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SEM Modelling of Interdependencies between Employee Advantages, Productivity and Economic Growth

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Abstract

The paper aims to identify and evaluate the interdependencies and impacts between one of the most important post-employment benefits granted by companies under the form of pension schemes and productivity, respectively economic growth in Romania and Serbia during 2005-2013. The research is based on developing several econometric models with structural equations, processed through MLE (Maximum Likelihood Estimator) method, using a set of specific indicators such as old-age pensions, GDP per capita, employment, education and productivity. The results highlight that economic growth and the associated improvement of living and working conditions, as well as an increase in wage levels represent important incentives for employees to remain actively integrated into the labor market and to increase their productivity. Moreover, in the case of Romania, education plays a significant role in shaping the number of old age pension beneficiaries, persons with primary and lower-secondary studies being more orientated towards retirement. Nevertheless, for Serbia, an improvement in educational level from primary towards upper-secondary and tertiary significantly reduces the number of pensioners and increases labor productivity.

Keywords: employee benefits, pensions, productivity, economic growth, SEM

1. Introduction – an overview of the socio-economic context within the European Union, in Romania and Serbia

In order to analyze the interdependencies between employee benefits, productivity and economic growth as a general framework of assessment, we performed an overview of the socio-economic context of the European Union and the two considered countries as a first phase of our overall analysis. Thus, we could observe that within the European Union the economic growth registered an increasing trend in the last decade, with an important downsize during 2008-2010 in the context of global economic and financial crisis, but with important positive socio-economic evolutions by the end of 2014.

At the same time, as regarding the economic activity in Romania and Serbia, official statistics point out that the GDP per capita registered an important increase during 2005-2013, from about 4500\$ to 18500\$ in Romania, respectively from 8410\$ to 12480\$ for Serbia.

This positive trend was counterbalanced by the negative effects of the economic crisis, with a new upward tendency at present. Moreover, the total GDP of Romania and Serbia improved during 2000-2014, with slight decreases in 2008 and 2009.

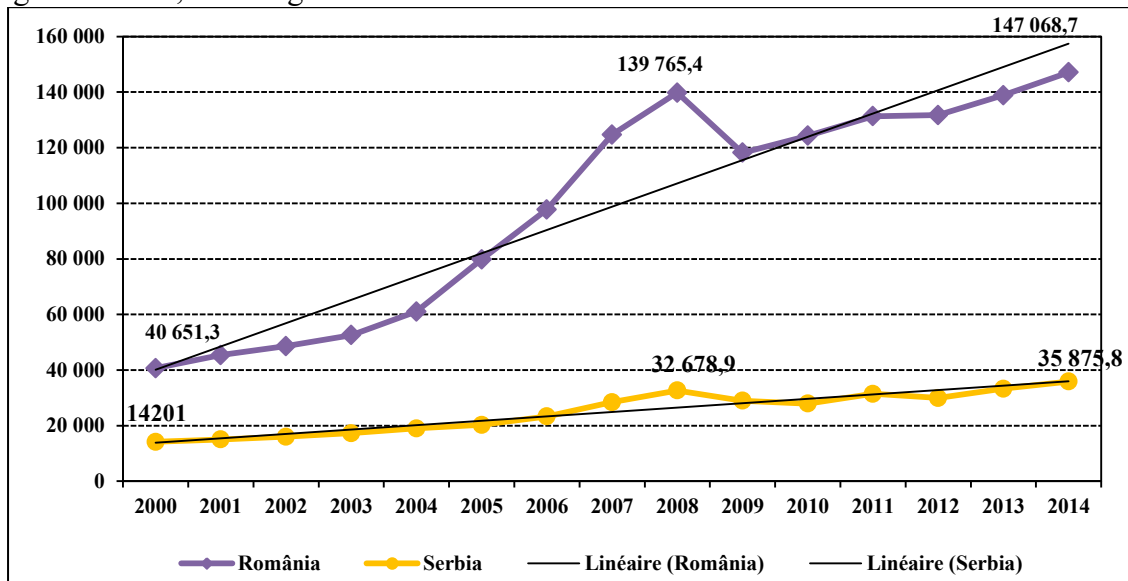


Figure 1: GDP trends in Romania and Serbia during 2000-2014, mil. Euro
 Source: performed based on Eurostat Statistics, National Accounts

Also, the GDP growth rate registered an increase in the last decade, 2004 and 2007 being extremely significant from this perspective, when the GDP increase reached 9.3% in Serbia and 8.4% in Romania. At the same time, Romania registered the highest economic growth in the third quarter of 2015 compared to the other EU Member States. Nevertheless, the negative effects of the economic crisis were extremely visible in 2009 when Romania encountered a negative rate of -6.6%, compared to Serbia which has managed to recover faster reaching 1.8% in 2013, way above the EU average of -0.1%.

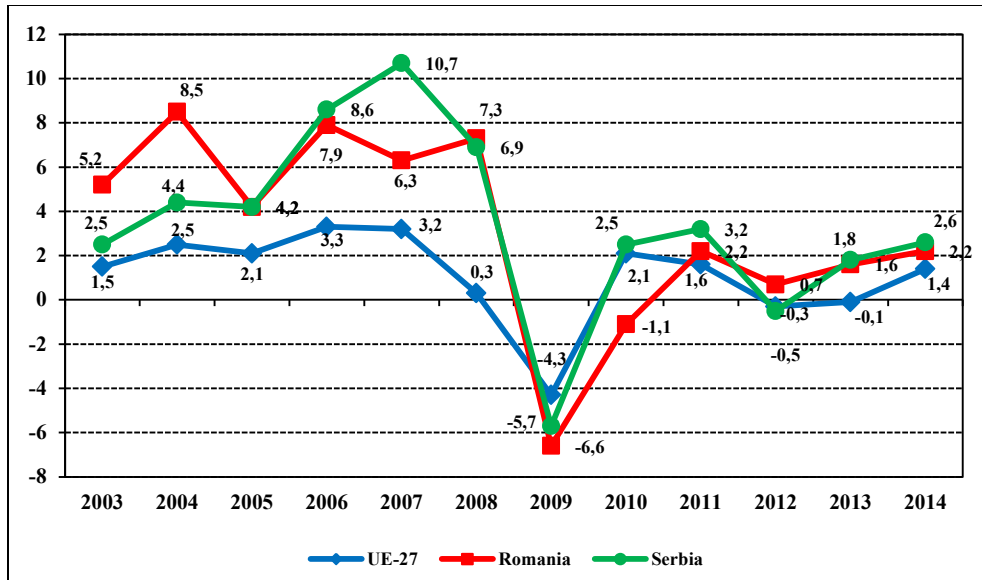


Figure 2: GDP growth rate trends within the European Union, in Romania and Serbia, 2003-2014, %
 Source: performed based on Eurostat Statistics, National Accounts

At the same time, the total number of employees has increased during 2000-2012, over-passing 5 million workers, with important gender differences. Thus, female employees were significantly outnumbered by male workers, reaching 3.5 millions in 2012.

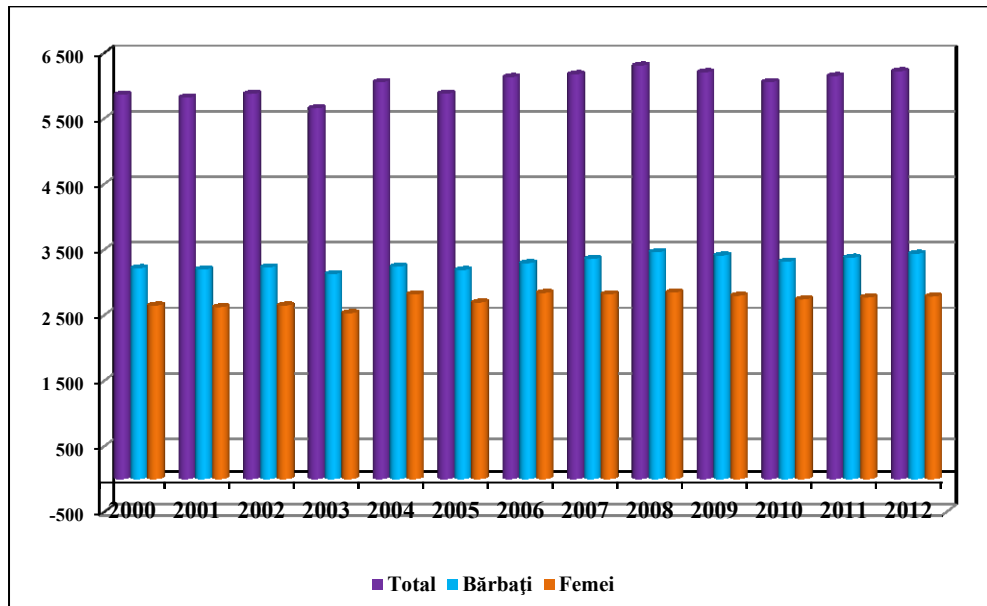


Figure 3: Trends in the total and by gender number of employees in Romania during 2000-2012, age 15-64
 Source: performed based on Eurostat Statistics, EU LFS

Still, the positive tendencies registered in the total number of employees are not quite significant due to the fact that it was a slow process if we take into account the trends of economic growth during the same period of time.

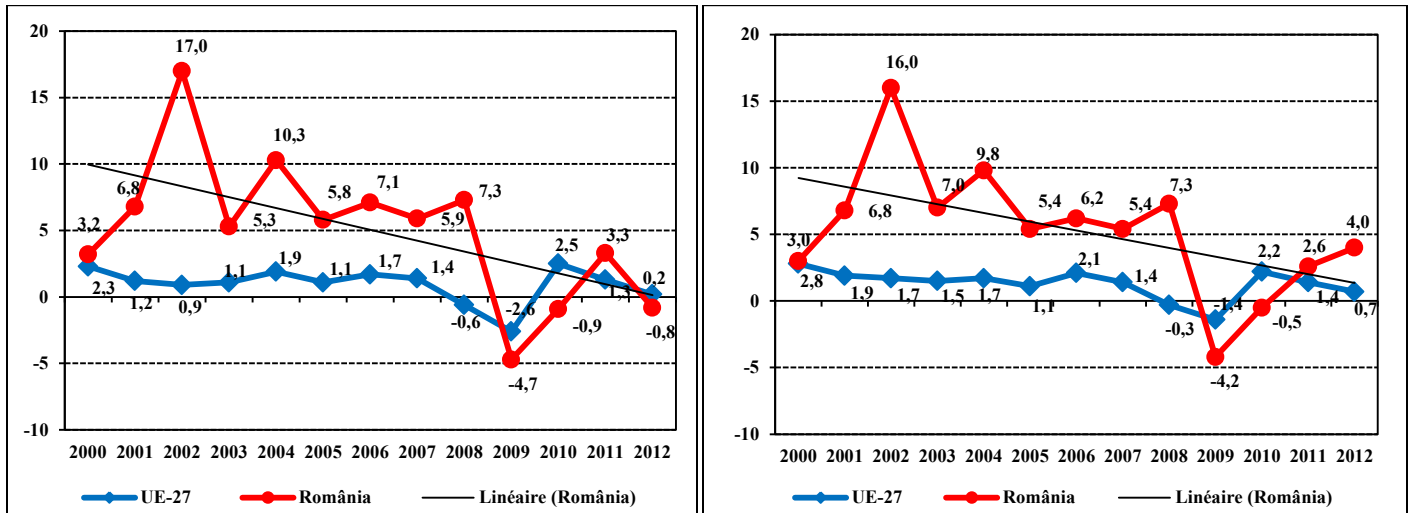


Figure 4: Real labor productivity within the European Union and in Romania per person employed (left) and by hour worked (right), percentage change
 Source: performed based on Eurostat Statistics, National Accounts

The labor productivity per employee registered a very high level in Romania, well above the EU average, the important performances in between the years 2002 and 2004, when labor productivity increased by 17.0% and 10.3% compared to the previous period. The same trend is observed for the productivity per hour worked. The negative effects of the economic crisis in the second half of 2008 continue to be felt, the labor productivity is very low, but with slight recovery towards the end of 2012.

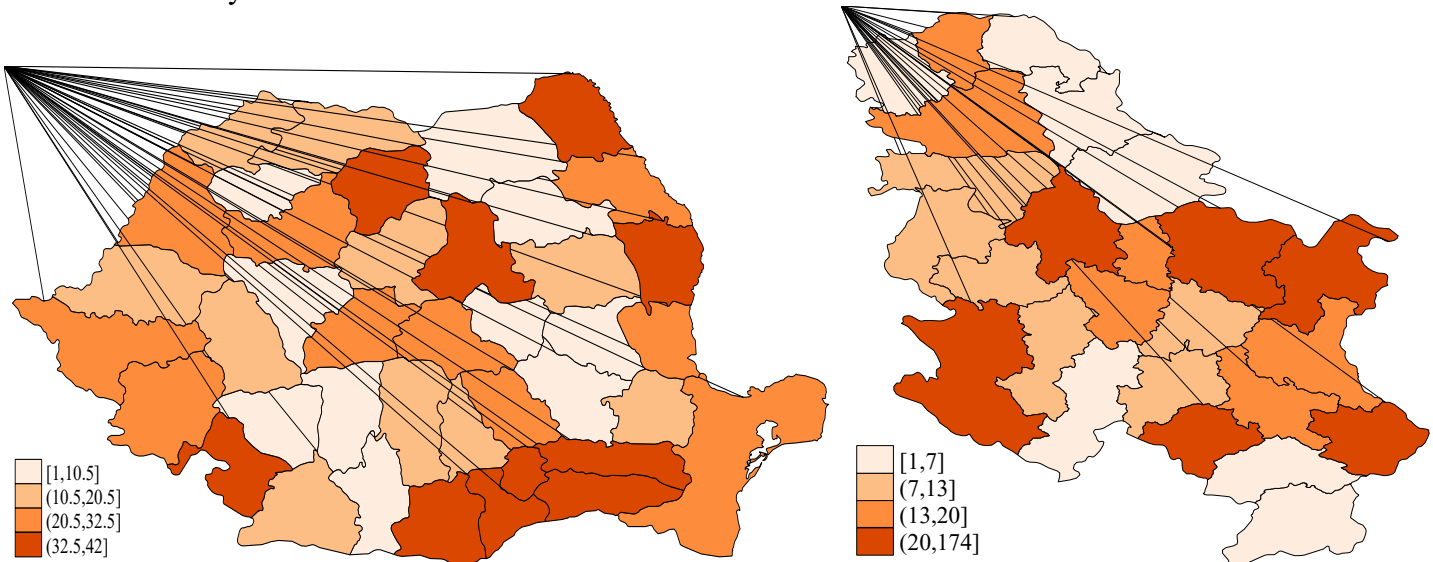


Figure 5: Employment density by counties in Romania and Serbia (employees by km²), 2013

Source: calculations made based on Eurostat data

Moreover, the employment density, seen as number of employees per km² in the districts of the two countries considered, shows a group around the capital and main economic pole of the country, being very high in the south of Romania and in the center and south-eastern Serbia.

2. Literature review

Advantages and employee benefits have shaped a different scenario in the last decade worldwide, but especially in the European Union, changed mainly by the increase of employee benefit costs, associated with the legislative changes and new benefits options. **Employee benefits** are a set of incentives granted by employers to hire and maintain their employees, and increased the productivity and workplace safety. In recent years, the budgets allocated for the employee benefits (HR) decreased significantly due to the unfavorable economic environment generated by the global financial and economic crisis in the second half of 2008. Thus, employers transfer accounting costs and benefits of the decision-making process in this sense to employees. This process causes organizations to be creative through the efforts to remain competitive in recruiting and retaining employees. Therefore, employers continue to reshape benefit schemes granted, ensuring their employees more responsibility in their coordination. *Employee benefits* are described by the International Accounting Standard – IAS 19, which has the primary objective to prescribe the accounting and to submit information for employee benefits.

Pension economic theories generally assume that retirement schemes increase productivity. This perspective of the markets offer is the assumption that pension incentives should create sufficient added value to cover the costs. The restriction applied on the ability of workers to handle other jobs more attractive or to retire when they want is very expensive, requiring employers to pay compensatory wages to attract workers. In companies where pension incentives have no productive function, employers can attract workers in a lower cost offering them pension contributions.

By contrast, outside the economic literature, the possibility that pensions are a tool that boosts productivity is ignored or explicitly removed from research and the debate on pensions and retirement policies. The human resource management perspective sees almost exclusively coordinated pensions as employee preferences. Imperfect portability of benefits has been submitted, in general, as a disadvantage of pre-defined benefit plans, rather than a deliberate policy of compensation. Pensions are usually discussed in the context of employee benefits, with emphasis on ensuring safety for their retirement. This perspective captures pensions solely as a means to provide needed revenue for the period after retirement. Also, Lazear (1990) concluded that managers understand pensions as retirement savings instruments, suggesting that it fails to understand the implications of pension incentives on results / labor productivity, or how they may have strategic value. The literature highlights the usefulness of retirement incentives and tools for companies and workers. However, economists often characterize waiving pension penalties awarded as impediments to efficient mobility between different jobs (Dorsey et al., 1998, p. 5). However, Turner (1993) describes two arguments for legislation to enhance the portability of pensions: (i) *firstly*, can increase the portability of retirement benefits of workers who, for various reasons, have experienced frequent changes of jobs; (ii) *secondly*, non-

portability reduces labor productivity because workers remain tied to jobs where productivity decreased due to changes in consumer preferences or technological shocks.

3. The empirical analysis of post-employment benefits in Romania and Serbia through structural equations modeling (SEM): the general model

In the macro-econometric analysis we focused on highlighting similarities and differences concerning factors model and the impact of pension systems in the two countries considered, namely Romania and Serbia. In this regard, models were developed based on structural equation, both panel and individual, using data for indicators of pensions and salaries in Romania and Serbia. The general form of the models developed and processed on the basis of structural equation is shown in Figure 6.

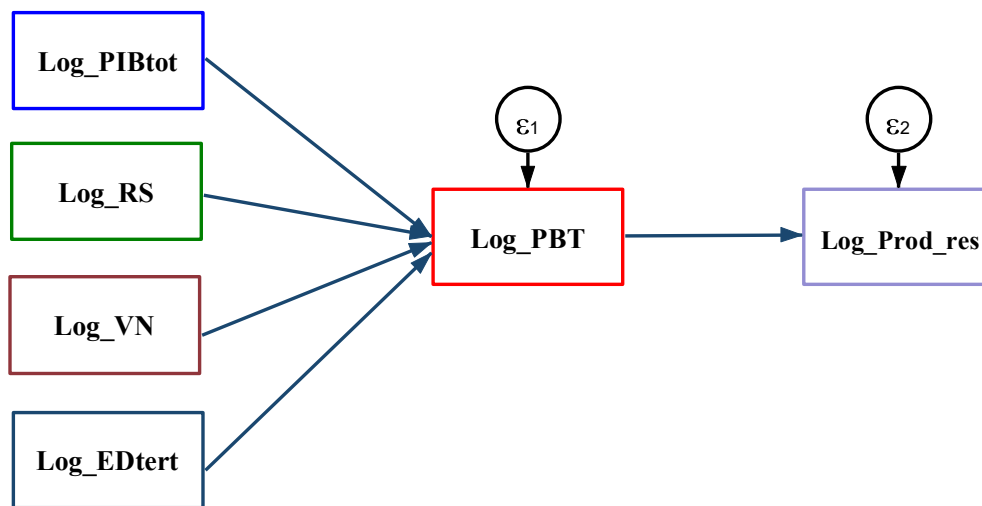


Figure 6: The general form of developed models under structural equation

Source: performed based on panel data, using Stata 12 econometric package

The specific indicators used to identify and assess the effects of post-employment benefits such as pensions upon productivity and economic welfare, as well as to analyze the main shaping factors of pension systems in Romania and Serbia can be grouped in two different categories:

i) pension system specific indicators:

- the number of pensioners at December 31st of every year during 2005-2013;
- old-age pension beneficiaries – total and by gender (males/ females);

ii) macroeconomic and labor market indicators:

- gross domestic product - total and per capita;
- labor and resource productivity (Euro per kg);
- employment rate;
- unemployment rate;
- wages/ net earnings;
- secondary and tertiary education level.

The main databases used in order to compile these indicators for Romania and Serbia during 2005-2013 is the Statistical Office of Republic of Serbia, the National Institute of Statistics of Romania and Eurostat (European Commission Database).

4. Results and discussions

To highlight the shaping factors of the pension schemes in Romania and Serbia, but also the impact on labor productivity and resources, we developed a set of macro-econometric models that focus on the total number of people receiving old age pension. Results were obtained by processing the panel data using the Stata 12 econometric package, through structural equations by maximum likelihood methods of estimation and are summarized in Annexes 1, 2 and 3.

The estimated coefficients are statistically significant, most at 0.1%, thus enabling validation of models and proper interpretation of results. Thus, we see economic activity, macroeconomic stability, income level and education level are the main shaping factors of pension schemes in Romania and Serbia, leading to greatly increase the total number of pensioners. Specifically, total GDP growth in the two countries deemed to induce an increase in the total number of pensioners 1.612% (model 3), respectively 1,741% of beneficiaries of old age pension (model 3). However, improved living standards and the standard of living of the population by increasing GDP per capita reflected can be an incentive to remain in the workforce, a reduction in the number of pensioners.

At the same time, people with secondary education are more oriented towards retirement, while improving the educational level of the labor force in the tertiary education induce only a slight increase in the number of pensioners, these benefits usually of good working conditions and a high level wage, strong incentives to remain active in the labor market.

However, imbalances in the labor market in the two countries as evidenced by high unemployment rates induce changes at the level of pensions, rising unemployment leading to reduced number of pensioners (according to Model 6 1% increase in unemployment induces a decrease of 0.756 % of total number of pensioners, respectively 0.790% of pension beneficiaries in old age). At the same time, increasing employment may create the necessary conditions for the withdrawal of employees from the workforce to retirement. Moreover, post-employment benefits as pensions granted to employees are important incentives for companies that generate an increase in productivity and resources (approximately 0.80% according to estimates).

Analyzing individual determinants of the pension system in Romania, we can see that the growth of total and per capita GDP reduces the overall number of pensioners by categories. Thus, economic growth and improved living standards for the population, in conjunction with improved working conditions and wages, are important motivations for employees to remain active in the labor market. Also, the educational level of the population has a major role in shaping the number of pensioners in Romania, people with primary and secondary education-oriented bottom being withdrawn from the workforce to retirement.

For Serbia, the main shaping factors of the pension system identified according to the results obtained are as well the economic activity, labor market performance and educational level. In this case, however, improving the education from primary to secondary causes significant reduction in the number of pensioners, both overall and among the beneficiaries of old age pension. Thus, regardless of educational level, employees in Serbia seem to be more oriented to remain active in the labor market. This contrasts sharply with the elements identified for

Romania and the panel, explained above. Meanwhile, the same trend is also confirmed for the improvement of living standards as a result of economic growth and labor market performance as reflected by increasing employment and reducing unemployment.

Unlike Romania, Serbian employees seem to consider pensions as major advantages and incentives that lead to a significant increase in resource productivity (to 2.168% according to the results).

5. Concluding remarks

Our comparative analysis of employee advantages (post-employment benefits under the form of pension schemes) granted by companies in Romania and Serbia in recent years highlights the importance given to retirement benefits, the sustainability of this system and legislative measures to ensure transparency and facilitate the change in the method of pension indexation.

The results obtained after processing various models developed for the analysis of the economic impact of pension systems in Romania and Serbia conforms to the relevant elements of the literature which shows that the post-employment benefits to employees, including those in the form of pensions, are important incentives that may lead increase productivity and income, and improve the standard of living and level of education.

However, in Romania's case processed individual analysis highlights patterns that an increase in the number of pensioners significantly reduces labor and resource productivity. Moreover, analyzing the individual shaping factors of the pension system in Romania, it was observed that the growth of total GDP and per capita reduces the overall number of pensioners by categories. Thus, economic growth and improved living standards for the population, in conjunction with improved working conditions and wages, are important motivations for employees to remain active in the labor market. Also, the educational level of the population has a major role in shaping the number of pensioners in Romania, people with primary and secondary education-oriented bottom being withdrawn from the workforce to retirement. For Serbia, however, improving the education from primary to secondary causes significant reduction in the number of pensioners, both overall and among the beneficiaries of old age pension.

Therefore the results of the models processed separately for Romania and Serbia highlights the importance of economic activity in the two countries which can shape significantly the pension systems and the economic growth with a reduction in the number of pensioners overall categories of pension (retirement, early follower). The essential differences are given by the implications in the education level and labor productivity and also of the resources (its significant reduction in Romania and its growth in Serbia).

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12. *** Statistical Office of the Republic of Serbia.
13. *** National Institute of Statistics of Romania.

Appendix 1

Table 1. Results of the models developed based on structural equations for shaping factors and economic consequences analysis of pension systems in Romania and Serbia, according to the number of old-age pension beneficiaries

| | Model 1 b/se | Model 2 b/se | Model 3 b/se | Model 4 b/se | Model 5 b/se | Model 6 b/se | Model 7 b/se | Model 8 b/se | Model 9 b/se |
|----------------------|--------------------|--------------------|---------------------|--------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| log_Pens_ben_varst-t | | | | | | | | | |
| log_GDP_Total | 0.918*** (0.05) | 0.836*** (0.06) | 1.741*** (0.18) | -0.435 (0.26) | 1.627*** (0.28) | | | | |
| log_Unemployment | | -0.162 (0.09) | 0.521*** (0.14) | -0.062 (0.09) | 0.464** (0.18) | -0.790*** (0.08) | -0.082 (0.06) | | |
| log_Net_Earnings | | | -1.506*** (0.29) | 0.697* (0.27) | -1.424*** (0.33) | 2.214*** (0.45) | 0.802*** (0.18) | 0.822*** (0.15) | 0.822*** (0.15) |
| log_Educ_sec | | | | 1.294*** (0.15) | | | 0.917*** (0.06) | 0.936*** (0.03) | 0.936*** (0.03) |
| log_Educ_tert | | | | | 0.016 (0.03) | 0.085** (0.03) | | | |
| log_GDP_loc | | | | | | -1.968*** (0.44) | -0.584** (0.18) | -0.597*** (0.15) | -0.597*** (0.15) |
| log_Employment | | | | | | | | 0.330 (0.18) | 0.330 (0.18) |
| Constant | 4.461*** (0.51) | 5.744*** (0.83) | 10.088*** (0.99) | -4.919** (1.72) | 10.417*** (1.16) | 8.776*** (1.42) | -0.847 (0.48) | -2.710*** (0.72) | -2.710*** (0.72) |
| var(e.log_Pens_ben-) | | | | | | | | | |
| Constant | 0.021** (0.01) | 0.017** (0.01) | 0.007** (0.00) | 0.001** (0.00) | 0.007** (0.00) | 0.009** (0.00) | 0.001** (0.00) | 0.001** (0.00) | 0.001** (0.00) |
| log_Productivity | | | | | | | | | |
| log_Pens_ben_varst-t | | | | | | | | | 0.080 (0.04) |
| Constant | | | | | | | | | -2.496*** (0.64) |
| var(e.log_Producti-) | | | | | | | | | |
| Constant | | | | | | | | | 0.015** (0.01) |
| N observations | 18.000 | 18.000 | 18.000 | 17.000 | 18.000 | 18.000 | 17.000 | 17.000 | 17.000 |

* p<0.05, ** p<0.01, *** p<0.001

Appendix 2

Table 2. Results of the models developed based on structural equations for shaping factors and economic consequences analysis of pension systems in Romania, according to the number of old-age pension beneficiaries

| | Model 1 b/se | Model 2 b/se | Model 3 b/se | Model 4 b/se | Model 5 b/se | Model 6 b/se | Model 7 b/se | Model 8 b/se | Model 9 b/se |
|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| log_Pens_ben_varst-t | | | | | | | | | |
| log_GDP_total | -0.049*** (0.01) | -0.048*** (0.01) | -0.043 (0.03) | -0.070* (0.03) | -0.049 (0.03) | | | | |
| log_Unemployment | | 0.003 (0.01) | 0.005 (0.02) | 0.012 (0.02) | -0.004 (0.02) | -0.007 (0.02) | 0.011 (0.02) | | |
| log_Net_Earnings | | | -0.005 (0.02) | 0.041 (0.04) | -0.000 (0.02) | 0.014 (0.03) | 0.047 (0.03) | 0.068 (0.04) | 0.068 (0.04) |
| log_Educ_sec | | | | 0.076 (0.06) | | | 0.064 (0.05) | 0.069 (0.04) | 0.069 (0.04) |
| log_Educ_tert | | | | | -0.004 (0.01) | -0.005 (0.01) | | | |
| log_GDP_loc | | | | | | -0.057* (0.02) | -0.072** (0.03) | -0.099** (0.03) | -0.099** (0.03) |
| log_Employment | | | | | | | | 0.204 (0.20) | 0.204 (0.20) |
| Constant | 15.808*** (0.07) | 15.797*** (0.09) | 15.788*** (0.10) | 14.542*** (0.96) | 15.869*** (0.15) | 15.666*** (0.11) | 14.453*** (0.90) | 13.572*** (1.32) | 13.572*** (1.32) |
| var(e.log_Pens_ben-) | | | | | | | | | |
| Constant | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) |
| log_Productivity | | | | | | | | | |
| log_Pens_ben_varst-t | | | | | | | | | -5.005 (2.85) |
| Constant | | | | | | | | | 74.992 (43.49) |
| var(e.log_Producti-) | | | | | | | | | |
| Constant | | | | | | | | | 0.006* (0.00) |
| N observations | 9.000 | 9.000 | 9.000 | 8.000 | 9.000 | 9.000 | 8.000 | 8.000 | 8.000 |

* p<0.05, ** p<0.01, *** p<0.001

Appendix 3

Table 3. Results of the models developed based on structural equations for shaping factors and economic consequences analysis of pension systems in Serbia, according to the number of old-age pension beneficiaries

| | Model 1 b/se | Model 2 b/se | Model 3 b/se | Model 4 b/se | Model 5 b/se | Model 6 b/se | Model 7 b/se | Model 8 b/se | Model 9 b/se |
|-----------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| main | | | | | | | | | |
| log_GDP_total | 0.396*** (0.11) | -0.070 (0.13) | -0.572** (0.20) | -0.175* (0.08) | -0.436* (0.18) | | | | |
| log_Unemployment | | 0.194*** (0.05) | -0.055 (0.09) | 0.079* (0.03) | -0.052 (0.08) | -0.035 (0.08) | 0.087* (0.03) | | |
| log_Net_Earnings | | | 0.663** (0.23) | 0.116 (0.10) | 0.666*** (0.19) | 0.648** (0.22) | 0.099 (0.10) | 0.105 (0.08) | 0.101 (0.07) |
| log_Educ_sec | | | | -1.812*** (0.21) | | | -1.880*** (0.20) | -2.007*** (0.20) | -1.465*** (0.17) |
| log_Educ_tert | | | | | -0.018* (0.01) | -0.020* (0.01) | | | |
| log_GDP_loc | | | | | | -0.401* (0.20) | -0.163* (0.08) | -0.131 (0.08) | -0.132* (0.07) |
| log_Employment | | | | | | | -0.241** (0.08) | | -0.012 (0.06) |
| Constant | 9.804*** (1.10) | 14.072*** (1.21) | 13.076*** (0.95) | 37.027*** (2.77) | 11.798*** (1.01) | 10.797*** (1.03) | 37.585*** (2.78) | 40.043*** (2.89) | 32.787*** (2.45) |
| var(e.log_Pens_ben~) | | | | | | | | | |
| Constanta | 0.002* (0.00) | 0.001* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) | 0.000* (0.00) |
| log_Productivity | | | | | | | | | |
| log_Pens_benef_tot | | | | | | | | | 2.168* (0.96) |
| Constant | | | | | | | | | -32.338* (13.78) |
| var(e.log_Pens_ben~) | | | | | | | | | |
| Constant | | | | | | | | | 0.000* (0.00) |
| var(e.log_Producti~) | | | | | | | | | |
| Constant | | | | | | | | | 0.014* (0.01) |
| N observations | 9.000 | 9.000 | 9.000 | 9.000 | 9.000 | 9.000 | 9.000 | 9.000 | 9.000 |

* p<0.05, ** p<0.01, *** p<0.001