Simplifying Retirement By Aligning Communication With Retirement Outcomes

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About the speaker

- **Catherine Donnelly**
- Associate Professor
- Co-PI for project **‘Minimising Longevity and Investment Risk while Optimising Future Pension Plans’**

- **Risk Insight Lab, Heriot-Watt University**
- The research programme is being funded by the Actuarial Research Centre, Institute and Faculty of Actuaries, UK.

Overview

- Background
- Improving communication by product design
- Numerical investigation

Typical current DC situation

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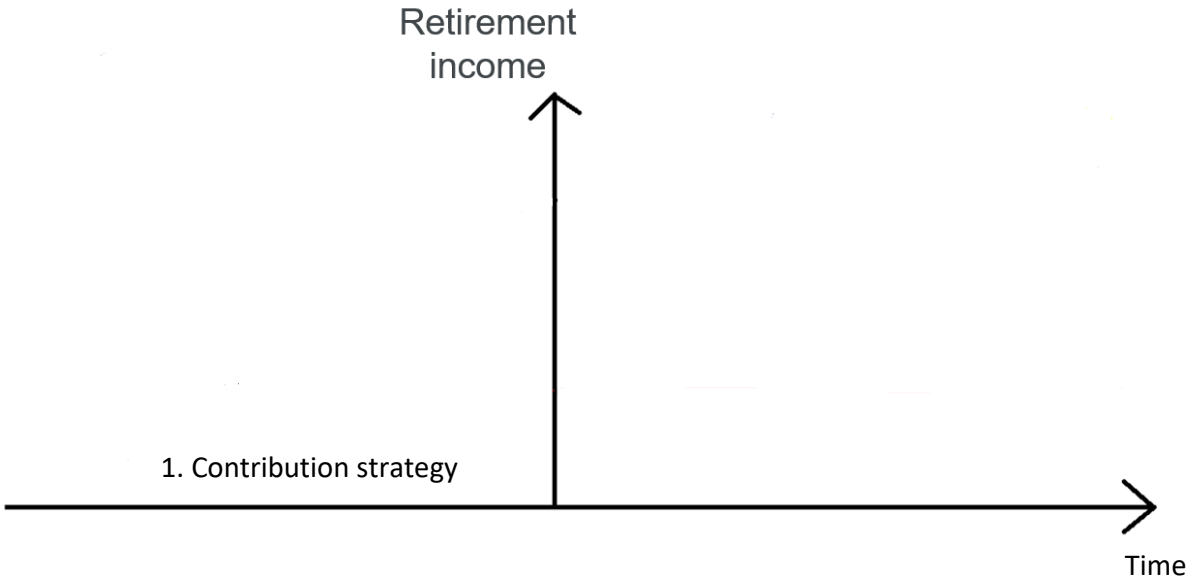

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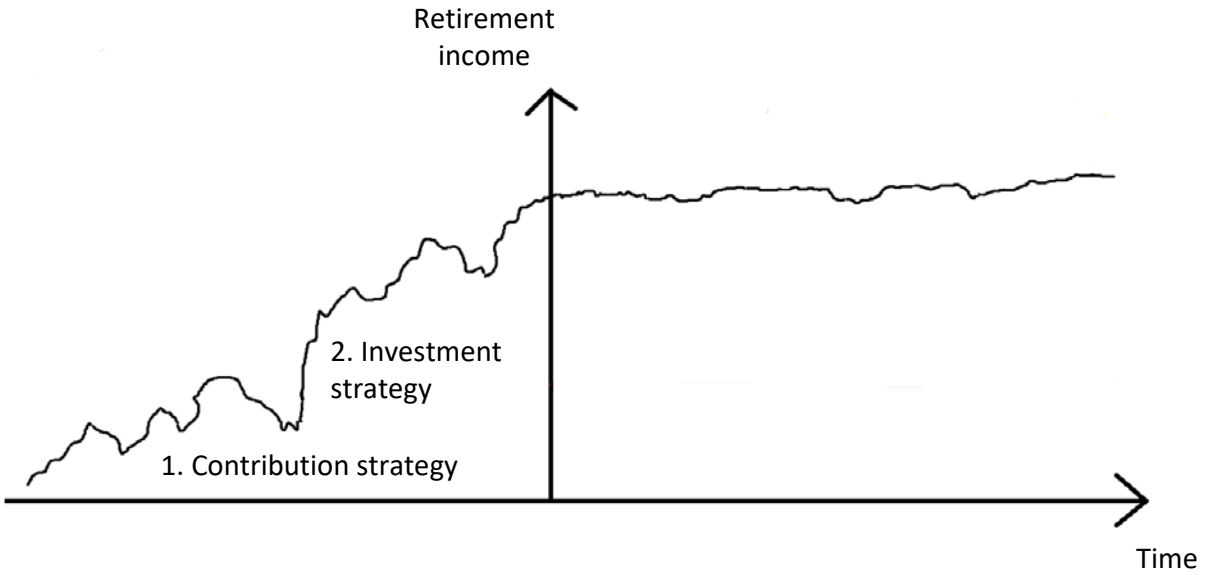

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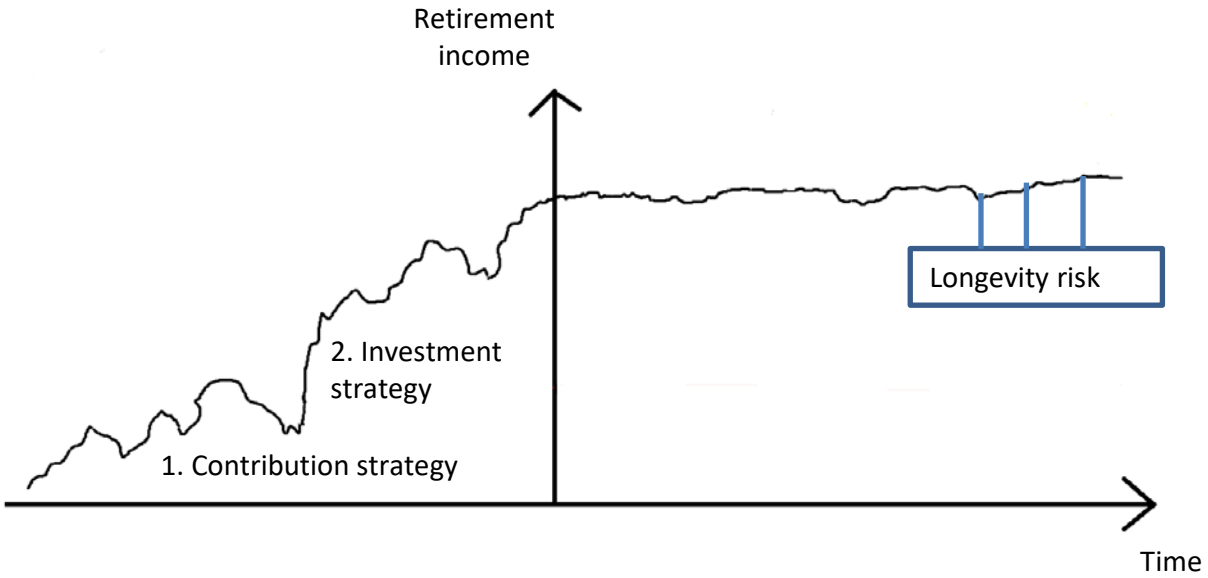

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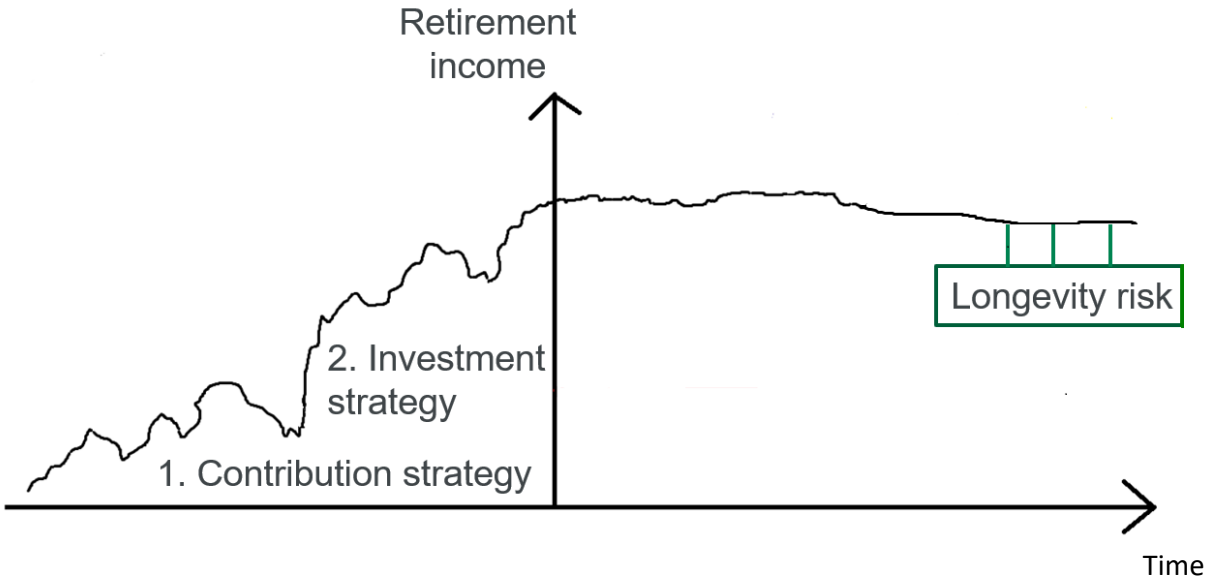

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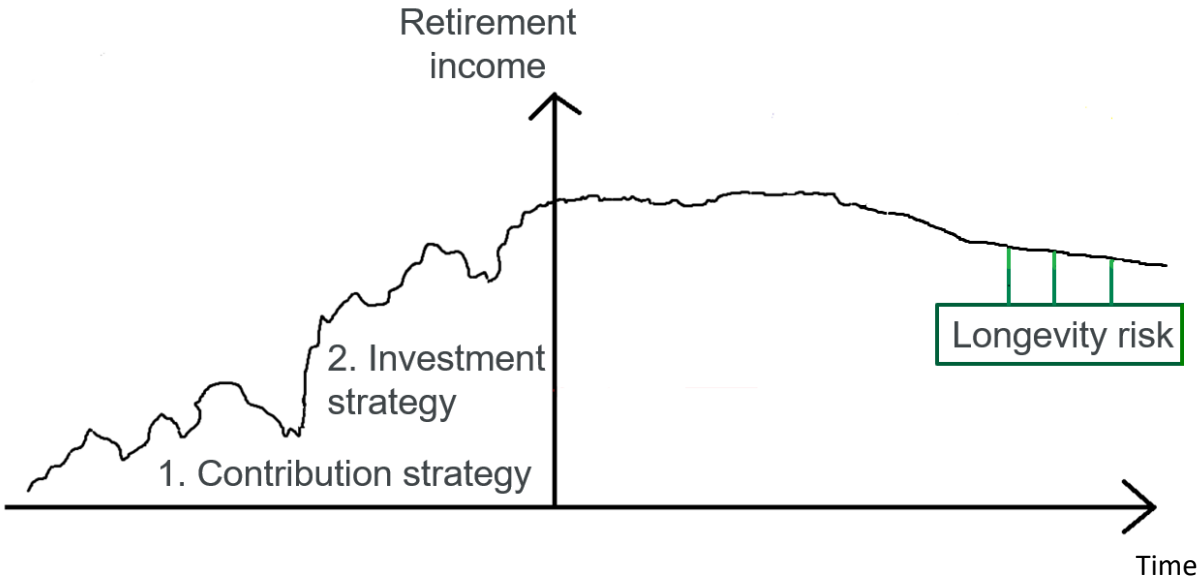
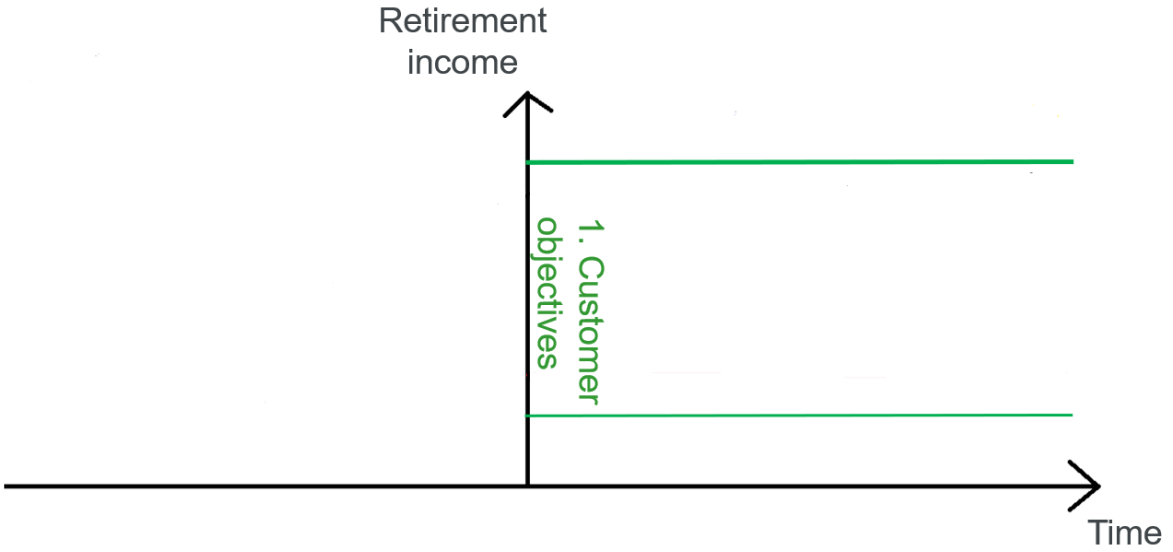


Put customer objectives at the centre

Time

Put customer objectives at the centre



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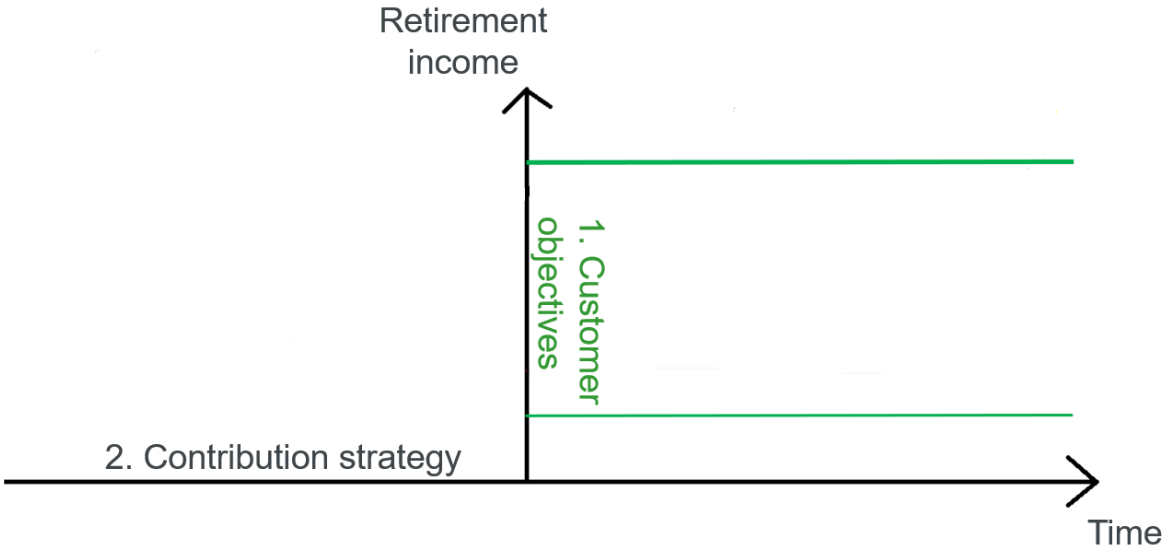

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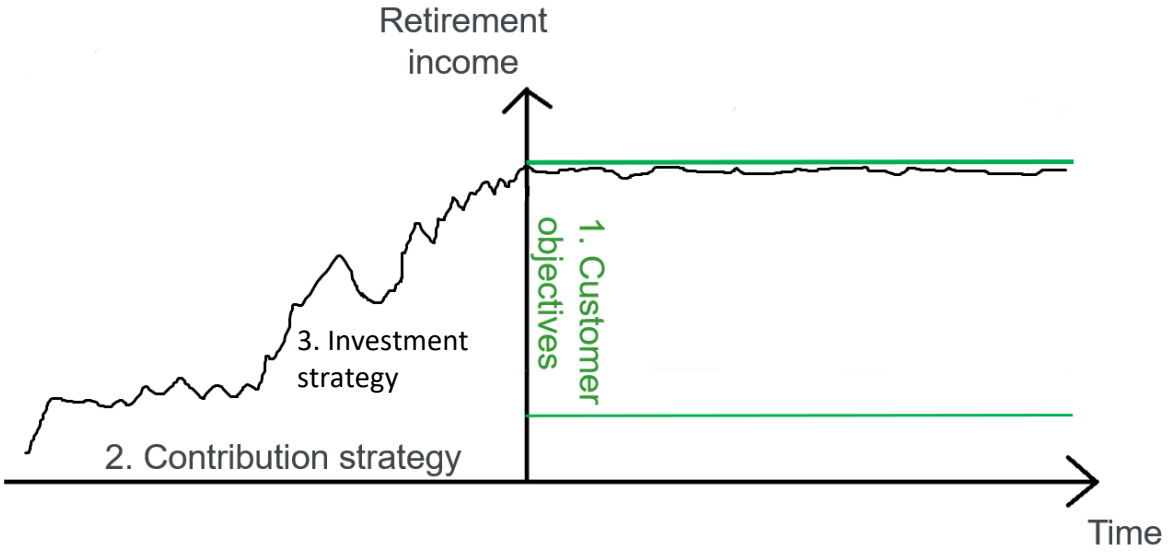

What people want

An inflation-indexed retirement income that lasts for their lifetime.

Robert C. Merton (2014) The Crisis in Retirement Planning. HBR.

- Goal= inflation-increasing income for life.

- Risk = failure to meet goal.
- Align investment strategy with goal.

How are pension outcomes communicated today?

- Big focus on investment values.

- Risk is not generally communicated.
  - e.g. DC pension pot converts to €872 p.a. income at retirement.
  - But what is not shown:
    - Income goes down by 11% if net return goes down by 0.5%,
    - Income goes down by 22% if net return goes down by 1%,…

Improving communication by product design

- Plan today…

- …for the future, but which one?

Improving communication by product design

- How much income in retirement?
- Target: The income you'd like to live on.
- Minimum: The minimum income that you are happy to live on.

Preliminary “proof-of-concept”

- How much **income in** retirement?
- Target: The **income** you’d like to **live on**.
- Minimum: The minimum **income** that you are happy **to live on**.

Preliminary “proof-of-concept”

- How much **money at** retirement?
- Target: The **money** you’d like to **have at retirement**.
- Minimum: The minimum **money** that you are happy **to have at retirement**.

Preliminary “proof-of-concept”

- How much **money at** retirement?
- Target: The **money** you’d like to **have at retirement**.
- Minimum: The minimum **money** that you are happy **to have at retirement**.

Mr Bean's data

- 55 years old.
- Current value of pension savings = €50000.
- Retiring at age 65.
- For simplicity, no future contributions.

Mr Bean's choices

- Target value of savings at retirement: €61000 (2% p.a.).

- Minimum value of savings: €50000 (0% p.a.).

- Retiring in 10 years' time.

Feedback to Mr Bean

- 42% chance of getting €61,000.
- 14% chance of getting €50,000.
- To increase the chance:
  - Start contributing,
  - Retire later,
  - (Take more investment risk).

Remove target – what happens?

- 42% chance of getting €61000 **and no more**.
- 14% chance of getting €50000.

Remove target – what happens?

- 33% chance of getting €61000 **or more**.
- 21% chance of getting €50000.

(still have the minimum guarantee in place)

Securing a value at retirement

Chance of getting €61K or higher	Target €61K	No target
Minimum €50K	42%	33%
No minimum	51%	41%

Chance of getting €50K or lower	Target €61K	No target
Minimum €50K	14%	21%
No minimum	10%	15%

Securing a value at retirement

- A target increases the chance to hit the target value.
- However, give up upside risk to do this.
- Offsets the cost of the minimum value.

Initial wealth €50K, no min, values in €000s, r = 0.01, μ = 0.04, σ = 0.20, γ = -2, T=10 years

p	Target=€58K (1.5% p.a.)	Target=€61K (2% p.a.)	Target=€67K (3% p.a.)	No Target
5%	49.4	47.2	45.8	45.6
25%	57.6	55.0	53.4	52.9
50%	58.0	61.0	59.5	58.8
75%	58.0	61.0	66.2	65.4
95%	58.0	61.0	67.0	76.3
Prob. hit Target	74%	51%	23%	N/A
Quantile uplift	109%	104%	101%	N/A

Conclusion

- Target wealth restriction:
  - Increases certainty of level of retirement wealth,
  - Offsets the cost of a minimum wealth,
  - May aid in communication of risk.

- Plan: do this for an income in retirement:
  - Aim for an income close to a target income, and
  - Income should not fall below a minimum income.

Bibliography

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- Donnelly, C, Guillén, M, Gerrard, R. and Nielsen, J.P. (2015) Less is more: Increasing retirement gains by using an upside terminal wealth constraint. *Insurance: Mathematics and Economics*, 64, pp259-267.

Thank you very much for your attention!

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Extra slides if needed

Derivation of the investment strategy

- Black-Scholes market
  - Risky stock price dynamics $\frac{dS(t)}{S(t)} = \mu\, dt + \sigma\, dW(t)$,
  - Risk-free bond price dynamics $\frac{dB(t)}{B(t)} = r\, dt$,
  - Process *W* a standard Brownian motion.

Derivation of the investment strategy

- Initial wealth $x_0 > 0$.
- Find an optimal strategy π^* that maximises

$$E[\frac{1}{\gamma} X^{\pi}(T)^{\gamma}]$$

subject to $X^{\pi}(T) \in [Minimum, Target]$, a.s.

- An optimal strategy is the hedging strategy that gives wealth

$$X^{\pi^*}(T) = z_0 Z(T) - [z_0 Z(T) - Target]_+ + [Minimum - z_0 Z(T)]_+.$$

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From optimal strategy when $X^{\pi}(T)$ unconstrained and initial wealth is z_0.

Remove minimum

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- For $t \leq T$, $X^{\pi^*}(t) = z_0 Z(t) - call\big(t, z_0 Z(t)\big)$.

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- At $t = 0$, $x_0 = z_0 - call(0, z_0)$.

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- An optimal strategy is the hedging strategy that gives wealth $X^{\pi^*}(T) = z_0 Z(T) - [z_0 Z(T) - Target]_+$.

- At $t = 0$, $x_0 = z_0 - call(0, z_0) \Rightarrow z_0 \geq x_0$

Interpretation of z_0

- Quantile uplift z_0/x_0.
- p-quantile

$$Q_p = \inf\{y \in \mathbb{R}: \mathbb{P}[X^\pi(T) \leq y] \geq p\}.$$

- Without Target constraint: $Q_p = x_0\beta_p$
- With Target constraint K: $Q_p = \min\{K, z_0\beta_p\}$