Analysis of the convergence of main indicators for funding healthcare in the EU countries

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Introduction

- **Healthcare** is one of the important sector in public economy in the EU countries.
- **Health of population** is a highest value of citizens in the developed democratic countries and the one of the prior target of social policy of the governments in the EU countries (European Commission, 2017).
- The values of **total government expenditure on health** as % of total government expenditure were essentially increased, from **13,32%** for **EU-27** countries in 2000 till **15,35%** in 2017.
- For **EU-28** countries **total government expenditure on health** as % of total government expenditure increased from **13,4%** in 2001 to **14,9%** in 2017.
- In **EU-19** (euro area) this indicator changed from **13,36%** in 2000 to **15,5%** in 2017 (Eurostat, 2020).

Common Policy and Key Factors of Convergence

- The development of the healthcare system in the EU should be considered in the point of **common policy and harmonization** (European Commission, 2010, 2017, 2019).
- The **common policy of the EU** is focused on the ***cohesion and harmonization*** across all main spheres and standards in the countries - members of the EU.

- **Key facts of the economic and social convergence** (European Commission, 2019).

- circulation of euro in the EU as currency of the EU;
- role euro area on the example of the EU-19;
- non-euro area income converges upwards towards euro area;
- EU recovers steadily and converges upwards;
- increasing investments and common strategical projects;
- employment policy and creation million new of new jobs;
- normalization of budget deficits, etc.

The purposes of the study and data

- **The purposes** in this study are

- to argue the background for the joint EU policy in the healthcare funding

- carry out the analysis of the phenomena of convergence of the main indicators for healthcare funding in the EU countries.

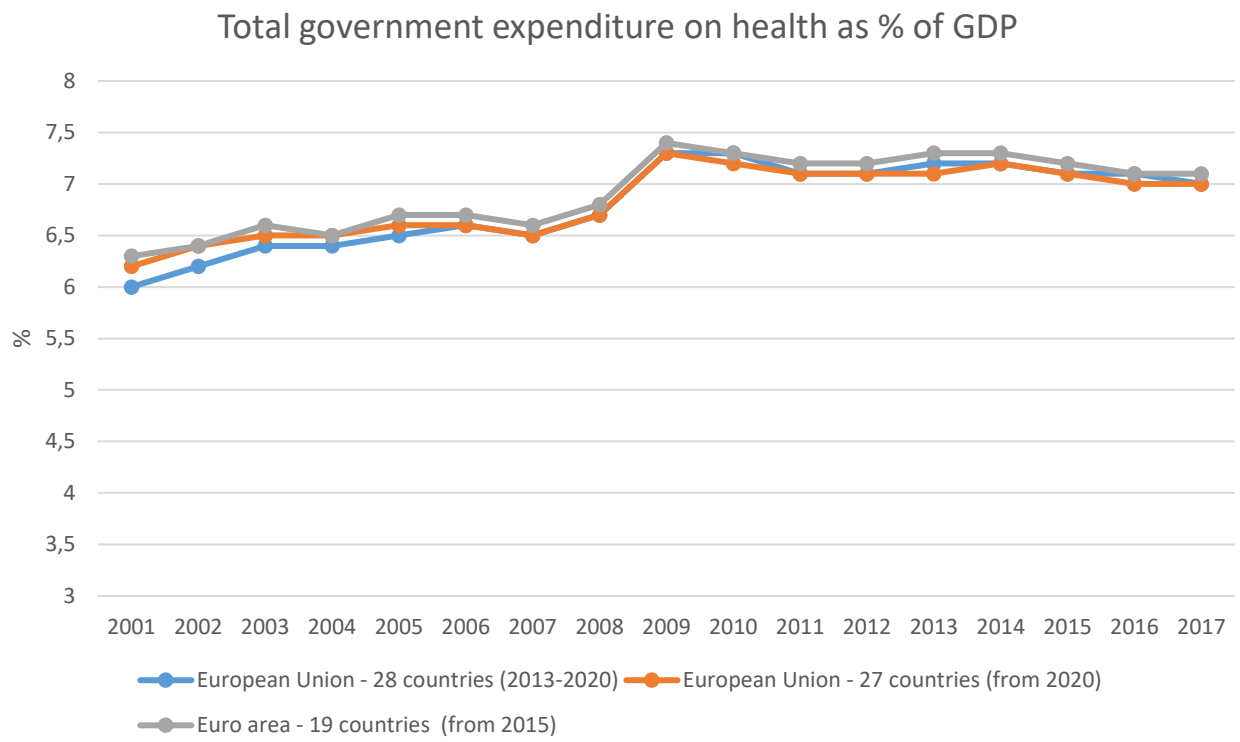
- The analysis was based by using econometric models and the database from Eurostat for main indicators for period of 2000-2017.

- total government expenditure on health as % of GDP;

- total government expenditure on health as % of total general government expenditure;

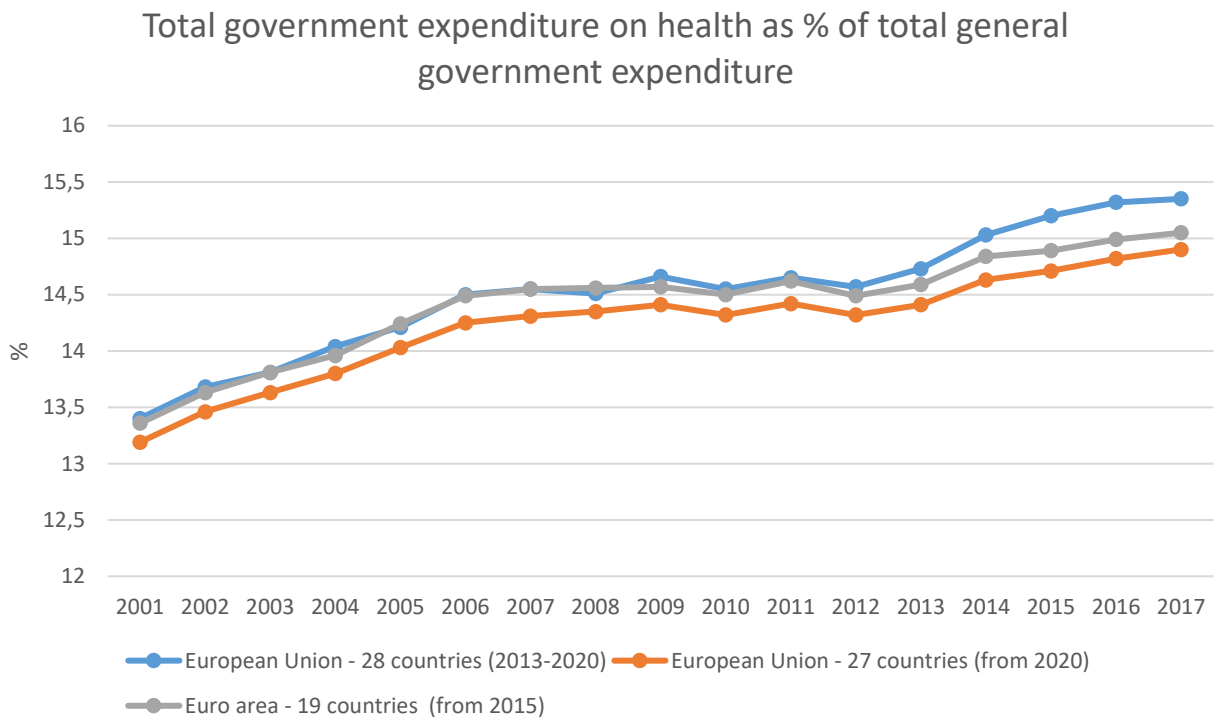
- total government expenditure on health per capita

The dynamics of total government expenditure on health in the EU as % of GDP



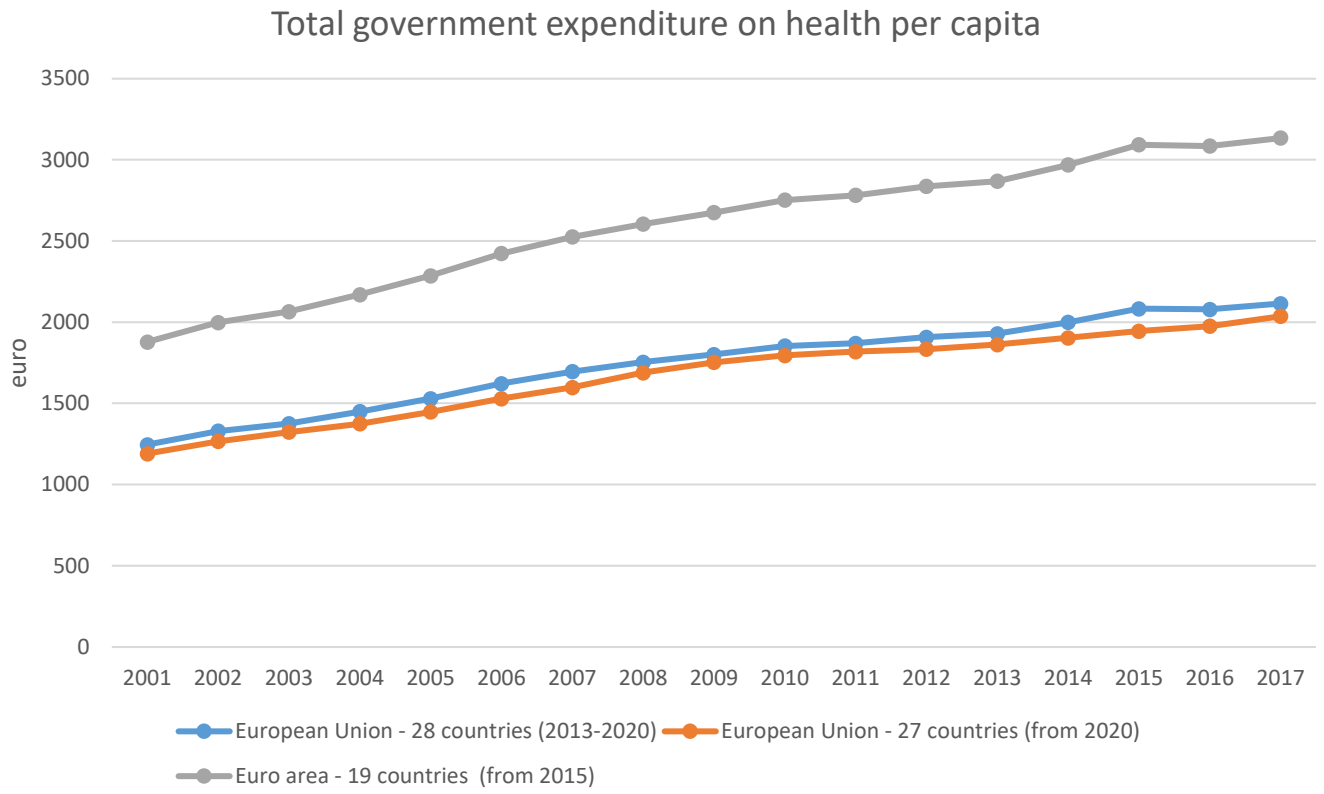
- Total government expenditure on health as % of GDP characterizes the government policy in healthcare in the point of economic development

The dynamics of total government expenditure on health in the EU, as % of total government expenditure



- Total government expenditure on health as % of total general government expenditure describes budget policy and social policy of the government in its relation to healthcare

The dynamics of total government expenditure on health in the EU per capita, euro



- Total government expenditure on health per capita shows the level of economic development of the country, well-being and relative value of the expenditure on health per capita, which are much more higher in rich and well-economically developed countries

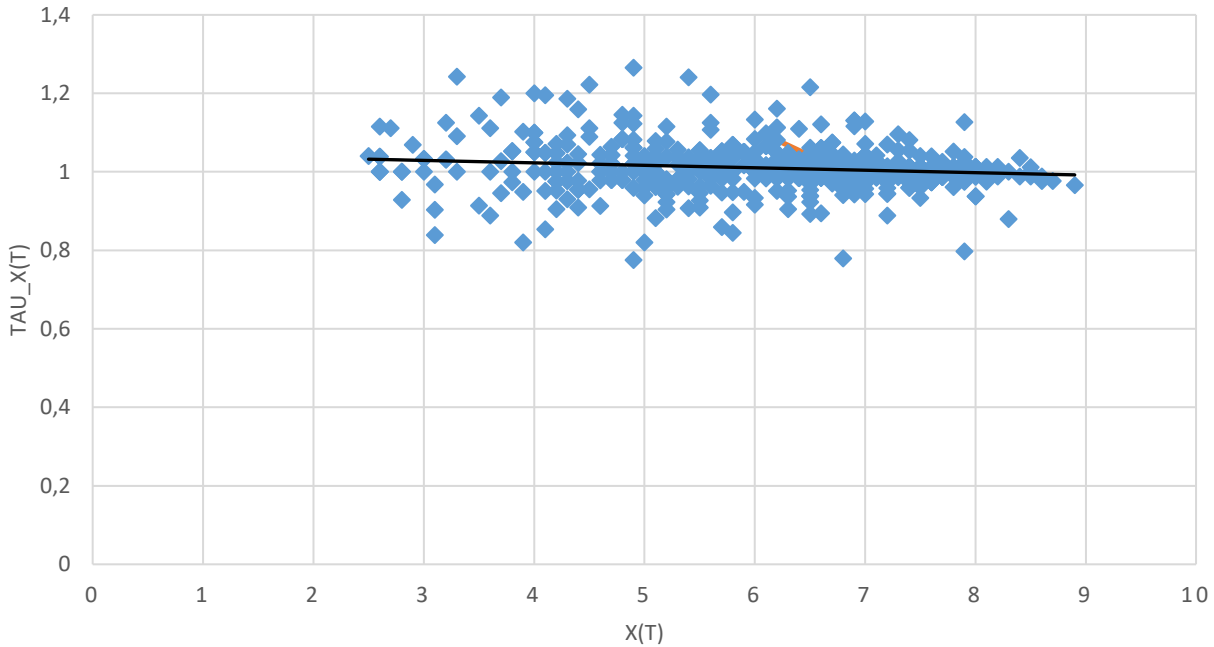
Regression model

$$\tau\_x(t) = b_0 + b_1 \cdot x(t-1) + \varepsilon_t,$$

where

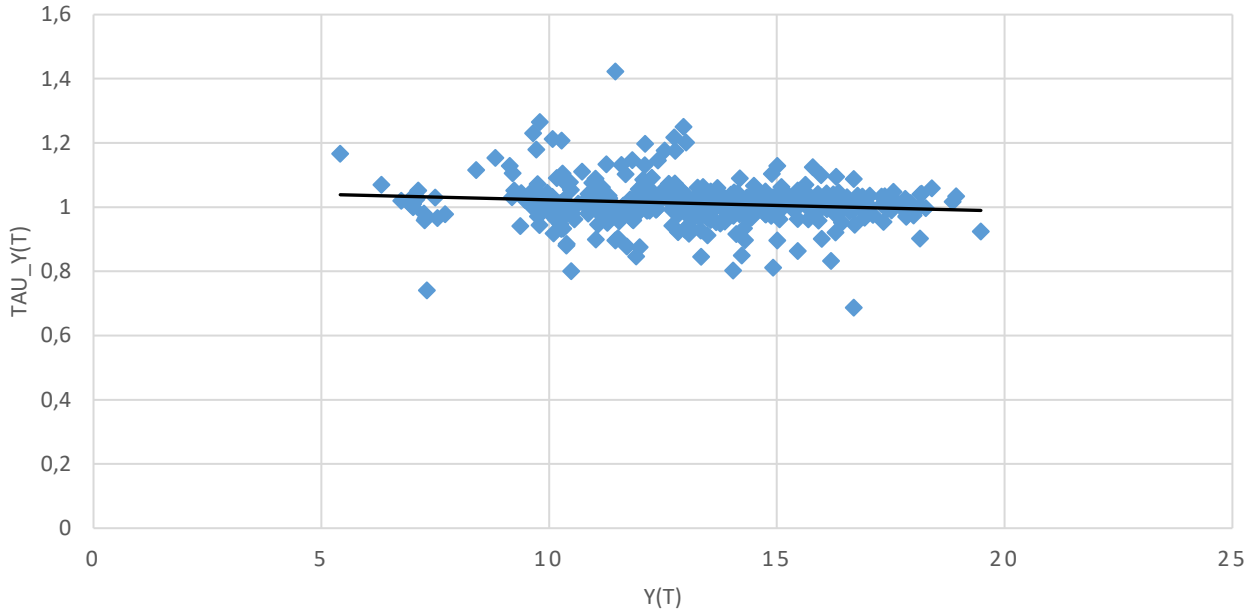
- $\tau\_x(t) = \frac{x(t)}{x(t-1)}$ are growth rates of the total government expenditure on health measured as % of GDP,
- $x(t)$ - is level of total government expenditure on health as % of GDP for time t ,
- $t = 1$ for 2000, $t = 2$ for 2001, etc.,
- b_0 and b_1 are the parameters which need to estimate,
- ε_t are stochastic terms.

Dependence of growth rates of total expenditure on health from their previous levels (measured as total government expenditure on health as % of GDP)



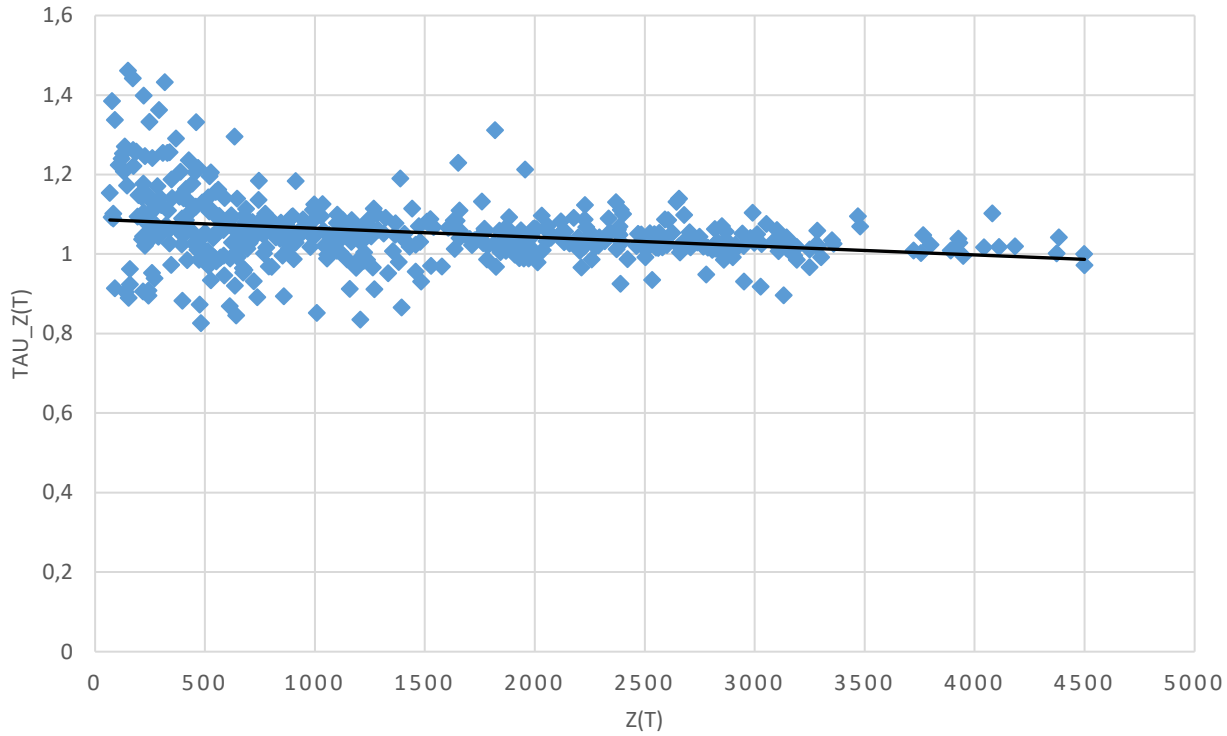
Regression Summary for Dependent Variable: TAU_X_T						
R= 0,14392716 RI= 0,02071503 Adjusted RI= 0,01876426						
F(1,502)=10,619 p<0,00120 Std.Error of estimate: 0,06048						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(502)	p-level
Intercpt			1,047617	0,011861	88,32398	0
X_T	-0,14393	0,044167	-0,00627	0,001923	-3,25867	0,001195

Dependence of growth rates of total expenditure on health from their previous levels (measured as total government expenditure on health as % of total general government expenditure)



Regression Summary for Dependent Variable: TAU_Y_T						
R= 0,13505159 RI= 0,01823893 Adjusted RI= 0,01616771						
F(1,474)=8,8059 p<0,00315 Std.Error of estimate: 0,06252						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(474)	p-level
Intercpt			1,056732	0,015752	67,08364	0
Y_T	-0,13505	0,045511	-0,00344	0,001159	-2,96747	0,003154

Dependence of growth rates of total expenditure on health per capita from their previous levels



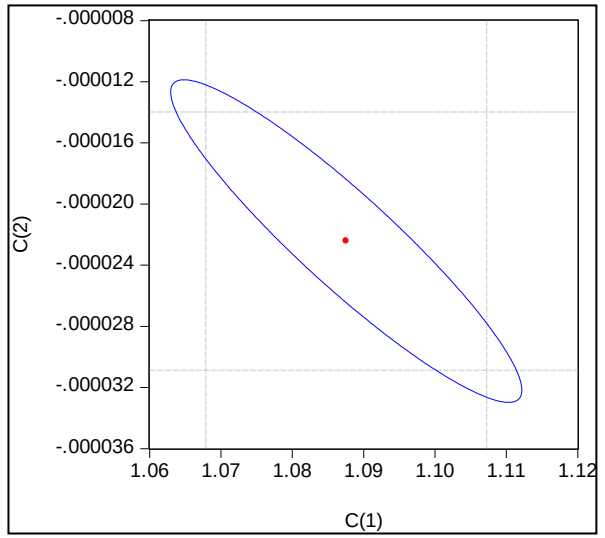
Regression Summary for Dependent Variable: TAU_Z_T						
R= 0,27334319 RI= 0,07471650 Adjusted RI= 0,07276442						
F(1,474)=38,275 p<0,00000 Std.Error of estimate: 0,08331						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(474)	p-level
Intercpt			1,08756	0,006519	166,8175	0
Z_T	-0,27334	0,044182	-2,2E-05	3,62E-06	-6,18671	1,33E-09

Robustness

Dependent Variable: TAU_X_T
Method: Least Squares
Sample: 1 476
Included observations: 476
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

TAU_X_T=C(1)+C(2)*X_T

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.087560	0.010021	108.5239	0.0000
C(2)	-2.24E-05	4.30E-06	-5.218955	0.0000
R-squared	0.074716	Mean dependent var		1.054869
Adjusted R-squared	0.072764	S.D. dependent var		0.086521
S.E. of regression	0.083313	Akaike info criterion		-2.128222
Sum squared resid	3.290091	Schwarz criterion		-2.110720
Log likelihood	508.5169	Hannan-Quinn criter.		-2.121340
F-statistic	38.27543	Durbin-Watson stat		1.472318
Prob(F-statistic)	0.000000	Wald F-statistic		27.23749
Prob(Wald F-statistic)	0.000000			

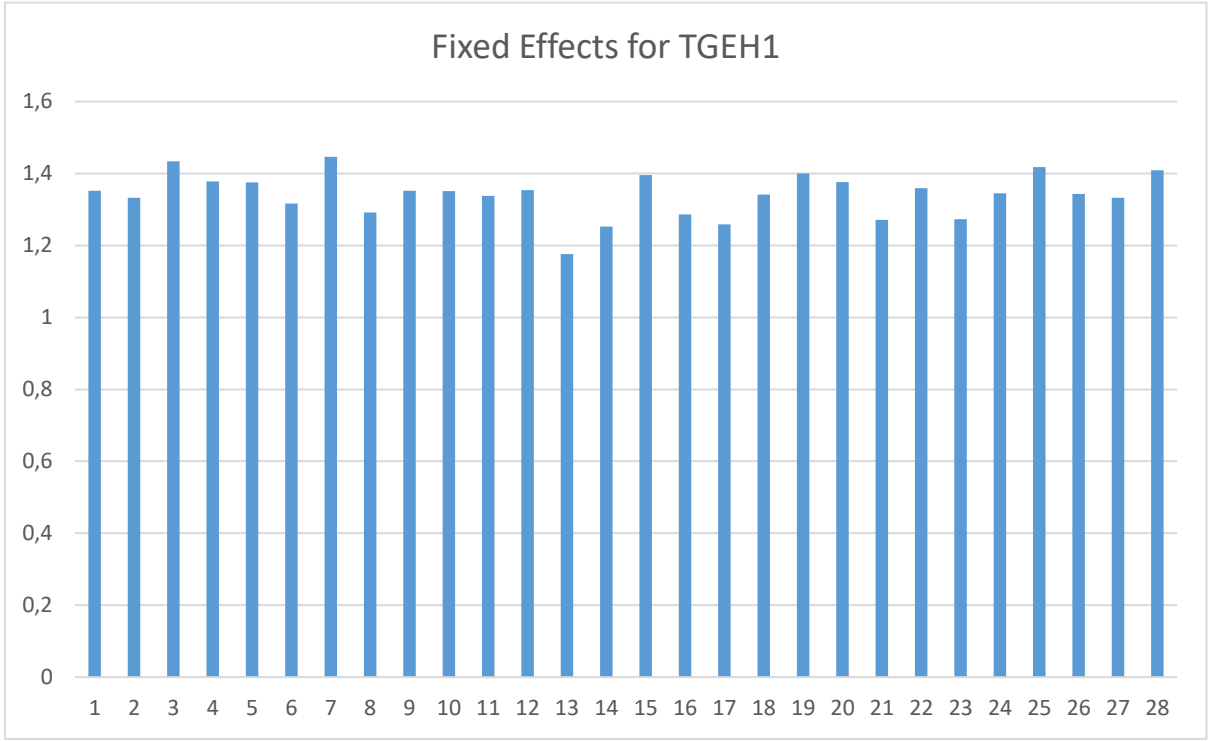


Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	-5.218955	474	0.0000
F-statistic	27.23749	(1, 474)	0.0000
Chi-square	27.23749	1	0.0000
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		-2.24E-05	4.30E-06
Restrictions are linear in coefficients.			

Panel data

Dependent Variable: TAUX?
Method: Pooled Least Squares
Sample: 2001 2017
Included observations: 17
Number of cross-sections used: 28
Total panel (balanced) observations: 476
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X?	-0,02471	0,003736	-6,61564	0
Fixed Effects				
R-squared	0,210361	Mean dependent var		1,010767
Adjusted R-squared	0,160898	S.D. dependent var		0,063034
S.E. of regression	0,05774	Sum squared resid		1,490279
Durbin-Watson stat	2,162747			



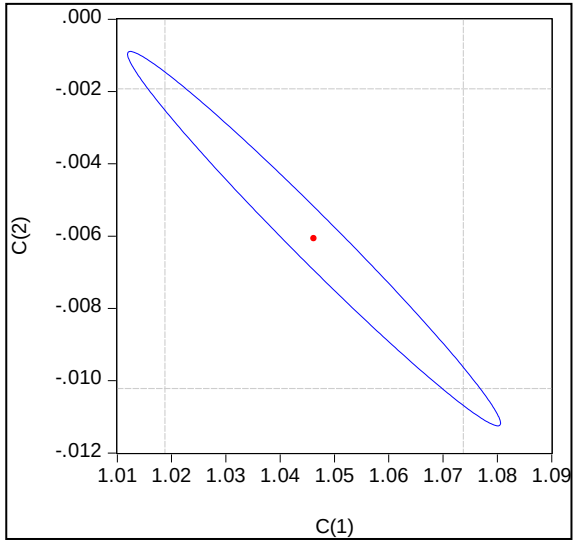
Robustness

Dependent Variable: TAU_Y_T
Method: Least Squares
Sample: 1 476
Included observations: 476
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

TAU_Y_T=C(1)+C(2)*Y_T

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.046243	0.013984	74.81473	0.0000
C(2)	-0.006070	0.002109	-2.878439	0.0042

R-squared	0.018653	Mean dependent var	1.009819
Adjusted R-squared	0.016583	S.D. dependent var	0.062196
S.E. of regression	0.061678	Akaike info criterion	-2.729579
Sum squared resid	1.803192	Schwarz criterion	-2.712077
Log likelihood	651.6399	Hannan-Quinn criter.	-2.722697
F-statistic	9.009741	Durbin-Watson stat	1.894146
Prob(F-statistic)	0.002827	Wald F-statistic	8.285413
Prob(Wald F-statistic)	0.004177		



Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	-2.878439	474	0.0042
F-statistic	8.285413	(1, 474)	0.0042
Chi-square	8.285413	1	0.0040

Null Hypothesis: C(2)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.006070	0.002109

Restrictions are linear in coefficients.

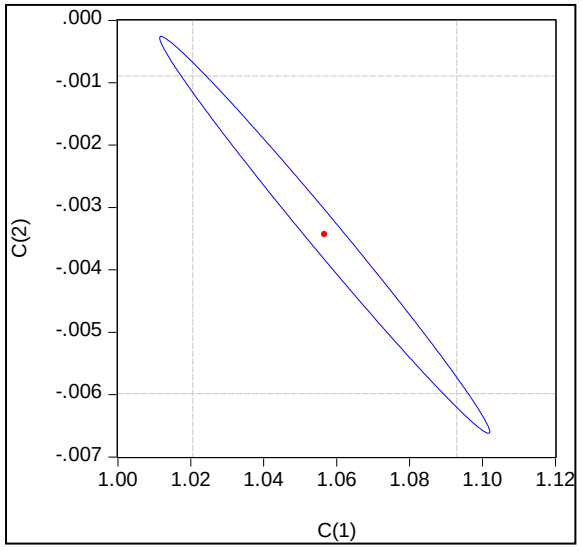
Robustness

Dependent Variable: TAU_Z_T
Method: Least Squares
Sample: 1 476
Included observations: 476
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

TAU_Z_T=C(1)+C(2)*Z_T

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.056732	0.018426	57.34871	0.0000
C(2)	-0.003438	0.001295	-2.654228	0.0082

R-squared	0.018239	Mean dependent var	1.010767
Adjusted R-squared	0.016168	S.D. dependent var	0.063034
S.E. of regression	0.062522	Akaike info criterion	-2.702402
Sum squared resid	1.852869	Schwarz criterion	-2.684901
Log likelihood	645.1718	Hannan-Quinn criter.	-2.695520
F-statistic	8.805864	Durbin-Watson stat	2.261914
Prob(F-statistic)	0.003154	Wald F-statistic	7.044925
Prob(Wald F-statistic)	0.008216		



Wald Test:			
Equation: EQ02			
Test Statistic	Value	df	Probability
t-statistic	-2.654228	474	0.0082
F-statistic	7.044925	(1, 474)	0.0082
Chi-square	7.044925	1	0.0079
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		-0.003438	0.001295
Restrictions are linear in coefficients.			

Discussion

- test sigma-convergence for the mentioned indicators for the EU countries
- test the hypotheses of conditional convergence, when for certain groups of countries their own tendencies will be observed and these countries will follow them in the long term period
- test convergence for some groups of countries

Conclusion

- For the EU-28 countries, the hypothesis of the existence of absolute convergence is confirmed over the long term period for the main macroeconomic indicators such as:
- $TGEH_1$ (total government expenditure on health as % of GDP),
- $TGEH_2$ (total government expenditure on health as % of total general government expenditure)
- and $TGEH_3$ (total government expenditure on health per capita)
- At the same time, hypotheses about the presence of sigma-convergence and conditional convergence should be tested for individual groups of countries, which may have their own separate paths for the development of health system financing processes

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