A New Approach For Satisfactory Pensions With No Guarantees

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ATRC
28.06.2019

1 Introduction

Classification of Pension Schemes...

The fundamental choice (pay-as-you-go/funding) is present for both: defined benefit (DB) and defined contributions pension schemes (DC).

	Pay-As-You-Go	**Funding**
DB	Classical social security	Classical employee benefit DB plan
DC	Notional accounts (NDCs)	Pension saving accounts

Risks

The increase in longevity, the ultra-low interest rates and the guarantees associated to pension benefits have put significant strain on the pension industry.

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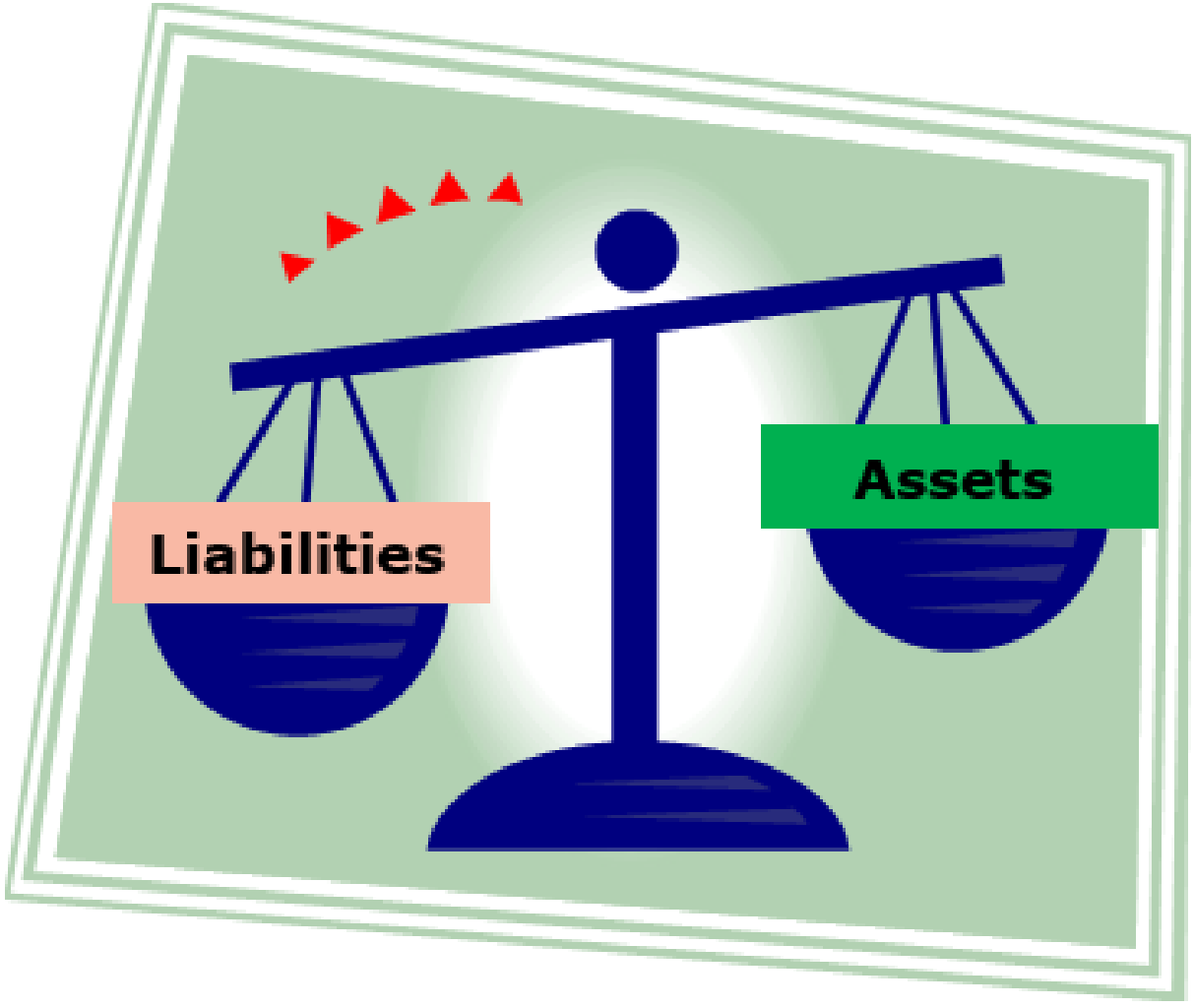
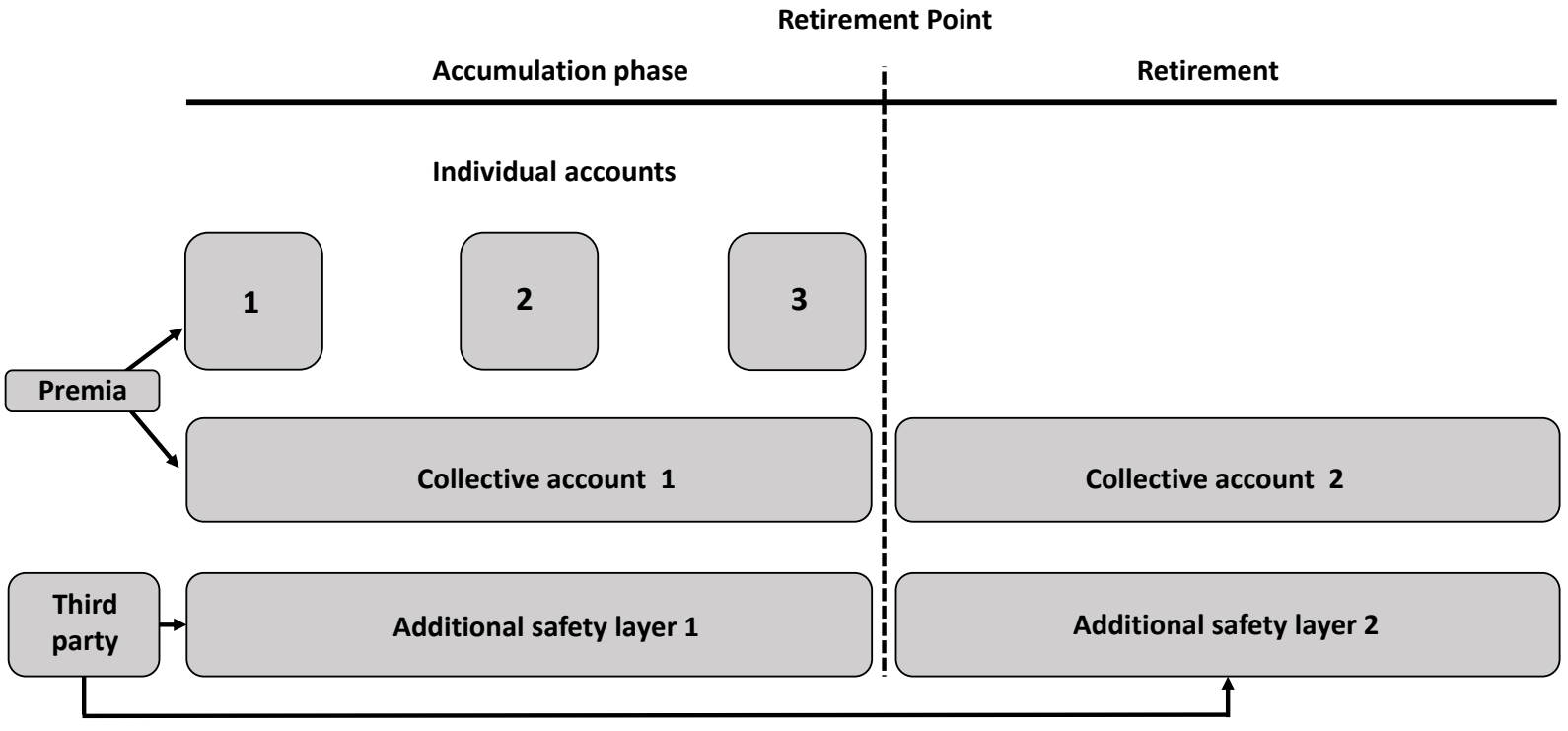
Low Interest Rates

Date		Deposit facility	Main refinancing operations		Marginal lending facility
			Fixed rate tenders Fixed rate	Variable rate tenders Minimum bid rate	
With effect from					
2016	16 Mar.	−0.40	0.00	-	0.25
2015	9 Dec.	−0.30	0.05	-	0.30
2014	10 Sep.	−0.20	0.05	-	0.30
	11 Jun.	−0.10	0.15	-	0.40
2013	13 Nov.	0.00	0.25	-	0.75
	8 May.	0.00	0.50	-	1.00
2012	11 Jul.	0.00	0.75	-	1.50
2011	14 Dec.	0.25	1.00	-	1.75
	9 Nov.	0.50	1.25	-	2.00
	13 Jul.	0.75	1.50	-	2.25
	13 Apr.	0.50	1.25	-	2.00
2009	13 May	0.25	1.00	-	1.75
	8 Apr.	0.25	1.25	-	2.25
	11 Mar.	0.50	1.50	-	2.50
	21 Jan.	1.00	2.00	-	3.00
2008	10 Dec.	2.00	2.50	-	3.00
	12 Nov.	2.75	3.25	-	3.75


Liabilities
Assets

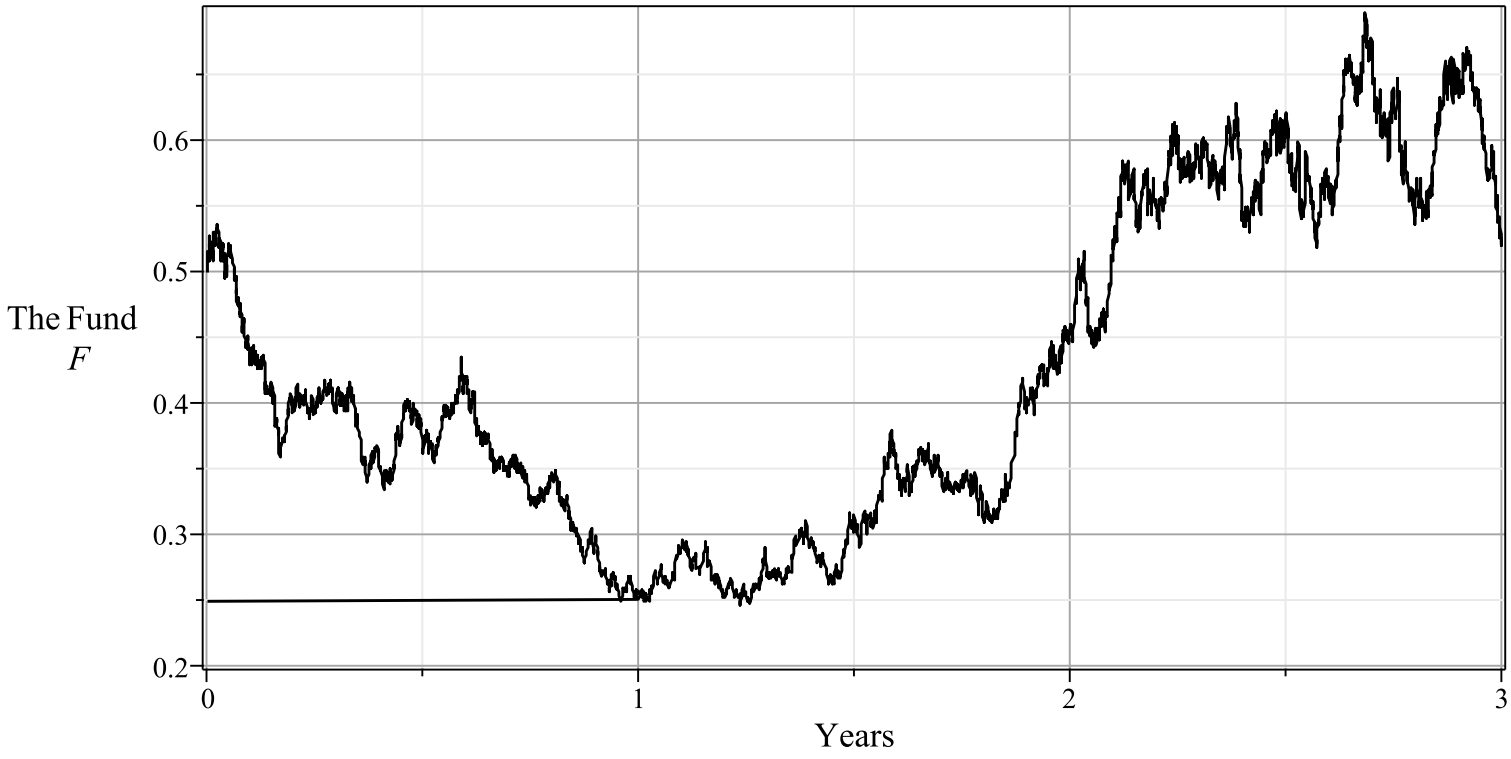
An Alternative Scheme



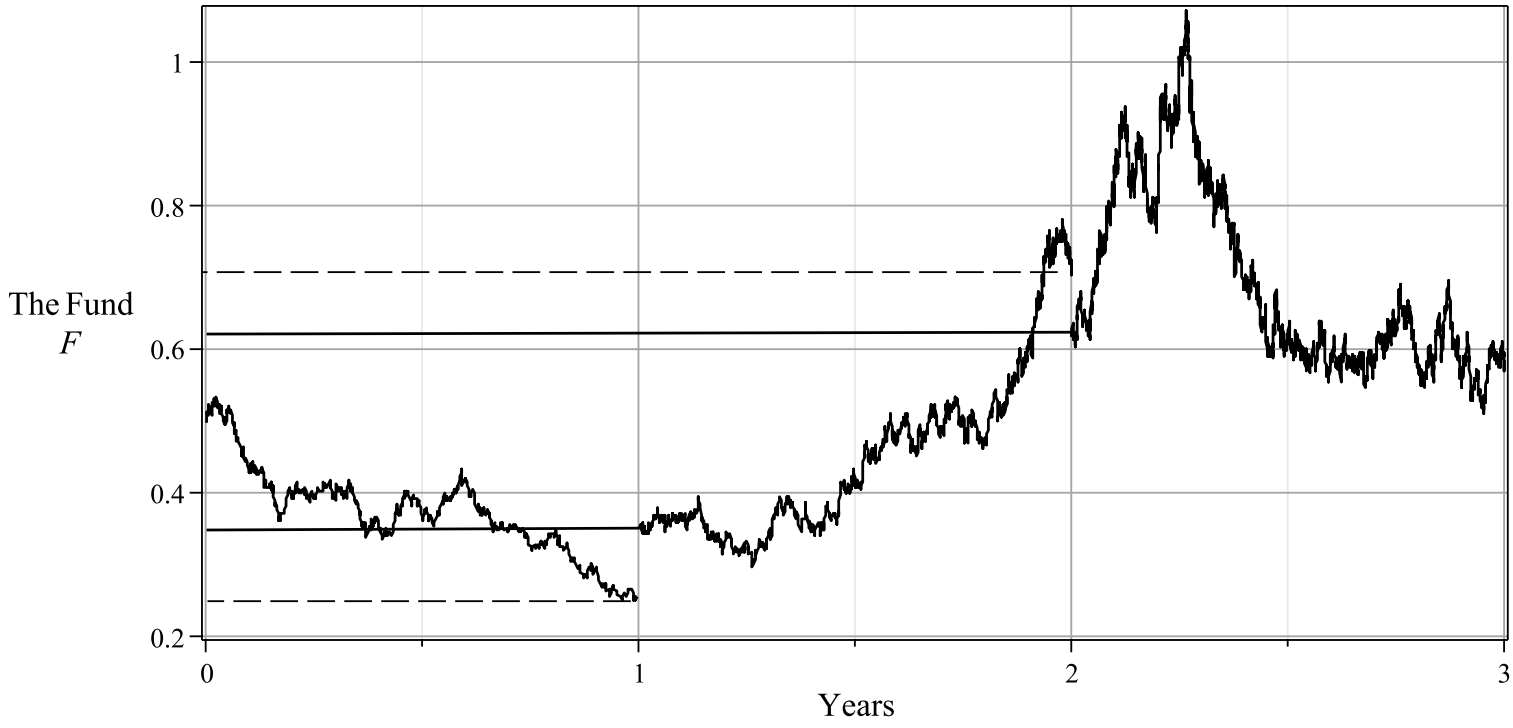
The overall target of the maximal with-profit is twofold:

• to maximise the total saved amount (alternatively the first pension or the discounted pension payments expected at the retirement point)

• to keep the pension evolution inside a corridor, mitigating the risk of a decrease.



A possible evolution of the individual fund H, where the decrease in value from $H_0 = 0.5$ to $H_1 = 0.25$ amounts 50%. If the chosen k is smaller than 0.5 then a part $q\%$, stipulated by contract, of the excess of loss $\big((1-k)H_0 - H_1\big)$ will be added to the individual account.



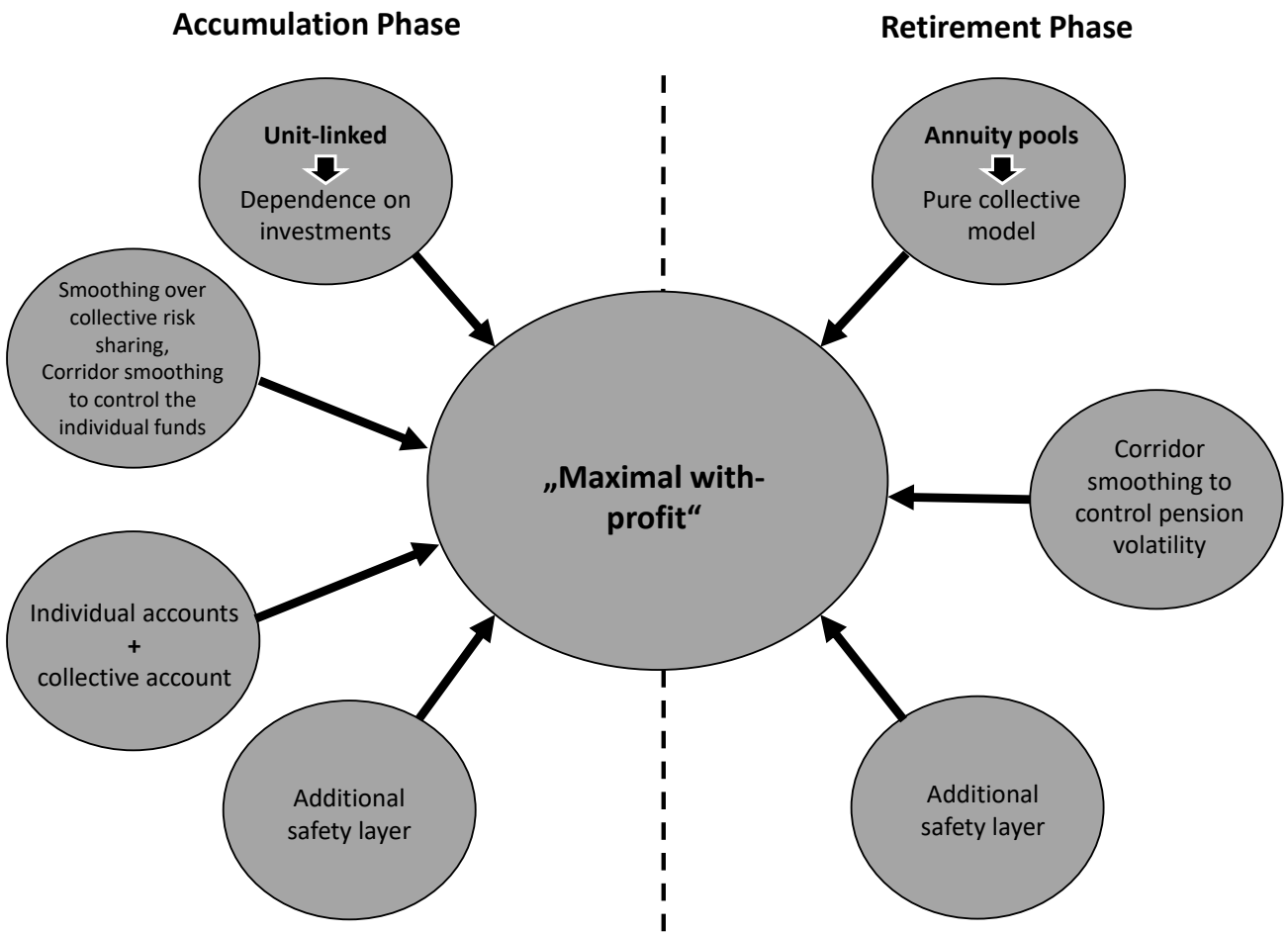
The evolution of the smoothed fund H with adjusted values after the $1st$ and $2nd$ year.

Degree of Capital Cover (DCC)

In the retirement phase, we will control the evolution of the pensions via the capital coverage degree (DCC) of the collective fund.
For the calculation of DCC, we have to consider the time value of the collective fund and the present value of pensions to be paid. The relation between both is a good measure to adjust the annuities and gives us:

$$\text{DCC} = \frac{\text{The value of the collective fund}}{\text{Pensions to be paid}} \ .$$

The corridor we are looking for is an interval surrounding the DCC. An example is given by the German law (BRSG): $100\% \leq$DCC$\leq 125\%$.
Thus, if DCC exits the corridor, the pensions have to be adjusted.
However, the third layer can prevent or at least postpone the downward adjustments.


Accumulation Phase
Retirement Phase
Unit-linked
Dependence on investments
Annuity pools
Pure collective model
Smoothing over collective risk sharing, Corridor smoothing to control the individual funds
„Maximal with-profit“
Corridor smoothing to control pension volatility
Individual accounts + collective account
Additional safety layer
Additional safety layer

Redistribution Index

It is important to give a cohort that leaves the saving phase a fair share of the accumulated collective wealth = Collective account 1.

A possible solution would be to put weights on account values in different time intervals: the earlier a value the higher the weight.

An example is provided by the calculation procedures in redistribution of hidden reserves (the difference between market and book value of assets) in Germany. There, the late payments are penalised so that a situation described above is not possible.

Possible Future Research Directions:

- Consideration of the third layer, possibility of surrender and deaths during the accumulation phase;
- Optimisation of pension amounts in the retirement phase over the level k or the upper boundary for DCC;
- Optimisation problems for state pension designs...

References

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Thank You for Your Attention