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Minimum Pension and Longevity Risk: a Solution for Notional Defined Contribution Pension Schemes

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Table of contents

Table of contents

Table of contents

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- Defined Contribution (DC): Pension depends on the accumulated capital

What is a NDC Pension Scheme?

	PAYG	Funding
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$\rightarrow$ NDCs attempt to reproduce the logic of a financial defined contribution pension plan within a pay-as-you-go framework.

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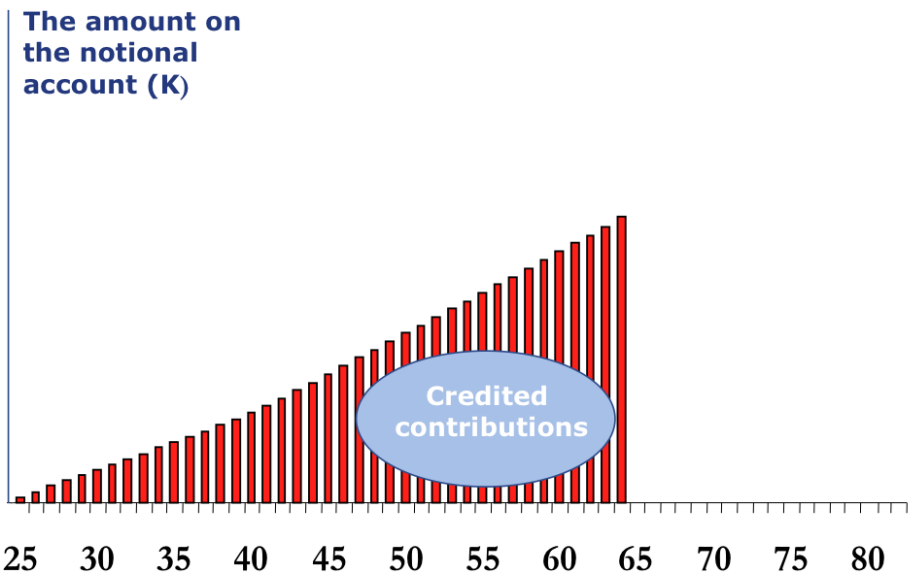

Figure 1: Principle of NDCs

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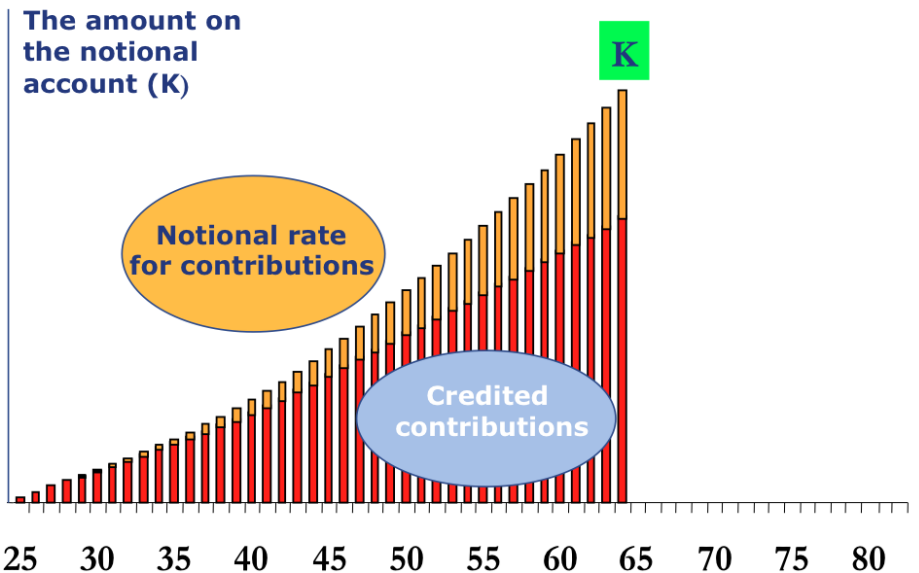

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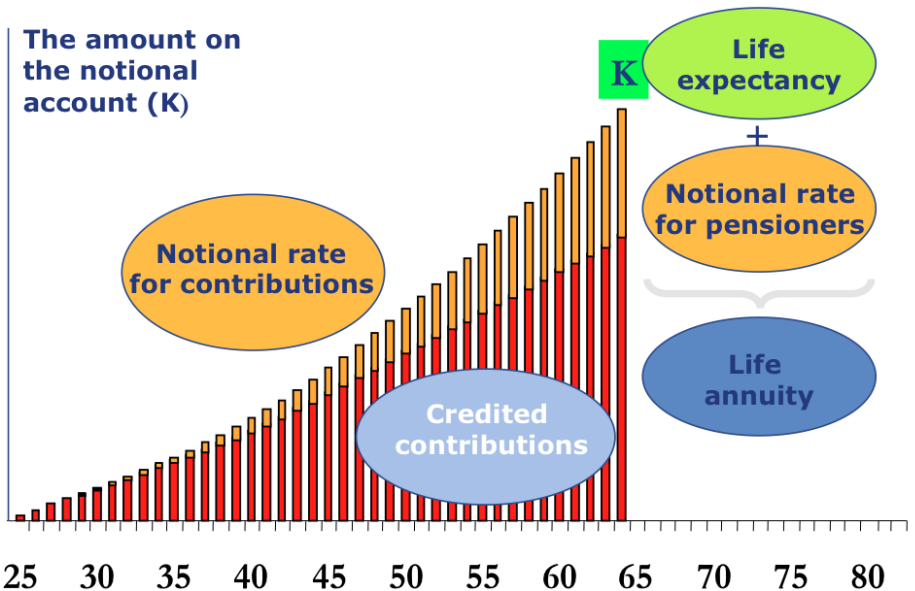

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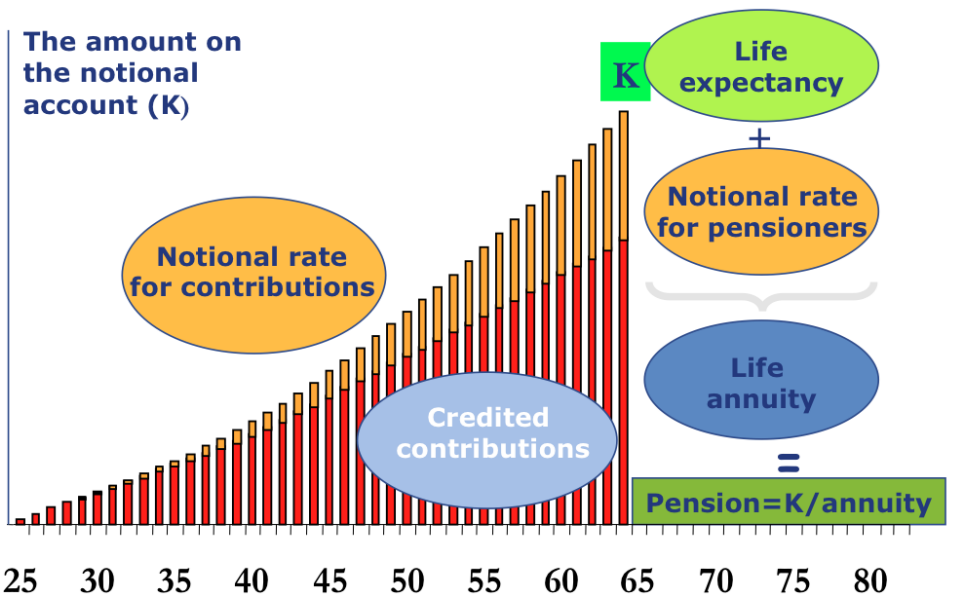

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Table of contents

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  $\rightarrow$ Survivor Dividend (or inheritance gains)

Boado-Penas and Vidal-Meliá [2014]

How can we use the survivor dividend?

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Aim

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2. To determine if the amount of the survivor dividend is sufficiently large to guarantee a minimum pension to the lowest socio-economic classes $\rightarrow$ minimum standard of living for the pensioners.

Table of contents

Table of contents

Expenditure
if the survivor dividend IS NOT distributed

$$E_t^{nd} = \sum_{k=0}^{\infty} P^{nd}_{(x_e+A+k,t)} \cdot I_{(x_e+A+k,t)}$$

with $P^{nd}_{(x_e+A,t)}$ = initial pension when the SD is not distributed.

Table of contents

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if the survivor dividend IS distributed

$$E_t = \sum_{k=0}^{\infty} P_{(x_e+A+k,t)} \cdot l_{(x_e+A+k,t)}$$

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2. Minimum pension
   - What is the maximum pension increase the NDC scheme can grant to all the retirees?
   - Which minimum pension could the system grant to the lowest socio-economic categories?

Table of contents

Table of contents

Assumptions

- Entry age = 25;
- Retirement age = 65;
- Contribution rate = 16%;
- Last age in the mortality tables = 110;
- Three mortality tables: Poland, Sweden and Latvia.

Maximum longevity improvement the system can face

	Latvia	Poland	Sweden
E_t^{nd} (in mill.)	1,324	1,395	1,598
E_t (in mill.)	1,610	1,642	1,710
Increase in Life Expectancy Δe,	3.65	3.12	1.42
Increase in survival probability a	1.85%	1.53%	0.59%
Maximum mortality decrease	35.32%	31.86%	17.24%
Life expectancy after retirement	16.39	17.10	19.84
Negative interest rate b	-1.81%	-1.50%	-0.58%

Retrospective analysis

	Latvia	Poland	Sweden
$E_t^{nd(t)}$ (in mill.)	1,324	1,395	1,598
$E_t^{nd(1980)}$ (in mill.)	1,217	1,279	1,453
Difference $E_t^{nd(t)} - E_t^{nd(1980)}$ (in mill.)	107	116	145
Survivor dividend (in mill.), using 1980 tables: $D_{(65,t)}^{ac(1980)}$	310	290	203
Is $E_t^{nd(t)} - E_t^{nd(1980)} < D_{(65,t)}^{ac(1980)}$?	Yes	Yes	Yes

Note: $t = 2009$ for Poland and $t = 2011$ for Latvia and Sweden.

Arnold et al. [2016]

Table of contents

Data

Mortality tables and wages by education level for France.

Category	Descriptive
D1	Superior to Baccalaureate
D2	Baccalaureate + 2 years
D3	Baccalaureate
D4	CPC (Certificate of professional competence), CPS (Certificate of professional studies)
D5	National Diploma, CPrS (Certificate of primary studies)
D6	No diploma

Table 1: Socio-economic categories by level of education (France)

Data

Category	Average Salary	Annual pension
D1	2194	693
D2	1800	577
D3	1500	513
D4	1475	493
D5	1408	489
D6	1300	443

Table 2: Wages and pensions by socio-economic category, 2011, France

Results

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1. Maximum pension increase the system can grant
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2. Minimum pension the system can grant to the lowest socio-economic categories
   $\rightarrow$ Amount of the minimum pension = **570 euro**.
   $\rightarrow$ Groups D3, D4, D5 and D6 benefit from that minimum pension.

Table of contents

Concluding remarks

If the survivor dividend is kept by the system, some reserves are accumulated.

- These reserves can be used to finance some unexpected mortality improvements;
  - Latvia: 35.3%
  - Poland: 31.9%
  - Sweden: 17.2%

- or a minimum pension of 570 euro.

Concluding remarks

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  - Which mortality improvements could be financed by the survivor dividend if this dividend is first used to guarantee a minimum pension?
  - What about an automatic balancing mechanism to re-establish the liquidity and/or the sustainability in pay-as-you-go pension systems?

Bibliography

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Thank you for your attention!

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