TOPIC OF THE ISSUE

Projections of the number of employees and retirees and impact on the pension system sustainability

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Introduction

Pension and Disability Insurance Fund (PIO) is the main financial institution of the public pension system in Serbia and is funded based on PAYG ('Pay as you go', current financing) scheme, primarily through contribution of the working population and transfers from the state budget. This funding system is sustainable under favorable demographic parameters which provide a satisfactory ratio between those who exercise the rights to social security and the insured themselves.

However, in PAYG pension system, the problem arises upon disturbances of dependency ratio[1] because the system can not provide proper funding of pensions and becomes dependent on transfers from external sources (public budget and other sources).

The most important factors affecting the dependency ratio disturbance are: population ageing caused by reduction in population growth rate, extending the population lifespan and disturbances in management such as; early acquiring of the status of pension and disability insurance beneficiary due to liberal conditions of retirement and a decrease in the number of insured persons as a result of an increasing unemployment. Disturbances may occur due also to inadequate macroeconomic (monetary or fiscal) policy. Changes in the process of ageing do not have to cause disturbances in the financial capacity of pension funds: good financial management, creation and contraction of investments enable the funds with ongoing pension funding to duly perform their obligations in the event of changes in the processes of ageing.

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1   The ratio of the number of retirees to the number of employees.

Number of pension beneficiaries by categories of the insured   as at 31 December

Year	Employed		Self-employed		Farmers		Total	
	Number of beneficiaries	chain indices	Number of beneficiaries	chain indices	Number of beneficiaries	chain indices	Number of beneficiaries	chain indices
1997	1243192	103,1	35970	111,0	181144	109,3	1460306	104,0
1998	1251394	100,7	37448	104,1	184202	101,7	1473044	100,9
1999	1263315	101,0	38462	102,7	196198	106,5	1497975	101,7
2000	1264175	100,1	39337	102,3	207289	105,7	1510801	100,9
2001	1297004	102,6	41207	104,8	213480	103,0	1551691	102,7
2002	1255814	101,3	42905	104,1	212778	99,7	1511497	97,4
2003	1248662	99,4	43472	101,3	213438	100,3	1505572	99,6
2004	1241082	99,4	43938	101,1	221047	103,6	1506067	100,0
2005	1239573	99,9	45225	102,9	224178	101,4	1508976	100,2
2006	1267574	102,3	47181	104,3	229293	102,3	1544048	102,3
2007	1290611	101,8	49872	105,7	229072	99,9	1569555	101,7
2008	1306394	101,2	50959	102,2	222986	97,3	1580339	100,7
2009	1324338	101,4	54450	106,9	224880	100,8	1603668	101,5
2010	1345733	101,6	58368	107,2	222480	98,9	1626581	101,4
2011	1357846	100,9	61851	106,0	218948	98,4	1638645	100,7

Source: http://www.pio.rs/images/dokumenta/statistike/

Type and structure of insurance

Serbia has a unique system of compulsory pension and disability insurance. This system covers all the employed, self-employed and farmers, and as of 2008 their insurance has been integrated into a common Pension and Disability Insurance Fund (PIO fund). Pension insurance holders can be classified into three categories according to the manner of exercising their pension rights: beneficiaries of old-age, disability and family pensions.

According to the number of the insured and the amount of funds required for maintenance of pension insurance right, the employee Fund plays a dominant role.

Number of pension beneficiaries. The number of retirees in Serbia progressively increased over the last two decades, which was partly caused by the demographic structure of society and mainly by liberal conditions for acquisition of pension insurance right. On the other hand, this phenomenon coincides with the decline in the number of the insured, due to adverse economic developments, the

Ratio of the number of retirees to the number of insured – category of employees[1], 1999-2011

Year	Number of retirees	Number of persons with compulsory insurance within the category of employees	Ratio
1999	1.263.315	1.992.181	1:1,6
2000	1.264.175	1.927.588	1:1,5
2001	1.297.004	1.919.255	1:1,5
2002	1.255.814	1.876.390	1:1,5
2003	1.248.662	1.841.219	1:1,5
2004	1.241.082	1.841.656	1:1,5
2005	1.239.573	1.839.461	1:1,5
2006	1.267.574	1.792.497	1:1,4
2007	1.290.611	1.760.437	1:1,4
2008	1.306.394	1.772.418	1:1,4
2009	1.324.338	1.678.760	1:1,3
2010	1.345.733	1.605.052	1:1,2
2011	1.357.846	1.542.282	1:1,1

Source: http://www.pio.rs/images/dokumenta/statistike/

Conditions for retirement pension

Article 19 of the Law	Beneficiary - MALE			Beneficiary - FEMALE		
	retirement year	Conditions		retirement year	Conditions	
		years of age	minimum insurance period		years of age	minimum insurance period
point 1	2011	65	15	2011	60	15
	2011	53y 4m	40	2011	53y	35y
	2012	53y 8m	40	2012	53y	35y
	2013	54y	40	2013	53y 4m	35y 4m
	2014	54y 4m	40	2014	53y 8m	35y 8m
	2015	54y 8m	40	2015	54y	36y
	2016	55y	40	2016	54y 6m	36y 4m
point 2	2017	55y 4m	40	2017	55y	36y 8m
	2018	55y 8m	40	2018	55y 6m	37y
	2019	56y	40	2019	56y	37y 4m
	2020	56y 6m	40	2020	56y 6m	37y 8m
	2021	57y	40	2021	57y	38y
	2022	57y 6m	40	2022	57y 6m	38y
	2023	58y	40	2023	58y	38y
point 3	45 years of insurance period					

Source: Fond PIO, jun 2012

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1 The Law on Pension and Disability Insurance provides for three categories of persons with compulsory insurance: employed persons, self-employed persons and farmers. For individuals who are also eligible for insurance on multiple grounds, the priority of insurance basis was set according to the pre-specified order, which means that the existence of employment excludes insurance based on simultaneous carrying out of independent or agricultural activities.

effects of transition and crisis, thus leading to a reduction in dependency ratio, or to deterioration of the relationship between the number of insured and the number of beneficiaries. Five decades ago this ratio was 6:1, and in mid-eighties 3,6 employees allocated funds for one retiree.

Dependency ratio in the **employee pension fund** recorded the lowest value in 2011 (1,1).

Changes in demographic structure of those insured with this Fund are not followed by the formation of the latent reserve in capital-investments, like it would be required by good financial practice.

Retirement conditions. Age limit, established at 55 years of age for women and 60 years of age for men, while meeting the conditions of 35, i.e. 40 insurance period, has not been corrected for a long time, thus ignoring demographic conditions and changes in the economic structure of the country. According to the 2012 data, the right to old-age pension by the years of age can be exercised by men of 65 years of age and 15 years of insurance period, i.e. women of 60 years of age and at lest 15 years of insurance period. According to the amended Law on Pension and Disability Insurance, conditions for retirement will be tightened successively from year to year, up until 2023 when the age limit for those with full service (40 years for men and 38 for women instead of the current 53) will be 58 years of age, whereby Serbia will continue to move closer to the EU countries. Dynamics of the conditions tightening for the old-age retirement is shown in the table.

System expenditures. The formula for determining individual pension was very favorable (85% of the beneficiary's average monthly income realized in most favorable ten consecutive years of the insurance period). Minimum pension ranged from 40% to 80% of an average wage paid in the Republic, which was very high percentage on the world scale.

The said facts have acted as an incentive for employ-

ees to tend to early retirement, which led to a situation in which the Pension and Disability Insurance Fund in Serbia faces major financial difficulties. At the same time, retirement policy encouraged early retirement and reduced initiative to extend the working life and contribution of beneficiaries who exceeded the prescribed age limit to the creation of the national product.

By 2000, the Government solved these difficulties by increasing contribution rates, introducing additional excise taxes on goods and various types of fees paid by legal entities and citizens (including retirees), which further reduces the available tax potential for funding the development, health service, education and other development-oriented budget expenditures.

Important pension reforms in Serbia started in December 2001 when the retirement age was raised from 58 to 63 years of age, pension increase was adjusted with growth of retail prices and growth of wages (Swiss model), minimum pension stood at 20% of gross average wage. Upon the adoption of the Law on Pension and Disability Insurance on 1 April 2003, the entire length of service was taken as the basis for pension calculation instead of the ten best years.

At the beginning of the new millennium it became completely clear that the pension system conceived in such a way, without taking serious reform measures, will face even greater financial problems, especially given that further worsening of demographic situation has been expected.

Demographic aspect

The population of Serbia, with all the demographic characteristics of age, can be classified into a group of extremely aged populations not only in Europe but worldwide as well. According to 2010 data, those younger than 15 years of age account for only 15% of total population,

Share of population aged 0-14 and 65+ in the total population of Serbia (%)

Source: RSO, Projections of the Republic of Serbia's labor force, 2010-2050

which is less than the share of population older than 65 years of age (17%). In the last fifty years, the share of young age group in the total population of Serbia has been almost halved, and the share of the elderly population increased 2,5 times.

All variants of the population projections show a significant increase in the share of the elderly (65 +) in the total population. According to the medium-fertility variant, their share increases from 16.9% in 2010 to 23.3% in 2050. All variants provide for the reduction of the working age population (15-64 years of age) in the total population, whereby a decline would range from 5.5% to 7.6% depending on the variant. The share of older workers in the working age population increases as well as the share of very old persons (over 80 years of age) in the elderly population. All these features indicate increasingly pronounced process of population ageing.

Serbian population will age if any of the combinations of assumptions on which the projections are based come true. Differences in variants would be manifested only in the speed of ageing process.

Total population and trends in demographic dependency ratio

	Medium-fertility variant			High-fertility variant			High-fertility variant		
	2010	2050	change	2010	2050	change	2010	2050	change
Republic of Serbia									
Total population (in thousands)	7428	6591	-837	7447	7168	-279	7394	5732	-1662
Young people (15-24) (% of total population)	12,1	11,2	-0,9	12,1	12,2	0,1	12,2	8,9	-3,3
Elderly (65+) (% of total population)	16,9	13,2	6,3	16,8	21,3	4,5	16,9	26,7	9,8
Working age (15-64) (% of total population)	67,6	61,1	-6,5	67,5	59,9	-7,6	67,9	62,4	-5,5
Demographic dependency ratio of the elderly population (65+/15-64)*100	24,9	37,9	13,0	24,9	35,6	10,7	24,9	42,7	17,8
The share of elderly workers in the working age population ((55-64)/(15-64))*100	20,9	21,6	0,7	20,9	20,3	-0,6	20,9	24,3	3,5
Very old as the percentage of the elderly (80+/65+)*100	22,3	26,4	4,0	22,3	26,4	4,0	22,3	26,4	4,0

Source: RSO, Projections of the Republic of Serbia's labor force, 2010-2050

Projections of Serbian population by age groups under the medium demographic variant
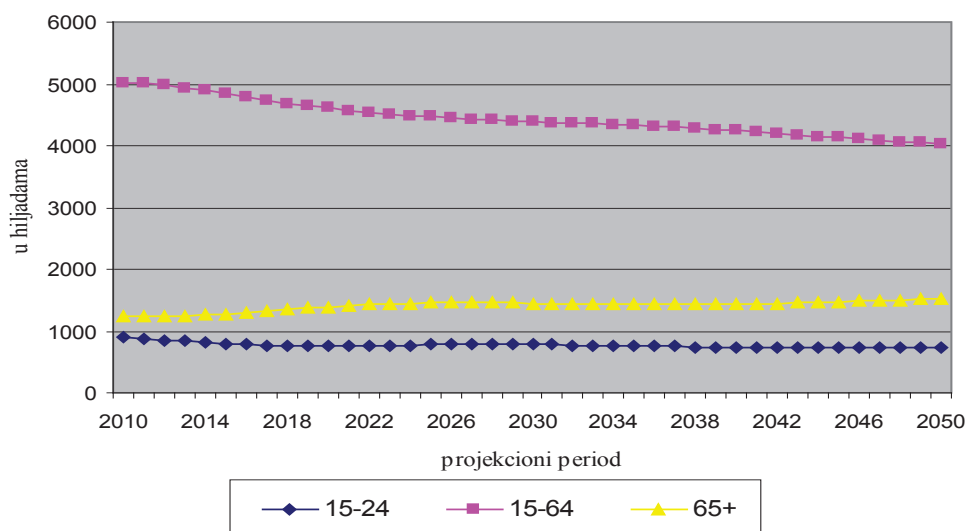
Source: RSO, Projections of the Republic of Serbia's labor force, 2010-2050

Projected indicators of the demographic ageing of Serbia, 2010-2050

Varijanta	Udeo starih (65+) u ukupnoj populaciji (%)				Koeficijent zavisnosti starih (65+/15-64)			
projekcija	2020	2030	2040	2050	2020	2030	2040	2050
Niska	20,0	22,1	23,3	26,7	30,3	33,6	35,7	42,7
Srednja	19,6	21,1	21,3	23,2	30,2	33,0	33,8	37,9
Visoka	19,3	20,5	20,2	21,3	30,2	32,7	32,8	35,6

Source: RSO, Projections of the Republic of Serbia's labor force, 2010-2050

Factors that influence ageing process

As with other populations, current age structure in Serbia is formed under the influence of the three components of population trends: fertility, mortality and migration, but also under strong influence of the inherited age composition, or under the influence of the so-called demographic inertia (which crucially affects the number of future generations of parents, i.e. the birth rate).

Population ageing is primarily the result of a large decline in fertility and its long-lasting low level. For sixty years (between 1950 and 2010) the average number of children per woman more than halved (total fertility rate reduced from 3,13 to 1,41children per woman), which significantly narrowed the base of the age pyramid. The achieved level of fertility is very low, so for more than half a century (from 1956) it has not even provided for a simple reproduction of the population.

If an average age of the population (an indicator that is directly influenced by the age structure) is observed as the criterion of demographic age, Serbia (with 41,6 years in 2011) then belongs to a group of 5 European oldest states (together with Italy, Germany, Bulgaria and Sweden).

The increase in the number of the elderly and very old people is also affected by the extension of life expectancy (ageing of the population at the top of the age pyramid). Life expectancy is under a direct influence of the population mortality by age. According to 2011 data, life expectancy in Serbia amounts to 71,6 years of age for men and 76,8 years of age for women.

For the past six decades, life expectancy in Serbia has extended by 17 years for men and by 18 years for women. During the fifties and sixties of the last century, the most significant reduction in mortality was achieved in the case of infants and young children (which considerably slowed down the effects of a fertility decrease) and resulted in the increase in life expectancy at birth. During the same period, life expectancy of the elderly was extended by only two years (men) and three years (women). A contribution to the reduction of mortality in the elderly population (60 years of age and over) is not relevant since life expectancy with this age cohorts has almost stagnated.

Life expectancy of men and women in Serbia is lower than the EU average. For the EU-25 it is 74,9 for men and 81,8 for women, and for the EU-15 it is 75,9 for men and 81,8 for women (data from 2011). Life expectancy at age of 65 is 13,6 years for men and 15,9 years for women. This indicator is very important for the pension system. RSO projections show that life expectancy at that age could extend until 2050 by 6,9 years for men and 6,1 years for women.

The dependency ratio of the elderly population[2] can best indicate to what extent it would be possible to expect the pressure of such demographic trends on the pension insurance expenditure, indicating the pressure exerted by the population ageing to the country's economy.

Projection of the number of employees and number of retirees

Main indicator of the pension system situation is the ratio of the number of retirees to the number of employees, while the population ageing leads to a long-term decrease thereof. Continuous trend in decline dates back from 2005. It reached the lowest value (1:1) in 2012, primarily due to the economic crisis. Retirement of "baby boom" generations in the next ten years will further affect this problem.

One of the key economic factors affecting the stability of the pension system is the employment rate and the share of employees in working age population. The 2011 employment rate in Serbia was 45.4% (LFS), which means that more than half of the population of working age is unemployed.

For the projections of the number of employees by 2020, the hypotheses have been used for the future activity rates, employment rate and unemployment. It has been assumed that the activity rate (the percentage of active[3] population out of the total population of working age) will reach 68.8%. in 2020. The unemployment rate (the percentage of the unemployed out of the total number of active working age population) would drop

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2   Number of the elderly, 65 and over, per 100 persons in the working age.

3   Active population (workforce) comprises all employed and unemployed persons.

Dependency ratio movements (for all three funds) 2008-2012

Year	Working age population (15-64)	Activity rate (LFS)	Employ ment rate (LFS)	Unemployment rate employed (LFS)[4]	Employed (LFS)[4]	Employed (LFS)[4] (ZP-20)[4]	Number of retirees (all three funds)	retirees / employed
2008	5.049.138	62,7	53,7	14,4	2.649.326	1.999.476	1.580.339	1,3
2009	5.037.135	60,6	50,4	16,9	2.468.688	1.889.085	1.603.668	1,2
2010	5.023.553	59,0	47,2	20,0	2.273.473	1.795.775	1.626.581	1,1
2011	5.003.291	59,4	45,4	23,6	2.166.656	1.746.138	1.638.645	1,1
2012	4.973.144	60,1	45,3	24,6	2.142.682	1.727.048	1.646.562	1,0
2013	4.937.657	60,6	46,0	24,1	2.272.251	1.769.741	1.655.765	1,1
2014	4.892.691	60,8	46,2	23,9	2.262.081	1.813.201	1.667.177	1,1
2015	4.840.862	61,6	48,1	22,0	2.326.450	1.875.169	1.709.418	1,1
2016	4.785.861	63,3	52,6	16,9	2.517.991	2.029.556	1.774.332	1,1
2017	4.730.762	64,8	55,0	15,2	2.600.831	2.096.326	1.803.146	1,2
2018	4.688.285	65,9	56,0	15,1	2.624.538	2.115.434	1.805.025	1,2
2019	4.647.052	67,0	57,0	15,0	2.647.727	2.134.125	1.806.521	1,2
2020	4.608.210	68,8	58,6	14,9	2.698.565	2.175.102	1.826.710	1,2

Source: period 2008-2012, the Funds for pension and disability insurance of the Republic of Serbia, Statistical Office of the Republic of Serbia – Communication ZP20, Labor Force Survey (LFS); 2013-2020 projected data,

Number of retirees and employees 2001 - 2020
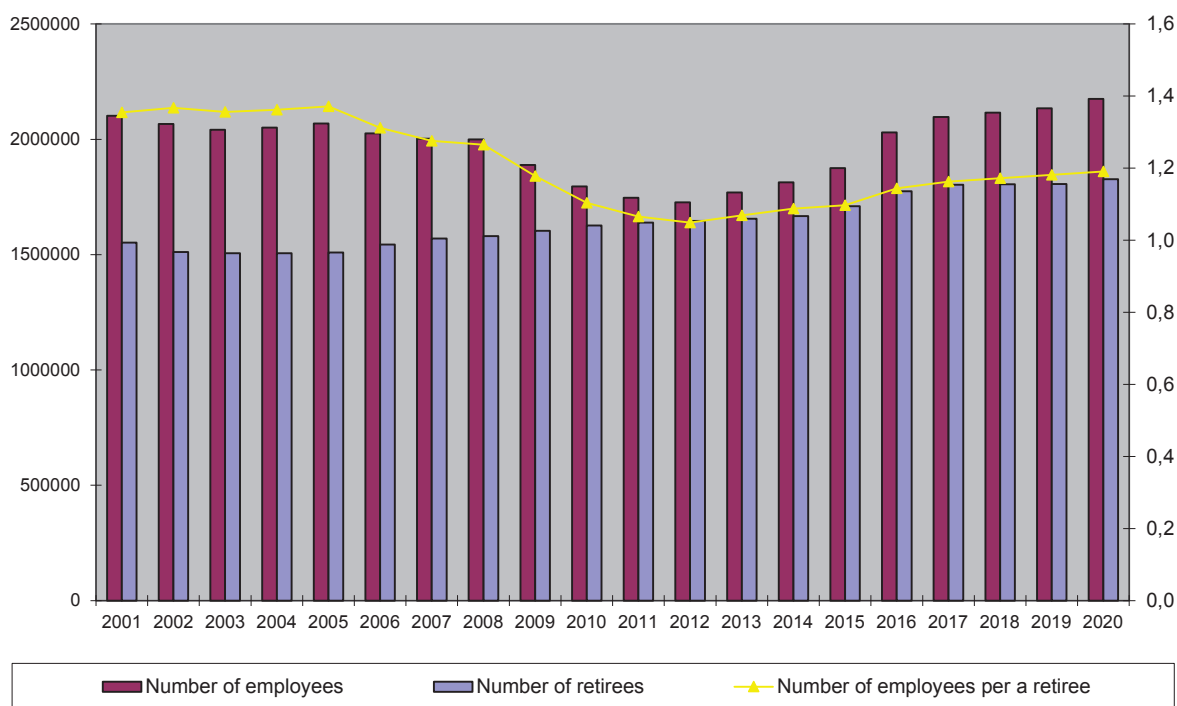
4   Data on employment in legal entities (companies, cooperative companies, institutions and organizations) have been obtained on the basis of regular semi-annual survey (RAD-1 / P) and through the "Survey to complement the semi-annual report on employment and wages", which presented the data on the number of employees in small-sized companies (up to 50 employees) not covered by the regular semi-annual survey; data on private entrepreneurs (individuals self-employed) and their employees are collected through regular semi-annual report (RAD 15) obtained from the Institute for health insurance of the Republic of Serbia.

to 14.9% by the end of the projection period. At the same time, the employment rate (the percentage of the employed out of the total number of active working age population) would reach 58.6%.

Given the demographic trends and the expected changes in the employment structure, the projection has been made of the number of pension beneficiaries and the number of employees by 2020 according to which the dependency ratio would be placed back to the level of 1,2 (as in 2009).

The opposite trend in the number of employees (contributors) and the number of retirees, with analyzed demographic trends, threatens the financial viability of the pension fund and alarms for the pension system reform.

Conclusion

This paper analyzes the relationship between the demographic factor and the ratio of the projected number of retirees to employees (the impact of ageing on the reduction of this ratio). Serbia has a unique system of compulsory pension and disability insurance, which covers employed, self-employed and farmers, and their insurance has been integrated in a common Pension and Disability Insurance Fund since 2008. According to the number of the insured and the amount of funds required for maintenance of pension insurance right, the employee Fund plays a dominant role. The dependency ratio (the ratio of the number of pension beneficiaries to the number of insured) reached its lowest value of 1,1

in 2001. Changes in the demographic structure of the Fund's beneficiaries are not followed by the formation of the latent reserve in capital-investments, like it would be required by good financial practice.

Serbian population will age according to all variants of demographic projections and the differences will be manifested only in the speed of ageing process. Population ageing is primarily the result of a large decline in fertility and its long-lasting low level, which significantly narrows the base of the age pyramid (ageing from the base upwards). The increase in the number of the elderly and very old people is also affected by the extension of life expectancy (ageing of the population at the top of the age pyramid). Impact of the inherited age composition (demographic inertia) is also significant.

One of the key economic factors affecting the stability of the pension system is the employment rate and the share of employees in working age population. The 2011 employment rate in Serbia was 45.4% (LFS), which means that more than half of the working age population is unemployed. Given the demographic trends and the expected changes in the employment structure, the projection has been made of the number of pension beneficiaries and the number of employees by 2020 (when the projected employment rate would reach 58.6%). The opposite trend in the number of employees and the number of retirees, with analyzed demographic trends, threatens the financial viability of the pension fund and alarms for the pension system reform.