



Society of Actuaries in Ireland

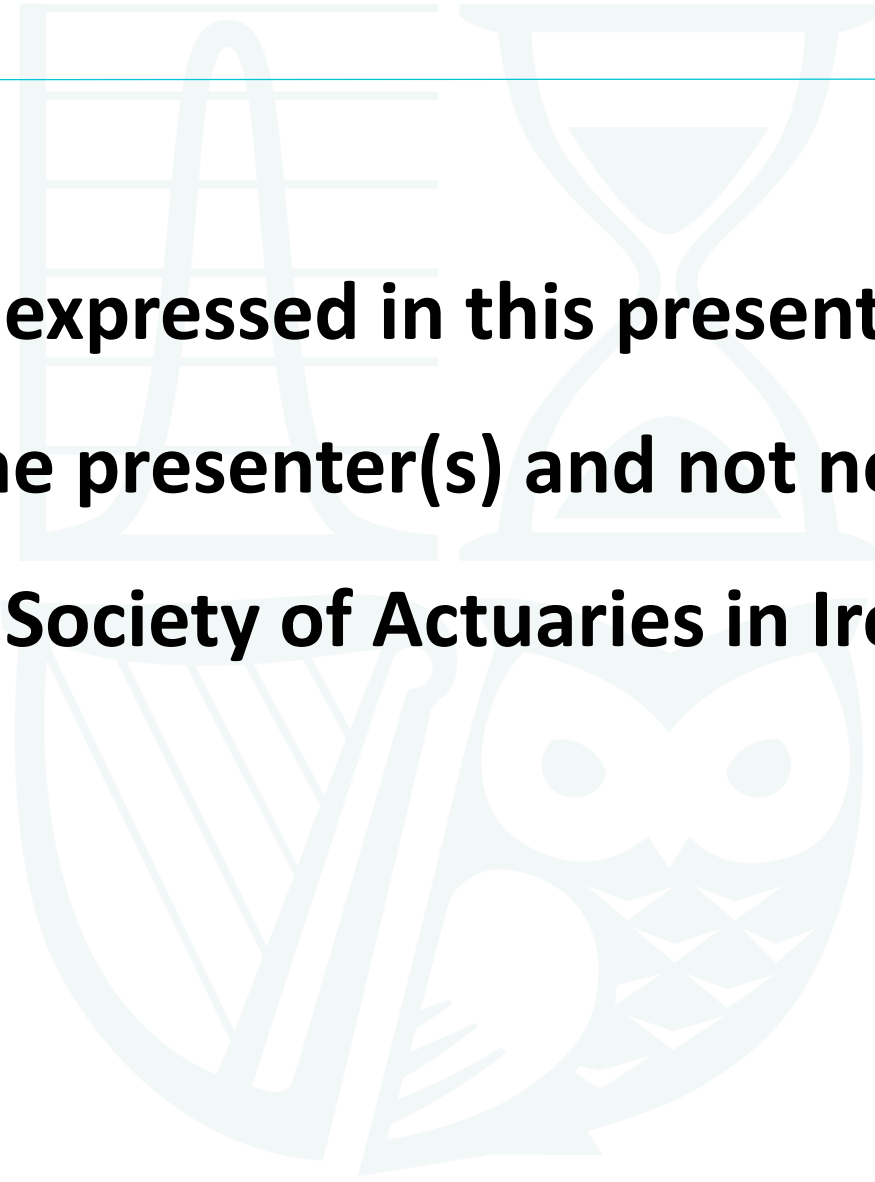
Tontines for DC Pension Drawdown

Finbarr Kiely FSAI FIA

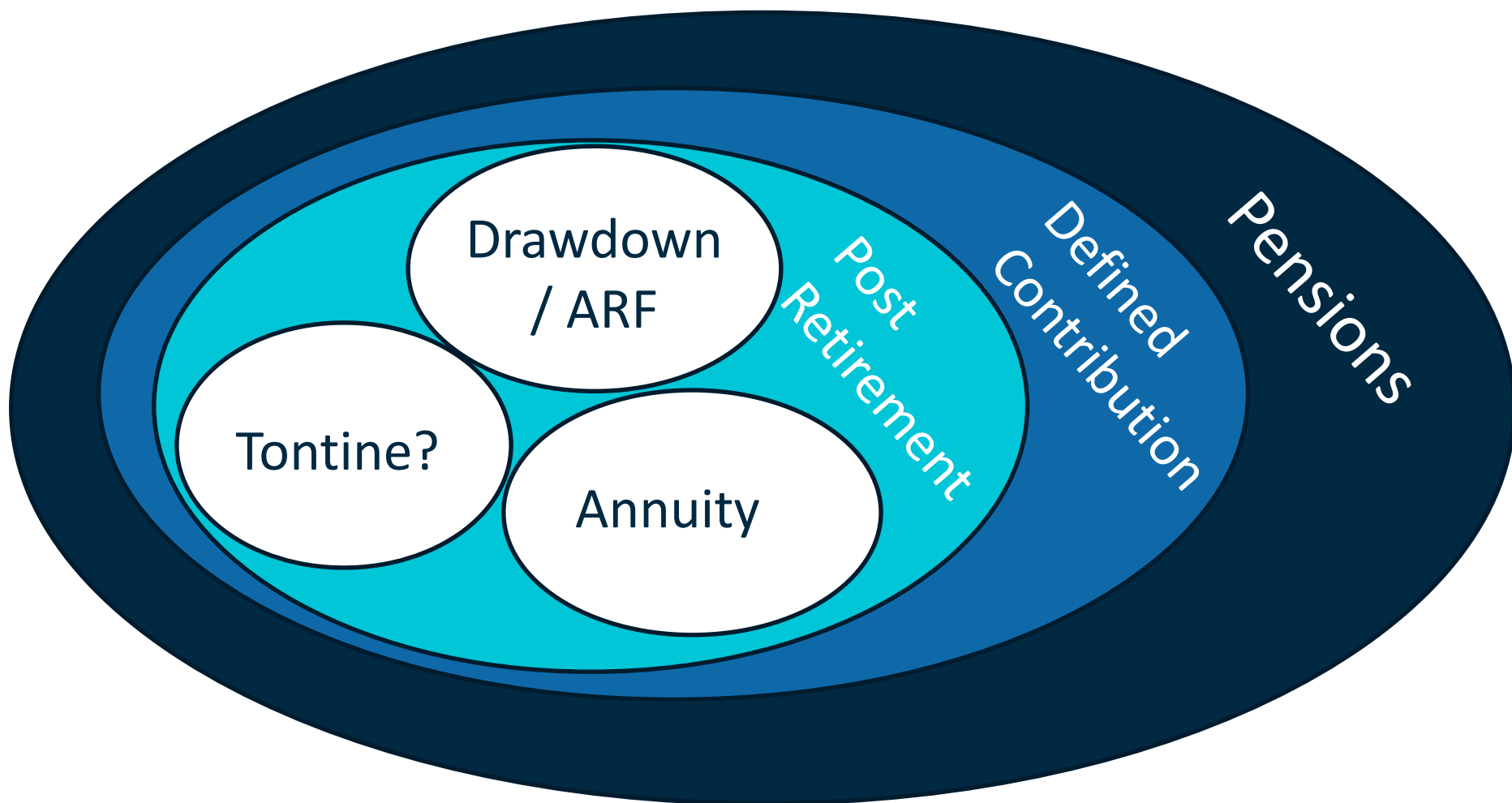
7th February 2019

Disclaimer

The views expressed in this presentation are those of the presenter(s) and not necessarily of the Society of Actuaries in Ireland



Tontines for Defined Contribution Drawdown



Sneak peak at Tontines...

Bill and Bob both have €1m in their Defined Contribution pension pot at retirement



Bob

€1m age 65



Bill

€1m age 65

Ignoring investment return they will both have enough money to last to age 85....if they draw down €50k per annum

Bill and Bob both have €1m in their Defined Contribution pension pot at retirement



Bob

€1m age 65

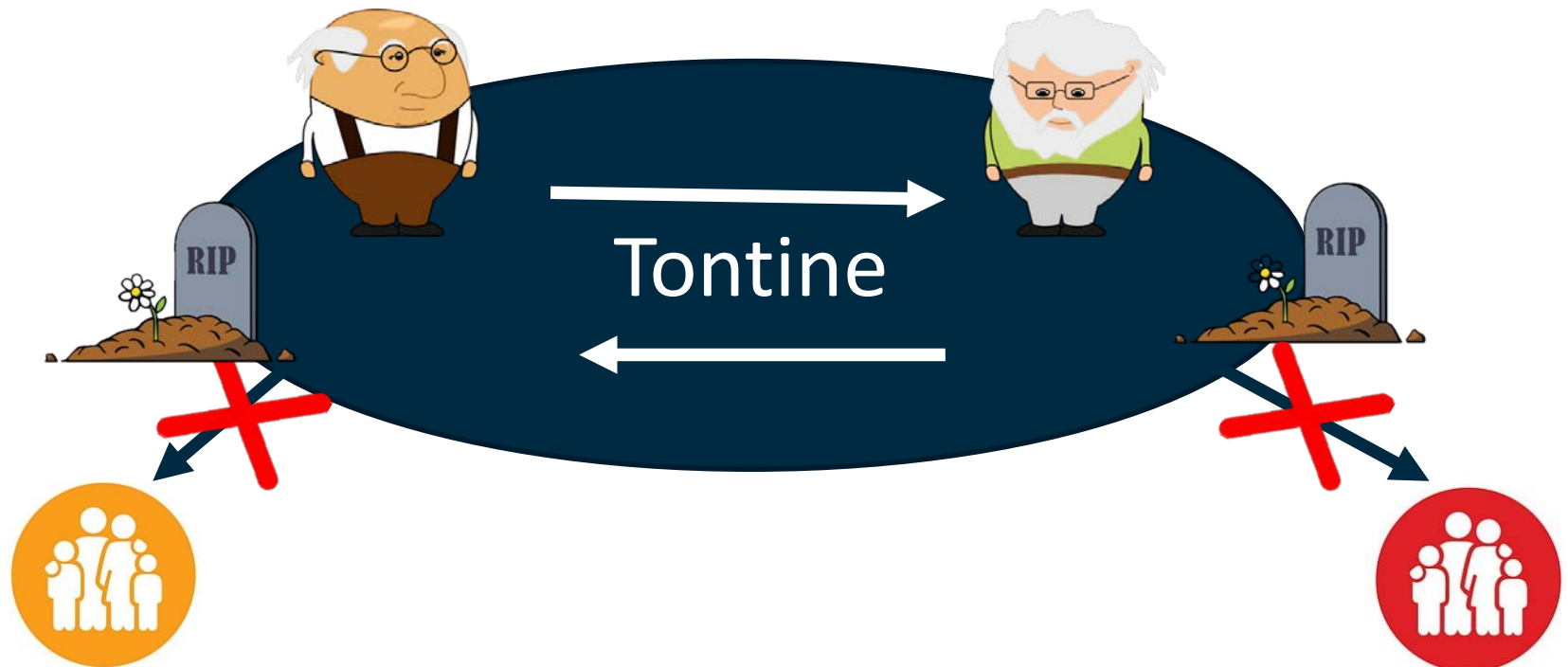


Bill

€1m age 65

If Bob dies at, say, age 75 then he will pass €500k to his estate and if Bill dies at, say, 95 he will have 10 years with no pension

Bill and Bob join a 2 person Tontine



Bob's estate

Bill's estate

.....when either dies they give anything remaining in their pension pot to the other person rather than their estate

We will return to Tontines later...

.... over to pensions for a while.

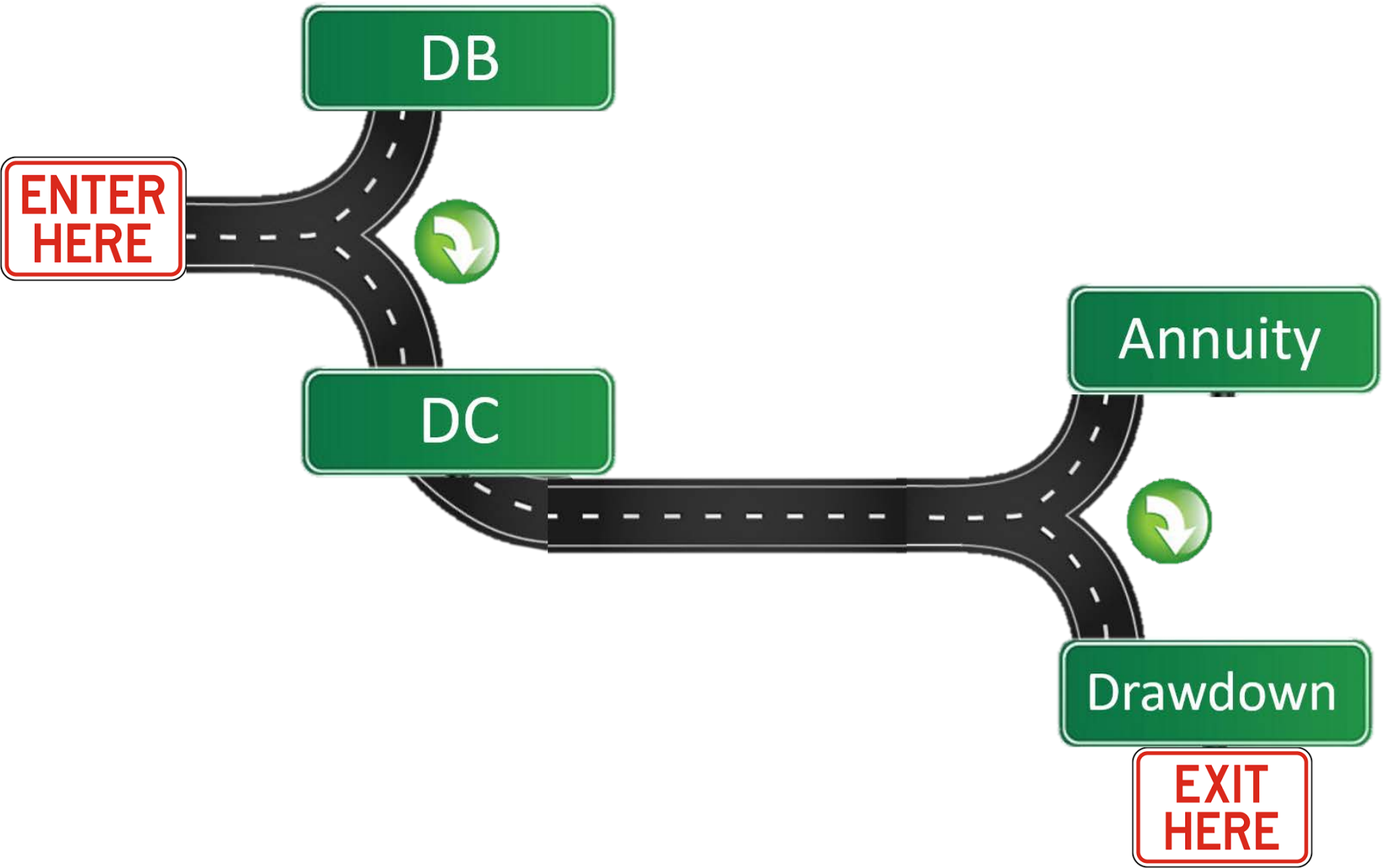


UCC

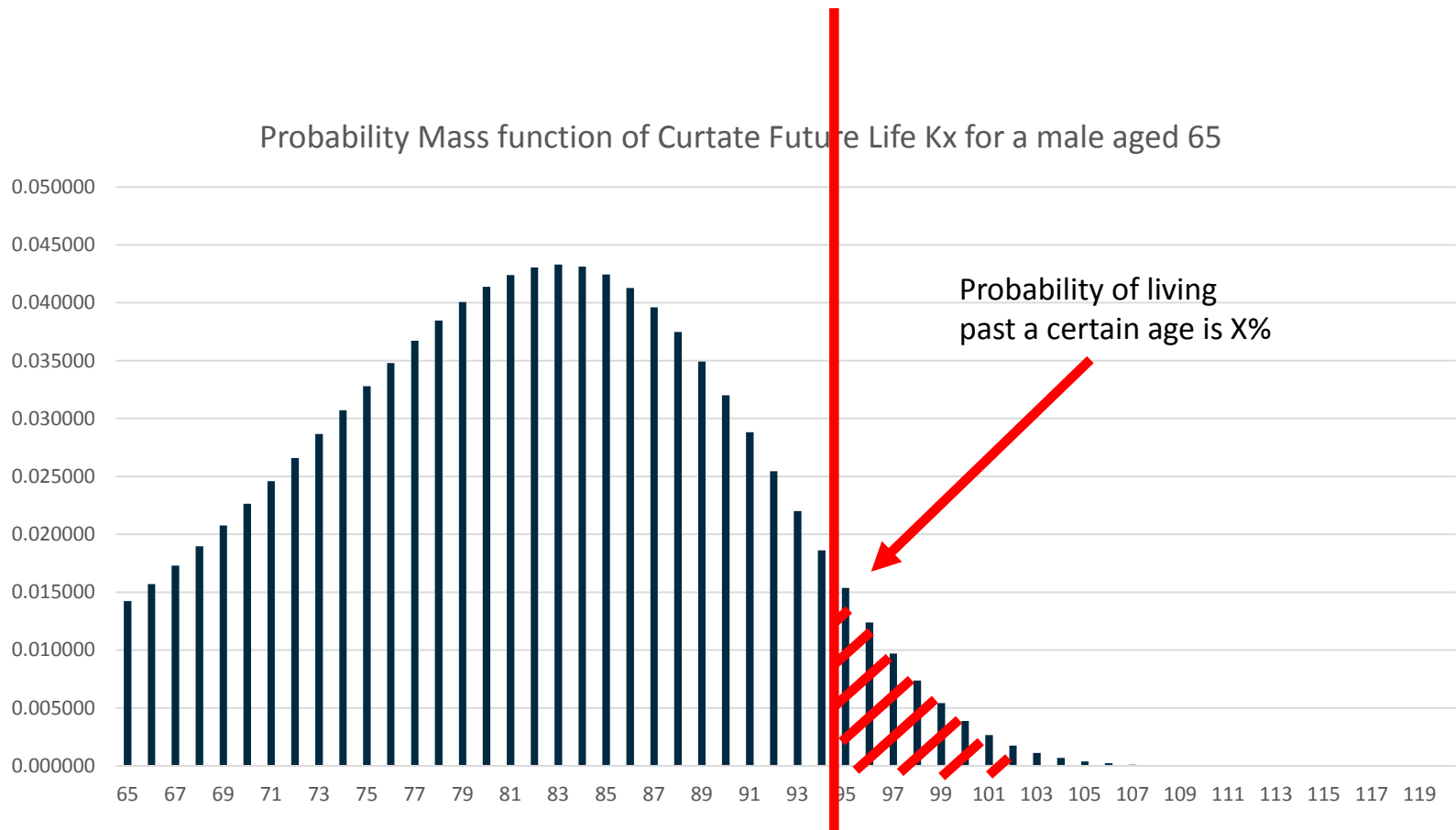
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



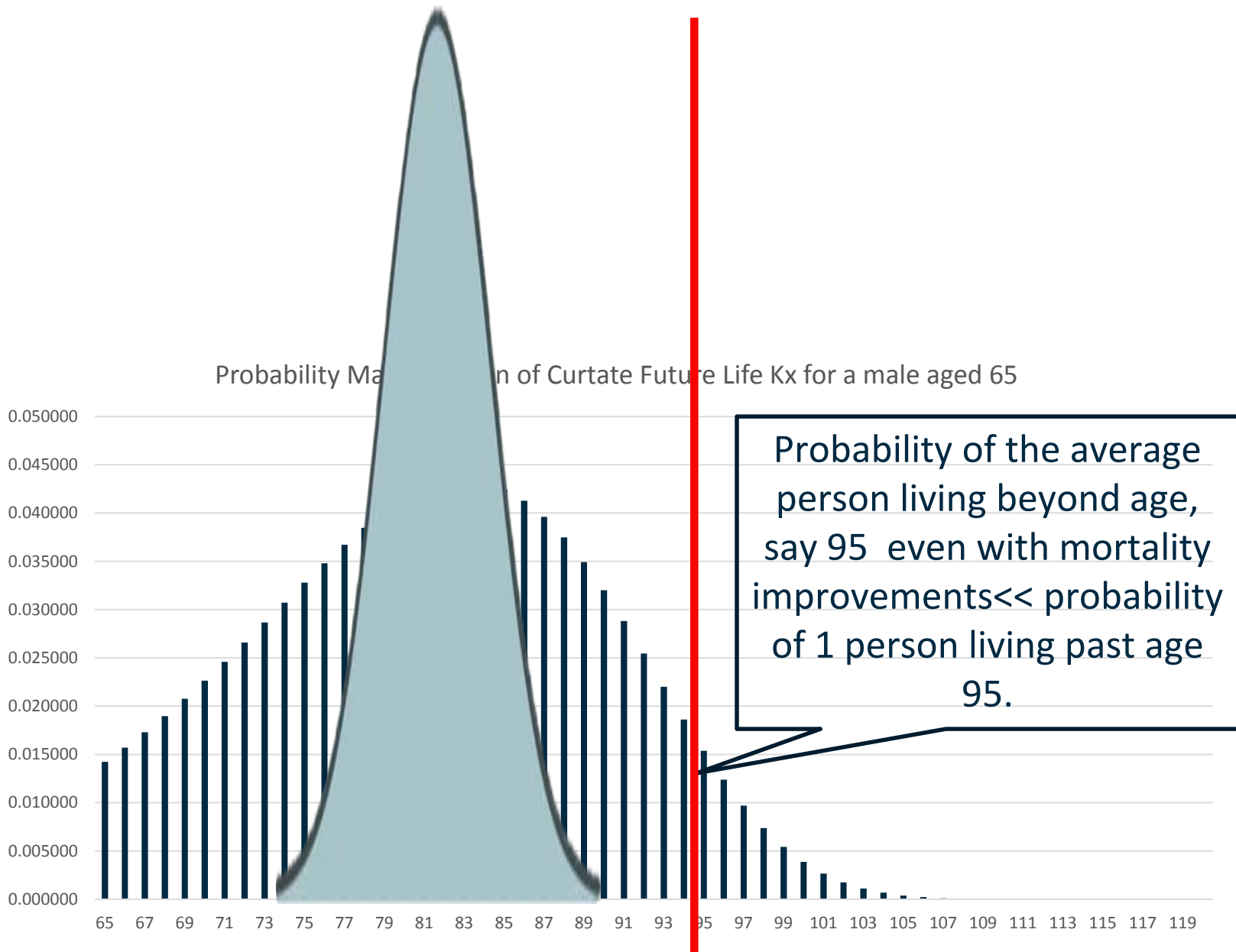
Private sector Pensions



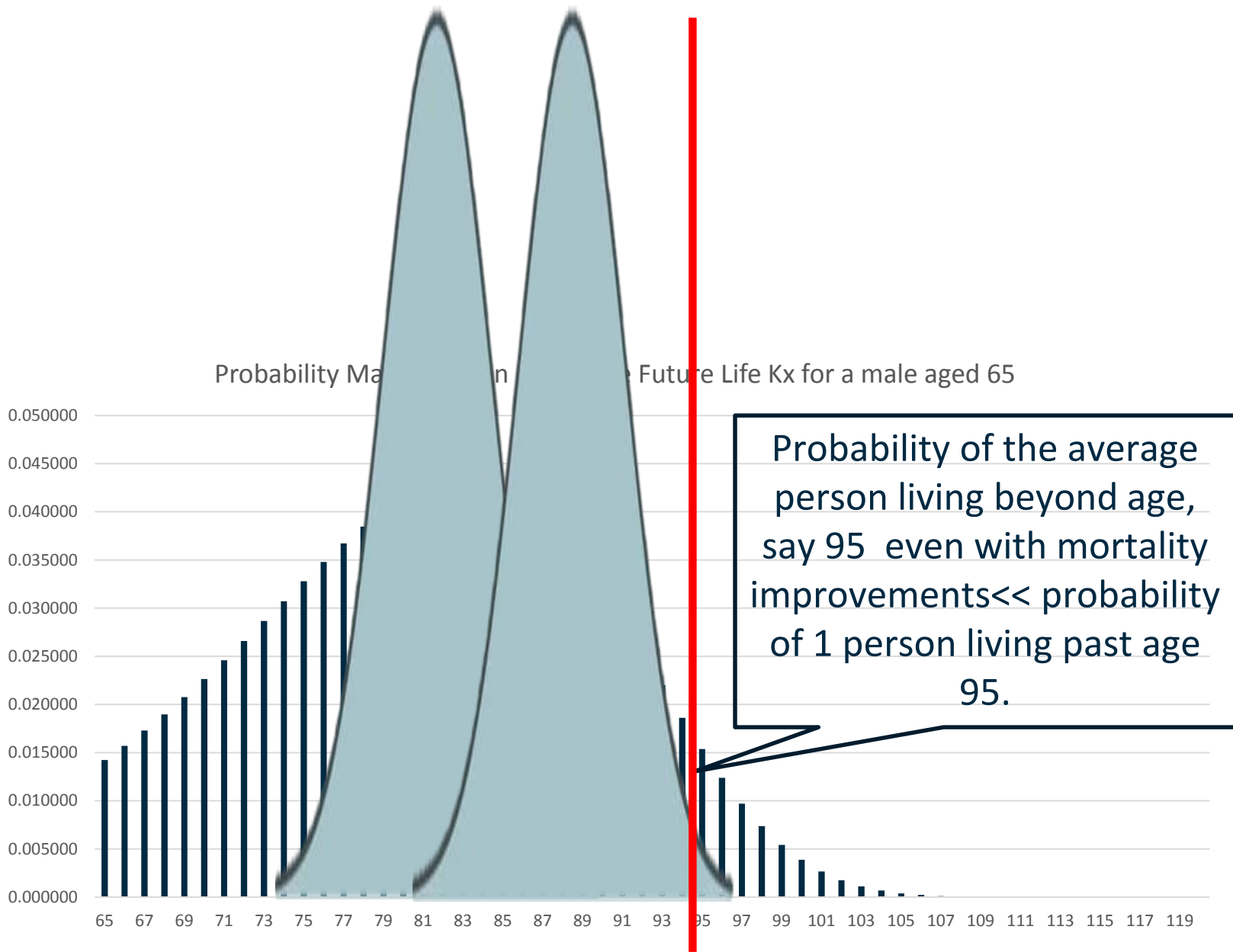
Sample distribution of future life



Figures are for illustrative purposes only
i.e. focus on shape of graph rather than numbers in graph

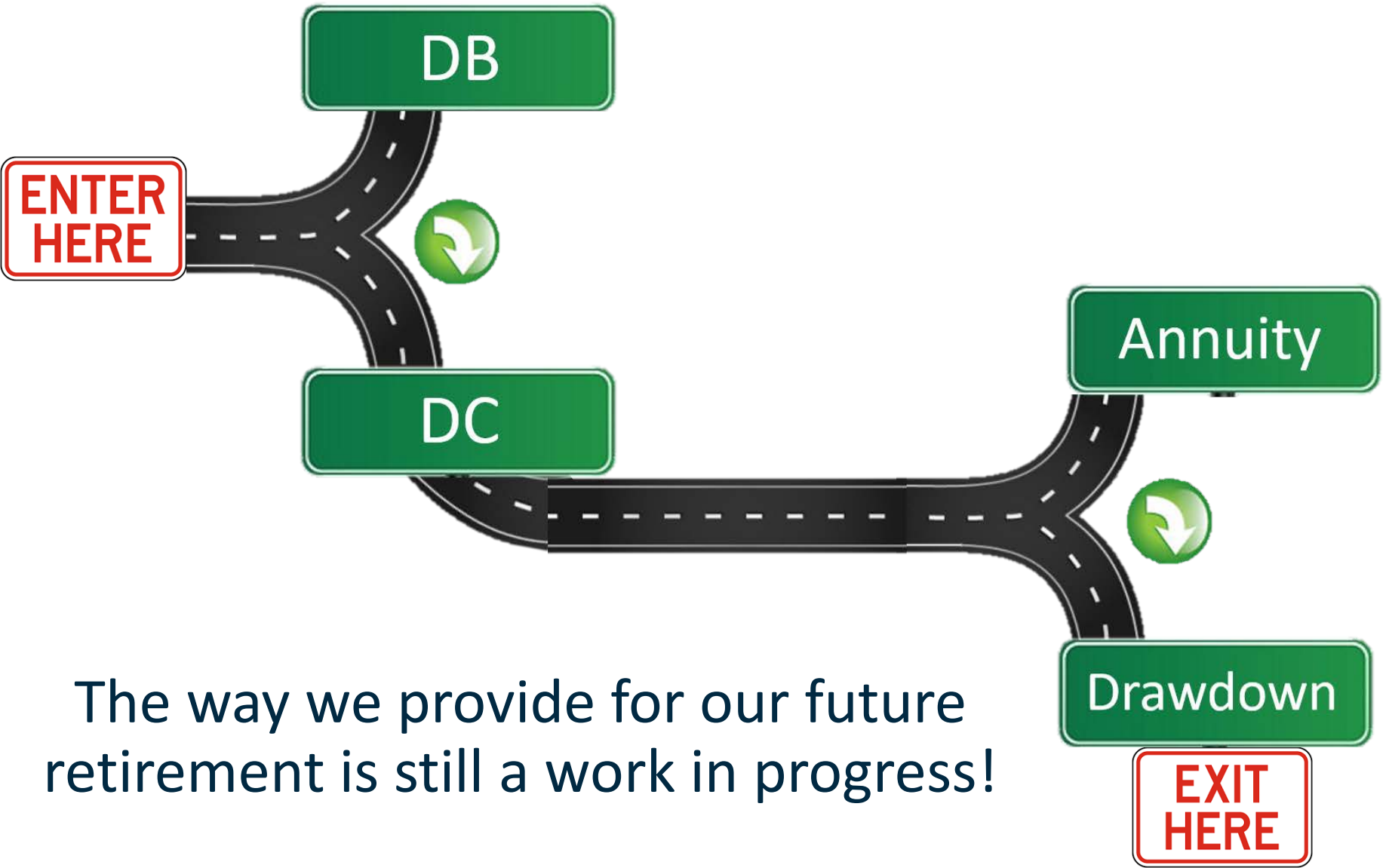


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Private sector Pensions

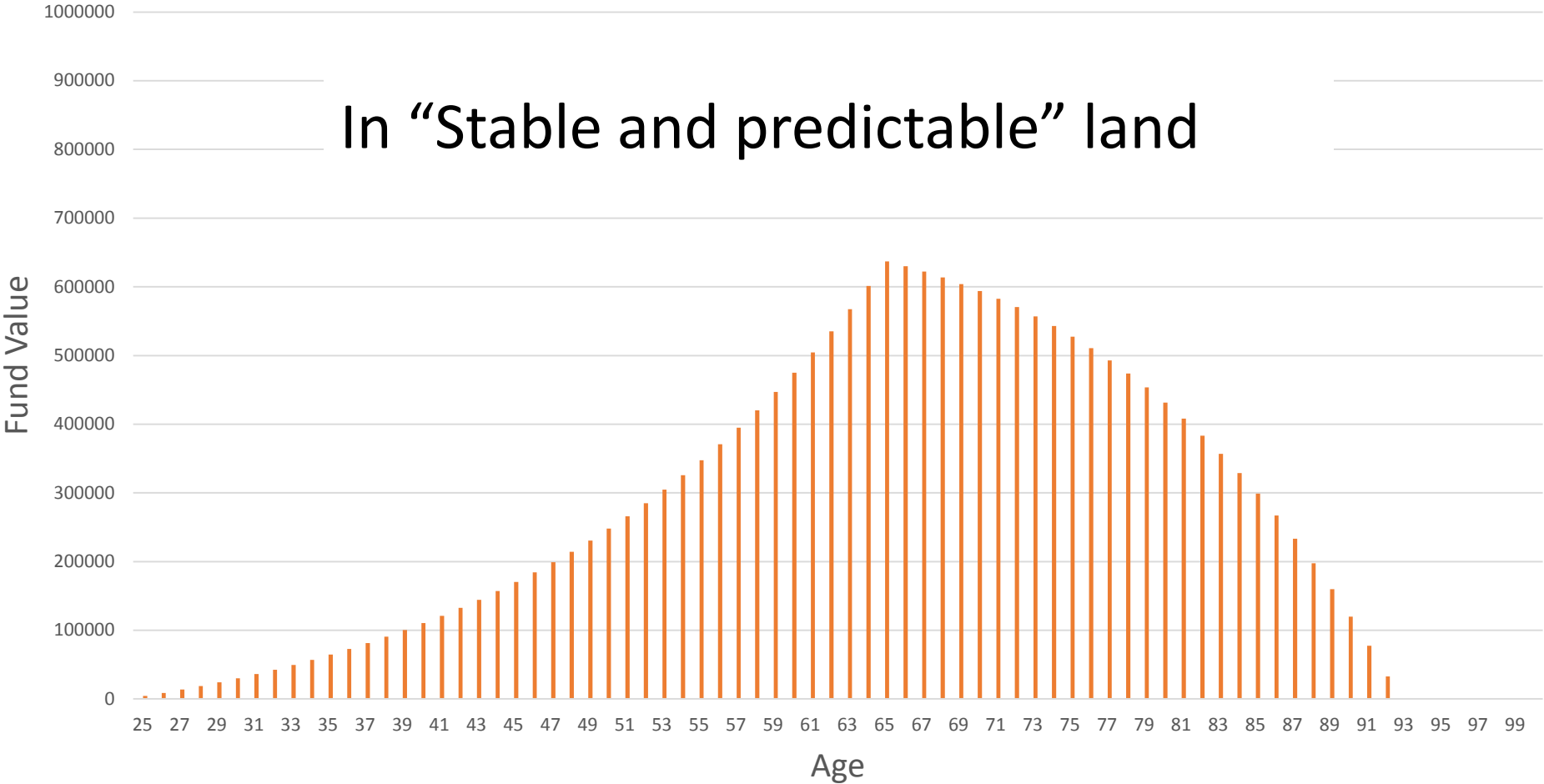


The way we provide for our future retirement is still a work in progress!

Drawdown

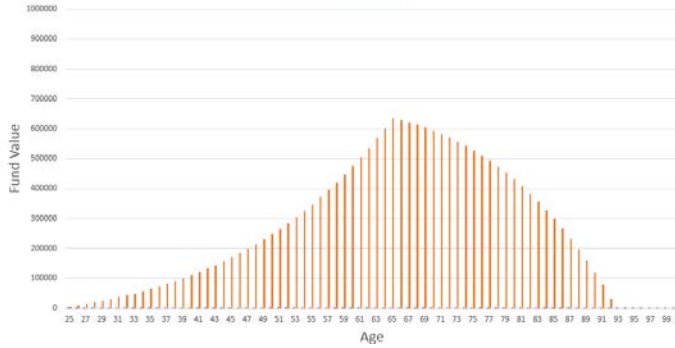
Sample growth and decumulation for a member of a DC plan

In “Stable and predictable” land

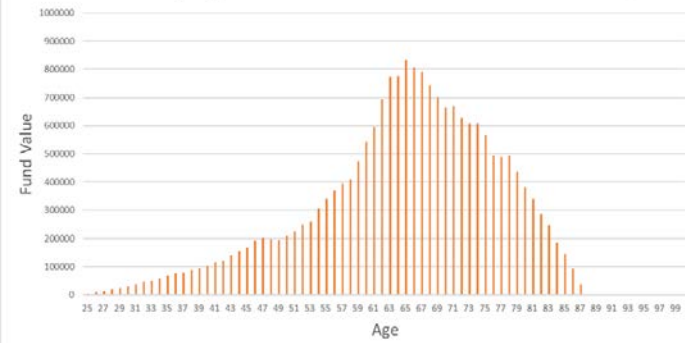


Investment Volatility

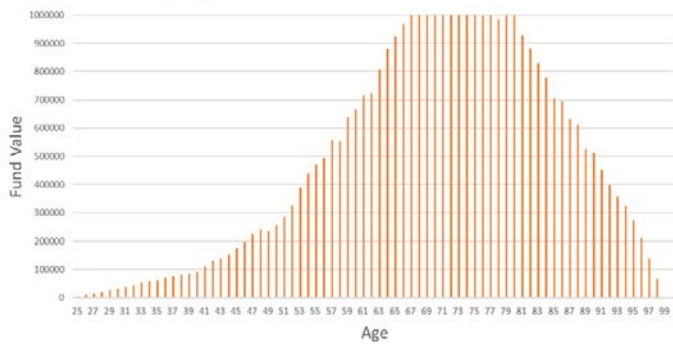
Sample growth and decumulation for a member of a DC plan



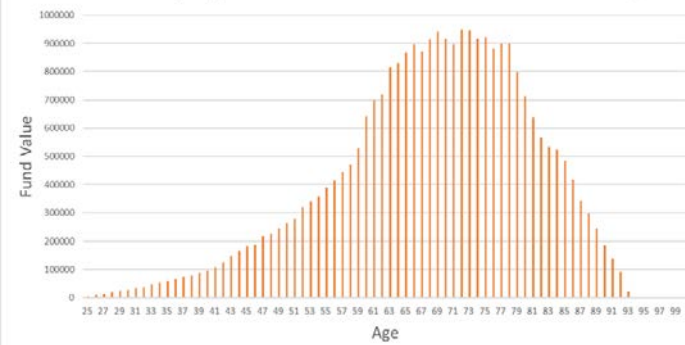
Sample growth and decumulation for a member of a DC plan



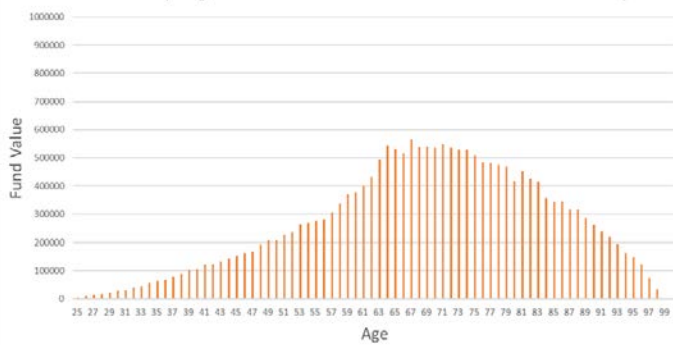
Sample growth and decumulation for a member of a DC plan



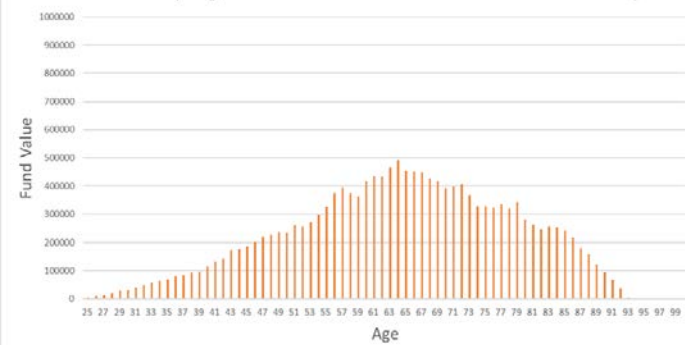
Sample growth and decumulation for a member of a DC plan



Sample growth and decumulation for a member of a DC plan



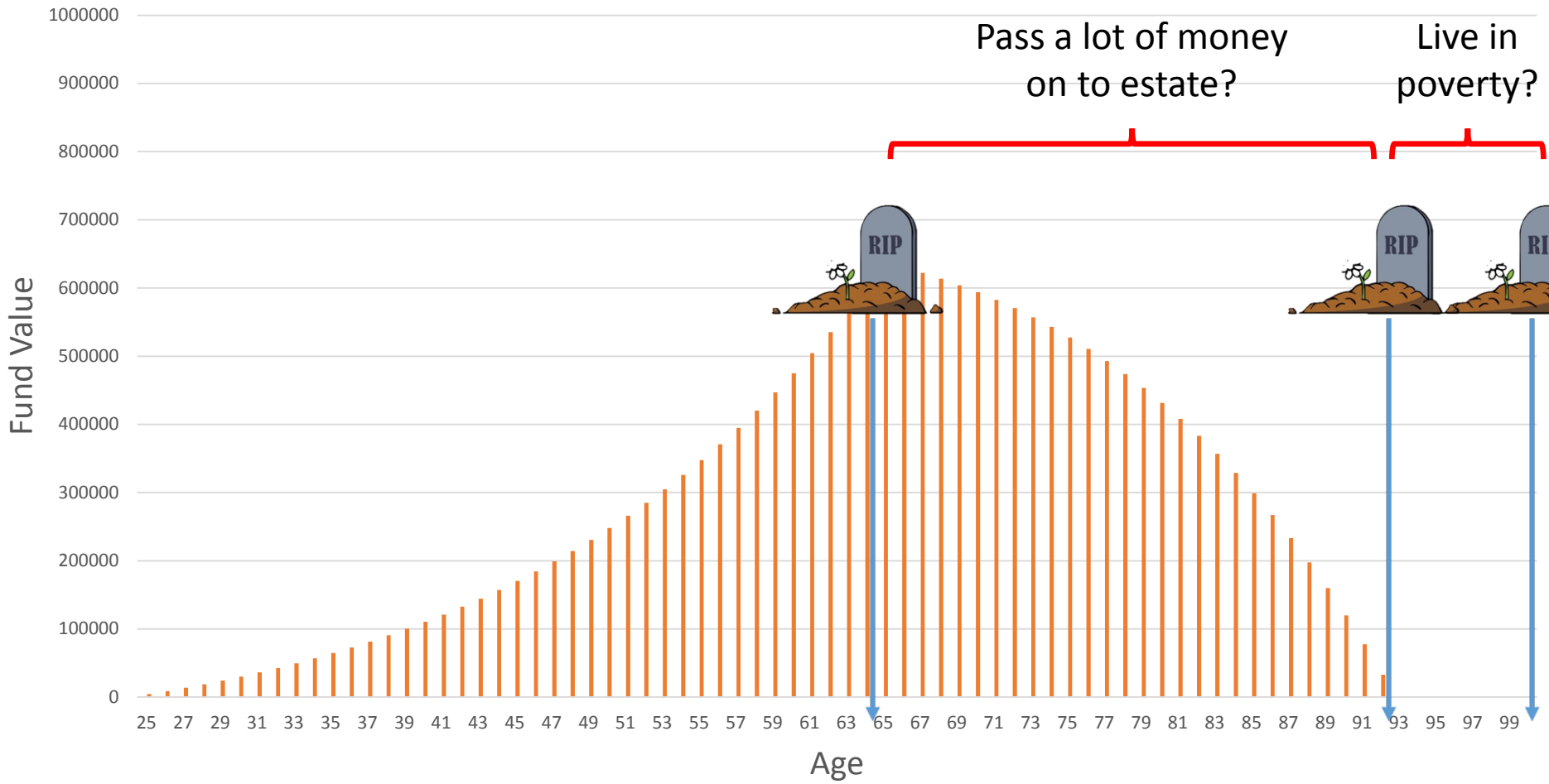
Sample growth and decumulation for a member of a DC plan



Sample growth and decumulation for a member of a DC plan

How long will he/she survive? (post retirement)





.....possibly not the most enjoyable
retirement experience

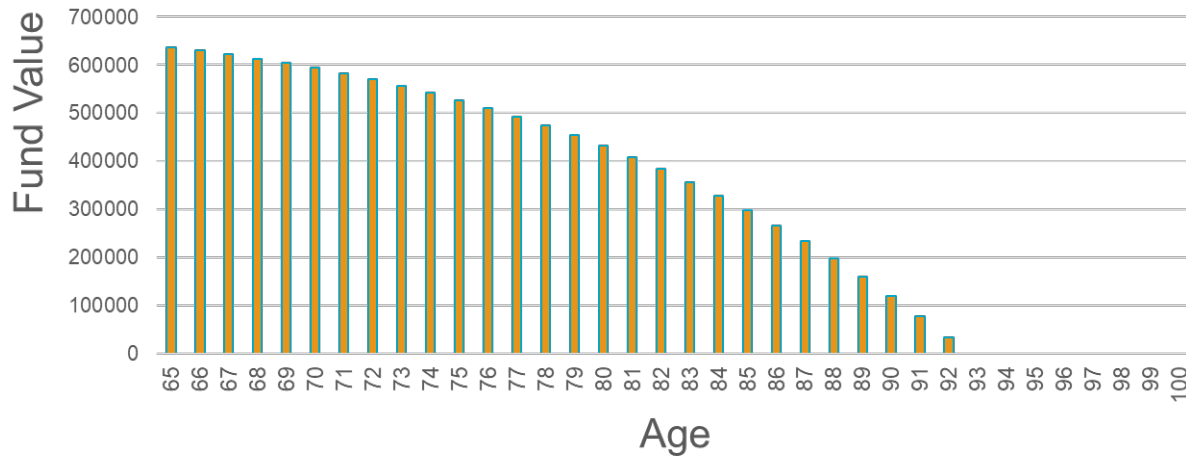
So would I buy an annuity or go
with drawdown?

A closer look at drawdown – focus on inheritance

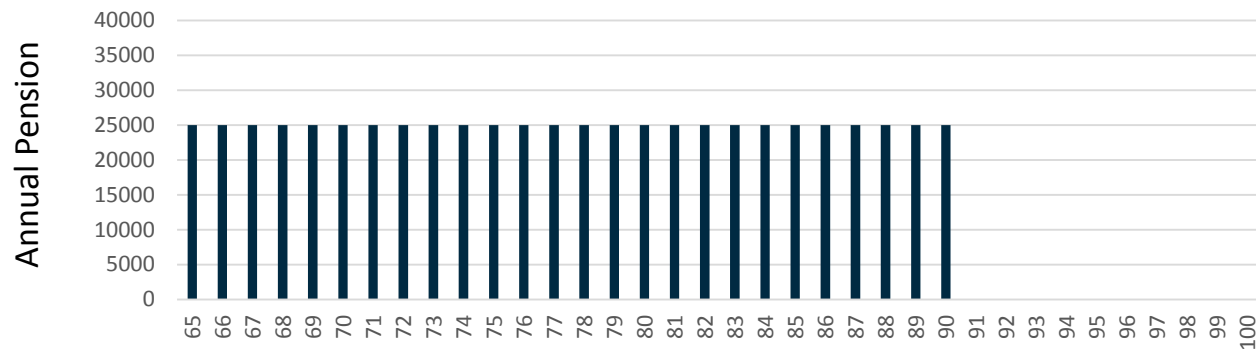
Drawdown - Fund Value and annual pension



Single Life



Projected Annual Pension



Again figures here are for illustrative purposes only
i.e. focus on shape of graph rather than numbers in graph
e.g. ignoring inflation linked cashflows here

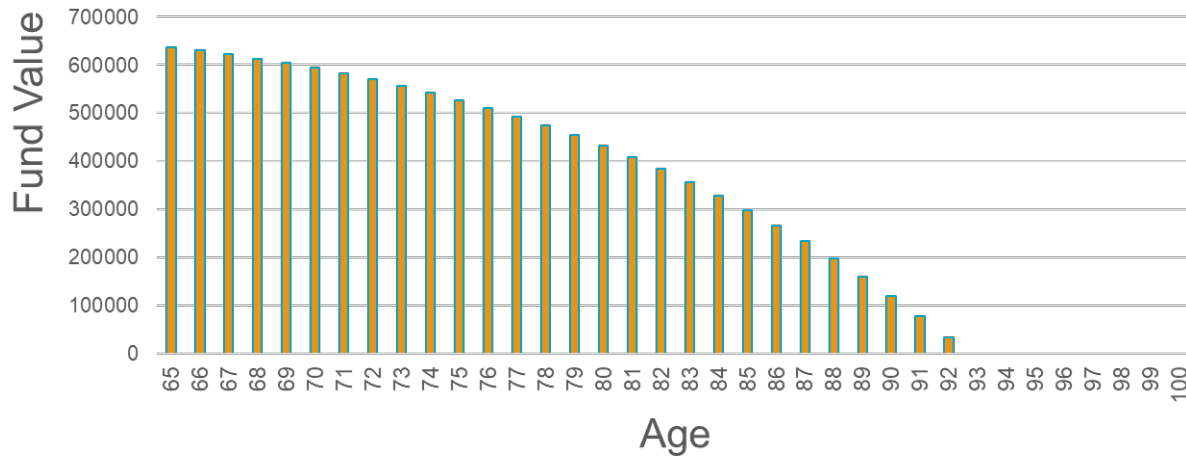
The inheritance



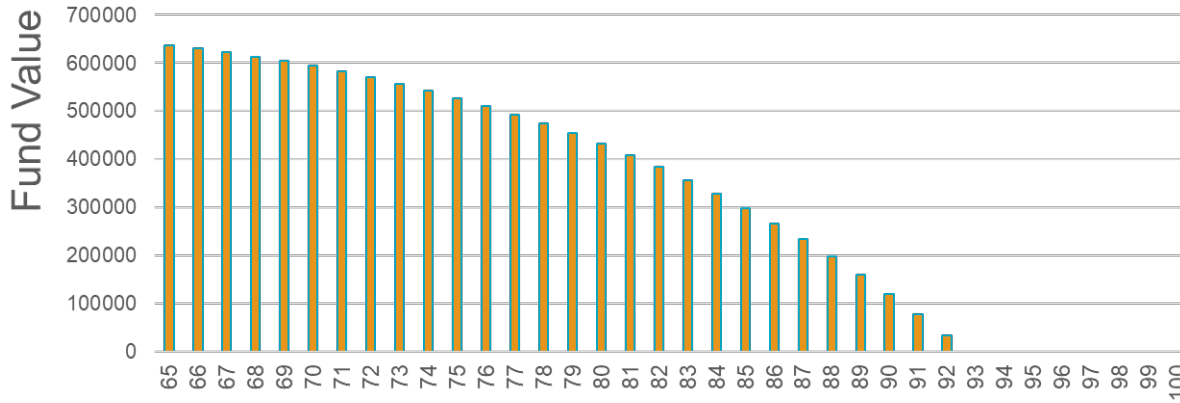
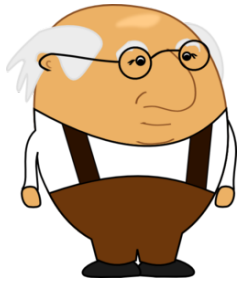
Single Life



Heir / Estate



The inheritance



Heir / Estate



I get it all



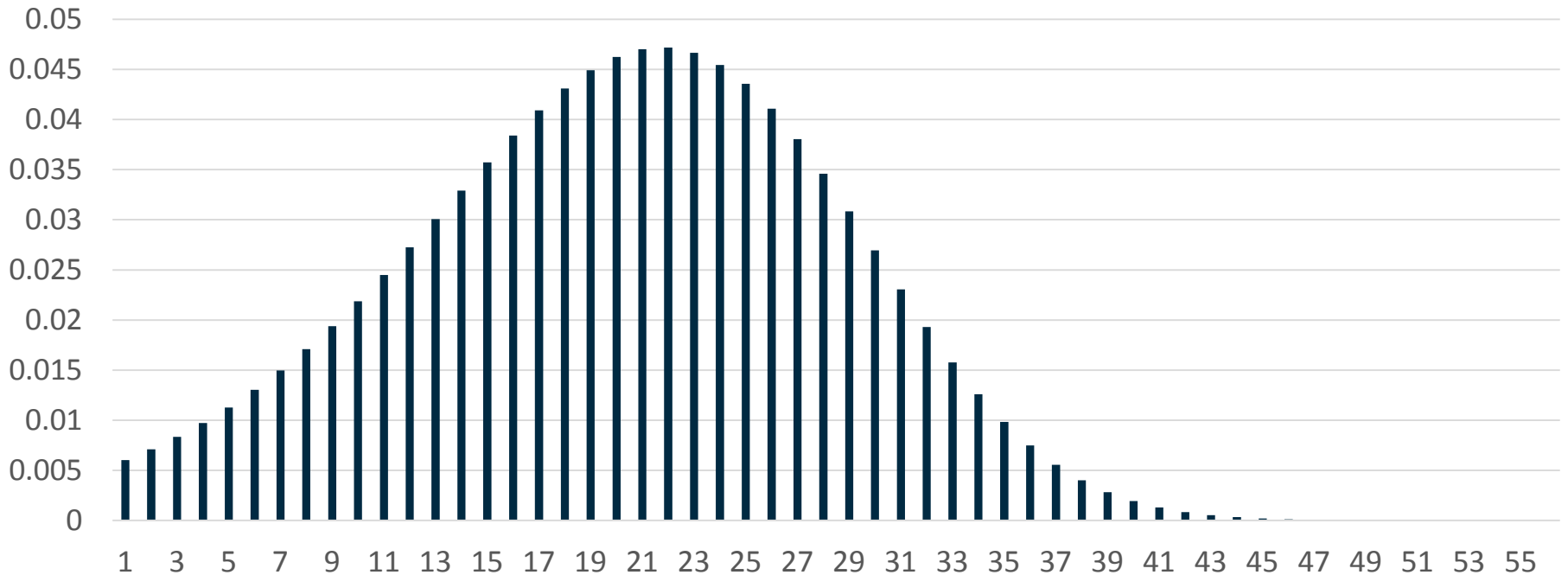
I get something



I get nothing

Valuing the inheritance

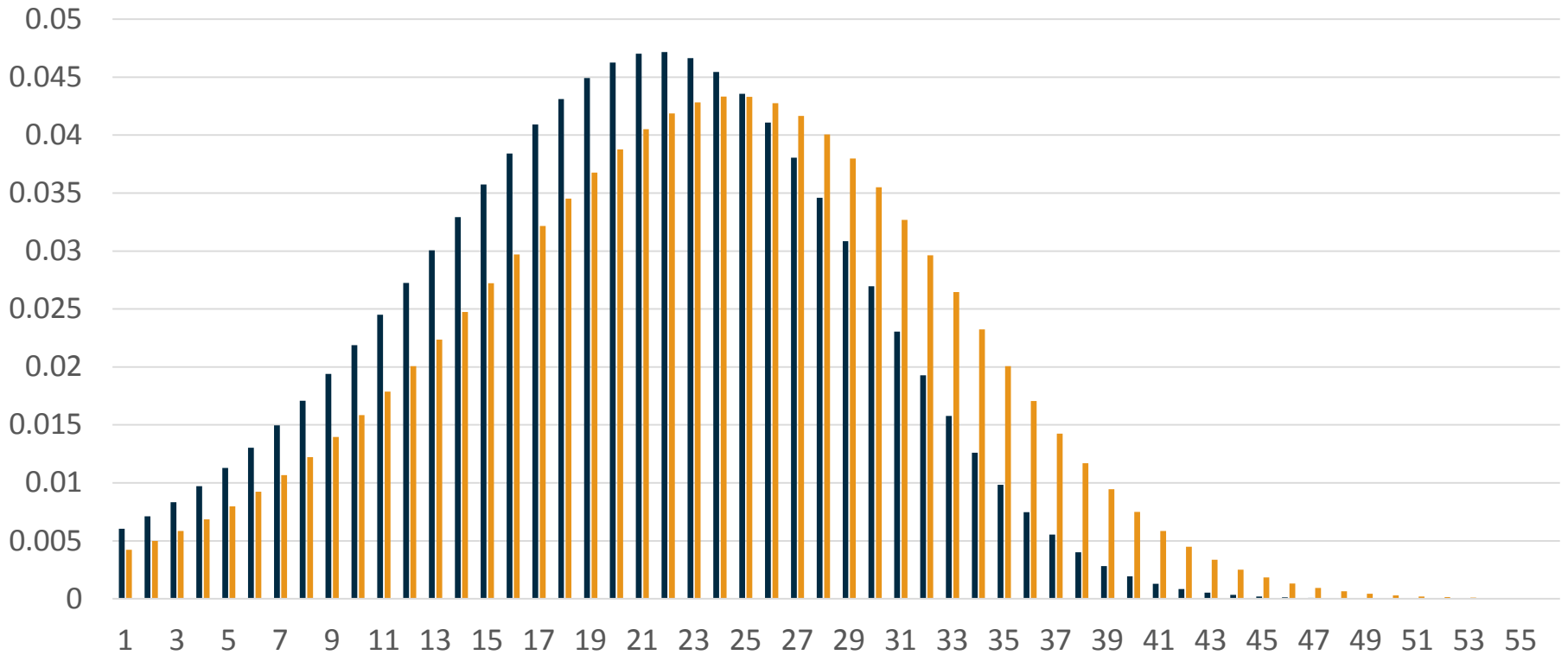
Future lifetime in years - male aged 65
Probability Mass function



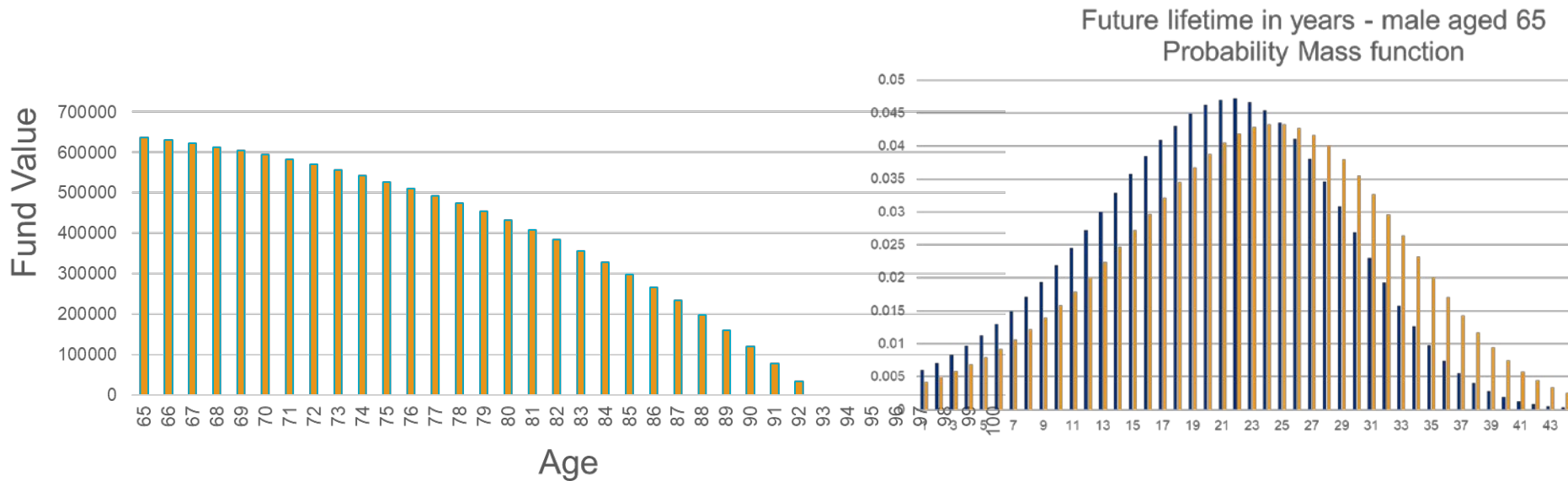
Again figures here are for illustrative purposes only
i.e. focus on shape of graph rather than numbers in graph

Valuing the inheritance

Future mortality improvements?



Approximate value of the inheritance

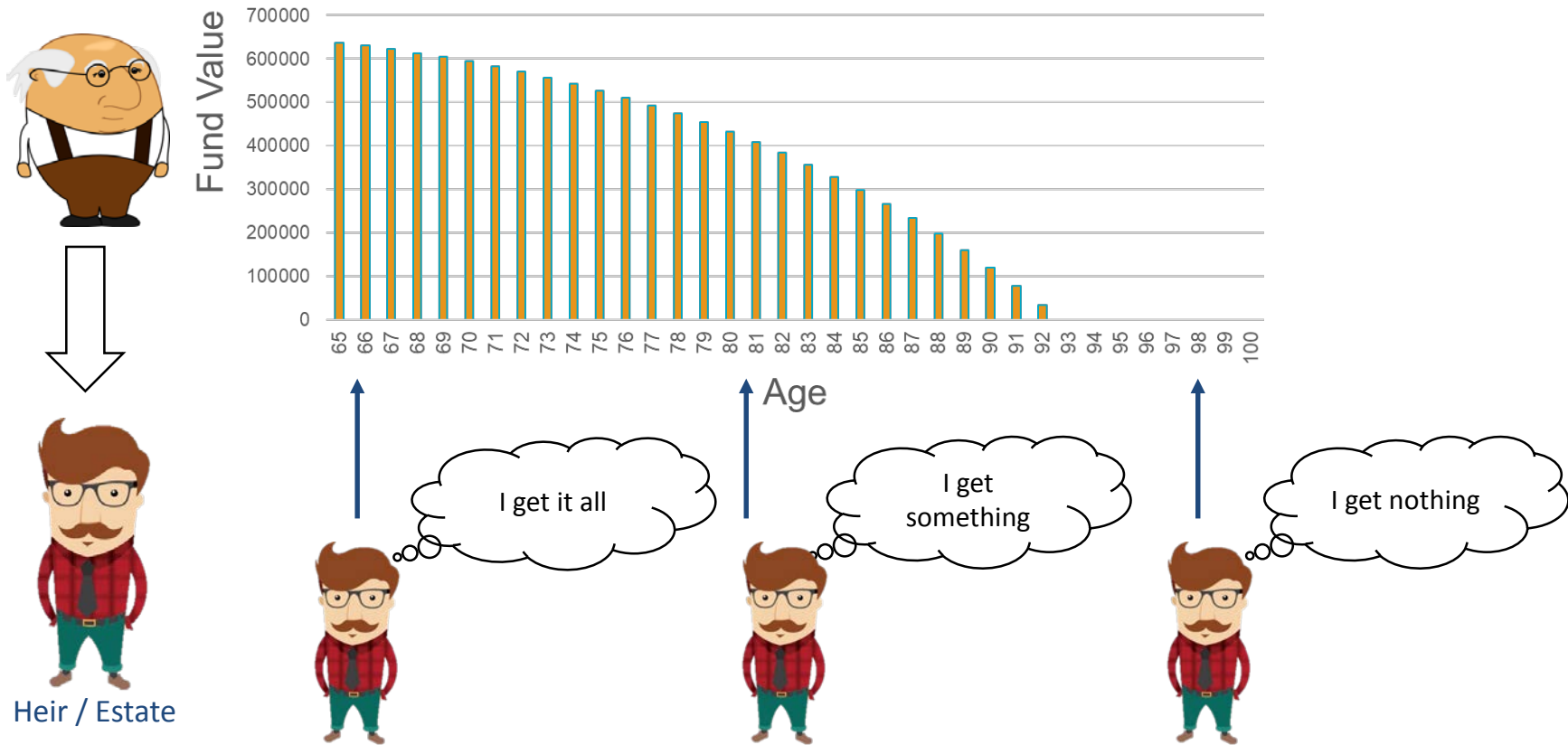


$$\sum_{k=0}^{\infty} ({}_kP_x \cdot q_{x+k}) (v^{k+1}) (\text{Fund at age } x+k)$$

Expected present value of inheritance is a function of drawdown rate, life table, age at retirement, financial assumptions

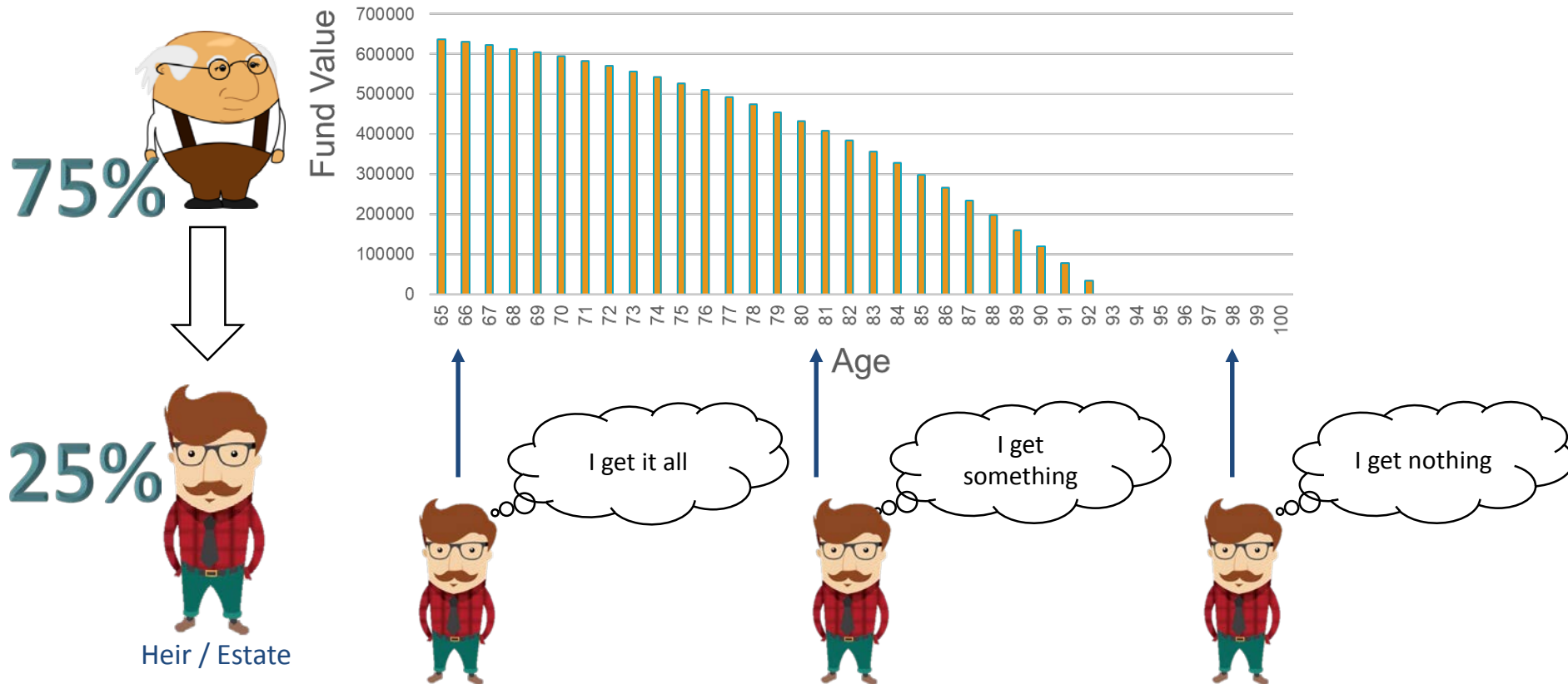
*Simple annual deterministic calculation rather than stochastic calculation

Value of inheritance – order of magnitude?...



Value of inheritance – order of magnitude?...

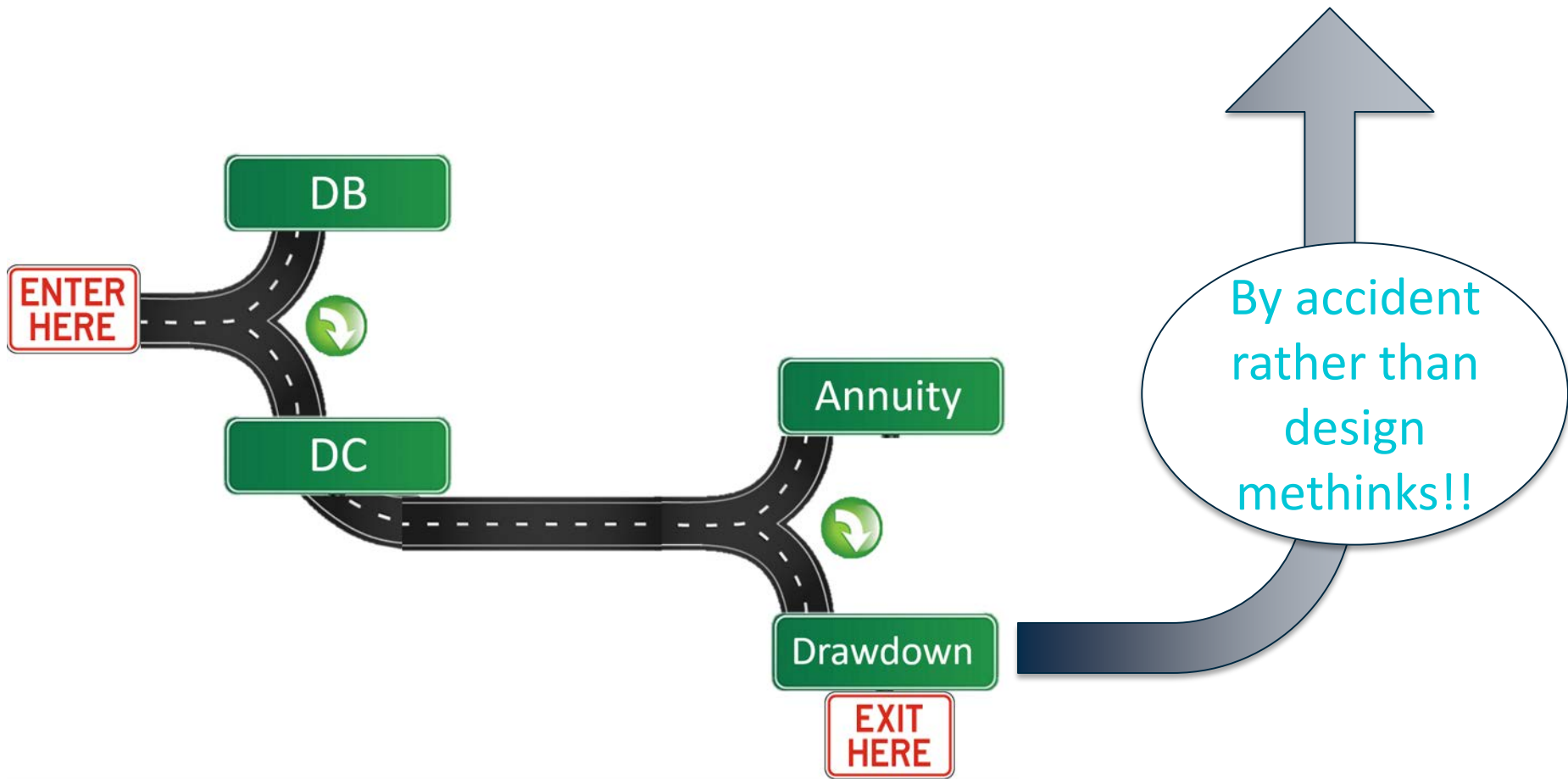
Expected present value of pension versus inheritance cashflows



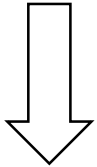
and inheritance

The ABC Ltd Defined Contribution Pension [^] Plan

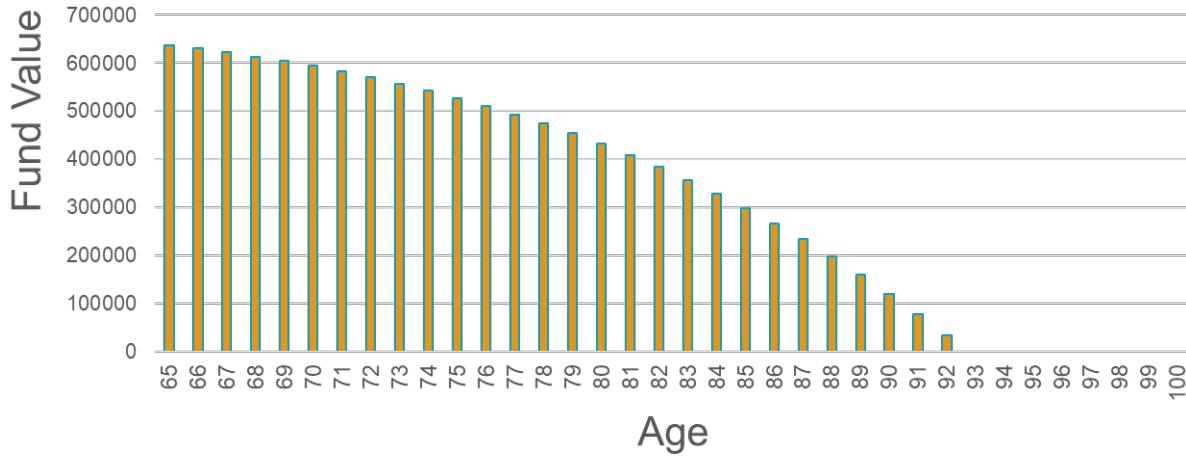
The ABC Ltd Defined Contribution Pension [^] Plan and inheritance





The inheritance




Heir / Estate





The pension

The inheritance

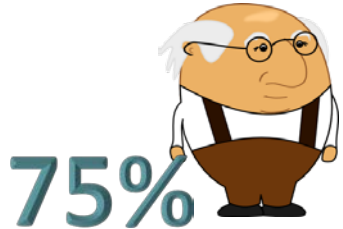
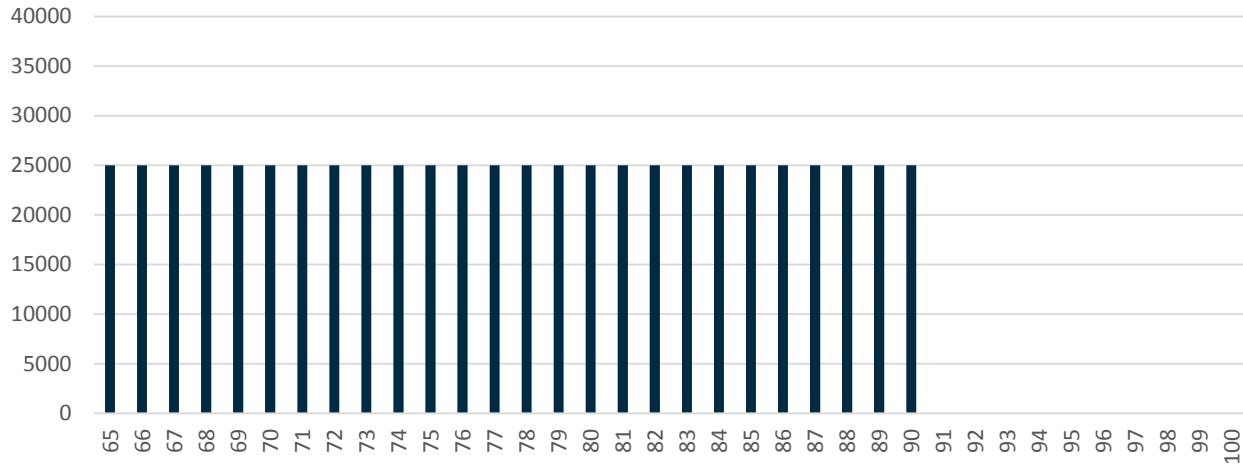


The house

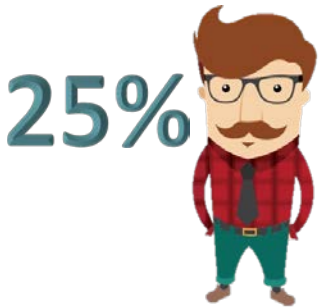
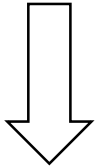
 

The pension cashflows

Projected Annual Pension - no Tontine



75%

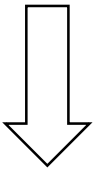
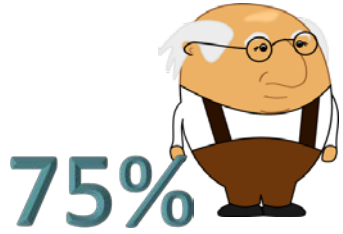
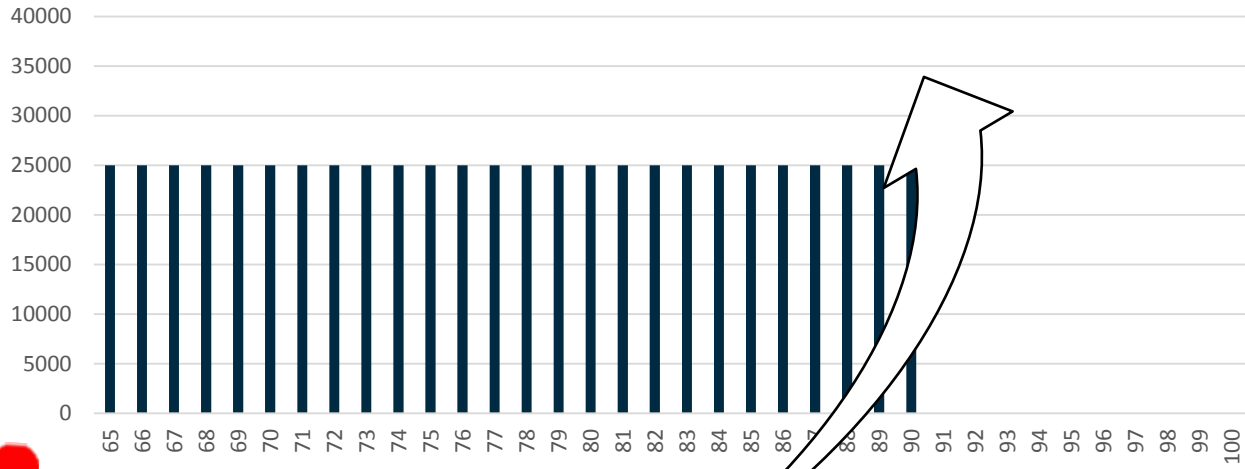


25%

Heir / Estate

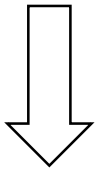
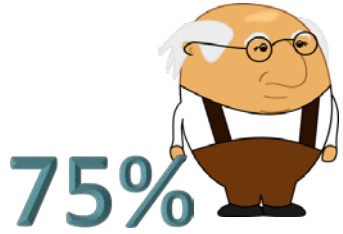
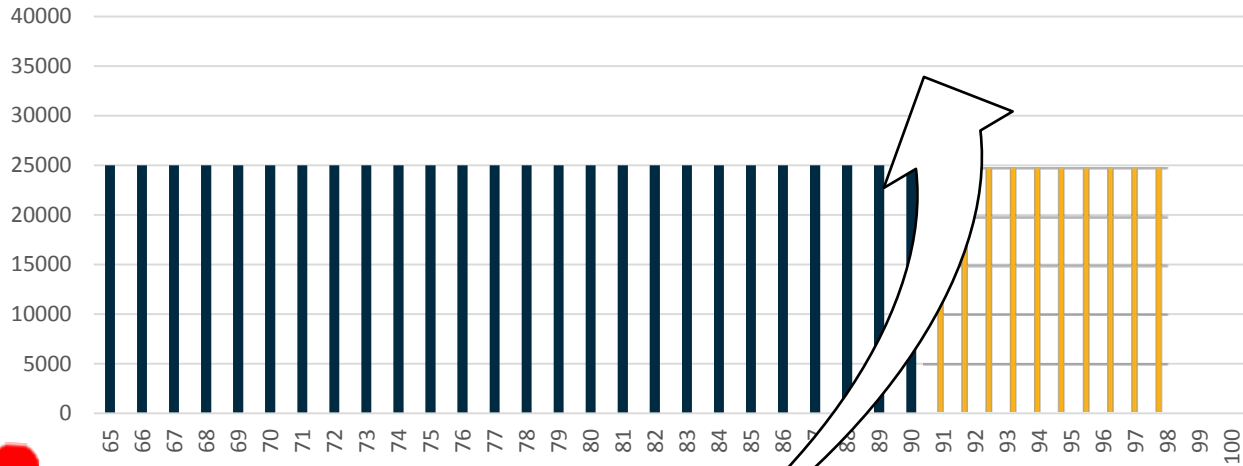
The pension cashflows

Projected Annual Pension - no Tontine



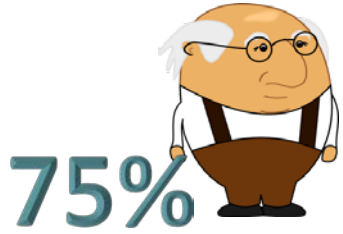
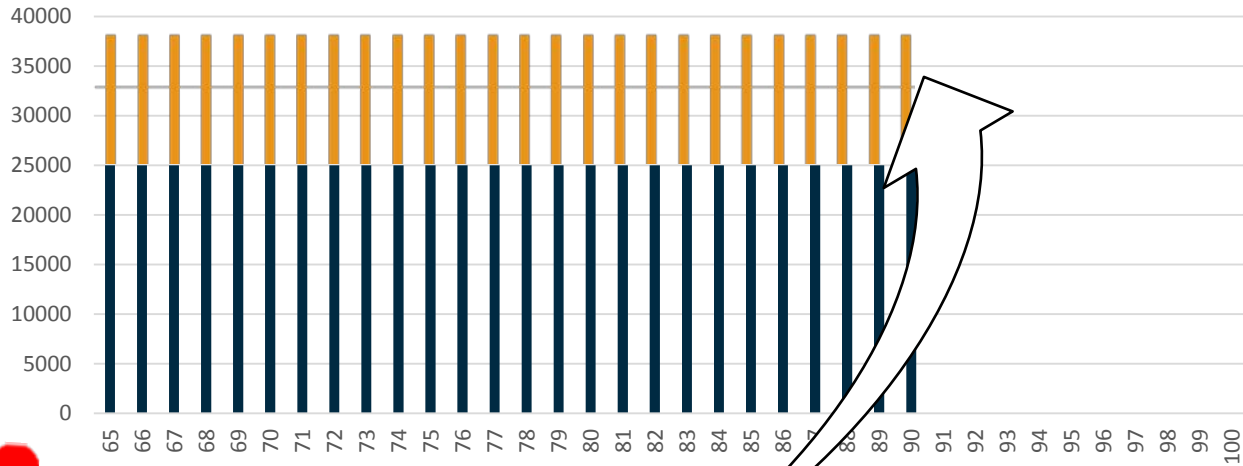
The pension cashflows

Projected Annual Pension - with Tontine

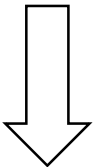


The pension cashflows

Projected Annual Pension - with Tontine

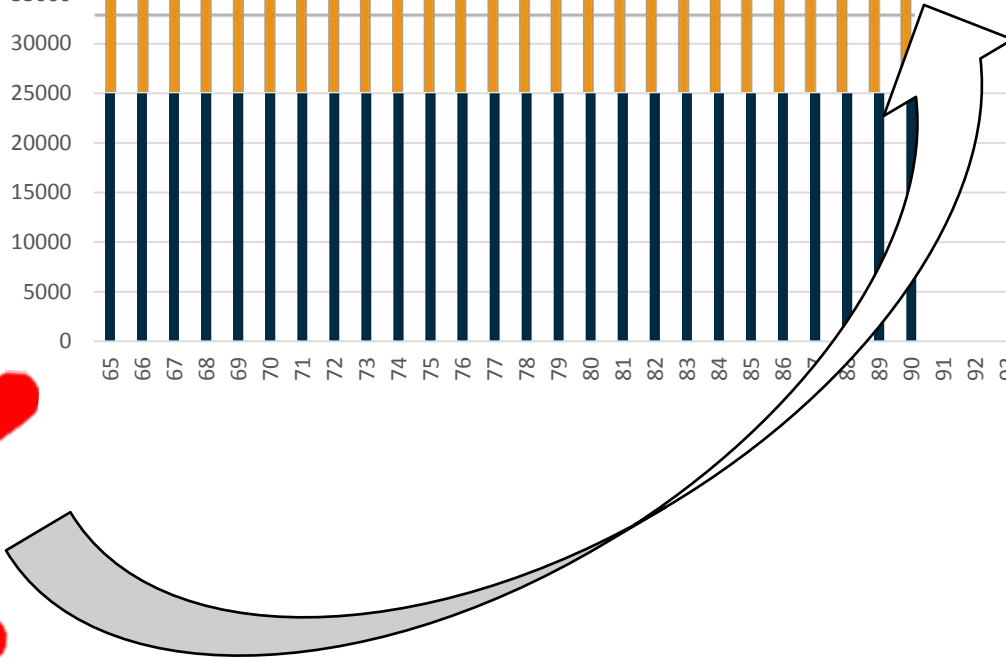


75%



25%

Heir / Estate



How a modern pension Tontine might
work

Earlier we looked at a simple 2 person Tontine



Bob

€1m age 65

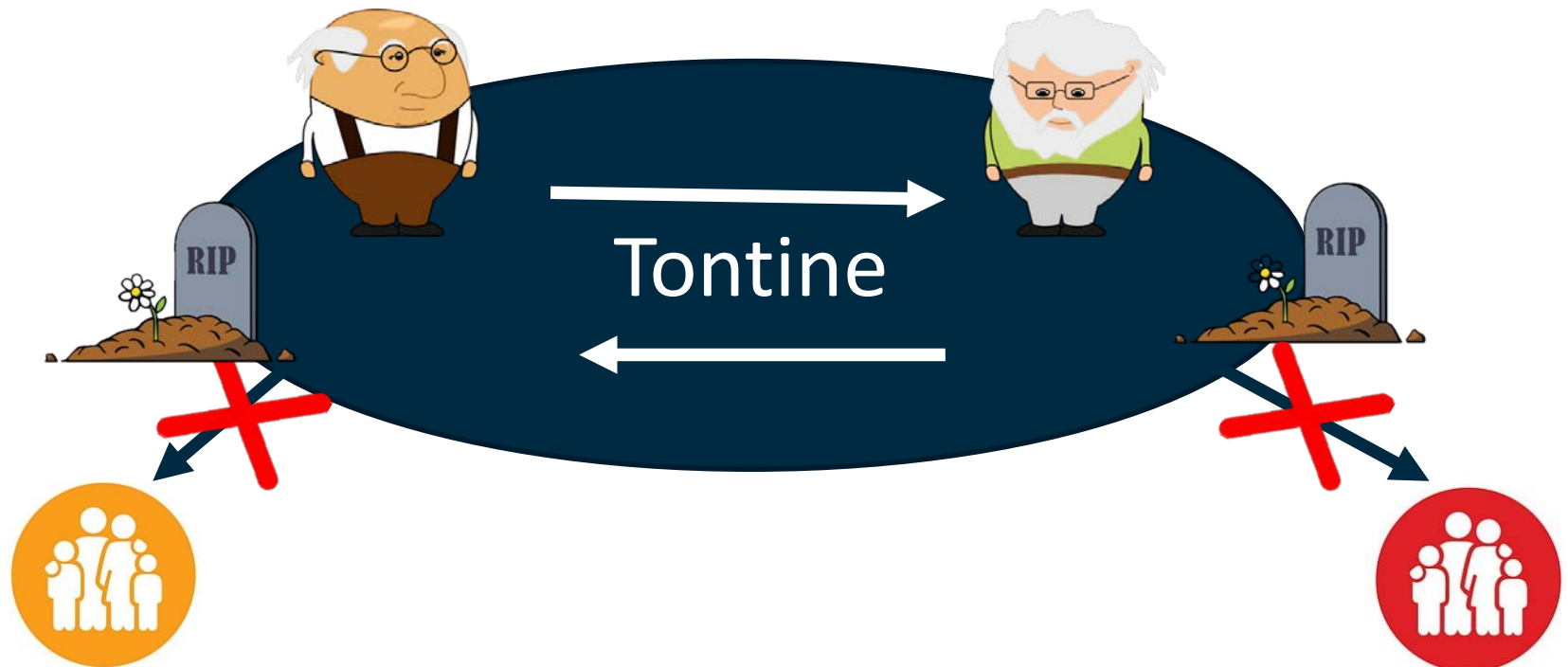


Bill

€1m age 65

If Bob dies at, say, age 75 then he will pass €500k to his estate and if Bill dies at, say, 95 he will have 10 years with no pension

Bill and Bob join a 2 person Tontine



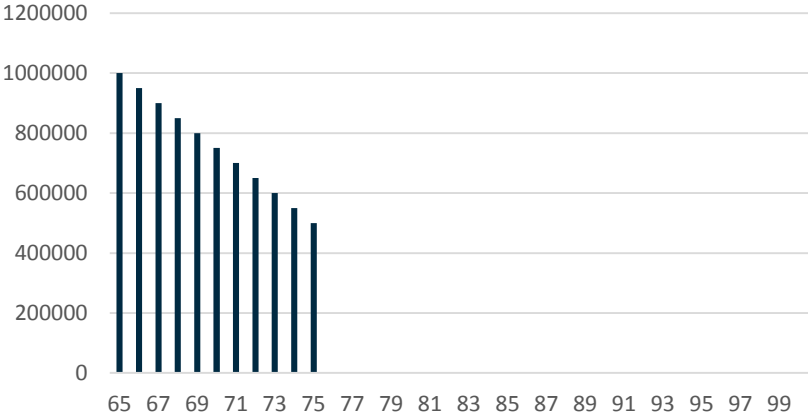
Bob's estate

Bill's estate

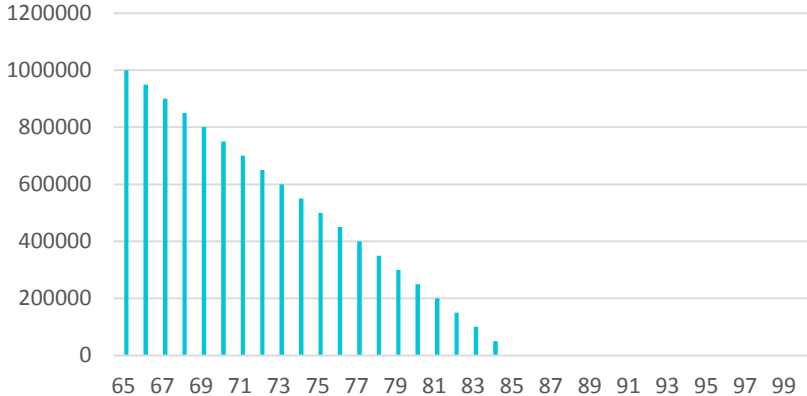
.....when either dies they give anything remaining in their pension pot to the other person rather than their estate

Pension Cashflows

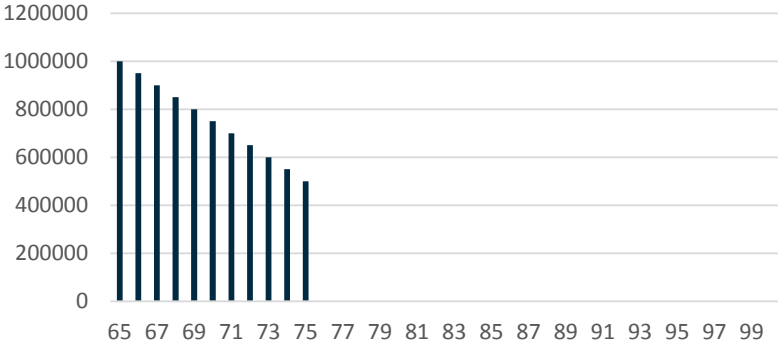
Bob's DC Fund - lives to 75



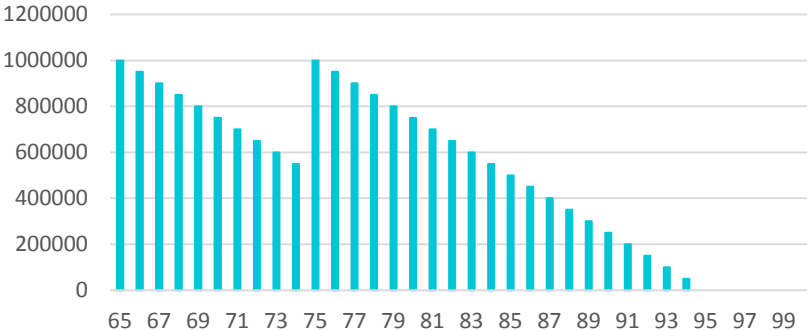
Bill's DC Fund - lives to 95



Bob's DC Fund - dies at 75 - in Tontine with Bill

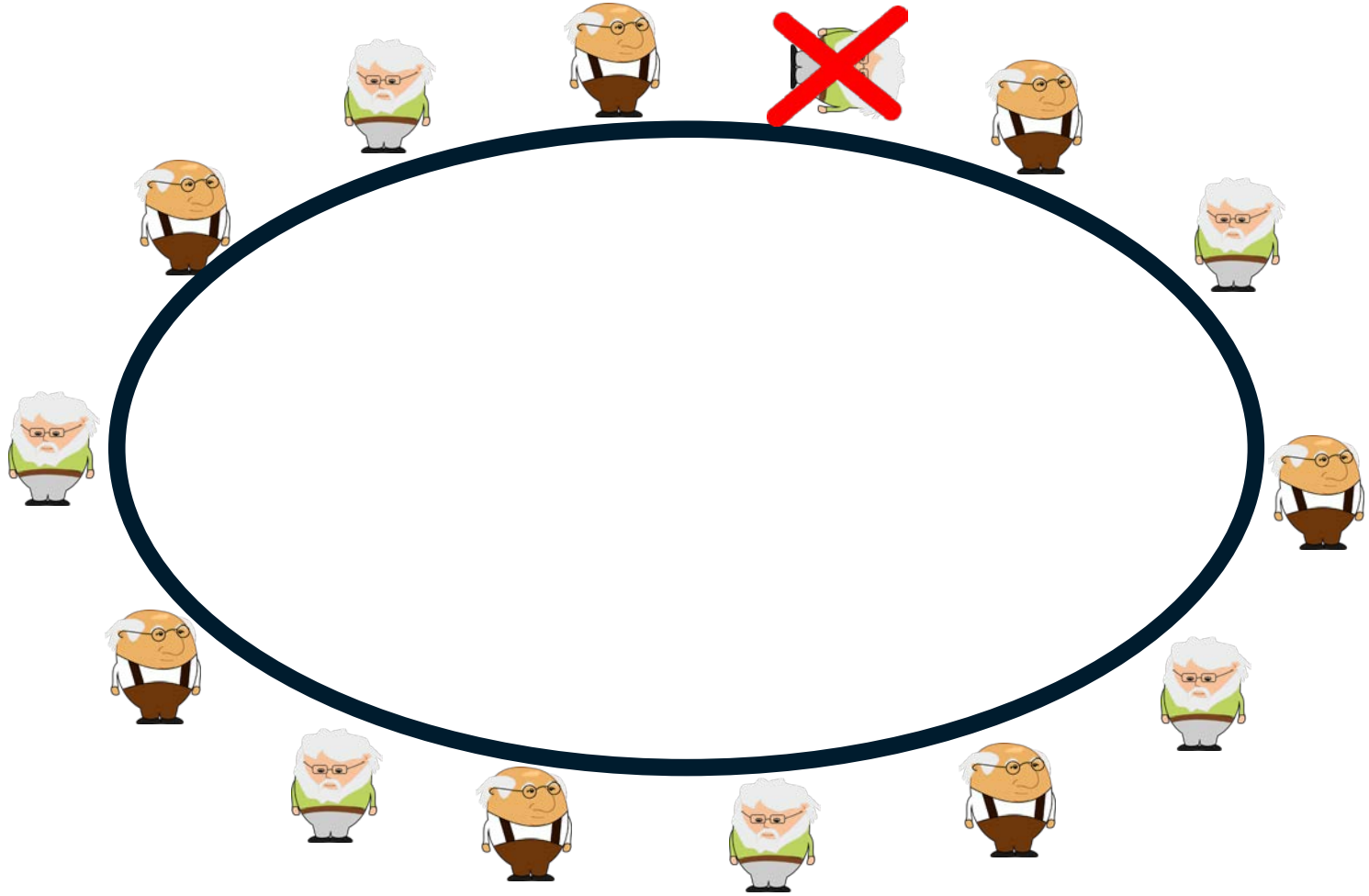


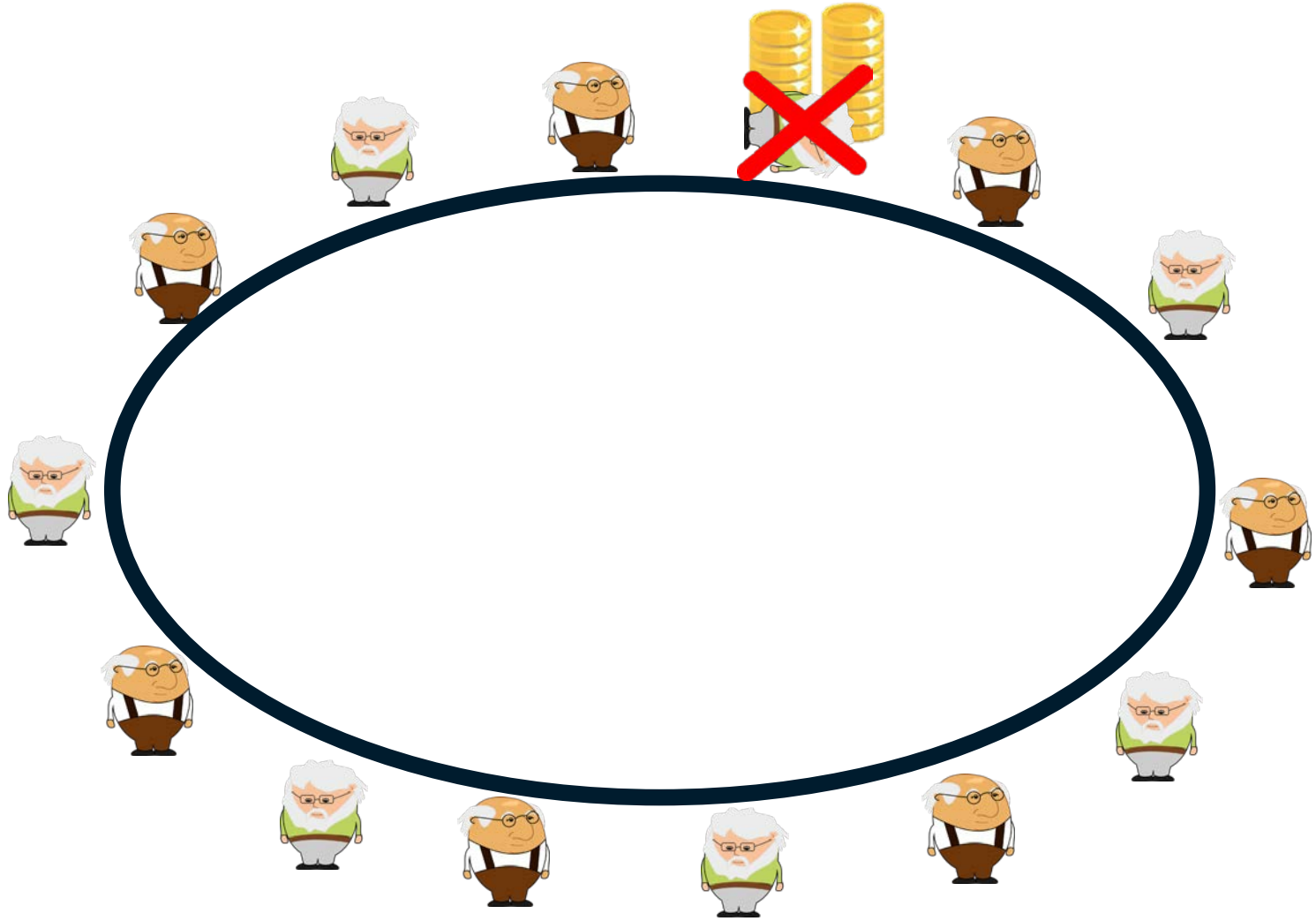
Bill's DC Fund - dies at 95 - in Tontine with Bob

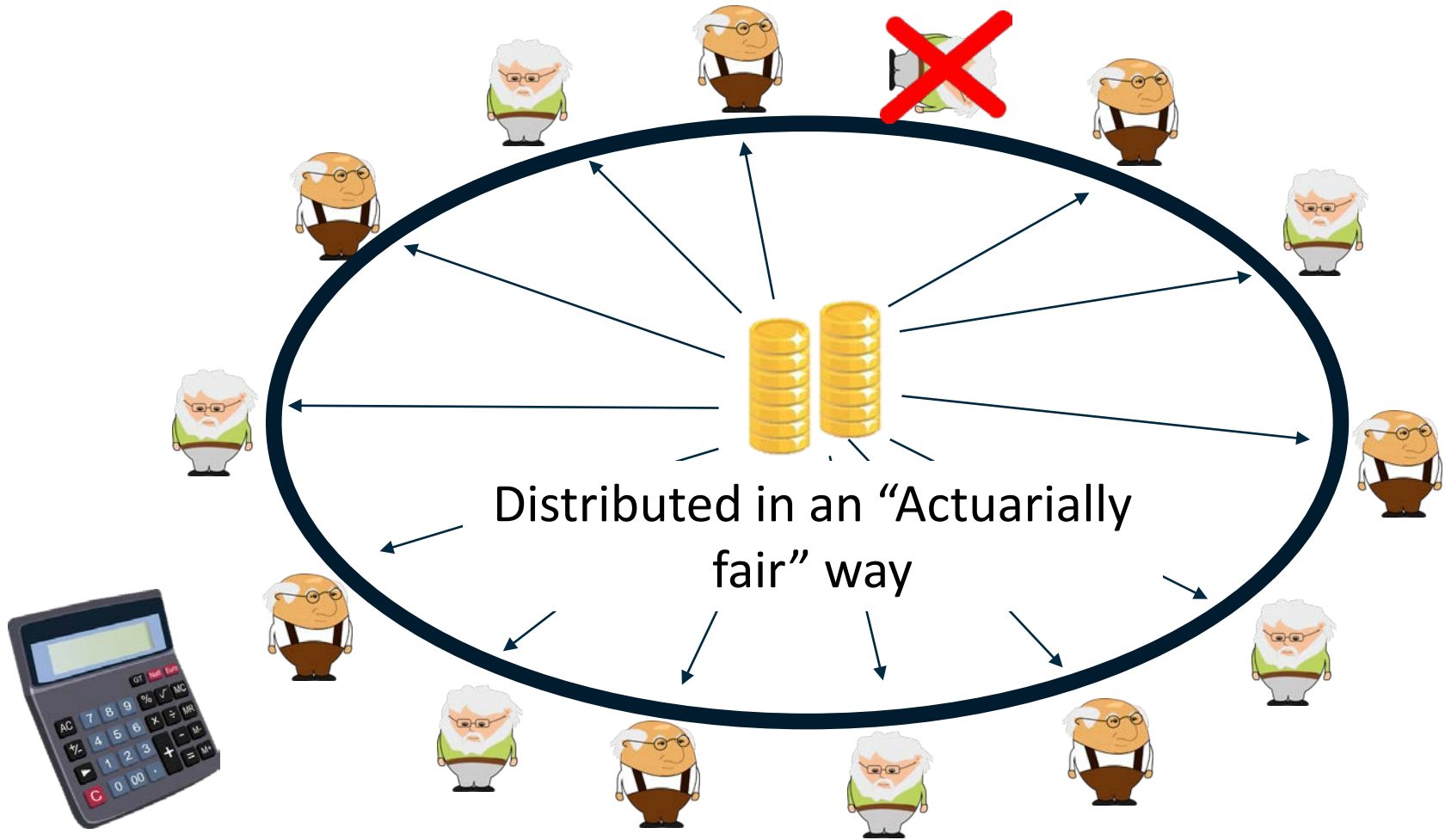


What about a 1,000 person Tontine?



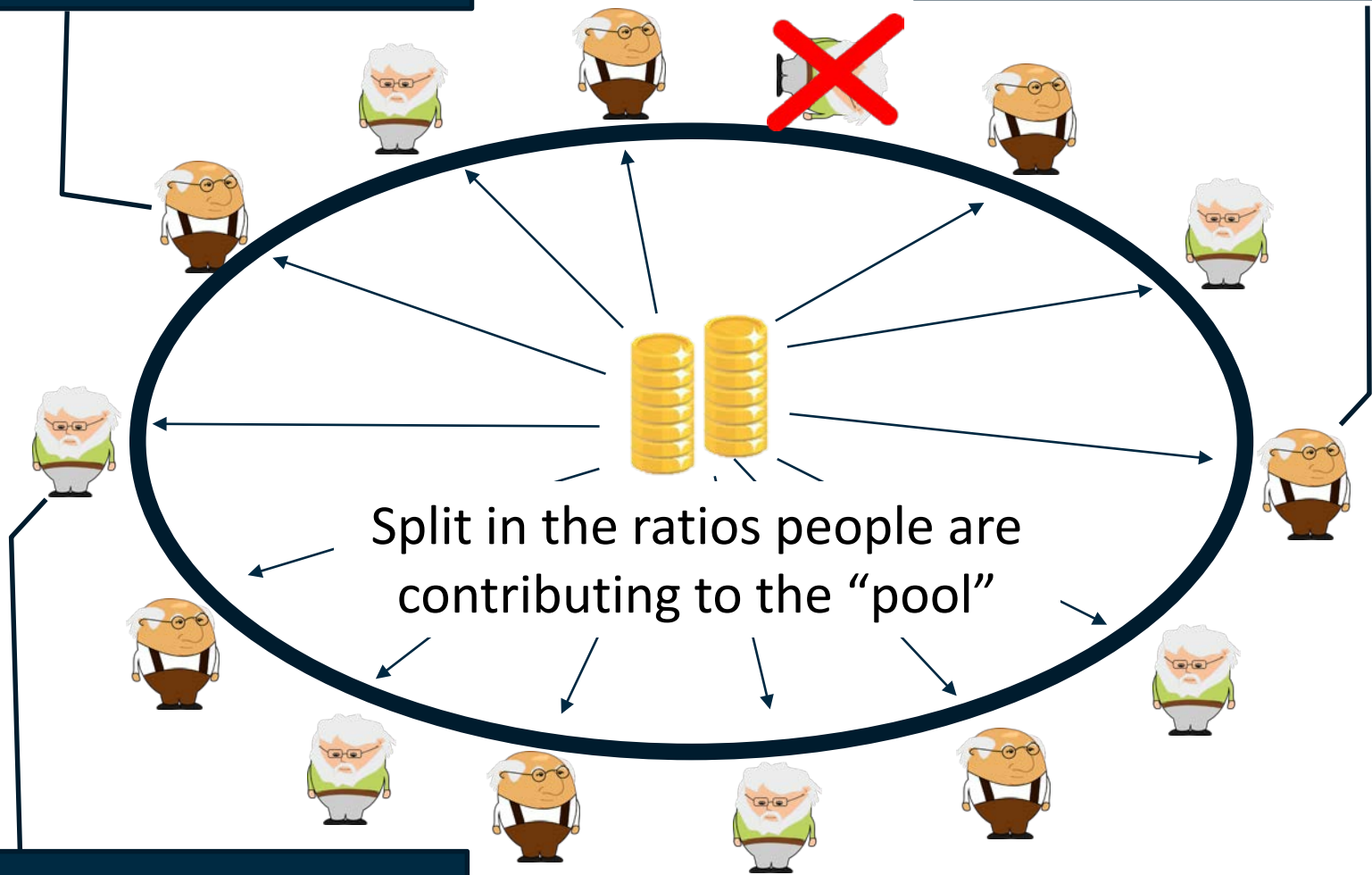






Fund Value = €800k, age 66 =>
1% chance of dying
=> $800k * 1\% = 8k$

Fund Value = €300k, age 81 =>
4% chance of dying
=> $300k * 4\% = 12k$



Fund Value = €1m, age 70 =>
2% chance of dying
=> $€1m * 2\% = 20k$

Figures for illustration purposes only
Focus on the logic rather than the numbers

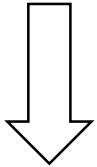
Mortality risk pooling – [DGN]

- $\lambda^{(i)}$ = Force of mortality of i^{th} member at time T .
- $W^{(i)}$ = Fund value of i^{th} member at time T .
- Payment (longevity credit) to i^{th} member:

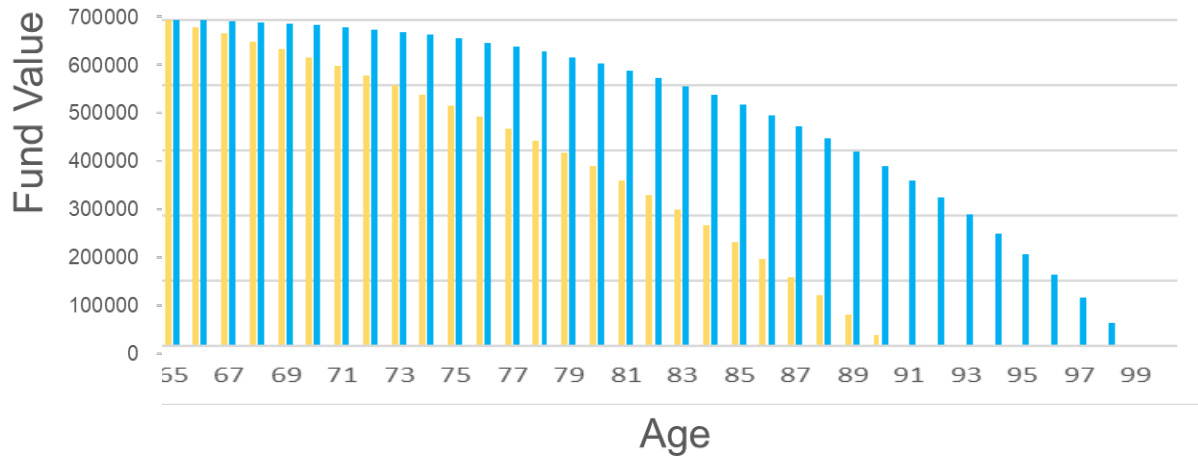
$$\frac{\lambda^{(i)} \times W^{(i)}}{\sum_{k \in \text{Group}} \lambda^{(k)} \times W^{(k)}} \times \{\text{Bob's remaining fund value}\}$$



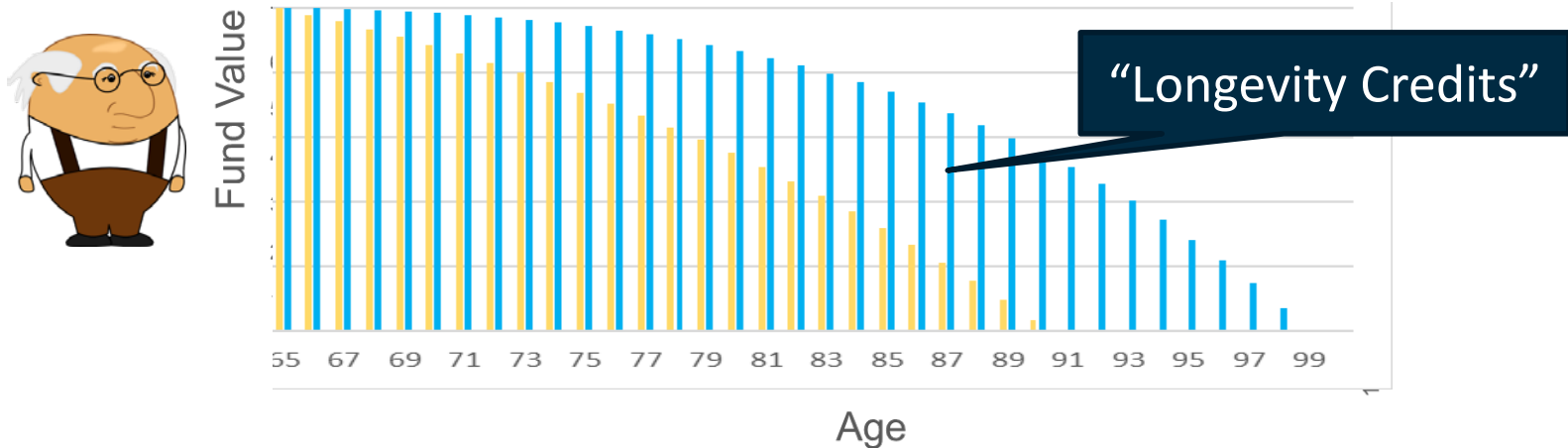
Tontine increases the value of pension cashflows at the expense of the inheritance



Heir / Estate



Key features



- The Tontine enables the member to ‘convert’ inheritance cashflows into pension cashflows.
- The Expected Present Value of the pension cashflows increases substantially (paid for by the forfeited inheritance cashflows.)
- All else being equal, significantly lower probability of retiree outliving their fund.
- Transparent – formula driven.
- **No guarantees** – (drawback for member? Impact on capital requirements?)
- Mortality improvements not covered like an annuity.

Retirement Options of the Future?

Annuities

Tontines

Drawdown

Longevity Risk
- pooled

Investment risk
- pooled

Longevity Risk
- pooled

Investment risk
- **not** pooled



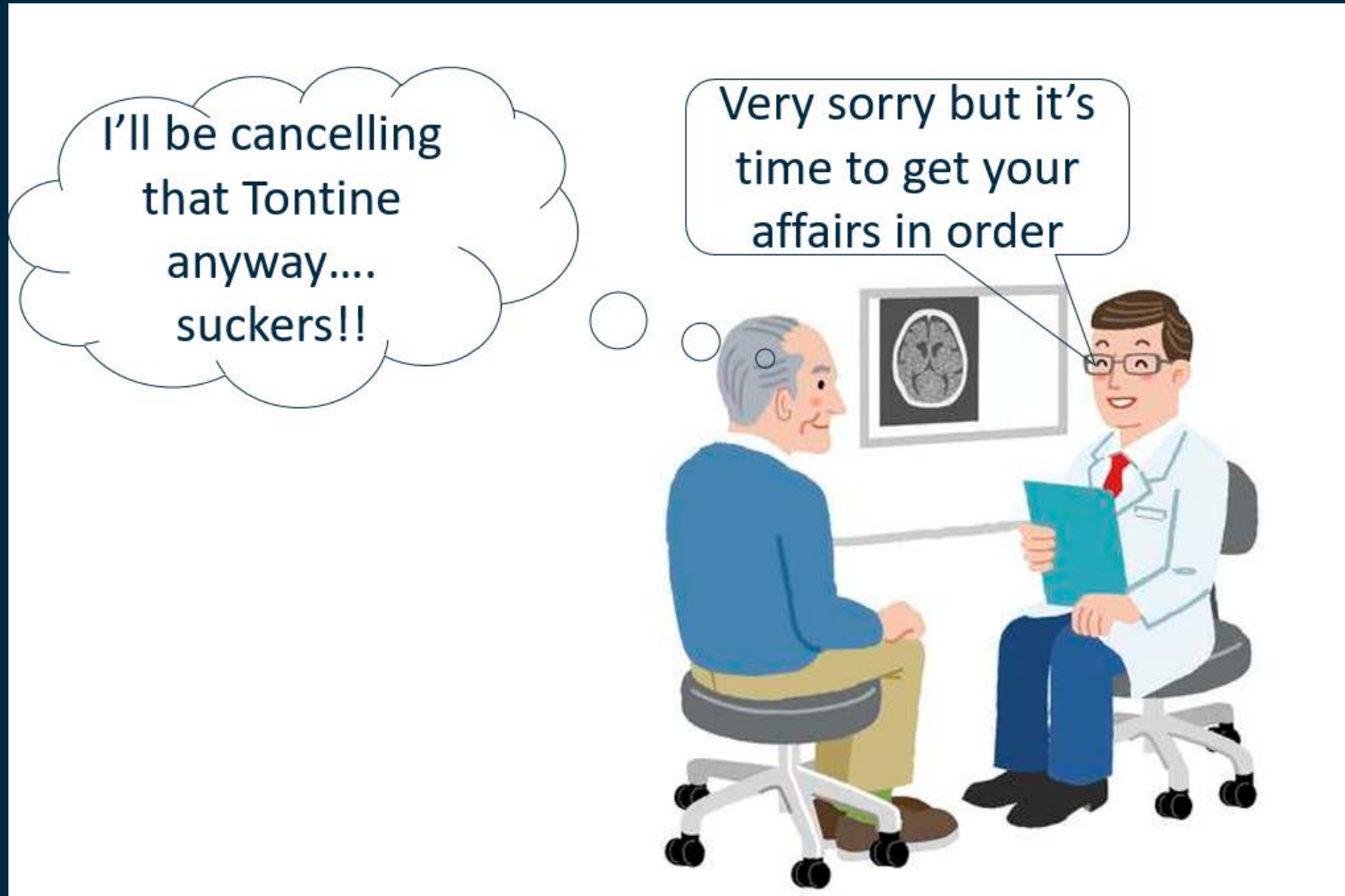
For a believer in
the Equity Risk
Premium

Longevity Risk
- **not** pooled

Investment risk
- **not** pooled

Perhaps $1/3^{\text{rd}}$ $1/3^{\text{rd}}$ $1/3^{\text{rd}}$

Rules of the Tontine?



Factors to consider in setting rules....

- Minimum number of people?
- Possible disbanding or joining with another Tontine if number falls below X
- Selection – can't leave? / can't take more than $X\%$ p.a.?
- Move from ARF to ARF+Tontine to annuity OK?
- Homogeneous groups? – Probably not
- Overspending due to illness risks
- Game theory
- Etc...much to consider

More on ~~Pension~~ Tontines

- The History
- Popular Culture
- Other research
- The marketplace
- Why now?
- Where from here?



Pery Square Tontine - Limerick

**KING WILLIAM'S
TONTINE**

Why the Retirement Annuity
of the Future
Should Resemble Its Past

MOSHE A. MILEVSKY



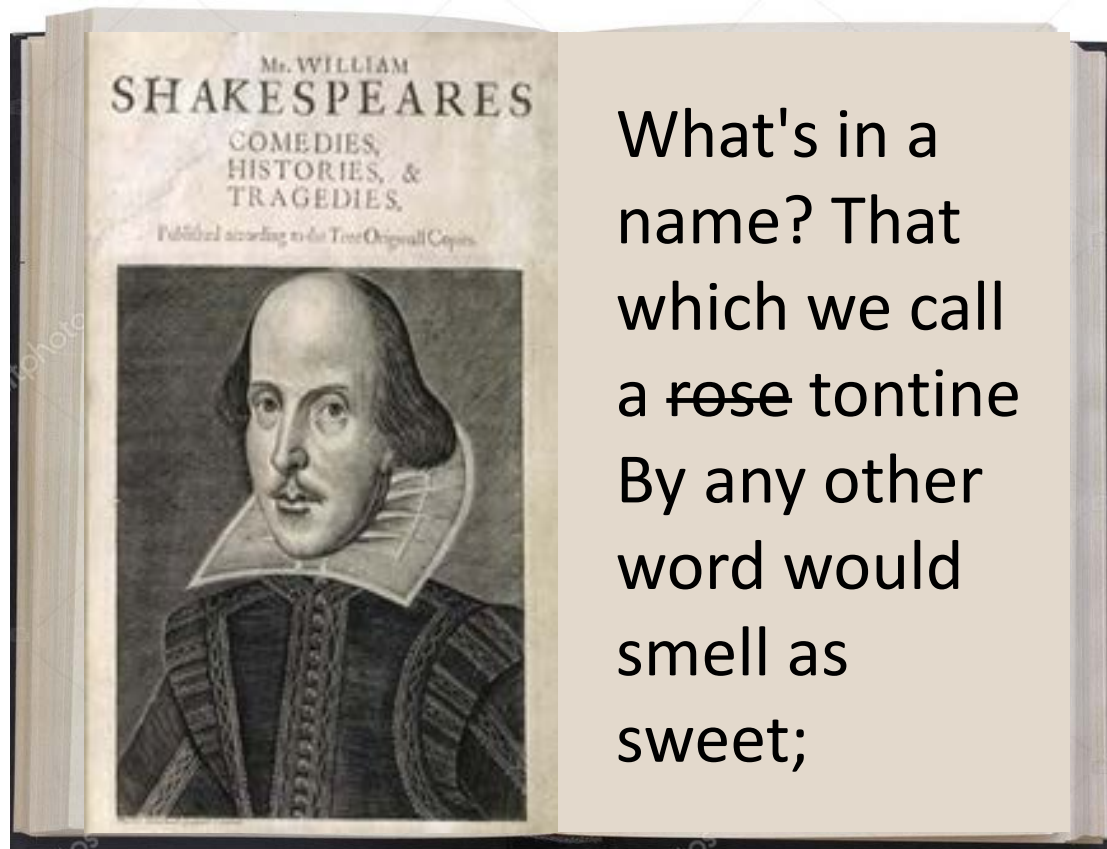
The wrong box



Tontine Coffee House
NYC first stock exchange



A “Tontine”

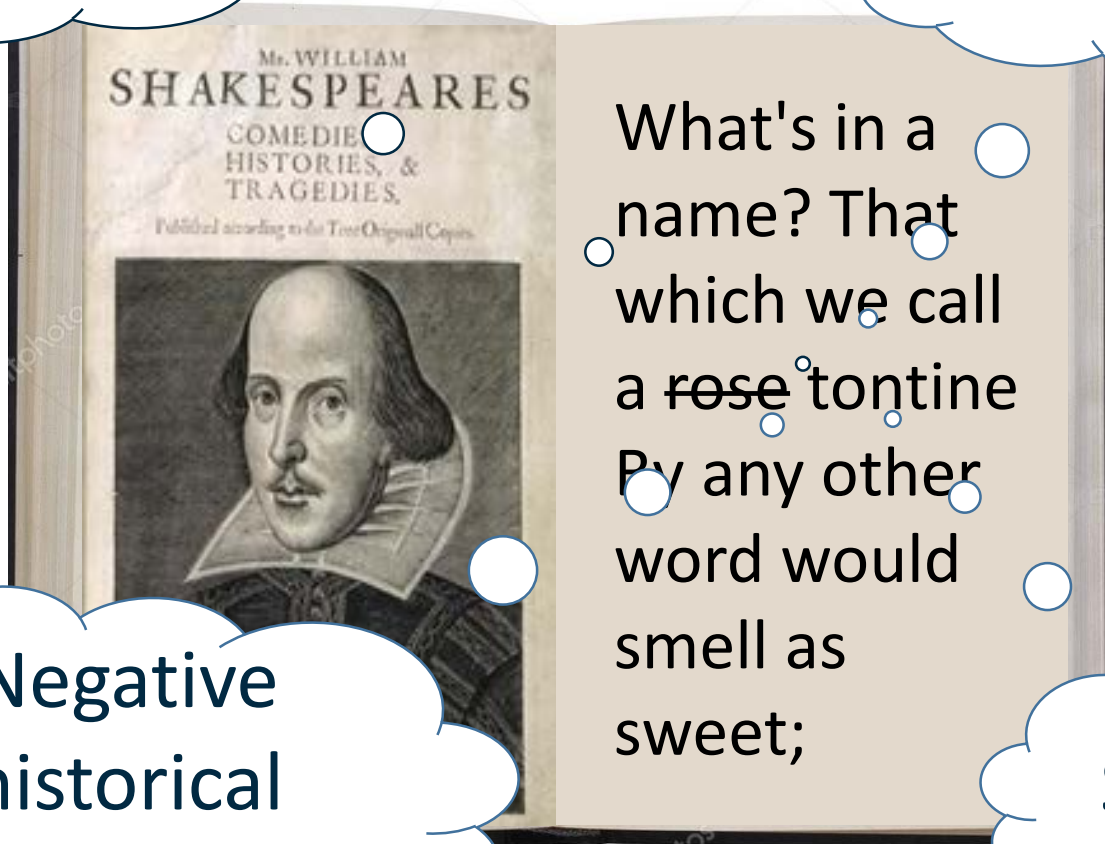


What's in a
name? That
which we call
a rose tontine
By any other
word would
smell as
sweet;

A "Tontine"

Regulations

Longevity
risk pooling

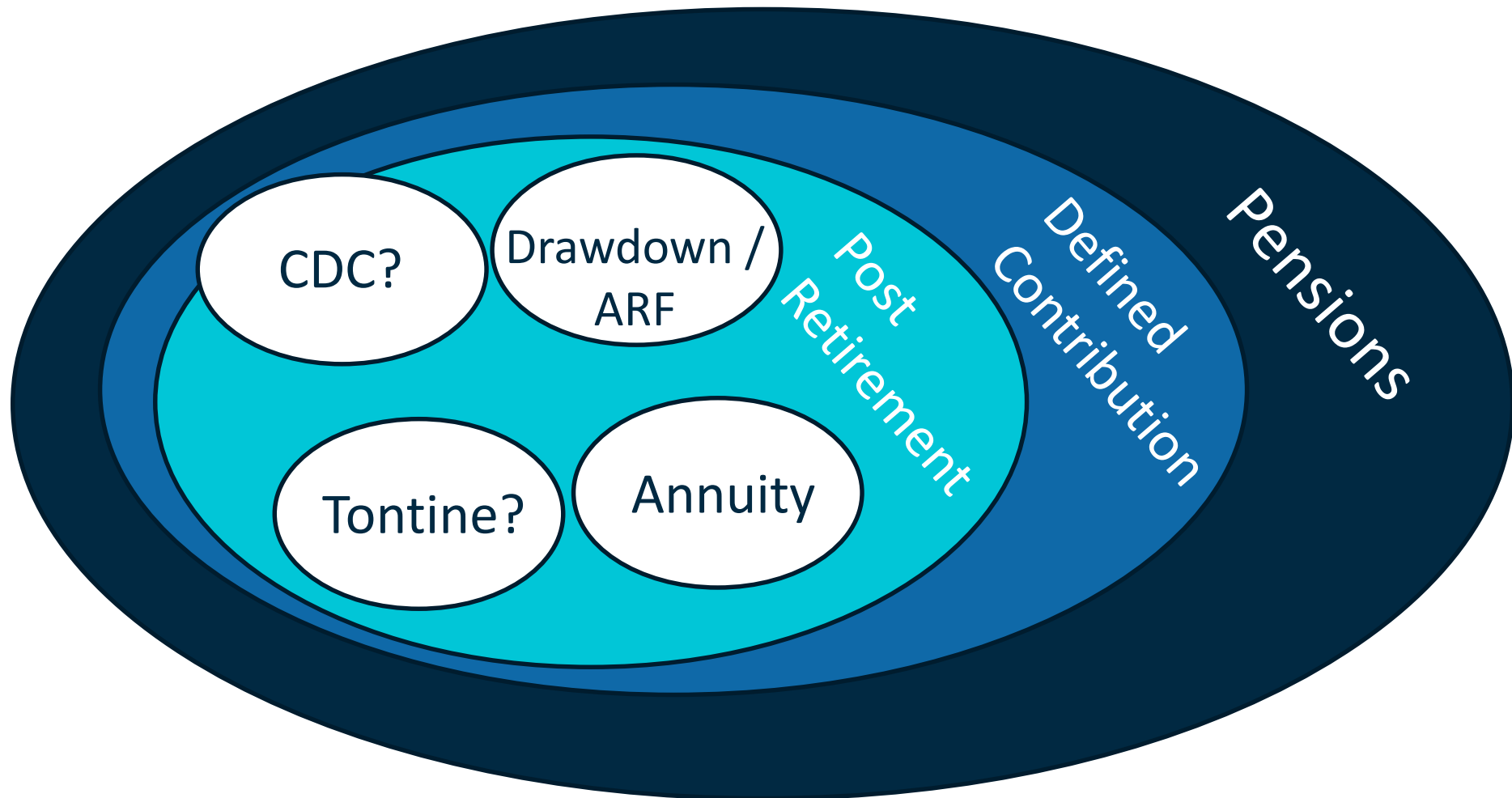


Negative
historical
connotations?

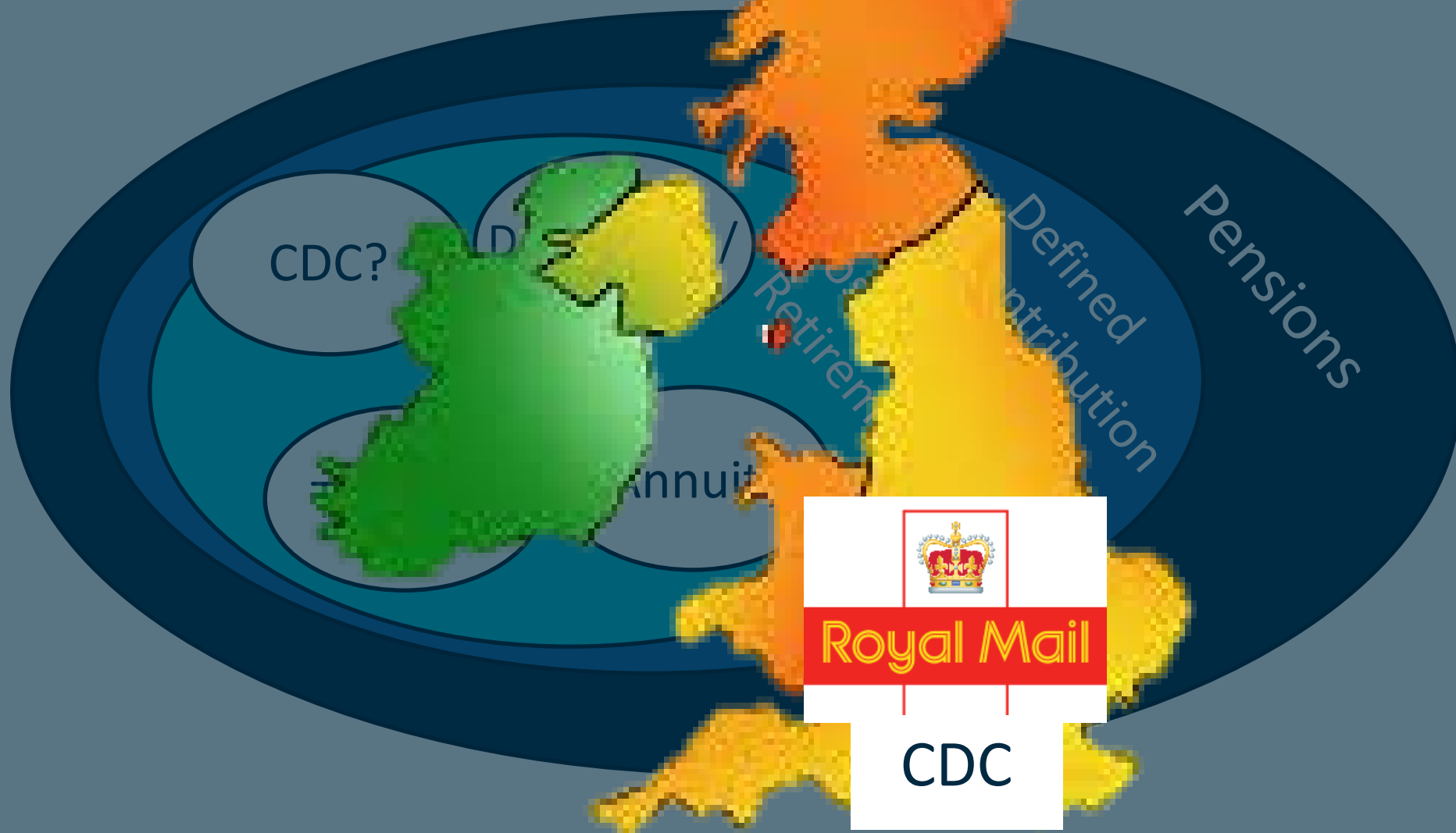
Simple

- According to DIRECTIVE 2009/138/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II),
- Article 2 1. This Directive shall apply to direct life and non-life insurance undertakings which are established in the territory of a Member State or which wish to become established there.
- 3. In regard to life insurance, this Directive shall apply: (b) to the following operations, where they are on a contractual basis, in so far as they are subject to supervision by the authorities responsible for the supervision of private insurance:
 - (i) operations whereby associations of subscribers are set up with a view to capitalising their contributions jointly and subsequently distributing the assets thus accumulated among the survivors or among the beneficiaries of the deceased **(tontines)**;

Pension Tontines versus Collective DC Schemes



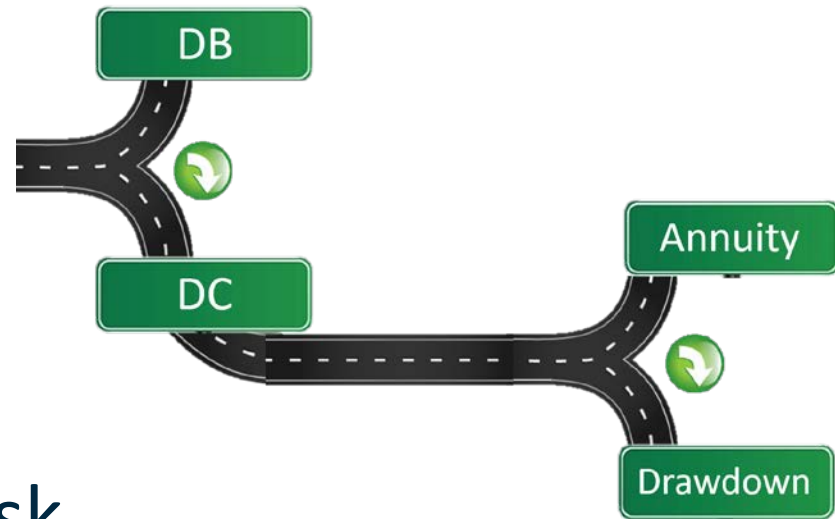
Pension Tontines versus Collective DC Schemes



Conclusion

Conclusion

- Room for improvement in post retirement options
- Too much being directed towards inheritance (accident rather than design I expect)
- Need to pool longevity risk
- Pension Tontine does both
- Pension Tontines should be explored further as a means of helping retirees not to outlive their pension savings
- We need to build some more roads!



Thanks for your attention