ST. JOHN'S COLLOQUIUM

Is one enough?

An enquiry into default funds and risk preferences

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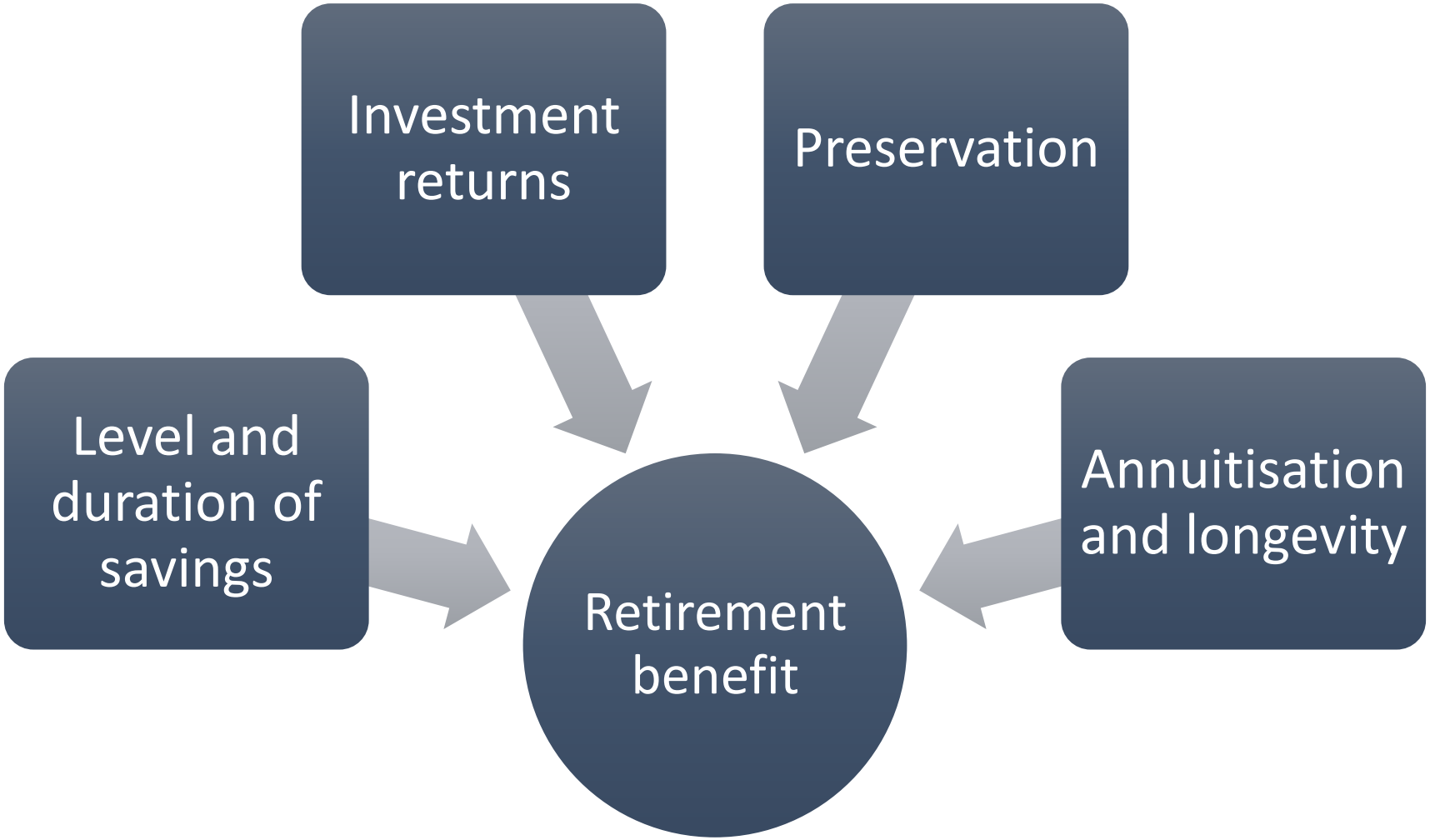
IPEBLA IACA IAAHS PBSS Canadian Institute of Actuaries Institut canadien des actuaires

The composition of defined contribution retirement outcomes



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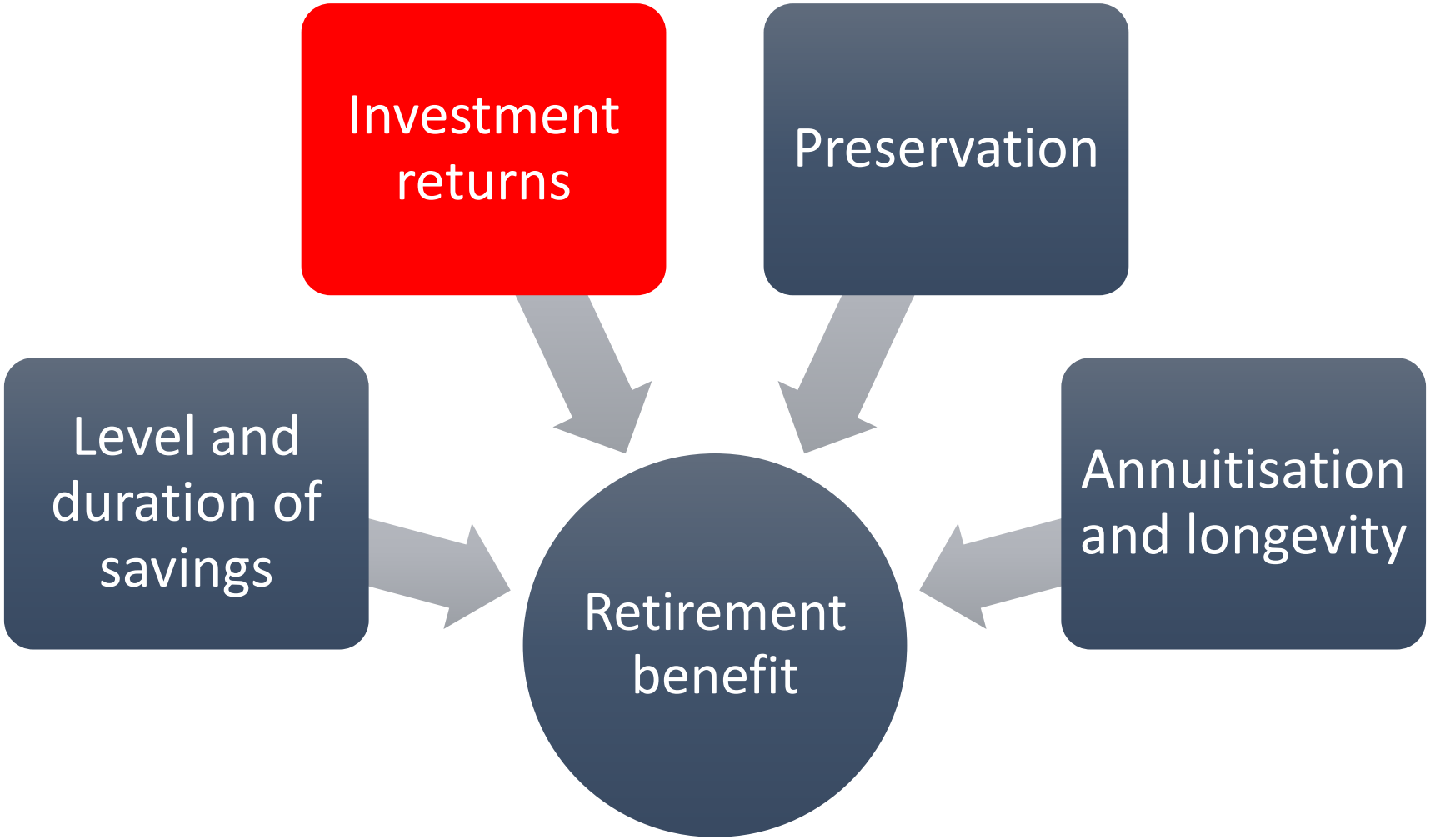


Investment choice

Sanlam Benchmark survey 2016:
76% of schemes offer member investment choice.

Offering choice implies the need for a default fund.

Default fund (trustee choice)

Trustee choice	2016	2015
Lifestage	52%	59%
Guaranteed / smoothed bonus	26%	23%
Balanced active	14%	15%
Cash / money market	4%	3%

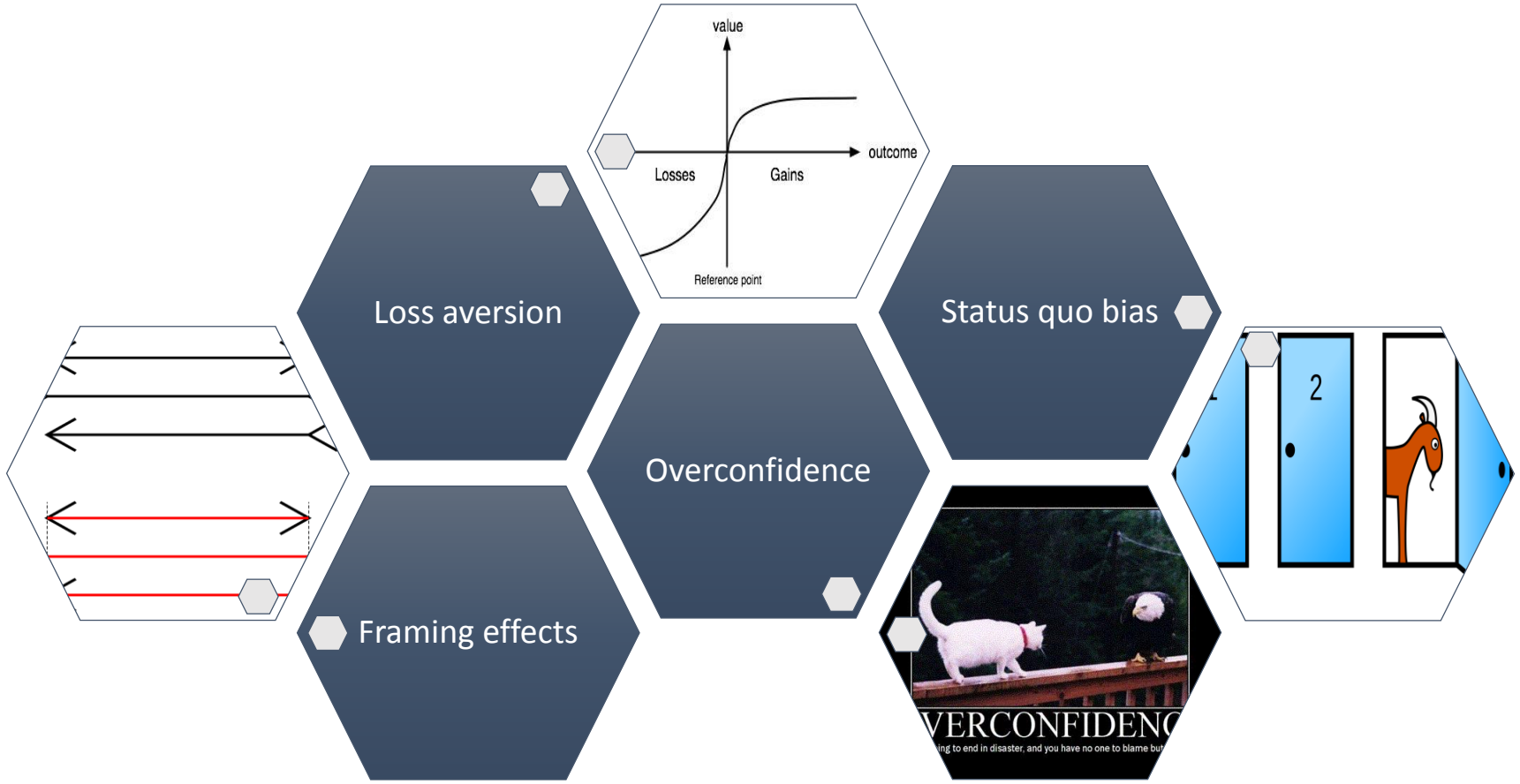
Sanlam Benchmark Survey (2016)

The trustee's environment

Fiduciary duty to act in the best interests of members, exercising "**due care**" and acting in the "**utmost good faith**" (Du Toit, 2002).

Undersaving, non-preservation and optimistic annuitisation choices rampant, so investment strategy takes on great significance.

Behavioural economics of investment choice



So how is that choice used?

> “84% of their members (2015: 79%) were invested in the Trustee choice or default investment option.”

Sanlam Benchmark Survey (2016)

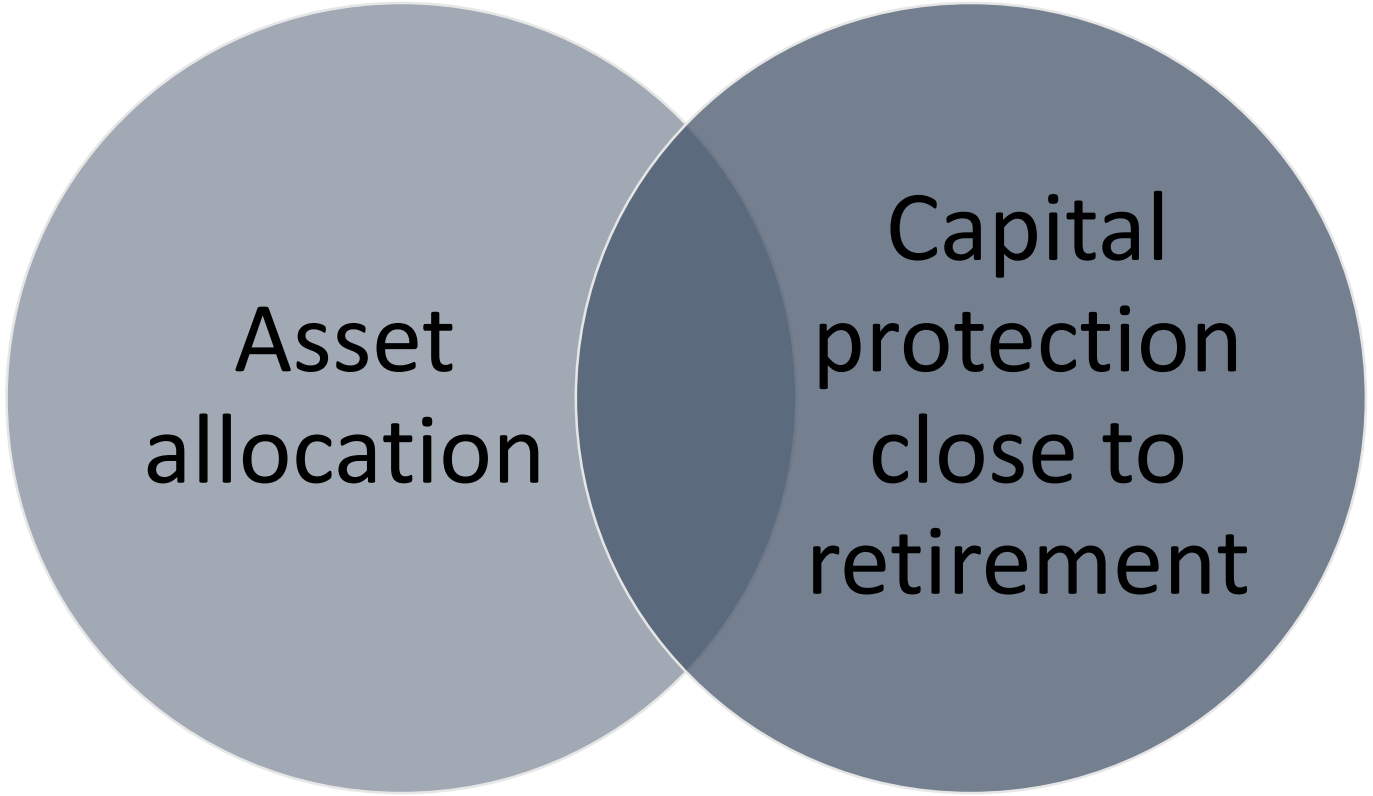
Question for trustees

Members capable of exercising choice?

Irrelevant given an appropriate default?

But then, is the default appropriate for the members who end up in it?

Investment strategy



Key question: is the price of life-stage protection (sacrifice of equity premium) worth it?

Critiques of life-stage

Industry:

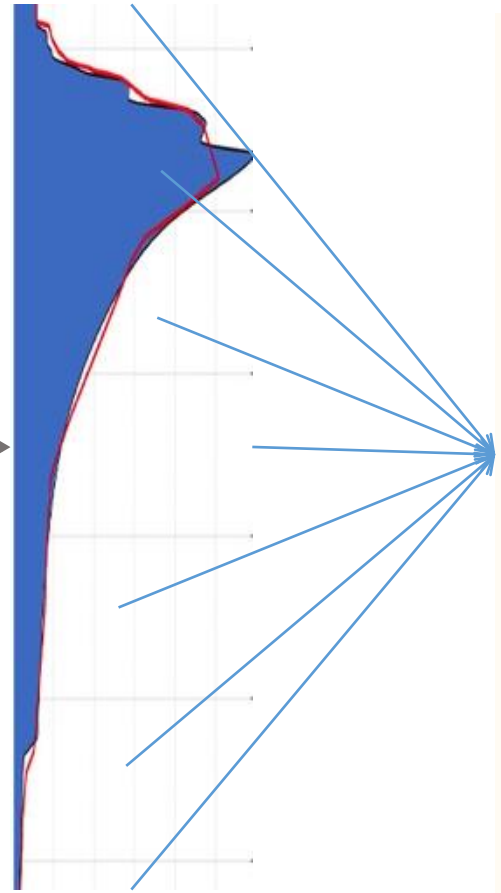
- Life-stage approaches prevail
- But not without its critics

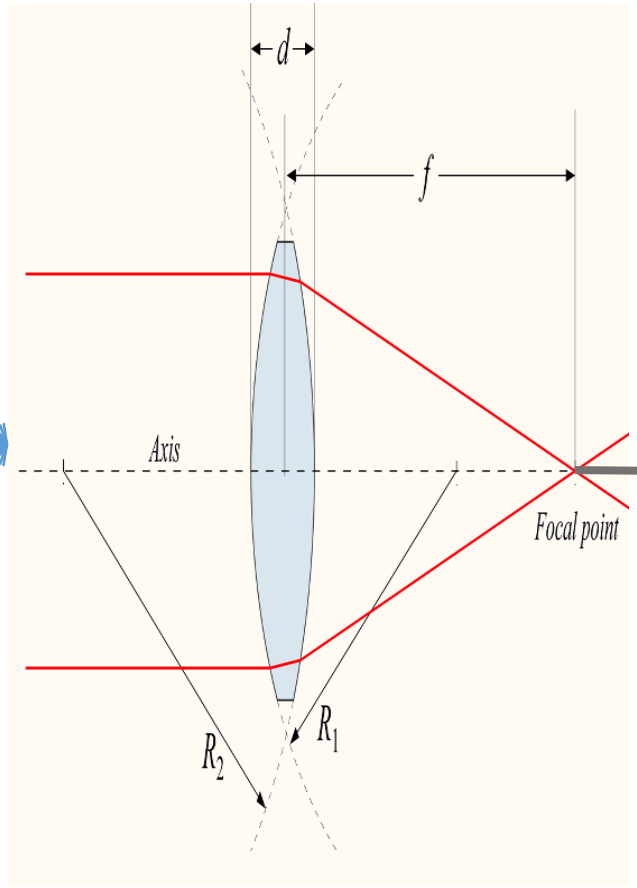
Literature:

- Support in e.g. Hibbert & Mowbray (2002), Antolín, Payet & Yermo (2010)
- High-equity strategies preferred by e.g. Booth & Yakoubov (2001), Blake, Cairns & Dowd (2000, 2001), Byrne *et al.* (2007)
- Low equity (inflation-linked bond strategy) proposed by Thomson (2011)

Comparing strategies through the lens of risk preferences

Allocation and de-risking strategy

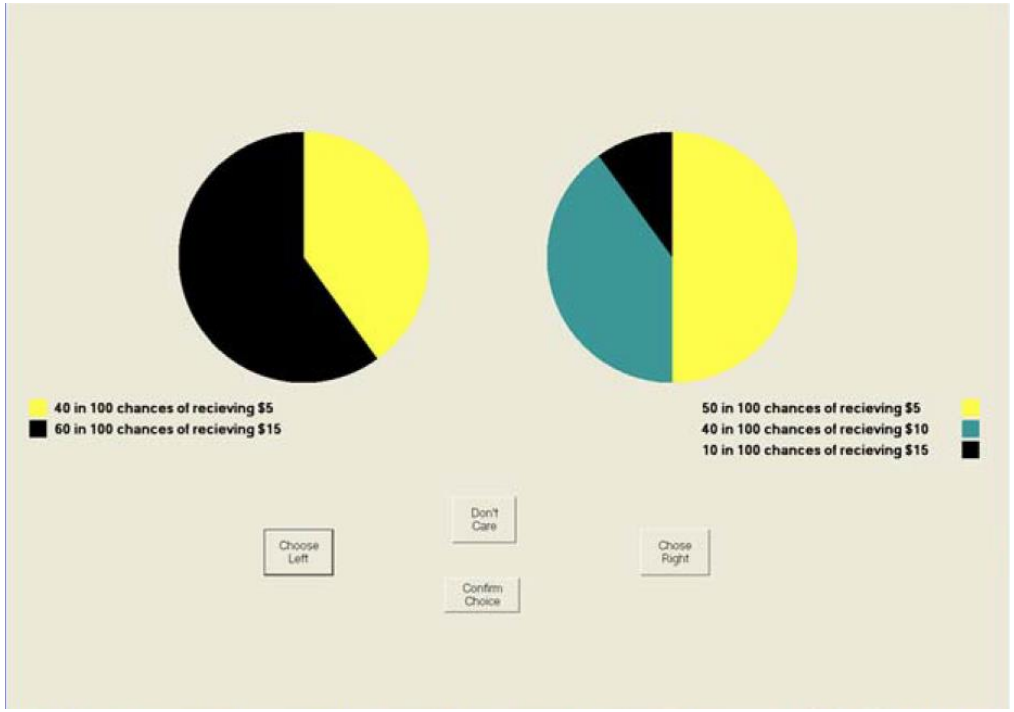


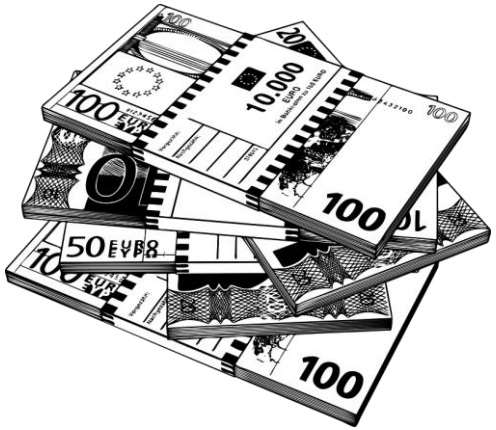


$V(X)$

Elicitation of risk preferences for a South African population

Project carried out by UCT's Research Unit in Behavioural Economics and Neuroeconomics, in association with Georgia State University's Center for the Economic Analysis of Risk, for Allan Gray, using UCT staff members as subjects.



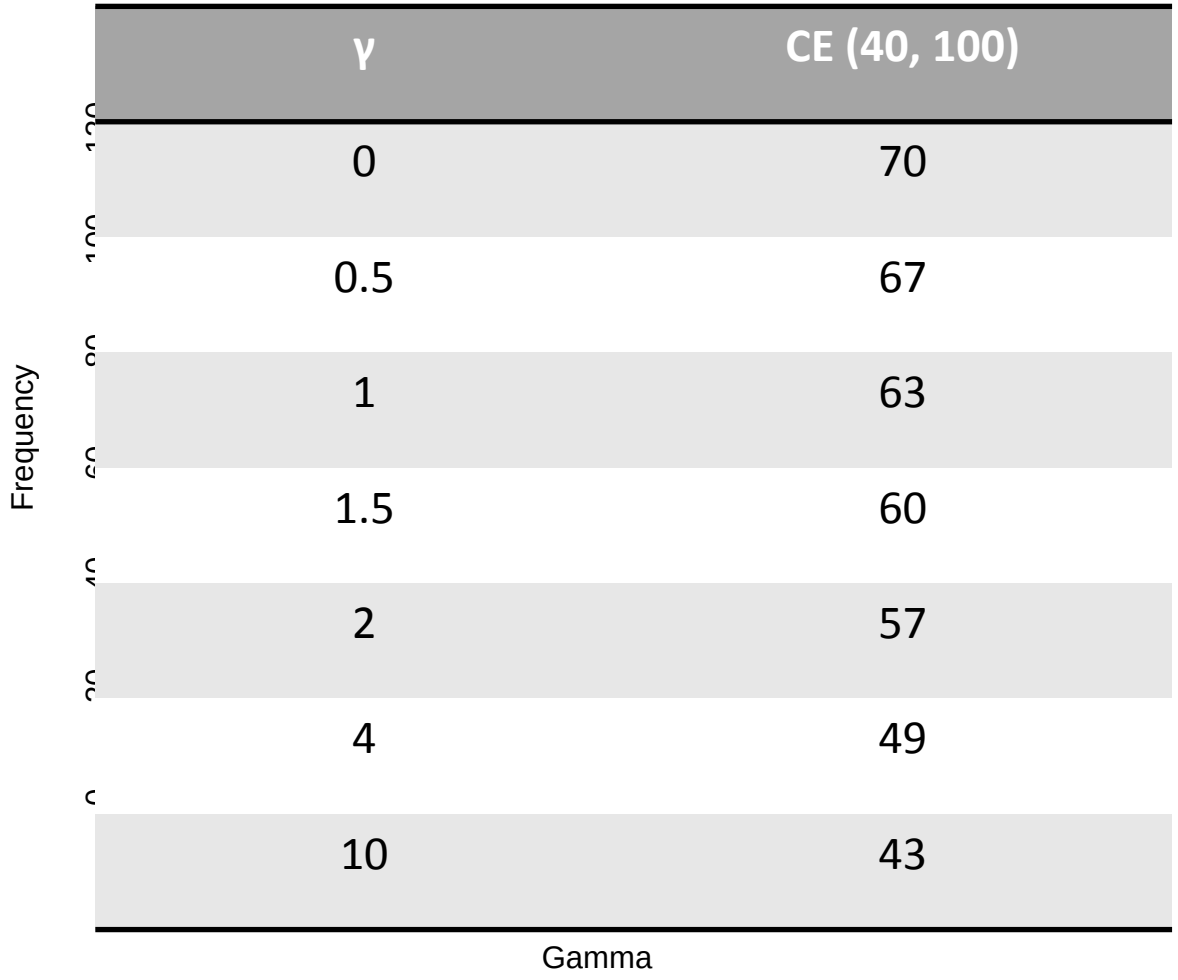


$$U(x) = \frac{x^{1-\gamma}}{1-\gamma}$$

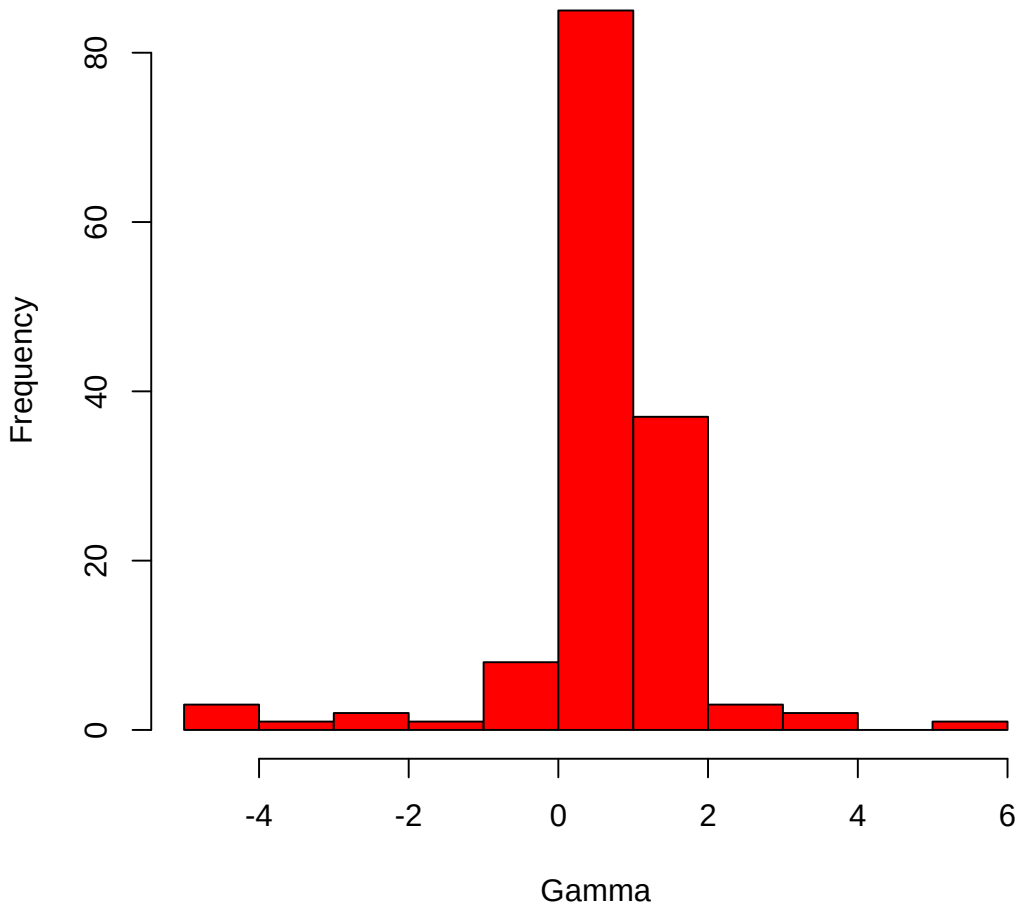
Range of risk preferences

CRRA parameter estimates, n=181 (of 194)

γ	CE (40, 100)
0	70
0.5	67
1	63
1.5	60
2	57
4	49
10	43



CRRA estimates in [-5,10], n=143



Models of asset returns

Asset class returns from Feb 1976 (domestic equities, bonds, cash and property, and international equities and bonds) and from Feb 2000 (inflation-linked bonds).

Much modelling inspiration from Blake, Cairns and Dowd (2001).

Four classes of models considered:

1. Multivariate normal
2. Multivariate t
3. Mixture of independent multivariate normals
4. Hidden Markov Model[1]

See e.g. Zucchini, MacDonald & Langrock. (2016). *Hidden Markov Models for Time Series: An Introduction using R*, CRC Press.

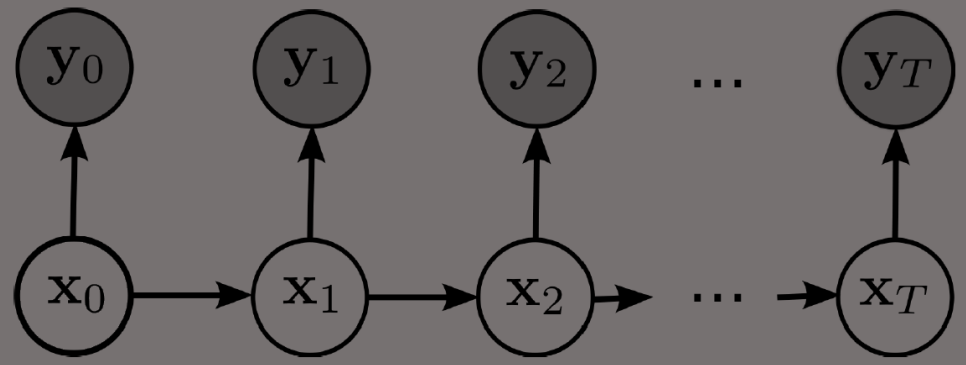
Modelling

MV normal

MLE of parameters due to shorter ILB history.

MV t

Blake, Cairns & Dowd (2001): differing df for each class to capture kurtosis (not restricted to integers).



HMM

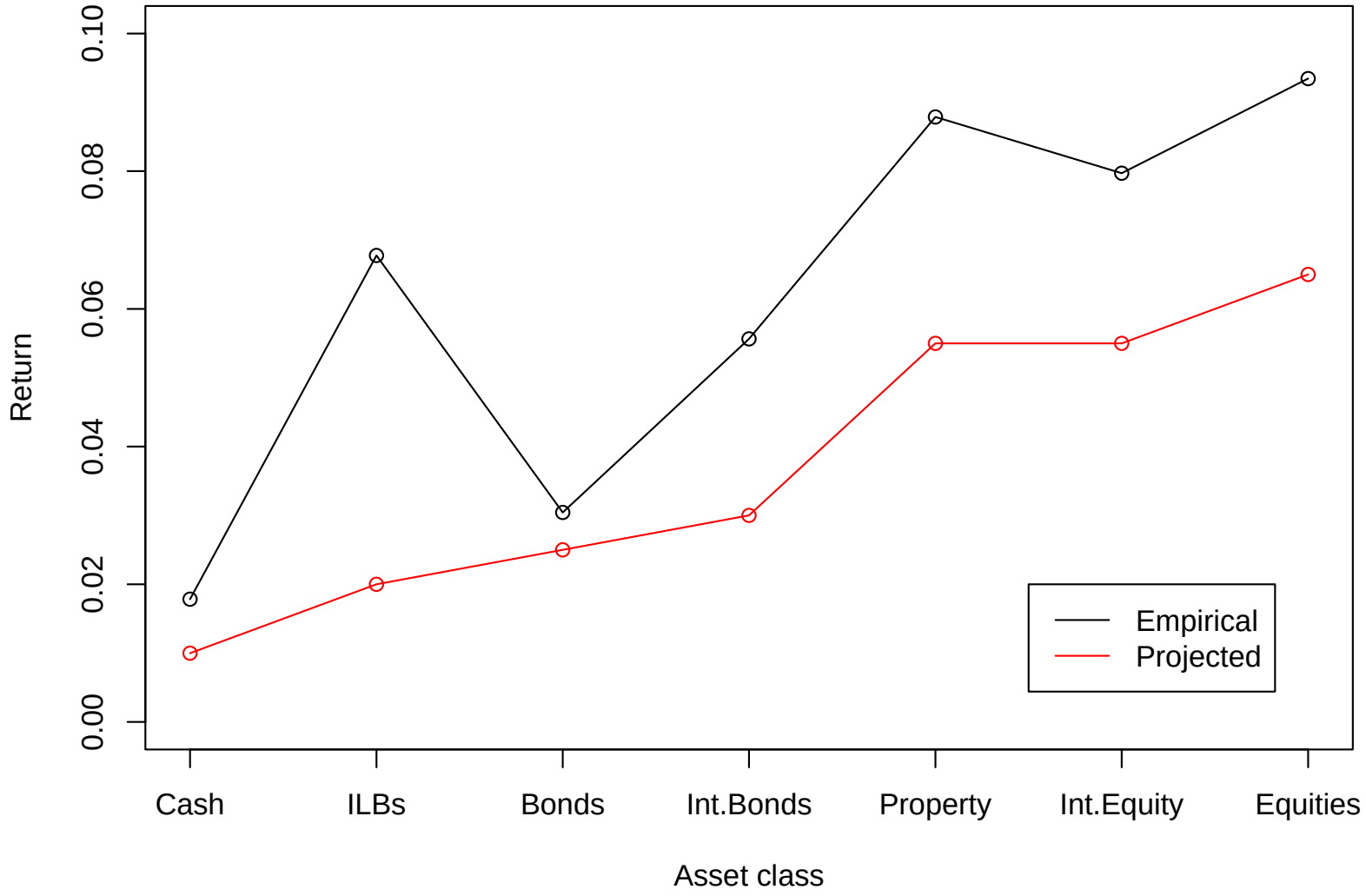
As for HMM, but states are independent rather than following a Markov chain.

Mixture

Model fits

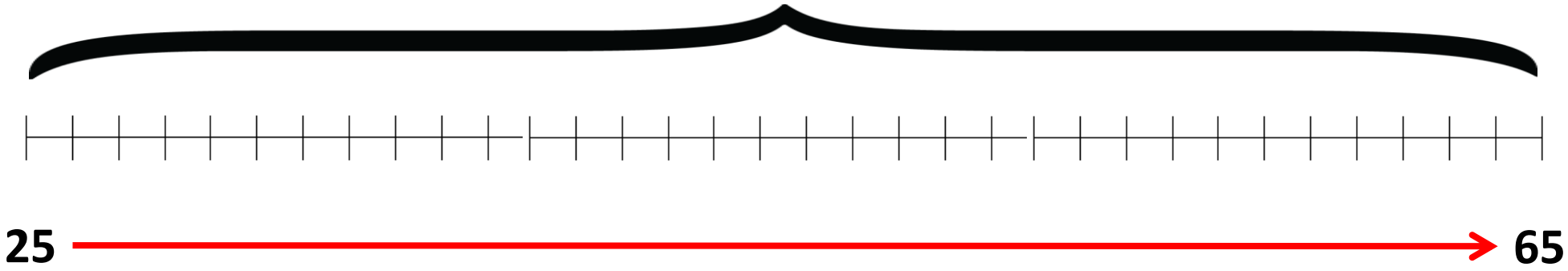
Model	States	AIC	BIC
Multivariate normal		-13,324	-13,109
Multivariate t			
Mixture of MV normals	2	-13,573	-13,138
	3	-13,671	-13,015
Hidden Markov Model	2	-13,711	**-13,270**
	3	**-13,762**	-13,082

Adjusted means



Simulations of returns

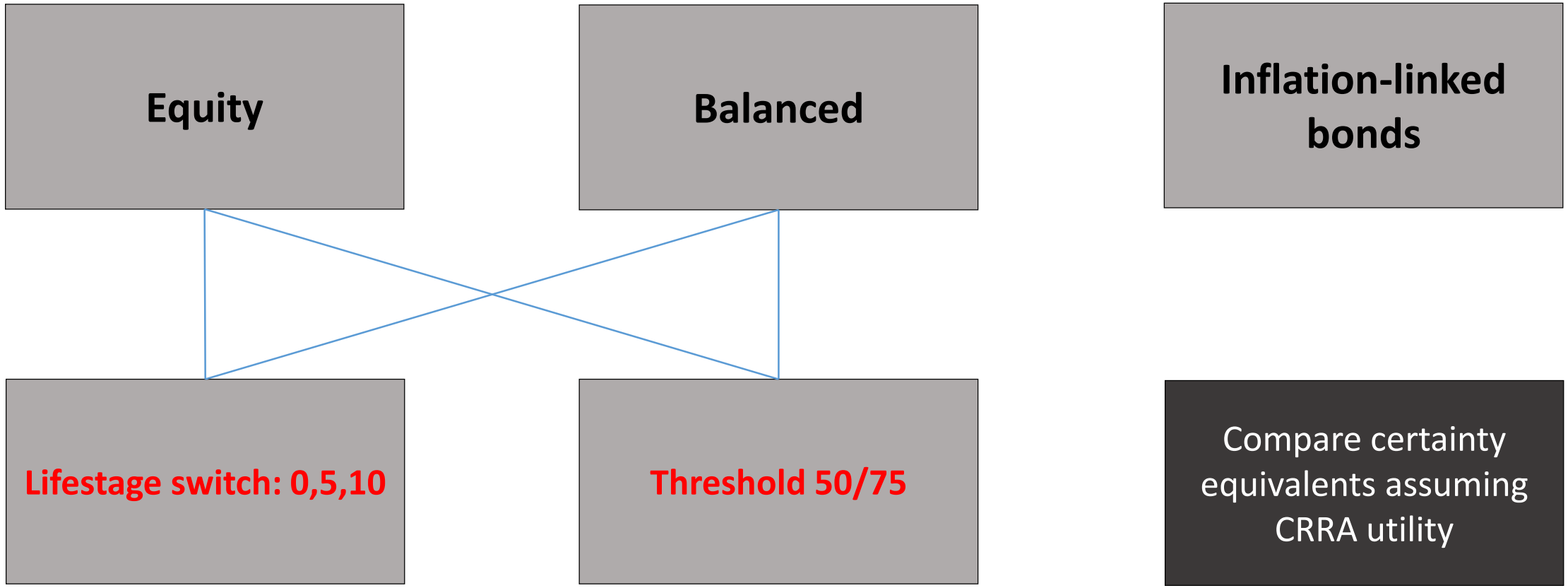
25,000 simulations for 480 months and 7 asset classes (in R).



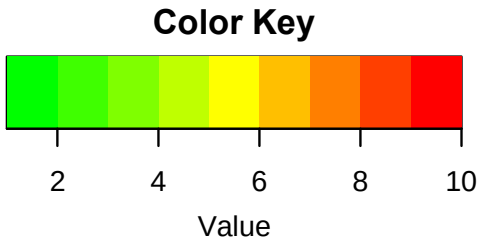
Deterministic salary increases; contributions 12.5% of salary.

Management fees in line with industry norms for medium to large scheme.
Inflation-linked annuity secured at retirement (male, JL 50%); SA2001-04 mortality. ILB yields consistent with simulated returns.
CRRA utility; argument of function is replacement ratio.

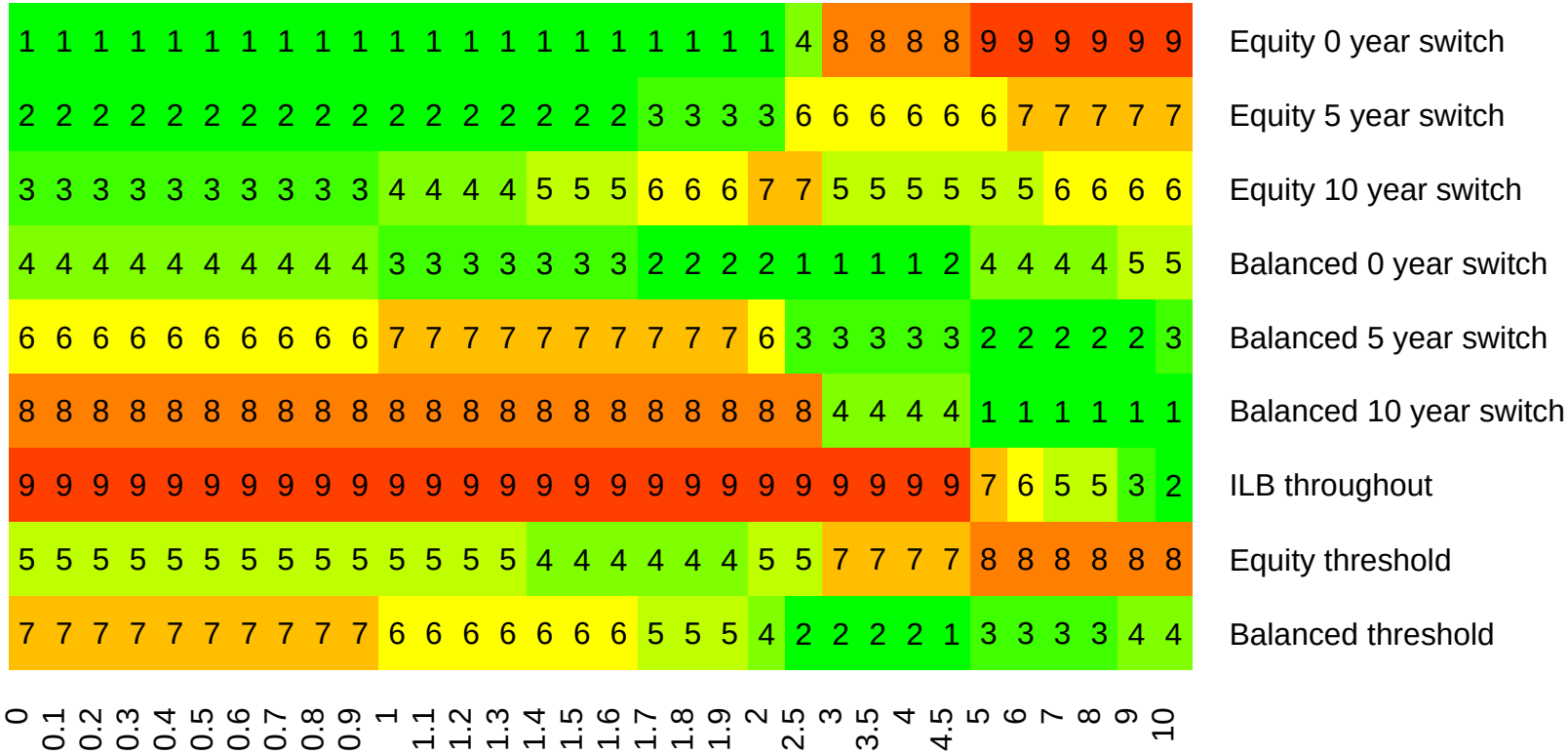
Investment strategies



Results



Preferred strategies



Is a single default sufficient?

Results tentatively suggest that it may be, for moderate levels of risk aversion.
But life-stage may not be the optimal solution.

Caveats:

- Subjective or historical nature of parameters
- Appropriateness of utility functions and parameter estimates:
  - Other forms of EU functions (e.g. displaying decreasing relative risk aversion)?
  - Other theories of choice (e.g. rank-dependent utility, prospect theory)?
  - Descriptive vs. normative/prescriptive estimates?
  - More risk-averse over retirement outcomes/near retirement age?

Acknowledgements

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- BNP Paribas Cadiz for financial market data
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- Iain MacDonald for guidance on Hidden Markov Models