ARC CENTRE OF EXCELLENCE IN POPULATION AGEING RESEARCH

Insuring longevity risk and long-term care: Bequest, housing, and liquidity

CEPAR Longevity Risk Workshop

Michael Sherris

18 July 2023

Australian Government
Australian Research Council
UNSW SYDNEY
Australian National University
Curtin University
THE UNIVERSITY OF MELBOURNE
THE UNIVERSITY OF SYDNEY

Coverage

- Theoretical annuitization of liquid wealth (superannuation) with functional disability risk (aged care), illiquid home equity and bequest motive.
- Impact of consumption smoothing and bequest, precautionary savings (uninsured risks), and long-term care insurance.

  - Retirement risks – mortality and functional disability (mean and variability)
  - Theoretical demand for life annuities – with housing wealth, no (private) LTC insurance (with government consumption floor) and bequest – per cent of liquid wealth (super) and of total wealth (including illiquid housing)
  - Theoretical demand for LTC insurance with housing wealth and bequest (with government consumption floor)
  - Theoretical demand for life annuities – with housing wealth and with private LTC insurance (with government consumption floor) – with and without bequest motive

- Full details: Mengyi Xu, Jennifer Alonso-García, Michael Sherris, Adam W. Shao, **Insuring longevity risk and long-term care: Bequest, housing and liquidity,** **Insurance: Mathematics and Economics**, Volume 111, 2023, Pages 121-141, ISSN 0167-6687, https://doi.org/10.1016/j.insmatheco.2023.03.004.

Functional Disability and Mortality Risks: Mean and Variability

Table 11. Trend model: future lifetime statistics for 65- and 75-year-old healthy individuals in 1998 and 2014, including mean, standard error of the mean in brackets and SD. The maximum attainable age is 110.

	Healthy at 65				Healthy at 75			
	CLHLS		HRS		CLHLS		HRS	
	Female	Male	Female	Male	Female	Male	Female	Male
Total future lifetime								
Mean	17.04	15.13	20.80	18.19	10.99	9.62	13.12	10.91
	(0.09)	(0.09)	(0.09)	(0.08)	(0.07)	(0.06)	(0.07)	(0.06)
SD	9.44	8.76	8.87	8.30	7.06	6.43	6.79	6.15
Healthy future lifetime								
Mean	15.90	14.34	17.62	16.43	9.99	8.97	10.58	9.56
	(0.09)	(0.09)	(0.09)	(0.08)	(0.07)	(0.06)	(0.06)	(0.06)
SD	9.33	8.67	8.58	8.18	6.84	6.28	6.37	5.92
Disabled future lifetime								
Mean	1.14	0.79	3.18	1.76	1.00	0.65	2.53	1.36
	(0.03)	(0.02)	(0.05)	(0.03)	(0.03)	(0.02)	(0.04)	(0.03)
SD	3.09	2.47	4.52	3.21	2.55	1.97	3.75	2.62
Healthy future lifetime over total future lifetime								
Mean	0.935	0.949	0.853	0.905	0.916	0.939	0.820	0.884
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
SD	0.164	0.149	0.202	0.173	0.195	0.172	0.247	0.215
Age at onset of disability conditional on becoming disabled								
Mean	76.69	75.77	79.69	78.73	83.34	82.62	84.35	83.66
	(0.17)	(0.18)	(0.11)	(0.13)	(0.12)	(0.13)	(0.08)	(0.09)
SD	7.72	7.21	8.44	7.85	5.81	5.24	5.90	5.44

Key model assumptions

Table 1
The parameter values used for the base case.

Parameter	Explanation	Value
Preference (Pang and Warshawsky, 2010)		
b	Strength of bequest motive	0 and 2
β	Subjective discount factor	0.96
γ	Coefficient of relative risk aversion	5
ψ	Elasticity of intertemporal substitution (EIS)	0.5
Asset returns (Yogo, 2016)		
R_f	Risk free rate	1.025
μ_H	Parameters of the lognormal distribution	0.34%
σ_H^2	of house price growth	3.5%
Consumption floor (Ameriks et al., 2011)		
Cf	Floor for healthy and mildly disabled states	$4,630
	Floor for severely disabled states	$5,640
Health expenditure (Ameriks et al., 2011)		
$h(s_1, 1)$	Initial cost for healthy state	$1,000
$h(s_2, 1)$	Initial cost for mildly disabled state	$10,000
$h(s_3, 1)$	Initial cost for severely disabled state	$50,000
$q^{\dagger}$	Health expenditure inflation in excess of CPI inflation	1.90%

† Source: Yogo (2016).

Calibrated to US settings (with insights for Australia)

In real terms (inflation adjusted)

Risk aversion: recursive utility function with bequest

- separates (constant) risk aversion and elasticity of intertemporal substitution (EIS)

Housing wealth is a risky asset realised on severe disability

Government provides consumption floor (a health and wealth contingent asset)

No product loadings – "pooled" products

Health care costs are private (out of pocket)

Full details: Mengyi Xu, Jennifer Alonso-García, Michael Sherris, Adam W. Shao, **Insuring longevity risk and long-term care: Bequest, housing and liquidity,** **Insurance: Mathematics and Economics**, Volume 111, 2023, Pages 121-141, ISSN 0167-6687, https://doi.org/10.1016/j.insmatheco.2023.03.004.

Survival probabilities and Functional Disability - US HRS data

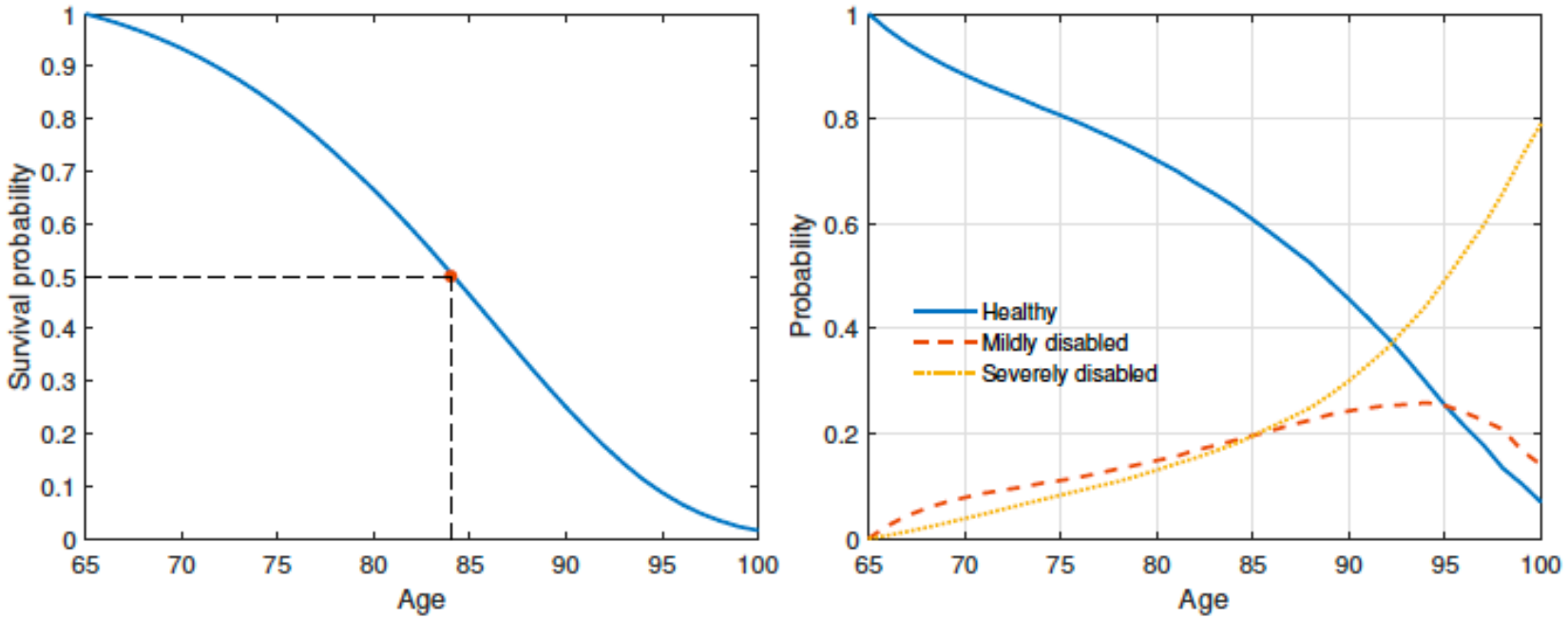


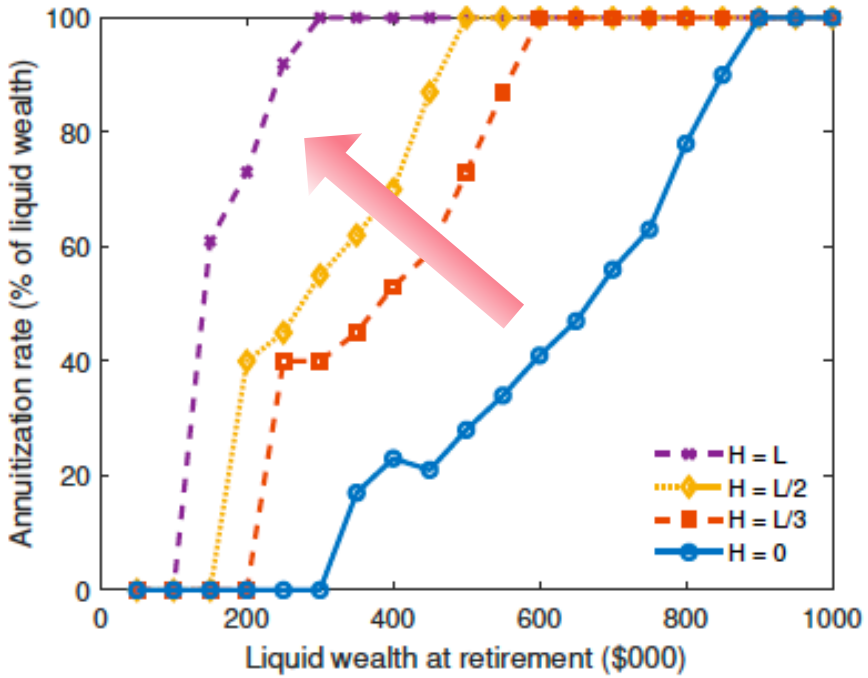
Figure 3. (Left panel) Survival curve and (right panel) probability of being in each health state conditional on being alive for a 65-year-old healthy female.

Source: Xu, M., Alonso-Garcia, J., Sherris, M., Shao, A., (2022), Insuring longevity risk and long-term care: Bequest, housing and liquidity, CEPAR Working paper.

Theoretical Demand for Life Annuities – with Housing Wealth, No LTC Insurance

With bequest motive

Per cent of liquid wealth



- Housing wealth
  - reduces precautionary savings/bequest impact
  - Increases annuitization
  - hedges long term care risk (severe disability)

Figure 6. Optimal annuitization rates for retirees endowed with liquid wealth and housing wealth. The legend represents the ratio between housing wealth (H) and liquid wealth (L) at retirement. The preference parameters are $b = 2, \gamma = 5, \psi = 0.5$. The LTCI is not offered in the market.

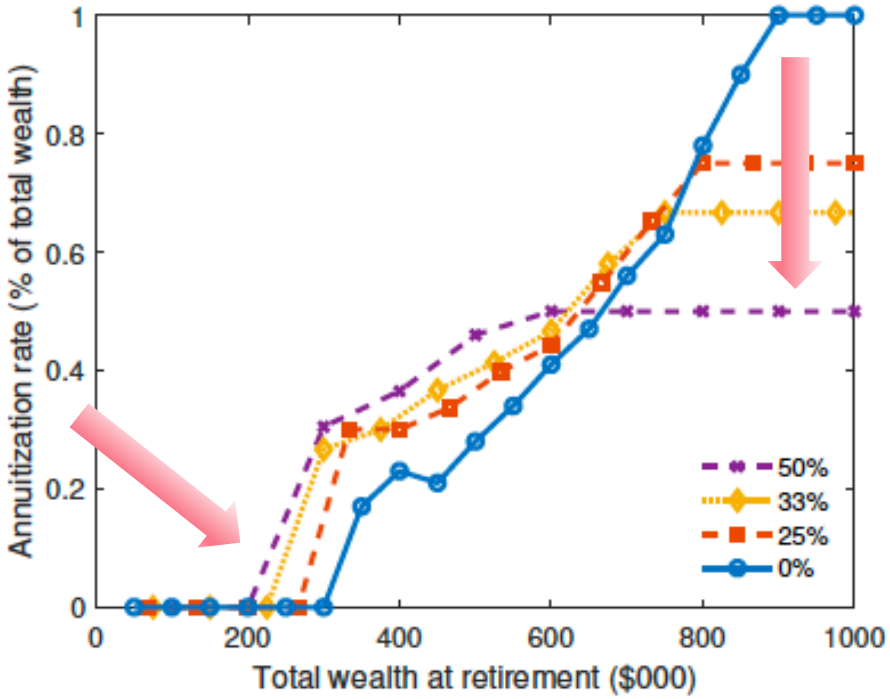
Source: Xu, M., Alonso-Garcia, J., Sherris, M., Shao, A., (2022), Insuring longevity risk and long-term care: Bequest, housing and liquidity, CEPAR Working paper.

Theoretical Demand for Life Annuities – with Housing Wealth, No LTC Insurance

With bequest motive

Per cent of total wealth

Precautionary savings/bequest at lower wealth demand



Liquidity constrained annuity demand from illiquid home equity

Figure 8. Optimal annuitization rates (as a percentage of total wealth) for retirees with different levels of total wealth. The legend represents the proportion of total wealth in home equity at retirement. The preference parameters are $b = 2, \gamma = 5, \psi = 0.5$. The LTCI is not offered in the market.

Theoretical Demand for Long Term Care Insurance – with Housing Wealth and No Life Annuity

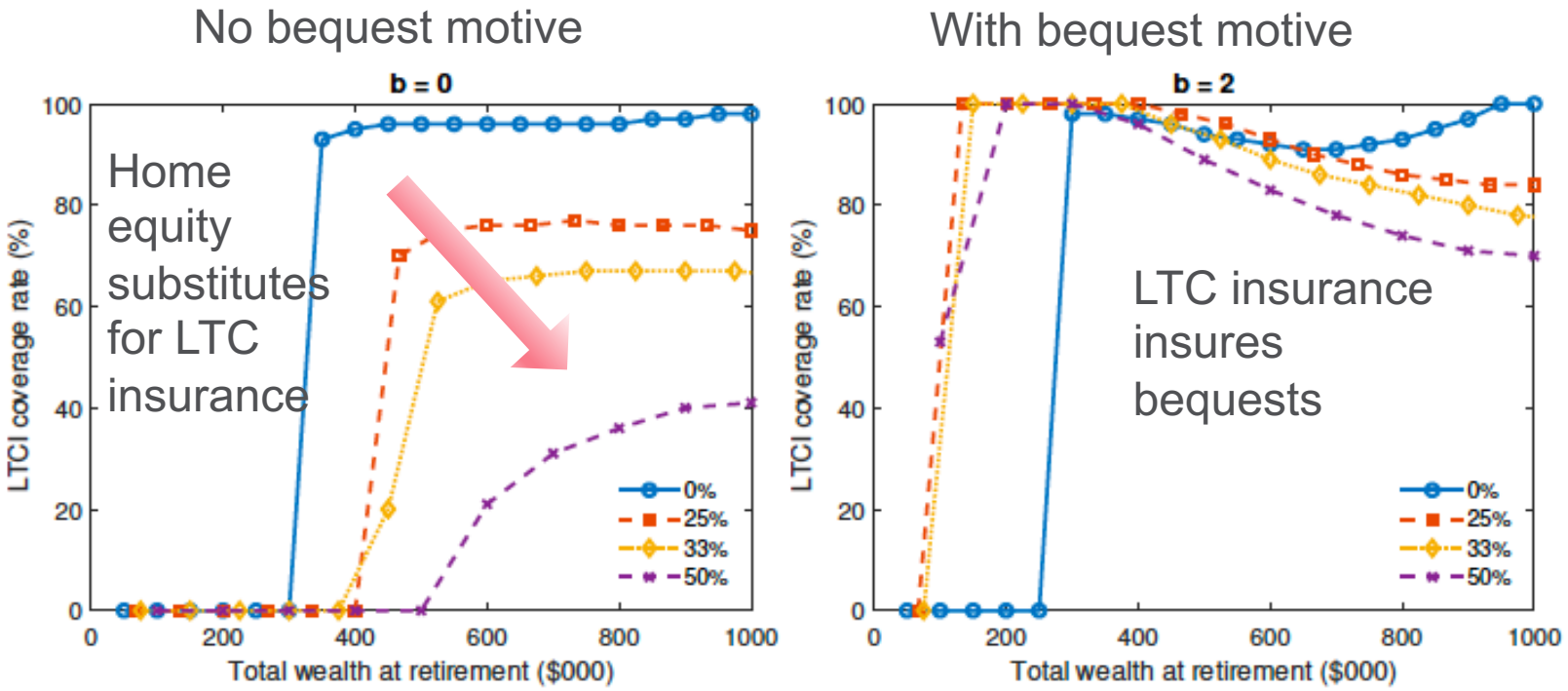


Figure 15. Optimal LTCI coverage rates for retirees endowed with liquid wealth and housing wealth. The legend represents the proportion of total wealth in home equity at retirement. The preference parameters are $\gamma = 5, \psi = 0.5$. The life annuity is not offered in the market.

Source: Xu, M., Alonso-Garcia, J., Sherris, M., Shao, A., (2022), Insuring longevity risk and long-term care: Bequest, housing and liquidity, CEPAR Working paper.

Theoretical Demand for Life Annuities – with LTC insurance and Housing Wealth

No bequest motive

With bequest motive

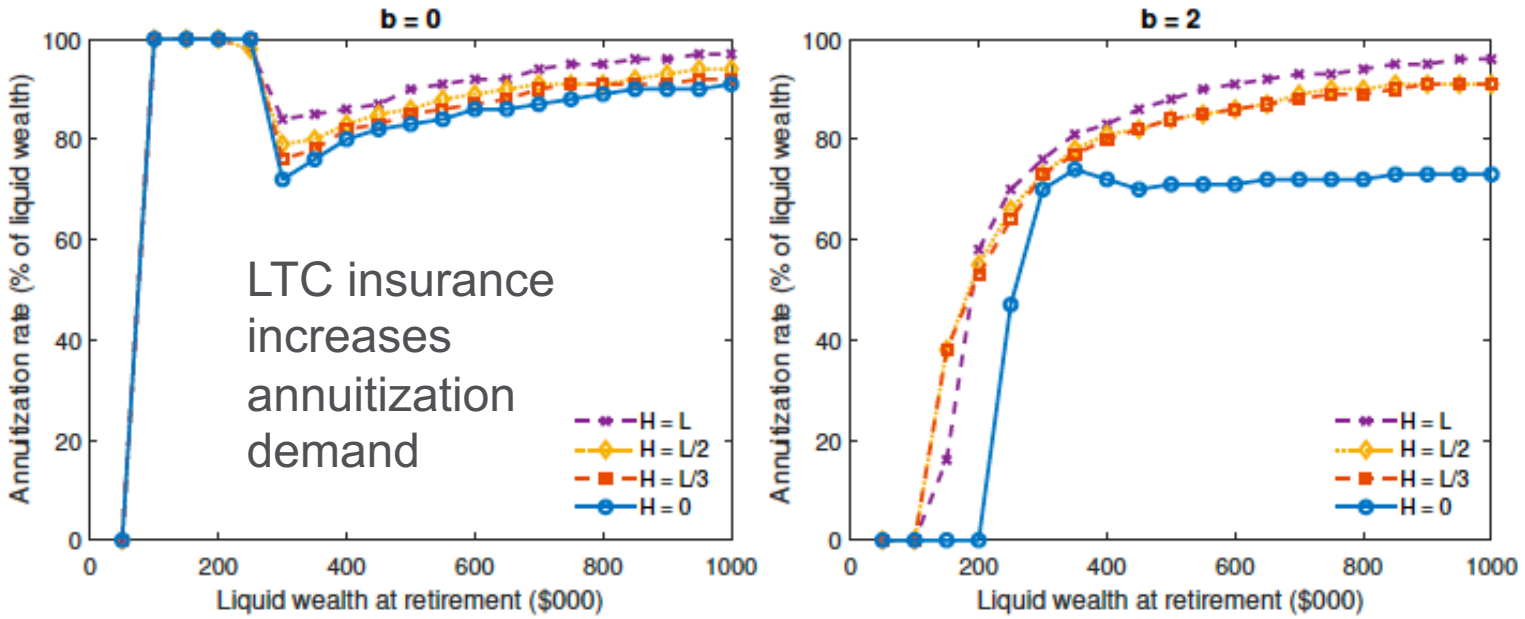


Figure 24. Optimal annuitization rates (as a percentage of liquid wealth) for retirees who have access to the LTCI. The legend represents the ratio between housing wealth (H) and liquid wealth (L) endowment at retirement. The preference parameters are $\gamma = 5, \psi = 0.5$.

Source: Xu, M., Alonso-Garcia, J., Sherris, M., Shao, A., (2022), Insuring longevity risk and long-term care: Bequest, housing and liquidity, CEPAR Working paper.

Wrap up

- Diversity in superannuation balances, home equity and mortality/functional disability risks impact amount of desired longevity protected income (lifetime income).
- Precautionary savings and bequest motives reduce desired annuitization particularly at low levels of liquid wealth.
- Higher levels of home equity (as per cent of total wealth) increase desired life annuitization.
- Long term care insurance (actuarially fair) reduces precautionary savings and insures bequests (hedges private costs from severe aged care risks).
- Further research
  - Calibrations for Australian setting, product loadings.
  - Higher levels of government means tested support (lifetime income and aged care costs) – contingent lifetime income in total wealth.
  - Reverse mortgages (making home equity liquid).

Q&A

- **Presenter: Michael Sherris,**
- Professor of Actuarial Studies (Part Time) and Chief Investigator, CEPAR
- Email: m.sherris@unsw.edu.au
- Web: https://www.unsw.edu.au/staff/michael-sherris
- School: https://www.unsw.edu.au/business/our-schools/risk-actuarial
- CEPAR: https://www.cepar.edu.au/

- CEPAR Research briefs Retirement Income in Australia (Parts I, II, III)

- **31st Colloquium on Pensions and Retirement Research**: 5-6 December 2023 (in person at UNSW Sydney): 7 December 2023 (online) submissions due 18 August 2023