Elements that have an Influence Over the Replace Income for Retirement

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*Abastract–***The main goal of any authority acting on pensions domain is to provide a decent living to the beneficiaries at the time of their retirement from activity. This is possible if the pension is as close to the gains that they have achieved during the period of activity, even if we relate to the whole period of activity or just to the last salary.**

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I. INTRODUCTION

The ratio between the gross proceeds of a first pension for a beneficiary and last income gross for the same person salary represents the gross income replacement at retirement. Gross income replacement rate shows the measure in which income offered at withdrawal by the pension system replace earnings obtained before retirement.

Currently, in Romania, we can talk about income replacement rate in retirement only in the state pension system because the private pension system has begun to provide pensions only in a very small measure [1].

Elements that determine the income replacement rate in retirement are [2,3]:

1. The earnings achieved by the pension beneficiary during the period of activity, which directly determines through contributions paid, the amount accumulated in his account.
2. The amount of time the participant pays contributions to the pension fund. Usually it is equal to the duration of activity, it ends at retirement age.
3. Rate of return on investments that is ensured by the pension fund administrator, in the case of private pension systems.
4. The tax on contributions, rights and investments related to pensions.

II. THEORETICAL ASPECTS

In order to calculate future pensions that will be received in 2010 by people entered into the system, we will first calculate the present value, estimated at the time of retirement of each person, a gross monthly annuity of 1,000 RON, payable starting from the age when retirement has been accomplished. This actual value will be the unique sum that needs to be paid by that person when retiring [5], in order to obtain from that moment on 1,000 RON per month

for the rest of life. According to the formulas staggered payments, the present value of an annuity immediate posticipate per n years with constant amounts and constant interest rate is calculated as:

$$A_n^p\left(S,i\right) = \frac{S}{i} \cdot \left[1 - \frac{1}{\left(1+i\right)^n}\right] \tag{1}$$

where:

$A_n^p\left(S,i\right)$ = Present value of an annuity immediate posticipate for n years with constant annual sum S and the annual interest rate i;

n = duration in years of operation;

i = annual interest rate;

S = annuity (annual rate) constant.

In Table 2, we have calculated the present value at the time of retirement for a gross monthly annuity of 1,000 RON which can be immediately paid.

Calculations were made based on the previous formula in which the annuity was considered S = 12,000 lei (annual amount received as pension), n = remaining life expectancy when reaching standard retirement age (calculated as the difference between the average life expectancy of the active population at retirement age calculated from Table 1 and the standard retirement age) and the role of interest rate is given here by the annual return on investment r in the three case-scenarios considered 3% ,4%, and 5%.

TABLE 1 LIFE EXPECTANCY BY GENDER GLOBAL POPULATION AND THE WORKFORCE IN 2010, CALCULATED IN 2010 AND VSP (YEARS)

Person age by in 2010 (years)	Life expectancy for males			Life expectancy for females		
	Global at the level of 2010	Active at the level of 2010	Active at VSP	Global at the level of 2010	Active at the level of 2010	Active at VSP
20	68,88	72,38	84,6	76,11	78,92	86,64
25	69,08	72,58	84,1	76,21	79,02	86,33
30	69,38	72,78	83,7	76,31	79,12	85,83
35	69,68	73,08	83,3	76,51	79,22	85,43
40	70,18	73,48	82,79	76,71	79,42	85,13
45	71,08	74,18	82,39	77,11	79,72	84,63
50	72,18	75,08	81,99	77,61	80,12	84,23
55	73,68	76,38	81,49	78,31	80,72	83,83
60	75,49	77,99	81,09	79,22	81,53	83,43
63	76,79	79,09	80,89	79,48	81,57	83,23
65	77,59	79,79	80,69	80,32	82,43	-

This account is not about only the second Pillon but about the present value of a pension in general. It may be noted first that the actual value measured at the time of retirement of a gross monthly annuity which is evaluated at 1,000 RON is higher for female than for male in all age groups. This is explained by the average remaining life of women which is higher than in case of the men, because on the one side: women's life chances are higher, on the other side they have a standard retirement age by two years lower than mens.

Taking the example of person X which is a male, aged 20 years when he joined the pension system in 2010, it will need to dispose at the standard retirement age of 65 years (i.e. in 2055) the sum of 175,896 RON in order to receive a gross monthly annuity of 1,000 RON e immediately payable in terms of annual investment returns r = 3%. If profitability increases to r = 4%, the required amount falls -8.51% - 14.977 USD and up to the value of £ 160,919, and if the return on investment increases to r = 5%, the cost of life annuities will decrease from the previous case r = 4% and - 8.17% -13.155 USD, reaching the lowest value of 147,764 RON.

TABLE 2 ACTUAL VALUE AT VSP OF AN IMMEDIATE ANNUITY MONTHLY GROSS 1,000 RON, PAYABLE TO ACTIVE POPULATION IN 2010, BY GENDER AND AGE

Year in 2010 (years)	The present value of a pension to gross monthly VSP 1.000 lei for male working population of 2010 (RON)			The present value of a pension to gross monthly VSP 1.000 lei for female working population of 2010 (RON)		
	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%
20	175.896	160.919	147.764	201.121	181.299	164.265
25	172.559	158.165	145.486	199.291	179.847	163.111
30	169.854	155.922	143.623	196.302	177.468	161.212
35	167.116	153.644	141.724	193.880	175.530	159.659
40	163.579	150.687	139.248	192.044	174.057	158.475
45	160.767	148.326	137.262	188.947	171.563	156.461
50	157.922	145.928	135.238	186.437	169.532	154.815
55	154.318	142.876	132.651	183.897	167.469	153.136
60	151.395	140.392	130.535	181.327	165.374	151.424
VSP	148.439	137.868	128.378	180.030	164.313	150.556

Source: own calculations

TABLE 3 VALUE AT VSP ACCOUNT OF A PARTICIPANT WHO HAS JOINED PILLON IN 2010, IS THE CASES WHEN V = 3% AND 4% RESPECTIVELY V = 5%, AND R = 4% AND V=5% AND R = 5%

Year in 2010 (years)	VSP value of the account for the male population (RON)						VSP value of the account for the female population (RON)					
	v=4%			v=5%			v=4%			v=5%		
	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%
20	324.426	390.659	476.373	423.092	502.382	603.785	254.568	303.972	367.262	327.920	386.581	460.939
25	253.350	300.734	360.755	318.530	373.812	443.098	198.020	233.035	276.905	246.015	286.666	336.975
30	197.015	229.763	270.092	239.871	277.042	322.636	151.131	175.078	204.258	181.518	208.585	241.286
35	145.734	167.320	193.224	171.427	195.435	224.076	112.493	127.988	146.402	130.806	147.911	168.136
40	105.931	119.304	134.888	120.883	135.415	152.262	80.798	90.155	101.022	91.161	101.324	112.895
45	73.709	81.291	89.925	81.712	89.820	98.981	55.240	60.372	66.107	60.573	66.007	72.044

Source: own calculations

TABLE 4 GROSS MONTHLY PENSION PAID FROM PILLON II STARTING WITHVSP, ESTIMATED FOR ACTIVE POPULATION 2010 BY AGE GROUP

Year in 2010	Gross monthly pension paid from VSP for the male population (RON)						Gross monthly pension paid from VSP for the female population(RON)					
	v=4%			v=5%			v=4%			v=5%		
	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%	r=3%	r=4%	r=5%
20	1.844	2.428	3.224	2.405	3.122	4.086	1.266	1.677	2.236	1.630	2.132	2.806
25	1.468	1.901	2.480	1.846	2.363	3.046	994	1.296	1.698	1.234	1.594	2.066
30	1.160	1.474	1.881	1.412	1.777	2.246	770	987	1.267	925	1.175	1.497
35	872	1.089	1.363	1.026	1.272	1.581	580	729	917	675	843	1.053
40	648	792	969	739	899	1.093	421	518	637	475	582	712
45	458	548	655	508	606	721	292	352	423	321	385	460

Source: own calculations

Person Y which is a **female** who joined the pension system in 2010 at the age of 35 years will pay at retirement (ie in 2038) for a gross monthly annuity of £ 1,000 immediately payable the sum of 193 880 RON if it is considered an annual return on investment of r = 3%. When profitability increases to r = 4%, this amount will decrease by -9.46% and -18.350 RON reaching 175.530 RON. If the annual return is r = 5%, the required amount falls -9.04% and -15.871 RON and to, reaching 159 659 RON.

III. RESULTS

Future gross monthly pension calculation under Pillon II and the gross income replacement in retirement

With current values at the standard age of retirement of life annuities evaluated at 1,000 RON in Table 2 and the amounts keept in the accounts of participants in Pillon II until retirement age (contained in Table 3) it can be determined **the budgeted gross monthly annuity** payments from retirement age for people participating in Pillon II.

The results obtained for the age groups considered, given the two versions of the real annual growth of wages v = 4% and v = 5%, and the three variants of rate of investments r = 3%, r = 4% and r = 5%, are shown in Table 4.

From Table 4 it is noted, primarily, **upward trend, that the gross pensions of participants, have decreases as the age of participants decreases** (or as they retire later), which is obvious because younger generations accumulate amounts over long periods of time.

Secondly, for the same annual growth rate of income v and the same annual return on investment r, **the difference between gross pensions of different generations increases as their age decreases**. Thus, if v = 4% and r = 4%, the difference between gross pension of a person which is male and was 20 years in 2010 and one male that was 25 years in 2010 will be 527 RON, and the difference between gross pension of a person which is male and was 25 years in 2010 and one male that was 30 years in 2010 will be 427 RON.

Third, **gross pensions of men are bigger than women**, because men have higher average salary and higher length of career (greater with two years of activity if compared to women).

Viewed on a whole working population participating in Pillon II, gross pensions are between 458 RON and 4,086 RON for the male population, and between 292 RON and 2,806 RON for the female population, with higher values in men due to the longer period of activity(with two years) and their higher average salary.

Person **X** which is a **male** person who necessarily adhered to Pillon II in 2010 at the age of **20 years**, will receive an annual increase in real terms wage v = 4% of gross monthly pension of 1,844 lei payable from retirement age at an annual return on investment of r = 3%. The person will receive gross pension 2,428 RON for r = 4%, respectively pension of 3,224 RON gross for r = 5%. That person, at an annual salary of v = 5% per year, will have a gross pension

of 2,405 RON, if annual return on investment of r = 3%, pension will be 3,122 RON gross for r = 4% and maximum 4.086 when r = 5%.

Person **Y** which is a **female** and join the Pillon II in 2010 at the age of **35 years**, when the real annual growth of wages was v = 4%, will have a gross monthly pension of 580 RON at an annual return on investment R = 3% , 729 RON if r = 4% and 917 RON if r = 5%. At an annual salary of v = 5% per year, the person will have a pension of 675 RON gross annual return on investment for the r = 3% gross pension 843 RON for r = 4% and maximum gross pension 1.053 RON when r = 5%.

IV. CONCLUSION

One can appreciate that adherence to Pillon II is particularly favorable to employees which in 2010 were aged under 40 years. They will get higher private pension compared state pension fall in any of the three conditions of return on investments and for both annual growth rates of wages.

People aged over 40 years who joined voluntarily to private pensions could be disadvantaged if there is an annual small return on investments (such as r = 3%), whereas the corresponding decrease of the contribution to the state pension Pillon II will not be covered by private pension they will receive on retirement. This happens because of the short period of time they have until retirement age.

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