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DISPARITY OF EXPENDITURES OF PENSION SYSTEMS IN EUROPEAN UNION COUNTRIES

Abstract. The topic of suggested paper concerns the one of basic economic problems, the growing expenditures connected with functioning pension systems in the countries of European Union. The main purpose is presenting the disparity of expenditures for public pensions in 25 countries of European Union and their projection until the 2050.

While discussing so important and present in many countries theme of pension security, the general characteristic of cooperation of members of the EU and EFTA in the area of social protection has been made. Particularly, the hitherto existing operations taken in the range of Open Method of Coordination of pension systems, which is realized since the year 2000, have been presented.

Besides, the synthetic variable has been applied for the general evaluation of the degree of diversification of expenditures for social protection (EU and EFTA) and public pensions in countries of the European Union. It allowed to describe and set countries in order from the point of view of analysed phenomenon.

Key words: Open Method of Coordination (OMC), old-age security, the projection of pension system expenditures, Zero Unitarization Method

1. INTRODUCTION

The international economic integration is the highest form of economic conversions in the modern world and also en example of social and economic phenomena which have an important influence on functioning and development of the world economy. The Integration of 27 countries of the European Union (since January 1st, 2007) establishes the most „spread out" and the most numerous group of the „united" countries, and their number will probably increase.

The integration introduces the common law regulations and leads to the convergence of countries' individual economic systems in the major spheres of economy. However, economic systems of the member countries differ much from each other. The divergences occur not only between the countries of the „Old" and the „New" Union, but also within each of these groups, e.g. the problem of social, pension protection.

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The paper discusses problems of coordination of social protection systems and pension systems in the countries of the European Union. The disparity of expenditures for social security in the EU countries in the historic approach is shown. It also presents expenditures on pensions in the years 2000 and 2004 and their projection until 2050. The attempt of ranking the countries from the point of view of expenditures on social protection and old-age security has been taken.

2. COORDINATION OF SOCIAL PROTECTION SYSTEMS

At the very beginning, the records of the Treaty of Rome (1957), establishing the European Economic Community (EEC), emphasized the guarantee of using the social protection by the employee changing workplace and living-area within the Community. The introduction of coordination of social security systems did not serve the purpose of removing differences among individual systems of the EU countries, as well as making the supranational system of social protection for migrating employees. Since the very beginning there existed an opinion that the so called social harmonization should not be undertaken in the area of social protection (Aniol 2003, pp. 99–106).

In the paragraph 51st of the Treaty of Rome the EEC Council was obligated to work out the solutions coordinating systems of social security. Therefore, The Council voted two regulations which have been in force in all member countries up to date: the Regulation (EEC) No 1708/71 of 14 June 1971 concerning the application of social security schemes to employed persons, to self-employed persons and to members of their families moving within the Community. Regulation No 574/72 of 21 March 1972 introducing detailed rules for implementing the previous Council regulation.

Regulations assure the coordination of social security systems of all European Union countries, Switzerland and 3 EFTA – European Free Trade Association countries – Iceland, Liechtenstein and Norway. Together with the EU they form European Economic Area. Since January 1[st,] 2007 adjustments concerning coordination of social security systems came into force in 31 countries (EU-27, Switzerland and 3 EFTA). Each of these countries has its own separate, compound social security system, with the institutions which were established to realize entitlement of its citizens.

Functioning of different social protection systems in Europe (sickness/health care, disability, old-age, survivors, unemployment and housing insurances) results from different economic, historical, demographic and cultural conditions of individual countries. The coordination accepts the existing differences between these systems, yet it does not influence the liberty of member countries to establish their own rules for systems of social protection. Countries maintain their

right to construct individual systems, set the level of pension contributions and conditions of acquisition of entitlements, set the pension age and payment of benefits etc.

Since the beginning, the supplementary (additional) pension systems were left outside the framework of the Coordination, because of their diversity, as well as different forms of pre-pension services and early retirements.

3. OPEN METHOD OF COORDINATION OF PENSION SYSTEMS

Since the year 2000 the European Union has been realising the Open Method of Coordination (OMC) of the pension systems. The Old-age protection is the third section of the social policy, after the employment and social inclusion policy, in which the EU has decided to apply this method of cooperation. Earlier, the OMC was applied in the area of economic policy, together with realization of Economic Union and Monetary Union (Golinowska 2002, p. 12). The purpose of this method is to expand cooperation between member states, what means:

- common setting the purposes of the European social policy,
- indication or/and constructing social indicators, which will define and test the defined purposes in a measurable way,
- indication of the reference – the benchmark which one should tend to,
- systematic watching and common assessment of the realization of established purposes.

These operations are merely common intellectual, statistical and political work and they constitute a certain kind of method of management by purposes.

Undertaking of coordination operations results not only from the different structure of old-age security (pillar construction), but also from the different way of financing and organizing of benefits. It should be noticed that in comparison with other world economies all member states attach great importance to „social" (public) pension systems, which form the basic source of incomes for senility. It is the growing expenditures on pensions and social pensions, which became one of the premises of introduction of the open coordination in this domain.

The history of cooperation of pension systems is not long. The first mention about using the OMC in the area of pension can be found in the report from the session of the European Councils in Lisbon, March 2000. The Social Protection Committee was obligated then to prepare the study about the development of social protection in the long-term future, focusing in particular on the sustainability of pension schemes. As a result of the undertaken analysis in October of 2000 a report was issued „ *The future evolution of social protection from long-*

term point of view: safe and sustainable pensions", in which the framework for pension problems' analysis was given. It was stated, that for securing the safe future of pension systems, reforms inside of individual countries will not be sufficient, but the economic growth and incrementation of employment is required. Though each country decides about the form of pension system on its own, they face common problems so, the coordination and exchange of information in the range of reform is useful (Szumlicz, Żukowski 2003, pp. 347–349).

The final decision in case of applying of the Open Method of Coordination was undertaken during the session of the European Council in Goteborg in June 2001. The report *„Adequate and sustainable pensions"* was published. Simultaneously, the Economic Policy Committee and the Social Protection Committee were obligated to elaborate the report about purposes and methods of working in the range of pensions. In the report published in June 2001 *„Supporting national strategies for safe and sustainable pensions through an integrated approach"* three basic purposes of operations connected with pension security formulated in Goteborg were adopted – adequacy, sustainability and modernization (COM(2001)326: 2001, p. 3).

In November 2001, the earlier commissioned report *„Joint report (...) on objectives and working methods in the area of pensions: applying the open method of coordination"*, was released and accepted by the European Council in Leaken in December 2001.

The next stage of introducing the coordination of the pension systems (up to September 2002) consisted in preparation of the national strategic reports containing the future of their pension systems by all member countries. They included the diagnosis of the most important challenges in the area of pensions, the information on implemented and planned reforms, and also the data enabling the definition of medium- and long-term results of present policy and implemented and planned reforms. On the basis of national reports the first common report (2003) *Joint report on adequate and sustainable pensions* appeared evaluating national pension strategies and identifying the great and innovative examples in the area of pensions.

However, as a result of expansion of the European Union in the year 2004, the national strategic reports on pension systems were prepared for the second time. On the basis of national reports *„Synthesis report on adequate and sustainable pensions"* was written (January 2006), which included: the general recapitulation of changes in pension systems and the method of coordination, the characteristics of 25 national pension strategies and the analysis of countries from the point of view of realization of common purposes (adequacy, sustainability and modernization).

In March 2006, the European Council presented the detailed proposals of rationalizing OMC in the report *Working together, working better: proposals for a*

new framework for the open coordination of social protection and inclusion policies". The set of common purposes for all of three areas of social policy: social exclusion, pensions and health protection and the long-term medical protection was established. In addition, the linking of OMC in the area of social integration and pensions and also in the range of long-term health protection is considered. Detailed tasks with the purpose of providing adequate and sustainable pensions are the following (COM(2005)706: 2005, p. 6):

- In the spirit of solidarity and fairness between and within generations, guarantee adequate retirement incomes for all and access to pensions which allow people to maintain, to a reasonable degree, their living standard after retirement.

- In the context of sound public finances, ensure the financial sustainability of public and private pension schemes, notably by: supporting longer working lives and active ageing; ensuring an appropriate and fair balance of contributions and benefits; and promoting the affordability and ensuring the security of funded and private schemes.

- Ensure that pension systems are transparent, well adapted to the needs and aspirations of women and men and the requirements of modern societies, demographic ageing and structural change; that people receive the information they need to plan their retirement and that reforms are conducted on the basis of the broadest possible consensus.

Applying the Open Method of Coordination will not improve the situation in the area of pension security automatically. Though the superiority of advantages connected with its introduction is noticeable, the realization of marked purposes is not a simple task in the light of dynamic process of ageing societies. Firstly, the Method of Coordination concerns one of the most important social problems, it means old-age security. Secondly, this problem includes a considerable part of the old-age population, and thirdly, the realization is a long-term project.

Taking into consideration the tasks formulated in the area of coordination of pension systems, it should be noticed that the two most important purposes sustainability and adequacy are partly contradictory to each other – it means the stable sponsoring pension systems, according to principle of balanced public finances, simultaneously assuring the proper level of pensions (Golinowska 2002, p. 11).

Therefore, the question arises – how to take care of finances of the base pension systems in case of difficulties connected with maintenance of employment and the proportions between population of working persons (paying contributions) and person receiving pensions. How to improve pension systems finances when a decrease in employment indicators is observed, and increasing, because of the production growth, wages are not able to make up for the shortages in the sphere of labour.

Advantages	Disadvantages
First of all, the interest in the most important social problems will grow. Problems peculiar for individual countries will be discussed at the Union level. The method promotes the transparency of applicable pension solutions in different countries, and it will facilitate international comparisons. It enables learning by experience of others and not by mistakes. It compares economic effects in pension systems and not only legal solutions. It will cause the development of social statistics and also the oriented social researches in the spheres which are the subject of open coordination.	Insufficient taking into consideration of the national conditions and a wider context of pension security in the OMC. The problem of choice of diagnostic indicators, so that they do not prefer any of the chosen pension systems Concern about increased competences of the Union in the area which was previously in competence of member states.

Elevation of pension contribution is the simplest way, however, this idea would bring about two negative results. First, the stabilization of the contribution ratio is the basic purpose of the conducted reforms, and this is the ultimate solution. Besides, the incrementation of pension contribution directly boosts work costs, and this leads to a decrease in competitiveness of economy and decrease in work supply from the side of employer.

The possibility of prolonged working life of elderly people in order to counteract the extended duration of life is also frequently considered. However, prolongation of their working life is tied up with bigger expenditures on holding them in work readiness, e.g. for medical protection. Also a dilemma appears, is it better to extend professional activity of old people or to help young people, to take up work. The postulate of stretching the period of old people's occupational activity depends on conditions on the local labour market and it poses a difficult problem although the researches show that workplaces of young and old people de facto are "different workplaces".

The key factor here is the proper forming of demographic process, in order to balance the relations between productive and non-productive generations (incomes and outcomes of the system). An important role in this area is played by the pro-family policy and policy of employment.

4. DISPARITY OF EXPENDITURES ON SOCIAL SECURITY AND PENSION

In each person's life there are periods of ability for achievement of work revenue, periods of lack of work, or limited capabilities of work. It is possible to solve a problem of affirmation of means for survival on the way of intergenerational distribution of livelihood between units, or by distribution of work revenue (savings) in time. Societies have developed systems of redistribution of current revenues of whole community, and they have given this individual responsibility a more collective character. This role is fulfilled the pension systems based on capital account, in which the future pensioners „buy" the participation in the value of capital, which has to be elaborated by future generations (Piętka 2005, p. 11). All the redistribution system of revenue is extended, and its participation in the generated GDP is growing. The data presented in Table 1 shows systematic growth of participation of expenditures on social protection in majority of the EU countries.

According to the latest data in 2004, the participation of social protection expenditures as a % of GDP in EU-25 countries amounted to 27.3%. The countries, where the participation of expenditures was equal to or bigger than the average from the whole EU are inhabited by over 42% of population. The group of countries, where participation of expenditures on the social security is within the range (23–27.3%> is populated by almost 32% of inhabitants, and over 22% of people live in the countries where the percentage of expenditures was within the range 18-23%>. Only 3.8% of the EU population is citizens of the states where the expenditures for social security were below 18% GDP.

Table 1

Total social protection expenditure as a % of GDP

EU /Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 (X_1)
1	2	3	4	5	6	7	8	9	10	11	12
EU-25	:	:	:	:	:	:	26.6	26.8	27.0^P	27.4^P	27.3 *
EU-15	28.4	28.2	27.9	27.6	27.2	27.1	26.9	27.1	27.4^P	27.7^P	27.6 *
Belgium	28.7	28.1	28.0	27.4	27.1	27.0	26.5	27.3	28.0	29.1	29.3
Czech Republic	:	17.0	17.6	18.6	18.5	19.2	19.5	19.4	20.2^P	20.2^P	19.6^P
Denmark	32.5	32.2	31.2	30.1	30.0	29.8	28.9	29.2	29.7	30.7	30.7
Germany	27.7	28.9	29.3	28.9	28.8	29.2	29.2	29.3	29.9	30.2	29.5^P
Estonia	:	:	:	:	:	:	14.0	13.1	12.7	12.9	13.4
Greece	22.1	22.3	22.9	23.3	24.2	25.5	25.7	26.7	26.2	26.0	26.0
Spain	22.8	22.1	21.5	20.8	20.2	19.8	19.7	19.5	19.8^P	19.9^P	20.0^P
France	30.2	30.7	30.6	30.4	30.0	29.9	29.5	29.6	30.4	30.9	31.2^P
Ireland	19.7	18.9	17.6	16.4	15.2	14.6	14.1	15.0	16.0	16.5	17.0
Italy	26.0	24.8	24.3	24.9	24.6	24.8	24.7	24.9	25.3	25.8^P	26.1^P
Cyprus	:	:	:	:	:	:	14.8	14.9	16.3	18.5	17.8
Latvia	:	:	:	15.3	16.1	17.2	15.3	14.3	13.9	13.4	12.6^P

Table 1 (cont.)

1	2	3	4	5	6	7	8	9	10	11	12
Lithuania	:	:	13.4	13.8	15.2	16.4	15.8	14.7	14.1	13.6	13.3 ^{P}
Luxembourg	22.9	23.7	21.2	21.5	21.2	20.5	19.6	20.8	21.4	22.2	22.6 ^{P}
Hungary	:	:	:	:	:	20.7	19.3	19.3	20.3	21.1	20.7
Malta	:	:	16.5	17.2	17.1	17.0	16.3	17.1	17.1	17.9	18.8
Netherlands	31.7	30.9	29.6	28.7	27.8	27.1	26.4	26.5	27.6	28.3	28.5 ^{P}
Austria	28.9	28.9	28.6	28.6	28.3	28.7	28.2	28.6	29.1	29.5	29.1
Poland	:	:	:	:	:	:	19.5	20.8	21.2	20.9	20.0 ^{P}
Portugal	21.3	22.1	20.2	20.3	20.9	21.4	21.7	22.7	23.7	24.2	24.9 ^{P}
Slovenia	:	:	24.1	24.5	24.8	24.7	24.9	25.3	25.3	24.6	24.3 ^{P}
Slovakia	:	18.7	19.3	19.6	20.0	20.0	19.3	18.9	19.0	18.2	17.2 ^{P}
Finland	33.8	31.7	31.4	29.1	27.0	26.2	25.1	24.9	25.6	26.5	26.7
Sweden	36.8	34.6	33.6	32.7	32.0	31.7	30.7	31.3	32.3	33.3	32.9 ^{P}
United Kingdom	28.6	28.2	28.0	27.5	26.9	26.4	27.1	27.5	26.4	26.4 ^{P}	26.3 *
Iceland	18.7	19.0	18.7	18.5	18.4	19.0	19.3	19.6	21.6	23.3	23.0
Norway	27.6	26.7	26.0	25.3	27.1	27.1	24.6	25.6	26.2	27.5	26.3
Switzerland	25.0	25.7	26.6	27.5	27.7	27.6	27.4	28.1	28.7	29.3	29.5

^{P} – provisional data, * – estimated data.

Source: *European Social Statistics. Social protection. Expenditure and receipts* (2005, p. 14, 2007, p. 14).

Countries of the EU with the highest participation of expenditures on social protection are first of all Sweden (32.9%), France and Denmark (31.2% and 30.7%, respectively) and Germany (29.5%). These countries spend over twice as much money on social security as the Baltic countries: Latvia (12.6%), Lithuania (13.3%) and Estonia (13.4%). Comparing the growth of participation in expenditures in the years 2000–2004 (EEA) it should be noticed that the biggest increase (about 3.7 points of percent) was observed in Iceland, but the biggest decrease (about 2.7 points of percent) in Latvia. In Poland the expenditures have grown merely about 0.5 percent point.

If the expenditures on social protection are counted per capita and expressed according to purchasing power standard (PPS) then the differences among individual countries are more visible. Among 25 countries of the EU, the biggest amount of expenditures per capita fell to Luxembourg (12 180 PPS), next were Sweden and Denmark, 8 756 PPS and 8 470 PPS, respectively. The Baltic countries are characterized by the lowest level of social expenditures below 1 625 PPS. It should be noticed, that in these countries the amount of expenditures falling to 1 inhabitant is almost seven times lower, than the average for the three mentioned above countries, with the biggest expenditures on social security.
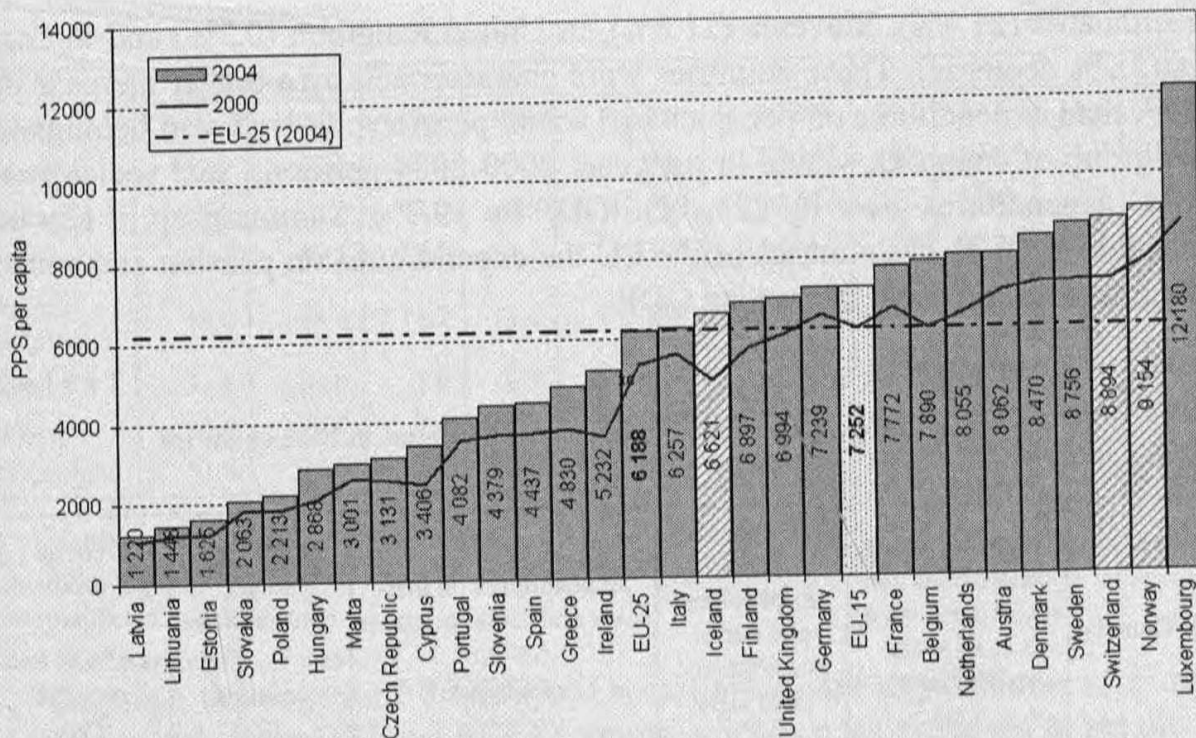
Graph 1. Total expenditures on social protection in PPS per capita in 2000 and 2004 (X₂)

For 2004 the provisional data and estimated data, see Table 1

S o u r c e: Own calculations based on *European Social Statistics. Social protection…* (2007), p. 17.

From the point of view of purposes and destinations of expenditures, the biggest percentage in total value of social security expenditures constituted the expenditures for pensions and social pensions. In 2004, in 25 countries of the European Union, they amounted to 45.9% and they made up 12.0% GDP (Table 2). The particularly high participation of expenditures on pensions and social pensions in 2004 took place in Italy, where over 61% of the general amount of social expenditures is assigned on this purpose. That resulted from a particularly high percentage of old people, at the age 65 years and older, which amounted to 19.2% in 2004, whereas it was at the level of 16.5% in the whole Union. With respect to expenditures Poland (60.1%), Latvia (50%), Malta (51.2%) and Greece (50.9%) are the countries which allocate for this purpose much above the average value for the enlarged Union (45.9%). The country with the lowest expenditure on pensions and social pensions is Ireland, where the participation of expenditure amounted to 23.3% only.

It should be added, while observing the dynamics of changes of pensions' and social pensions' expenditures, that in the years 2000–2004 they grew the most in Hungary (74.2%), in Ireland (58.5%), on the Cyprus (50.1%) and in Portugal (47.7%). In mentioned countries the increase of pensions' and social pensions' expenditures was considerably higher than the increase of GDP. The smallest increase in expenditure on pensions and social pensions was observed

in Lithuania (21.7%), Slovenia (21.8%), in United Kingdom (0.2%) and in Latvia (5.3% decrease). These countries were characterized by a bigger increase of GDP, than expenditures on pensions and social pensions. Poland also belongs to this group of countries, where in the years 2000-2004 pensions' and social pensions' expenditures grew by 22%, and GDP by 39.9%. Summing up, it can be said, that in 16 of 25 countries of the EU the expenditures on pension and social pensions were growing faster than GDP.

Table 2

Pension, social pension expenditures and contributions in EEA countries
in the years 2000 and 2004

UE/Country	The expenditures on pensions and social pensions as a % of social expenditures (X_3)		The expenditures on pensions and social pensions as a % of GDP (X_4)		Expenditures on pensions and social pensions (million of EURO)		Employers' social contributions as a % of total receipts (X_5)		General government contributions as a % of total receipts (X_6)	
	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
1	2	3	4	5	6	7	8	9	10	11
EU-25	46.7	45.9	12.0	12.0	1 085 282	1 256 982 *	38.7	38.6 *	35.4	37.3 *
EU-15	46.6	45.7	12.0	12.1	1 049 620	1 210 277 *	38.7	38.6 *	35.5	37.5 *
Belgium	44.1	44.1	11.0	12.3	27 768	35 605	49.9	49.3	25.3	27.0
Czech Republic	43.3	41.1	8.2	7.8	5 029	6 773 [P]	49.7	53.2 [P]	25.0	19.6 [P]
Denmark	38.1	37.2	10.7	11.1	18 547	21 872	9.1	10.2	63.9	63.5
Germany	42.4	43.5	11.9	12.4	246 465	273 328 [P]	38.5	36.3 [P]	31.8	34.5 [P]
Estonia	45.4	43.7	6.3	5.8	381	542	79.2	78.0	20.6	21.2
Greece	49.7	50.9	12.4	12.8	15 597	21 588	38.2	37.3	29.2	30.5
Spain	46.2	43.7	8.8	8.5	55 888	71 532 [P]	52.4	50.9 [P]	27.4	30.3 [P]
France	44.4	43.6	12.2	12.8	177 015	212 140 [P]	46.0	45.5 [P]	30.4	30.4 [P]
Ireland	25.1	23.3	3.4	3.8	3 529	5 595	25.1	23.1	58.3	60.8
Italy	63.2	61.3	15.0	15.4	179 103	214 479 [P]	42.8	41.2 [P]	40.6	42.4 [P]
Cyprus	48.8	48.3	7.1	8.4	716	1 075	9.4	8.8	45.0	52.7
Latvia	57.1	50.0	8.5	6.1	720	682 [P]	52.6	48.9 [P]	30.2	33.4 [P]
Lithuania	47.8	47.3	7.3	6.1	908	1 105 [P]	53.7	54.0 [P]	38.9	39.5 [P]
Luxembourg	39.9	36.5	7.5	8.1	1 653	2 185 [P]	24.7	27.3 [P]	46.9	44.6 [P]
Hungary	41.4	42.5	7.9	8.6	4 077	7 102	47.0	42.8	31.6	33.0
Malta	51.9	51.2	8.3	9.5	354	414	45.3	44.4	30.5	32.5
Netherlands	42.4	41.6	10.5	11.0	43 854	54 263 [P]	29.4	34.0 [P]	14.4	19.2 [P]
Austria	48.4	48.2	13.2	13.7	27 813	32 146	39.0	37.2	32.7	34.6
Poland	55.8	60.1	10.6	11.8	19 649	23 979 [P]	30.1	27.7 [P]	32.4	34.8 [P]
Portugal	44.7	47.2	8.7	10.9	10 605	15 662 [P]	35.6	31.7 [P]	39.1	42.2 [P]

Table 2 (cont.)

1	2	3	4	5	6	7	8	9	10	11
Slovenia	45.3	44.6	11.0	10.6	2 289	2 787[P]	27.0	27.1[P]	31.5	31.6[P]
Slovakia	37.2	40.1	7.0	6.6	1 540	2 246[P]	48.3	49.8[P]	31.0	28.8[P]
Finland	35.8	36.9	8.7	9.6	11 510	14 514	37.7	39.4	43.2	44.3
Sweden	39.4	40.1	11.9	12.7	31 176	35 826[P]	40.5	40.8[P]	45.8	48.7[P]
United Kingdom	48.8	44.6	12.7	11.6	199 098	199 542 [*]	29.9	32.5 [*]	46.4	49.7 [*]
Iceland	31.1	30.6	5.9	6.9	554	728	39.5	27.8	51.4	38.3
Norway	30.6	29.9	7.4	7.7	13 371	15 833	24.4	29.6	60.5	56.3
Switzerland	51.8	48.5	12.9	13.4	34 392	38 665	29.3	29.3	21.0	23.5

[P] – provisional data, [*] – estimated data
S o u r c e: *European Social Statistics. Social protection. Expenditure and receipts* (2007), pp. 60–92.

To judge the degree of disparity of social protection expenditures in European Economic Area (EU and EFTA) countries it has been proposed to set them in order according to synthetic variable. To rank these countries from the point of view of burdens of states with the social expenditures, statistical data from the area of general social protection expenditures, public pension and social pensions expenditures (which make up the bigger part of social expenditures) and contributions were used.

In the first step for the suggested set of data, the degree of disparity of individual features was calculated. It is important that, the data accepted for the analysis was characterized with a proper variability and it effectively discriminated objects (countries). For this purpose the classic and the positional coefficient of variation were indicated (Młodak 2006, pp. 28–29):

$$v_j = \frac{s_j}{\overline{x}_j} \qquad \upsilon_j = \frac{mad(X_j)}{med(X_j)},$$

where:

$\overline{x}_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij}$ is an arithmetic average of the characteristic X_j,

$s_j = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(x_{ij} - \overline{x}_j\right)^2}$ is a standard deviation of the characteristic X_j,

$med(X_j)$ is a median of the characteristic X_j defined by the formula;

$$med(X_j) = \begin{cases} \dfrac{1}{2}\left(x_{\left(\frac{n}{2}\right)j} + x_{\left(\frac{n}{2}+1\right)j} \right) \\ x_{\left(\frac{n+1}{2}\right)} \end{cases}$$, for even and uneven number of observations,

and $mad(X_j) = \underset{i=1,\ldots,n}{med}\left| x_{ij} - med(X_j) \right|$ is a median absolute deviation of the characteristic X_j.

Features which are characterized by the low variability, below 0,1 are eliminated from set of statistical data, therefore $|v_j| < 0,1$ and $|\upsilon_j| < 0,1$.

In the second step to eliminate correlated variables, which are carriers of similar information, the matrix of correlation was indicated and the method of inverted matrix of correlation was used (Malina, Zeliaś 1998, pp. 523–544). It relies on assignment of inverse matrix R^{-1} for the matrix of correlation R.

$$\text{Matrix } R^{-1} = \begin{bmatrix} \tilde{r}_{11} & \tilde{r}_{12} & \cdots & \tilde{r}_{1m} \\ \tilde{r}_{21} & \tilde{r}_{22} & \cdots & \tilde{r}_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{r}_{m1} & \tilde{r}_{m2} & \cdots & \tilde{r}_{mm} \end{bmatrix}, \text{ in which: } \tilde{r}_{jk} = \frac{(-1)^{j+k}\det(R_{jk})}{\det(R)},$$

where $\det(R)$ is a determinant of the matrix of correlation, and $\det(R_{jk})$ is a determinant of matrix which was built by deleting the $j-$ line and $k-$ column. Next, elements $\tilde{r}_{jj}$ which fulfill the inequality $|\tilde{r}_{jj}| > r_0$ i.e. bigger than the set value (often $r_0 = 10$) are distinguished and eliminated from the set of data. Finally, we receive a set of features which describe and present the researched phenomenon correctly.

In order to rank the countries a simple, synthetic modeless variable has been used – Zero Unitarization Method (Kukuła 2000, pp. 86–104). It is based on normalization and unitarization of features accepted for the further analysis. Normalized variables (stimulant, destimulant) are transformed according to formulas:

$$z_{ij} = \frac{x_{ij} - \underset{i=1,2,\ldots,n}{\min} x_{ij}}{rg(X_j)}, \text{ if the characteristic } X_j \text{ is a stimulant,}$$

$$z_{ij} = \frac{\max\limits_{i=1,2,...,n} x_{ij} - x_{ij}}{rg(X_j)}, \text{ if the characteristic } X_j \text{ is a destimulant,}$$

where $rg(X_j) = \max\limits_{i=1,2,...,n} x_{ij} - \min\limits_{i=1,2,...,n} x_{ij}$ is a range of the characteristic X_j. The arithmetic average of the value of the normalized characteristic for each object (country) is adopted as a synthetic variable:

$$\mu_i = \frac{1}{m} \sum_{j=1}^{m} z_{ij}, \text{ where } i = 1, ..., n, \quad j = 1, ..., m.$$

Received values at these standardized assumptions are normalized on the interval $[0,1]$ and interpreted as average percentage of values considered as optimal values achieved by the given object (country). The higher the value of the measure, the better the position of the country.

Table 3

Characteristics of the measures accepted for analysis (social protection)

Specification	X_1		X_2		X_3		X_4		X_5		X_6	
	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
Min	14.0	12.6	1084	1220	25.1	23.3	3.4	3.8	9.1	8.8	14.4	19.2
Max	30.7	32.9	8795	12180	63.2	61.3	15.0	15.4	79.2	78.0	63.9	63.5
Range $rg(X_j)$	16.7	20.3	7711	10960	38.1	38	11.6	11.6	70.1	69.2	49.5	44.3
Arithmetic average $\bar{x}_j$	22.4	23.5	4616.2	5613.4	44.3	43.6	9.5	9.9	38.4	37.8	36.6	37.4
Standard deviation s_j	5.3	5.8	2366.4	2867.5	8.2	8.1	2.7	2.9	14.4	14.0	12.3	11.9
Coefficient of variation v_j	0.24	0.25	0.51	0.51	0.19	0.19	0.28	0.29	0.38	0.37	0.34	0.32
Median	23.15	24.6	4353	5744.5	44.55	43.7	8.75	10.1	38.75	37.25	32.1	34.55
Mad	3.85	4.65	2226	2328	4.45	4.05	1.9	2.3	9.4	8.85	7.05	7.6
Coefficient of variation υ_j	0.17	0.19	0.51	0.41	**0.10**	**0.09**	0.22	0.23	0.24	0.24	0.22	0.22

S o u r c e: Own calculations.

In this case, after eliminating characteristics with the low variability (variable X_3) and excessively correlated (variable X_4) for the analysis of degree of burdens of the state with the social protection expenditures in the years 2000 and 2004 the following factors were accepted:

• total social protection expenditures (including costs) as a % of GDP, which should be treated as a stimulant. They cause the growth of the degree of burdens with the social expenditures (X_1);

• total expenditures on social protection in *PPS per capita*, which prove the growing expenditures – stimulant (X_2);

• employers' social contributions as a % of total receipts – as a destimulant. The growth of paid contributions causes the desirable decrease of burdens from the point of view of state expenditures (X_5);

• general government contributions as a % of total receipts, stimulant. Their growth shows the growth of social security expenditures(X_6).
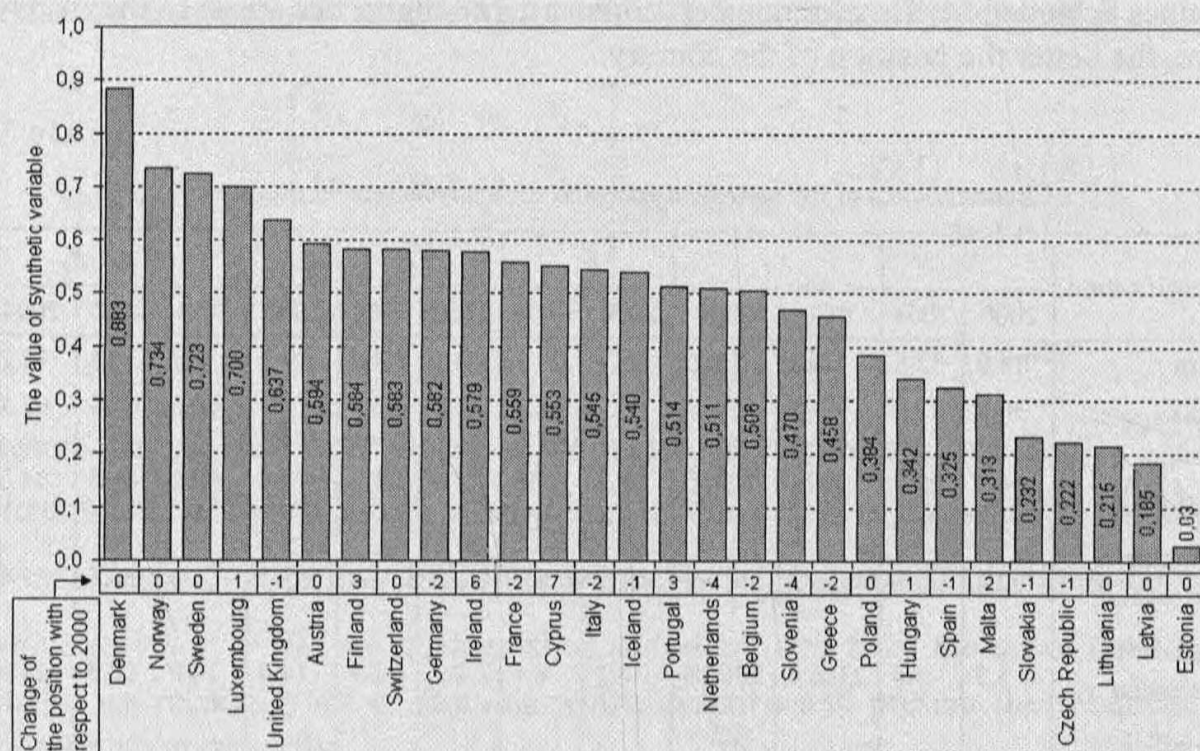
Graph 2. The rank of countries according to degree of burdens with the social expenditures in 2004 (EU, EFTA)

S o u r c e: Own calculations.

The analysis has been carried out from the point of view of influence of social expenditures on financial stability and burdens of the state budget – this approach was adopted at the stage of normalization of diagnostic features. Therefore, the higher value of calculated synthetic variable indicates de facto the

bigger burdens of the state with expenditures of the pension and social pension system.

According to synthetic variable in the years 2000 and 2004 the position of the first three countries (Denmark, Norway and Sweden) and the last three countries (Lithuania, Latvia and Estonia) was equal. Also Poland, with respect to expenditures in the years 2000 and 2004 took the same 20th position twice, so it is placed in the group of countries with low expenditures on social security. Comparing the position of individual countries in the presented years, we can notice that the biggest (unprofitable) „advance – 7 position upwards" has been noted down by the Cyprus, but the biggest (profitable) „decrease – 4 positions down" has been noted down by Slovenia and Netherlands.

Generally, it can be stated that high expenditures on social protection are some kind of problem for budgets of individual countries (as regards stability of finances). However, there are countries such as Denmark, Sweden, Norway which, despite high social expenditures, have stable financial situation and they are not threatened by the crisis of public finance. On the other hand, there are countries like the Czech Republic, Slovakia and Malta with a low degree of burdens with state expenditures, were financial problems will take place either in present or in future. It should be noted that the presented ranking list evaluates disparity, but not efficiency of social security schemes.

5. THE PROJECTION OF EXPENDITURES OF PENSION SYSTEM UP TO THE YEAR 2050

In the next step of introduction of OMC in October 2006 the Commission of European Communities presented a report about long term financial stability of the EU countries: *The long-term sustainability of public finances in the European Union.*

The report said that as a result of demographic and social changes the significant growth of public expenditures will occur in the future. Simultaneously, many member countries have an unprofitable situation now – the high budget deficit and serious state indebtedness, expressed as a relation of debt to GDP.

The projection of expenditures for public pensions in the years 2004–2050 was presented in this report. It shows, that starting from 2015 the biggest percentage of GDP devoted to old-age security is going to be spent by Italy (13.8%). In the years 2020–2050 the country with the highest pension expenditures is going to be Portugal. This time, its expenditures will grow from 14.1% to 20.8% of the value of GDP.

Gross public pension expenditure (I pillar) as a share of GDP between the years 2004
and 2050 (X_1)

UE/Country	Public pensions, gross as a % of GDP								Change 2004–2030	Change 2004–2050
	2004	2010	2015	2020	2025	2030	2040	2050		
EU-25*	10.6	10.3	10.4	10.7	11.3	11.9	12.8	12.8	1.3	2.2
EU-15	10.6	10.4	10.5	10.8	11.4	12.1	12.9	12.9	1.5	2.3
Belgium	10.4	10.4	11.0	12.1	13.4	14.7	15.7	15.5	4.3	5.1
Czech Republic	8.5	8.2	8.2	8.4	8.9	9.6	12.2	14.0	1.1	5.6
Denmark	9.5	10.1	10.8	11.3	12.0	12.8	13.5	12.8	3.3	3.3
Germany	11.4	10.5	10.5	11.0	11.6	12.3	12.8	13.1	0.9	1.7
Estonia	6.7	6.8	6.0	5.4	5.1	4.7	4.4	4.2	−1.9	−2.5
Spain	8.6	8.9	8.8	9.3	10.4	11.8	15.2	15.7	3.3	7.1
France	12.8	12.9	13.2	13.7	14.0	14.3	15.0	14.8	1.5	2.0
Ireland	4.7	5.2	5.9	6.5	7.2	7.9	9.3	11.1	3.1	6.4
Italy	**14.2**	**14.0**	**13.8**	14.0	14.4	15.0	15.9	14.7	0.8	0.4
Cyprus	6.9	8.0	8.8	9.9	10.8	12.2	15.0	19.8	**5.3**	**12.9**
Latvia	6.8	4.9	4.6	4.9	5.3	5.6	5.9	5.6	−1.2	−1.2
Lithuania	6.7	6.6	6.6	7.0	7.6	7.9	8.2	8.6	1.2	1.9
Luxembourg	10.0	9.8	10.9	11.9	13.7	15.0	17.0	17.4	5.0	7.4
Hungary	10.4	11.1	11.6	12.5	13.0	13.5	16.0	17.1	3.1	6.7
Malta	7.4	8.8	9.8	10.2	10.0	9.1	7.9	7.0	1.7	-0.4
Netherlands	7.7	7.6	8.3	9.0	9.7	10.7	11.7	11.2	2.9	3.5
Austria	13.4	12.8	12.7	12.8	13.5	14.0	13.4	12.2	0.6	-1.2
Poland	13.9	11.3	9.8	9.7	9.5	9.2	8.6	8.0	−4.7	−5.9
Portugal	11.1	11.9	12.6	**14.1**	**15.0**	**16.0**	**18.8**	**20.8**	4.9	9.7
Slovenia	11.0	11.1	11.6	12.3	13.3	14.4	16.8	18.3	3.4	7.3
Slovakia	7.2	6.7	6.6	7.0	7.3	7.7	8.2	9.0	0.5	1.8
Finland	10.7	11.2	12.0	12.9	13.5	14.0	13.8	13.7	3.3	3.0
Sweden	10.6	10.1	10.3	10.4	10.7	11.1	11.6	11.2	0.4	0.6
United Kingdom	6.6	6.6	6.7	6.9	7.3	7.9	8.4	8.6	1.3	2.0

* Excluding Greece
S o u r c e: *Adequate and sustainable pensions, Synthesis report* 2006, p. 92.

From the point of view of total increase in expenditures on old-age security,
during the whole period of time, the biggest growth - about 5.3% up to 2030 and
about 12.9% up to 2050 will be observed in Cyprus. In Poland the whole expen-
ditures connected with public pensions will decrease from 13.9% to 9.2% in
2030 and to 8% in 2050. However, in the whole Union (25 countries, excluding
Greece) the participation of pension expenditures will grow from 10.6% to
12.8% of GDP.

Table 5

Characteristics of pension system in the years 2004 and 2050

UE/Country	Pension system dependency ratio – number of pensioners relative to number of contributors (public system) (X_2)		Support ratio – number of contributors relative to number of pensioners (public system) (X_3)		Pensions contributions to public pension schemes as share of GDP (X_4)		Social security pension contributions relative to public, gross pension (X_5)		Assets in public pension plans as a share of GDP			Total pension expenditure gross, as a % of GDP (the whole pension system)	
	2004	2050	2004	2050	2004	2050	2004	2050	2004	2030	2050	2004	2050
EU-25	68	104	167	112	8.7	8.9	80	72	:	:	:	11.9	14.6
EU-15	71	109	166	111	8.7	9.0	80	72	:	:	:	12.0	14.8
Belgium	59	95	170	106	:	:	:	:	4.4	1.9	:	:	:
Czech Republic	55	97	181	104	8.9	8.9	105	63	0.3	9.4	:	:	:
Germany	74	117	135	86	7.7	8.9	68	68	0.1	:	:	:	:
Estonia	63	77	159	130	6.5	6.1	98	146	2.8	50.5	101.0	:	:
France	52	78	191	128	12.8	12.9	100	87	1.2	2.8	:	:	:
Ireland	23	49	439	205	3.6	3.4	76	30	:	:	:	:	:
Italy	68	99	146	101	10.2	10.6	72	72	:	:	:	:	:
Cyprus	26	64	387	156	5.5	7.1	80	36	39.3	25.1	:	:	:
Latvia	55	70	182	143	7.1	5.4	104	97	0.3	57.4	71.5	6.8	8.3
Lithuania	92	126	108	79	6.8	6.1	101	72	0.3	27.9	52.7	6.7	10.4
Luxembourg	42	62	240	162	9.9	10.0	99	58	23.6	17.8	:	10.0	17.4
Hungary	76	103	131	97	7.7	6.8	74	40	4.0	50.0	73.7	10.4	20.3
Malta	38	63	264	158	7.1	3.3	96	47	:	:	:	7.4	7.0
Netherlands	27	38	364	266	6.8	6.6	88	59	135.5	230.1	243.7	12.4	20.0
Austria	66	86	151	117	9.0	8.6	67	70	:	:	:	13.4	12.2
Poland	53	71	189	142	7.7	7.9	55	99	7.1	51.5	85.0	13.9	9.3
Portugal	71	157	141	64	10.5	9.2	95	44	4.3	:	:	11.1	20.8
Slovenia	65	113	154	88	9.3	10.6	85	58	1.4	22.6	35.9	11.0	19.3
Slovakia	54	101	185	99	6.5	4.4	90	49	:	31.5	58.0	7.2	11.2
Finland	55	78	180	128	9.1	11.2	85	82	52.4	69.9	72.9	10.7	13.7
Sweden	:	:	:	:	7.7	7.3	72	65	38.6	72.3	60.9	12.9	13.9
United Kingdom	:	:	:	:	5.7	6.3	87	73	:	:	:	:	:

S o u r c e: *The impact of ageing on public expenditure...*, p. 92–97, *Adequate and sustainable pensions...*, p. 97.

On the basis of the current budget situation the forecasted growth of costs connected with the ageing society the EU countries may be divided into three groups:

• **The First group**, comprises countries with the higher risk: Cyprus, Greece, Portugal, the Czech Republic, Slovenia and Hungary; it is characterized with considerable growth of expenditures connected with ageing of the society in long-term prospect. The countries require conducting the reform of public finances. The consolidation of the budget is also wanted, as the majority of these countries have a big budget deficit (especially Greece, Hungary and Portugal).

• **The Second group** is made up of countries with the average risk, for which the cost of ageing of the society is considerable. Some of them e.g. Spain, Ireland, Luxembourg require the introduction of structural reform, but a part of them: Germany, France, Italy, Malta, Slovakia and United Kingdom needs the consolidation of public finances in the medium term. Belgium require the introduction of structural reform and needs the consolidation of public finances.

• **The Third group** includes Austria, Denmark, Estonia, Finland, Lithuania, Latvia, Netherlands, Poland and Sweden. These countries, till now, have undertaken the biggest number of operations aimed at counteracting the results of ageing of the society. However, the low risk does not mean that there is no threat of fiscal balance.

Table 6

Characteristics of the measures accepted for analysis (pension system)

Specification	X_1	X_2	X_3	X_4	X_5
	2050	2050	2050	2050	2050
Min	4.2	38	64	3.3	30
Max	20.8	157	266	12.9	146
Range $rg(X_j)$	16.6	119	202	9.6	116
Arithmetic average $\bar{x}_j$	12.7	86.8	129.1	7.8	67.2
Standard deviation s_j	4.8	28.9	47.9	2.7	27.3
Coefficient of variation v_j	0.38	0.33	0.37	0.35	0.41
Median	13.1	78	128	7.9	63
Mad	4.1	19	29	1.8	16
Coefficient of variation υ_j	0.31	0.24	0.23	0.23	0.25

S o u r c e: Own calculations.

To calculate the synthetic variable of development of pension system i.e. the degree of burden of individual countries with pension expenditures for 2050 it has been chosen:

- gross public pension expenditure (I pillar) as a share of GDP, as a stimulant, because it causes the growth of burden of pension system (X_1),
- pension system dependency ratio – number of pensioners relative to number of contributors (public system); this characteristic is a stimulant, as it causes the growth of burden of pension system (X_2),
- support ratio – number of contributors relative to number of pensioners (public system); this feature is a destimulant – the growth of working persons causes the growth of paid contributions, so the decrease in the burden of the system from the point of view of the state (X_3),
- pensions contributions to public pension schemes as share of GDP – destimulant, as the growth of paid contributions causes (desirable) decrease in burden from the point of view of expenditures of the state (X_4),
- social security pension contributions relative to public, gross pension, destimulant – the decrease of paid contributions causes the desirable growth of burden from the point of view of the state (X_5).
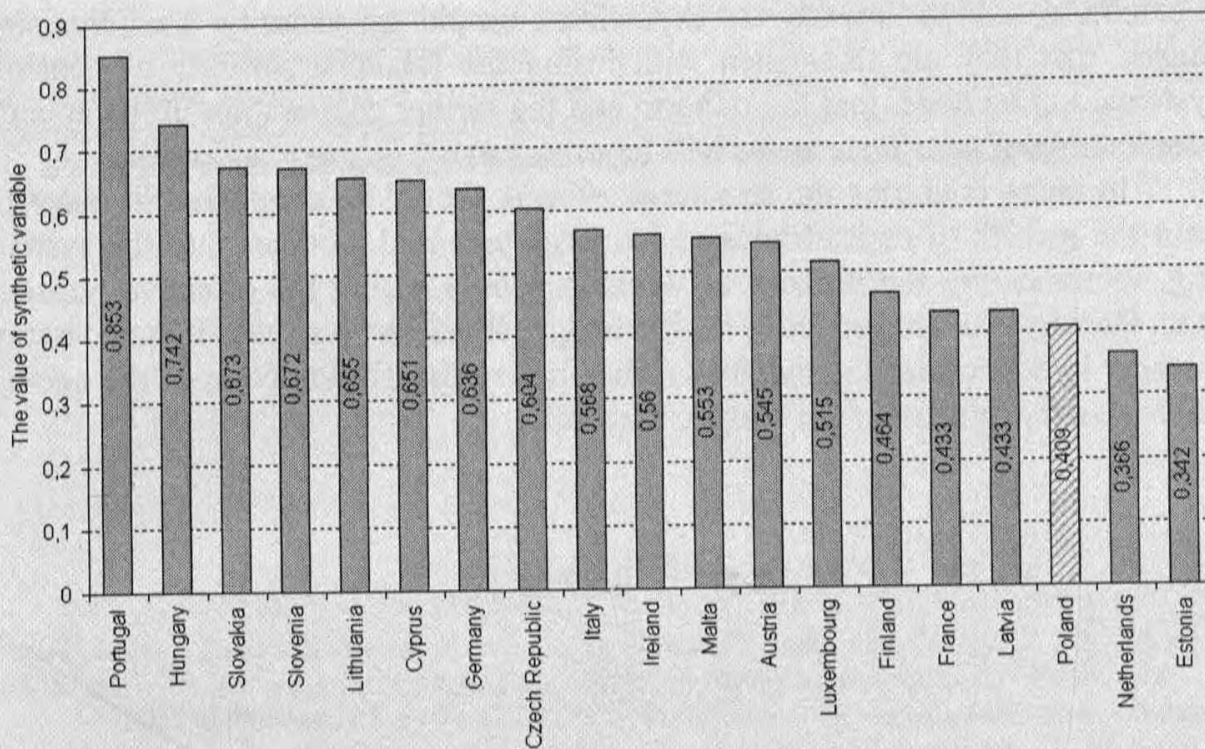
Graph 3. The degree of burden of countries with pension expenditures in 2050 (EU)

S o u r c e: Own calculations.

The ranking list created by means of the chosen indicators describing financial situation of pension systems of individual countries in 2050 has partially confirmed conclusions of cited report. The most seriously threatened by the lack of stability of public finances are Portugal and Hungary. However, the group of

countries with the lowest fiscal risk consist of Latvia, Poland, Netherlands and Estonia. It should be noticed, that applying the simple taxonomy method (with the proper choice of variables) has allowed to confirm the most important conclusions of the report. The results presented in graph 3 should be treated as a general presentation of different degrees of burden of pension systems of individual countries.

6. CONCLUSION

From the statistical data and aggregated information it results, that the situation of different states as regards of the degree of burden with the social and pension expenditures is diversified. It assures us, that the applied Method of Coordination of the social policy, particularly the Open Method of Coordination in the area of pensions, is correct.

The EU faces a big challenge connected with the ageing of society in the coming decades. Countries differ considerably with respect to social protection expenditure, and particularly the expenditure on old-age security. This diversity causes, that they are threatened with losing the financial stability of pension systems. Let us hope, that the hitherto and the further cooperation in the area of coordination of pension systems will let us to solve this important problem.

In many countries the structural reforms should be conducted in order to limit the growth of expenditures and enlarge potential incomes into the system (e.g. incrementing the number of working people, rising the effective pension age). Besides, the consolidation of the budget should be pursued. It is necessary in order to economize the budget surplus, before the phenomenon of the ageing of the society influences the budget situation.

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Artur Mikulec

OPIEKA ZDROWOTNA W POLSCE – GŁÓWNE PROBLEMY FUNKCJONOWANIA

Celem artykułu jest wskazanie głównych problemów funkcjonowania opieki zdrowotnej w Polsce po reformie ubezpieczeniowej. Począwszy od roku 1999 świadczenia zdrowotne w Polsce są finansowane ze składki na ubezpieczenie zdrowotne. Składka ta opłacana jest przez pracownika i w części pomniejsza podatek dochodowy od osób fizycznych. Celem artykułu jest wskazanie przede wszystkim negatywnych aspektów wprowadzonych zmian. W artykule została dokonana analiza infrastruktury medycznej, wynagrodzeń służby zdrowia, czasu oczekiwania na usługę medyczną, szarej strefy w tym sektorze. Zwrócono również uwagę na finansowy aspekt funkcjonowania regionalnych organizacji powszechnych ubezpieczeń zdrowotnych w Polsce.

Słowa kluczowe: publiczna opieka zdrowotna, świadczenia zdrowotne, sytuacja finansowa NFZ, ubezpieczenia zdrowotne