OPTIMAL SIZE OF GOVERNMENT SPENDING. THE CASE OF EUROPEAN UNION MEMBER STATES

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ABSTRACT: The theme of public expenditure has been of great interest in the latest years. Focusing on government size, role of government and the efficiency of the public sector becomes an even more important issue nowadays when the financial crisis has covered severly almost all economies worlwide. The debate has as starting point the keynesian belief (state intervention overcomes recession periods) but also the division of the economy between the public and the private sector. Goods and services could be provided by the state, but many times the private sector seems to be more efficient. Using a specific econometrical analysis, the authors try to establish the optimal size of the public sector in both old and new member states of the European Union, a level that fosters economic growth and suggest that, following this point, GDP should be left in the hands of the private sector.

Key-words: *public expenditure, economic growth, optimum level, public sector*

JEL codes: *H10, H50, H70*

Introduction

The economic theory provides two main categories of arguments that explain the public sector size in time and among countries. The first category has as starting point the Wagner law, according to which the elasticity of governmental expenditures compared to GDP is greater than 1. As countries become more developed, the demand for public goods raises and is consistent with the increasing ability to collect the necessary funds. On the other hand, the "Baumol cost disease", explains that the percentage of governmental expenditures increases because the raise of public servants' salaries is higher than their productivity, while the price related to public services demand is relatively non-elastic. The second category of arguments is political. For election purposes, the fiscal policies, especially those concerning the governmental expenditures, tend to be inconsistent in time and focuse on greater deficits and greater public sectors. This trend is more powerful if the number of parties forming the government is larger, if the election frequency is greater, and election system is proportional and not relying on majority.

The theoretical studies support the idea that the long-run relation between the size of the administrative sector and the economic growth has a concave shape. When the administrative sector is very small, the long-term economic growth can be accelerated through the capital and labour productivity growth by increasing the provision of public goods. The marginal economic growth is positive but decreasing as the size of the administrative sector increases, and it becomes negative when additional charges harm the benefits resulting from increasing the productivity. The exact position of this turning point remains a key question. The response depends on structural factors, such as the economic cycle, the structure of public expenditures and the fiscal pressure. Using a specific econometrical analysis, the authors try to establish the optimal size of the public sector in

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old and new member states of the European Union, which fosters economic growth and suggest that, following this point, GDP should be left in the hands of the private sector.

The paper is structured as follows. Section 2 presents some theoretical approaches. Section 3 outlines the methodological framework. Section 4 reveals the main econometrical results. Section 5 reviews the final conclusions and some aspects concerning further research.

Theoretical framework

Starting with the theoretical framework proposed by Armey (1995), in this being proposed an optimum level of the public sector within the economy, we focused on an econometrical methodology, that is meant to identify the optimal size of government spending within the EU-15 countries, respectively in the EU-12 countries. In order to achieve this objective, we have taken into consideration the real GDP growth and the total amount of public expenditures (as % of GDP), for the period 1999-2008.

The subject of the paper is of wide interest, considering the fact that in the last decades, beginning with 60', 70', the level of public expenditure as % of GDP has been permanently growing and the issue of a correct size of public expenditures in GDP has been largely debated. This subject is reviewed with an even more significant frequency during periods of economic and financial crisis, when the issue of management of public funds is of crucial interest. Analysing the historical data, we can conclude that both big governments and also those who had proceeded at reducing the level of the public expenditures, have reached a maximum level of the economic growth and of social welfare. This is the reason why we state that the optimum level of public expenditures varies within countries due to a range of social and economical factors that influence upon the management of public resources. An economy can function in optimum conditions when there is a mix between the force of the market economy and the public intervention through allocation of public resources.

Taking into consideration the analysis made by Grossman (1987), Scully (1994), Chao and Grubel (1998) or Pevcin (2004), we emphasize on the idea that a generalized optimum level of the public expenditure as % in GDP cannot be reached for more countries on a whole. Though, through the econometrical modelling, considering the past experiences, can be obtained an optimum level, but restricted to the conditions and limitations of the proposed model. An extension of the number of observations, for example, using wider time series, could lead to a change in the proposed optimum level of public expenditures with several percents.

The Armey curve outlines the fact that an increase in the level of public expenditures in GDP can be translated into social welfare and economic growth up to a certain level, beyond this point additional expenditures will be generating a reversed effect.

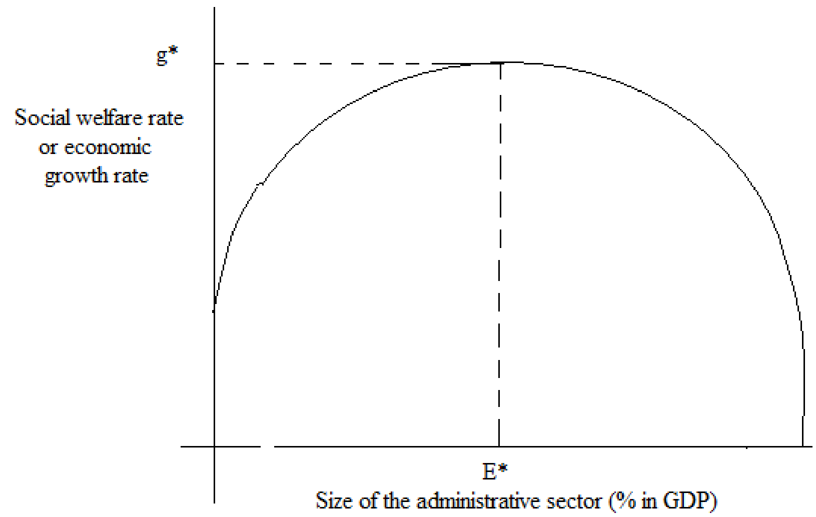

Fig. no. 1 – Public expenditure and the economy (Armey curve)
Source: Armey, 1995

Methodological framework

The empirical test regarding the existence of Armey curve can be illustrated by the following mathematical model:

$$Q = f(G,N) \quad (1)$$

where Q measures the output of the economy, G indicates the state intervention in the economy, while N shows the existence of some exogenous factors. We have considered the most adequate indicator for Q the real GDP growth (expressed in %), for G the public expenditure as % of GDP, while N was ignored.

Consequently, the model can be rewritten with the following non-linear regression:

$$GDP = \alpha_1 + \alpha_{2*}E + \alpha_{3*}E^2 \quad (2)$$

where:

GDP– dependent variable, real GDP growth (%);

Ch – independent variable, public expenditure (% in GDP);

Computing the equation 2 as a function, that must me maximizied, leads to identifying the optimal level of public expenditure as % of GDP. In order to do that, we proceed to derivation of the function by E and equalize it to zero. We reach the following equation:

$$2 * \alpha_3 * E + \alpha_2 = 0 \quad (3)$$

from where the optimum level of public expenditure:

$$E = {}^{-\alpha_2}\!/_{2 * \alpha_3} \quad (4)$$

Empirical framework

The first model we propose indicates the optimal level of public expenditure for the old members of the European Union (EU-15)[3]. It is an econometrical model of pool data type[4], that verifies the equation 2 and to which the heteroskedasticity and the general corellation of the cross-sectional observations have been corrected, for the whole considered time period. Moreover, there have been taken into consideration the robustness of serial correlation and timevarying variances in the disturbances. The main econometrical results are illustrated in Tab. no.1.

Table no. 1

Econometrical results regarding the optimal level of public expenditures in the EU-15 countries

Dependent Variable: GDPC?
Method: Pooled EGLS (Period SUR)
Date: 08/25/09 Time: 15:55
Sample: 1 10
Included observations: 10
Cross-sections included: 15
Total pool (balanced) observations: 150
Linear estimation after one-step weighting matrix
White period standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXP?	0.260644	0.013733	18.97984	0.0000
EXPP?	-0.004284	0.000277	-15.44947	0.0000

Weighted Statistics

R-squared	0.792426	Mean dependent var	1.832273
Adjusted R-squared	0.791024	S.D. dependent var	2.197606
S.E. of regression	1.004612	Sum squared resid	149.3683
F-statistic	564.9997	Durbin-Watson stat	1.965158
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.143969	Mean dependent var	2.754667
Sum squared resid	501.0964	Durbin-Watson stat	0.864528

Source: E-views 5.0

For checking the model stability, we have proceeded to a „unit root” checking of residuals, the results being presented in Table no. 2.

[3] We are considering the 15 old member states of European Union: Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Holland, Austria, Portugal, Finland, Sweden, Great Britain.

[4] The observations have been provided by Eurostat, for the period 1999-2008. The econometrical analysis was realized with E-views 5.0.

Table no. 2

„Unit root" testing of residuals in the case of modelling the optimal size of government expenditure the case of EU-15 countries

Group unit root test: Summary
Date: 08/25/09 Time: 16:05
Sample: 1 10
Series: RESID_BE, RESID_DK, RESID_DE, RESID_IE, RESID_GR, RESID_ES, RESID_FR, RESID_IT, RESID_LU, RESID_NL, RESID_AT, RESID_PT, RESID_FI, RESID_SE, RESID_UK
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0 to 1
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.47361	0.0003	15	131
Breitung t-stat	-6.56689	0.0000	15	116
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.87651	0.0303	15	131
ADF - Fisher Chi-square	44.5699	0.0423	15	131
PP - Fisher Chi-square	28.0610	0.5672	15	135
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	3.97074	0.0000	15	150

** Probabilities for Fisher tests are computed using an asympotic Chi -square distribution. All other tests assume asymptotic normality.

Source: E-views 5.0

All tests, except PP-Fisher, Chi-square and Hadri Z-stat tests, indicate the fact that the residuals do not have a "unit root", fact that gives more quality and stability to the model (the DW test, with a value a litlle less than 2, confirm once again the same conclusion).

Equation 2 transforms itself in:

$$\text{PIB} = 0.2606xCh - 0.0042xCh^2 \tag{5}$$

Solving the equation 2, as a function, that must be maximized, leads to identifying the optimal level of public spending as percent in GDP, more precisely, the level of 30,42 % of GDP.

The second model we propose aims at finding the optimal level of public expenditures as percent of GDP in the new member states of the European Union (UE-12)[5]. It is an econometrical model, of pool data type, in which there have been operated the same adjustments as in the previous model and that verifies also the equation 2.

The econometrical results can be observed in Table no. 3:

[5] The new members of the European Union (UE-12) consider: Bulgaria, Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia

Table no. 3

Econometrical results regarding the optimal level of public expenditures in the EU-12 countries

Dependent Variable: GDPC?				
Method: Pooled EGLS (Period SUR)				
Date: 08/25/09 Time: 16:11				
Sample: 1 10				
Included observations: 10				
Cross-sections included: 12				
Total pool (unbalanced) observations: 118				
Linear estimation after one-step weighting matrix				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXP?	0.491991	0.022836	21.54486	0.0000
EXPP?	-0.008956	0.000577	-15.53296	0.0000
Weighted Statistics				
R-squared	0.831092	Mean dependent var		1.839395
Adjusted R-squared	0.829636	S.D. dependent var		2.376583
S.E. of regression	0.980940	Sum squared resid		111.6202
F-statistic	570.7628	Durbin-Watson stat		2.049608
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.243062	Mean dependent var		4.771186
Sum squared resid	745.2678	Durbin-Watson stat		1.144364

Source: E-views 5.0

For checking the model stability, we have proceeded again at a „unit root” test, checking the residuals, the results being presented in Table no. 4.

Table no. 4

„Unit root” testing of residuals in the case of modelling the optimal size of government spending in the case of EU-12 countries

Group unit root test: Summary				
Date: 08/25/09 Time: 16:19				
Sample: 1 10				
Series: RESID_BG, RESID_CZ, RESID_EE, RESID_CY, RESID_LV, RESID_LT, RESID_HU, RESID_MT, RESID_PL, RESID_RO, RESID_SI, RESID_SK				
Exogenous variables: Individual effects				
Automatic selection of maximum lags				
Automatic selection of lags based on SIC: 0 to 1				
Newey-West bandwidth selection using Bartlett kernel				
Method	Statistic	Prob.**	Cross-sections	Obs

Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.81970	0.0000	12	103
Breitung t-stat	1.92405	0.9728	12	91
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.65626	0.0040	12	103
ADF - Fisher Chi-square	46.5986	0.0037	12	103
PP - Fisher Chi-square	46.4716	0.0039	12	106
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	2.70215	0.0034	12	118
** Probabilities for Fisher tests are computed using an asympotic Chi -square distribution. All other tests assume asymptotic normality.				

All tests, except Breitung t-stat and partially Hadri Z-stat, indicate the fact that the residuals do not have a "unit root", confirming the quality and the stability of the model (including the DW test, with a value of 2, confirm once again the same conclusion).

Equation 2 transforms itself in:

$$\text{PIB} = 0.4919 * Ch - 0.0089Ch^2 \quad (6)$$

As in the previous case, resolving the equation 2 as a function, that must be maximized, leads to the identification of the optimal size of public expenditure as percent of GDP, of 27,46 %.

Conclusions

The main result of this analysis reveals the fact that using specific analysis, public sector can be optimized, our specific results pointing towards an optimum public size in EU-15 of 30,42 % of GDP and in the EU-12 countries a level of 27,46 % of GDP.

As far as concerns the EU-15 countries, the result suggests the fact that if the level of public expenditures would have been on average of 30,42 % in GDP in the analysed period of time, then it could have lead to a maximum rate of GDP growth of 3,96 %/year as average for the EU-15 countries. This value is higher than the average values reached in the old member states of EU in the years of economic boom. In these years, there have been registered average values of maximum 2-3 % as far as concerns the real GDP growth (as it is the case of Germany, Denmark, Belgium, France and Italy). In order to reach the proposed optimal size of public expenditures in GDP, it is imposed a significant drawback in the curent average level of public expenditure for the period 1999-2008 for the EU-15 (of 46,47 % in GDP). It results a decline in the current level of public expenditures as percent of GDP with 16.05 %.

Regarding the EU-12 countries, the result shows us that if the level of public expenditures in GDP would have been of 27,46 % on average in the analysed period, then this could have lead to a maximum rate of GDP growth of 7,69 %/ year (as average for the EU-12 states). With the exception of the Baltic countries, that have registered even values of real GDP growth of 7-10 % in the 1999-2008 period, the proposed optimal level of 7,69 % would have represented a pretty satisfying objective for the other Central and Eastern European countries. For reaching the optimal level of 27,46 % of GDP in what concerns the public expenditures for the EU-12 countries, implies declining in a significant way the current level of public expenditures, with over 13 % (from 41,1 % in GDP).

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Appendix 1

Statistical data for modelling the optimal size of government expenditure for EU-15 countries

GDP_BE	GDP_DK	GDP_DE	GDP_IE	GDP_GR	GDP_ES	GDP_FR	GDP_IT	GDP_LU	GDP_NL	GDP_AT	GDP_PT	GDP_FI	GDP_SE	GDP_UK
3.4	2.6	2	10.7	3.4	4.7	3.3	1.5	8.4	4.7	3.3	3.8	3.9	4.6	3.5
3.7	3.5	3.2	9.2	4.5	5	3.9	3.7	8.4	3.9	3.7	3.9	5.1	4.4	3.9
0.8	0.7	1.2	5.8	4.2	3.6	1.9	1.8	2.5	1.9	0.5	2	2.7	1.1	2.5
1.5	0.5	0	6.4	3.4	2.7	1	0.5	4.1	0.1	1.6	0.8	1.6	2.4	2.1
1	0.4	-0.2	4.5	5.6	3.1	1.1	0	1.5	0.3	0.8	-0.8	1.8	1.9	2.8
3	2.3	1.2	4.7	4.9	3.3	2.5	1.5	4.5	2.2	2.5	1.5	3.7	4.1	3
1.8	2.4	0.8	6.4	2.9	3.6	1.9	0.7	5.2	2	2.5	0.9	2.8	3.3	2.2
3	3.3	3	5.7	4.5	3.9	2.2	2	6.4	3.4	3.5	1.4	4.9	4.2	2.9
2.8	1.6	2.5	6	4	3.7	2.3	1.6	5.2	3.5	3.5	1.9	4.2	2.6	2.6
1.1	-1.2	1.3	-2.3	2.9	1.2	0.4	-1	-0.9	2.1	2	0	1	-0.2	0.7

EXP_BE	EXP_DK	EXP_DE	EXP_IE	EXP_GR	EXP_ES	EXP_FR	EXP_IT	EXP_LU	EXP_NL	EXP_AT	EXP_PT	EXP_FI	EXP_SE	EXP_UK
50.2	55.4	48.1	34.1	44.3	39.9	52.6	48.2	39.2	46	53.7	43.2	51.5	58.6	38.9
49.2	53.6	45.1	31.5	46.7	39.1	51.6	46.2	37.6	44.2	52.1	43.1	48.3	55.6	39.1
49.2	54.2	47.6	33.4	45.3	38.6	51.6	48	38.1	45.4	51.6	44.4	47.8	55.5	40.1
49.9	54.6	48.1	33.6	45.1	38.9	52.6	47.4	41.5	46.2	51	44.3	48.8	56.7	41
51.2	55.1	48.5	33.4	45	38.4	53.3	48.3	41.8	47.1	51.5	45.5	50.1	57	42.1
49.5	54.6	47.1	33.7	45.4	38.9	53.2	47.7	42.5	46.1	54	46.5	50.1	55.6	42.9
52.2	52.8	46.8	33.7	43.3	38.4	53.4	48.2	41.6	44.8	49.9	47.6	50.3	55.2	44.1
48.5	51.6	45.3	34	42.2	38.5	52.7	48.7	38.6	45.6	49.4	46.3	48.7	54.1	44.2
48.3	51	44.2	35.7	44	38.8	52.3	47.9	37.2	45.3	48.7	45.8	47.3	52.5	44
49.9	51.7	43.9	41	44.9	40.5	52.7	48.7	40.7	45.5	48.7	45.9	48.4	53.1	47.7

Source: Eurostat

Appendix 2

Statistical data for modelling the optimal size of government expenditure for EU-12 countries

Year	GDP_BG	GDP_CZ	GDP_EE	GDP_CY	GDP_LV	GDP_LT	GDP_HU	GDP_MT	GDP_PL	GDP_RO	GDP_SI	GDP_SK
1999	2.3	1.3	-0.1	4.8	3.3	-1.5	4.2	na	4.5	-1.2	5.4	0
2000	5.4	3.6	9.6	5	6.9	4.2	5.2	na	4.3	2.1	4.4	1.4
2001	4.1	2.5	7.7	4	8	6.7	4.1	-1.6	1.2	5.7	2.8	3.4
2002	4.5	1.9	7.8	2.1	6.5	6.9	4.4	2.6	1.4	5.1	4	4.8
2003	5	3.6	7.1	1.9	7.2	10.2	4.3	-0.3	3.9	5.2	2.8	4.7
2004	6.6	4.5	7.5	4.2	8.7	7.4	4.7	1	5.3	8.5	4.3	5.2
2005	6.2	6.3	9.2	3.9	10.6	7.8	3.9	4	3.6	4.2	4.3	6.5
2006	6.3	6.8	10.4	4.1	12.2	7.8	4	3.3	6.2	7.9	5.9	8.5
2007	6.2	6.1	6.3	4.4	10	8.9	1.2	4.2	6.6	6.2	6.8	10.4
2008	6	3	-3.6	3.7	-4.6	3	0.6	2.5	5	7.1	3.5	6.4

Year	EXP_BG	EXP_CZ	EXP_EE	EXP_CY	EXP_LV	EXP_LT	EXP_HU	EXP_MT	EXP_PL	EXP_RO	EXP_SI	EXP_SK
1999	41.8	42.3	40.3	36.8	41.8	40.1	49.9	43	42.7	39.6	46.5	47.8
2000	42.6	41.8	36.5	37	37.3	39.1	46.5	41	41.1	38.5	46.7	50.9
2001	40.3	44.5	35.1	38.2	34.6	36.8	47.3	43.1	43.8	36	47.6	44.5
2002	40.3	46.3	35.9	40.2	35.6	34.7	51.4	43.2	44.2	35	46.3	45
2003	40.3	47.3	34.9	45	34.8	33.2	49.1	47.8	44.6	33.5	46.4	40.1
2004	39.7	45.1	34.1	42.8	35.8	33.3	48.9	45.5	42.6	33.5	45.8	37.6
2005	39.3	45	34	43.6	35.6	33.3	50.1	44.7	43.4	33.5	45.3	38.2
2006	36.5	43.8	34.2	43.4	38.2	33.6	51.9	43.7	43.8	35.3	44.6	36.9
2007	41.5	42.6	35.5	42.9	35.9	34.9	49.7	42.6	42.1	36.6	42.4	34.4
2008	37.4	42.4	40.9	44	39.5	37.2	49.8	45.3	43.1	38.5	43.6	34.9

Source: Eurostat