THE ROLE OF ACTUARIAL CALCULATIONS IN ENSURING THE FINANCIAL SUSTAINABILITY OF PENSION FUNDS

CZU: 368.5:[368.4:336.1] DOI: https://doi.org/10.53486/csc2025.38

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Abstract: Due to impetuous demographic changes that have hit our planet over the last decade, financial sustainability of pension funds becomes an actual problem of 21st century. This article is dedicated the role of actuarial calculations in ensuring balanced and trustworthy pension system. Actuarial models help forecast financial burdens and analyze potential risks of increased taxes for the workforce. The research involves thorough analysis of impact of demographic trends on pension funds and potential ways of increasing stability in government payments. In this article there were applied either theoretical or practical methods of analyses, including statistical data and current legislative norms.

Keywords: pension system, actuarial calculations, demographic changes, sustainability

JEL Classification: C63, J26, G22, H55

INTRODUCTION

Nowadays, pension systems in many countries face different challenges due to impetuous demographic changes like ageing population, birth rate decrease and increased life expectancy. Financial sustainability is a milestone of today's economy due to the growth of burden on the workforce as pension payments are continuously rising. Actuarial calculations play an essential role in assurance of balanced and reliable pension systems as they allow forecasting financial burdens, analyzing potential risks and developing strategies for their minimization. Such factors as demographic trends, macroeconomy conditions, current level of income and life expectancy are taken into account while developing actuarial models.

This article aims to examine the impact of demographic chances on financial sustainability of pension funds, the role of actuarial mathematics in forecasting future pensions, and probable strategies in increasing the security of public pensions. Methodology, used while conducting this research, comprises a number of theoretical and practical aspects and is guided by corresponding elaborations in this realm, conducted either in Moldova or abroad.

MAIN CONTENT

1. Materials and methods

It the last few decades, increased life expectancy and decreased birth rate have been observed in many countries. These inevitably lead to changes in population age structure. There is enlarged proportion of elderly people as well as the number of the workforce, that ensure pension payments, decreases [1]. Growing life expectancy is accompanied by not only increased number of pensioners, but also by shifting their needs. Now, seniors are more active, maintain the ability to work longer hours and require new forms of social security, medical care and financial support.

In terms of healthy aging, national pension system has to be revolutionized as it no longer suits modern policy. Now, it is mainly focused on financial security, when pensioners are not dependent on minimal pension payments just to make both ends meet, but can lead a healthy and fulfilled life.

National pension system is currently based on PAYG (pay-as-you-go) system that means that retirement burdens fall on the shoulders of the employed nation. Such way makes pension system quite vulnerable due to constant brain drain of skilled and qualified workers that leads to increased aged dependency ratio. Another aspect worth mentioning is that "salary in an envelope" is still popular in our country, that is the main risk factor affecting transparency of pension system. Such way of payroll undoubtedly influences future pension payments as it depends on different factors. If the whole salary or its part is paid unofficially, the employer does not make tax deductions to the pension fund or makes payments from a minimum wage, that leads to a decline of total amount of future pension. That is why, such payment scheme may only seem tempting to reduce tax burdens over working years, but when it comes to the retirement, the individual may remain without a sufficient amount of money to provide themselves with all the essentials [2].

Actuarial calculations are the milestone of financial sustainability of pension funds as they allow forecasting average life expectancy and its impact on terms of pension payments. Due to the growing number of centenarians, pension system runs the risk of deficit in money, granted for them by the government. Actuarial mathematics also helps manage individual calculations for pensioners depending on their contribution period during lifetime [3].

2. Results and discussions

In the Republic of Moldova ageing population is constantly growing. At the beginning of 2024 the percentage of pensioners (60 years or more) was 25,2% or a quarter of all residents, that means the demographic ageing ratio is quite high (Figure 1).





Average subsistence minimum for pensioners could cover all the essentials at the time of year 2023, but due to current inflation level and price increase, it is supposed not to be enough anymore. Even if the amount of received retirement payments is sufficient for covering the cost of municipal service and staple food, there can be no talk of any healthy ageing and fulfilled life (Figure 2).



Source: *National Bureau of Statistics* [4]

The percentage of employed aged population has also increased over the last four years due to difficult economic situation and increased level of prices. Pensioners now are running the risks of becoming ill too frequent because of insufficient time for quality rest (Figure 3).





According to General Government Law on Pensions and Social Insurance, the average monthly insured income can be calculated individually, using formula (1). It is quite an important datum, that reflects an individual's average income used to make deductions to social funds. This indicator shows the impact on future pension payments, dole and maternity leave [5].

$$S_{a} = \frac{\sum_{i=1}^{n} (c^{on_{i}}/c_{i})}{n}$$
(1)

 S_a – average monthly insured income con_i – the sum of individual contribution, paid in the i-year C_i – amount of individual contribution, established in the i-year n – number of paid months Another formula, worth mentioning is certainly the one, by which the full retirement pension is calculated (2) [5].

$$P = 1,35\% * T_t * V_{av}$$
(2)

P – full retirement pension

T_t – full insurance period

Vav - valorized average monthly insured income

To illustrate this formula application, full retirement pension for school teachers with full insurance period of 34 years and valorized average monthly insured income of 12 000 lei can be calculated as:

$$P = 1,35\% * 34 * 12\ 000 = 5\ 500\ lei$$
 (3)

CONCLUSION

In this article there was discussed the role of actuarial calculations in ensuring financial sustainability of pension funds under demographic changes. It was revealed that such factors like increased life expectancy, decreased birth rate and ageing population dramatically impact pension systems by increase in tax burdens on employees.

Main method of investigation included actuarial modeling, statistical analyses of national pension payment systems and use of mathematical formulae to calculate individual pension payments and average monthly insured income to assess full retirement pensions.

Constrains of integrating actuarial calculations are related to a number of factors, including high ratio of people, employed unofficially and receiving "salaries in an envelope", that certainly decline the amount of pension payments and undermine the reputation of governmental policy. Also, increased inflation and economic crisis can make it difficult to forecast probable changes in longer period of time.

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