605*	0.6766*	0.6766*
θ_2		0.0216[0.000]	0.0017[0.000]	0.0342*	-0.0132***	-0.0132***
θ_3			-0.0270[0.000]		-0.1047*	-0.1047*
θ_4			0.0023[0.565]		0.0302*	0.0302*
θ_1'				0.0247*	-0.0722**	-0.1729*
θ_2'				-0.0126*	-0.0110***	-0.0011***
θ_3'					0.0377*	0.0418*
θ_4'					-0.0171*	0.0122***
γ_1				2.8179	0.1368	
γ_2						0.2269
c_1				73.5628	74.3265	0.0003
c_2				85.9729	85.3997	0.0005
AIC	-1.338	-2.275	-2.527	-6.327	-6.485	
SIC	-1.304	-2.223	-2.440	-6.206	-6.174	
RSS	2.811	1.090	0.829	0.297	0.211	
*%1sig. level **%5 sig. level ***%10 sig. level.						

According to model 1 results; the elasticity of HCE 0.6605+0.0247*g ($RPEH_{i,t-5}$; 2.8179, 73.5628, 85.9729)>0 is positive. For extreme values of transition function, these values are 0.6605 and 0.6852. Evidently, HCE behaves as a necessity good. After adding age structure variables to the model, these values for the first and second transitions are; 0.6766-0.0722*g ($RPEH_{i,t-5}$; 0.1368, 74.3265, 85.3997)>0 and 0.6766-0.1729*g ($RPEH_{i,t-5}$; 0.2269, 0.0003, 0.0005)>0, respectively, and both of them are positive.

The time variable has positive effect on health care expenditures 0.0342-0.0126 *g ($RPEH_{i,t-5}$; 2.8179, 73.5628, 85.9729)>0 for model one. On the other hand, it has negative effect in the first and second transitions; -0.0132-0.0110x g($RPEH_{i,t-5}$; 0.1368, 74.3265, 85.3997)<0, -0.0132-0.0110*g($RPEH_{i,t-5}$; 0.2269, 0.0003, 0.0005)<0, respectively, for model two.

The effect of the population above 65 has negative effect in the first and second transitions, like the time variable; first transition; -0.1047+0.0377*g ($RPEH_{i,t-5}$; 0.1368, 74.3265, 85.3997)<0 and second one; -0.1047+0.0418*g($RPEH_{i,t-5}$; 0.2269, 0.0003, 0.0005)<0.

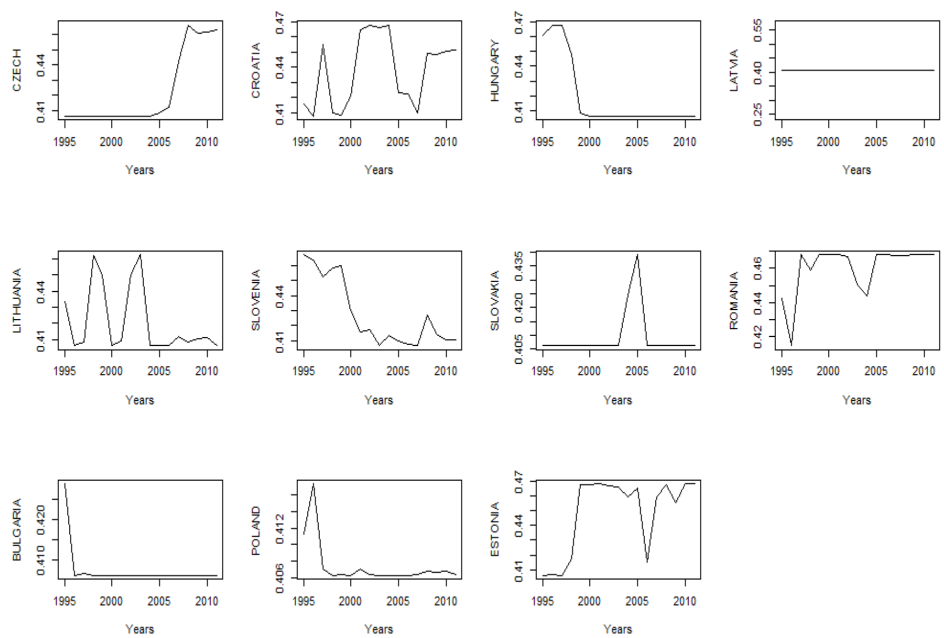
Lastly, the effect of the population under 15 has positive effect in the first and second transitions; first transition; 0.0302-0.0171*g ($RPEH_{i,t-5}$; 0.1368, 74.3265, 85.3997)>0 and second transition is; 0.0302+0.0122*g ($RPEH_{i,t-5}$; 0.2269, 0.0003, 0.0005)>0.

4.3. Estimated Income Elasticities

Figure 1 shows estimated income elasticities of 11 transition economies.

Figure 1

Estimated Income Elasticities



Apart from Latvia, every country does not have stable income elasticity in the related period. Bulgaria, Poland and Hungary have relatively low elasticity values among the other countries after 2000. Likewise, Slovenia's elasticity of income decreases consistently. On the other hand, Croatia, Romania, Lithuania and Estonia show fluctuating structure in their dynamic paths. Lastly, the Czech Republic and Slovakia seemed to be affected by the 2008 economic crisis. Especially, in the Czech Republic, the effect seems to be continuous.

Table 8 shows that health care is a necessity good for each country, obviously. Romania and Latvia have the highest and lowest income elasticity values, respectively, and the average elasticity value is 0.4243 for all sample countries.

Table 8

Average Income Elasticities		
Countries	*Average Income Elasticity*	*RPEH*
Czech Republic	0.4223	% 87.96
Croatia	0.4375	% 84.97
Hungary	0.4193	% 71.41
Latvia	0.4063	% 58.06
Lithuania	0.4210	% 72.26
Slovakia	0.4093	% 79.48
Slovenia	0.4277	% 73.82
Romania	0.4602	% 79.41
Bulgaria	0.4077	% 62.11
Poland	0.4074	% 70.72
Estonia	0.4488	% 79.94
Average	0.4243	% 74.56

In order to check the relationship between the average income elasticity and ratio of public expenditures on health, the correlation coefficient is calculated and it is 0.74. This value shows that the ratio of public expenditure is one of the most important determinants of income elasticity of healthcare for the sample countries in the 1995 – 2011 period.

5. Conclusion

This study analyzes the relationship between health care expenditure and income by the panel smooth transition regression model (PSTR). In addition, a second model is defined in order to include the age structure of the sample countries to the model. Our study's major contribution is defining better model specification by evaluating the age structure of these economies in a panel context. Also, another promising contribution of this study is the estimation of these economies' health expenditure and income relationship by using the PSTR model. According to our model results, health care expenditure, per capita gross domestic product, time trend and age structure variables exhibit non-linear relationships. Firstly, the health care expenditure-income model shows that health care is a normal good; however, it is clear after the second model result that neglecting the age structure leads to overestimation of the income elasticity of health care expenditure. Actually, health care is not a normal good; it is a necessity good for these 11 transition economies. Unlike the previous literature, our results present that health care expenditure can be seen as a necessity good for these economies in the related period. Secondly, ignoring the age structure also leads to misspecification of number of regimes and transition functions. Health care expenditure and income model implies that a relatively sharp transition has occurred in the related period; notwithstanding examining the age structure shows that there are two relatively smoother transitions emerged in the 1995 – 2011 period for these 11 transition economies.

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