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## **OUTLAYS ON HEALTH PROTECTION IN POLAND AND IN THE EUROPEAN UNION – A SPACE-TIME ANALYSIS**

### **1. Introduction**

Health care is one of the biggest and most dynamic – as far as new jobs formation and innovation is concerned – sectors of the national economy. This is a sector which is getting more and more complex to finance, and for which financial analyses should be carried out in such a way as to guarantee their reliability and contribute favourably to Poland's preparations for entering the EU structures.

One of the strategic aims of the EU for the years 2000–2006 regarding public health can be defined as follows: "the member countries should endeavour to unify their own stock of information in order to enable comparative analyses".

At present, due to the existent differences across individual countries respecting health sector and other social or economic fields of activity, various methods of classification, diversity in information presented and in standing rules, it is very troublesome to perform reliable international comparisons. National systems of financing health care tend towards creation of common – for all countries – means of classification of outlays on health care so as to enable sound comparative analyses based on such information. National Health Accounts (NHA) are best suited to do so. NHA are a set of health care stock that make it possible for countries of different systems of financing health care to look into the health care sector, first of all, from the viewpoint of international comparisons.

For the sake of international comparison the total outlays on health protection are grouped according to the classification proposed by the OECD.

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While running international comparisons of total outlays on health protection, it is of crucial importance to count the outlays per capita and convert the calculations into the world currency (e.g. the USA dollar) allowing for the purchasing power of a local currency or, alternatively, express the outlays as a fraction of GDP. The level of outlays on health protection is strongly related to the GDP level per capita. Differences in purchasing power parity between individual countries' currencies require converting nominal outlays in line with the official exchange rates into the so-called real per capita outlays. To this end the face value of outlays is contrasted with its purchasing power parity (PPP).

Estimation of outlays on health protection in a given country followed by a comparison with other countries' expenditures often forms a ground on the basis of which conclusions are drawn with respect to the effectiveness and management of the health care system existent in such a country. However, such a comparison comes across a lot of difficulties both in the process of the analysis itself as well as while interpreting results. Some of such difficulties result from the specificity of the health sector, first of all, from methods of measurement, data collection and interpretation of the obtained results. Moreover, various systems of management and financing of health protection, existent across different countries, exhibit diversity in the structure and volume of means engaged, and consequently, in absorption of the means by the sector in individual groups of systems as well as in particular countries under a given health care system.

The basic purpose of our paper is to present the outlays on health protection in Poland within the years 1990–2000, contrasted with the EU average. Some preliminary results based on a space-time analysis are also reported in the paper.

## **2. Outlays on health protection – a comparative analysis**

Adequate management of health protection funds calls for multifarious analyses of the health care system, including international comparisons. Still, even in the EU member countries such analyses run into a lot of difficulties. It is easier to perform an investigation for each country separately than to run a joint inter-country analysis. Those difficulties stem from different national health accounts across various countries, and what is more, the accounts, being at varied stages of development and circumstantialities, make use of diverse classification systems. By reason of the intensifying integration processes taking place in Europe, the OECD put forward System of Health Accounts (SHA) which provides a common layout of the information tables on outlays on health and means of financing the outlays. The introduction of the SHA by the end of

2002 in all the EU member countries was forced by EUROSTAT. This was meant to be one of the elements implementing the programme of the EU in the field of public health.

The following countries belong to the group that started implementing the pilot project: Denmark, Finland, Germany, Ireland, Luxemburg, Holland, Spain, and Great Britain (see: Table 1). For over a year the above-mentioned countries have been working on assessing the introduction of the tables of the International Classification of Health Accounts (ICHA).

Table 1. Overview of the situation regarding introduction of the pilot SHA in the EU member countries (2001)

Country	Present state of introduction of the SHA			Availability of a project design of the SHA standard tables		
	project team	work in progress	available tables	providers x function	financing x providers	financing x function
Austria	X	(-)	(-)	(-)	(-)	(-)
Belgium	X	(-)	(-)	(-)	(-)	(-)
Denmark	X	x	x	x	x	x
Finland	X	(-)	(-)	x	x	x
France	(-)	(x)	(-)	(-)	(-)	(-)
Germany	X	x	x	x	x	x
Greece	(x)	(-)	(-)	(-)	(-)	(-)
Ireland	x	x	(-)	x	x	x
Italy	x	(-)	(-)	(-)	(-)	(-)
Luxemburg	x	x	x	x	x	x
Holland	x	x	x	x	x	x
Portugal	x	(x)	(-)	(-)	(-)	(-)
Spain	x	x	x	x	x	x
Sweden	x	x	(-)	(-)	x	x
Great Britain	x	x	(-)	(-)	x	x

x – yes, (x) – unconfirmed, (-) non available or unknown situation

Source: Końcowy Raport Techniczny. Opracowanie i wdrożenie Narodowego Rachunku Zdrowia. Projekt IBRD, Warszawa 2002.

The level of outlays on health protection is strongly dependent on the level of Gross Domestic Product (GDP) per capita. GDP reflects economic potential of a given country as well as her welfare. It also informs us about the level of resources that can be spent on public and private consumption or on investment within a given year. The share of outlays on health protection (both total and public) in GDP is considerably lower in Poland than the EU average (see: Tab. 2 and Fig. 1). Germany is the country from among all the EU members, whose share is the highest. Poland contrasted with other countries takes the last but one position; she outstrips only Luxemburg. However, while conducting any kind of

research, one should take into account the economic standing of the countries under investigation, especially the living standards of the societies.

Table 2. Share of GDP spent on health protection in the EU countries in the years 1990–2000

Outlays on health in % of GDP	Countries	Years										
		'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Total	EU mean	7.5	7.7	8.0	8.1	8.0	8.1	8.2	8.0	7.9	8.1	8.0
	Poland	5.3	6.6	6.6	6.4	6.0	6.0	6.4	6.1	6.4	6.2	6.3
Public	EU mean	5.8	6.0	6.1	6.2	6.0	6.0	6.1	5.9	5.9	6.0	6.0
	Poland	4.8	5.0	5.1	4.7	4.3	4.4	4.7	4.4	4.2	4.6	4.3
Private	EU mean	1.8	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1
	Poland	0.4	1.6	1.6	1.7	1.6	1.6	1.7	1.7	1.8	1.7	2.0

Source: Own calculations based on OECD Health of Data 2002.

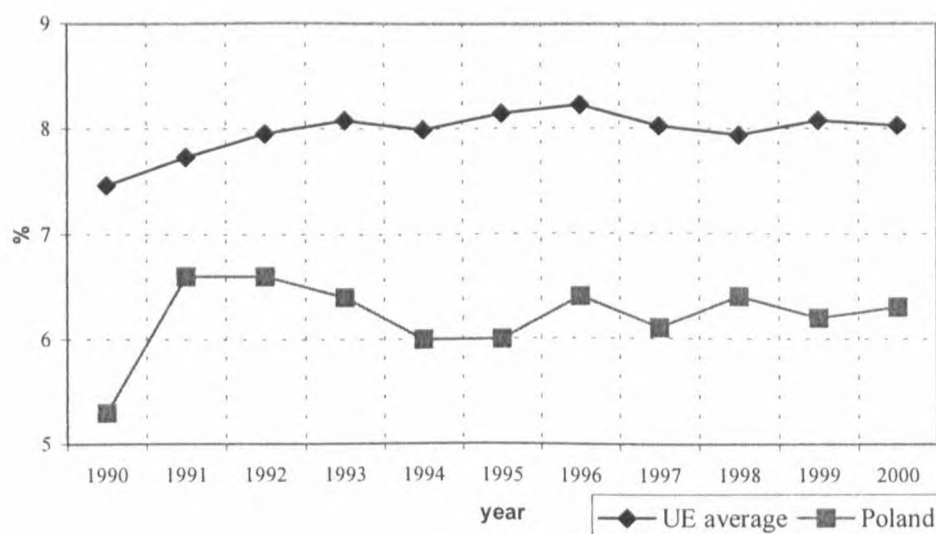


Fig. 1. Share of total outlays in GDP on health protection in the EU countries and in Poland in the years 1990–2000

Source: Own calculations based on OECD Health of Data 2002.

Somewhat different picture emerges while investigating the share of public outlays in GDP (see Tab. 2, Fig. 2). In this situation it is Germany, France and Sweden that take the leading positions. They have a considerable, 2-percentage point advantage. The public expenditures on health in Poland and in Greece stand far behind the other countries.

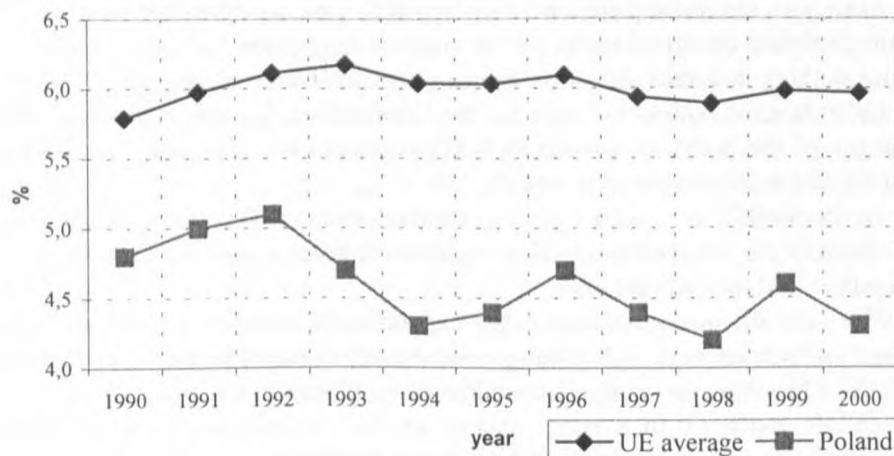


Fig. 2. Share in GDP of public outlays on health protection in the EU countries and in Poland in the years 1990–2000

Source: As same as Fig. 1.

In most countries public expenditures constitute a very significant fraction of the total outlays on health protection (see Fig. 3). In line with an overall rule characterizing expenditures on health protection, the share of public outlays in total outlays on this field of economic activity is higher in high-developed countries than in developing ones. In the so-called high-developed countries this share amounts to 70–95%, whereas in developing countries it does not exceed 60%.

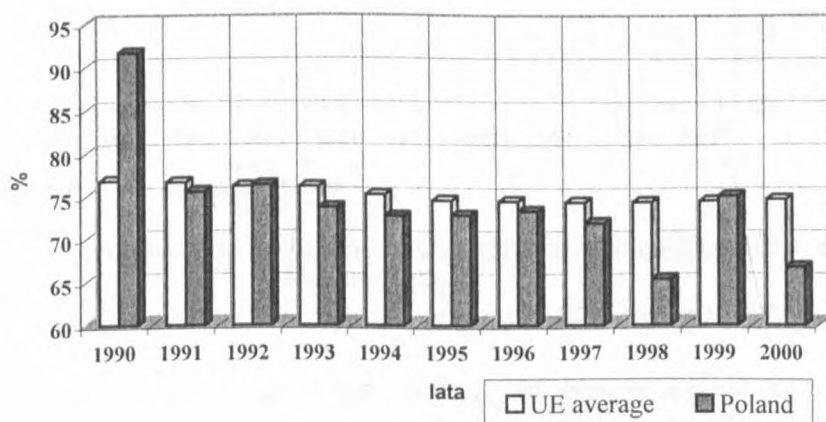


Fig. 3. Share of non-public outlays in total outlays on health protection in the EU countries and in Poland in the years 1990–2000

Source: As same as Fig. 1.

Basing on the already presented information, one can state that from among all the analysed countries in the period under investigation the highest shares of public outlays in total outlays on health protection have Luxemburg, Sweden, and Great Britain, whereas Greece has the lowest share. Except for the year 1990 (changes of the political system) Poland possesses only a slightly lower share than the EU member countries (see Fig. 3).

In the Polish as well as in international statistical systems there exists a division of the means designed for health protection, most generally speaking, into public and into private ones.

The most distinctive change in the expenditures on health protection in the Poland under transition is the change in the relation between public and private outlays. The share of public expenditures is abating, whereas the share of households' outlays is increasing (see Fig. 4). One can thus risk a statement that, under sufficiently low level of GDP per capita, health protection in Poland is too less extent than in other countries financed from public means. The analysis of non-public expenditures also shows mental changes of the society. There is a still growing belief in Poland that "one has to possess a big money to be treated" because the health care is more and more often financed out of the patient's pocket.

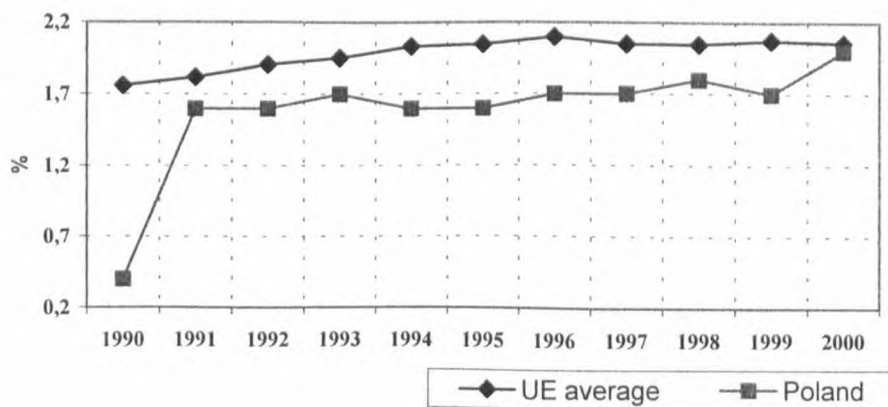


Fig. 4. Share of private outlays in GDP on health protection in the EU countries and in Poland in the years 1990–2000

Source: As same as Fig. 1.

One can clearly mark the period of transformation in Poland (the year 1990) followed by the introduction of the act of Basic Health Care. Private expenditures exhibit a growing tendency but, if compared with the EU, Poland starts from a much lower level.



In a lot of cases – quoting Włodarczyk – “the social consciousness petrified information on the outlays on health protection as being 70–102 USD (year 1993) per capita” and in “numerous presentations this sum was [...] confronted with the expenditures, amounting to thousands of dollars, incurred by the western countries (Włodarczyk 1998)”. Conducting international comparisons with respect to expenditures expressed in dollars by the official exchange rate is not “a good idea”. It is obvious that exchange rates are determined by e.g. international currency market and biased with international trade. That is why the nominal value of expenditures should be expressed in terms of purchasing power parity (PPP), which allows for reliable international comparisons. PPP are scaling units of various countries’ currencies that equalize differences in purchasing power of local currencies due to differences in prices in individual countries.

Analysing outlays on health protection in terms of USD by PPP (see Tab. 3, Fig. 5) one can say that in Poland much less money is spent on health care than on average in the EU member countries. From among all the EU countries it is Germany that assigns the most means on health. As far as public expenditures are concerned it is Luxemburg that takes the lead. On the other hand, Portugal and Greece are the countries that spend the least means – both total and public – on health.

It follows from the data reported in Table 3 and in Figure 5 that the share of public outlays on health protection, expressed in terms of USD allowing for PPP, is in the EU countries lower than in Poland. All in all, analysing expenditures on health, one can state that financing the sphere of health protection in Poland is at a very low level.

Table 3. Outlays on health protection per capita in USD in terms of PPP in the EU countries and in Poland in the years 1990–2000

Outlay on health in USD per capita by PPP	Countries	Years										
		'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Total	EU mean	1 189	1 268	1 376	1 427	1 484	1 619	1 690	1 767	1 825	1 943	2 032
	Poland	258	296	331	339	349	420	469	461	543	557	587
Public	EU mean	942	999	1 073	1 110	1 141	1 226	1 277	1 331	1 374	1 466	1 535
	Poland	237	224	253	250	254	306	344	332	355	418	406

Source: As same as Tab. 2.

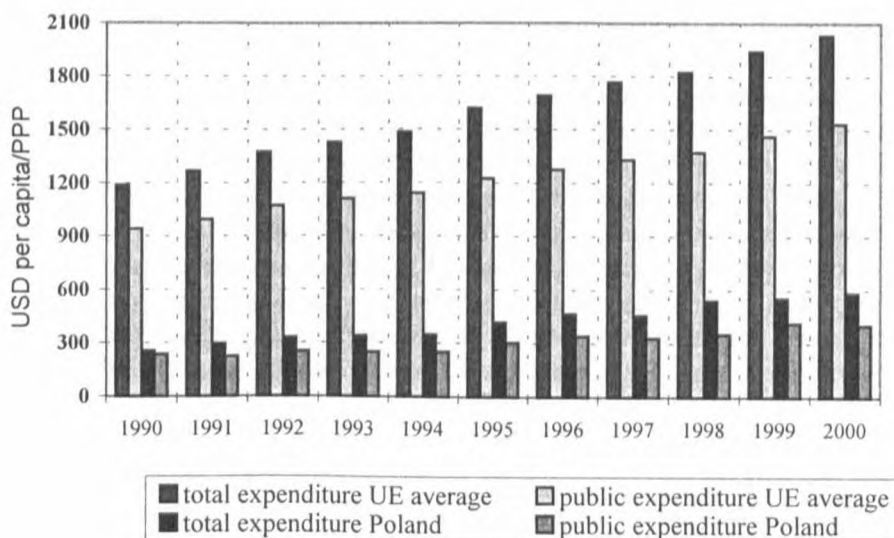


Fig. 5. Share of public outlays in total outlays on health protection per capita in USD in terms of PPP in the EU countries and in Poland in the years 1990–2000

Source: As same as Fig. 1.

### 3. Space-time modelling of expenditures on health protection

The dynamic model used to model outlays on health protection is the error correction model (ECM). In such a model the error term is subject to verification and constitutes also a correction factor (explanatory variable) (Welfe (ed.) 2000).

The space-time framework suggested in the paper enables an answer to the following questions:

- What are expenditures on health protection in various countries like?
- What spatial effects, typical of individual countries can be observed?
- What is, common for all the countries under investigation, short- and what is long-run elasticity of outlays on health protection with respect to GDP like?

The statistical data come from the annual OECD Health 2002 databases and cover the period from 1990 to 2000. This time span was dictated by the changes in the classification of the collected data after the year 2000 regarding circumstantialities, comparability, unity in classification of medical notions, availability and credibility of data. In the models subject to estimation there are also some dummies present because of the existence of outliers. The data should



be comparable as they are expressed in terms of the PPP dollars. The log-incremental model has been implemented in the space-time analysis.

### Estimation of the space-time model of total expenditures on health protection (TOT)

As a result of the conducted analysis the following estimates have been derived for the TOT model (*t*-Student statistics are given in parentheses):

$$\begin{aligned} \Delta \ln TOT_t = & -0,4243 - 0,2984 \cdot (\ln TOT_{t-1}) - 0,8511 \cdot \ln GDP_{t-1} + 0,7732 \cdot \Delta \ln GDP_t + \\ & + 0,1308 \cdot \text{Austria} + 0,1464 \cdot \text{Belgium} + 0,1400 \cdot \text{Denmark} + 0,0778 \cdot \text{Finland} + 0,1727 \cdot \text{France} + \\ & + 0,2026 \cdot \text{Germany} + 0,1346 \cdot \text{Greece} + 0,0897 \cdot \text{Ireland} + 0,1157 \cdot \text{Italy} + 0,0584 \cdot \text{Luxemburg} + \\ & + 0,1347 \cdot \text{Holland} + 0,1085 \cdot \text{Portugal} + 0,1007 \cdot \text{Spain} + 0,1129 \cdot \text{Sweden} + \\ & + 0,0875 \cdot \text{Great Britain} + 0,1397 \cdot U31 - 0,1202 \cdot U62 + 0,0978 \cdot U115 + 0,1264 \cdot U151 \end{aligned}$$

$$\hat{R}^2 = 0,822$$

$$DW = 2,373$$

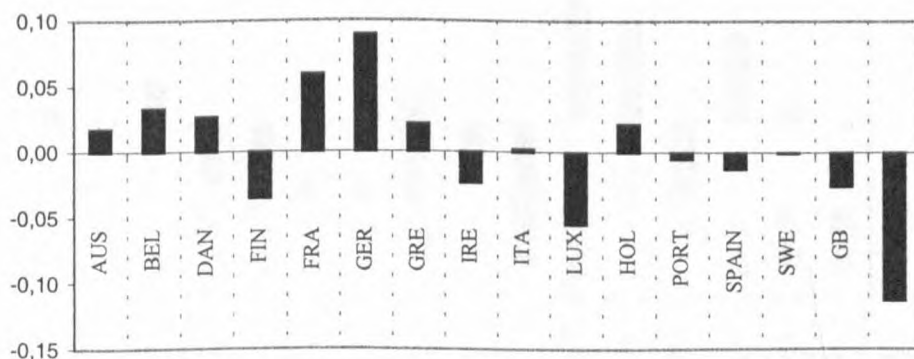


Fig. 6. Total outlays on health protection in the EU and in Poland in the years 1990–2000  
Source: As same as Fig. 1.

The long-term elasticity of total expenditures with respect to GDP equals 0.8511. The elasticity informs us that, in the long run, increasing GDP by 1% resulted, on average, in a 0.85% rise in outlays on health protection. In the short run, outlays on health grow, on average, by 0.77% with respect to GDP. Both the estimates turned out to be statistically significant. The total outlays on health protection in Germany and in France are much higher than the EU mean. Luxemburg is the country of the least total expenditures as compared to

the EU average. The outlays on health protection in Poland are far below the EU mean.

### Estimation of the space-time model of public expenditures on health protection (PUB)

As a result of the conducted analysis the following estimates have been derived for the PUB model (*t*-Student statistics are given in parentheses):

$$\begin{aligned} \Delta \ln PUB_t = & -0,3683 - 0,2971 \cdot (\ln PUB_{t-1} - 0,8425 \cdot \ln GDP_{t-1}) + 0,6656 \cdot \Delta \ln GDP_t + \\ & + 0,0052 \cdot \textit{Austria} + 0,0179 \cdot \textit{Belgium} + 0,0589 \cdot \textit{Denmark} - 0,0331 \cdot \textit{Finland} + 0,0652 \cdot \textit{France} + \\ & + 0,1013 \cdot \textit{Germany} - 0,0698 \cdot \textit{Greece} - 0,0150 \cdot \textit{Ireland} - 0,0030 \cdot \textit{Italy} + 0,0145 \cdot \textit{Luxemburg} + \\ & + 0,0032 \cdot \textit{Holland} - 0,0287 \cdot \textit{Portugal} - 0,0255 \cdot \textit{Spain} + 0,0325 \cdot \textit{Sweden} + \\ & + 0,0033 \cdot \textit{Great Britain} + 0,1550 \cdot U31 - 0,1359 \cdot U62 \end{aligned}$$

$\hat{R}^2 = 0,816 \quad DW = 2,825$

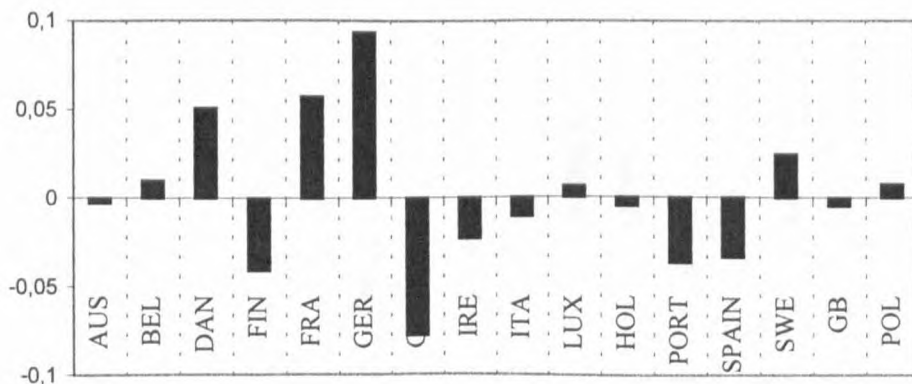


Fig. 7. Public outlays on health protection in the EU and in Poland in the years 1990–2000  
Source: As same as Fig. 1.

In the case of the equation describing the increment in public expenditures on health protection, the long-term elasticity of the expenditures with respect to GDP equals 0.8425. The elasticity informs us that, in the long run, increasing GDP by 1% resulted, on average, in a 0.84% rise in outlays on health protection. In the short run, outlays on health grow, on average, by 0.67% with respect to GDP. Thus the effect of the GDP impact is less than proportional. On the basis of the obtained outcomes, one can state that, in the short run, much less money was spent on health protection than in the long run. Both the estimates turned out

to be statistically significant. The public outlays on health protection in Germany and in France are much higher than the EU mean. Greece is the country of the least public expenditures as compared to the EU average. The public outlays on health protection in Poland exceed the EU mean.

### Estimation of the space-time model of private expenditures on health protection (PRYW)

As a result of the conducted analysis the following estimates have been derived for the PRYW model (*t*-Student statistics are given in parentheses):

$$\begin{aligned} \Delta \ln PRYW_t = & -2,8694 - 0,6346 \cdot (\ln PRYW_{t-1} - 1,0581 \cdot \ln GDP_{t-1}) + 0,6281 \cdot \Delta \ln GDP_t + \\ & (-5,496) \quad (7,313) \quad (16,416) \quad (2,909) \\ & + 0,1154 \cdot Austria + 0,1996 \cdot Belgium - 0,1568 \cdot Denmark - 0,0278 \cdot Finland + 0,1095 \cdot France + \\ & (4,543) \quad (6,642) \quad (-5,526) \quad (-1,178) \quad (4,192) \\ & + 0,1223 \cdot Germany + 0,4608 \cdot Greece + 0,0096 \cdot Ireland + 0,0542 \cdot Italy - 0,9200 \cdot Luxemburg + \\ & (4,651) \quad (9,506) \quad (0,387) \quad (2,242) \quad (-10,628) \\ & + 0,1850 \cdot Holland + 0,2696 \cdot Portugal + 0,0702 \cdot Spain - 0,2642 \cdot Sweden + \\ & (6,577) \quad (7,410) \quad (2,828) \quad (-8,145) \\ & - 0,2683 \cdot Great Britain \\ & (-8,351) \end{aligned}$$

$$\hat{R}^2 = 0,867 \quad DW = 1,593$$

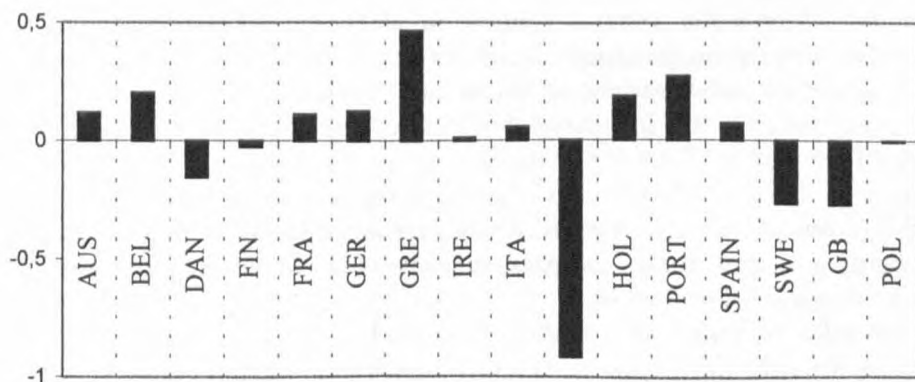


Fig. 8. Private outlays on health protection in the EU and in Poland in the years 1990–2000

Source: As same as Fig. 1.

In the equation describing the increment in private expenditures on health protection, the long-term elasticity of the expenditures with respect to GDP equals 1.0581. The elasticity informs us that, in the long run, increasing GDP by 1% resulted, on average, in a 1.06% rise in outlays on health protection. In the

short run, outlays on health grow, on average, by 0.63% with respect to GDP. Both the estimates proved to be statistically significant. The private outlays on health protection are much higher in Greece, whereas in Luxemburg much lower than the EU mean. The private outlays on health protection in Poland are at almost the same level as the EU average, being only slightly lower.

It is worth stressing that in each of the presented models the increments were used instead of the levels of the variables. To much extent this type of models eliminates the possibility of the occurrence of spurious correlations. Another important feature of this class of models is that they exclude the occurrence of non-stationarity or autocorrelation. However, their shortcoming is a poor goodness of fit. The low value of the coefficient of determination is caused by the transformations of variables used in the model (increments of logarithms).

### 3. Conclusions

At the beginning of the 90s there increased the number of countries that looked afresh at their national accounts. The countries were searching for a strategy that would allow them to pursue adequate health policies; to get versatile and internally consistent health accounts as well as general national health information systems. The broader outlook on the issues related to public health contributed to changes in the existing statistical systems of health care. The new information systems connect in unity socio-economic factors of secondary importance (economic, social and physical environment) with the data on expenditure and financing of health care service. The System of Health Accounts prompts the International Classification of Health Accounts that covers three issues: functions of health care; providers of health care service; sources of finance of health care. The suggested accounts enable comparisons both in terms of time and in terms of space for individual countries. They serve the purpose of international comparative analyses of various organizational and financial aspects of health care.

Recently, in numerous countries belonging to the EU, a change in their attitude towards finance of health care sphere has been observed. Private expenditures are gaining a higher and higher share in the total expenditures on health protection. This can be attributed to changes in the social mentality as well as to the welfare effect and to the existing insurance systems. In a lot of countries, independently of their methods of financing health care, there diminished the expenditures – measured as a fraction of GDP – on public health protection in favour of private outlays.

To sum up, it follows from the conducted investigation that there is strong dependence between expenditures on health protection and the economic environment expressed by Gross Domestic Product.

In the EU countries as well as in Poland expenditures on health protection constitute essential goods. Total and public expenditures are normal goods both in the short and in the long run, whereas private outlays are normal goods only in the short run. However, in the long run, private expenditures on health are perceived as luxurious goods.

Basing on observations and on researches being conducted, one is allowed to state that the best-suited model for the sake of space-time analyses is the error correction model.

## References

- A System of Health Accounts, Version 1.0, OECD 2000.
- Baran A. (2000), *Wydatki na ochronę zdrowia w Polsce w latach dziewięćdziesiątych*, „Zdrowie Publiczne”, suplement 1.
- Kawiorska D. (2000), *Wydatki na ochronę zdrowia – możliwości i bariery porównań międzynarodowych*, „Zdrowie i Zarządzanie”, nr 3–4.
- Kawiorska D., Kozierkiewicz A. (2003), *Wydatki publiczne na ochronę zdrowia – definicje i porównania międzynarodowe*, „Zdrowie i Zarządzanie”, nr 2.
- Końcowy Raport Techniczny, Opracowanie i wdrożenie Narodowego Rachunku Zdrowia w Polsce, Warszawa 2002.
- Koronkiewicz A., Karski J. B. (1998), *Aktualne zagadnienia reformy opieki zdrowotnej w krajach Europy Środkowej i Wschodniej oraz Unii Europejskiej w świetle aktualnych wydawnictw niemieckich*, „Zdrowie Publiczne”, nr 11.
- Kozierkiewicz A. (2000), *Znaczenie wybranych wskaźników dla podejmowania decyzji w ochronie zdrowia*, cz. I, „Zdrowie Publiczne”, suplement 1.
- Leowski J. (2000), *Polityka zdrowotna – finansowanie opieki zdrowotnej w świecie, jego źródła, efekty i zagrożenia*, „Zdrowie Publiczne”, nr 4.
- OECD Health Data 2002, OECD, A comparative analysis of 30 countries, OECD, Paris 2002.
- Parkin D. (1991), *Comparing Health Service Efficiency Across Countries*, [in:] A. McGuire, P. Fenn, K. Mayhew, *Providing Health Care. The Economics of Alternative Systems of Finance and Delivery*, Oxford.
- Schneider M., Kawiorska D. (red.) (2002), *System Rachunków Zdrowia w Polsce*, Warszawa.
- Suchecka J. (1998), *Ekonometria ochrony zdrowia*, Łódź.
- Welfe A. (red.) (2000), *Gospodarka Polski w okresie transformacji. Zasady modelowania ekonometrycznego*, Warszawa.
- Włodarczyk C. (1998), *Reforma opieki zdrowotnej w Polsce. Studium polityki zdrowotnej*, Kraków.
- Zeliaś A. (red.) (1991), *Ekonometria przestrzenna*, Warszawa.

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## **WYDATKI NA OCHRONĘ ZDROWIA W POLSCE I UNII EUROPEJSKIEJ – ANALIZA PRZESTRZENNO-CZASOWA**

W krajach OECD opieka zdrowotna jest jednym z największych i najbardziej dynamicznie rozwijających się sektorów gospodarki narodowej, którego finansowanie jest coraz bardziej złożone, a którego analizy finansowania są niezwykle ważne z praktycznego punktu widzenia.

Jednym ze sposobów porównywania wydatków na ochronę zdrowia pomiędzy poszczególnymi krajami jest ustalenie wspólnych, dla tych państw, sposobów klasyfikacji wydatków zdrowotnych. Międzynarodowe porównania w tym zakresie są możliwe przy wykorzystaniu Narodowego Rachunku Zdrowia (NHA). System Rachunków Zdrowia (SHA) został zalecony przez EUROSTAT i OECD krajom członkowskim w celu wsparcia prawidłowej analizy danych.

W wyniku zmian zachodzących w poszczególnych państwach niezbędne stało się, między innymi, określenie nowego zapotrzebowania na informacje w systemie opieki zdrowotnej oraz ustalenie nowych reguł zbierania i korzystania z danych tak, aby stanowiły one dla osób zajmujących się opracowaniem i wdrożeniem polityki zdrowotnej podstawę do podejmowania określonych decyzji. Informacje uzyskane z narodowych rachunków mogą ułatwić podejmowanie decyzji makroekonomicznych dotyczących alokacji źródeł finansowania dla całego sektora opieki zdrowotnej. Ich konstrukcja umożliwia również dokonywanie analizy porównawczej wydatków zdrowotnych w innych krajach.

Przy porównaniach międzynarodowych całkowitych wydatków na ochronę zdrowia niezwykle istotną sprawą jest przeliczenie tych wydatków na liczbę ludności danego państwa oraz określenie waluty (np. USD) i podanie ich w odniesieniu do ich siły nabywczej, bądź też jako procent produktu krajowego brutto.

Biorąc pod uwagę aspekty prawne i organizacyjne oraz dostępność danych statystycznych w artykule zaprezentowano wyniki analiz przestrzenno-czasowych.