Actuaries Summit

Think Differently

Actuaries Institute

21-23 May 2017 • Grand Hyatt Melbourne

Member's Default Utility Function Version 1 (MDUF v1)

David Bell, Estelle Liu and Adam Shao

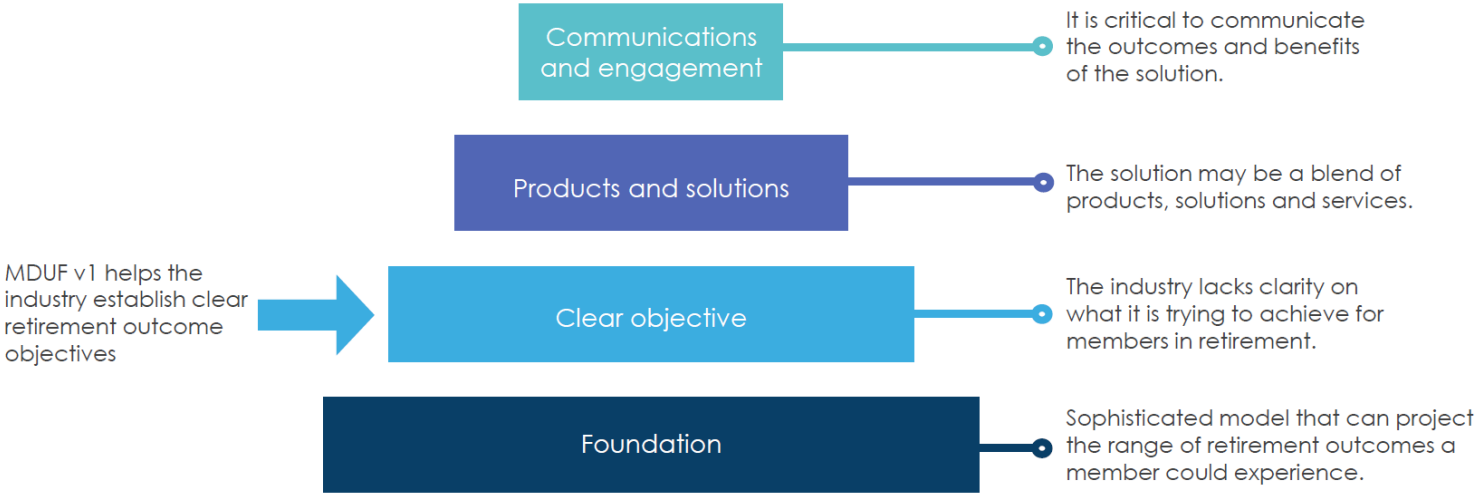
Disclaimer

The following content represents the personal views of the Members Default Utility Function (MDUF) working group. All views expressed are personal and should not be considered as endorsement from their employers. By using these tools, you consent that you are responsible to assess their appropriateness for your intended use. The MDUF working group and their employers will not be held responsible for any reliance made on this content.

Background

The retirement outcome challenge is considerable

- Providing retirement outcome solutions is a hugely challenging and complex area
- Ignoring the complexity could be at a member's expense



Background

A panel of academics and industry professionals was established to research and ultimately develop MDUF v1

The panel has over 200 years of combined relevant experience

Coordinators and lead authors

- David Bell, Mine Wealth + Wellbeing
- Estelle Liu, Mine Wealth + Wellbeing
- Dr Adam Shao, Mine Wealth + Wellbeing

Working group members

- Assoc. Prof. Anthony Asher, UNSW
- Nick Callil, Willis Towers Watson
- Prof. Geoff Kingston, Macquarie University
- Dr David Knox, Mercer
- David Schneider, 10E24
- Tim Unger, Willis Towers Watson
- Dr Geoff Warren, ANU

"Working group members have been contributors who also endorse the MDUF v1 as a sensible starting point when determining a set of preferences for Trustees to assume on behalf of those members whom they have little insight into."

Informal contributors

- Dr Jack Ding, Milliman
- Wade Matterson, Milliman
- Craig McCulloch, Milliman
- Nicolette Rubinsztein, UniSuper

"Informal contributors have participated in the MDUF v1 Project but make no endorsement."

Background

The essence of the MDUF v1

- Establish a sensible, well-researched set of assumed preferences for what a default member would prioritise in retirement
- Represent this as a metric (i.e. create a mathematical function, just like Replacement Rate or Shortfall Risk or Funded Ratio)
- Use this metric to "score" or assess the ability of different products or solutions to maximise the achievement of these preferences
- The project is called the Members Default Utility Function Version 1 or "MDUF v1"

Background

MDUF v1 can then be used in many ways, for instance

- Super funds could use MDUF v1 to help design their post-retirement solutions, and as a metric to assist prioritise internal capital and projects
- Policymakers could use MDUF v1 as a metric for informing the implications of policy changes
- Academics could use MDUF v1 in their academic research on retirement outcomes, thereby making it more relevant to industry
- MDUF v1 also has relevance to regulators, life companies, fund managers, industry bodies, fund ratings groups and financial planners

Establishing an objective

What is a sensible set of financial preferences for a super fund to assume on behalf of the members that we know little about?

The MDUF v1 accounts for the following considerations:

- Income stream not lump sum
- A higher income stream is viewed more favourably
- A more volatile income stream is viewed less favourably
- Outliving one's retirement savings is a poor outcome
- Residual benefit is valued
- People are risk averse (the pain of an adverse outcome is greater than the joy of a positive outcome)

MDUF v1 also accounts for the trade-off's between these issues

MDUF v1 – a complex formulae

$$\boldsymbol{E_0}\left[\sum_{t=0}^{T}\left\{{}_{t}\boldsymbol{p}_x\left(\frac{\boldsymbol{c}_t^{1-\rho}}{\boldsymbol{1}-\boldsymbol{\rho}}\right)+{}_{t-1|}\boldsymbol{q}_x\left(\frac{\boldsymbol{b}_t^{1-\rho}}{\boldsymbol{1}-\boldsymbol{\rho}}\left(\frac{\boldsymbol{\phi}}{\boldsymbol{1}-\boldsymbol{\phi}}\right)^{\boldsymbol{\rho}}\right)\right\}\right]$$

- T: time horizon
- c_t: consumption in year t
- b_t: level of wealth at time t which equals the amount of residual account value if the person dies between $t-1$ and t
- ${}_{t}p_x$: probability of being alive at age $x+t$ conditional on being alive at age x
- ${}_{t-1|}q_x$: probability of dying between age $x+t-1$ and $x+t$ conditional on being alive at age x
- $\rho = 8$: level of risk aversion
- $\phi = 0.83$: strength of residual account motive

Applications of MDUF v1

- Compare static solutions (Excel Model available)
- Design optimal dynamic strategies

Consider the following inputs

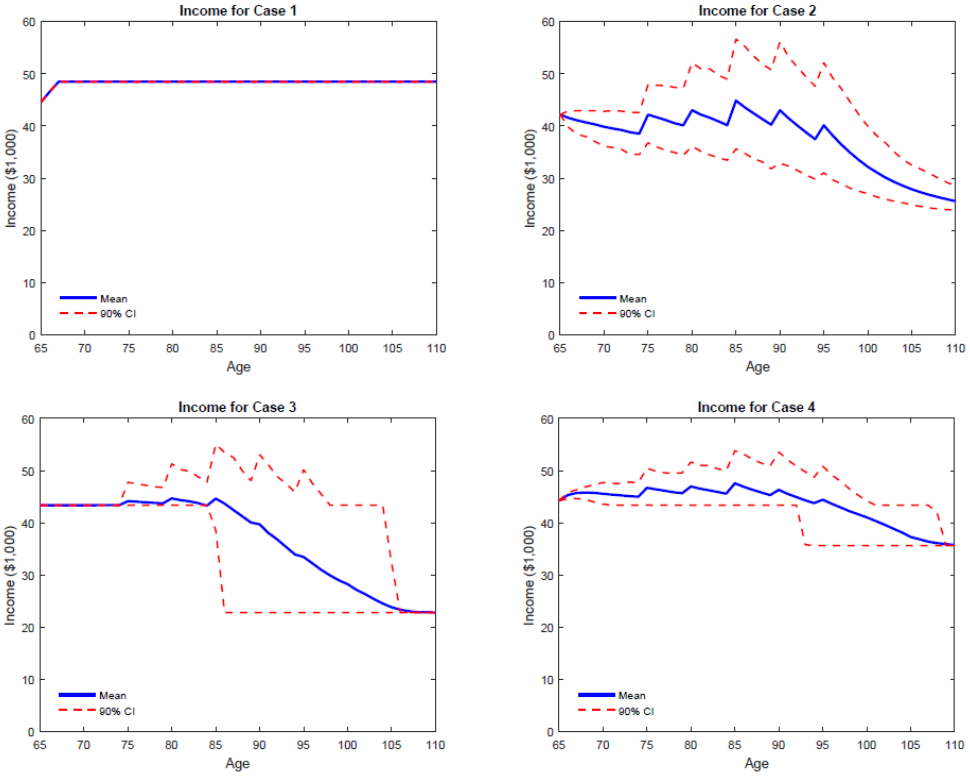
Items	Values
Wealth at retirement	$500,000
Retirement age	65
Gender	Male
Family situation	Single
Home-ownership	Non-homeowner
Real risk-free rate	0%
Distribution of risky asset real return	Normal with mean = 5% & volatility = 15%

Compare static solutions

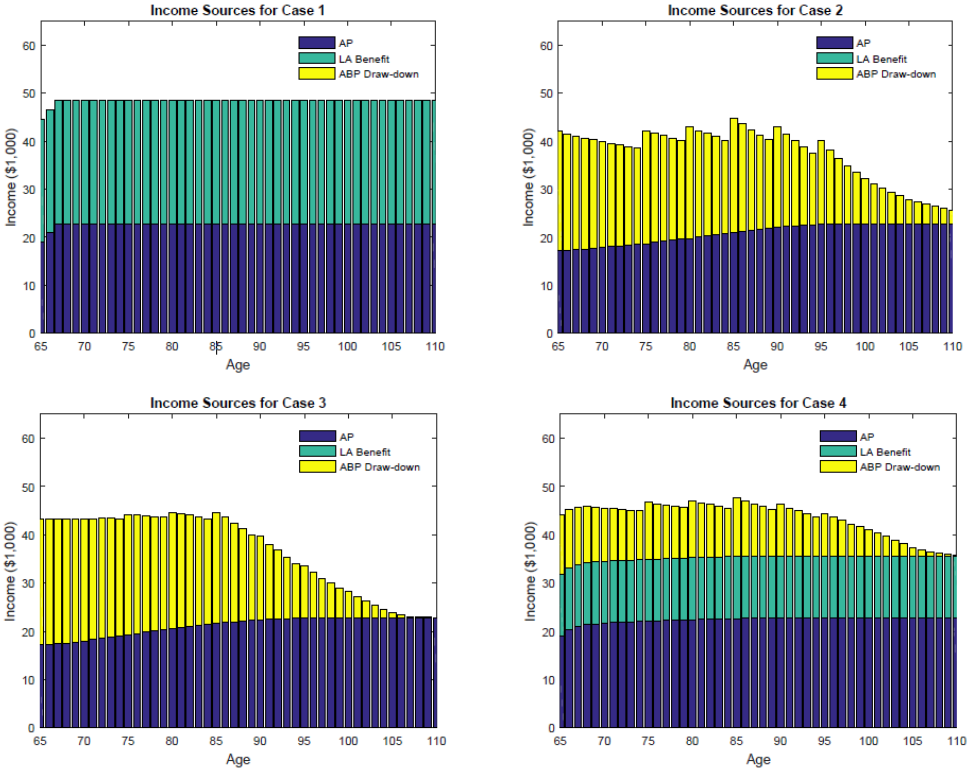
- **Case 1:** 100% Life Annuity (LA)
- **Case 2:** 100% ABP with minimum drawdown rule
- **Case 3:** 100% ABP with target constant income = ASFA comfortable
- **Case 4:** 50% ABP + 50% LA with target constant income = ASFA comfortable

*Current Age Pension (AP) rules apply in all cases
*Portfolio asset allocation for the non-annuitized portion is 50% risk-free & 50% risky
*Annuity pricing is based on Challengers Annuity quote

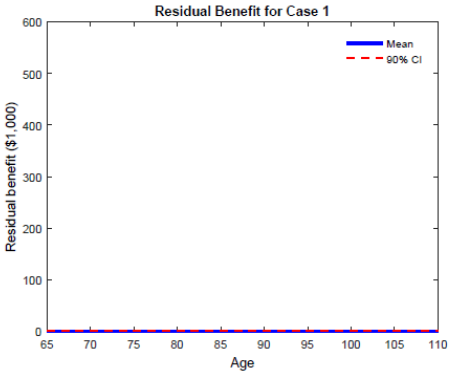
Compare income: average income & 90% CI

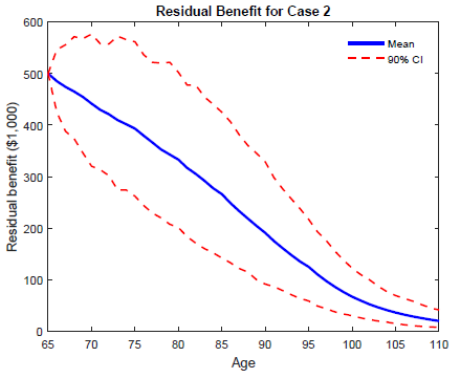


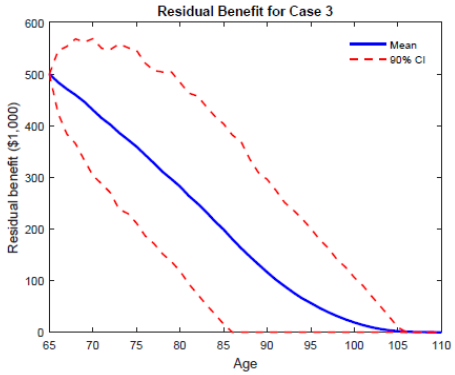
Compare income: sources of average income

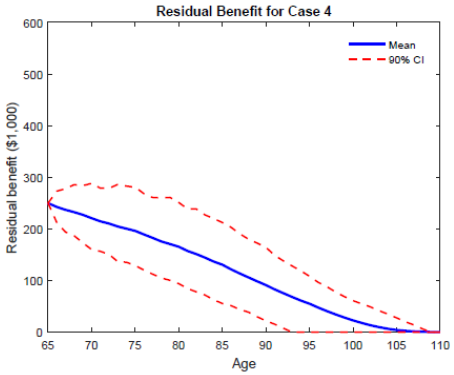


Compare residual benefit: average and 95% CI









How do these solutions rank, based on MDUF?

Rank	Case	MDUF score
1	**Case 2:** 100% ABP with minimum drawdown rule	-1.5E-26
2	**Case 4:** 50% ABP + 50% LA with target constant income = ASFA comfortable	-1.1E3
3	**Case 3:** 100% ABP with target constant income = ASFA comfortable	-6.2E3
4	**Case 1:** 100% LA	-4.6E4

Design optimal dynamic strategies

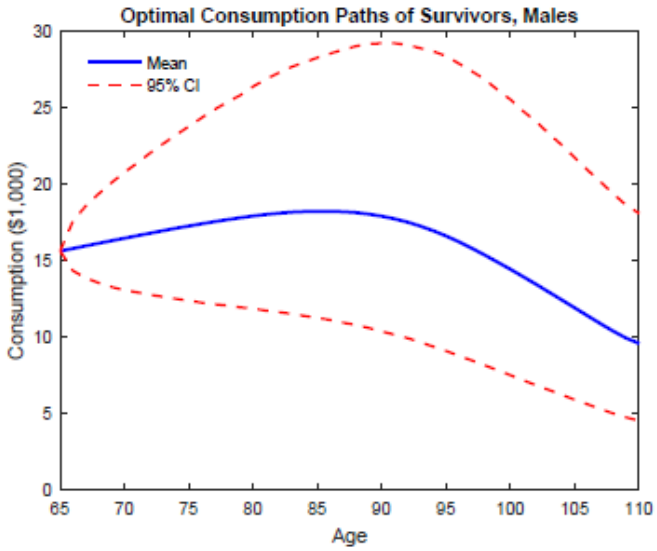
3 scenarios considering Account based pension (ABP) with Age Pension (AP) and Life Annuity (LA)

Scenario	Age Pension	Life Annuity
1	No	No
2	Yes	No
3	Yes	Yes

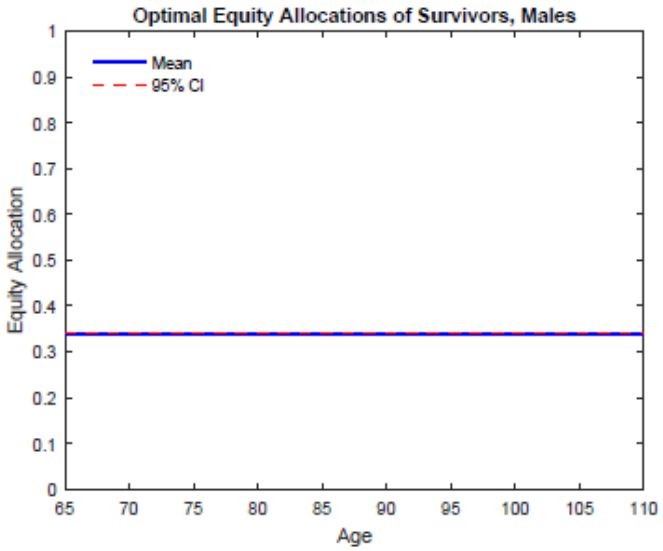
*Current Age Pension (AP) rules apply in scenario 2 & 3

Scenario 1: no AP, no LA

Consumption



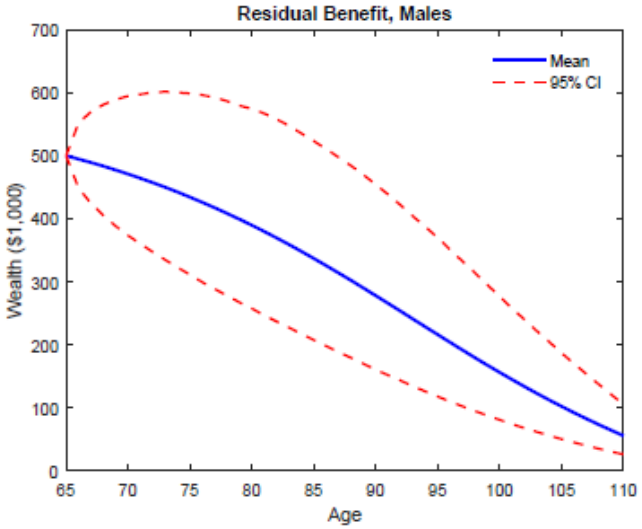
Equity allocation



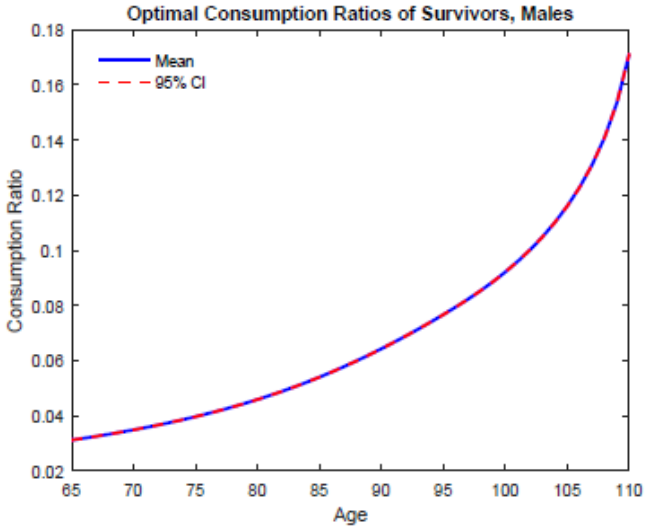
* Optimal allocation to risky asset: a constant proportion of wealth (33.95%)
* Optimal consumption path: slightly increases for the first 20 years

Scenario 1: no AP, no LA

Residual benefit



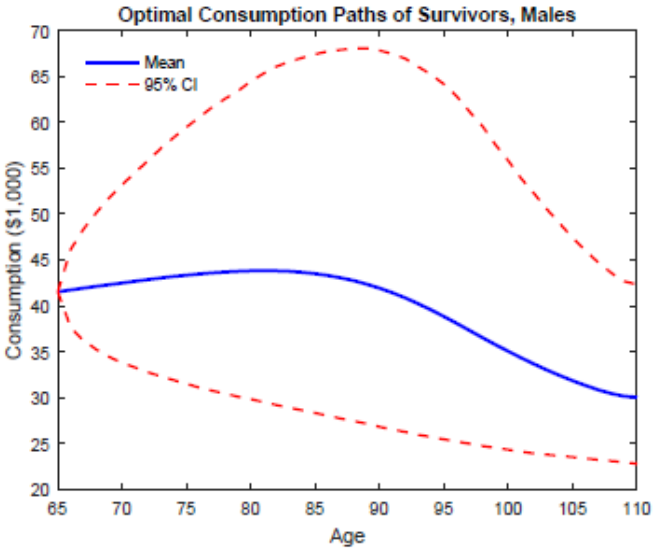
Consumption ratio



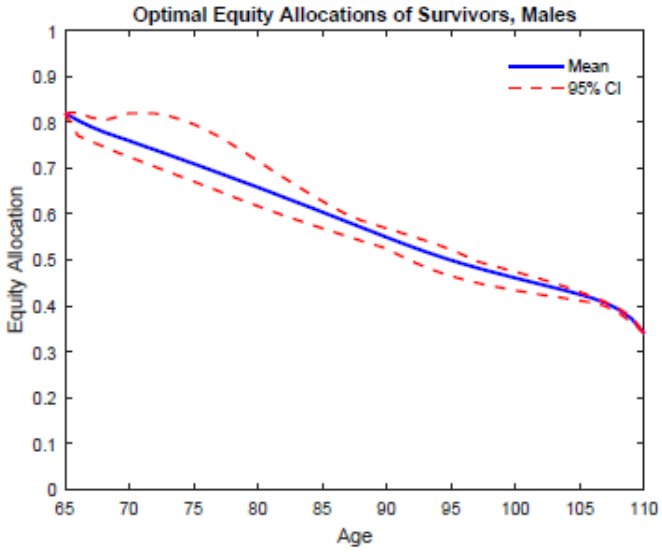
* Optimal consumption ratio: very comparable to minimum drawdown rules

Scenario 2: with AP, no LA

Consumption



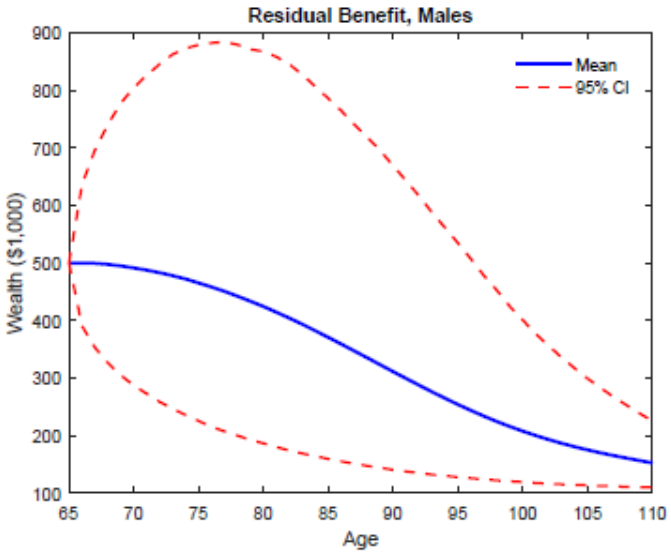
Equity allocation



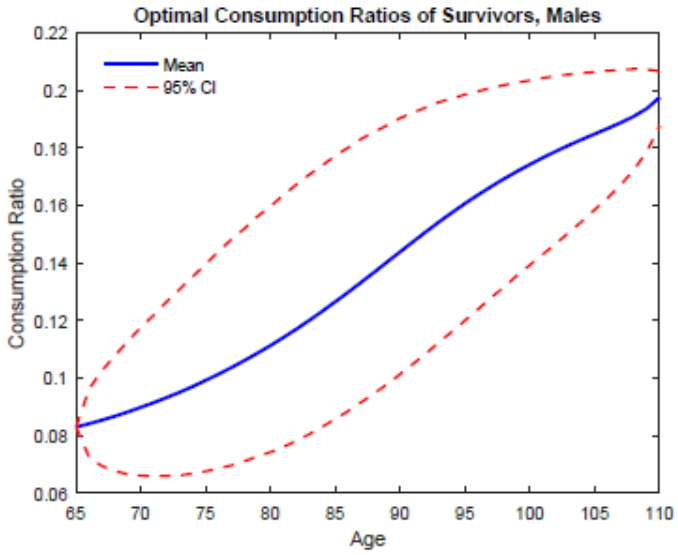
* Optimal allocation to risky asset: decreasing & converge to scenario 1
* Optimal consumption path: higher than scenario 1

Scenario 2: with AP, no LA

Residual benefit



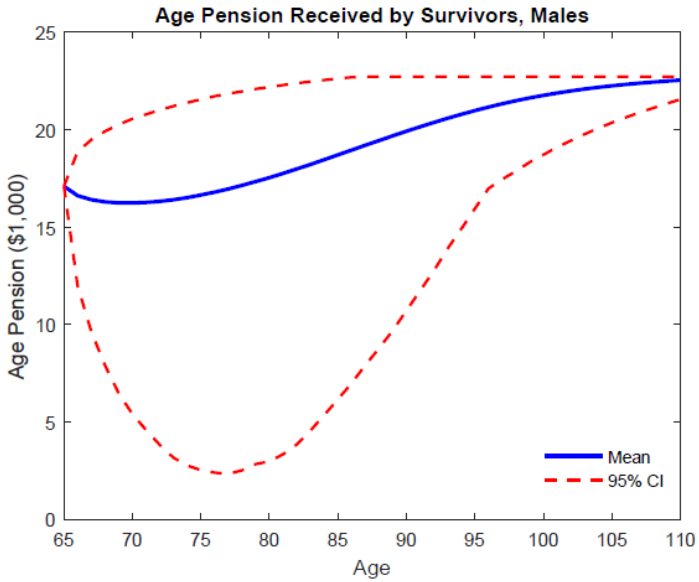
Consumption ratio



* Optimal consumption ratio: higher than scenario 1

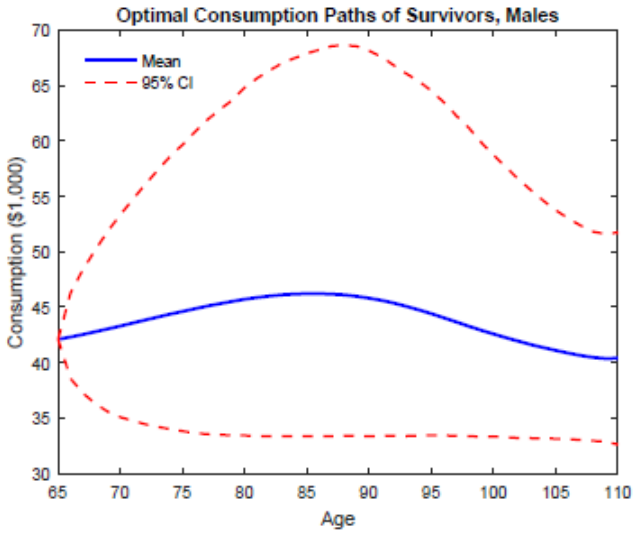
Scenario 2: with AP, no LA

Age Pension

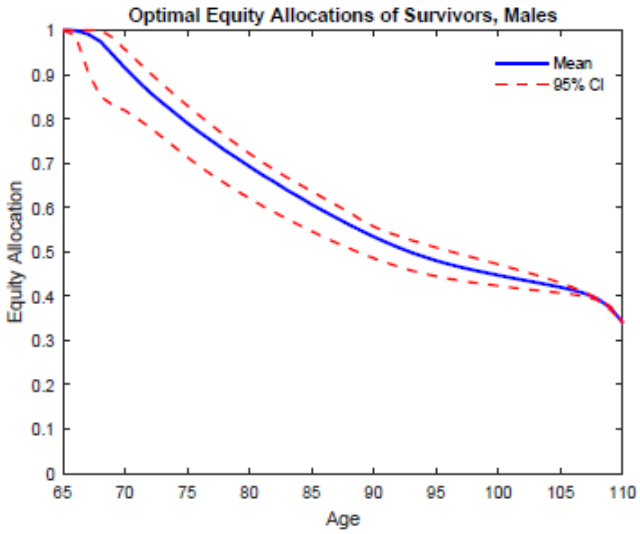


Scenario 3: with AP, with LA

Consumption



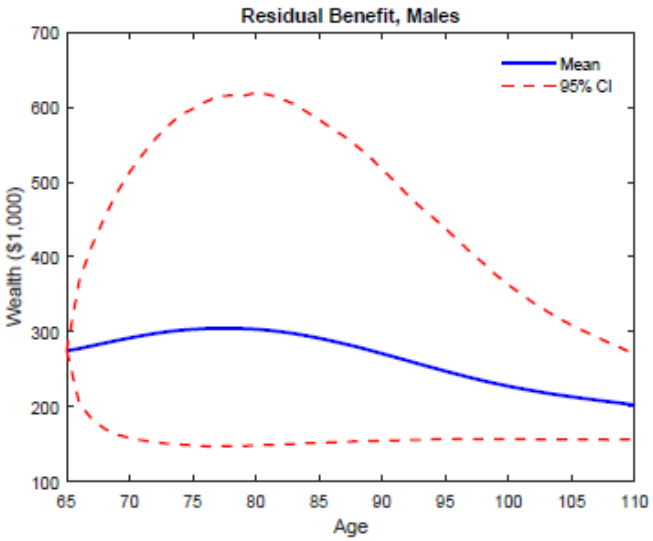
Equity allocation



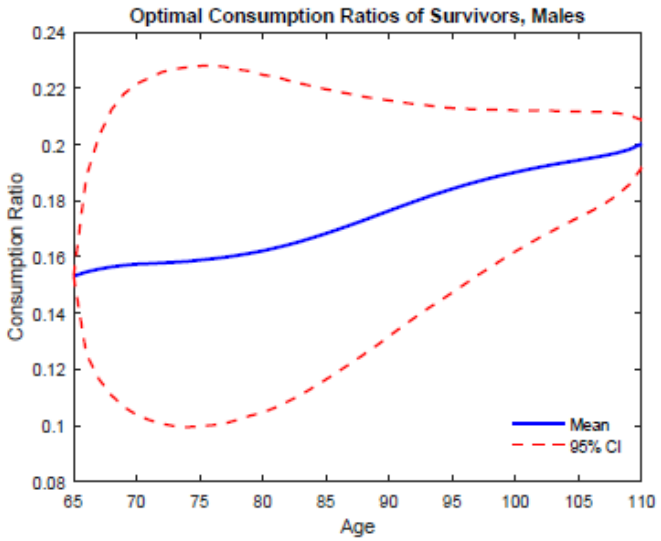
* Optimal allocation to risky asset: decreasing & converge to scenario 1

Scenario 3: with AP, with LA

Residual benefit



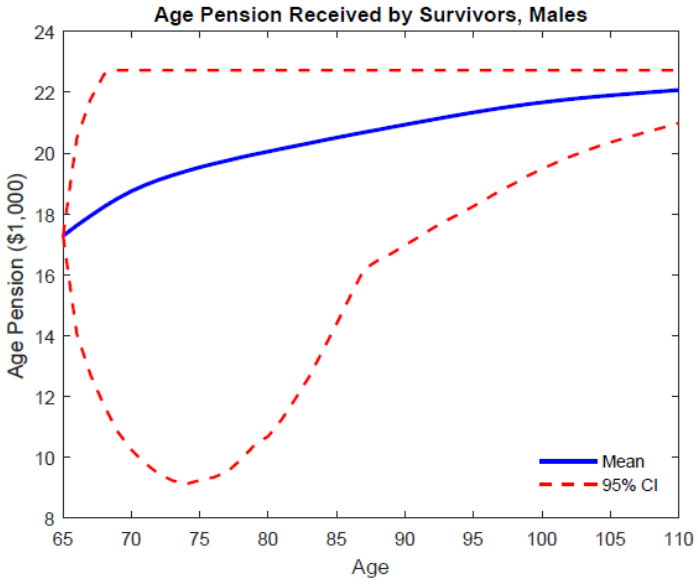
Consumption ratio



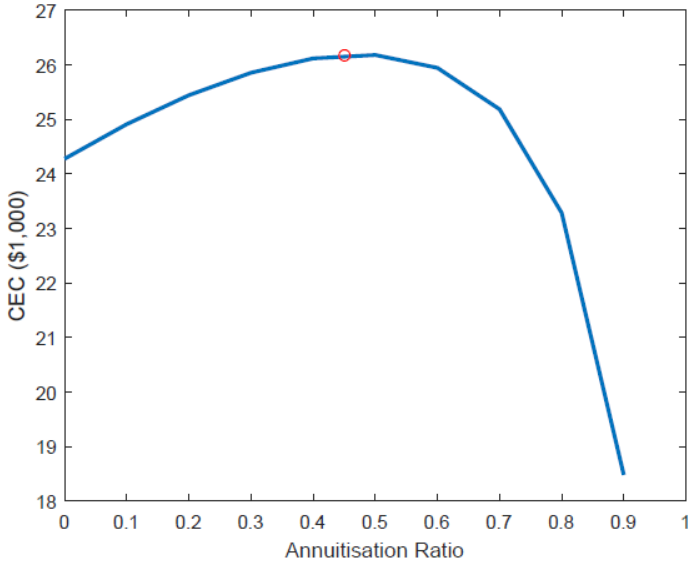
* Optimal residual benefit: lower than scenario 1 & 2

Scenario 3: with AP, with LA

Age Pension



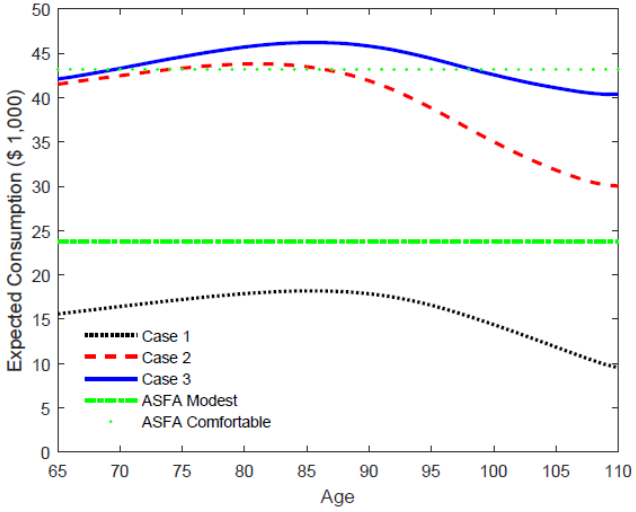
Annuitisation ratio



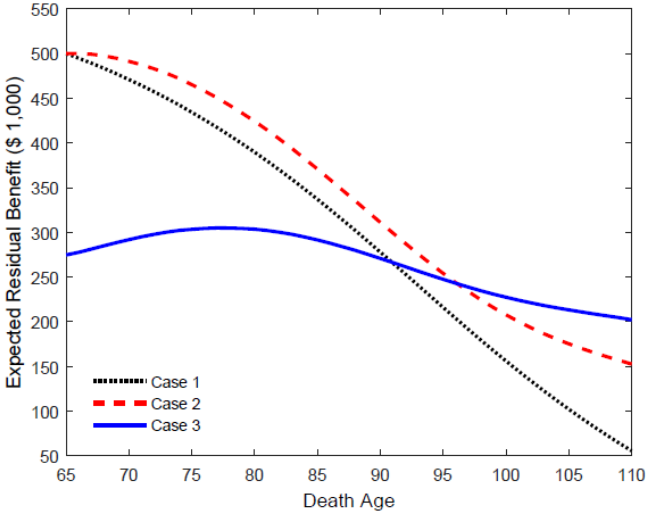
* Optimal annuitisation ratio: 45% (annuitise > 80% worse than zero annuitisation)

Compare across scenarios

Consumption



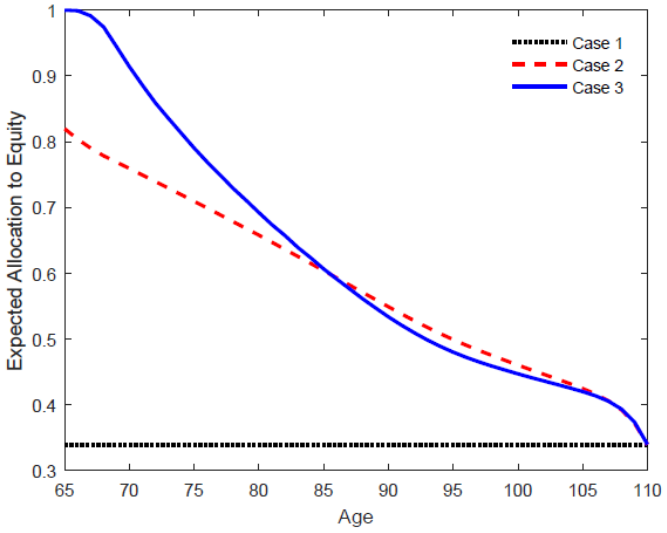
Residual benefit



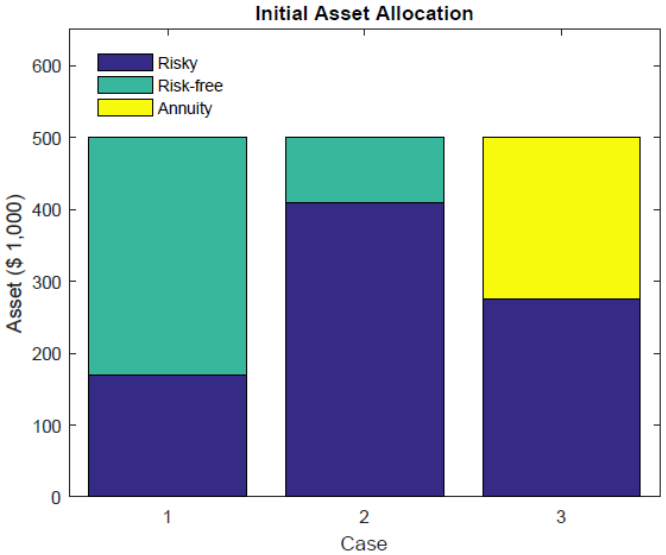
* LA improves lifetime consumption most likely at the cost of reduction in residual benefit

Compare across scenarios

Equity allocation

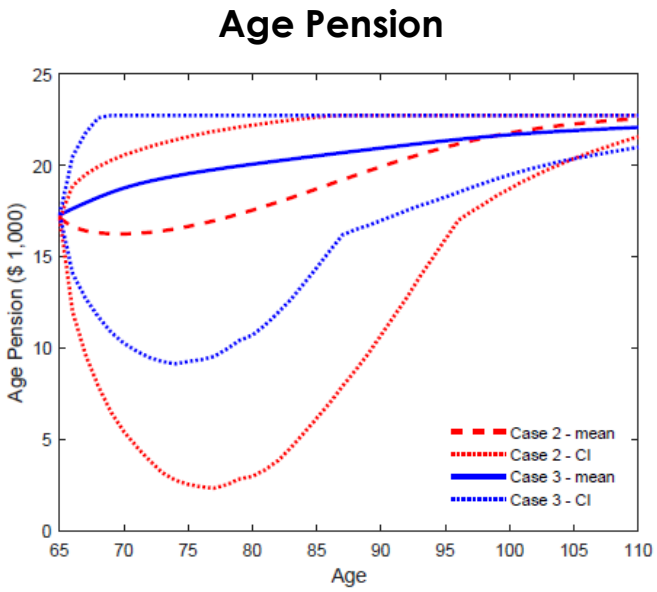


Initial asset allocation



* Optimal dollar allocation to risky-asset is lower in scenario 3 than in 2

Compare across scenarios



* AP improves expected consumption level significantly
* LA interacts with AP rules more efficiently

Welfare analysis

Quantify the cost/benefit

The measure of expected utility can be converted into other measures which make it more useful and understandable

Expected utility, based off MDUF v1

Certainty Equivalent Consumption (CEC)	Extra Annual Return	Wealth Gap
The certain level of consumption which delivers an equivalent level of utility	The extra rate of return required for the inferior solution to generate an equivalent level of expected utility (when comparing two solutions)	Difference in initial wealth between alternative solutions required to produce equivalent expected utility

Welfare analysis

Quantify the cost/benefit

- The measure of expected utility can be converted into other measures which make it more useful and understandable

Benefit measure	1. ABP and AP	2. ABP, AP and LA
Wealth gap	$776K	$876K
Extra annual return	6.36%	7.04%

* We can estimate the value of Age Pension (for a single person and non-homeowner with $500,000 in super at retirement) to be worth $776,000. For this person to achieve the same expected utility in a system with no Age Pension they would have to achieve a 6.36% p.a. (risk-free) higher return
* By using a combination of different retirement product solutions optimally an extra $100,000 of benefit can realised. This is equivalent to finding an extra 0.68% p.a. (risk-free) of returns

Further applications of MDUF v1

Estimate society-wide benefits

- If the average welfare gap is multiplied by the relevant population size then the society-wide benefit of a product / service / policy change can be estimated
  - Note that the welfare gap may differ across individuals
- This has significant application for policymakers (current policy estimation techniques do not readily capture the benefits of lower volatility and bequests)
  - For instance it would challenge the basis of some of the calculations in The "Murray" Financial System Inquiry

Further applications of MDUF v1

Estimate the value of non-investment aspects such as regular financial advice

- The MDUF (v1) allows one to estimate the benefits of product and also non-product based services
- Examples include assessing the benefits of investment advice and personalised strategies
- As most super fund initiatives involve a cost the MDUF (v1) has the ability to provide a broader estimation of the benefits of competing business proposals

Collaboration

- This work is a good example of collaboration
- We commit to making this work available for industry to use
- To assist we are pleased to announce that AIST and ASFA have both agreed to act as custodians of this work. This means they will be working to provide platforms for sharing this research

Australian Institute of Superannuation Trustees

the voice of super

Conclusion

Working with industry

- A key starting point, currently missing in the super industry, is establishing the preferences they assume on behalf of their members
- A diverse, highly respected group of industry professionals has established a set of sensible preferences and then reflected these into a metric – the MDUF v1
- These preferences can then be used for many purposes, most notable fund/product design and policy considerations
- We believe that the MDUF v1 represents a leap forward for the industry and we are hoping for sustained uptake amongst super funds, rating groups, academics, industry bodies, policymakers and regulators
- Thank you to all panel members for their involvement in this work

Conclusion

Where to for super funds?

- The MDUF v1 provides a clear, mathematical representation of a sensible set of objectives