ESTIMATE OF THE LEVEL OF PENSIONS AND INCOME REPLACEMENT RATES IN TERMS OF THE LONGEVITY RISK

Mariana POPA, PhD[*]

Abstract

Ensuring the incomes required at the retirement age, in order to ensure an optimal income replacement rate after the active period, represents an issue of utmost importance because the pension systems are underlying the social security of the population, they interact and have implications at the macroeconomic level in that they influence and they are influenced by the labor market, by the capital market, the level of GDP, the unemployment rate, the inflation rate and the budget balance. The longevity risk is a concern of the providers of annuities (pensions), the increase thereof being the consequence of improvement of the average life expectancy of the people that reached retirement age. A global concern is that improvement of life expectancy at the standard retirement age is not properly considered when estimating the level of the annuities (pensions) which will be obtained after retirement. In the analysis performed i estimated the income replacement rates at standard retirement age taking into account the main demographic and financial parameters that will influence the level of pensions in Romania. The conclusions highlight the issues to which the Romanian pension system will have to find solutions.

Keywords: personal income, wealth distribution, portfolio choice; investment decisions, non-bank financial institutions; financial instruments; institutional investors, demographic trends, macroeconomic effects, and forecasts, retirement; retirement policies

JEL Classification: D31, G11, G23, J11, J26

[*] Economist, Financial Supervisory Authority, Romania

1. The macroeconomic impact of the implementation of the private pension system in Romania

Starting with 2007, Romania begin to reform the pension system, therefore, together with the public pension system there was also implemented the private pension system Pillar II and Pillar III. Currently, in Romania operates a multi-pillar pension system that was implemented following the World Bank model. Thus, besides the public pension system (Pillar I), it was also implemented the private pension system (mandatory-Pillar II and voluntary-pillar III). The public pension system is a DB-type (defined benefits) and its risks belong to the state. The private pension system (Pillar II and III) is a DC-type (defined contributions) and the risks belong to the pension fund participants. The contributions to the voluntary private pension system (Pillar III) are made voluntarily, directly by the people with income and/or by their employers. Within the private pension system, the state's role is limited to financing (only Pillar II), regulation, supervision, control, protection of the rights of participants and beneficiaries, as well as promotion of financial education.

In Romania, because the contributions to the mandatory private pension system (Pillar II) are received by transfer from the public pension system (Pillar I) that leads to the fact that the longevity risk (for the part of old-age pensions which is transferred from the public pension system – Pillar I to the mandatory private pension system - Pillar II) **is transferred from the whole active population towards participants in the mandatory pension system (Pillar II).**

In order to determine the degree of aging of the population, in **Table 1**, i presented the evolution of the population by age groups (from 0-14 years old and over 64 years old) and its ratio to the total number of inhabitants and active population. As it can be seen from the data presented, the population aged over 64 years old has increased, within the period from 1990 to 2013, from 2,414 thousand people to 5,410 thousand people. This increase is due on the one hand to the increase of life expectancy, and on the other hand to the structure of the generations that were born more than 64 years ago. The population aged over 64 years old has increased both in numbers as well as in percentage compared to the total number of inhabitants and the active population. This increase is due to the

process of population aging, to the increase of life expectancy respectively.

<div align="right">**Table 1**</div>

Population ageing

Year	Population aged over 64 years old (thousands of persons)	Population aged over 64 years related to		Population aged between 0-14 years (thousands of persons)	Population aged between 0-14 years old related to	
		the number of inhabitants (%)	the active population (%)		the number of inhabitants (%)	the active population (%)
1990	2,414	10.4	15.8	5,469	23.6	35.7
1991	2,479	10.7	16.1	5,329	23.0	34.7
1992	2,533	11.1	16.7	5,102	22.4	33.7
1993	2,595	11.4	17.1	4,947	21.7	32.5
1994	2,656	11.7	17.4	4,802	21.1	31.4
1995	2,721	12.0	17.8	4,644	20.5	30.3
1996	2,769	12.2	18.0	4,500	19.9	29.3
1997	2,832	12.6	18.5	4,376	19.4	28.5
1998	2,884	12.8	18.8	4,300	19.1	28.1
1999	2,928	13.0	19.1	4,215	18.8	27.5
2000	2,985	13.3	19.4	4,098	18.3	26.7
2001	3,054	13.6	19.9	3,985	17.8	25.9
2002	3,061	14.0	20.5	3,779	17.3	25.3
2003	3,108	14.3	20.6	3,530	16.2	23.4
2004	3,150	14.5	21.0	3,501	16.2	23.3
2005	3,191	14.8	21.2	3,373	15.6	22.4
2006	3,188	14.8	21.2	3,335	15.5	22.1
2007	3,199	14.9	21.3	3,289	15.3	21.9
2008	3,198	14.9	21.3	3,265	15.2	21.7
2009	3,204	14.8	21.3	3,246	15.1	21.6
2013[1]	5,410	27.07	58.79	5,372	26.9	53.4

Source: INSE, Romanian Statistical Yearbooks for years 1991-2014.

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[1] *Provisional data, Romanian Statistical Yearbook 2014*

In Romania, the total number of inhabitants has decreased, within the period from 1990 to 2013, from 23,207 thousand to 19,984 thousand, such being a consequence of decrease of the birth rates. The increase of the population older than 64 years old has determined an increase of the dependency ratio, by the fact that in 2013 an active population of 9,202 thousand people is required to support an inactive population consisting of 5,410 thousand people aged over 64 years old and 5,372 thousand of children. In 2013, according to the provisional data provided by INSE, the population older than 64 years old reached a number of up to 5,410 thousand people resulting in an increase of its share by 27.7% compared to the total number of inhabitants and by 58.79% compared to the active population. Also, as mentioned, the increase of the number of people aged over 64 years old and the decrease of the active population are reflected in the state social insurance budget and they have as consequence budget deficits. The pensions provided by the public pension system are correlated to the pension point value. From a theoretical point of view, the pension point value represents a percentage of the Average Gross Salary of Economy (AGSE). From a declarative point of view, the pension point value is correlated to the AGSE. However, the pension point value is, in reality, subject to the political decisions, in what concerns the moment when this correlation with the AGSE is done.

2. The main demographic and financial parameters that will influence the level of private pensions in Romania

The amount of the lifelong annuity (pension) to which a participant will be eligible after retirement depends on seven key parameters: three exogenous parameters to the system and four endogenous parameters to the system.

2.1. Exogenous parameters of the pension system

a) The mortality rate of the participants to the pension fund

The mortality rate is the ratio between the number of deaths recorded within one year and the number of the exposed population, within that period, to the risk of death depending on age and gender. The mortality rate for the disabled population is higher than the mortality rate for the active population. The mortality rate depends on age, gender, exposure to risks. The mortality rate determines the life

expectancy, respectively the average number of years that an x-aged man or a y-aged woman will live. The longevity of a population is measured by the life expectancy at birth, respectively the average number of years that a newborn will live for. **For the pension providers, the relevant index for calculating the annuities is the life expectancy at the standard retirement age.**

The evolution of life expectancy varies from one country to another, because it depends on the economic situation, on the level of medical services, as well as on other economic and social parameters. There are separate mortality tables for men and women, for employees who perform intellectual labor and employees who perform physical labor, but also for the fit participants and the disabled participants. The distinction between the mortality rates of men and women as well as between that of the fit and disabled participants is obvious. The distinction between the mortality rates of the intellectual workers and those who perform physical work is less obvious. There is also an example of the "income effect", according to which higher improvements of the mortality rates were observed among the wealthier people. According to the statistics, the phenomenon of decrease of the mortality rates takes place in Romania with greater intensity, since 1990.

In Romania the difference in the mortality rates between the genders is also added the difference in the mortality rates due to the environment where the person has a permanent residence established (urban or rural areas). Thus, the mortality rate for the urban areas is different from the one for the rural areas. In the rural areas, the mortality rate is higher. According to the data from the Romanian Statistical Yearbook 2014, the average life expectancy at birth for men was of 71.24 years in 2013 (70.19 years in the rural areas and 72.07 years in the urban areas), for women it was of 78.28 years (77.69 years in the rural areas and 78.72 years in urban areas). The decline of the mortality rate was not equal for every age. For ages under 40 years old the decrease of the mortality rate was higher than for ages over 40 years old due to the longer period lived with a higher life quality (better nutrition, better medical care). The discrepancy between the mortality rate in the urban areas and the the rural areas is a major challenge for the pension funds. The substantial difference between the mortality rates of the two areas (rural and urban) - expressed by the difference in life expectancy between this two areas - leads to the inevitable conclusion that the private

pensions for contributors of this two areas should be calculated differently. **Thus, for the same amount of money accumulated in their personal account at standard retirement age and transferred to the annuities provider, the participant from the rural areas should receive a higher pension than the participant from the urban areas because their life expectancy is lower than the latter's and, therefore, the equal amount transferred must finance their pension for a shorter period of time.**

The European Union – for reasons of abolishing the gender discrimination - is seeking ways to remove from the calculation of the annuities (pensions) the use of different mortality tables for men and women (see European Council Directive 2004/113/EC implementing the principle of equal treatment between men and women in the access to and supply of goods and services), although from a statistical point of view it is proven the fact that there is a difference, in all the countries, for all the ages, between the mortality rates of women and the mortality rates of men.

In a society with a high mobility of labor, the calculation of an annuity (pension) based on the mortality tables suitable to the work environment (urban, rural) is complex. This calculation requires a rigorous analysis of the participants' activity before and after the standard retirement age (SRA). *If the calculation of the sole amount paid to the SRA for a life annuity will not consider the discrepancy between the mortality rates in the urban areas and in the rural areas, the pension providers as entities paying the annuities will prefer to attract retirees from the rural areas.*

The mandatory pension funds in Romania accumulate rights to an old-age pension only for active population on the labor market. The inactive population (unemployed, housewives, women on childcare leave) does not accumulate pension rights in the mandatory private pension system and, frequently, either into voluntary system.

If the annuities provider will be an insurance company, the risk of mortality due to the work environment (urban, rural), to profession, to gender is assumed by this company, and if the annuities provider will be a pension fund, then all the insured members of this fund (both those exposed to the high mortality rate, as well as those exposed to a low mortality rate) assumes this risk. Assuming that the investment risks of the pension funds are equal, a member will prefer to transfer

their net assets before retirement to a pension fund whose members (participants) belong to the populations with higher the mortality rates.

Adaptation of the mortality tables to future changes of life expectancy in Romania. The forecasts for future improvements in survival rates can be done either equally for all ages, either differently for every generation, the latter being considered the most appropriate. As the studies on building a suitable model for predicting the improvements of the mortality rates of the Romanian population are in the early stages, and Romania's integration in the EU will lead to an approximation of the mortality rates of the Romanian population with the mortality rates of populations of the other Member States (especially those in Western Europe where the mortality rate is already substantially lower), I have performed the calculations based on mortality rates of the active population (estimated mortality tables).

Estimation of mortality tables was performed by gender and the year of birth, for the active population employed in Romania, in two stages as follows:

o *Stage 1* **–Evaluation of the active population mortality rates in Romania for 2009**
Thus, I assumed that in 2009 the mortality rate for the employed active population was of 75% of the mortality rates of the Romanian population. Based on this assumption I calculated the mortality rates table for the active population in Romania for 2009. The mortality rate of the active population q_x^a in 2009 is equal to 75% of the mortality rate of the entire population of Romania, urban and rural, cumulated according to the data published by the INSE in the Statistical Yearbook of Romania from 2010. Where,

$q_{x, y} = d_{x, y} / l_{x, y}$

$q_{x, y}^a = 0.75 * q_{x, y}$

$q_{x, y}$ - the mortality rate,

$d_{x, y}$ - the number of men / women aged x, y years old deceased in year 2009,
$l_{x, y}$ - the number of men / women aged x, y years old alive on December 12, 2008.

o *Stage 2* **– Future improvements in mortality rates**

As of 2009 we have predicted that the mortality rates in Romania, for the active population will decrease (see formula no. 1). **Formula no. 1.** [2]

$$q_{x,t} = 1 - (1 - q_{x+t-1})^{0.99^t}$$

where:
q - the mortality rate
q_x - the probability that a man aged x years old will not be alive at age of x+t years old;
q_y - the probability that a woman aged y years old will not be alive at age of y+t years old;
t - the time elapsed from the year when the mortality rates were measured until the year to which we refer.
In Romania for year 2009, t = 0, and for year 2010, t = 1.

Based on formula no. 1, we calculated the mortality rate depending on the year of birth and gender. According to the estimated mortality rates for the employed active population in Romania, for year 2009, calculated for ages between 20 and 65, it resulted the fact that the mortality rates tend to decline; more people from the current and future generations will survive as opposed those from the generations that have already joined the private pension system and they will receive a pension from it. **The current and future generations will expose the pension providers to a higher risk of longevity due to the decrease of the mortality rates and to the increase of life expectancy.**

The longevity risk represents the risk that the providers of annuities (pensions) would pay life annuities for a period of time much longer that the one predicted by the actuarial calculations at the time of opening the pension right, due to the *inadequate estimates of the increase of life expectancy at the SRA.*

Table 2 presents the life expectancy, at the standard retirement age (SRA), of the active population based on own calculations and on heterogeneous population based on the data

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[2] *Browers, N., Gerber, H., Hickman, J., Jones, D., Nesbitt, C.*

provided by INSE, for 2009. Life expectancy is the average length of life of an individual at a given age (x,y).

Table 2

Life expectancy at standard retirement age in Romania (years)

Current age - year 2009- (years)	*Life expectancy at the current age,* in 2009, calculated according to INSE's data for heterogeneous population (years)		*Life expectancy at SRA* calculated according to INSE's data for heterogeneous population (years)		*Life expectancy at the current age,* in 2009, for active population – own calculations (years)		*Life expectancy at SRA* for active population –own calculations (years)	
	Men	Women	Men aged 65	Women aged 65	Men	Women	Men aged 65	Women aged 65
20	68.8	75.9	77.5	79.7	77.9	83.8	84.5	86.4
25	69.0	76.0	77.5	79.7	77.4	83.4	84.0	86.1
30	69.3	76.1	77.5	79.7	77.0	82.9	83.6	85.6
35	69.6	76.3	77.5	79.7	76.7	82.6	83.2	85.2
40	70.1	76.5	77.5	79.7	76.5	82.4	82.7	84.9
45	71.0	76.9	77.5	79.7	76.7	82.1	82.3	84.4
50	72.1	77.4	77.5	79.7	77.1	82.1	81.9	84.0
55	73.6	78.1	77.5	79.7	78.0	82.3	81.4	83.6
60	75.4	79.0	77.5	79.7	79.1	82.6	81.0	83.2
63	76.7	80.0	77.5	79.7	80.0	83.0	80.8	83.0
65	77.5	80.1	77.5	0.0	80.6	83.2	80.6	0.0

Source: own calculations based on INSE's data.

Based on the data from the Romanian Statistical Yearbook for 2009, we calculated **(table 2)** the life expectancy at the current age and the life expectancy at the SRA for a man aged x years old, in 2009, and a woman aged y years old, in 2009, based on the following formula:

Formula no. 2.

$$e_x = x + \sum_{t=1}^{\infty} t \frac{l_{x+t}}{l_x} * q_{x+t} + 0.5 \quad (**_3$$

e_x – The life expectancy at age x (y) or the average lifespan of an individual from a certain x/y age.

The calculations performed show that the heterogeneous population at the SRA will have a life expectancy as follows: men aged 65 at the SRA have a life expectancy of 77.5 years; women aged 63 at the SRA have a life expectancy of 79.7 years and women aged 60 at the SRA have a life expectancy of 79.0 years.

If we consider the same mortality tables (afferent for year 2009) for the entire heterogeneous population, then the life expectancy remains equal at the SRA, both for men and for women. In general, the life expectancy of the active population is higher than the life expectancy of the heterogeneous population, both at the current age as well as at the SRA. If the mortality rates (and thus the mortality tables) will evolve exponentially, then life expectancy at the SRA for the active population will increase from 77.5 years old to 80.6 years old for men age 65 in 2009, and for men age 20, in 2009, life expectancy will increase from 68.8 years old in 2009 to 84.5 years old at the SRA.

Life expectancy at the SRA is calculated based on the current age, respectively on the year of birth, which differs from one age to another. The lower the current age, the higher the life expectancy at the SRA. In conclusion, the probability of staying alive until the standard retirement age and of benefiting from the pension increases as the year of birth increases. Several persons from the future generations, in comparison to the generations that have joined so far to the new pension system will remain alive to receive an old-age pension. Also, current cohorts as well as the future cohorts will expose the pension providers to the longevity risk given the decrease of the mortality rate, respectively the increase of life expectancy for each cohort.

b) The level of growth of the gross salaries / incomes depending on age and gender

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[3] ** *Developed formula see Browers, N., Gerber, H., Hickman, J., Jones, D., Nesbitt, C.*

In Romania, since the contributions to the public pension system and to the mandatory and voluntary pension funds are a share from the gross income/salary, any financial forecast on the benefits to be obtained from the pension system must be based on an assumption regarding the development in time of the income / salary of the participants to the system. The estimation of the level of pension to be received by the pension participants at the standard retirement age, as well as the social implications depend on the evolution of the gross salary income, because almost the entire participation to the pension system is represented by the active employed and paid population. The gross salary income is obtained as a result of a number of parameters, part of them being interdependent.

The parameters that can determine the gross salary income are: the age, the gender, the work seniority, the region of residence, the professional training, the level of education, the unemployment rate, the inflation rate. The evolution of the wage is also specific to the branch of activity, and the increase of the personnel's salaries is due to the specialization, the gained experience, to seniority, to the level of education, etc. Also, the unemployment rate in the region where the activity is performed influences the evolution of the gross revenue / salary. The revenues of the independent workers depend on average on the situation of the national economy. There is a correlation of these obtained revenues with the average increase in the GDP. According to the data from the Romanian Statistical Yearbook 2010, for the evolution in time of salaries, we took into account the average gross salary equal to 1,906 RON for men and the average gross salary equal to 1,775 RON for women. In order to calculate the wages based on age, gender and the average wage we used our own formula (no. 3). Note that age is correlated with the work seniority.

Formula no. 3. (own formula)

$$S(V) = \begin{cases} V^{\alpha}, & 20 \leq V \leq 40, \alpha > 1 \\ (V-40)^{\beta} + 40^{\alpha}, & V > 40, 1 > \beta \end{cases}$$

S (V) - Wage at age V;
V – age;
40 – is the approximate age when the function is changing direction;

α, β – the coefficients set according to the average salary, the branch of activity, the professional training etc. The wage increases exponentially due to the employee's professional specialization, to seniority and to the increase of the GDP. Given the variation in time of personal remuneration depending on gender, we calculated the pensions that will be obtained at the SRA using my own calculation formula (no. 4).

Formula no. 4

S(V)= V^λ + Const 1 > λ

C – constant (minimum salary)

For the calculations i assumed the variation in time of the personal gross salary and of the average gross salary per economy (AGSE) as a result of real growth in the GDP by 4%. In 2009, the average gross salary was of 1,845 RON. The average gross salary earned takes into consideration only the employees who have worked continuously up to the SRA, full time.

c) The tax treatment applied to the private pension system

The tax treatment applied to the private pension system (mandatory and voluntary) is of the EET type (Exempt, Exempt, Tax), respectively exempt contributions, exempt investments, taxed pensions. The regulations regarding the taxation applicable to the pensions in Romania can be found in the Fiscal Code.

2.2 Endogenous parameters of the pension system

a) The Standard Retirement Age (SRA)

Within this analysis, the standard retirement age (SRA) for the age limit is 65 years old for men and 63 years old for women and it represents the age established in the public pension system, according to the provisions of Law no. 263/2010 as subsequently amended and complemented. The more the retirement age is higher than the standard retirement age: i) the period of accumulation of personal assets to the pension fund is extended, ii) the period of payment of pension decreases.

b) The level of contributions paid to the pension system

During the period of accumulation, the amounts from contributions truly grow, due to the increase of the gross salary/revenues, which in turn grow based on the real growth of the economy and of the workforce productivity. In conclusion, the

increase of the contributions accumulated in the personal account is exponential and it fluctuates differently depending on the base percentage to which the percentage point is added.

c) The return on investment of pension fund

The return on investment taken into account is the real annual investment return. The return on investment has the greatest impact on the amounts accumulated in account of the pension fund until the retirement date and implicitly on the level of the pension. **The most important factor in the accumulation of the amounts, and in determining the level of the pension for the age limit, is the percentage of the return on investment obtained during the accumulation period**. The accumulated amount in the account/net asset of the pension fund to which the participant has adhered is due to the investment return if after 35 years of contributions, for a constant level of contributions, given that the salaries do not increase, a real annual investment yield of 3 %, 4% and 5% is obtained. The impact of the investment return on the net assets accumulated at the SRA is more consistent than the impact of increase of the contributions to the pension fund. The increase or the decrease of the investment yield by one percentage point influences the net assets already accumulated plus the assets to be accumulated in the future from the future contributions of the participants, while the increase or the decrease of the contributions to the pension fund influences only the assets that will accumulate in future from contributions.

d) Management fees and costs

The management fees and costs of a pension fund differ from Pillar II to Pillar III and they include, in general, management fees, trading fees, audit fees, storage fees. The management fees of the private pension funds have two main components: a percentage from the gross contribution and a percentage from net assets accumulated in the fund according to the legal provisions.

The estimates of the level of pensions and of the income replacement rates at the retirement age were based on the following assumptions:

➢ The improvements of mortality rates and life expectancy after the SRA;

> ➤ The Standard Retirement Age (SRA): 65 years old for men and 63 years old for women;
> ➤ The uninterrupted period of contributions since 2009 until the SRA;
> ➤ Average annual real growth of 4% and 5% of the Gross Domestic Product (GDP) and of the Average Gross Salary of Economy (AGSE);
> ➤ Annual real growth of the public pensions of 4% and 5% due to the increase by the same percentage of the gross salaries (income) of the employed population;
> ➤ Average annual real growth of 3%, 4% and 5% of pensions from Pillar II and Pillar III as a result of the increase by the same percentage of the return on investment;
> ➤ The return of investment predicted to be obtained from investing the money is of 3%, 4% and 5%;
> ➤ The gross salary/income of the workers will fluctuate over time depending on gender and the salary variation, according to own calculations performed. We also assumed that the gross salary(incomes) are equal to the gross average salary for those who were, in 2009, aged 40. In 2009, the general Average Gross Salary of Economy was of 1,845 RON. The Average Gross Salary of Economy was 1,906 RON for men and the one for women was 1,775 RON;
> ➤ The contribution to the public pension system for year 2009, for normal working conditions;
> ➤ The value of the pension point for year 2009. In 2009, the pension point value for the public pension system was 38.8% from the Average Gross Salary of Economy;
> ➤ The taxation of pensions was according to the provisions of the Romanian Fiscal Code.

Within the analysis performed, the income replacement rate is the ratio between the first pension for the age limit obtained immediately after retirement (usually at the standard retirement age) and the last salary/income before the standard retirement age.

The results obtained reveal the following aspects:

a) the impact of the population aging process-, through the future effects of life expectancy improvements, increase of the mortality rates and, implicitly, of increase of the longevity risk

that -will influence the level of pensions and, consequently, the population's income replacement rates at the SRA;

b) the major influence relationship of the macroeconomic elements (the evolution of the GDP, the evolution of the Average Gross Salary of Economy, the pension point value, the taxation of the gross salary /income, the taxation of pensions), of the exogenous parameters and of the endogenous parameters of the pension system will determine the amount of the pensions that will be received by the participants to the pension system at the standard retirement age;

c) the inefficiency of the pension system (public and private) in Romania, to replace the population's income during the active period with income from pensions, as was evidentioate by the net / gross income replacement rate;

d) the income replacement rates differs between ages and genders;

e) the income replacement rates is differentiated between genders according to: the average gross salary, the standard retirement age and the life expectancy;

f) there are differences between the level of the pensions obtained from Pillar II and those obtained from Pillar III, both until the standard retirement age (different investment returns and different management fees), as well as after the standard retirement age (different investment risks, different administration fees and exposure to mortality risk);

g) the existence in Romania of three important factors that will decide the development of the voluntary pension system:
  ➢ the deductibility ceiling for contributions to the system;
  ➢ the involvement of the employers to ensure decent pensions for the employees;
  ➢ the insurance for the risk of disability and death by entering such in the pension schemes offered by the voluntary pension funds (for example, *disability pensions before the SRA and survivors' pensions in case of death before and after the SRA*). Currently these risks are not covered by the mandatory private pension funds and, partly, neither by the public pension system.

h) if the pension point value is linked to the Average Gross Salary of Economy (AGSE), the net replacement rate at the

SRA that can be offered by public pension system together with the private pension system (mandatory and voluntary) will vary in optimal conditions (annual investment yield of 4%, annual increase of the AGSE of 4%) between 77.2% and 41.2% for men aged 20-65 years old in 2009 and for women between 67.3% and 44.2% for the same conditions (table 3).

Table 3

Net replacement rate at SRA for Pillar I+II+III (pension point value correlated to AGSE)

Age in year 2009	Male SRA=65						Female SRA=63					
	a[4]=4 %	a=4 %	a=4 %	a=5 %	a=5 %	a=5 %	a=4 %	a=4 %	a=4 %	a=5 %	a=5 %	a=5 %
	b[5]=3 %	b=4 %	b=5 %	b=3 %	b=4 %	b=5 %	b=3 %	b=4 %	b=5 %	b=3 %	b=4 %	b=5 %
20	66.1	77.2	92.4	68.9	68.4	80.3	62.6	67.3	79.7	54.0	61.4	71.3
25	65.4	75.5	88.9	68.5	67.5	78.3	61.8	65.1	76.0	53.2	60.0	68.9
30	64.7	73.6	85.1	68.0	66.6	76.1	60.8	62.5	71.8	52.2	58.2	66.0
35	62.5	70.0	79.5	65.9	64.2	72.2	59.3	59.3	66.8	50.6	55.9	62.3
40	60.2	66.3	73.7	63.5	61.6	68.0	57.2	55.3	61.2	48.6	52.8	58.0
45	57.2	61.8	67.3	60.2	58.3	63.2	54.7	50.9	55.1	46.0	49.3	53.1
50	60.2	63.4	67.1	62.8	61.0	64.4	60.3	63.2	66.5	59.4	62.0	65.1
55	57.0	59.3	61.9	60.2	58.5	60.9	55.0	56.7	58.5	54.6	56.2	57.9
60	50.2	51.2	52.4	52.1	51.0	52.1	49.2	49.8	50.5	49.1	49.7	50.4
SRA	41.2	41.2	41.2	41.2	41.2	41.2	44.2	44.2	44.2	44.2	44.2	44.2

Source: own calculations based on INSE's data

i) **if the value of the pension point will be correlated to inflation rate** according to Law. 263/2010, **the net replacement rate at the SRA** that can be offered by the public pension system together with the private pension system (mandatory and voluntary) **will vary in optimal conditions** (annual investment yield of 4%, annual increase of 4% of the AGSE) **between 55.0% and 41.2% for men**

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[4] *It represents the annual average growth rate of Average Gross Salary of Economy (AGSE) until the standard retirement age (RSA)*
[5] *It represents the annual investment return of the pension fund*

aged 20-65 years old in 2009, and between 44.0% and 44.2% for women for the same conditions (table 4).

Table 4

Net replacement rate at SRA for Pillar I+II+III (pension point value correlated to inflation rate according to Law no. 263/2010)

Age in year 2009	Male SRA=65						Female SRA=63					
	a=4%	a=4%	a=4%	a=5%	a=5%	a=5%	a=4%	a=4%	a=4%	a=5%	a=5%	a=5%
	b=3%	b=4%	b=5%	b=3%	b=4%	b=5%	b=3%	b=4%	b=5%	b=3%	b=4%	b=5%
20	43.9	55.0	70.1	45.1	44.7	56.6	39.3	44.0	56.5	29.0	36.5	46.4
25	44.8	54.8	68.2	46.2	45.2	56.0	40.5	43.7	54.6	29.9	36.7	45.6
30	46.0	55.0	66.5	47.5	46.1	55.6	41.8	43.5	52.8	31.1	37.2	44.9
35	46.4	54.0	63.4	47.8	46.1	54.1	43.3	43.3	50.8	32.4	37.7	44.2
40	47.6	53.7	61.1	48.5	46.6	53.1	45.5	43.6	49.5	34.1	38.4	43.5
45	49.1	53.7	59.2	49.3	47.4	52.3	48.2	44.4	48.6	36.5	39.8	43.6
50	49.2	52.5	56.2	49.5	47.7	51.1	50.6	53.4	56.7	47.4	50.1	53.2
55	50.4	52.8	55.4	52.1	50.3	52.8	49.6	51.2	53.0	47.8	49.3	51.0
60	47.2	48.3	49.5	48.3	47.2	48.3	47.7	48.3	49.0	47.0	47.6	48.3
SRA	41.2	41.2	41.2	41.2	41.2	41.2	44.2	44.2	44.2	44.2	44.2	44.2

Source: own calculations based on INSE's data

3. Conclusions

• In order to provide adequate pensions at the SRA, uninterrupted contribution to all the pension systems is required, with amounts as large as possible and for periods of time as long as possible, so that sufficient assets can accumulate as to cover the needs upon retirement.

• The pension funds and the annuity providers must manage and cover their longevity risk through:

  − internal risk management procedures (actuarial methods for estimating the improvements of the mortality rates and life expectancy);

- outsourcing the risk management towards insurance and reinsurance companies;
- outsourcing the risk management towards the capital market (assurance of financial instruments for the longevity risk: longevity swaps, longevity bonds or other types of derivatives).

• Information and awareness of the fact that the level and the length of the contributions to the pension systems will influence the pensions income at the SRA and the improvements to life expectancy and the increase of the number of pensioners due to the retiring of the baby-boom generation will result in the decrease of the GDP and of the investment profitability.

• The public pension system will have **sustainability** problems because the payment of the pensions is not correlated with the increase of life expectancy, and the current value of future pension payments cannot be estimated because there is no direct correlation between the contributions made to the system and the future pension payments. To these problems are also added those regarding the generation of those born during the "baby booms" period, an aspect that will determine the increase of the public expenses of pension payments. In addition, the public system will have problems also **solvency problems**. The risk of contributors to the public pension system refers to its sustainability and solvency, but these risks are transferred to the Romanian state.

• The private pension system will have problems in terms of **adequacy** because, since they are not guaranteed, the level of the pensions at the SRA does not provide an adequate standard of living. In Romania it is very important the content of the law that will regulate the payment of private pensions and there must take into account the longevity risk as well as an effective asset allocation based on the life cycle of the participants to the system so that it can provide adequate benefits to SRA. The risk of the private pension system (Pillar II and III) related to offering the adequacy of the incomes upon retirement belong to the participants to the system.

• The improvements of average life expectancy and mortality rates can create serious problems for the pension funds and for the annuity providers. The mandatory private pension system (Pillar II) is exposed to the longevity risk because it is a DC type system with guarantees: the pension schemes guarantee the level of the paid contributions minus the management fees. Management company of

the pension fund promised to pay pension benefits (contributions paid minus the legal costs and transfer penalties) according to the prospectuses of the pension schemes and they are required to establish provisions with the purpose for fulfilling this future payment obligation. The amount of the provisions after the SRA will be calculated based on two main factors: the return on investments and the length of period for which the annuities (pensions) will be paid. As regard to pension payment period, an important role is played by the estimates of the mortality rates which will determine the level and length of the future payments until the death of the pensioners. The return on investments can be negatively influenced by the process of population aging and, therefore, should be imposed the estimation of the impact of increase of increasing life expectancy on the solvency of the pension fund that a participant has joined. Although there isn't yet a law on payment of private pensions in Romania, this risk exists and it should be taken into account when drafting the legislation for the payment of pensions, because the estimation of the mortality rates, when calculating the pension at the SRA and the obligations of the pension fund, will have an essential role in the living standards after the SRA.

• The Romanian contributors to the mandatory private system (P2) will become aware of the longevity risk when they will realize that, at the retirement age, for the same accumulated amount they will receive different pensions depending on the year of birth, gender, their areas (rural, urban). Meanwhile, the public system (Pillar I) – from which were drown contributions to Pillar II - will calculate pensions without any direct reference to the year of birth. As a consequence, there is a growing public interest regarding the division of the longevity risk and the limitation thereof.

• Even after reforming the public pension, the income net replacement rate after the SRA will not be able to achieve the target set to offer a net pension equal to 60% -70% of the last salary earned before retirement. Therefore, the pension received after the SRA will not provide a necessary income for a decent standard of living.

• As regard the need to save for the retirement age, along with supporting the development of the private pension systems, the financial education has an essential role in voluntary saving for providing the necessary financial resources for old age and informing on the risk of not having an adequate income for a decent life at the retirement age.

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