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Determining the efficiency of health expenditure as a prerequisite for achieving economic equilibrium in the European Union

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***Abstract*—Objective of this study was to conduct a comparative analysis of health sector efficiency at the EU member states level. The economic efficiency of health systems in Europe was analyzed through the ratio of obtained effects and expended economic effort. Effort indicator is considered to be the expenditure for health as percentage of GDP in each country, and the effects are given by a total of 11 indicators that make up the composite indicator of health effects. Following the analysis made it can be concluded that the average efficiency of health spending at EU level is sub unitary, revealing that the level of benefits is lower than the level of funding. Countries that have reached the level of efficiency are considered those with a ratio between effect and effort larger than 1, namely Slovenia and Luxembourg. Romania, although it does not reach the minimum level of efficiency, recorded a roughly balance between effects and efforts. This can be interpreted in a manner somewhat favorable, that the few sources allocated to health have been used judiciously.**

Keywords-components: efficiency, public sector, benchmarking, health system

I. INTRODUCTION

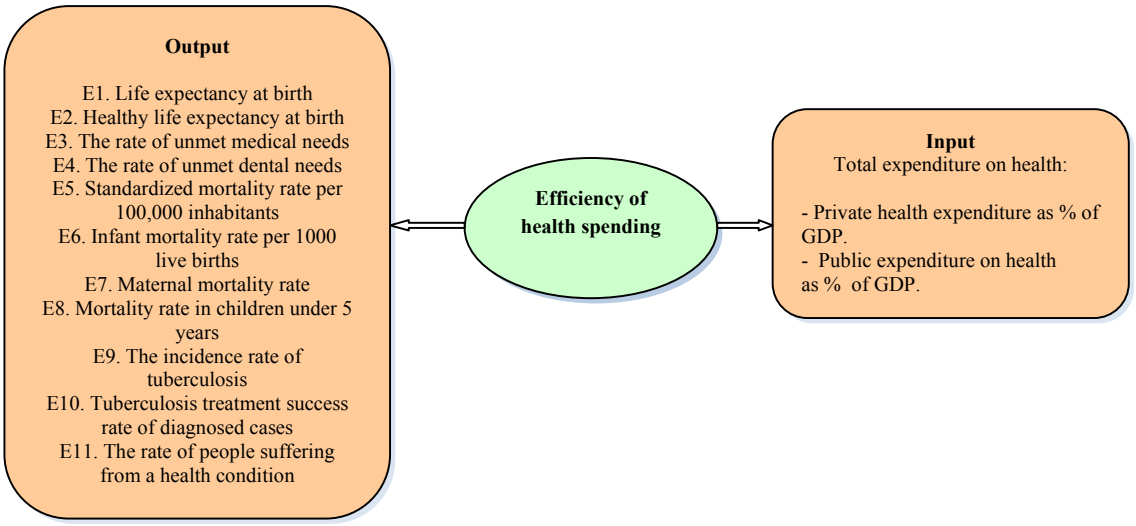
Public health is an area of great interest at the EU level, but also at a global level, and this should be reflected in actions taken at national level in order to ensure broad access to quality health services. In order to reach this goal, it should be ensured the efficiency of the actions taken, of the resources used, under the conditions of their limited nature.

In general, an efficiency analysis involves a relationship between efforts (inputs) and effects (outputs), and from a mathematical point of view it can be calculated as the ratio between the amount of effects and amount of efforts (in this case, a value of the ratio higher than 1indicates a higher efficiency), or vice versa, the ratio between the amount of effort and the amount of effects (in this case, a lower ratio indicates a higher efficiency).

The present study aimed to examine the economic efficiency of health systems in Europe by the ratio of the obtained effects and the economic effort expended. To achieve an efficiency analysis of health expenditures at the European Union level by benchmarking, representative indicators were elected in order to quantify the amount of effort and the effects shown in the figure 1.

The effort will be represented by total health spending financed from both public and private, as in health care in some countries, financing from private sources reached significant levels. As a result, it will be examined the efficiency of total health expenditure, and not just the efficiency of public spending, because the effects obtained cannot be divided into effects obtained from private funding and effects derived from public funding.

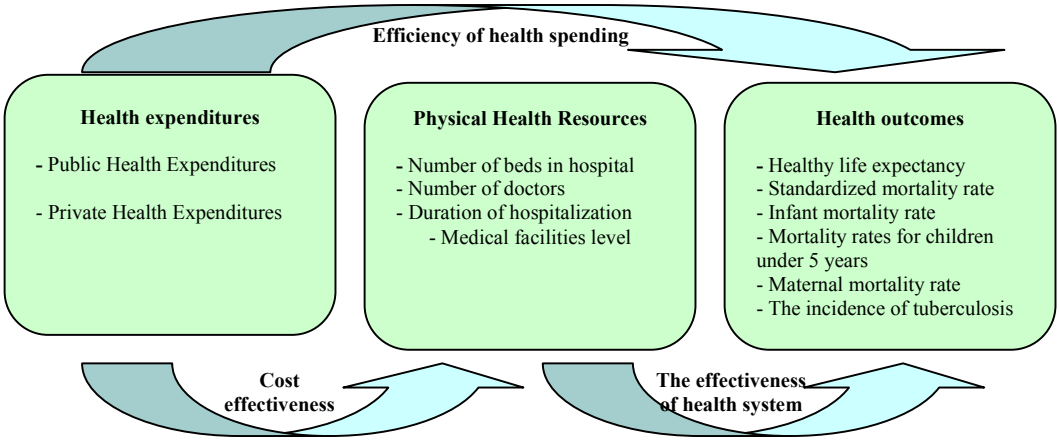
Figure 1. Measurement of the indicators of input and output in determining the health spending efficiency



The study of the efficiency of strict public health expenditures would have had poor representation since the effects cannot be separately identified, and would have distorted the results: efficiency of public health expenditures would be higher in countries where private funding was significantly greater, but because of the effects created by the private, and not the public sector.

As illustrated in Figure No. 2 [3], the relationship between physical resources and health effects allows a measurement of health system efficiency; the ratio of total expenses involved in health and its effects measures the efficiency of these expenditures, which is under study in this paper.

Figure 2. The relationship between health spending efficiency, natural resources and results



Source: *Government Spending On Health Care And Education In Croatia: Efficiency And Reform Options*, Etibar Jafarov

Şi Victoria Gunnarsson, International Monetary Fund Wp/08/126, 2008, Page.34

II. Study's Findings On The Analysis Of The EU Health Expenditure Efficiency Through Benchmarking

Given that the indicators presented in the introductory part, in Figure 1, are expressed in different units of measurement, *standardization of data* has become a necessary process that was done using the following procedure:

- For indicators that optimize the maximum, the standardized value of the indicator was calculated by comparing the maximum value in the series *(standardized* $x_i = x_i / X_{max}$*)*.

- For indicators that optimize the minimum, the standardized value of the indicator was calculated using the formula: *standardize* $x_i = (x_i / X_{max})^{-1}$, where X_{max} is the lowest value, from a mathematical point of view.

The results of the standardization process and the quantification of the effects of effort for EU countries are presented in the table below:

TABLE I. Relationship effects-efforts in calculating the efficiency of health spending in the EU

EU COUNTRY	GLOBAL STANDARDIZED EFFECTS	STANDARDIZED EFFORT	EFFICIENCY INDICATOR
Austria	0.579	0.918	0.630
Belgium	0.549	0.855	0.643
Bulgaria	0.448	0.673	0.667
Cyprus	0.605	0.600	1.008
Czech Rep	0.601	0.618	0.972
Denmark	0.657	0.891	0.737
Estonia	0.423	0.491	0.861
Finland	0.610	0.745	0.818
France	0.592	1.000	0.592
Germany	0.574	0.945	0.607
Greece	0.651	0.873	0.746
Hungary	0.417	0.673	0.620
Ireland	0.646	0.691	0.935
Italy	0.635	0.791	0.803
Latvia	0.391	0.564	0.693
Lithuania	0.422	0.564	0.748
Luxembourg	0.651	0.645	1.009
Malta	0.549	0.682	0.805
Netherlands	0.664	0.818	0.811
Poland	0.450	0.582	0.773
Portugal	0.540	0.909	0.594
Romania	**0.421**	**0.427**	**0.986**
Slovakia	0.484	0.700	0.691
Slovenia	0.743	0.718	1.035
Spain	0.594	0.773	0.768
Sweden	0.672	0.827	0.813
G. Britain	0.588	0.764	0.771
AVERAGE	**0.561**	**0.731**	**0.783**

Source: own computations

At the EU level, for health is allocated on average 8.04% of member states' GDP. These funds come at a rate of about 74% from public resources. However, variations from the average level are large. While France allocates 11% of GDP, Germany 10.4% Austria 10.1%, exceeding the EU average, at the other extreme is Romania with 4.7% of GDP and Estonia with 5.5%. In most countries, most of the funds are public funds, and at the top of the list is still France, because of the 11% of GDP assigned for health financing, 8.69% of GDP, i.e. 80% of the total funding comes from the government's budget; in Denmark 85 % of funds are public, 77% in Germany, 76% in Austria, 74% in Belgium, 75% in Finland, 90% in Luxembourg. In Bulgaria, however, only 57% of total health funding comes from public sources, whereas in Cyprus 45% and in Greece 60%. Usually, the developed countries are those which provide a broader funding from the public budget of social spending in order to ensure equity in the provision of public services and unhindered access to certain socially disadvantaged categories, but they also offer alternatives through the existence of private services to people with a certain financial comfort.

The situation of funding the health sector in Romania is critical. Romania allocates the lowest percentage of GDP to health, only 4.7% of which 80% come from the state budget and national health insurance budget. The low percentage of GDP to health and the high public contribution highlights the underdeveloped private health insurance that could appeal to people with high incomes. The critical situation of health financing appears more prominent in the analysis of health expenditure per capita; in 2008 this level was of 353 Euros per capita in Romania, a very low level by comparison to Belgium's level of 3000 Euros per capita, while Denmark allocates 4000 Euros per capita, Germany and France over 3,000 Euros per capita, but also by comparison to other countries of a similar degree of economic development, such as Hungary which allocates 744 Euros per capita and Poland with 660 euro per capita.

The low levels of health financing in Romania sets a serious mark on the quality of medical services. The number of physicians per 100 000 inhabitants is among the lowest in the EU, only 222 doctors per 100,000 people, while the EU average is around 280, and this situation is due to low salaries, which lead to a higher rate of emigration of the medical staff to more developed countries. Giving the lack of modern medical equipment, the performance is poor; for example, Romania has a computer tomography (CT) to 300 000 inhabitants, in Austria there are 2 CTs to 100 000 inhabitants, and in Cyprus, due to private sector development in the provision of medical services, there are 3.5 CTs per 100 000 inhabitants. Only the number of beds in hospitals in Romania is above the EU average, this is a legacy of the period when the funding of hospitals was based on the number of days of hospitalization, a system that ignored the complexity and the number of patients, and thus the hospitals had the incentive to hospitalize mild cases, for a longer period of time, in sectors charging high fees. So, the value of this indicator does not show a favorable situation, but on the contrary, it has led to congestion in hospitals due to speculative reasons in order to raise funds. This deficiency

was attempted to be solved by introducing case resolved based funding.

Besides the issues strictly related to reduced funding levels of the system, there are problems which limit the quality, equity and accessibility of health services to population, and thus delay the improvement of the population's health.

Analyzing the values of the indicators recorded by each country can be seen that the low level of health financing in Romania sets its mark on the quality of life, the degree of accessibility to health services for the residents. *Life expectancy* in Romania is 73 years, five years less than the average recorded at the EU level, and 9 years less than the life expectancy in Italy. *Healthy life expectancy* is 65 years in Romania, which shows that the Romanians lost an average of 5 years of life because of health problems, whereas in most EU countries healthy life expectancy is over 70 years.

Rates of unmet medical needs (E3) is 4.84% at the Union level, but with large variations between countries; the Netherlands has a level of only 0.1%, Austria 1.1%, while Bulgaria's level is 25%, 17% in Latvia and in Romania more than 16%. These high values of this rate emphasize the lack of equity of the health system in those countries, including Romania. The reasons, which lead to this value in Romania, are related to the lack of confidence in the quality of the Romanian medical services, to major differences that exist between the medical services provided in rural areas compared to the urban ones, to high levels of direct payments, "out of pocket payments", which are borne by the population. *Rates of unmet dental needs (E4)* is 9.3%, at an average level, but again Romania deviates significantly from this average, recording a value of 20.2%.

The average standardized mortality rate is 715 deaths per 100,000 inhabitants; Romania has a mortality rate of 980, with the lowest value being recorded in Italy by 511, and the highest in Lithuania 1095.8.

Infant mortality rate in Romania exceed 2.4 times the EU average and *maternal mortality rate* exceeds three times the average. Romania is among the countries that are facing the *incidence of tuberculosis*. If the average occurrence rate of this disease is 20 cases per 100 000 inhabitants, in Romania the frequency is 134 cases per 100 000 inhabitants. Amid economic troubles, some mortality indicators place Romania on the last places in Europe. Diseases of poverty, such as TB, have increased at alarming rates in Romania, placing us, once again, on the last place. High infant and maternal mortality in Romania are indicators of access problems of mothers and newborn babies to specialized health care, of low quality of services offered and of the degree of reduced health care education.

Contrary to the above, *E11- the rate of people suffering from a health condition* - recorded the lowest value in Romania, where life expectancy is among the lowest, and mortality rates among the highest in the EU. Analyzing this problem, it was found the actual cause of this distorted value of the E11 indicator, namely the small number of people who carried out medical consultations in the last reported year. In Romania only 40% of the population went to a medical check-up, and the average rate in the EU is 76%. Hence the reduced value of the indicator E11; if the population does not go to medical examinations, it is obvious that the diseases will not be detected, nor will they appear registered. We believe that the value of the E11 indicator is not representative for Romania, and as evidence is the lack of correlation with the other indicators examined. These differences, between the effects obtained by Romania and the EU average, are shown in chart number 1, below:

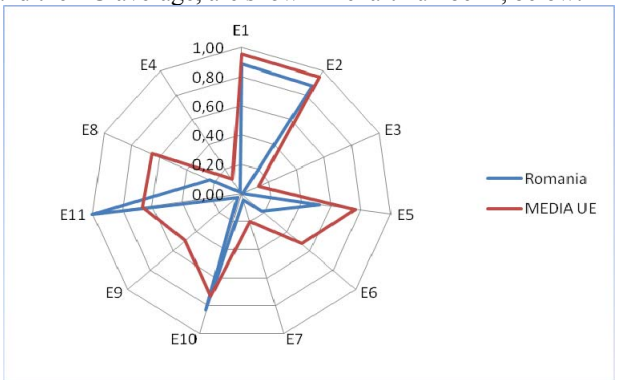


Chart no. 1: Differences between Romania and the EU on health effects

The chart below presents a ranking of the EU countries, based on their total achieved effects in health. The total value of the effects is given by the standardize value of the 11th indicators analyzed.

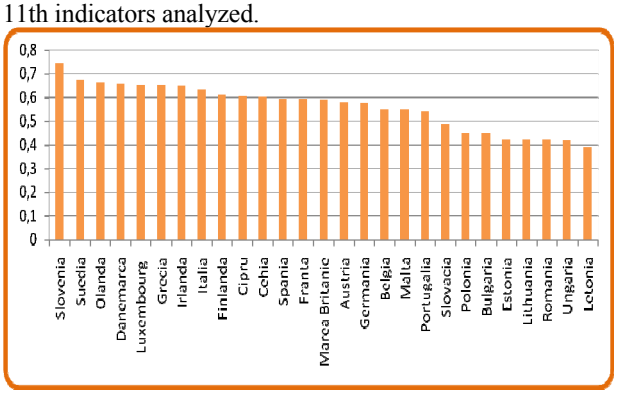


Chart no. 2: Ranking of the EU countries according to the obtained effects in health

The country which recorded the best results is Slovenia, followed by Sweden, Holland, Denmark and Luxembourg, and the countries with the lowest results were Romania, Hungary and Latvia. If the E11 had a real value, it is safe to say that Romania would have probably been on the last place in this ranking. Romania's results represent approximately 50% of Slovenia's total results, in terms of relative measurement, and 25% below the average, taking into account all 11 indicators of health effects.

It can be seen that the average efficiency of health spending at the EU level is lower than 1, revealing that the level of benefits is lower than the level of funding. Countries that have achieved success rates, i.e. with a ratio effect / effort greater than 1, are Slovenia and Luxembourg.

France, while ensuring the highest level of funding, seems to be experiencing some problems in the system

because it fails to use them effectively, and, as a consequence, the results are slightly above average. A similar situation, as the one in France, can be observed in Germany, Portugal, Belgium and Austria.

Romania, although not reaching the level of efficiency, has an almost balanced ratio between the effects and the efforts that can somehow be interpreted in a favorable way, meaning that the few sources, allocated to health, have been used judiciously. Indeed, Romania occupies the last place in the EU in terms of health results and health financing.

Austria, for example, is 3rd runner-up in terms of funding, after France and Germany, and only on 15th place in terms of benefits yielded by those funds. This suggests that most of the countries that recorded above-average expenditure and below-average results, such as Austria, Belgium, Germany, Greece, Portugal, have significant potential to reduce healthcare spending without affecting the results. As a general conclusion regarding the entire EU, health expenditure is too high compared to the achieved results; in other words, the effects are too low in relation to the effort.

Although Romania's health indicators have improved over the past decade, there still are serious challenges, and in order to continue to make progress, the government needs to take further action. Increasing access to health services in remote areas of population and with insufficient coverage regarding public health care education, transport facilitation, and encouraging health care providers to initiate activities in areas with poor coverage, reducing the burden of health expenditures that need to be paid directly - both the official and the unofficial, and emphasizing the prevention and primary health care services are among the priorities that need to be addressed. The government has begun to focus its attention on these priorities, but needs to adapt its measures better in order to reach those groups, for which indicators have yet to be improved. In the case of Romania, it is appropriate to extend funding direct from the state budget, which currently is very low at approximately 15% of total public funding for health, as the current system relies too much on social health insurance contributions incurred by employees, employers and some retirees. The state must pay to ensure persons not participating in the tax system and capital expenditures and investments in the Romanian health system must be a priority for the government because there is an obvious lack of modern equipment and the real problems cannot be solved without an appropriate financial support from the state. The population confidence in the public health system should be increased by providing quality services and by eradicating the practice of informal payments to medical personnel. It is important to develop the private health financing system, but it must rely on private insurance, and not on direct payments as in the present time; private insurance must predominantly complementary (to cover co-payments for those forced to bear them). For the wealthy people, private health insurance can replace the public ones (as in Germany), but even in this case, a compulsory health insurance must be imposed, in order to avoid the situation in which some people do not benefit from any form of health insurance (as happens in the U.S.).

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