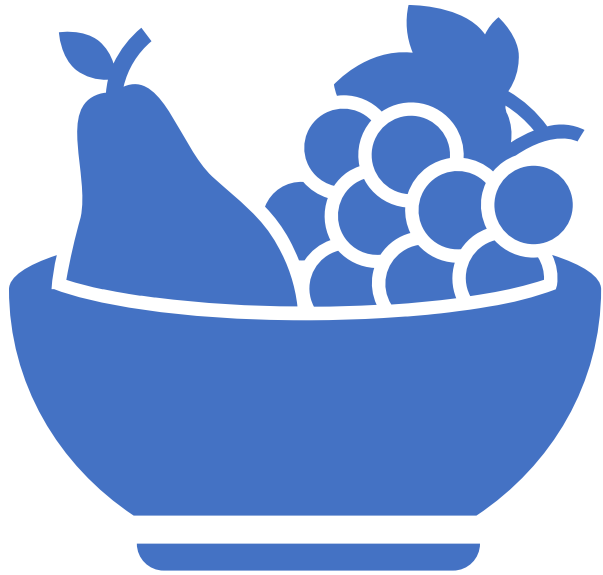


Tontines – Sharing is Caring

Vivian Dang & Young Tan

What is a tontine?



It's about sharing

Flexible designs

Can be used for different things

Long strange history

Contents



Historical Tontines



Modern Research



Product Design



Modelling Example

Historical Tontines



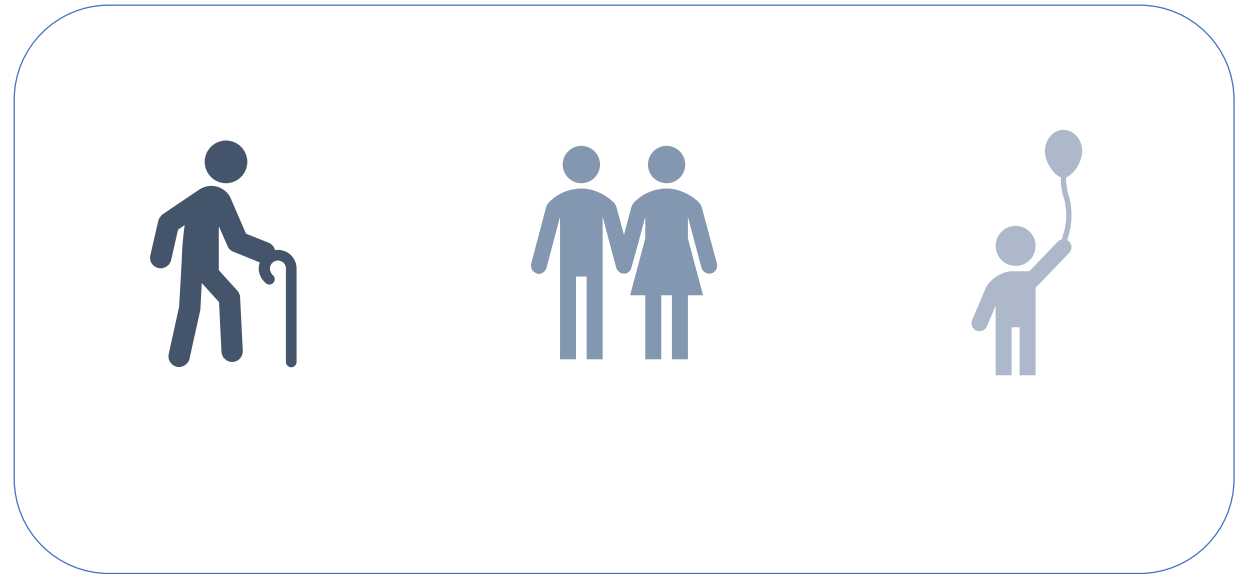
Alexander Houghton

History

Modern
Research

Product
Design

Modelling



Annual rent from
estate paid to 13
staff – equal share

Amount
participants die,
share divided
among survivors

Increasing amount
of income for
survivors

Relatively common
arrangement –
predates Lorenzo
de Tonti

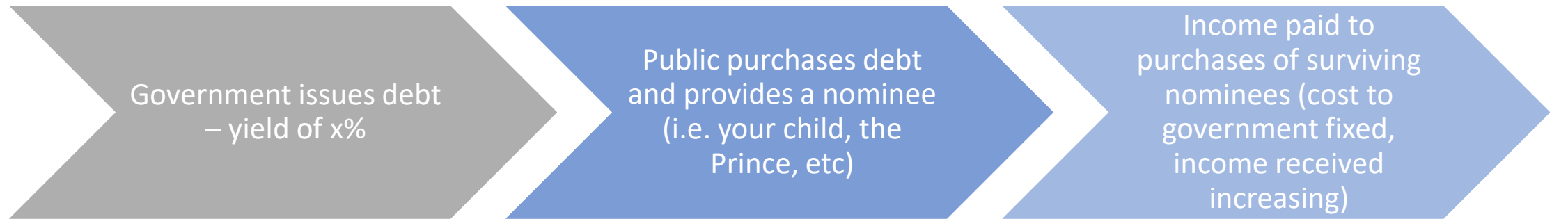
Government Debt

History

Modern Research

Product Design

Modelling



Lorenzo de Tonti

- 1653
- Designed to generate commission for Lorenzo
- Marketing – do it so your family will take care of you

King William III

- 1693
- Raised debt to fund war against the French
- Taught by Johan de Witt
- Interest rate of 7%, with bonus 3%
- Survivors capped at 7
- Annuity conversion options added later

French

- 1689
- Age based interest rate – separate age classes
- Eventual debasement or forced conversion to annuity

Modern Research



Retirement Tontines | Group Self-Annuitisation (GSA) | Tontine Account

Retirement Tontines | GSA | Tontine Account

History

Modern Research

Product Design

Modelling

Closed pool

Risk free assets

Natural tontine payout function aims to provide stable income

Minimal or no ongoing actuarial management

Expect income to fluctuate (volatility and trend) as mortality experience emerges

Key design relationships

1. Tontine payout function

$$d(t) = C \times {}_tP_{\text{commencement age}}$$

2. C which is a constant, determined such as the asset pool exhausts at terminal age (e.g. age 110)

3. Individual payout = $d(t)$ divided by # of survivors

Very simple and not so flexible. Is it practical?

- Consumer market: Unlikely
- Government scheme: Maybe

Retirement Tontines | GSA | Tontine Account

History

Modern Research

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Modelling

Open pool OK

Risk free or risky assets

Similar to annuities
Aim is for income to last as long as participants live

Higher level of ongoing actuarial management

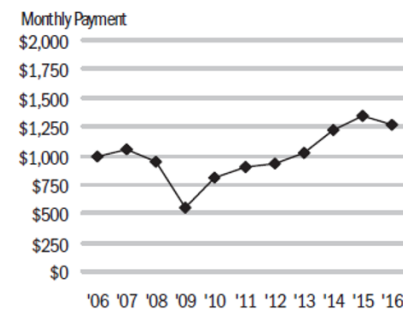
Initial income based on an annuity factor
Ongoing income will vary to reflect mortality/investment experience

Key design relationships

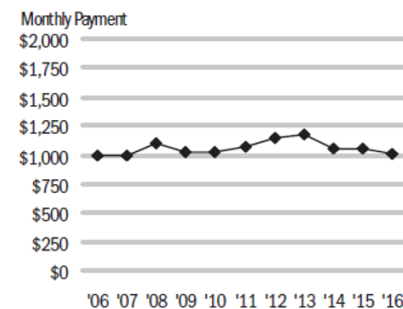
1. Initial benefit (income) amount
 $B_0 = \text{Investment amount} \div \text{Annuity factor}_0$
2. Many ways to adjust ongoing benefit amount B_t
 - Adjusted as a result of experience
 - Adjusted as a result of long-term assumptions

College Retirement Equities Fund (TIAA-CREF)

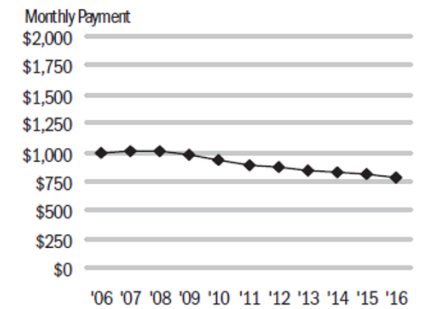
Equity Index Account



Inflation-Linked Bond Account



Money Market Account



Source: College Retirement Equities Fund Prospectus, TIAA, May 2016

Retirement Tontines | GSA | Tontine Account

History

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Modelling

Open ended

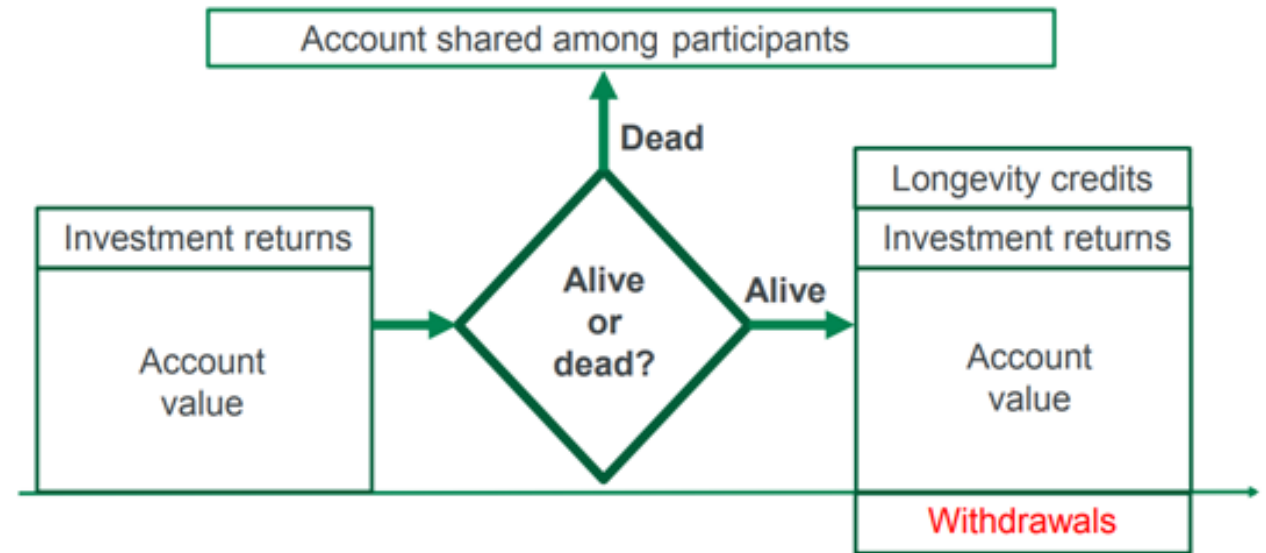
No restriction on investment options

Aim is to earn *tontine gains* on top of investment return to fund retirement income

Similar to an investment account

Mortality experience can be pooled among different accounts

Not limited to any particular drawdown options



Source: 21st century retirement - Modern tontines, Catherine Donnelly, Risk Insight Lab, Heriot-Watt University, October 2018

High flexibility and transparency

- Different drawdown options possible
- Part of decumulation investment portfolio (More about this later)

Product Design



What's out there now?

History

Modern
Research

**Product
Design**

Modelling

Sharing is not a new concept



Funds/Stuctures

- UniSuper, TIAA
- We??

Products

- Mercer Lifetime Plus
- Nippon Gran Age?
- SPAC – Pershing Square ‘Tontine’ Holdings [not a tontine..]

Concepts (high level...)

History

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ABP + Tontine Account

- Standard concept
- Investment Choice?
- Withdrawal/death benefits managed by tontine glidepath
- Drawdown/payout options?
- How to explain to members??

Whole of Life

- Blend of USA Tontine and deferred annuity
- Aligned with one account, member stapling
- 'longevity insurance' premiums
- Unlikely to fit within existing legislative or tax requirements!

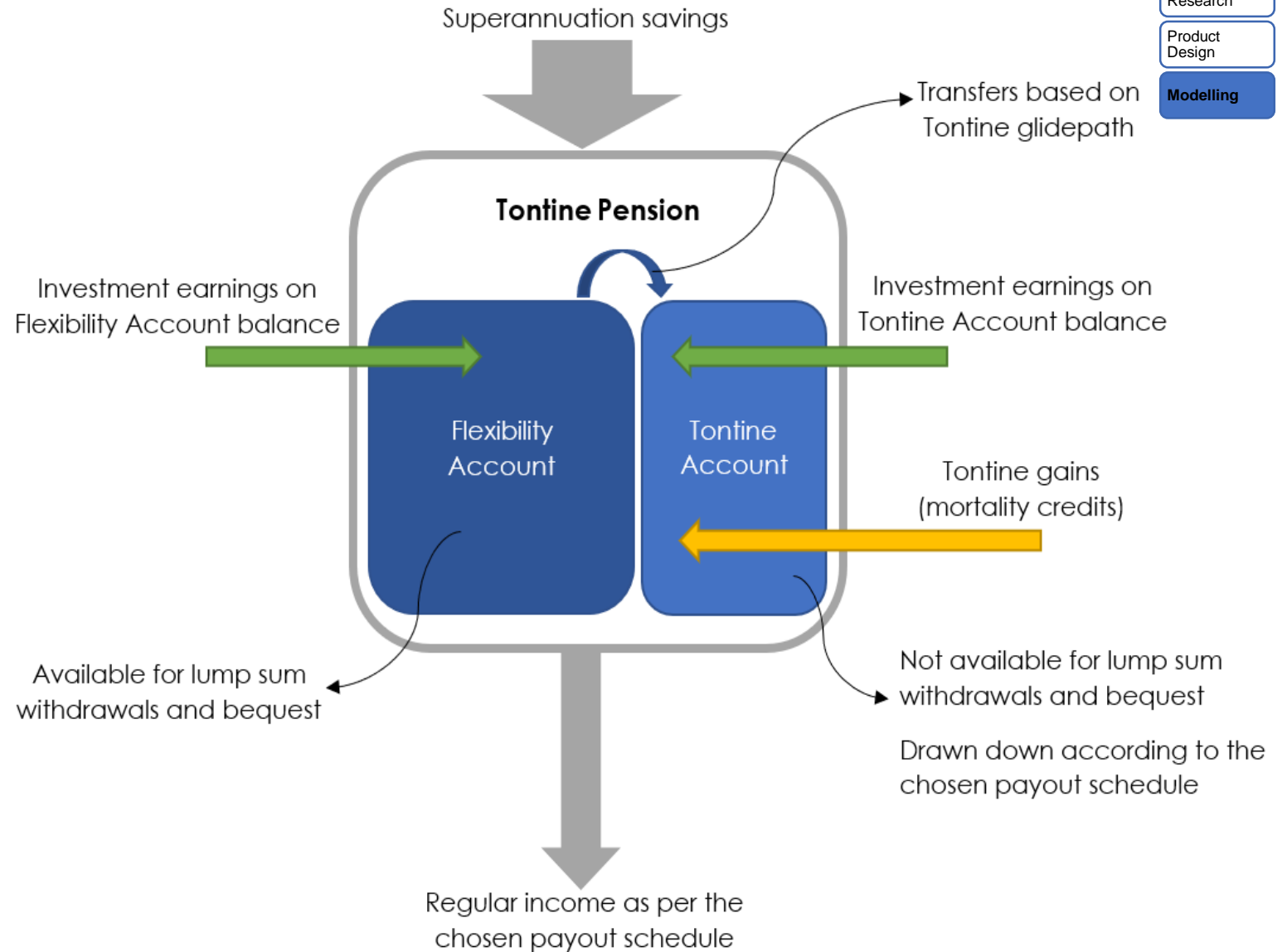
Defensive Asset

- Tontine bond (Fullmer, 2019)
- Not for longevity protection
- Bond yield + mortality credit

Modelling Example



Modelling – Sample Design structure



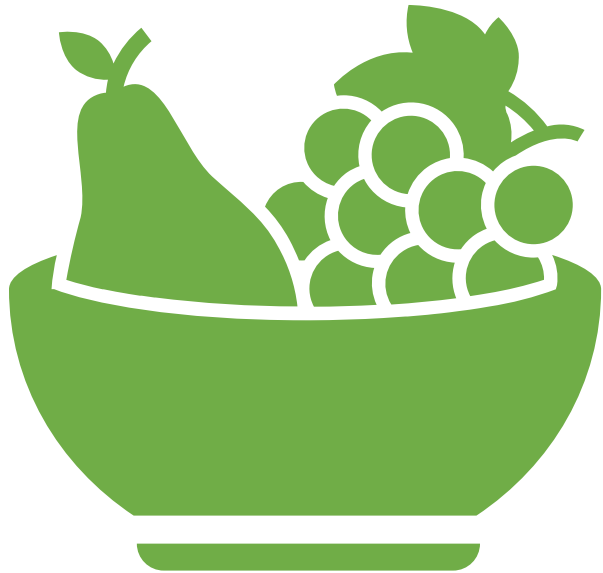
Key product design variables

History

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Modelling



Tontine glidepath

How much and how quickly into Tontine Account

Drawdown schedules

How many options and how flexible

Tontine gains distributions

Frequency and mechanism

Investment options

Between death and distribution of tontine gains

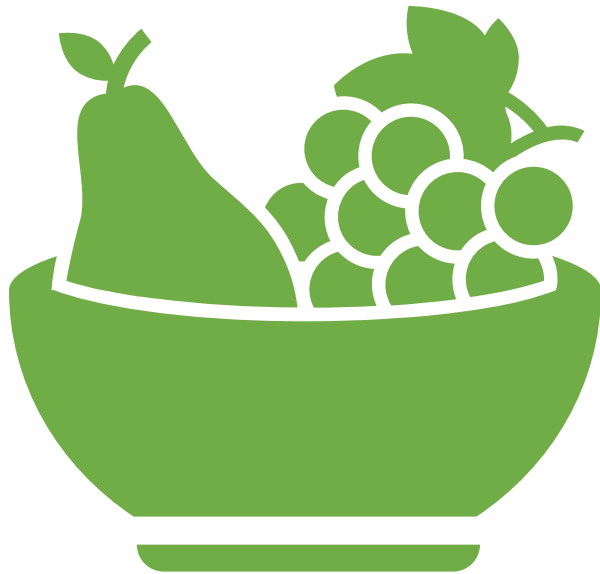
A simple example for illustration

History

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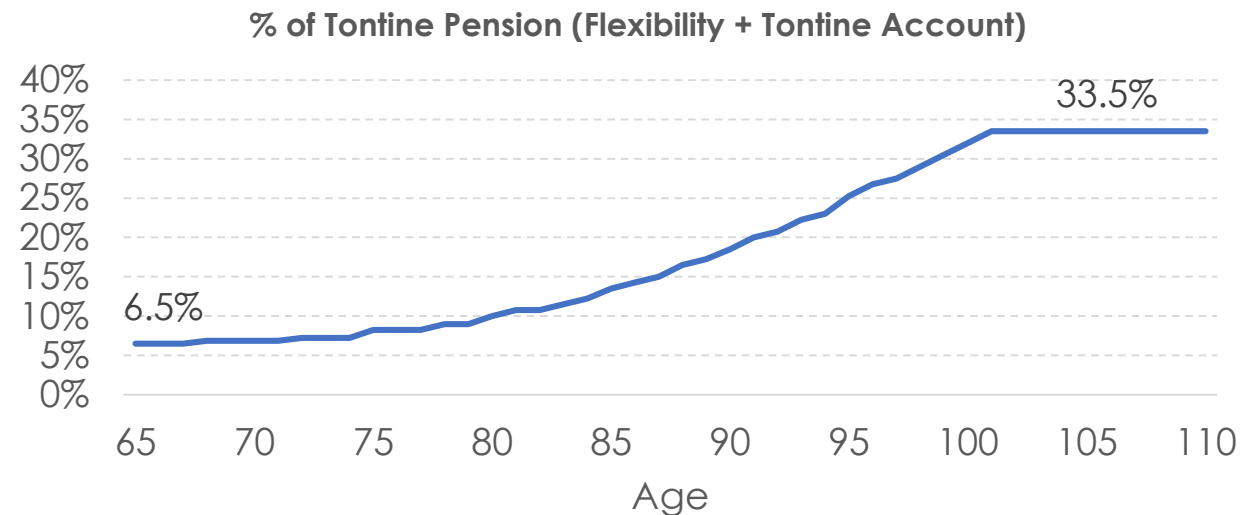
Modelling



Tontine glidepath

2.5% of Flexibility account is **transferred** to Tontine account each year from age 70 to age 90 to gradually build up a longevity protection over time

Drawdown schedule



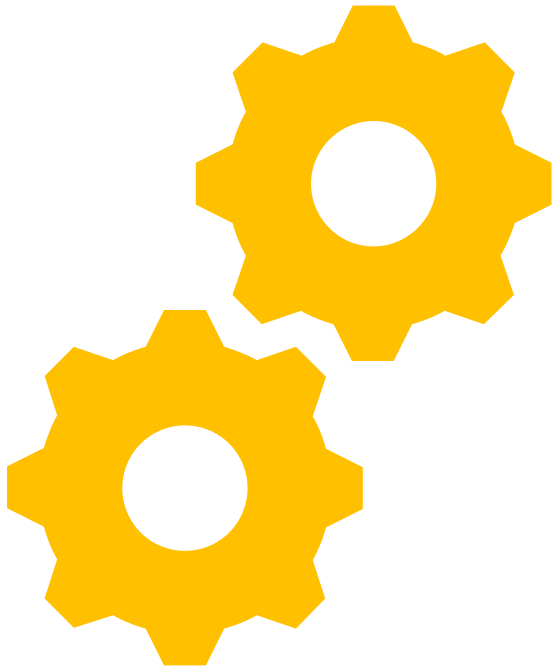
Modelling settings / assumptions

History

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Modelling



A closed group of 1,000 female retirees aged 65

Age of death of each retiree is drawn from an assumed distribution.

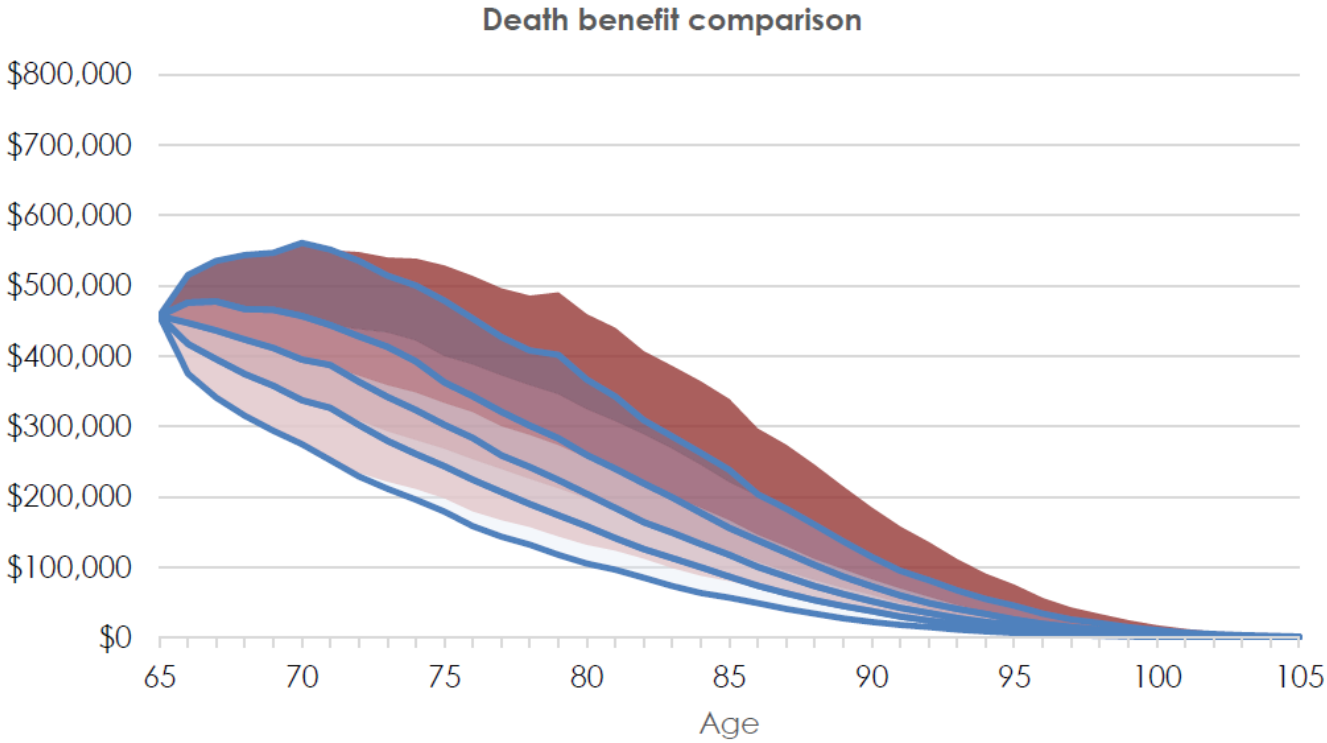
The distribution was constructed from a set of cohort mortality rates based on the Australian Life Table 2010-12 for females with the 125-year improvement factors.

1,000 investment return scenarios

Balanced option – drawn from a normal distribution with a mean of 6.6% and a standard deviation of 10%

Same initial balance of \$500,000

Death | Impact of tontine account



- 100% ABP: 5th - 25th percentile
- 100% ABP: 25th - 50th percentile
- 100% ABP: 50th - 75th percentile
- 100% ABP: 75th - 95th percentile
- Tontine Pension: 5th - 25th percentile
- Tontine Pension: 25th - 50th percentile
- Tontine Pension: 50th - 75th percentile
- Tontine Pension: 75th - 95th percentile

Represent amount in Flexibility account over time

Smooth decline over time

Not materially different from pure ABP under the same drawdown schedule

Income | Impact of tontine account

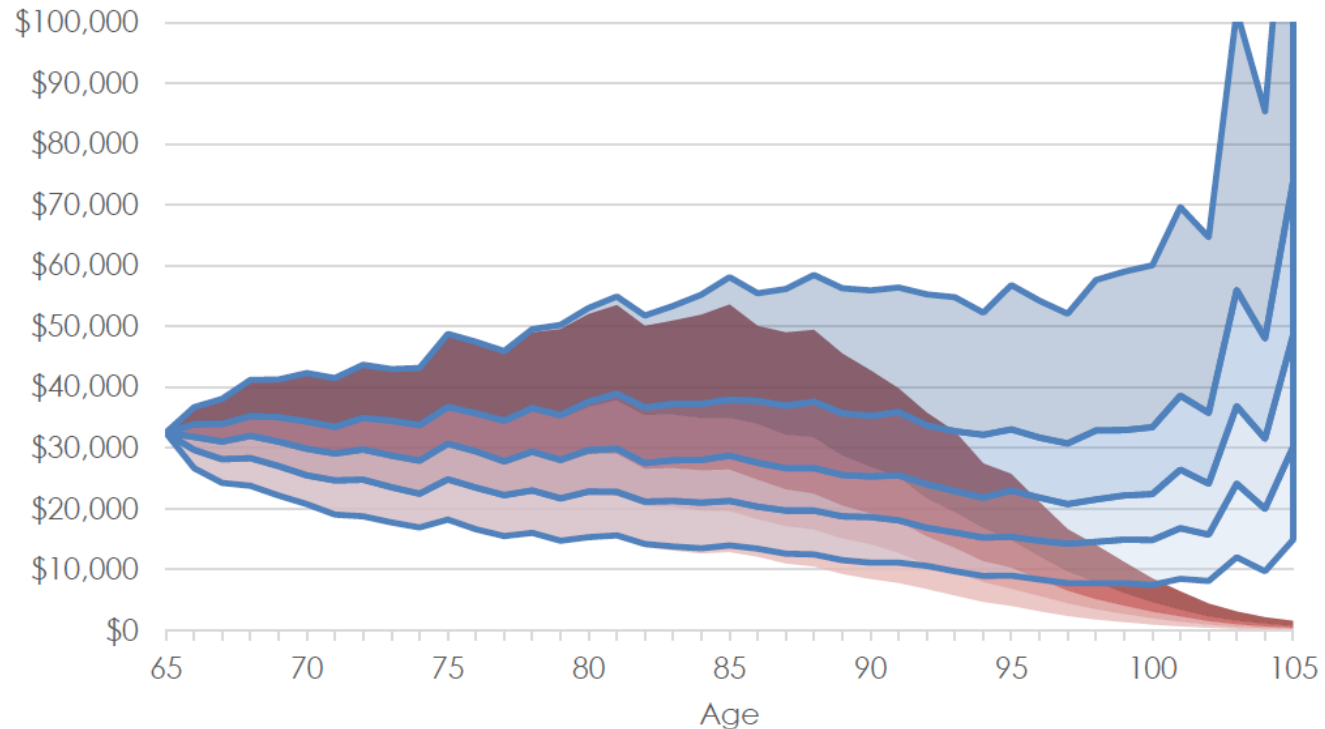
History

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Income comparison | Impact of mortality credits



- 100% ABP: 5th - 25th percentile
- 100% ABP: 25th - 50th percentile
- 100% ABP: 50th - 75th percentile
- 100% ABP: 75th - 95th percentile
- Tontine Pension: 5th - 25th percentile
- Tontine Pension: 25th - 50th percentile
- Tontine Pension: 50th - 75th percentile
- Tontine Pension: 75th - 95th percentile

Obvious benefit after age 85

Range of outcomes still dominated by investment experience

Volatility at advanced old ages due to a closed group.

Smoother experience can be expected for open-ended products

Summary



WHAT WE COVERED
TODAY



OTHER THINGS TO
EXPLORE



WHY IS THIS RELEVANT?

Thank you for listening

