Financial Stability of Pension Systems: A Cross-Country Analysis

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Abstract
The aim of the paper is to identify the main factors (apart from demographics) influencing the public expenditure on pensions in Europe. The main research question raised in the paper is: What are the most important factors affecting old-age pension expenditure? The work consists of two parts: a theoretical and an empirical one. The first one includes a review of literature and preliminary theoretical justification for the choice of explanatory variables affecting old-age pension expenditure. The second part embraces regression analysis of panel data covering 25 European countries in the years 2005-2010. The models were estimated with reference to two different dependent variables: old-age pension expenditure as a proportion of GDP and the quotient of the old-age pension expenditure/GDP ratio and old-age dependency ratio. The results of the analysis have led to the conclusion that demographics is not the only factor affecting pension expenditure. Economic activity of the working-age group as well as of older groups, and GDP, are also very important in maintaining the solvency of pension systems. As it was observed, GDP growth affects its division between generations.

Keywords: pensions system, solvency, GDP division, panel regression
JEL codes: J26, J11, J14, J18, J21

1. Introduction

Demographics is recognized as the most important factor causing problems related to the financial stability or solvency of pension systems. Pension systems based on the unfunded pay-as-you-go model are expected to be less resistant to both demographic and labor market situation than the funded model. This thesis has been setting the trend for pension reforms for a few decades. The aim of these reforms is to improve the financial balance of pension systems, but tools applied in order to achieve this vary from country to country and involve e.g. increasing the retirement age or pension contribution, or supporting the development of voluntary savings for retirement. However, the model of the pension system – whether fully unfunded, fully funded or hybrid – is not the ultimate solution for the financial solvency of pension systems. The aim of this paper is to identify the main factors (apart from demographics) influencing public expenditure on old-age pensions in selected 25 European countries. The main research question raised in the paper is: What are the most important factors affecting old-age pension expenditure? The work consists of two parts: a theoretical and an empirical one. The first one includes a review of literature and preliminary theoretical justification for the choice of explanatory variables affecting old-age pension expenditure. The second part embraces regression analysis of panel data covering 25 European countries in the years 2005-2010. It proves that the most common demographic measure used in the analyses of pension systems – old-age dependency ratio – is not the only variable affecting old-age pension expenditure, and thus the solvency or financial stability of pension systems. The models were estimated with reference to two different dependent variables: old-age pension expenditure as a proportion of GDP and the quotient of the old-age pension expenditure/GDP ratio and old-age dependency ratio. The first measure of the financial stability of pension systems seems to be obvious but the second one needs some explanation. Namely, it is based on the definition of a pension system as a tool for sharing current GDP between generations of workers and pensioners and takes into account the demographic situation in measurement of pension expenditure (in contrast to the ratio PE/GDP).

2. Potential Factors Determining Pension Expenditure: What Does the Literature Say?

As mentioned before, demographics is regarded as the main determinant deteriorating the financial situation of pension systems, and thus aggravating the crisis in public finance, but also forcing reforms of pensions systems. The reforms are of model nature (i.e. they involve the change of the pension system model employed, and usually lead from the unfunded model to the funded one) or concern specific parameters of the pension system, primarily including retirement age. There are many premises pointing to the fact that the shift from the unfunded, pay-as-you-go model to the hybrid model (mix of unfunded and funded) or the fully funded model alone does not settle the problem of pension system solvency. This is because the sources of such insolvency or of threats thereof, are of diverse kinds.

The first one is obvious and commonly mentioned in debates on pension system funding. It is the issue of longevity and having few children. People tend to live longer and longer, and at the same time fewer and fewer children are born. Reforms of the pension system model are intended to challenge these unfavourable demographic trends, and the funded (or at least partly funded) is supposed to prove resistant to negative demographic factors. However, an in-depth look at the pension system reveals that it is actually a tool dividing the current GDP between – simply speaking – the working generation and the pensioners (Góra, 2008). The distribution of GDP between these generations, taking into account aggregate decisions of individuals (including decisions about consumption smoothing), enterprises and the government, is well-characterised by overlapping generation models (OLG), reviewed by e.g. Blake (2006). It should be noted that in the case of a closed economy (or one with a pension system in which all liabilities towards future pensioners are liabilities of the state or the domestic private sector), pensions may only be covered from the current GDP. It is performed through its division between generations. In an open economy, the above principles remain basically unchanged, except the possibility of consuming a part of GDP of another country if pension assets are invested abroad.

There is no other way of pension funding than through GDP distribution, in both unfunded and funded pension system. In the unfunded system, the distribution occurs without the involvement of the financial market, and it is based on the promise that in return for the submitted contributions, a pension benefit will be paid out in the future, enabling the consumption of a part of the future GDP. As noted by Barr and Diamond (2006), the mentioned promise of sharing part of the future GDP with the generation of pensioners may be given by children to their parents, by businesses to their employees, and by the government to citizens – depending on the type of pension security, i.e. natural (based on the intergenerational solidarity within the family), corporate (organized be employers) or public (organized be the state).

In the funded model, the distribution is made with the participation of the financial market, and the amount of the future pension benefit received in return for the contributions depends on the rate of return on this market. In the funded model, employees save part of their wages, thus accumulating their pension capital, which in the future will be exchanged for goods produced by the younger generation (i.e. their children).

These considerations based on the pension economy theory help recognise a second, no less important threat for the solvency of pension systems. Namely, pension expenditure results from the distribution of the current GDP between the generation of pensioners and the working generation. This distribution not only determines the current incomes of both groups – and thus their consumption and savings – but also the developmental prospects of the economy. This is because the share of the working generation in GDP is equivalent to the share of the expenses on production factors in GDP. Therefore, apart from demographic factors, such as the age structure of the population or life expectancy, there are other, equally significant factors, primarily concerning the labour market as well as the level and growth of GDP that is being distributed between generations. Another important factor is income adequacy of the pension system, measured primarily by the replacement rate.

The financial stability of pension systems may also be based on the education of population. It stems from the fact that individuals make many decisions determining their financial status and income during the old age. These pension-related decisions concern saving, the moment of leaving the labour market, and the commencement of pension capital consumption. These decisions are often very complex, and their extensive analyses in the literature and research indicate that people have immense problems with their rational making (see: Blake, 2006; Beshears et al, 2008; Barr and Diamond, 2006;

Arza, 2008; Mitchell and Utkus, 2003; O'Donoghue and Rabin, 1999; Schwartz, 2004; Potters and Prast, 2009; Choi et al, 2001). Education is of merit for the quality and rationality of pension decisions, but also for the state economy. It may affect the distribution of current GDP, and thus the pensioners' share in these funds. Furthermore, better education is one of the factors extending life expectancy (Blake, 2006). Therefore, in the analysis of current pension expenditure, one should verify if the education of people around the retirement age – which might affect their decisions about leaving the labour market and commencing the decumulation of pension capital – might influence pension expenditure.

In summary of this part of the considerations based on the pension economy theory, one may list the following important groups of factors determining pension expenditure. They include demographics, the labour market, GDP and its growth, income adequacy of pensions, and education. Obviously, they do not exhaust the issue of pension system solvency determinants, but in the context of pension reforms and actions taken thereon, they seem to be of highest significance.

3. Method of Analysis of the Financial Situation of Pension Systems

So far, the assessment of financial stability of pension systems has been approached in a few ways in the literature. For instance, Vidal-Melia et al. (2008) have described and evaluated the effectiveness of automatic balance mechanisms (ABMs) in selected countries. The automatic balance mechanism is a set of predetermined measures established in appropriate acts of law that aims at maintaining a required level of pension system solvency based on the pay-as-you-go model. An important advantage of ABM is its relative resistance to political factors, as the legally established rules of ABM activation do not require additional political decisions. Automatic balance mechanisms are based on specific demographic and economic indicators. Changes in the values of these indicators result in changes in pension contributions or pension benefits. In Canada, for example, the adjusting mechanism covers both contributions and benefits, thus distributing the weight of financial consequences of ABM between pensioners and the working generation. In Sweden, on the other hand, its costs are only borne by pensioners. A notable feature of ABMs is their anticipative operation. Analyses based on ABMs are of actuarial nature and they evaluate the balance between the expected income from contributions and the expected expenditure on pension benefits (Vidal-Melia et al., 2008).

Another approach is based on modelling pension system solvency on the basis of specific, more or less restrictive assumptions concerning demographics and the economy (economic growth, pays, inflation). Equations of pension system incomes (from contributions) and expenses (for pension benefits) are formed on account of the above variables. Comparing the results of simulations of both equations provides the ground for assessment of pension system solvency. This type of procedure was employed by e.g. de la Fuente (2011). In another study, following a similar pattern, only included the analysis of pension expenditure (Domenech and Melguizo, 2009).

An important aspect of the analysis of old-age pension expenditure is its measurement. These expenses (further referred to as PE) are measured in absolute values or in relation to GDP (PE/GDP). In comparative analyses of pension systems, the latter approach is definitely more legitimate, as it enables comparing these expenses throughout many countries with various GDPs. This indicator was used as the measure of pension expenditure in the empirical part of this work.

As a supplementary measure, the study employed the quotient of the share of pension expenditure in the GDP (PE/GDP) and the old-age dependency ratio (ODR). Thus, the measure has the form (PE/GDP)/ODR. It is hardly noticeable in pension system analyses. However, in the context of the pension system definition discussed in the previous section, stating that the system is a tool of current GDP distribution between generations, the choice of this measure is validated. The proposed indicator (in contrast to the ratio PE/GDP) takes into account the demographic situation in the measurement of pension expenditure. This is because it approximates the relation between the share of pensioners' population in GDP distribution, and the relation of this population to the working population. The approximation is due to the fact that the old-age dependency ratio measures the proportion between population aged 65 and above and population at the productivity age (15-64) for a given country, whereas the statutory retirement age is not the same for men and women in all countries, and it is not always 65 years. Nevertheless, the simplification adopted here does not

significantly distort the results of the analysis based on the measure, particularly if the analysis concerns the trend of this indicator, rather than its specific value. This measure enables to compare the changes in the GDP distribution between generations, with changes in the relation between pensioners' generation and working-age generation. A rise in this indicator means that the share of pensioners in GDP distribution increased more or decreased less than the proportion between pensioners' population and the working-age population in a given country, or that, while the pensioners' share in GDP distribution increased, their proportion to working-age population dropped. Similarly, a decrease in the value of this indicator suggests that the share of pensioners in GDP distribution increased less or decreased more than their proportion to working-age population, or that, while the pensioners' share in GDP distribution fell, their proportion to the working-age population rose.

4. Data and Methodology

The main research question raised in the paper is: What are the most important factors affecting old-age pension expenditure? In order to answer this question, the study analysed the relationship between five groups of factors that should affect the dependent variables, i.e. pension expenditure measured with their value in relation to GDP (PE/GDP), and the pension expenditure/GDP ratio divided by the old-age dependency ratio ((PE/GDP)/ODR). The analysis involved cross-sectional data from 25 European countries, over the period 2005-2010 (obtained from Eurostat databases). Taking into account the credibility of individual measures of possible factors affecting the level of pension expenses, as well as the availability of statistical data, the following explanatory variables were employed in particular groups of factors:

- demographics: old-age dependency ratio (ODR) and life expectancy at age 65 (LE),
- labour market: duration of working life (DWL), employment rate in the age group over 65 ($EMP_{(>65)}$) and employment rate in the age group 15-64 ($EMP_{(15\text{-}64)}$),
- national product: GDP growth (GDP_g), GDP per capita (GDP_pc), labour productivity (LP),
- income adequacy of pensions: replacement rate (RR),
- educational attainment: % of total population having completed at least upper secondary education in the age group 55-64 years ($ED_{(55\text{-}64)}$).

The analysis consisted of the following phases:
Phase 1: assessment of trends of PE/GDP and (PE/GDP)/ODR;
Phase 2: estimation of panel regression models for the two dependent variables, omitting ODR in the set of explanatory variables in models referring to (PE/GDP)/ODR, for obvious reasons. Consequently, the following models were estimated:

$$\frac{PE}{GDP}_{it} = \alpha_0 + \alpha_1 ODR_{it} + \alpha_2 LE_{it} + \alpha_3 DWL_{it} + \alpha_4 EMP_{(>65)it} + \alpha_5 EMP_{(15-64)it} + \alpha_6 GDP_{g_{it}} + \alpha_7 GDP_{pc_{it}} + \alpha_8 LP_{g_{it}} + \alpha_9 RR_{it} + \alpha_{10} ED_{(55-64)it} + v_{it}\ , \quad (1)$$

$$\frac{PE}{GDP}/ODR_{it} = \alpha_0 + \alpha_1 LE_{it} + \alpha_2 DWL_{it} + \alpha_3 EMP_{(>65)it} + \alpha_4 EMP_{(15-64)it} + \alpha_5 GDP\_g_{it} + \alpha_6 GDP\_pc_{it} + \alpha_7 LP\_g_{it} + \alpha_8 RR_{it} + \alpha_9 ED_{(55-64)it} + v_{it} \quad (2)$$

where v_{it} is a total random component in the model based on panel data covering pure random error, as well as fixed effects (referring to country *i*), or random effects.

In the panel regression, the following tests have been employed for the verification of the models and selection of the model form (with fixed effects or with random effects): test for the variance of the intercept in groups, the Breusch-Pagan test and the Hausman test (Ajmani, 2008; Adkins, 2010). The decision to reject the null hypothesis for each test was taken at the

significance level α = 0.05. The estimation procedure was performed with the help of GRETL software.

5. Results

Tables 1 and 2 present the values of PE/GDP and (PE/GDP)/ODR in the countries under analysis, and their trends in the period 2005-2010.

Table 1: The PE/GDP ratio and its trends in 25 European countries in the years 2005-2010

	2005	2006	2007	2008	2009	2010	2010/2005
Austria	9.34	9.39	9.40	9.71	10.45	10.49	1.12
Belgium	7.33	7.3	7.07	7.52	8.12	8.10	1.11
Cyprus	5.26	5.25	5.21	5.37	5.86	6.24	1.19
Denmark	7.31	7.31	7.43	7.66	8.3	8.69	1.19
Estonia	4.13	4.12	3.96	4.80	6.04	6.65	1.61
Finland	6.97	7.06	6.93	7.06	8.44	8.73	1.25
France	10.47	10.58	10.72	11.03	11.83	11.94	1.14
Germany	9.13	8.95	8.67	8.73	9.36	9.07	0.99
Greece	7.99	6.85	6.94	7.17	7.57	7.95	1,00
Hungary	6.21	6.27	6.49	6.72	6.95	7.01	1.13
Iceland	4.25	4.16	4.36	4.41	4.86	4.65	1.09
Ireland	2.67	2.93	3.49	4.14	4.71	4.89	1.83
Italy	11.27	11.27	8.94	9.26	10.13	10.27	0.91
Latvia	5.38	5.23	4.54	5.15	7.16	8.60	1.60
Lithuania	5,00	4.79	4.99	5.67	7.35	6.59	1.32
Malta	6.48	6.60	6.55	6.74	7.22	7.65	1.18
Netherlands	8.16	8.09	8.20	8.24	8.94	9.13	1.12
Norway	4.93	4.70	4.78	4.67	5.43	5.45	1.11
Poland	6.70	6.79	6.39	6.45	6.94	7.08	1.06
Portugal	8.58	8.73	8.70	9.19	9.95	10.04	1.17
Slovakia	5.59	5.39	5.27	5.15	5.87	5.84	1.05
Slovenia	6.37	5.34	5.31	5.19	6.02	6.20	0.97
Spain	5.38	5.31	5.35	5.50	6.07	6.46	1.20
Sweden	8.33	8.07	8.02	8.32	9.29	9.02	1.08
United Kingdom	8.88	8.90	8.97	9.13	9.94	10.06	1.13

Source: Author's own calculation based on Eurostat data.

The analysis of data in Tables 1 and 2 reveals that over the analysed period, only in a few countries did the share of pension expenditure in GDP and the relation of this share to old-age dependency ratio decrease or not increase. The countries were: Germany, Greece, Italy, and Slovenia. However, there is a fundamental difference between them. Namely, in the case of Germany and Slovenia, the replacement rate, measuring pensioners' income, rose in the period of analysis, just like GDP per capita, while in Greece and Italy, the replacement rate and GDP per capita dropped, aligning with the peak of public finance crisis in these countries. In the former two countries, the analysed indicators of pension expenditure improved as a result of a better economic situation of pensioners, while simultaneously, their share in GDP dropped, which may suggest that in the same period, the working generation obtained even higher benefits from economic growth (as their share of GDP distribution increased). It is confirmed by the downward trend of ((PE/GDP)/ODR, caused by the fact that while the pensioners' share in GDP distribution fell, their share in the population went up.

Moreover, in 2005-2010, in Germany, the employment ratio in the 15-64 age group rose by 9%, and in the 65+ group by 18% (all rises and drops in the value of indicators are given in relative values, calculated as relative, rather than absolute growths, thus the results are expressed in percentage, not in percentage points). It also significantly affected the distribution of GDP between the working group and the retired group, improving the financial situation of the pension system. In Greece, Slovenia and Italy, the employment ratios did not change or only changed slightly.

Table 2: The (PE/GDP)/ODR ratio and its trends in 25 European countries in the years 2005-2010

	2005	2006	2007	2008	2009	2010	2010/2005
Austria	0.40	0.39	0.38	0.38	0.41	0.4	1.01
Belgium	0.28	0.28	0.27	0.29	0.31	0.31	1.12
Cyprus	0.30	0.30	0.30	0.30	0.32	0.35	1.15
Denmark	0.32	0.32	0.32	0.32	0.34	0.35	1.08
Estonia	0.17	0.17	0.16	0.19	0.24	0.26	1.55
Finland	0.29	0.29	0.28	0.28	0.34	0.34	1.16
France	0.42	0.42	0.43	0.44	0.47	0.47	1.12
Germany	0.33	0.31	0.29	0.29	0.3	0.29	0.88
Greece	0.3	0.25	0.25	0.26	0.27	0.28	0.94
Hungary	0.27	0.27	0.28	0.29	0.29	0.29	1.06
Iceland	0.24	0.24	0.25	0.26	0.28	0.26	1.09
Ireland	0.16	0.18	0.22	0.26	0.29	0.29	1.78
Italy	0.38	0.38	0.30	0.30	0.33	0.33	0.87
Latvia	0.22	0.21	0.18	0.21	0.29	0.34	1.53
Lithuania	0.22	0.21	0.22	0.25	0.32	0.28	1.26
Malta	0.34	0.33	0.33	0.34	0.36	0.36	1.08
Netherlands	0.39	0.38	0.38	0.38	0.40	0.40	1.02
Norway	0.22	0.21	0.22	0.21	0.25	0.24	1.10
Poland	0.36	0.36	0.34	0.34	0.37	0.37	1.04
Portugal	0.34	0.34	0.34	0.35	0.38	0.38	1.10
Slovakia	0.34	0.33	0.32	0.31	0.35	0.35	1.01
Slovenia	0.29	0.24	0.23	0.22	0.26	0.26	0.89
Spain	0.22	0.22	0.22	0.23	0.25	0.26	1.19
Sweden	0.31	0.31	0.30	0.31	0.34	0.33	1.04
United Kingdom	0.37	0.37	0.37	0.38	0.40	0.40	1.11

Source: Author's own calculation based on Eurostat data.

At the opposite end, there are such countries as Ireland, Estonia, and Latvia, where the pensioners' share in GDP distribution increased by 83%, 61% and 60%, respectively. The (PE/GDP)/ODR ratio in these countries changed in a very similar manner. The old-age dependency ratio increased in these countries over the analysed period, though no more than in many other countries. The replacement rate rose slightly in Ireland (by 2%), while in Estonia by 17%. The situation in Latvia was different – the replacement rate fell there by 25% in the period under analysis. Therefore – what was the reason for such a substantial growth of the share of pension expenditure in GDP, also in relation to old-age dependency ratio? In Estonia, it was largely the increase in pension benefits (reflected in the growth of the replacement rate) on the one hand, and negative economic growth in 2008 and 2009 on the other. In Ireland, it was primarily the negative economic growth, as the replacement rate remained almost unchanged. A similar situation occurred in Latvia, where GDP considerably dropped in 2008-2010, though in contrast to Ireland, the high cost of the recession was borne by the pensioners whose income decreased significantly. In all countries where the PE/GDP

ratio and its relation to ODR grew, the employment ratios deteriorated, with the exception of Ireland, where the employment ratio in the 65+ age group rose by 8% (while at the same time it fell by 12% in the 15-64 group). Taking into account that in the period under analysis, the retirement age in Ireland was 66 years, during the recession, people at the retirement age and older increased their economic activity, remaining longer on the labour market, while the economic activity of the working generation significantly fell, especially in the youngest group (the unemployment rate among people under 25 rose from 8.6% in 2005 to 27.6% n 2010). It had a great impact on the structure of GDP distribution between generations.

The above analysis of two indicators describing pension expenses of the state illustrates the complexity of the considered mechanism, and confirms its susceptibility to demographics, labour-market situation, GDP and its trends, as well as income adequacy of pensions.

In the second phase, panel regression models were estimated. The results are shown in Table 3.

Table 3: Results of the estimation of models for panel data

Independent variable	Model 1 for the dependent variable PE/GDP (fixed effects)	Model 2 for the dependent variable PE/GDP/ODR (random effects)
ODR	0.137* (0.073)	-
LE	0.371*** (0.138)	0.007 (0.004)
DWL	0.263** (0.105)	0.012 (0.004)
$EMP_{(>65)}$	-0.125*** (0.040)	-0.003*** (0.001)
$EMP_{(15-64)}$	-0.158*** (0.025)	-0.007*** (0.001)
GDP_g	-0.042*** (0.009)	-0.001*** (0.000)
GDP_pc	-0.146*** (0.059)	0.000 (0.002)
LP	-0.016 (0.012)	0.000 (0.001)
RR	1.265 (0.818)	0.129*** (0.038)
$ED_{(55-64)}$	0.043*** (0.014)	0.000 (0.000)

Notes: In parentheses there are parameter estimation errors and the corresponding significance levels: * statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Source: Author's own calculation based on Eurostat data.

Based on the results of estimation of model 1, one may notice that in the countries with higher old-age dependency ratios, life expectancy at age 65 and duration of working life, pension expenditure in relation to GDP is also higher. This conclusion agrees with the expectations, and shows that an aging society spends a larger part of its product on pensions. It happens even though people are able to work and perform work longer (as proved by the DWL ratio), perhaps as more elderly continue to work past retirement age and receive incomes from two sources: work and pension.

The factors that – unlike demographic ones – decrease the share of pension expenses in GDP, are factors related to the labour market and GDP. The higher the percentage of working individuals among the elderly (pensioners) or in the working-age population (15-64), the lower the share of PE in GDP. It is similar in the case of GDP growth and GDP per capita.

When these conclusions are paired with the results of estimation of model 2 for the dependent variable being the (PE/GDP)/ODR ratio, it should be noted that in the countries under analysis, there was no correlation between this variable and the variables describing demographic factors (life expectancy and duration of working life). It may stem from the structure of this indicator that has the old-age dependency ratio as its denominator, which may have neutralised the influence of LE and DWL. However, the (PE/GDP)/ODR variable, just like PE/GDP, is negatively correlated with labour-market indicators ($EMP_{(>65)}$, $EMP_{(15-64)}$), and with GDP growth. It means that in countries with higher employment ratios in the working-age population, or in the pensioners' population, the share of pensioners' population in GDP distribution in the relation to the old-dependency ratio is smaller. The negative parameter next to GDP growth suggests that when GDP grows, individuals from the working

generation benefit from it to a greater extent, and their share in GDP increases, while the pensioners' share drops due to their lower participation. However, in periods of negative GDP growth, the pensioners' share in GDP distribution increases, and consequently, the negative effects of recession are more acutely suffered by the working generation.

Among the other control variables, a statistically significant correlation with the dependent variable PE/GDP was displayed by the variable $ED_{(55-64)}$ – total population having completed at least upper secondary education in the 55-64 age group. It means that in countries with a higher percentage of educated people, pension expenditure is higher, which may be attributed to the fact that educated people live longer, which was previously mentioned in the theoretical section. However, the insignificant parameter next to variable $ED_{(55-64)}$ in model for the ratio (PE/GDP)/ODR suggests that education does not influence the share of pensioners' generation in GDP distribution in relation to the old-age dependency ratio. Thus in countries with higher educated population aged 55-64, the pension expenditure expressed as a percentage of GDP in the relation to ODR was not higher (or lower) than in other countries. It may result from the fact that pension systems in Europe are more public and less private so autonomous pension decisions are limited significantly.

Interestingly enough, the replacement rate failed to explain the variability of PE/GDP. It means that on the basis of the study, one cannot claim that on countries with higher pension adequacy, pension expenditure is higher in relation to GDP. However, in the model estimated with reference to (PE/GDP)/ODR, the parameter next to the RR variable was significant and positive. This may suggest that in countries with higher pension adequacy, the share of pension expenditure in the part of GDP due for the pensioners' generation on the basis of their share in population was, in fact, higher.

6. Conclusion

The study conducted in the paper is based on an alternative approach to state pension expenditure analysis, different from the one commonly employed. The author put aside the aggregate intergenerational accounting models, or the simulation of pension expenditure using deterministic models adopting revenues or expenses in the pension system as the dependent variable, and sources of these revenues (contributions) or expenses (benefits) as explanatory variables. An attempt was made to answer the question about the factors determining pension expenditure and the direction of their influence.

The answer to the question posed in the study is as follows: the factors significantly affecting pension expenditure, and thus the solvency or financial stability of pension systems, include primarily demographics, but also the situation on the labour market and economic growth. It means that pension policies of countries struggling with harmful demographic processes that are hard to prevent and reverse should be based on initiatives aimed at increasing professional activity, also in older age groups, which promotes economic growth – another important factor increasing the financial stability of pension systems by reducing the weight of pension expenditure on GDP. This is because, as it was noted, economic growth is most profitable for the working generation whose share in GDP distribution in times of prosperity increases at the cost of pensioners. Thus, economic growth is not without influence on the structure of current GDP distribution.

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