OPTIMIZING THE SIZE OF THE ENVIRONMENTAL PROTECTION EXPENDITURE IN THE EUROPEAN UNION

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Abstract: *General economic theory acknowledges the existence of two main arguments that explains the difference in size of the public sector in different countries. A first category of arguments is based on the Wagners law, according to which the share of government spending in GDP will increase by a degree of proportionality greater than one if GDP growth (elasticity above par). As states increase their incomes, becoming richer, the demand for public goods increases in the same direction with increasing capacity to collect revenues. The second argument is the political nature and focus on that for reelection, government policy makers, especially those related to government spending, tend to be inconsistent over time with the economic evolution, geared towards large deficits a comprehensive public sectors. The prevention of pollution and restoring damage caused in the past is an important issue considered in managing the revenues and expenditures budgets of central and local public authorities and other categories of private operators in the economy. Thus, Government which has made a number of strong international obligations targeting environmental protection, should provide funds to cover expenses resulting from the implementation of environmental programs.*

Keywords: environment protection, evvironmental protection expenditure, state budget, public expenditure,

1.Introduction

The literature highlights a relationship between the public sector and the dynamics of economic growth, relationship described by a concave curve. So, when the public sector achive a very low level, economic growth can be sustained by boosting labor productivity and capital by offering public goods. Thereby, this generated marginal economic growth is positive, but decreasing when you increase the size of the public sector. In this case there will be a reverse trend, because additional public spending actually means a higher tax burden and less stimulation of productivity. The solution to this problem is reconsidering structural economic issues such as the structure of public spending, tax burden and sequencing of economical cycles.

2. Determining an optimal value of public expenditure for environmental protection

Having regard of the above presented aspects, with the help of econometric methods it can be determined the value of an optimal structure of public expenditure for environmental protection. By identifying the optimal points it can be established till where the state can intervene in the economy and to what point it is better for the economy to remain available to the private sector. Starting from the theoretical foundations of Armey, which aims to identify the optimal size of the public sector, I realized an econometric model to determine the optimal size of public expenditures for environmental protection in the Member States of the European Union.This model aimed to analyze the 27 Member States of the European Union, by considering the variation in real gross domestic product (GDP) and public sector environmental protection expenditure as a percentage of GDP for the period 2002-2014. Through the econometric modeling presented below it can be obtain an optimal level of environmental

protection public spending in GDP for operating conditions closely related to data and limits operating model.

Armey curve reveals that an increase in public spending on GDP can cause social welfare and economic growth to a certain level, beyond which additional public spending will generate the opposite effect.

The existence of the Armey curve can be achieved based on the following mathematical model:

$$Q = f(G,N)$$

where Q measures the performance of the economy, G indicates government intervention, N indicates the existence of exogenous factors influence. Q indicator is the rate of real GDP growth, for G public expenditure on environmental protection as a percentage of GDP, while N was ignored.

Therefore, the model can be described using the following linear equations:

$$GDP = a_0 + a_1 EnvProtExpen + a_2 EnvProtExpen^2$$

where:

GDP - dependent variable, real GDP growth rate

EnvProtExpen - independent variable, environmental protection expenditures as percentage of GDP

Considering the model $GDP = a_0 + a_1 EnvProtExpen + a_2 EnvProtExpen^2$ as a function to be maximized, we arrive to identify the optimal level of environmental expenditures as a percentage of GDP.

To accomplish this taskit we shall proceed to the derivation function based on the expenditure and the equalizer they with zero and reach the following equation:

$$2 \cdot a_2 \cdot EnvProtExpen + a_1 = 0$$

where the optimal level of public spending for environmental protection as a percentage of GDP:

$$EnvProtExpen = \frac{-a_1}{2 \cdot a_2}$$

Below are presented the results obtained by calculating the optimal points of public expenditure for environmental protection in the Member States of the European Union.

The data series used are taken from the official website of the European Union Eurostat and are related to the time period 2002-2014. In the table below are shown the result of the regression and also the coefficients used in the above relation to identify the optimal points acording to the mentioned methodology.

Optimizing the environmental protection expenditure – UE-27
Dependent Variable: Real growth of GDP Method: Pooled EGLS (Period SUR) Sample: 2002 - 2014 Included observations: 13 Cross-sections included: 27 Total pool (balanced) observations: 351

Coefficient	Std. Error	t-Statistic	Prob.
a_1	0.08271	11.65834	0.0000
0.072114	0.01688	-7.235610	0.0000
a_2 -	Durbin-Watson	stat	
0.052800	1.891699		
R-squared			
0.672536			

As a result of econometric modeling, we can appreciate that the results allow us to further analyze in terms of maximizing the function that describes the link between economic growth (real GDP growth) and environment protection expenditure (expressed as a percentage of GDP).

The obtained optimum level of 0.68% ($\frac{-a_1}{2 \cdot a_2} = \frac{-0.072114}{2 \cdot (-0,052800)} = 0,68$), which should attain environmental protection expenditure to maximize economic growth in EU Member States indicate a rate below the average for this category of expenditure in the period under review (0,69% of GDP). Consequently, we can say that, to achieve maximum results regarding environmental protection, it requires a reduction of environmental protection public expenditure on average 0.01% of GDP for EU Member States. This can be explained by the fact that the state, through the financing of public spending for environmental protection, not produced an advancement of gross domestic product generating added value, budgetary appropriations being mainly allocated to eliminate negative environment externalities, or to cover the current expenditure. This indicates that this area quite sensitive, namely the environmental protection, should be funded mainly by manufacturers specialize or entities that can generate added value through the investment expenditures, expenses which have a significant share in the revenue and expenditure budget of those entities.

Funds for the environment can be found in each economy, whether they are developed or are still developing, but what differs from one country to another is the amount of these funds, a sum which is determined by national concept regarding environment and the scale of programs targeted in this direction.

To determine the impact of the environmental protection expenditure on economic growth in Romania I used as dependent variable the GDP during 2000-2014, and as an independent variable the environmental protection expenditure for the same period.

The econometric model that describes the relationship between the two variables is:

$$GDP = a_0 + a_1 \, EnvProtExpen + u_i$$

Economic growth is represented by the GDP, while the expenditures on environmental protection represent the policy of decision- makers on environmental protection activities.

Correlation analysis performed using SPSS statistical program measures the intensity of the relationship between the variables used and explain this relationship through Pearson coefficient.

The plus or minus sign of the Pearson coefficient will determine the relationship between these two variables (direct link for plus sign and stronger intensity bond if its value is closer to 1 or reverse if the sign is negative).

The "cloud of points" diagram is used to represent the relationships between the variables, in our case, the link between environmental protection expenditure and GDP in Romania in the years in question.

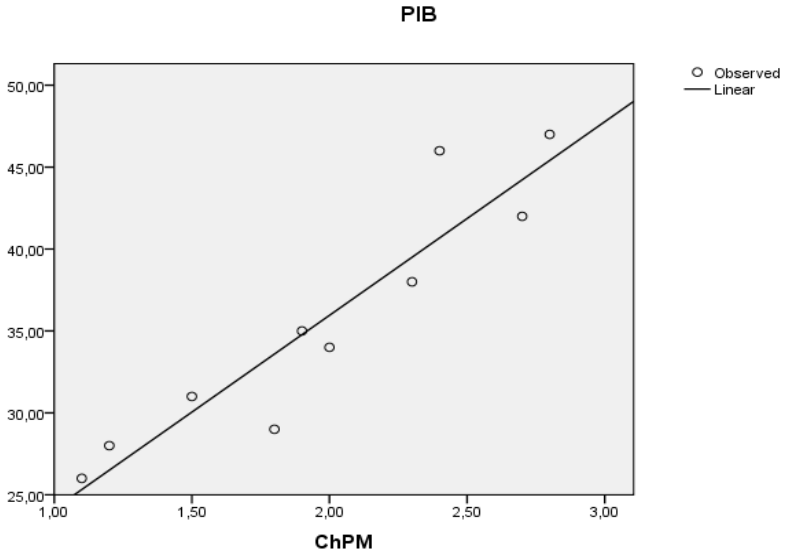
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	12,321	3,344		3,684	,006
	EnvProtExpen	11,817	1,633	,931	7,235	,000

a. Dependent Variable: PIB

Correlations

		PIB	ChPM
GDP	Pearson Correlation	1	,931
	N	10	10
EnvProtExpen	Pearson Correlation	,931	1
	N	10	10



As can be seen the point cloud diagram supports a direct connection between the two variables. Also, the positive value of the parameter regression indicate a direct link between these two variables, meaning that an increase in the environmental protection expenditure with an absolute unit of measurement will result in an increase in GDP of 11.817 mil. lei. Pearson

coefficient maintains that there is a very strong link between the two variables, its value being 0.931, very close to 1.

3. Conclusions

For developing countries, the restructuring of public finances is a serious problem, given that traditional funding sources are unable to provide and finance all the expenditure. Public budget restrictions and uncertainties about the principles and procedures of the budget process have made environmental funding to rely on extrabudgetary funding mechanisms.

For Romania, the funds intended for the environment are versatile in that it provides funding for a wide range of projects for environment, based on their financing achieving and destination. In parallel, there are specific funds intended to finance the protection of environmental factors or components.

As showed above, the environmental protection expenditure must be financed throught private funds and based on the „polluter pays" principle.

Based on this, the polluter is the one how must bear the costs of prevention and control of pollution. In this sense, the principlehas an economic nature, because this stimulate economic environmental protection. According to this principle, polluters are responsible in terms of financial measures and in accordance with the rules adopted by the environmental authorities with competence in this area. As this principle excludes any financial help it is also called the principle of non-subsidy.

Basically, polluters assume the full cost of their activities, such as to reduce environmental pollution, so that the public power assumes all the costs which relate to the natural environment overall.

In Romania, like other central and eastern European countries, the implementation of this principle and implementing an effective system of financing environmental projects are hampered by several factors, among which:

• the environmental action shows large gaps that originate in people"s attitude vis-à-vis this issue;

• serious financial problems of industrial enterprises, leading to postpone renewal of the outdated and polluting technologies;

• the stage of development in which the capital market is limits the use of sophisticated financial instruments;

• political decision-making and setting budgets processes, most often neglect environmental issues;

• not always the economic decisions are optimal in terms of environmental protection;

• non-governmental organizations rarely influence effectively decision making.

In this context, in Romania, the „polluter-pays" principle is misunderstood, being charged and circulated as such just as an application of an administrative measures against those who "get dirty", who break the admitted environmental protection rules or throw garbage where is prohibited.

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