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RUSSIAN PENSION TRENDS: ACTUARIAL ASSESSMENT

Tatiana Sinyavskaya (a), Alexandra Tregubova (b)*, Magomed Muzaev (c)
*Corresponding author

(a) Rostov State University of Economics, Rostov-on-Don, Russia, sin-ta@yandex.ru
(b) Rostov State University of Economics, Rostov-on-Don, Russia, alexandra_a_t@mail.ru
(c) Grozny State Oil Technical University, Grozny, Russia, maga_muzaev@mail.ru

Abstract

The paper examines the issues of the crisis state of the modern Russian pension system and considers options for overcoming it. Actuarial calculations in pension insurance are implemented on the basis of data from the mortality and life expectancy tables of Russia and the Rostov region population for 2017. The calculations are carried out in accordance with the Methodology for calculating insurance rates for types of insurance related to life insurance. Actuarial assessment of premiums and pensions allows us to formulate a number of recommendations. It is proposed to combine state social pensions with corporate programs, where pensions are accumulated according to the insurance principle from the beginning of an individual's work activity. Thus, individuals who started their labor activity early have the opportunity to save for a decent pension, and those who are not employed or who started working late need state pension provision. The study results can be used both by state social security authorities and insurance companies.

Keywords: Actuarial calculations, annuity, net premium, pension insurance, pension reform, pensions

1. Introduction

Currently, in Russia two types of future pensions can be formed: mandatory (compulsory) state pension and voluntary private pension. Voluntary pension insurance can be considered as part of the national pension system, and the principles of voluntary pension formation can be used to assess the effectiveness of the existing pension system.

OECD report (OECD, 2005) examined the financial market and policy implications of the increasing importance of funded retirement saving. Among the works of foreign authors who have studied the problems of reforming pension systems, population aging, we can highlight the works of (Andersen & Bhattacharya, 2021; Oksanen, 2002; Orszag & Stiglitz, 2001). Population aging is raising concerns about the sustainability of public pension systems in high-income countries (Bongaarts, 2004). Bongaarts (2004) identified four factors that determine trends in public pension expenditures: population aging, pension benefit levels, the mean age at retirement, and the labor force participation rate (Bazzana, 2020). shows that delaying the retirement age is an effective policy to raise the pension scheme sustainability.

The main directions of reforming the Russia pension system are studied by (Maleva & Sinyavskaya, 2005, 2010; Mamiy & Novikov, 2014; Roik, 2015; Roik, 2020). The consequences of population aging for economic growth and the sustainability of pension systems are assessed by (Gurvich & Ivanova, 2018). In his researches Solovyev covers in detail the issues of formed pension rights actuarial justification in the conditions of pension reforms in Russia (Solovyev, 2006, 2017, 2019). Thus, in a recent study (Solovyev, 2020) analyzed the economic mechanism and features of the formation of the insured persons pension rights in various employment conditions, taking into account the presence in the compulsory pension insurance system of both pay-as-you-go and funded components. (Yakushev, 2012) substantiated the need for an actuarial risk assessment in pension insurance, highlighted the factors that affect the Russian pension system efficiency.

Based on the voluntary method of forming pension a corporate insurance pension system can be developed, despite the low prevalence of voluntary pension among the population. The purpose of the paper is to justify the possibility of introducing individual voluntary pension plans, which allows to form the pension rights of future pensioners more efficiently, on the basis of actuarially calculated tariffs.

2. Materials and Methods

The calculations were carried out on the data of the life tables of Russia and the Rostov region population for 2017. This year was chosen for calculations, since in 2018 the Russian government introduced new legislation to increase the retirement age (ConsultantPlus, 2022).

To ensure comparability, the calculations were carried out in accordance with the Methodology for calculating insurance rates for types of insurance related to life insurance (Kontur.Normativ, 2022). The following formula was used in the calculations:

$$_{n|}\ddot{a}_x^{(m)} \approx \sum_{t=x+n}^{w} \frac{l_t}{l_x} v^{t-x} - \frac{(m-1)}{2m} \frac{l_{x+n}}{l_x} v^n = \frac{N_{x+n}}{D_x} - \frac{(m-1)}{2m} \frac{D_{x+n}}{D_x}, \qquad (1)$$

where $_{n|}\ddot{a}_x^{(m)}$ – one-time net premium, the current value of an immediate annuity due (payment is made at the beginning of the period) in case of survivor life insurance up to the term

established by the insurance contract with the payment of insurance coverage in the form of a life annuity (pension) deferred for n years, paid m times a year, at the first payment upon reaching the age of (x + n) years; lx – indicator of the life table, the number of persons from the observed population who survived to the age of x years (x = 0,1,2, ..., w, where w is the maximum age of the life table); D_x, N_x – special functions to simplify the recording of actuarial formulas; v – discount factor for 1 year, $v = \frac{1}{1+i}$; i - effective interest rate.

The instalment rate was used to receive the monthly net premium, formula (2):

$$P^{(m)} = R \cdot \frac{n|\ddot{a}_x^{(m)}}{\ddot{a}_{x:\overline{n}|}^{(m)}},$$ (2)

where $P^{(m)}$ – net premium paid m times a year (here m=12); R – annual pension payment (the insurer obligation); $\ddot{a}_{x:\overline{n}|}^{(m)}$ – the current value of an immediate annuity due, paid m times a year during the period established by the insurance contract (n years) (the insured obligation).

Thus, we assessed the amount of monthly net premiums that allow person to receive a pension equal to the average size of the assigned pension, using actuarial methods. When calculating net premiums, we used data on the average monthly accrued wages in the Russian Federation (Rosstat, 2022) and the Rostov region (Rostovstat, 2022a) in 2017, and the average amount of pensions in 2017 in Russia (Rostovstat, 2022b) and the Rostov region (Rostovstat, 2022c). When estimating the amount of monthly pension payments, assuming that net premiums are equal to contributions paid to the Russian pension fund, we used data on the average monthly accrued wages in 2020 in Russia (Rosstat, 2023a, 2023b) and the Rostov region (Rostovstat), and the minimum wage in 2020 in Russia (Kremlin.ru, 2020) and the Rostov region (Minimum wage in the Rostov region in 2020, 2020). In our calculations, we used the current retirement age (65 for men and 60 for women) as the as the age when pension payments started. As the discount rate, we used the interest rate equal to 10% on the "Savings account" (Sberbank Official website, 2022).

3. Results and Discussion

Table 1 shows the results of calculations of net premiums for men and women of the Rostov region and the Russian Federation, at different ages at entry into employment. The choice of ages was due to the start of employment activity for most of the population, as well as the need to illustrate the rate of change in net premiums. The age limit of 48 years was due to the fact that the value of the net rate becomes higher than 1. As can be seen, the difference in the values of net premiums for the Rostov region and the Russian Federation is practically imperceptible, especially for young ages. For men, the difference is even smaller.

It should be noted that premiums for women are higher at similar ages compared to premiums for men. At the same time. The gap in the value of premiums for women and men is smaller for the population of the Rostov region, the closest differences in the value of premiums for the urban population of the Russian Federation and the Rostov region.

Table 1. Monthly net premiums that allow person to receive a pension equal to the average size of the assigned pension in 2017, rubles

Age	All population				Urban population				Rural population			
	Russia		Rostov region		Russia		Rostov region		Russia		Rostov region	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
15	787.0	2229.4	799.4	2182.6	797.5	2245.1	801.7	2197.3	759.6	2181.4	792.8	2150.8
18	1031.4	2912.8	1046.5	2851.0	1044.7	2932.8	1049.3	2869.9	996.9	2851.7	1038.6	2809.8
19	1129.4	3185.8	1145.5	3118.0	1143.8	3207.5	1148.4	3138.6	1092.2	3119.8	1137.1	3073.1
20	1237.2	3485.5	1254.2	3410.8	1252.7	3509.0	1257.3	3433.2	1197.0	3413.9	1245.3	3361.9
21	1355.6	3814.5	1373.7	3732.0	1372.4	3840.0	1377.0	3756.5	1312.4	3737.0	1364.2	3679.0
22	1486.0	4176.0	1505.1	4084.9	1504.1	4203.7	1508.6	4111.5	1439.4	4092.1	1494.9	4027.2
23	1629.6	4573.4	1649.6	4472.7	1649.1	4603.4	1653.4	4501.7	1579.4	4482.7	1638.7	4410.0
24	1787.8	5010.7	1808.8	4899.4	1808.9	5043.2	1812.8	4930.9	1733.7	4912.6	1797.2	4831.1
25	1962.3	5492.2	1984.3	5369.0	1985.1	5527.4	1988.5	5403.4	1904.0	5386.1	1972.0	5294.7
30	3151.8	8760.7	3178.0	8555.1	3185.9	8813.6	3183.9	8607.9	3065.8	8602.8	3160.5	8441.5
35	5150.6	14239.7	5175.2	13891.0	5202.8	14320.5	5184.3	13974.9	5020.2	14000.8	5148.8	13711.3
40	8613.1	23852.2	8626.9	23250.7	8694.3	23978.5	8642.6	23390.3	8411.6	23481.2	8584.0	22952.3
45	14902.7	42107.1	14895.0	41014.2	15029.3	42314.6	14933.8	41266.9	14589.4	41497.7	14801.5	40472.2
46	16728.2	47647.2	16714.5	46400.9	16866.8	47878.6	16761.9	46685.8	16385.3	46967.2	16603.1	45789.2
47	18825.4	54164.4	18804.6	52738.0	18977.3	54423.4	18862.6	53059.7	18449.5	53402.4	18671.8	52046.8
48	21247.4	61907.5	21219.6	60266.2	21414.3	62198.7	21290.9	60629.6	20834.1	61050.0	21060.0	59483.9

In Figure 1, the red line marks the size of the pension, which, in accordance with the calculations, will be received by a person living in the Rostov region upon reaching retirement age. As can be seen, the monthly premium begins to exceed the pension received from the age of 44 for men, for women - from the age of 34. Note that age in this case means the age at which the accumulation of individual pension insurance contributions began. When moving to older age groups, the amount of premiums will remain unchanged. At the same time, the differences between net premiums for men and women are much more noticeable than is typical for other types of life insurance.
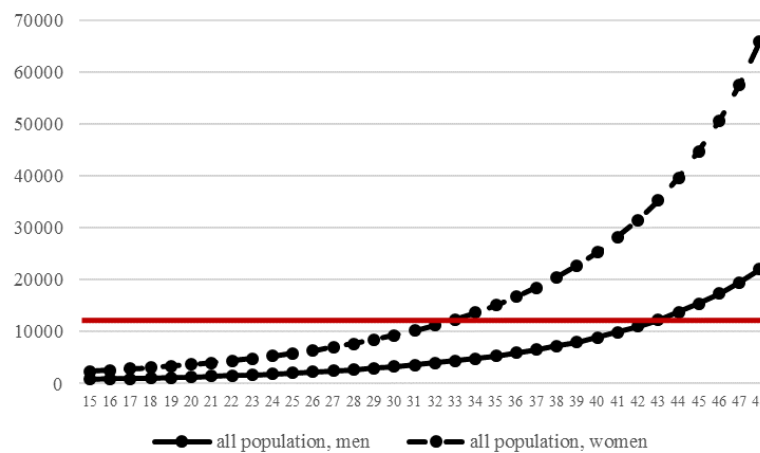

Figure 1. Monthly net premiums that allow person to receive a pension equal to the average size of the assigned pension in 2017, Rostov region, rubles

These significant differences are due to two important circumstances. Firstly, the retirement age of men is five years higher than that of women, therefore, the accumulation of contributions from women should occur over a shorter period of time. Secondly, the life expectancy of women is higher than that of men. In other words, a woman, on average, will need to pay a pension eight years longer than a man, which requires more significant pension savings. In this regard, we can conclude that individual voluntary pension insurance is a more profitable way to improve well-being after retirement for men than for women.

Table 2 shows the values of the potential pension calculated under similar conditions for all population in Russia and the Rostov region. Similar results were obtained for the urban and rural populations.

Table 2. Monthly pension payments, assuming that net premiums are equal to contributions paid to the Russian pension fund in 2017, all population, rubles

Population	Gender	Wage	Age at entry into employment, years			
			15	18	22	24
Russia	Male	Average	136044.0	103805.6	72051.1	59888.5
		Minimum	26050.8	19877.5	13796.9	11467.9
	Female	Average	48025.6	36758.4	25638.9	21367.8
		Minimum	9196.3	7038.8	4909.5	4091.7
Rostov region	Male	Average	95181.6	72703.7	50553.4	42063.3
		Minimum	25048.1	19132.8	13303.7	11069.4
	Female	Average	34859.3	26687.3	18626.0	15529.7
		Minimum	9173.6	7023.1	4901.7	4086.8

As can be seen, the differences in the values for the Russian Federation and the Rostov region are small. This makes it possible to extrapolate the regularities revealed on the example of the Rostov region to the Russian Federation. However, it should be understood that the trends in the Russian Federation are largely averaged, while the demographic situation in specific regions may differ.

It seems possible to recommend, when introducing corporate pension insurance programs, to use regional life tables, as most corresponding to the order of extinction of the population of a given region, without averaging for the country.

4.   Conclusion

The variation of contributions (net premiums) depending on the length of service (beginning of employment) is promising in the context of further the pension system reform. By hiring long-term employees, employers will benefit not only in the employees' experience, but also in the amount of contributions paid to the Pension Fund. However, it is necessary to take measures to avoid discrimination in hiring those who started their labor activity later (for example, because of longer studies).

Thus we justified the possibility of introducing a complex approach to the pensions formation with the inclusion of a corporate component in the context of the pension system gradual reform. The assessment results can be used both by state social security authorities and insurance companies when

developing new and modifying existing pension plans taking into account the employment start age of men and women. Both when assessing future pension payments and contributions required.

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