Investment Decisions of the Elderly

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The analysis and conclusions expressed in this paper are those of the author and should not be interpreted as those of the Bank of Italy.

Research Questions

- Why do the elderly maintain such a high homeownership rate?
  - about 78% of the retirees: homeowners (SHIW 2010)
  - about 60% of homeowners say to face financial difficulties in sustaining their consumption (SHIW 2010)
- Why do the elderly choose not invest in risky assets?
  - on average, more than 90% of the financial wealth is invested in safe assets (SHIW 2010)
- Is there any financial instrument that is financially accessible and, at the same time, able to provide additional financial resources to sustain consumption and medical expenses?
  - Longevity Insurance

What the Paper does?

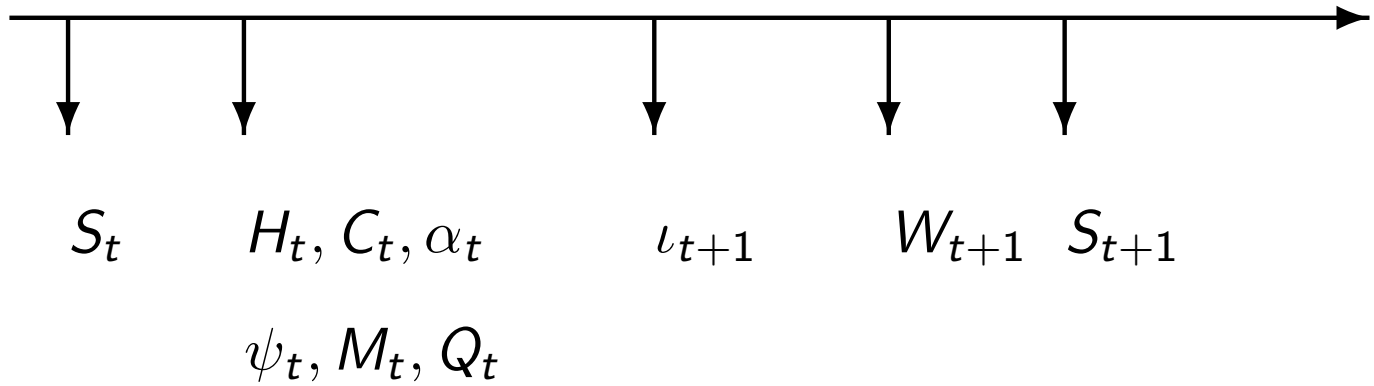
- Realistic life-cycle model
- Households heterogeneous with respect to age, education, marital status, health, financial assets, housing
- Risks:
  - Longevity
  - Disability
  - Return on Risky Assets
- Choices:
  - Housing
  - Consumption
  - Share of risky assets

Main Results

- Housing Choices affected by:
  - Strong Preference for Homeownership: Moral Hazard
  - Institutional Feature: Generous Old-Age Pension
  - Institutional Feature: Low Medical Expenses
  - Role of Liquidity Constraints
- Financial Investment Decisions affected by:
  - NO: Disability Risk and related Medical Expenses
  - NO: Participation Costs
  - YES: Illiquid Housing
  - YES: Event Risk
- Positive Utility from Bequest

Model

State variables: $S_t = \{X_t, H_{t-1}, Z_t, N_t, E\}$
where $X_t = W_t + Y_t$
The sequence of events:



Preferences

Preferences:

$$U(C_t, H_t) = \frac{\frac{C_t}{g(N_t)}^{1-\gamma}}{1-\gamma} + \theta\phi(H_t) \tag{1}$$

Utility from Bequest:

$$TW(C_t, H_t) = \eta\frac{(W_t + D(H_t))^{1-\gamma}}{1-\gamma} \tag{2}$$

Marital Status, Income, and Health

- Marital Status : $N = \begin{cases} 1 \text{ single} \\ 2 \text{ married} \end{cases}$

  Evolves over time: Π_N, whose elements $\pi(N_t) = Pr(N_{t+1}|N_t)$

- Household Income: $Y(N_t, E)$ where $E = \begin{cases} \text{Low Education} \\ \text{High Education} \end{cases}$

- Health: $Z = \begin{cases} \text{Good} \\ \text{Bad, No limited ability} \\ \text{Bad, limited ability} \end{cases}$

  Evolves over time: Π_Z, whose elements $\pi(Z_t) = Pr(Z_{t+1}|Z_t)$
  Medical Costs: $Q(Z_t, N_t, t)$

Housing costs

- Housing Annual Costs: $\psi(H_t)$
- Transaction Costs when moving: $\lambda(H_{t-1}, H_t)$
- Total Moving Costs:

$$M(H_t, H_{t-1}) = D(H_t) - D(H_{t-1}) + I_D \lambda(H_{t-1}, H_t) \qquad (3)$$

Financial Assets

Households can invest in two financial assets:

- Safe Assets with gross real return $R_F = 1 + r_F$
- Risky Assets with gross real return R_t and excess premium:

$$R_{t+1} - R_F = \mu + \iota_{t+1} \tag{4}$$

where ι_{t+1} is distributed as $N(0, \sigma_\iota^2)$ + event risk
No short-selling:

$$S_t \geq 0, B_t \geq 0, \forall t. \tag{5}$$

Optimization Problem

$$V(S_t) = \max_{C_t, \alpha_t, H_t} U(C_t, H_t) + \beta sp(N_{t+1}) E_t V(S_{t+1}) \tag{6}$$

where next-period financial wealth:

$$W_{t+1} = R_{t+1}(W_t + Y(N_t, E) - C_t - M(H_t, H_{t-1}) - \psi(H_t) - Q(Z_t, t)) \tag{7}$$

Portfolio return:

$$R_{t+1} = \alpha_t(1 + r_{t+1}(1 - \tau_S)) + (1 - \alpha_t)(1 + r_F(1 - \tau_F)) \tag{8}$$

and

$$C_t \geq C_{min}, 0 \leq \alpha_t \leq 1 \tag{9}$$

Parameter Values

Data:

- SHIW DATA: marital status, financial assets, house value, education, income, minimum consumption
- SHARE DATA: health status and medical expenses
- ISTAT: survival probabilities
- OECD: equivalence scale, moving costs

SHIW Sample of 2,500 households:

- Only if household head born before 1946
- Retirees, No income from employment
- 160 households dropped out of 2,650: Households whose house value greater than €800,000 or financial assets greater than €150,000.

Reference Year: 2010

Parameter Values: Marital status

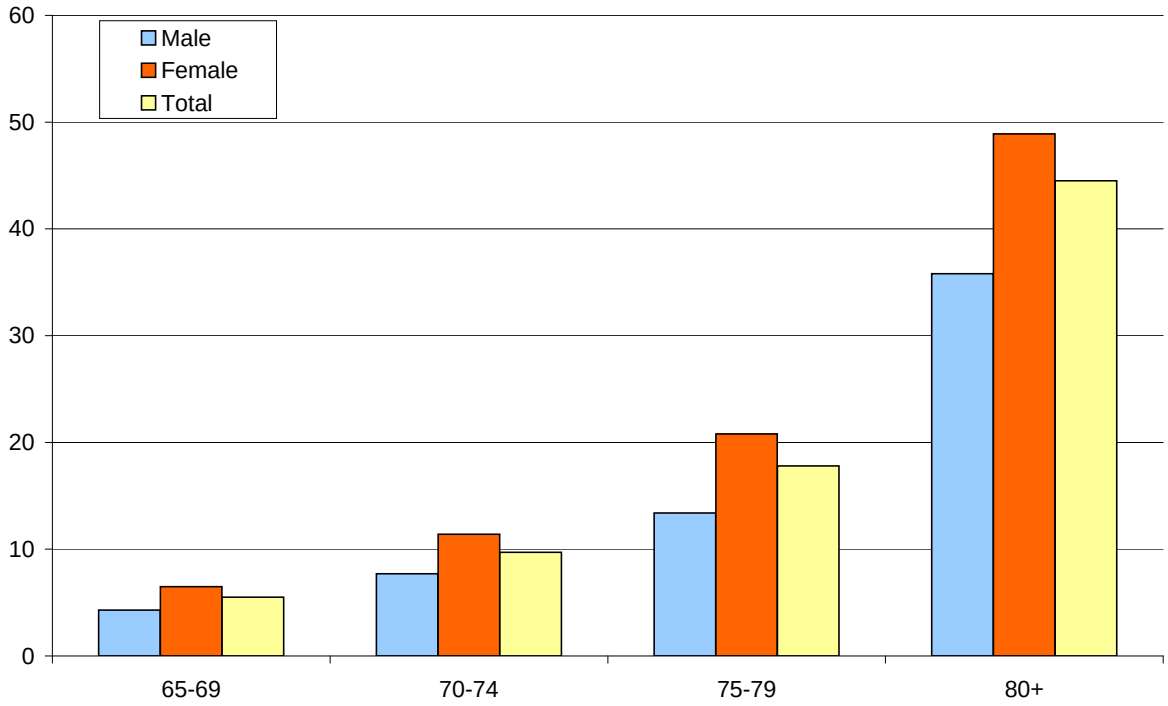
Data: SHIW data, 2008-2010

Table: Transition Matrix by Marital Status

	Single	Married
Age 65-69		
Single	0.990	0.010
Married	0.038	0.962
Age 70-74		
Single	0.993	0.007
Married	0.042	0.958
Age 75-79		
Single	0.995	0.005
Married	0.072	0.928
Age 80+		
Single	0.996	0.004
Married	0.088	0.912

Parameter Values: Health

Figure: Disability by Age and Sex



Source: Indagine Multiscopo Istat Salute 2005.

Parameter Values: Health Transition Matrix

Data: SHARE, 2004-2006

Table: Health Transition Matrix

	Good	Bad No Disability	Bad Disability
Age 65-79			
Good	0.563	0.111	0.326
Bad - No Disability	0.134	0.689	0.177
Bad - Disability	0.300	0.115	0.585
Age 80+			
Good	0.585	0.065	0.350
Bad - No Disability	0.112	0.635	0.253
Bad - Disability	0.202	0.077	0.721

Parameter Values: Medical Expenses

Table: Average Medical Expenses in 2010€

	Single	Married
Age 65-79		
Good	340	706
Bad - No Disability	520	1030
Bad - Disability	700	1140
Age 80+		
Good	510	560
Bad - No Disability	420	1106
Bad - Disability	1255	1410

Parameter Values

Table: Parametri

Parameter		Value
A. Preference		
γ	Risk Aversion	5
β	Discount Factor	0.96
θ	Housing Preference	2.14E-2
$\phi(H=2)$	Preference for "Large" House	1.00
$\phi(H=1)$	Preference for "Small" House	0.69
$\phi(H=0)$	Preference for Rent	0.00
η	Intensity of Bequest	3.55
$g(N_t)$	Equivalence Scale	$\sqrt{N_t}$
B. Income and Consumption		
$Y(N=1,E=1)$		€11,100
$Y(N=1,E=2)$		€15,930
$Y(N=2,E=1)$		€16,650
$Y(N=2,E=2)$		€23,340
C_{min}	Minimum Consumption	€3,000

Parameter Values

Table: Parameters

Parameter		Value
C. Housing		
$D(H=2)$	"Big" House Value	€300,000
$D(H=1)$	"Small" House Value	€135,000
$D(H=0)$	Rent	€0.0
$\psi(H)$	Maintenance Costs for Homeowners	1.5%
$\psi(H=0)$	Annual Rent	€3,600
λ_s	Moving Costs for Seller	3.5%
λ_b	Moving Costs for Buyer	8.5%
λ_r	Moving Costs for Renter	1-month
D. Financial		
r_F	Real Gross Return on Safe Assets	1.20%
μ	Excess Premium	4.90%
σ_ι	Standard Deviation	0.20
τ_F	Tax Rate on Safe Assets	12.5%
τ_S	Tax Rate on Risky Assets	20.0%

Event Risk

Table: Event Risk

Year	Event	Real Return Mediobanca	Real Return Milan Comit Global
1964		-0.31	-
1974	First Oil Shock	-0.47	-0.48
1977	Recession	-0.43	-0.39
1982		-0.25	-0.31
1987	Stock market crash	-0.33	-0.35
1990	Recession	-0.34	-0.29
2008	Great Recession	-0.50	-0.49

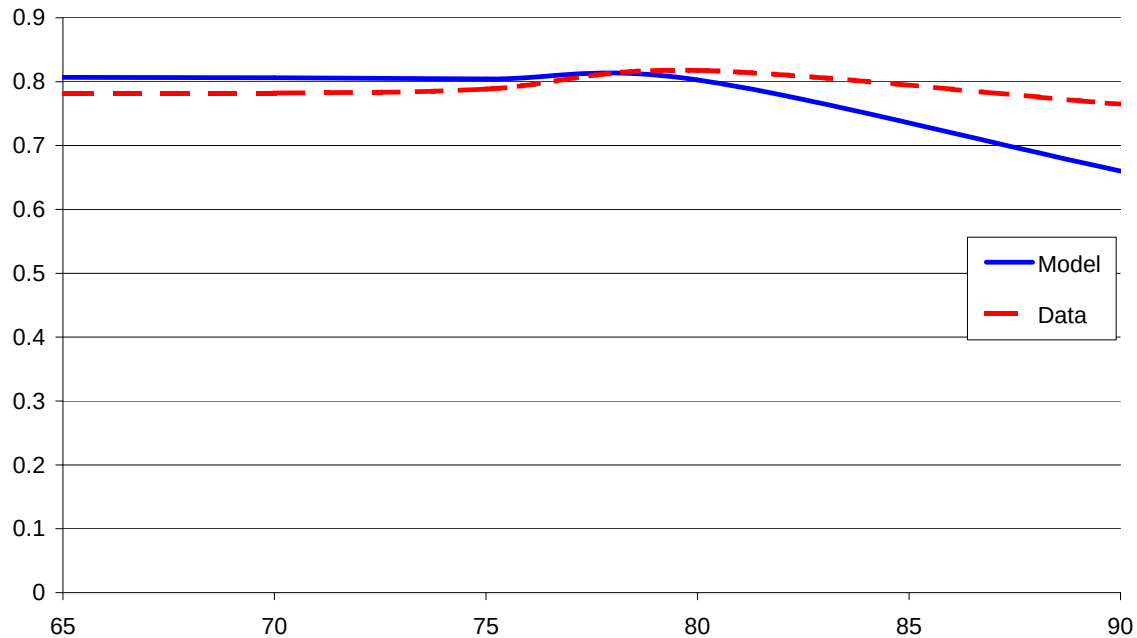
Main Results

Table: Baseline Statistics

	Model	Data
Homeownership Rate (Percentage)	72.0	78.5
"Small" House Owners (Percentage)	50.1	52.1
House Value (€)	182,568	202,054
Financial Assets (€)	14,192	15,888
Share of Safe Assets (Percentage)	97.7	90.1
Consumption (€)	17,442	18,132
Mobility Rate (Percentage)	1.96	1.50

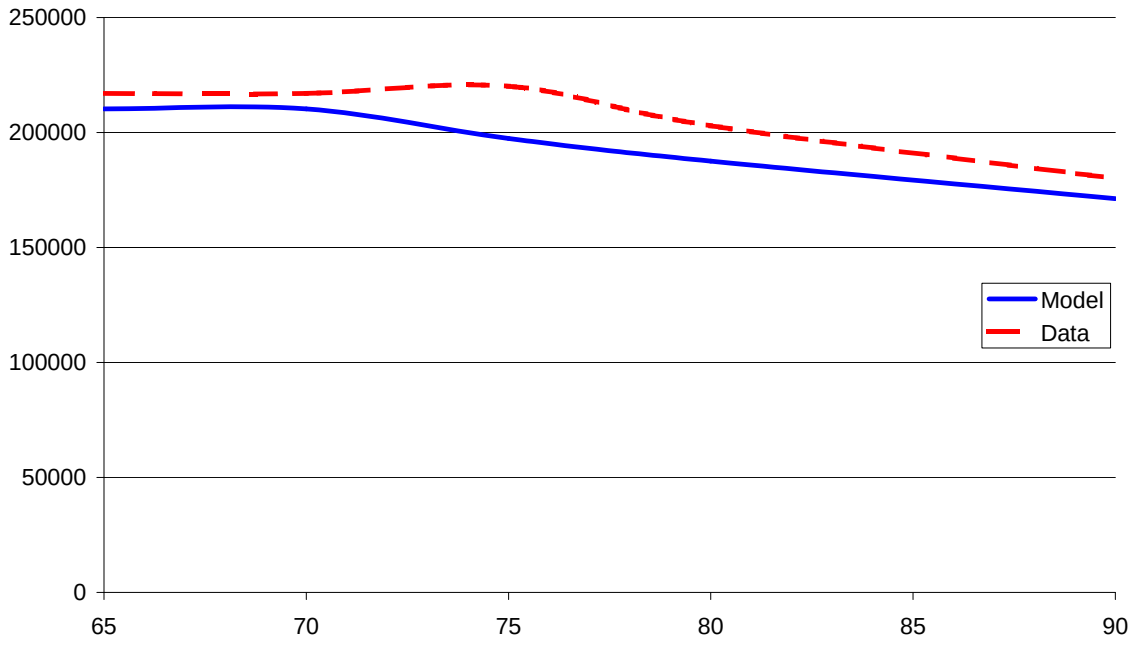
Main Results: Homeownership Rate

Figure: Homeownership Rate by Age



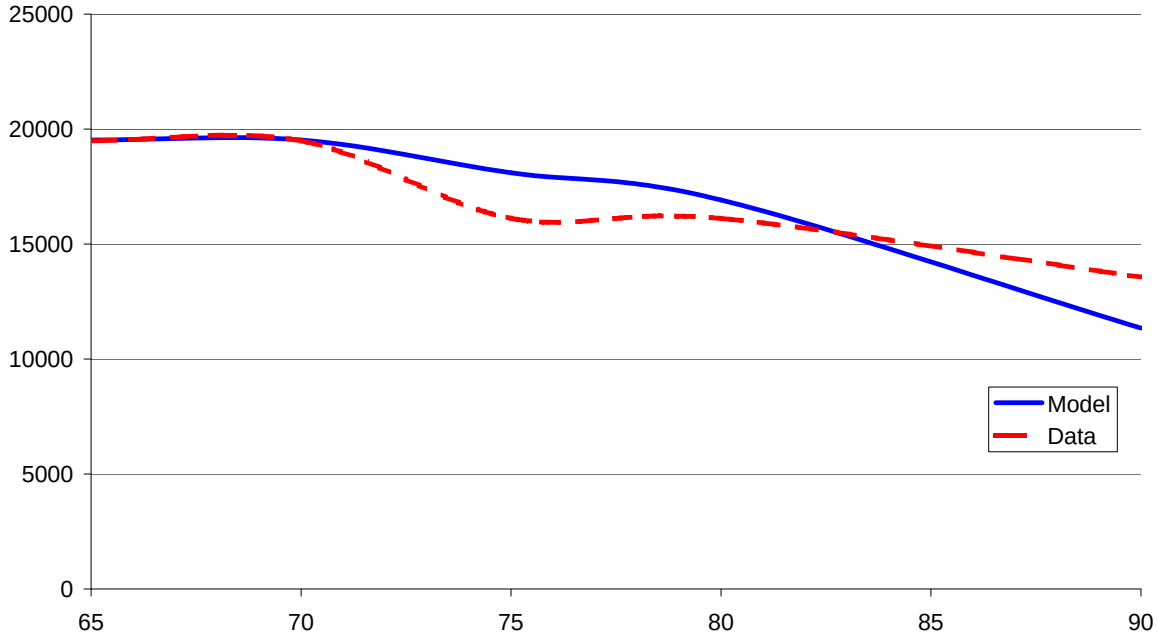
Main Results: House Value

Figure: Average House Value by Age



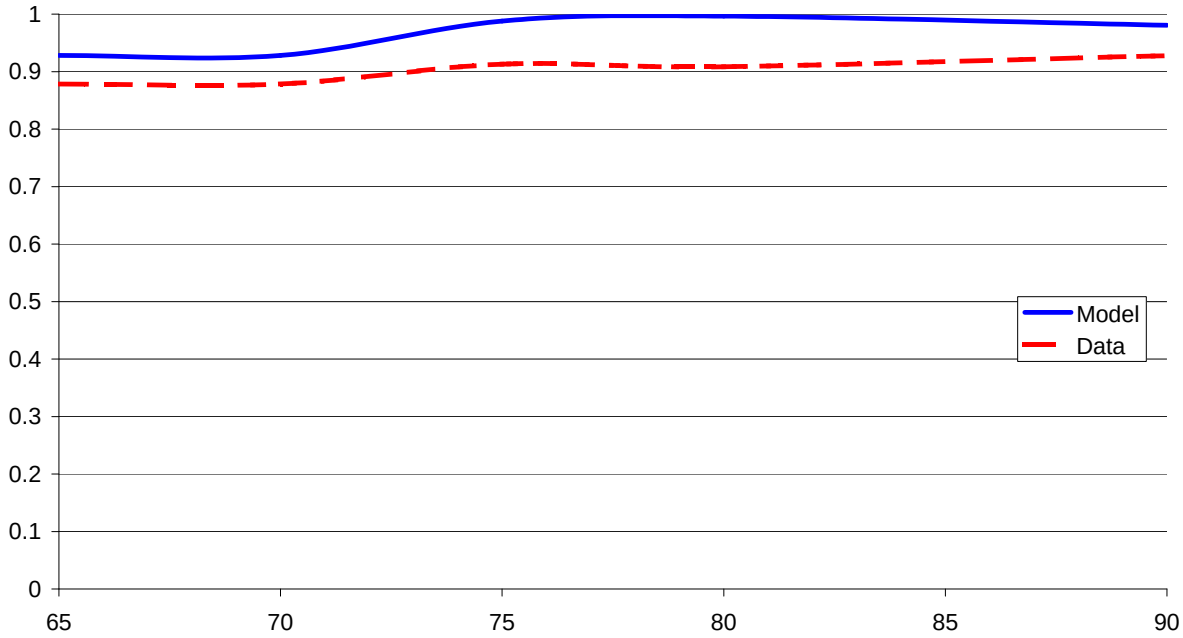
Main Results: Financial Assets

Figure: Average Value of Financial Assets by Age



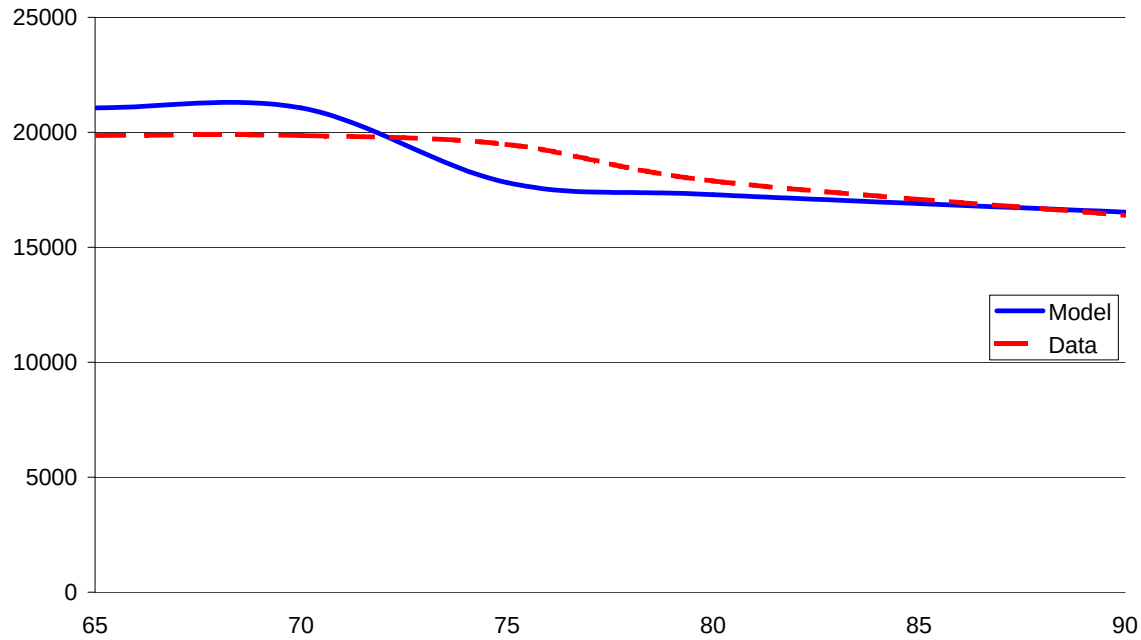
Main Results: Share of Safe Assets

Figure: Average Share of Safe Assets in Portafolio by Age



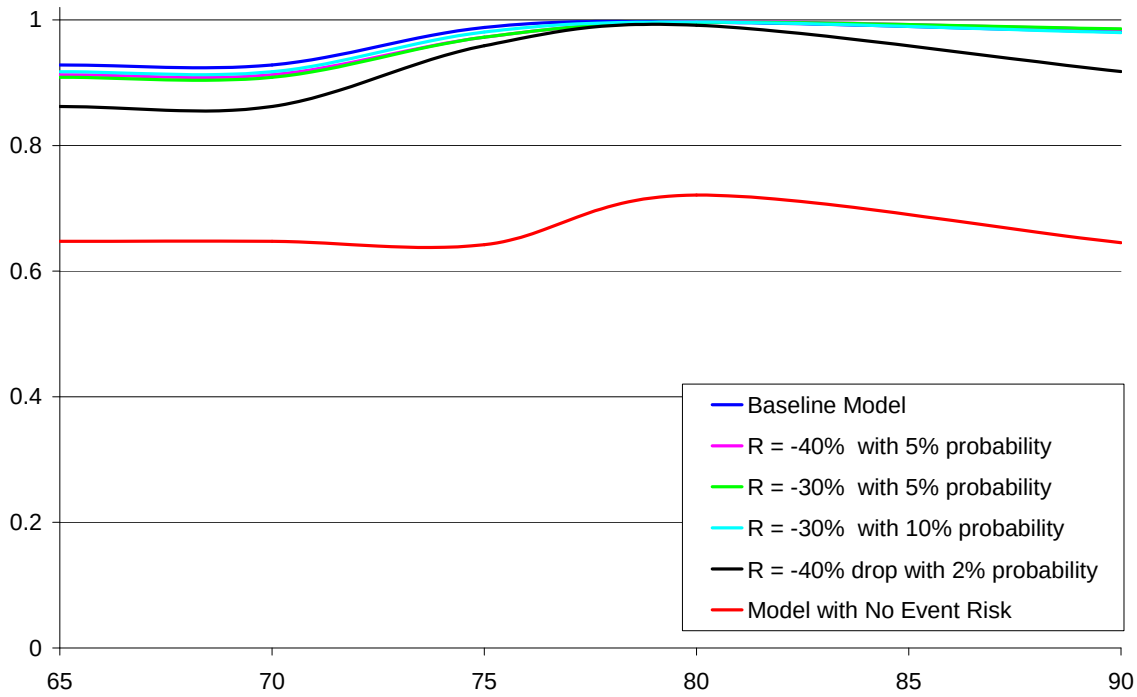
Main Results: Consumption

Figure: Average Consumption by Age



Role of Event Risk

Figure: Average Share of Safe Assets by Age



Policy Experiments

Table: Percentage Changes in Aggregate Variables

	(1)	(2)	(3)	(4)	(5)
Homeownership Rate	8.43	-4.42	-0.02	-2.50	-6.87
"Small" House Owners	7.96	-6.00	-0.31	5.19	4.01
House Value	0.91	1.01	0.18	-5.15	-7.58
Financial Assets	11.95	-2.74	0.11	1.82	32.66
Share of Safe Assets	0.37	-0.17	0.00	-0.29	-0.55
Consumption	1.80	-1.32	0.02	-1.25	-7.13

(1) Medical Expenses are cut in half
(2) Introduction of caregivers
(3) No Moving Costs
(4) 10 Percent Increase in Maintenance Costs for Homeowners
(5) 10 Percent Cut in Social Security Income

Innovative Financial Instrument: Longevity Insurance

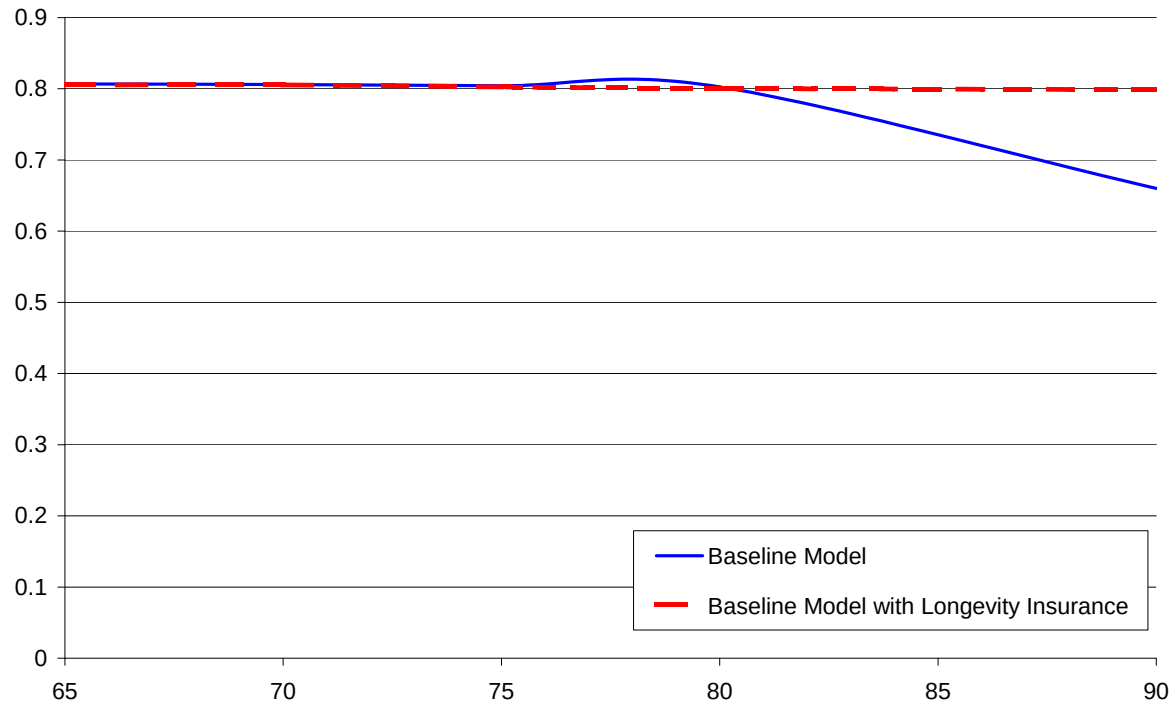
- The longevity insurance is a particular kind of annuity that guarantees a stream of payments until death. Households buy it at the age of 65, but the payments do not start until the age of 85.
- Actuarially Fair Price:

$$P_L = \sum_{t=85}^{T} \left[\prod_{j=85}^{t} sp_j \right] L(1+i)^{(t-65+1)} \tag{10}$$

- Annuity that pays €20,000 yearly and starts immediately has a cost of €235,000
- Annuity that pays €20,000 yearly and starts at age 85 has a cost of €21,000.

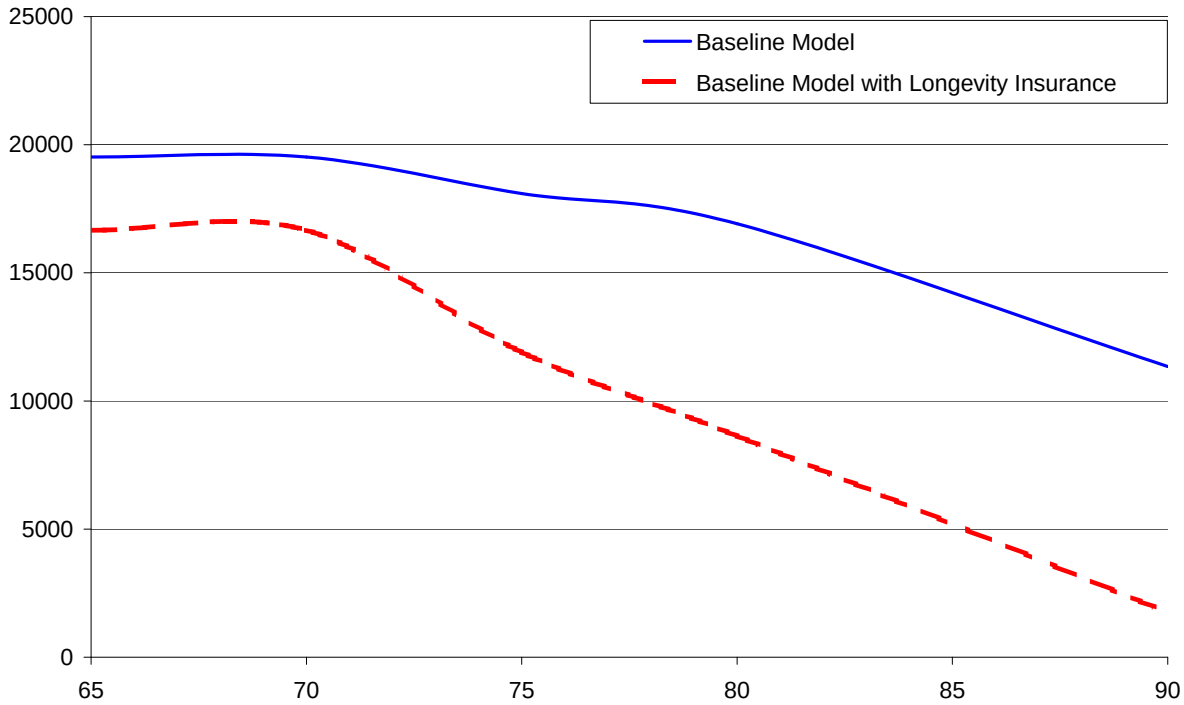
Longevity Insurance

Figure: Homeownership Rate with and without Longevity Insurance



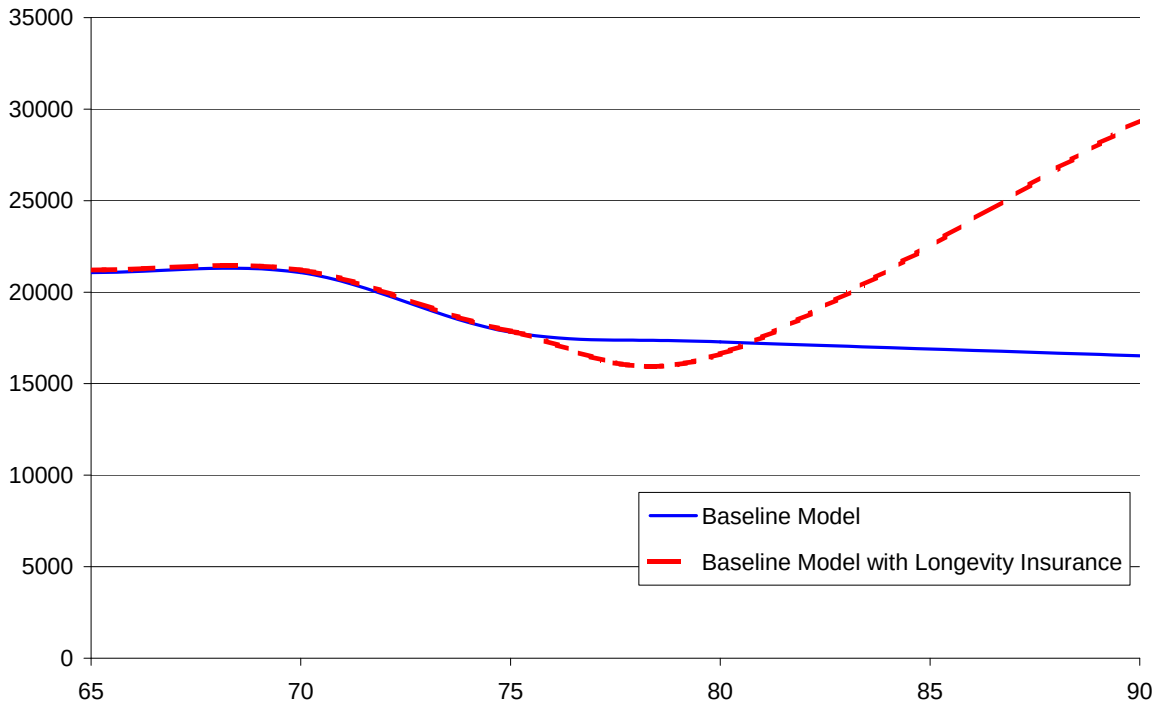
Longevity Insurance

Figure: Financial Assets with and without Longevity Insurance



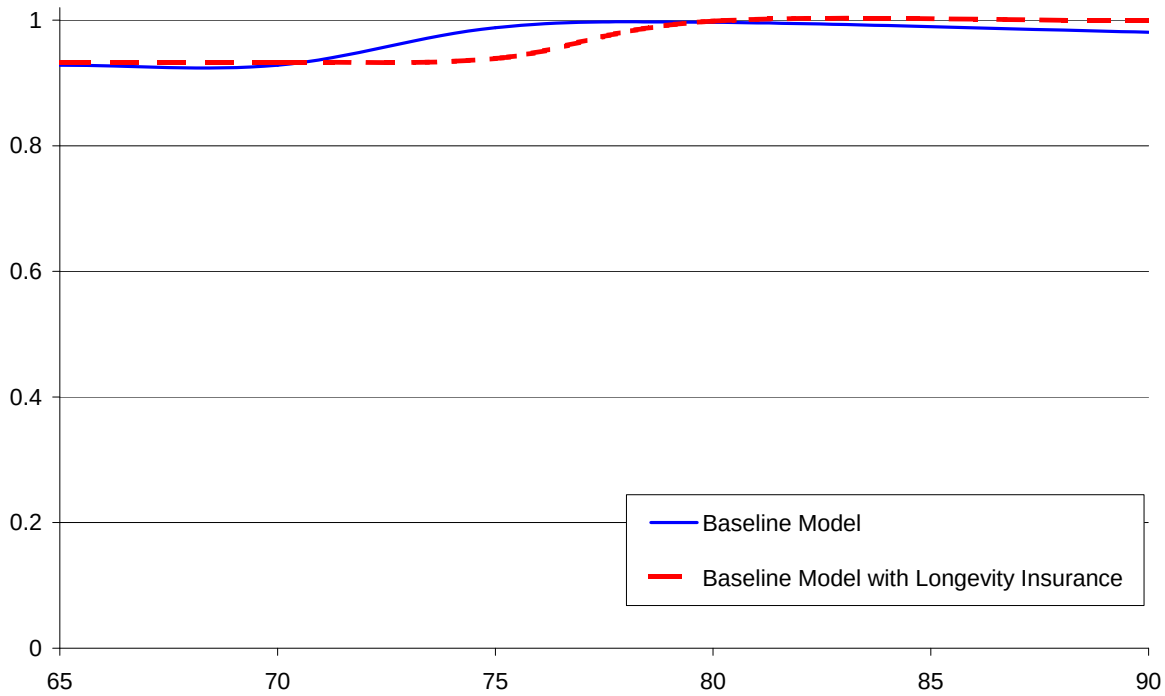
Longevity Insurance

Figure: Consumption with and without Longevity Insurance



Longevity Insurance

Figure: Share of Safe Assets with and without Longevity Insurance



Possible Extensions

- House Price Risk
- Endogenous Choice over Longevity Insurance

Detailed Results: Policy Experiments

Table: Percentage Change by Age

	(1)	(2)	(3)	(4)	(5)
Homeownership Rate					
65-69	0.08	-1.16	0.00	-1.73	-0.97
70-74	0.31	-1.46	-0.01	-2.18	-1.19
75-79	0.52	-2.75	-0.01	-2.12	-1.17
80+	15.51	-6.71	-0.03	-2.92	-11.89
Financial Assets					
65-69	-5.29	1.35	0.11	12.37	27.68
70-74	-18.93	-2.19	0.17	6.84	20.59
75-79	-21.13	0.29	0.02	-1.70	4.75
80+	5.25	-5.71	0.12	-3.16	49.19
Consumption					
65-69	0.85	0.76	0.14	1.74	-6.08
70-74	-0.95	-1.12	0.02	0.35	-5.40
75-79	-1.08	-0.27	-0.02	-0.86	-8.04
80+	3.52	-2.26	-0.01	-2.67	-7.67