The Role of Demographic Risks for Unfunded Pension Systems

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Abstract: The current unfunded pension system is balancing on the edge of financial stability, which manifests itself in the budgetary deficit of the Pension Fund of the Russian Federation and reallocation of pension savings to the unfunded pension system in 2014. Demographic risks became one of the main causes of this situation. This article provides comparative dynamic analysis of demographic risks in Russia and the OECD countries and structures the demographic risks. The impact of demographic risks on the redistributive pensions systems and measures of the OECD countries, which target minimization of the impact of demographic risks in the unfunded pension systems, are studied.

Key words: Unfunded pension systems • Financial stability • Demographic risks • Retirement age • Period of pension payment

INTRODUCTION

The impact of demographic risks on the pension system can hardly be overestimated. It is observed in both unfunded and defined contribution pensions systems.

Demographic risks are not the only risks that affect pension systems. Particularly for defined contribution pensions systems, the main risks are those related to investments. Such risks are managed through active use of portfolio theories [1, 2]. Besides, operational risks should be also highlighted [3].

Demographic risks influence the financial stability of pension systems through the incomes and expenditures of the systems. The causes of such influence are the impact of the age of entrance into working life and the retirement age on the duration of the period of pension saving, the impact of the number of able-bodied people on the income of the pension system, the impact of the number of senior people and the longevity on the expenditures of the pension system.

Demographic risks of the pension system are of a versatile nature and in some cases, it is not only the demography that they are related to. For the analysis of demographic risks, all pension systems will be divided into two groups: defined contribution pensions systems and unfunded pension systems. The former are affected by such risks as:

- Increase of life expectancy, which influences the period of pension payment.
- Increase of the age of entrance into working life, which influences the amount of pensions savings.
- Fluctuations of the average retirement age, which influence both the period of pension saving and the period of pension payment.

Unfunded pension systems are more exposed to demographic risks. Beside the above-mentioned demographic risks relating to defined contribution pension systems, the most significant risks for the unfunded ones are:

- Increase of the number of recipient of pensions
- Decrease of the number of working population whose contributions and tax payments are used for financing pensions payment.

The Risk of the Increasing Age of Entrance into Working Life: Change of the age of entrance into working life is a risk both for the defined contribution
pension systems, as it influences the duration of the period of pension saving and for unfunded pension systems, as it influences the amount of insurance contributions. For both variants of pension systems, the risk of increasing the age of entrance into working life influences the incomes of pension systems.

We calculate the age of entrance into working life (X) as the age, at which the average age of employment of economically active population is achieved, according to the equation:

\[ A_{av} = \frac{A_i - A_{i-1}}{X_i - X_{i-1}} \cdot X \]

(1)

Where:

- \( A_{av} \) is the average occupational level of the economically active population, in general
- \( A_i \) and \( A_{i-1} \) are the occupational level in the age group \( i \) and \( i-1 \), respectively
- \( X_i \) and \( X_{i-1} \) are the average age of the age group \( i \) and \( i-1 \), respectively

Using the equation (1), we receive:

\[ X = \frac{A_{av} - A_{i-1}}{A_i - A_{i-1}} \cdot (X_i - X_{i-1}) + X_{i-1} \]

(2)

Calculation of values according to the formula (2) was carried out by us based on the statistic data of the Goskomstat (State Statistics Committee) of Russia. The results of calculations are provided in Table 1.

The calculations show a tendency of the increasing age of entrance into working life by 0.7 years from 23.7 years of age in 2000 to 24.4 years of age in 2009 and, accordingly, a tendency of the decreasing period of pension saving. The low retirement age also adds to the situation.

### Table 1: The risk of the increasing age of entrance into working life

<table>
<thead>
<tr>
<th>Years</th>
<th>Age of entrance into working life</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>23.7</td>
</tr>
<tr>
<td>2001</td>
<td>23.7</td>
</tr>
<tr>
<td>2002</td>
<td>23.9</td>
</tr>
<tr>
<td>2003</td>
<td>24.0</td>
</tr>
<tr>
<td>2004</td>
<td>24.3</td>
</tr>
<tr>
<td>2005</td>
<td>24.3</td>
</tr>
<tr>
<td>2006</td>
<td>24.4</td>
</tr>
<tr>
<td>2007</td>
<td>24.5</td>
</tr>
<tr>
<td>2008</td>
<td>24.2</td>
</tr>
<tr>
<td>2009</td>
<td>24.4</td>
</tr>
</tbody>
</table>

The Risk of Increasing Life Expectancy: The risk of increasing longevity is topical for both unfunded and defined contribution pension systems through the impact on the duration of the period of pension payment.

The positive, from the social point of view, tendency of increasing longevity becomes the factor of expenditures growth and the risk of weakening financial stability for pension systems. The longevity increased in Russia from 64.5 in 1995 to 69.83 in 2011 [4]. Despite this fact, the life expectancy and, accordingly, the period of pension payment in Russia (the retirement age for men is 60 years and for women-55 years of age) remain much lower than in European countries. However, this factor plays a positive role in ensuring financial stability of pension systems.

The widely discussed question of the necessity to increase the retirement age is supported by statistic research of the Ministry of Finance and the Pension Fund of the Russian Federation. However, the pension reforms of Bismarck (Germany) in 19th century and Lloyd (UK) in the early 20th century, which are very popular within the expert community, had an interesting peculiarity: at that time, the retirement age in Germany was 70 years where the life expectancy equaled to 45 years of age [5]; in the UK, accordingly, they were 70 and 50 years of age [6]. In the circumstances of high birth rate in these countries, the proportion of the retirement age and the life expectancy created proper environment for ensuring financial stability of pension systems of these countries at an adequate level of pension tax. However, the drastic change of the demographic situation in the developed countries against the background of the lower retirement age, which had been decreased after the Second World War, resulted in the growth of payroll taxes up to 30-40% and their further growth is expected at the rate of 6-10% [7].

Another argument to support the increase of the retirement age is the increase of the active working age due to the development of medicine technology [8].

At the same time, T.N. Maleeva and O.V. Sinyavskaya, having analyzed the experience of the CIS, EU, Asian and American countries, concluded that the share of senior people as well as the life expectancy did not affect the retirement age rate. Besides, the authors also highlighted another factor, which negatively affected the financial stability of the pension reform-the increase of the age of entrance into working life in Russia, which led to the decrease of the period of pension contributions payment [9]. This opinion corresponds to our calculations on the age of entrance into working life (refer to Table 1).
An alternative to increasing the retirement age could be the more active involvement of certain categories of population into working activity. For example, engagement of women in working activity in the OECD countries varies between 53.8 (Greece) and 94.9 (Sweden) [10], [11]. In this article, the author has also formulated the problem that we will have to face and approach if the retirement age is increased: different longevity of different population categories. With the purpose of solving the problem of the pension system funds deficiency, the author proposes to change the rules of pension indexation, encourage people to retire at older age and shift from the "pensions to all" system to the "pensions as the allowance for disadvantage population" system. V.V. Potapenko and A.A. Shirokov proved in their work that the increase of the level of economic activeness of retired people to the values existing in Germany can result in the number of the retired people being equal to 13 million with 45.2 million people receiving the superannuation pensions in 2020 [12].

E. Gontmacher also agreed in his work with the necessity to increase the retirement age and analyzed problems, which can arise if this decision is implemented [13]. According to the author, there are three main problems, which can hinder gaining the expected effect from increasing the retirement age. The first problem is the disablement institution, namely the vast list of reasons for being acknowledged a disabled person. If the retirement age is increased, the majority of population will retire by disablement. The second problem is the low competitive position of people over 55 years of age in the labor market. The increase of the retirement age will result in the situation when this category of population will have to work for very low salaries, which will bring minor effect to the revenues of the Pension Fund budget. The third reason is the lack of seats in kindergartens, which encumbers involvement of grandmothers and grandfathers into the working activity, as they need to watch after their grandchildren in order to let the parents of these children work.

The pension system influenced by the factors of the retirement age and duration of the period of pension payment must satisfy the following inequation in order to maintain the achieved financial stability:

$$\Delta PV_z > \Delta PV$$ (3)

Where:

- $\Delta PV_z$ is the change of the retirement age
- $\Delta PV$ is the change of the period of pension payment

The worsening of demographic risks is typical not only for the Russian pension system.

The OECD countries also face the general trend of increasing longevity, which, in its turn, causes the increase of the period of pension payment. As evidenced by our analysis represented in Figure 2, the duration of the period of pension payment to men in the OECD countries increased over the 1958 to 2010 period from 13.4 to 18.5 years [11]. The rate of growth equaled to 5.1 years or 38.5%. Thus, even without increasing pension payments and the number of retired people, the retirement expenses of pension systems would increase by 38.5%. The increase of the period of pension payment in OECD countries has been also observed with respect to women. But the rate of the increase is much higher. The increase of the period of pension payment to women over the 1958 to 2010 period in the OECD countries equaled to 37.1% (from 17.7 to 23.3 years) on the average.

Retirement age is one of the main tools, which the governments of countries use in order to support the financial stability of their pension systems and counterbalance the influence of demographic risks on them. By increasing the retirement age, the governments reduce the period of pension payment and improve the financial stability of their pension systems.

However, it would be wrong to analyze the increase of the period of pension payment without account for the change of the retirement age. The graphic analysis of the ratio of changes of the period of pension payment and the increase of the period of pension payment for women in the OECD countries is provided in Figures 1 and 2.

In the figures, all countries are divided into 2 groups: Group 1 of countries meets the requirement to maintain the financial stability of the pension system affected by demographic risks according to Inequation (1); the Group 2 of countries does not meet the requirements of financial stability of the pensions system (Inequation (1)).

As evidenced by the figures, over the 1958 to 2010 period, not all countries at the development of their pension systems for women satisfied the condition of retention of financial stability (Inequation (1)), according to which the increase of the period of pension payment was to be compensated by the increase of the retirement age in order to retain the financial balance of the pension system. For example, such countries as Canada, France, Slovakia, Luxembourg, Norway, Switzerland, Czech and Poland decreased the retirement age for women against the background of the increasing period of pension payment. In other countries, including Austria, the UK, the Netherlands, Mexico, the USA, Australia, Sweden, Germany, Italy, Japan and Hungary, the increase of the
period of pension payment was accompanied by locking or increasing the retirement age. The situation changes over the 2010 to 2050 period: the condition of financial stability is satisfied by eight countries, namely: Japan, Hungary, Italy, Australia, Austria, Great Britain, Czech, Slovakia and on the average in the OECD countries (Group 1 of countries in the figure). The rest countries, namely: Canada, Luxembourg, Mexico, the Netherlands, Norway, Poland, the USA, France, Switzerland, Sweden and Germany (Group 2 of countries in the figure) keep violating this inequality.

Not all countries satisfied the condition of retaining financial stability of the pension system for men against the influence of demographic risks (refer to Figure 4) as per Inequation (1). Over the 1958 to 2010 period, the financial stability of pension systems for men decreased under the influence of demographic risks in the following countries: Hungary, the USA, Mexico, the Netherlands, the United Kingdom, Australia, Austria, Sweden, Switzerland, Italy, Canada, Norway, Luxembourg and France. In these countries, the increase of the period of pension payment exceeded the increase of the retirement age. On the average, the situation was the same in the OECD countries. The condition of retaining the financial stability according to Inequation (1) was satisfied by Germany, Japan, Czech, Slovakia and Poland. In these countries, the retirement age was being increased faster than the period of pension payment. The situation slightly changed over the 2010 to 2050 period (refer to Figure 5). The USA, Australia, Czech, the United Kingdom, Hungary, Italy and the OECD countries on the average retain the financial stability of their pension systems. It is planned that the period of pension payments will be increasing faster than the retirement age in Slovakia, Sweden, Switzerland, Norway, Luxembourg, Austria, Germany, Canada, France, the Netherlands, Poland and Mexico.
In Figures 3 and 4, all countries are divided into 2 groups also: Group 1 of countries meets the requirement to maintain the financial stability of the pension system and the Group 2 of countries does not meet the condition to maintain the financial stability of the pension system.

According to the OECD Statistic Committee [14], the OECD countries can be divided into the countries, in which the actual retirement age corresponds to the legal retirement age, the countries, in which it is lower than the retirement age and the countries, in which it is higher than the retirement age. With respect to men, the actual retirement age is higher than the legal retirement age in Mexico, Switzerland, Sweden and Japan and with respect to women-in the UK, Mexico and Japan.

Only in two countries, Australia and Czech, the actual and legal retirement ages are equal with respect to men. In case of women, such equality exists only in Czech. In the rest countries, people retire before achieving the legal retirement age. With respect to men, such countries are the United Kingdom, Germany, Hungary, Italy, Luxembourg, the Netherlands, Norway, Poland, Slovakia, the USA and France and for women, they are Australia, Austria, Germany, Hungary, Italy, Luxembourg, the Netherlands, Norway, Poland, Slovakia, the USA, France, Switzerland and Sweden.

Table 2 provides the division of countries into groups.

The occupation and retirement policies of the second group of countries are interesting in terms of usage of this tool against demographic risks. These countries encourage continuation of working activity and, accordingly, the period of pension capital saving along with decreasing the period of pension payment. The combination of these two measures could minimize demographic risks and improve the financial stability of the unfunded pension systems. The excess of the actual retirement age over the legal retirement age, which takes place in the first group of countries, makes the negative impact of demographic risks on the financial capacity of pension systems even worse.
Table 2: Division of countries into groups according to the ratio of the actual and legal retirement age

<table>
<thead>
<tr>
<th>Countries, in which the actual retirement age is equal to the legal retirement age</th>
<th>Countries, in which the actual retirement age is below the legal retirement age</th>
<th>Countries, in which the actual retirement age is above the legal retirement age</th>
</tr>
</thead>
<tbody>
<tr>
<td>for men</td>
<td>for women</td>
<td>for men</td>
</tr>
<tr>
<td>Australia</td>
<td>Czech</td>
<td>UK</td>
</tr>
<tr>
<td>Hungary</td>
<td>Czech</td>
<td>Mexico</td>
</tr>
<tr>
<td>Germany</td>
<td>Hungary</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Italy</td>
<td>Germany</td>
<td>Sweden</td>
</tr>
<tr>
<td>Canada</td>
<td>Italy</td>
<td>Japan</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Canada</td>
<td>Luxembourg</td>
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<tr>
<td>the Netherlands</td>
<td>Luxembourg</td>
<td>the Netherlands</td>
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<tr>
<td>Norway</td>
<td>Norway</td>
<td>Norway</td>
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<tr>
<td>Poland</td>
<td>Poland</td>
<td>Poland</td>
</tr>
<tr>
<td>Slovakia</td>
<td>the USA</td>
<td>Slovakia</td>
</tr>
<tr>
<td>France</td>
<td>the USA</td>
<td>France</td>
</tr>
<tr>
<td>On the average across the OECD countries</td>
<td>Switzerland</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

Summary:

- Demographic risks of unfunded pension systems include the increase of the number of citizens, being recipients of pensions and the decrease of the number of working population whose contributions and tax payments are used for financing pension payments.
- The risk of increasing age of entrance into working life increments in all the considered OECD countries and is caused by the increase of the age of entrance into working life.
- The risk of the life expectancy increase also increments in the majority of considered OECD countries.
- The growth of demographic risks is counterbalanced by certain countries through the increase of the retirement age.
- Despite the worsening of demographic risks, the financial stability of pension systems can be retained through maintaining parity between the increase of the saving period and the increase of the payment period.
- Not all countries maintain financial stability of their pension systems according to the condition of maintaining financial stability of pension systems, suggested in this article.

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