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Notes on a mandatory fully funded pension system and an application for Greece

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Funded systems:

a simplified formula describing the accrued amount would be:

Acc = $\sum_{i=1}^{n} X(1+i)^{n}$ **(1)**

where:

Acc	is the accrued amount at retirement
X	is the amount of contributions per year
i	is the yearly rate of return on investment
n	is the number of years of contribution

In our case, the accrued amount at time n shall be given by:

$$Acc_n = X_n * (1 - E)(1 + i)^{\frac{1}{2}} + Acc_{n-1}(1 + i) \qquad \textbf{(2)}$$

where:

Acc_n	is the accrued amount at time n
X_n	is the amount of contributions at time n as percentage of income, before expenses
E	is the percentage of expenses on contributions
i	is the yearly rate of return on investment
n	is the number of years of contribution

The payments are assumed to be monthly, hence the amount of the last year is multiplied by $(1 + i)^{\frac{1}{2}}$ as if there was one payment in the middle of the year, to simplify things.

Main assumptions on calculating the replacement rates for a funded scheme include:

- annuity
- contribution rate
- return rate

Assumptions on calculating the replacement rates for a funded scheme	
Income maturity	0,50%
Total contribution rate	6,00%
Expenses on contributions	0,50%
Total working life in years	40
Annuity	15,64

Return rate calculations based on Zero-coupon yield curve spot rates				
Maturity / Time	All EA average 10 (2008-2017)	AAA average 10 (2008-2017)	All EA average 10 (2004-2013)	AAA average 10 (2004-2013)
Maturity: 10 years	2,828	2,12	3,86	3,38
Maturity: 20 years	3,509	2,73	4,38	3,88
Maturity: 21 years	3,537	2,74	4,4	3,89
Maturity: 22 years	3,56	2,75	4,42	3,9
Maturity: 23 years	3,58	2,76	4,43	3,9
Maturity: 24 years	3,597	2,77	4,44	3,91
Maturity: 25 years	3,613	2,77	4,46	3,91
Maturity: 26 years	3,624	2,77	4,46	3,91
Maturity: 27 years	3,636	2,77	4,47	3,91
Maturity: 28 years	3,644	2,76	4,47	3,91
Maturity: 29 years	3,652	2,76	4,48	3,9
Maturity: 30 years	3,659	2,76	4,48	3,9

Sensitivity Analysis

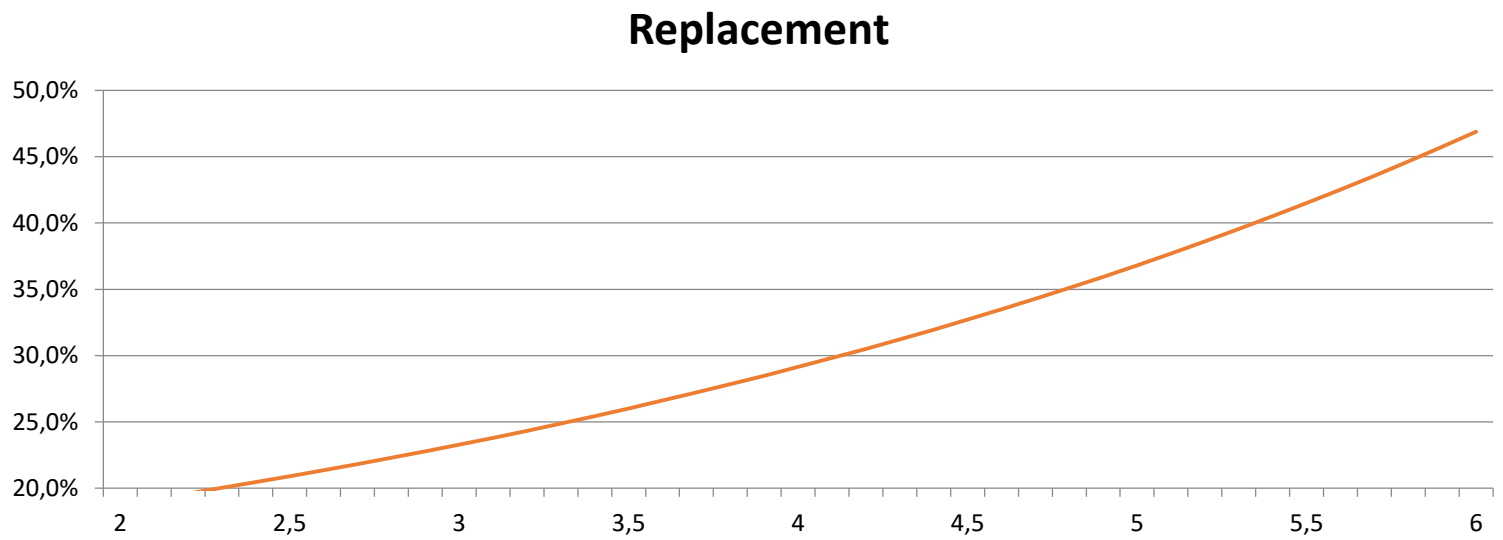
Retirement age	Annuity at retirement	
	GR1990	*PM6064
62	17,36	17,39
63	19,18	16,68
64	15,88	15,98
65	17,47	15,3
66	14,46	14,63
67	15,8	13,97

Annuity	14	14,5	15	15,5	16	16,5	17	17,5	18
Replacement	29,10%	28,10%	27,10%	26,30%	25,40%	24,70%	24,10%	23,40%	22,70%

Return rate sensitivity

Sensitivity Analysis

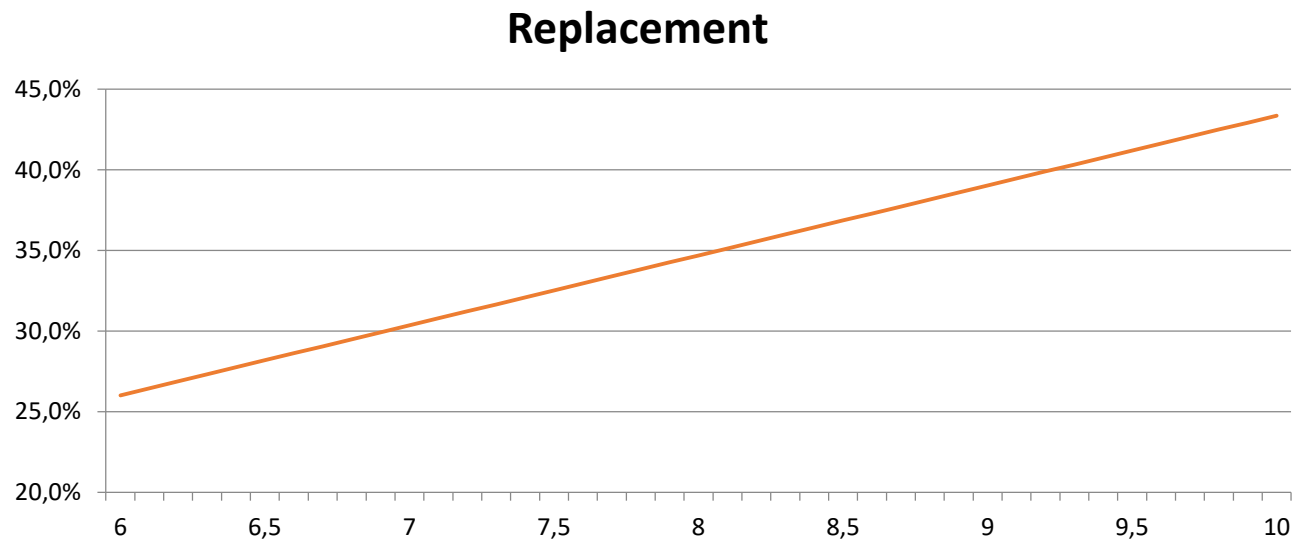
Return rate	2	2,5	3	3,5	4	4,5	5	5,5	6
Replacement	18,80%	20,50%	22,80%	25,40%	28,50%	32,70%	36,80%	41,50%	46,90%



Contribution rate sensitivity – based on European experience

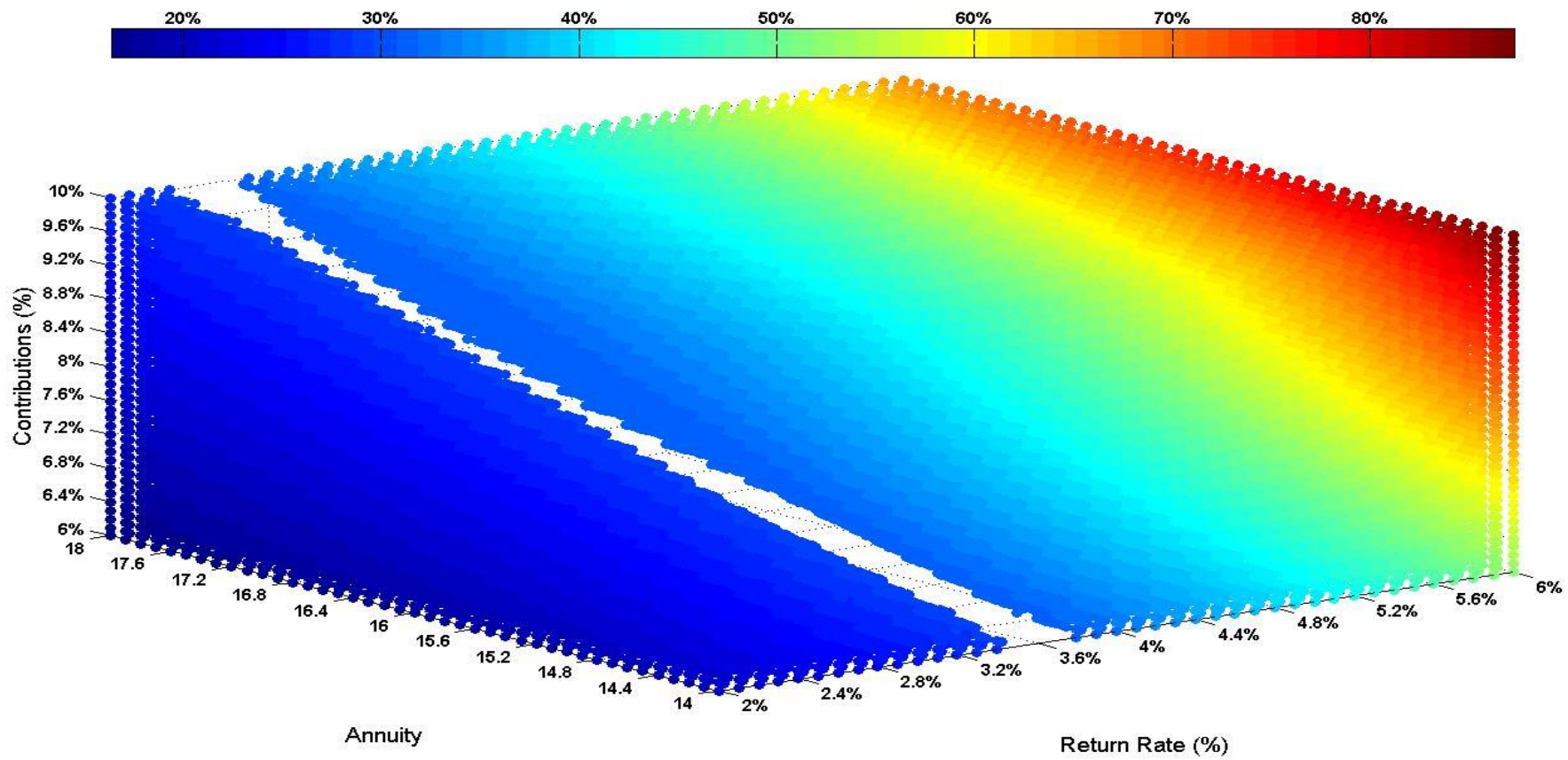
Sensitivity Analysis

Contribution rate	6	6,5	7	7,5	8	8,5	9	9,5	10
Replacement	26,00%	28,20%	30,40%	32,50%	34,70%	36,90%	39,00%	41,20%	43,40%



Joint sensitivity – looking for an ideal area of parameters – where they add up to a valuable 30% replacement

Sensitivity Analysis



The Greek case study

A new reform proposal:

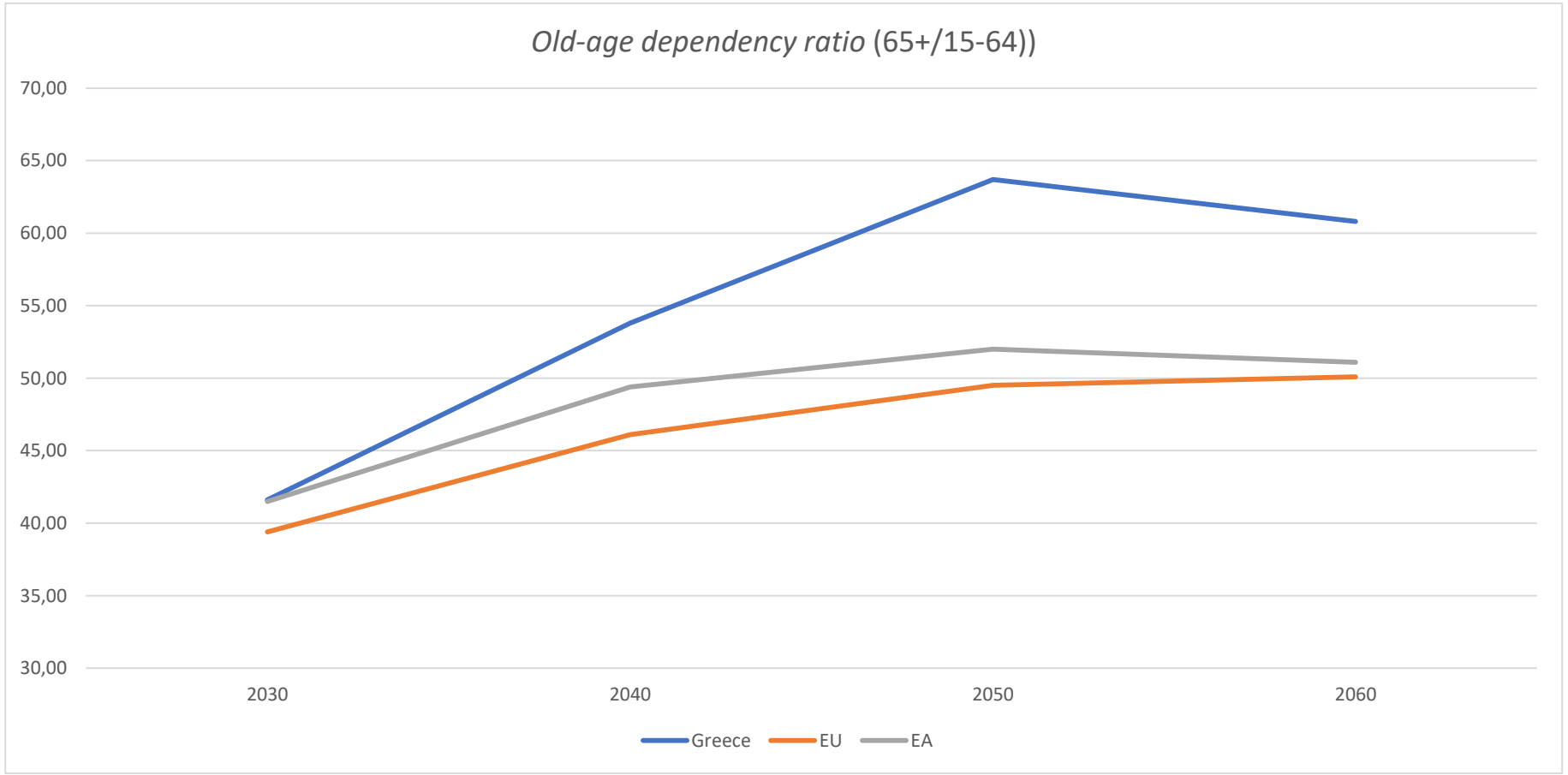
Pillar I ➔ NDC, 50% reduction on contribution aiming to create an incentive for the FDC, Pillar II

Pillar II ➔ mandatory funded scheme (FDC)

- Contributions are aimed at 6% at minimum
- Everybody joins (as opposed to today)
- Exit age coincides with Pillar I
- No burden from the past – past credits are treated outside the system (recognition bonds etc)

Pillar III ➔ remains voluntary FDC

Trying to cope for intense aging



Macroeconomic assumptions framework comes from Eurostat

People contributing to the fund will evolve…

Base year (2013) coverage percentages	Insured
SQ total	4.188.200
Labor Supply = DC Contributors	4.188.200
	100%

Year	Labor Supply = funded scheme Contributors
2020	4.665.652
2030	4.993.526
2040	4.922.508
2050	4.467.694
2060	4.189.135

Results of the valuation for the new DC capitalized supplementary pension fund – Benefit expenditure, contributions and Calculation of the actuarial capital

New funded scheme			
Mil. euros	Contributions	Benefits	Reserve
2017	3.751	1	3.750
2020	3.752	14	15.543
2030	4.766	200	68.670
2040	6.585	1.410	149.214
2050	8.911	5.025	255.722
2060	12.120	11.131	371.500

What we hope to achieve

- Better replacement for one's money
- Risk sharing between the state and the individual
- Higher involvement of private sector which will bring more jobs and hence more contributions to Pillar I
- Growth

Thank you for your attention.

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