Housing, Long-Term Care Insurance, and Annuities with Recursive Utility

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Outline

Topic Coverage

Research Background

- Individuals face greater challenges in financing their retirement
  - living longer $\rightarrow$ harder to allocate resources over time to avoid ruin
  - likely to spend more time in disability $\rightarrow$ expensive healthcare cost
- Growing interest in retirement products
  - life annuities $\rightarrow$ hedge longevity risk
  - long-term care insurance (LTCI) $\rightarrow$ tackle healthcare cost

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- Only a handful of papers consider home equity among the studies looking at optimal consumption and portfolio choice during retirement
- The role of housing wealth among the elderly can hardly be overlooked

Research Motivation

- High home ownership rates among people aged 65 and over
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- A large fraction of household portfolios held in the form of housing
  - median ratio of home equity to all assets 56% among 62+ (Davidoff, 2009)
- Generally not reduced among people who continue to own (Venti and Wise, 1990, 1991, 2004)
  $\rightarrow$ left to heirs
- Selling often associated with losing spouse or entering into a nursing home (Walker, 2004; Venti and Wise, 2004)
  $\rightarrow$ can insure against uncertain healthcare cost

Research Overview

Study the impact of housing wealth on demand for life annuities and LTCI

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- Risks: lifespan, health expenditure, house price

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Study the impact of γ and ψ on the demand

- γ: risk aversion; ψ: elasticity of intertemporal substitution (EIS)
- Epstein-Zin-Weil-type utility (Epstein and Zin, 1989, 1991; Weil, 1989)
  - generalise the power utility model
  - separately identify risk aversion and EIS

Topic Coverage

Health dynamics

- Health status: four (4) states based on number of difficulties in independently performing ADLs (Ameriks et al., 2011)

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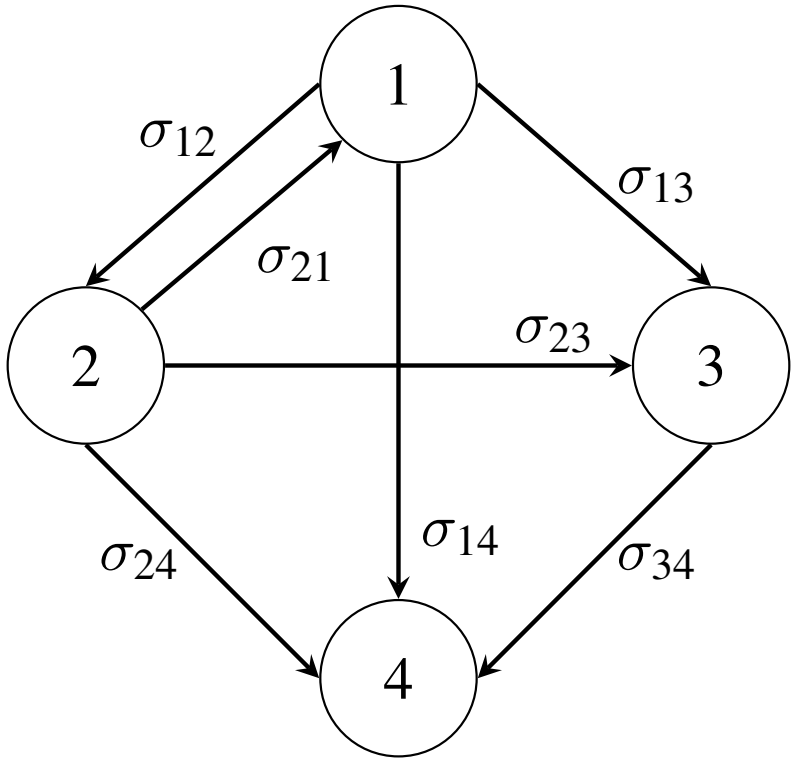
$\rightarrow$ allow transition from mildly disabled to healthy state

$\rightarrow$ do not allow for recoveries from severely disabled state

Health transitions (Cont')



$$\underset{\text{transition intensity}}{\sigma_{jk}} \xrightarrow{\text{matrix exponential}} \underset{\text{transition probability}}{\pi(s_{t+1} = k | s_t = j)}$$

Health expenditure

Model health expenditure that is not covered by the government

- A deterministic process given the health state (Ameriks et al., 2011)
- Relative price of healthcare increases at a rate of q per annum

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  - gross rate of return $R_{H,t+1}$ from time t to time $t+1$
    - $\ln\left(R_{H,t+1}\right) \sim \mathcal{N}(\mu_H, \sigma_H^2)$
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Retirement products

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- life annuities
  - choose the proportion of liquid assets to annuitise
  - level payment for the remaining lifetime
- long-term care insurance (LTCI)
  - choose the percentage coverage
  - cover healthcare cost for severely disabled state

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Preferences

Epstein-Zin-Weil-type preferences (Epstein and Zin, 1989, 1991; Weil, 1989)

- Risk aversion (γ)
- Elasticity of intertemporal substitution (EIS) (ψ)
- Reduces to the power utility model when $\gamma = 1/\psi$

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- Elasticity of intertemporal substitution (EIS) (ψ)
  - willingness to substitute consumption over time
  - meaningful in a deterministic setting
- Reduces to the power utility model when $\gamma = 1/\psi$

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Base case analysis

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Base case analysis

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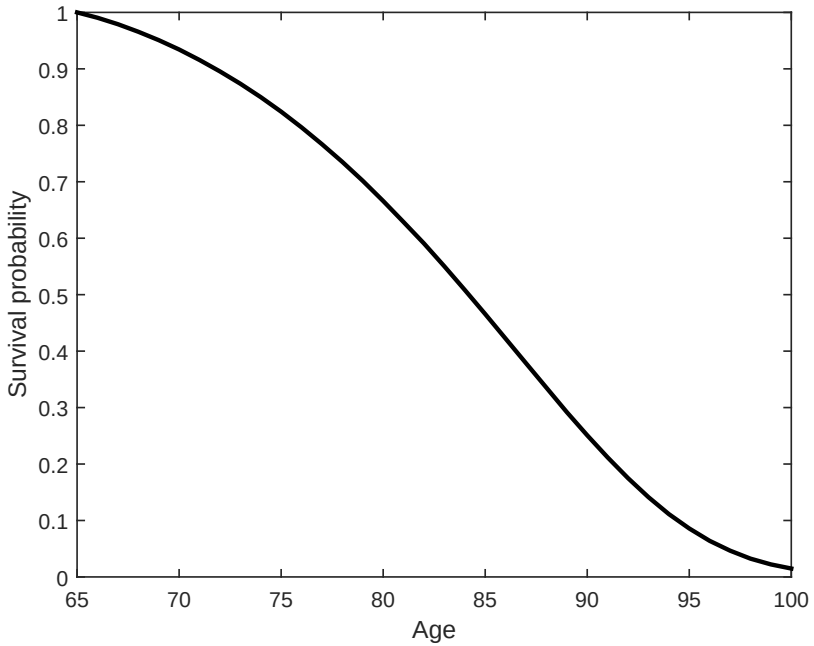
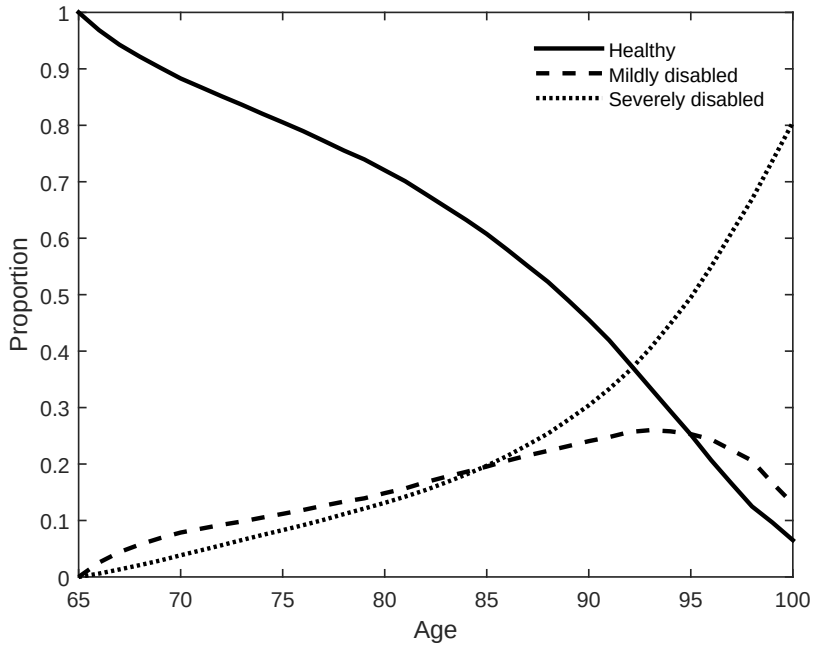
- Full coverage of LTCI costs $94,752.31
  - based on the health transition model calibrated to the HRS
- Annuity costs $14.89 per $1 annual income

Simulated health states





- $\sim$50% chance of living beyond age 85
- chance of becoming severely disabled increases significantly after age 85

Optimal product choices at retirement

Wealth ($000)		Single product			Both products		
		Annuity only		LTCI	Annuity		LTCI
Liquid	House	% Liquid	% Total	only	% Liquid	% Total	
500	0	0.30	0.30	0.93	0.71	0.71	0.92
220	280	0.94	0.41	0.89	0.65	0.29	0.81

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- LTCI: illiquid housing wealth reduces demand for LTCI
  - home equity serves as an insurance against healthcare costs

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- LTCI available: illiquid housing wealth can reduce demand for annuities
  - depends on the amount of liquid wealth (found in the sensitivity analysis)

Impact of preference parameters

	Annuity	LTCI
Coef. of relative risk aversion		
$\gamma = 2$	$\uparrow$	$\downarrow$
$\gamma = 10$	$\downarrow$	$\uparrow$
Elasticity of intertemporal subs.		
$\psi = 0.2$	$\uparrow$	$\downarrow$
$\psi = 0.7$	$\downarrow$	$\uparrow$

$\uparrow$: increase compared to the base case

$\downarrow$: decrease compared to the base case

Demand for annuities and LTCI

- $\gamma \uparrow \rightarrow$ more risk averse
  $\rightarrow$ LTCI $\uparrow$ annuity $\downarrow$

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Demand for annuities and LTCI

- $\gamma \uparrow \rightarrow$ more risk averse
  $\rightarrow$ LTCI $\uparrow$ annuity $\downarrow$
- $\psi \downarrow \rightarrow$ more concerned about intertemporal consumption smoothing & less concerned about insuring against health risk
  $\rightarrow$ LTCI $\downarrow$ annuity $\uparrow$

Impact of preference parameters (Cont')

- Power utility model: $\gamma \times \psi \equiv 1$
  - $\gamma \uparrow \rightarrow \psi \equiv 1/\gamma \downarrow$
  - inadequate in determining the demand when $\gamma \neq 1/\psi$

Impact of preference parameters (Cont')

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In reality,

- Individuals have relative risk aversion greater than the reciprocal of the EIS (Brown and Kim, 2013)
- Individuals have heterogeneous preference parameters
  - risk tolerance and the EIS are essentially uncorrelated across individuals (Barsky et al., 1997)
  - the rich have larger EIS than the poor (Ogaki and Atkeson, 1997)

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  - typically increases the optimal annuitisation rate (when annuities alone are available)
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- Presence of home equity
  - typically increases the optimal annuitisation rate (when annuities alone are available)
  - can enhance demand for annuities if there are sufficient liquid assets (when LTCI is also available)
- Importance of separating risk aversion and EIS
  - a higher γ and a lower ψ have opposite effects on the demand for annuities and LTCI
  - the power utility model is unable to disentangle the impact of these two factors

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