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21st century retirement: Modern tontines

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The **'Minimising Longevity and Investment Risk while Optimising Future Pension Plans'** research programme is being funded by the Actuarial Research Centre.

3 October 2018

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Question 1 for audience

- Which option best describes tontines?

Option A	Aren't they illegal?
Option B	Last survivor takes all - watch your back!
Option C	Higher retirement income than drawdown.
Option D	Never heard of them.

Tontines, by other names



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(CDC)
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OUR THINKING

Mercer LifetimePlus

On average, more than half of all Australians today will outlive their retirement savings. Yet despite recommendations from the 2014 Financial Systems Inquiry, the market for self-funded retirement products has been slow to evolve.

Mercer LifetimePlus is an award-winning investment solution that tackles longevity risk in a new way by providing genuine income for life that grows as people age.



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What is a tontine?

- A tontine is a structure to pool longevity risk.
- A pure tontine has no guarantees – the pool of people bear the longevity risk.
- The purpose of modern tontines is to pay an income for life.

Imagine yourself...



What to do?



Seeking advice...



Age 70 with £100K pot



	Pure modern tontine			
Annual income	£7,100			
Age at which out-live savings	120 years			
Money left to heirs	Nothing			
Basis				
<i>(Mortality, Investment returns), [allocation to tontine],[income if use unadjusted table]</i>	<i>(S1PMA-2, 2% p.a.), [100% allocation], [£7,700 on S1PMA]</i>			



Age 70 with £100K pot

	Pure modern tontine	Modern tontine with bequest		
Annual income	£7,100	£6,600		
Age at which out-live savings	120 years	120 years		
Money left to heirs	Nothing	20% of pot at death		
Basis				
<i>(Mortality, Investment returns), [allocation to tontine],[income if use unadjusted table]</i>	<i>(S1PMA-2, 2% p.a.), [100% allocation], [£7,700 on S1PMA]</i>	<i>(S1PMA-2, 2% p.a.), [80% allocation], [£7,100 on S1PMA]</i>		



Age 70 with £100K pot

	Pure modern tontine	Modern tontine with bequest	Life annuity	
Annual income	£7,100	£6,600	£6,000	
Age at which out-live savings	120 years	120 years	Never	
Money left to heirs	Nothing	20% of pot at death	Nothing	
Basis				
<i>(Mortality, Investment returns), [allocation to tontine],[income if use unadjusted table]</i>	<i>(S1PMA-2, 2% p.a.), [100% allocation], [£7,700 on S1PMA]</i>	<i>(S1PMA-2, 2% p.a.), [80% allocation], [£7,100 on S1PMA]</i>	<i>(S1PMA-4, UK yield curve), equivalently (S1PMA-2, -0.3% p.a.)</i>	



Age 70 with £100K pot

	Pure modern tontine	Modern tontine with bequest	Life annuity	Income drawdown
Annual income	£7,100	£6,600	£6,000	£6,600
Age at which out-live savings	120 years	120 years	Never	87 years
Money left to heirs	Nothing	20% of pot at death	Nothing	Whatever left in pot at death
Basis				
<i>(Mortality, Investment returns), [allocation to tontine],[income if use unadjusted table]</i>	<i>(S1PMA-2, 2% p.a.), [100% allocation], [£7,700 on S1PMA]</i>	<i>(S1PMA-2, 2% p.a.), [80% allocation], [£7,100 on S1PMA]</i>	<i>(S1PMA-4, UK yield curve), equivalently (S1PMA-2, -0.3% p.a.)</i>	<i>(S1PMA, 2% p.a.)</i>



Question 2 for audience

Which do you want to know more about
(currently age 70, £100K pot)?

	Annual income	Beneficiaries get...
Option A – pure tontine	£7,100 p.a. until age 120.	Nothing.
Option B – modern tontine with bequest	£6,600 p.a. until age 120.	20% of pot at death.
Option C – life annuity	£6,000 p.a. until death.	Nothing.
Option D – income drawdown	£6,600 p.a. until age 87.	Whatever is left in pot at death.

Life annuity contract



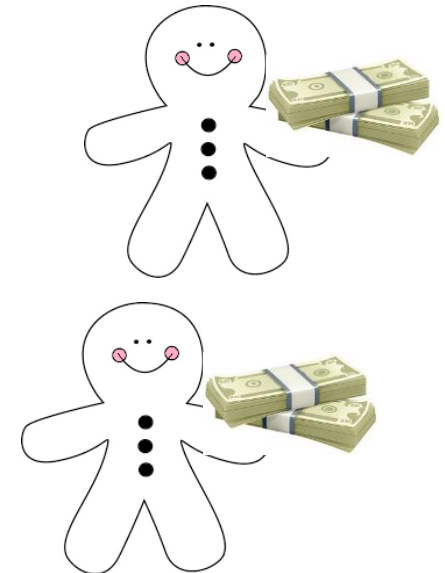
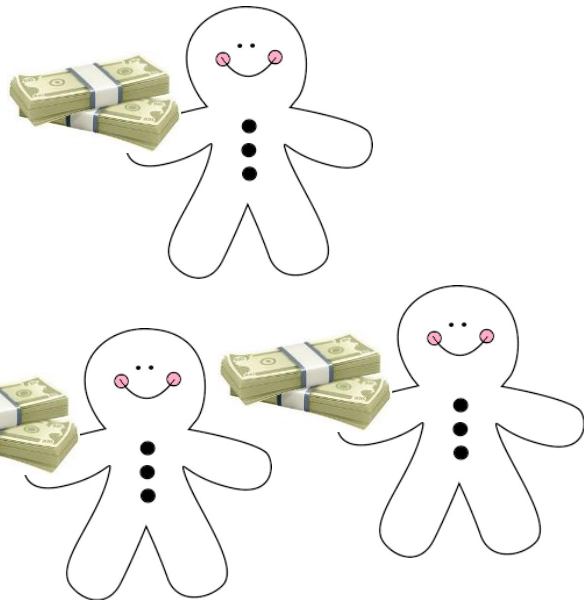
Life annuity contract



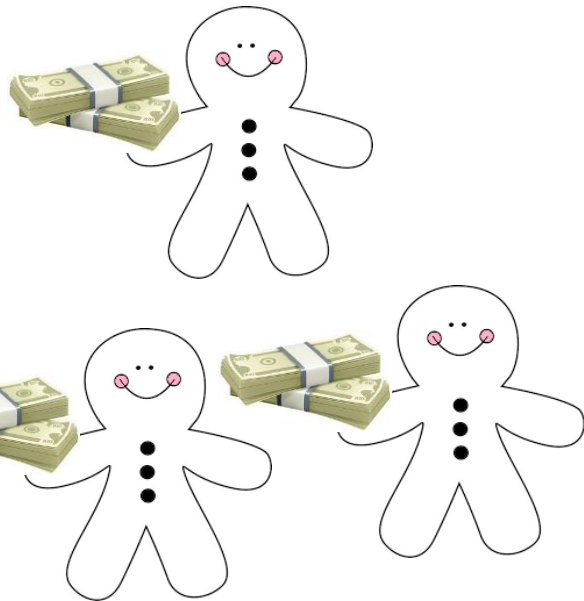
Life annuity contract



Life annuity contract



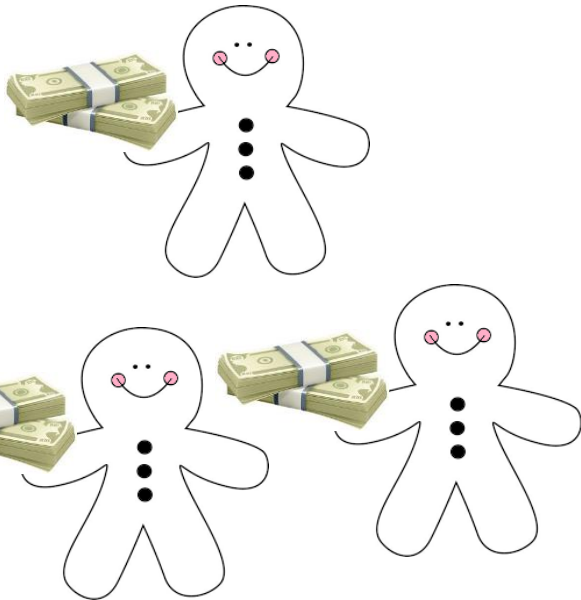
Life annuity contract



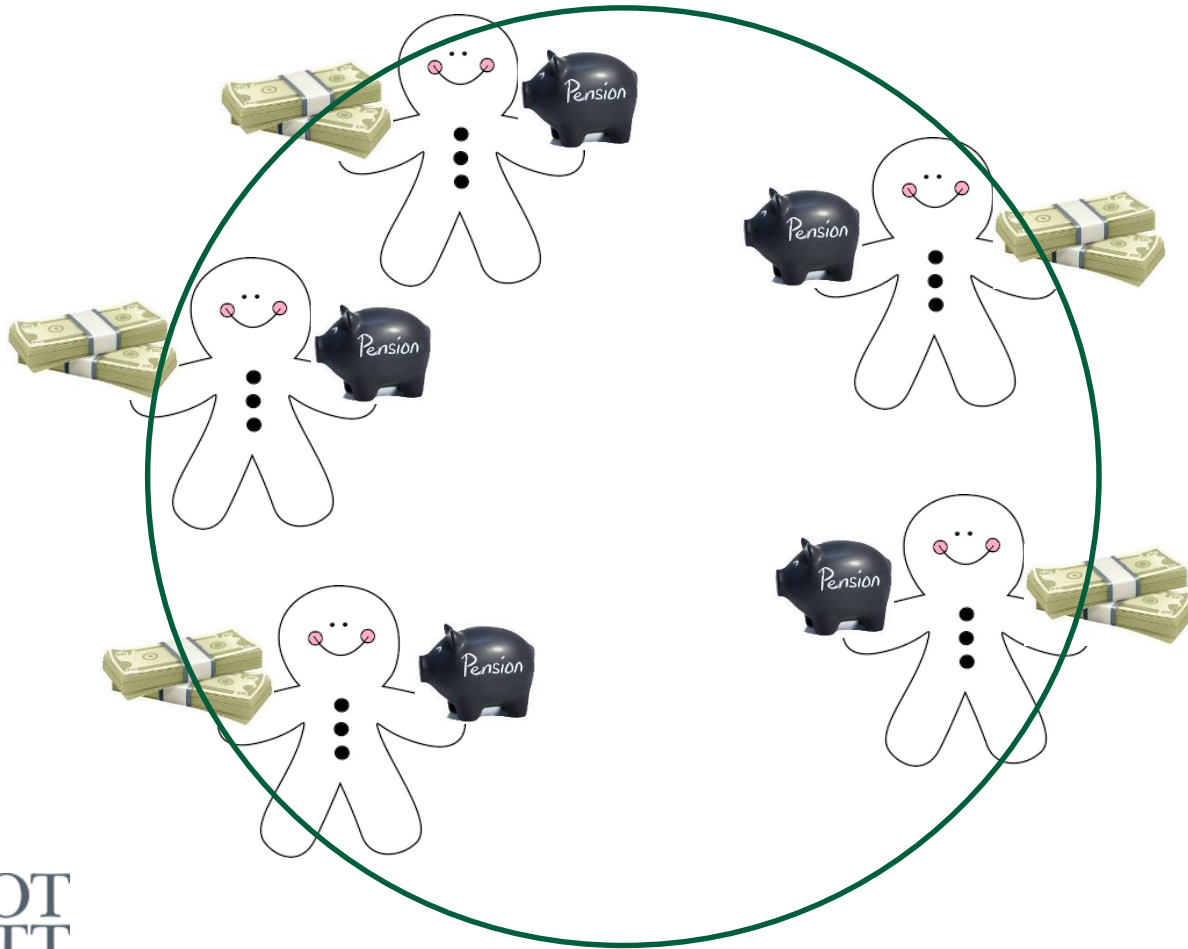
Life annuity feature

- Life annuity gives higher income than income drawdown,
 - if follow same investment strategy, and
 - ignore fees, costs, taxes, etc.
- Why? Pool longevity risk.
- We can pool longevity risk without buying life annuities.

Life annuity contract



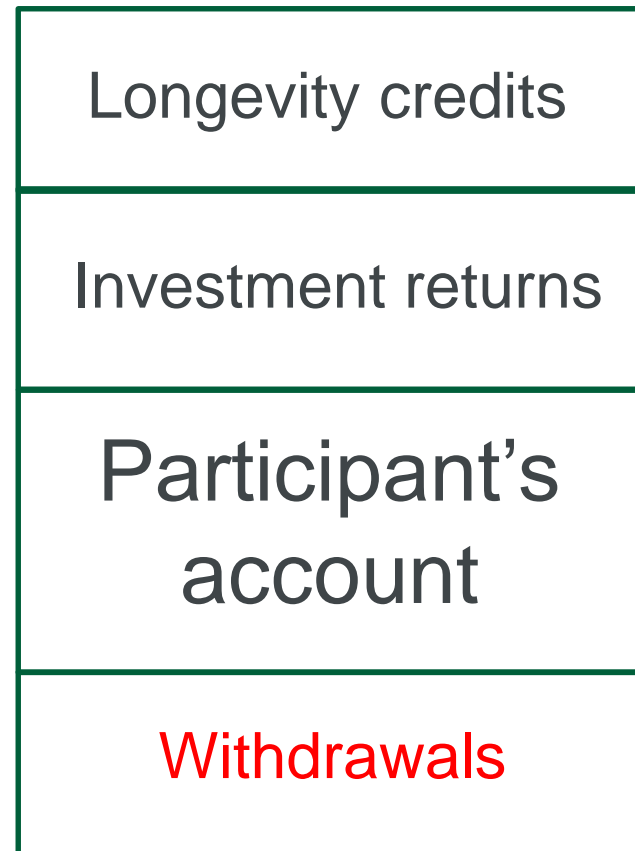
Tontine



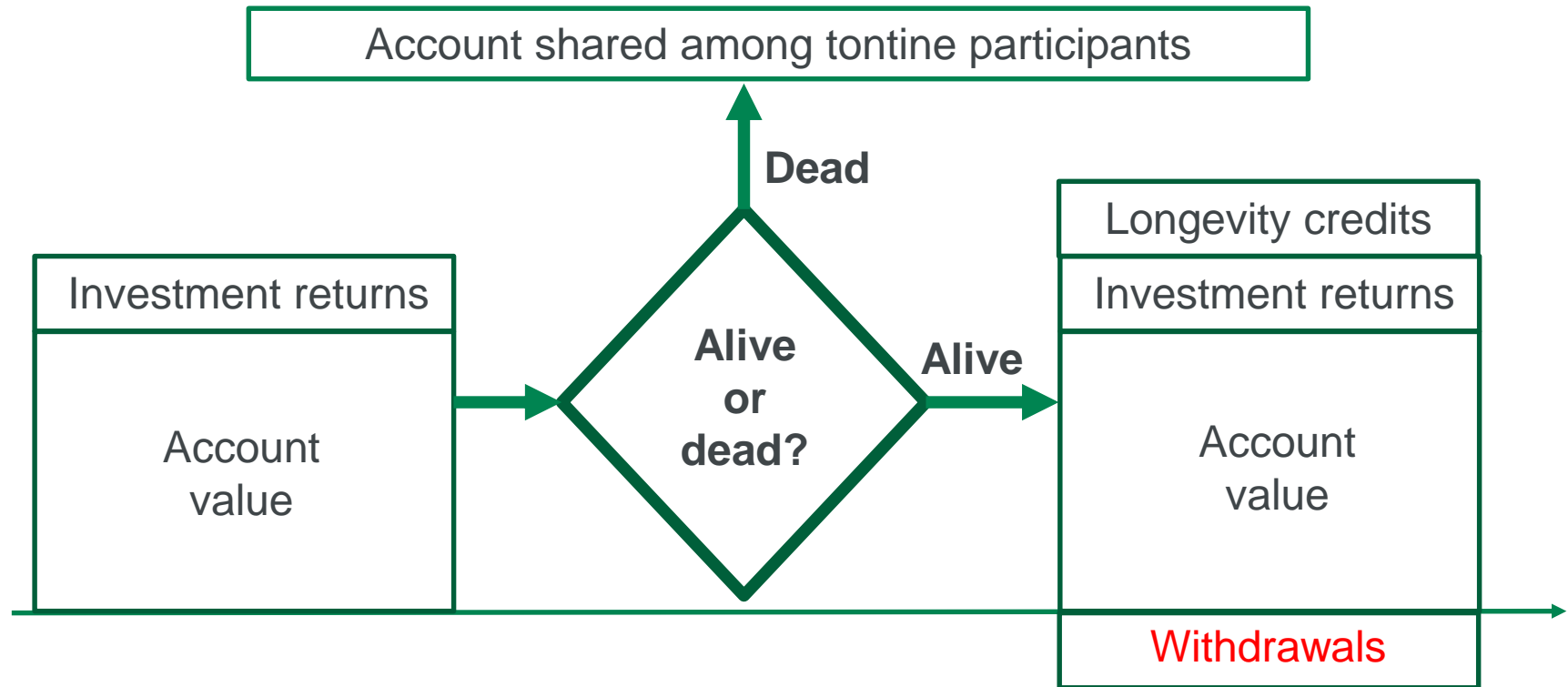
Modern tontines

- Aim: retirement income, not a life-death gamble.
- Various tontines structures have been proposed.
- Focus on [DGN] method of pooling longevity risk

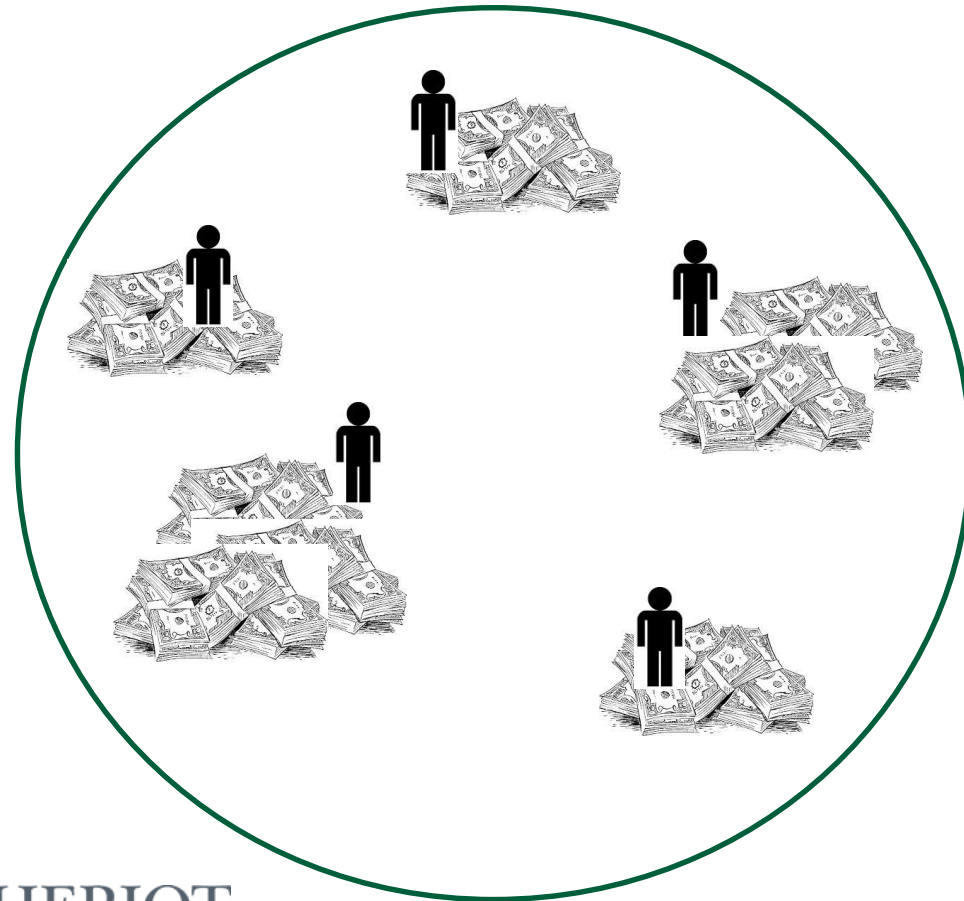
Pure modern tontine – individual account structure



Pure modern tontine



Calculating longevity credits [DGN]



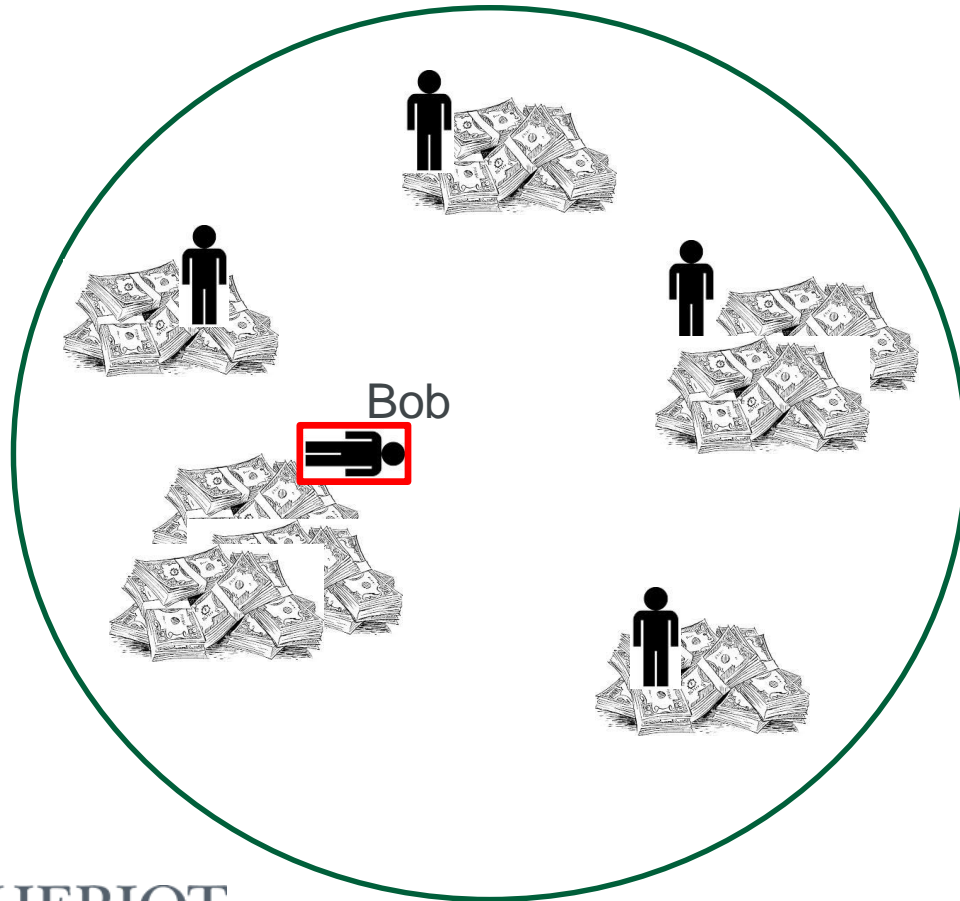
Pool risk over lifetime

Individuals make their own investment decisions

Individuals withdraw income from their own accounts

However, when someone dies at time T ...

Calculating longevity credits [DGN]



Share out account value of Bob.

$\lambda^{(i)}$ = Force of mortality of i^{th} member at time T

$W^{(i)}$ = Account value of i^{th} member at time T .

Longevity credit to i^{th} member

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

Calculating longevity credits [DGN]

- Total account value of group is unchanged by pooling.
- Expected actuarial gain = 0, for all members at all times.
 - i.e. the pool is actuarially fair at all times
- There will always be some volatility in the longevity credit:
 - But longevity credit ≥ 0 , i.e. never negative.
 - Loss occurs only upon death.



Calculating longevity credits [DGN]

- Mitigates longevity risk, but does not eliminate it.
- Update forces of mortality to reflect new information on longevity.
- Anti-selection risk remains, as for life annuity. Waiting period?
- “Cost” is paid upon death, not upfront like life annuity.
 - Could consider, e.g. housing (Donnelly & Young 2017).



Questions

Comments

Other methods of longevity credits, for finite groups

- [DGN] rule works for any group:
 - Actuarial fairness holds for any group composition, but
 - Requires a (small) payment to estate of recently deceased.
- [Sabin] proposes a survivor-only, actuarially fair payment. However, it requires restrictions on membership.
- Implicit tontines pay an income rather than longevity credits
 - Group Self-Annuitization Scheme of [Piggott *et al*], enabled by Australian Government.
 - Milevsky and Salisbury (2015).

Minimising Longevity and Investment Risk while Optimising Future Pension Plans

Recent project presentations

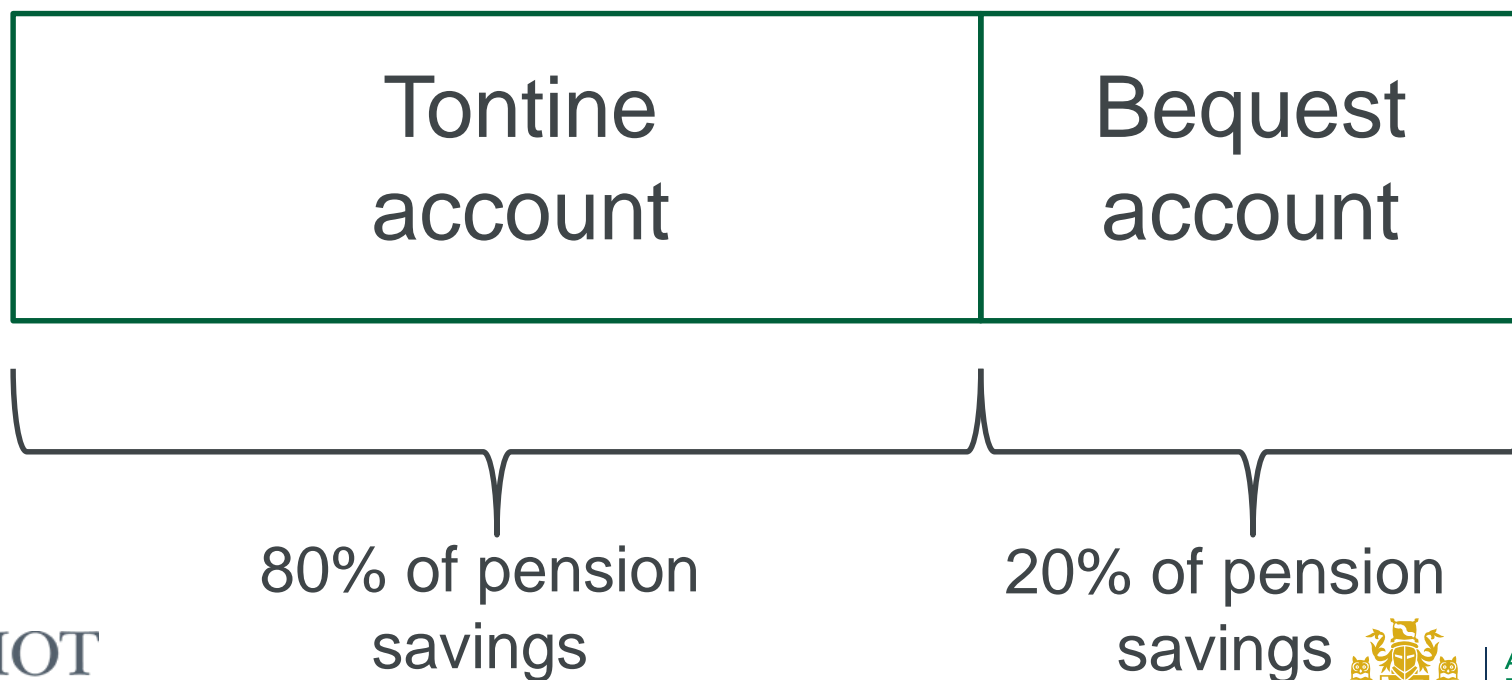
- Sessional Research Event in May 2018:

Self-selection and Risk Sharing in a Modern World of Life-Long Annuities, presented by J.P. Nielsen.

- Here, present work with Thomas Bernhardt, Risk Insight Lab, Heriot-Watt University

Modern tontine with bequest

Split pension savings into two accounts, 80% in tontine account

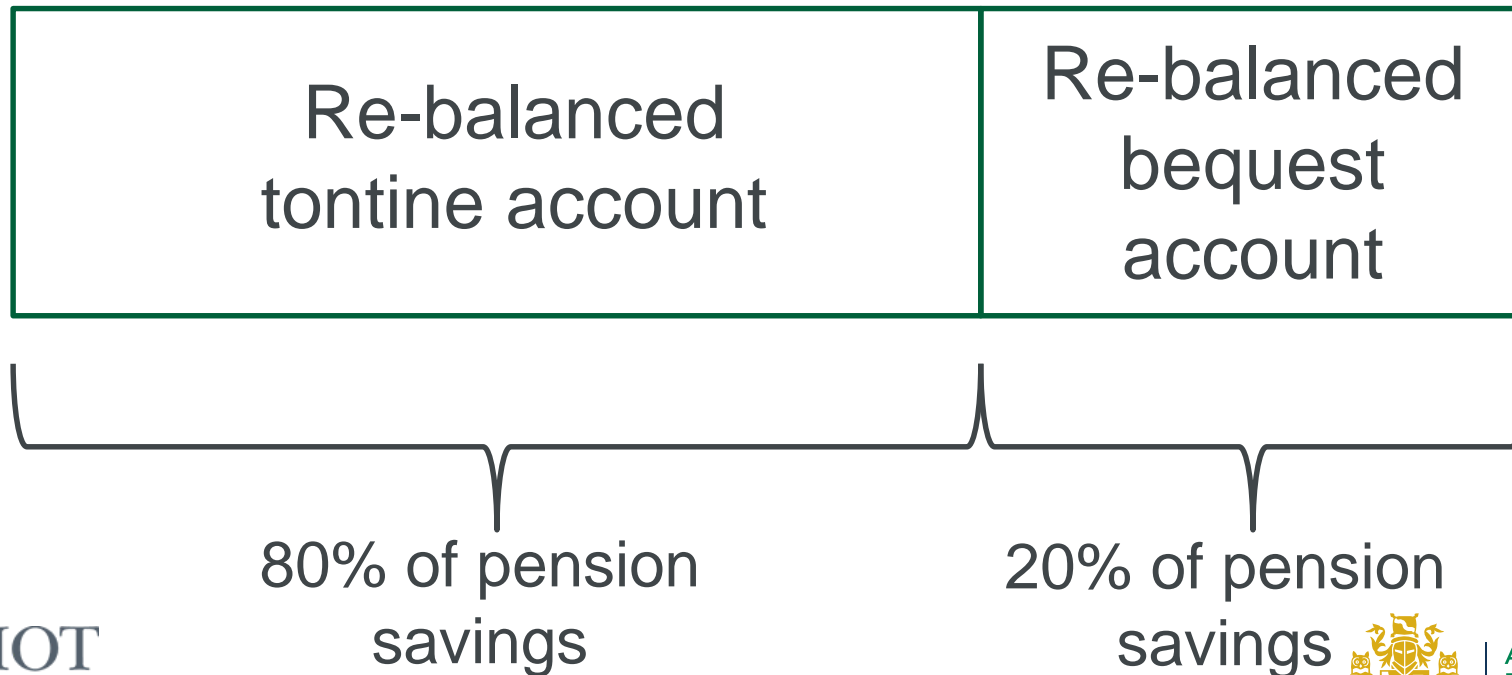


Modern tontine with bequest

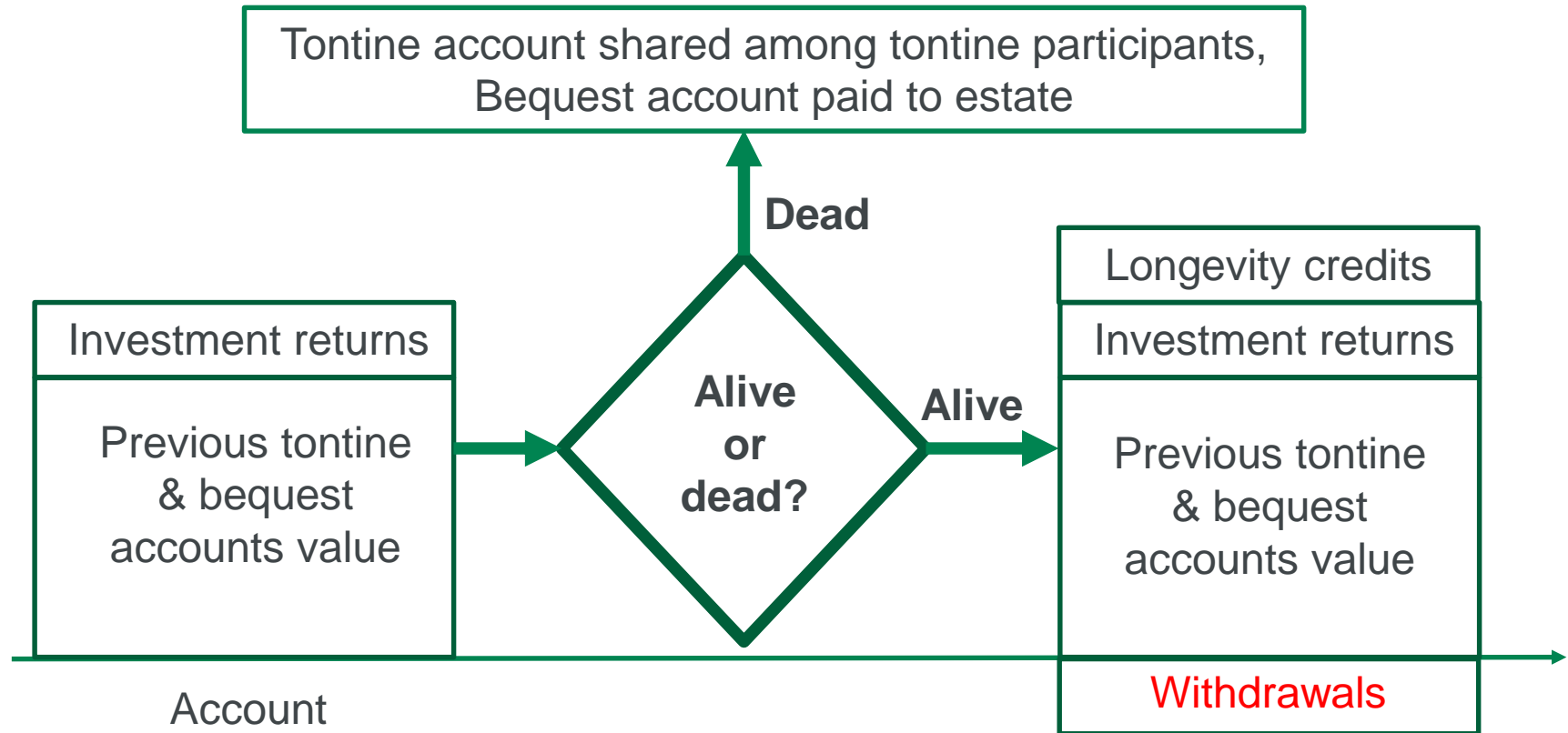
Longevity credits	
Investment returns	Investment returns
Tontine account	Bequest account
Withdrawal	Withdrawal

Modern tontine with bequest

Rebalance accounts (re-distribute longevity credits)



Modern tontine with bequest

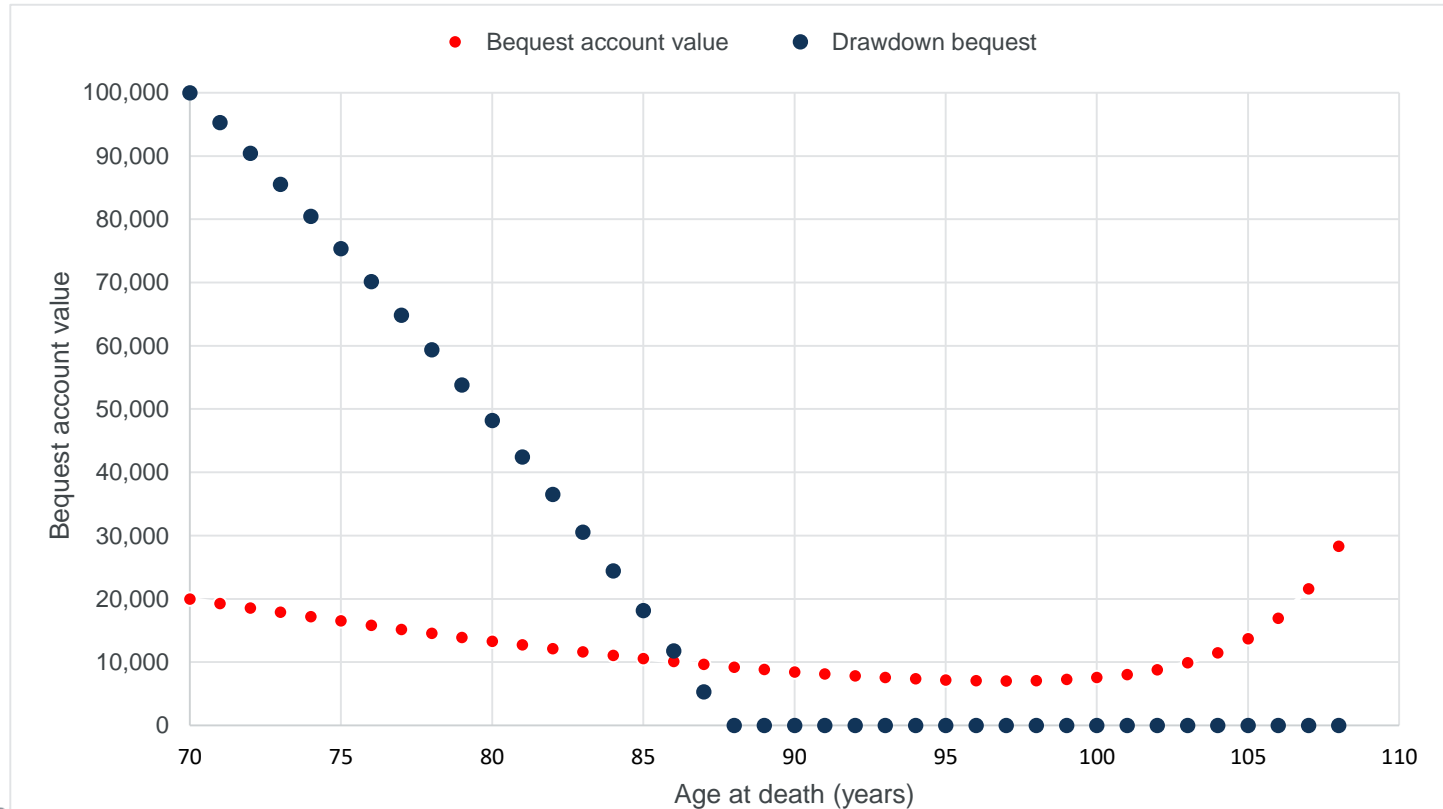




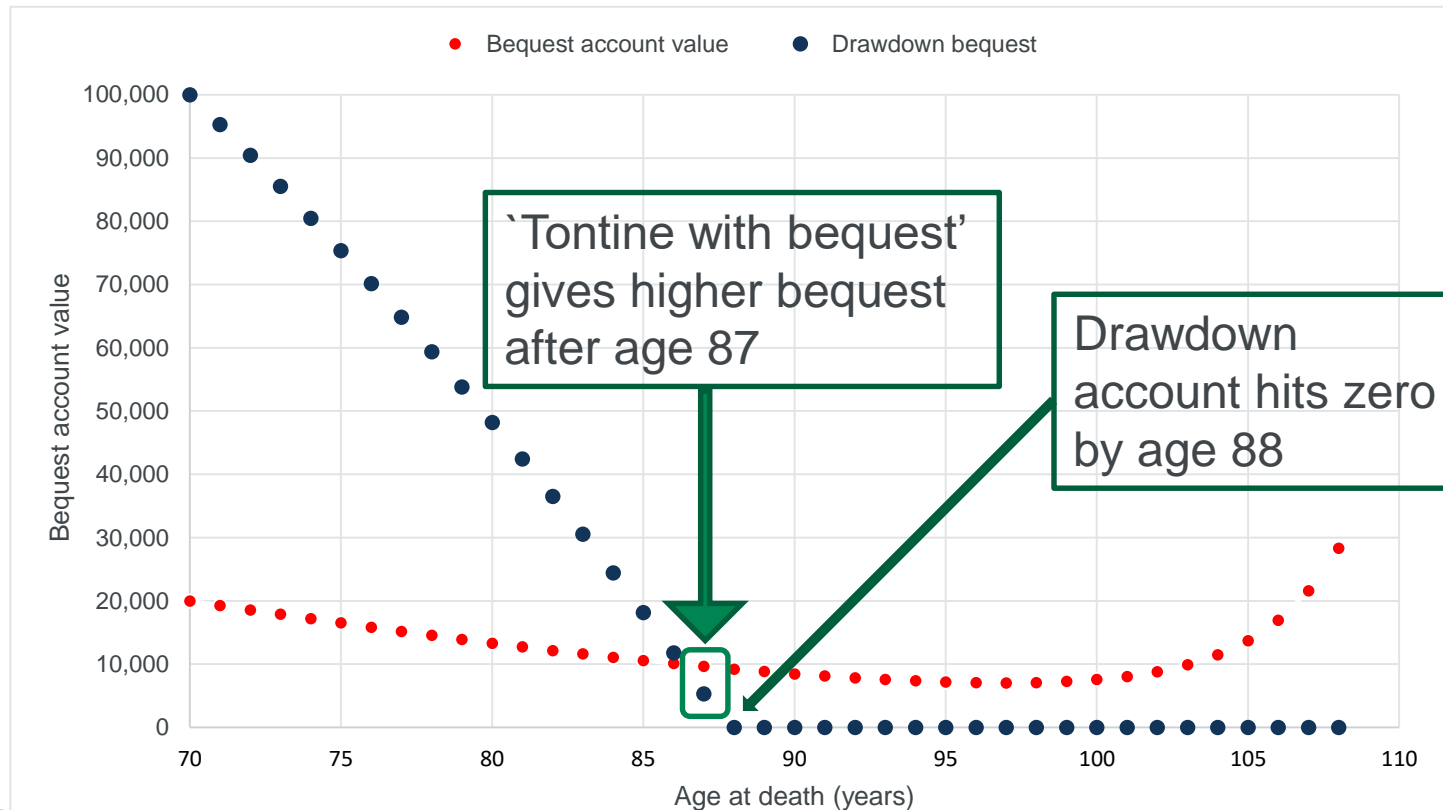
Age 70 with £100K pot

		Modern tontine with bequest		Income drawdown
Annual income		£6,600		£6,600
Age at which out-live savings		120 years		87 years
Money left to heirs		20% of pot at death		Whatever left in pot at death
Basis				
<i>(Mortality, Investment returns), [allocation to tontine],[income if use unadjusted table]</i>		<i>(S1PMA-2, 2% p.a.), [80% allocation], [£7,100 on S1PMA]</i>		<i>(S1PMA, 2% p.a.)</i>

Bequest account vs Drawdown bequest



Bequest account vs Drawdown bequest



Research question

What percentage of pension savings should you put in the tontine account?

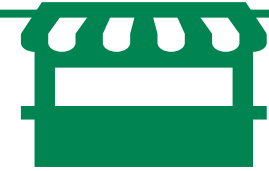
- Allow for desire for income, bequest motive and risk aversion.
- Found that, for (normal) risk aversion, percentage is fairly stable and high.
- Harder to say for risk-seekers.
- Results are in theoretical model.
- Next step is to look at more realistic model.

Modern tontines - summary

- Reduce risk of running out of money in retirement.
- Should be structured to provide a stable, fairly constant income (**not** increasing exponentially with the longevity credit!).
- Provide a higher income than living off investment returns alone.
- Can seek higher investment returns than life annuity.
- Can incorporate bequests.

Modern tontines - applications

- Innovation in retirement products
 - e.g. allow for bequest: ‘modern tontine with bequest’.
 - e.g. provide downside protection that too few deaths occur (minimum income) – see Donnelly & Young (2017).
 - e.g. allow less liquid assets such as pensioner’s house.
- Foundation for collective DC plans
 - Provides income without buying life annuities.
 - Could be integrated into DC plans as post-retirement option.



Question 3 for audience

Which would you choose (currently age 70, £100K pot)?

	Annual income	Beneficiaries get...
Option A – pure tontine	£7,100 p.a. until age 120.	Nothing.
Option B – modern tontine with bequest	£6,600 p.a. until age 120.	20% of pot at death.
Option C – life annuity	£6,000 p.a. until death.	Nothing.
Option D – income drawdown	£6,600 p.a. until age 87.	Whatever is left in pot at death.

Question 4 for audience [Word cloud]

Type in three distinct key words that you take away from this webinar



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Questions

Comments

Bibliography and further reading

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