Medical Expenses and Savings in Retirement: The Case of the U.S. and Sweden

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Facing Demographic Change in a Challenging Economic Environment

Background: Retirement Saving Puzzle

- In the U.S., many people die with positive wealth. Why?
  - Risks: longevity, healthcare (medical and long-term care) expense
    (De Nardi et al. (2010), Poterba et al. (2010))
  - Bequest motives
    (Hurd (1989), Lockwood (2012))
  - Public care aversion: Social Security and Medicaid
    (Hubbard et al. (1995), Ameriks et al. (2011))
  - Difficult to identify: risks vs. bequest.

- Most study only net worth; model a single asset.
  - Nakajima and Telyukova (2012): role of housing.

- Important issue, especially with aging society.
  - Effects of pension or health insurance reform to aggregate savings.

This Paper: Delve Deeper Using Cross-Country Variation

1. **Document cross-country facts** on saving in retirement
   - Net worth
   - Homeownership rates
   - Housing and financial assets
   - Debt

2. **U.S. vs Sweden**: What accounts for differences in dissaving?
   - Out-of-pocket (OOP) healthcare expense risk.
   - Housing/mortgage markets
   - Policy (social safety net, tax)
   - Social norm ($\rightarrow$ bequest)

3. **Quantify role of healthcare expanse risk** in asset decumulation
   - How much of the difference in saving patterns is accounted for by differences in risk characteristics?
   - How does risk impact housing and financial assets differently?

Literature

- Retirement saving puzzle:
  De Nardi et al. (2016), Hurd (1989), Hubbard et al. (1995), Poterba et al. (2010), Love et al. (2009), Ameriks et al. (2011), De Nardi et al. (2010), Lockwood (2012).

- Housing in retirement:
  Venti and Wise (2004), Nakajima and Telyukova (2012, 2016, 2017)

- Cross-country comparison (HRS, SHARE, ELSA):
  Angelini et al. (2014), Christelis et al. (2013), Blundell et al. (2016).

CROSS-COUNTRY DATA FACTS

The Data

- We use three (longitudinal) data sets:
  - Health and Retirement Study (HRS) – U.S.
  - English Longitudinal Study of Ageing (ELSA) – U.K.
  - Survey of Health, Ageing and Retirement in Europe (SHARE) – continental Europe

- 2006 cross-section.

- ELSA, SHARE: do not oversample the oldest old.

- ELSA, SHARE: almost no information on nursing home population.

# Median Net Worth: Dissaving Late in Life
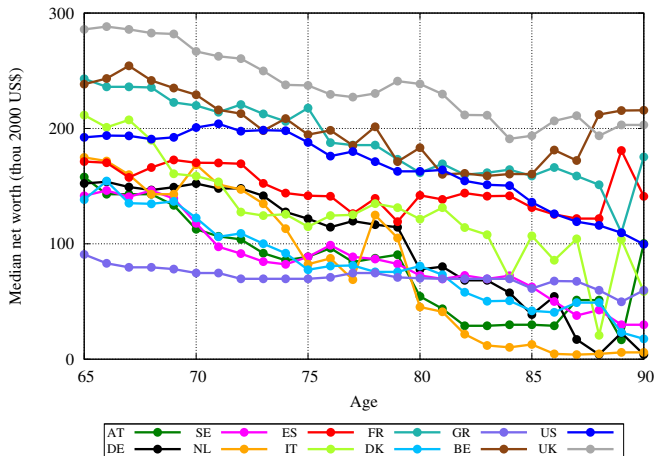
- All countries exhibit decreasing profile of net worth.
- Retirement saving puzzle: slow decumulation of net worth.

Median Net Worth: Rate of Dissaving

	NW_{86-90}/NW_{65-69}
Spain	0.824
Belgium	0.822
Greece	0.740
U.K	0.714
France	0.649
U.S.	0.592
Italy	0.385
Austria	0.345
Sweden	0.266
Denmark	0.256
Germany	0.136
Netherlands	0.032

- U.S. in the middle.
- Large dispersion regarding the speed of decumulation.
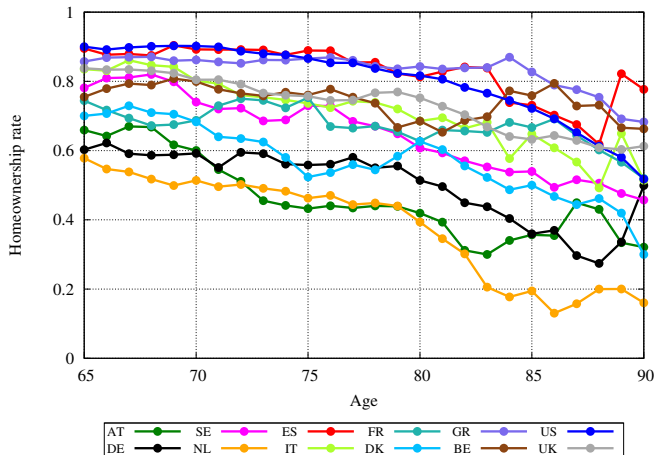
Median Financial Assets: U.S. = Outlier
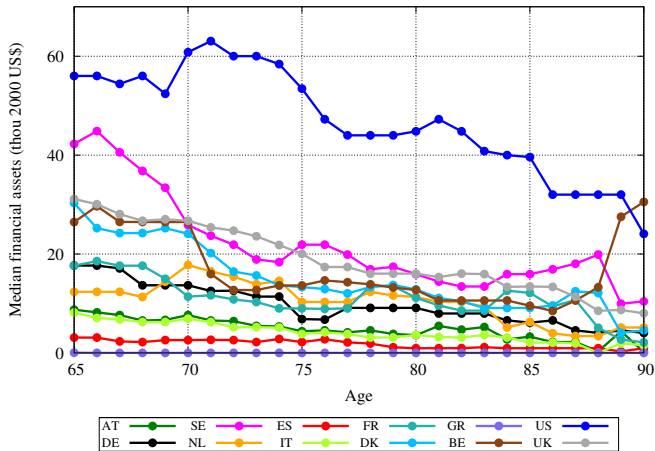
- U.S. households exhibit the highest median financial assets.
- Speed of decumulation is the slowest (except BE).

Median Housing Assets (Homeowners)
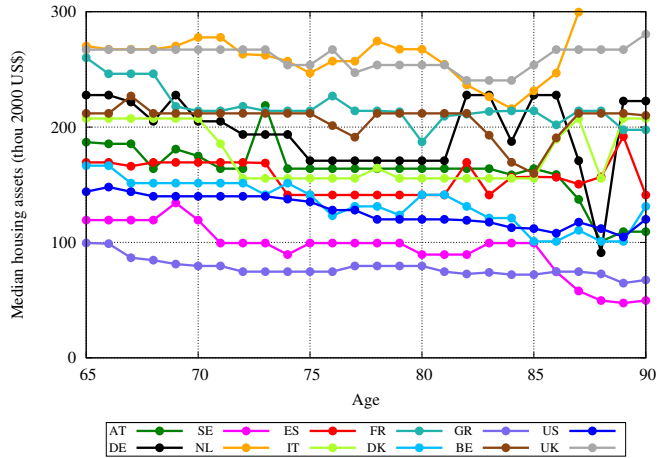
- No frequent "downsizing" (Venti and Wise (2004))
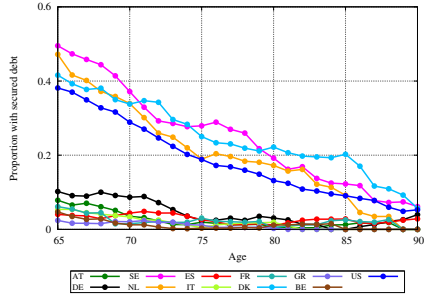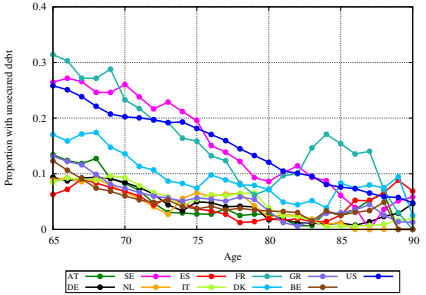
Homeownership Rate

- Some countries exhibit faster decline than others.

Proportion with Secured and Unsecured Debt
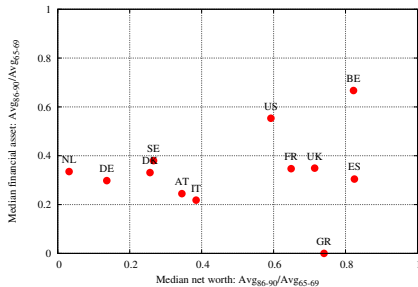

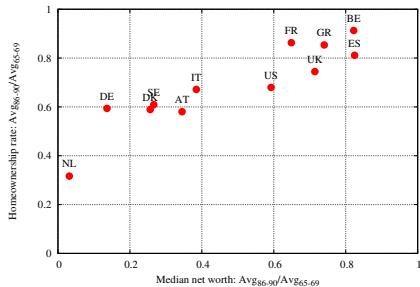Secured debt — Unsecured Debt

- Monotonic decline in all countries.
- Sweden is similar to the U.S.
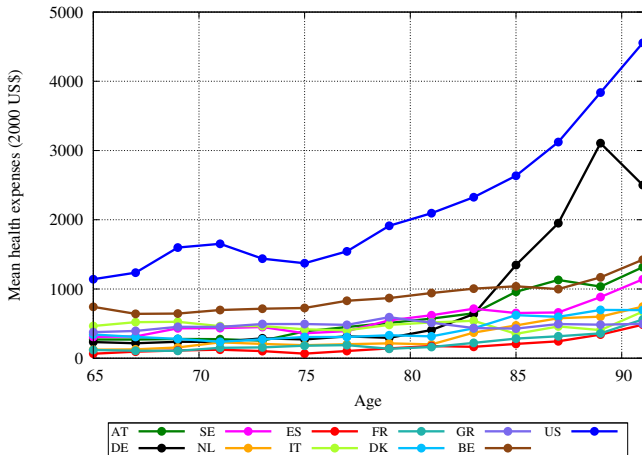
Cross-Country Correlations

Financial asset

Homeownership rate

- U.S. exhibits faster decumulation of financial assets than European countries (except for BE).
- Countries which exhibit slower decumulation of net worth exhibit slower decline in homeownership rate.

Mean Out-of-Pocket Healthcare Expenses

- Only U.S. data include long-term care (nursing home) expenses.
- Not a serious issue for countries with small OOP long-term care expenses.

Cross-Country Data Facts: Summary

- **Net worth decumulation**
  Large dispersion across countries. U.S. in the middle.

- **Financial assets**
  U.S. exhibits slower decumulation than European countries.

- **Housing**
  All countries exhibit slow decumulation.
  U.S. in the middle.
  Correlated with speed of net worth decumulation.

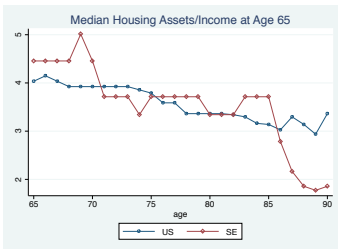- **OOP healthcare expenses**
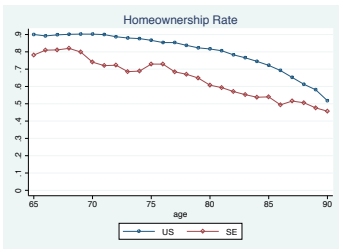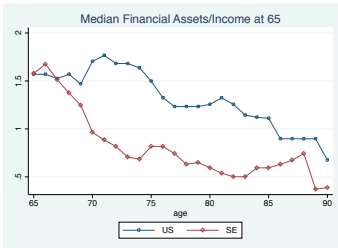 Significantly higher expenses in the U.S.

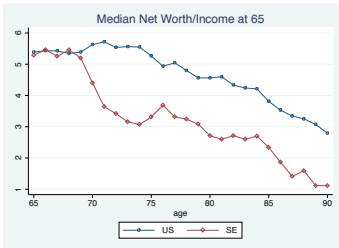- Healthcare expense risk might affect only financial assets.

MODEL EXPERIMENT: U.S. vs Sweden

Why U.S. vs Sweden?

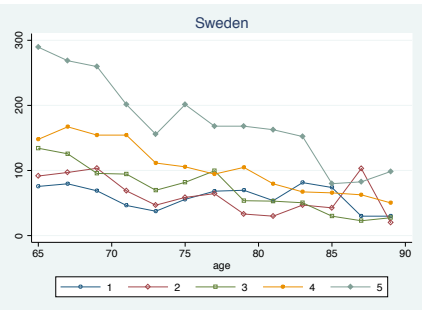- Similar in terms of average assets and debt at age 65.

- Faster decumulation of assets in Sweden.

- Stark differences in OOP healthcare expense risks.

U.S. vs Sweden: Assets

- More rapid decumulation of wealth in Sweden.
- Pronounced differences in financial assets
- Similar behavior of housing.

U.S. vs Sweden: Wealth by Income Quintile
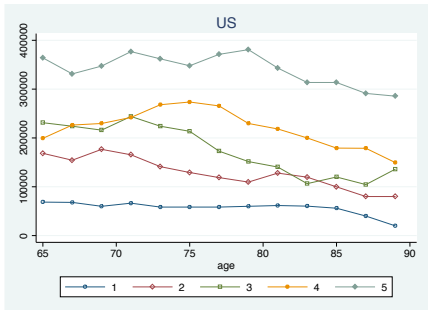
- For each income quintile, Swedish retirees decumulate wealth faster.

U.S. vs Sweden: Debt
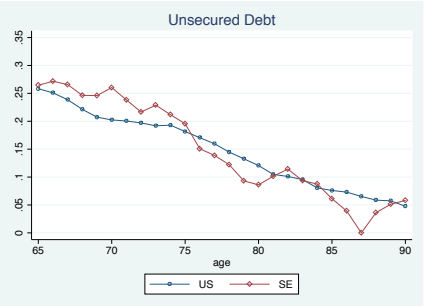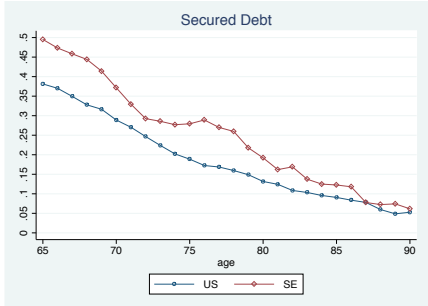
- Showing proportion with secured or unsecured debt.
- Similar profiles between the U.S. and Sweden.

U.S. vs Sweden: Out-of-Pocket Healthcare Expenses
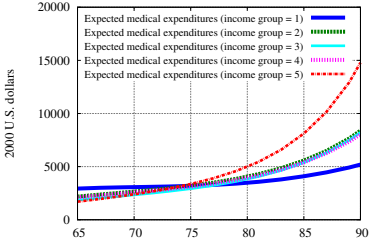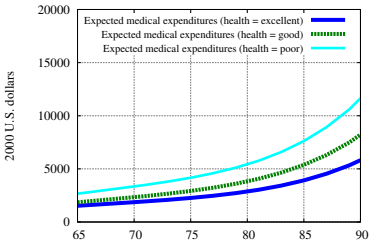
U.S.   Sweden
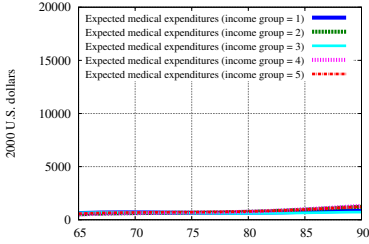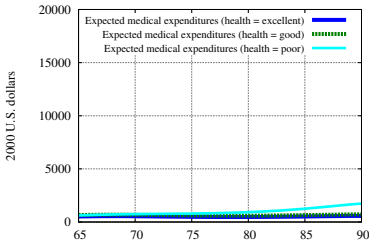
- Sweden: mean OOP healthcare expenses at 1/10 of U.S.

U.S. vs Sweden: Out-of-Pocket Healthcare Expense Risks
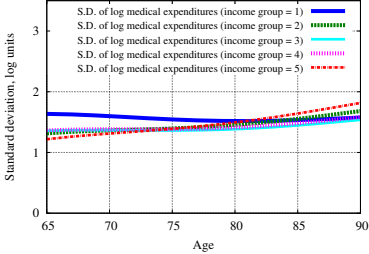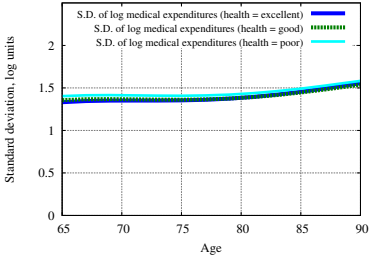
U.S.   Sweden
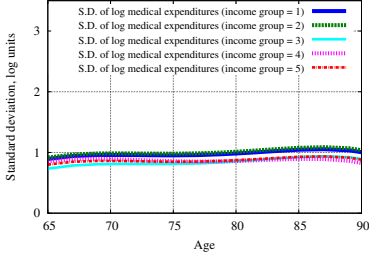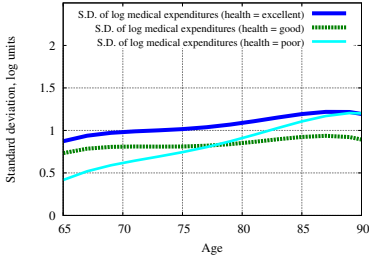
- Sweden: OOP healthcare expense risks are also smaller.

Model Experiment: Overview

- Step 1: Construct model inputs for the U.S. and Sweden
  - Type distribution of age-65 households in 2006.
  - Age-dependent health status, hh size, and mortality shocks.
  - Out-of-pocket healthcare expense shock.

- Step 2: Estimate the model for the U.S. households.
  - Use the U.S. inputs and match the U.S. data.
  - Estimate parameters that are not directly observable.

- Step 3: Experiment with Swedish inputs.
  - Keep the estimated parameters (for now).
  - Use Swedish inputs: Type distribution and shocks.
  - How much of the differences in asset decumulation between U.S. and Sweden can be explained by differences in healthcare expense risks?

Model: Overview

- **Life-cycle model of retirees**: Nakajima and Telyukova (2017)
  - Consumption, financial assets
  - Housing (dual purpose: consumption and saving)
  - Extra utility from owning a house (ω)
  - Warm-glow bequest motives (γ, ζ)
  - Receive pension income
  - Risks: health, mortality, hh size, and healthcare expense
  - Policy: government-provided consumption floor ($\underline{c} \simeq$ Medicaid)
  - Mortgage market: age-dependent collateral constraint (λ_i)

- **Homeowner's decision**:
  - Remain an owner ($o = 1$) or become a renter ($o = 0$)
  - Save ($a' \geq 0$) or borrow ($a' < 0$) against home equity

- **Renter's decision**:
  - Size of house to rent ($\widetilde{h}$)
  - Save (cannot borrow) ($a' \geq 0$)

Model: Renter's Problem

$$V(i, b, s, m, x, h = 0, a) = \max_{\widetilde{h}, a' \geq 0} \left\{ u(c, \widetilde{h}, s, 0) \right.$$

$$\left. + \beta \mathbb{E}_{m' > 0} V(i + 1, b, s', m', x', 0, a') + \beta \mathbb{E}_{m' = 0} v(a') \right\}$$

subject to:

$$\widetilde{c} + a' + r_h \widetilde{h} + x = (1 + r)a + \psi_s b$$

$$c = \begin{cases} \max\{\psi_s \underline{c} - r_h \widetilde{h}, \widetilde{c}\} & \text{if } a' = 0 \\ \widetilde{c} & \text{otherwise} \end{cases}$$

- $\underline{c}$: consumption floor supported by the government.
- ψ_s: income multiplier ($\psi_1 = 1$, $\psi_2 = 1.48$)

Model: Preferences

$$u(c, h, s, o) = \frac{\left((c/\xi_s)^\eta (\omega_o(h/\xi_s))^{1-\eta}\right)^{1-\sigma}}{1 - \sigma}$$

- ω_o: extra utility from ownership.
- ξ_s: family equivalence scale ($\xi_1 = 1$, $\xi_2 = 1.34$).

Utility from bequest:

$$v(a) = \gamma \frac{(a + \zeta)^{1-\sigma}}{1 - \sigma}.$$

- γ: Strength of bequest motive.
- ζ: Curvature of bequest motive.

Model: Homeowner's Problem: Tenure Decision

$$V(i, b, s, m, x, h, a) = \max\{V_0(i, b, s, m, x, h, a), V_1(i, b, s, m, x, h, a)\}$$

- $V_0(.)$ is value conditional on moving out and becoming a renter.
- $V_1(.)$ is value conditional on staying in the house.

Model: Homeowner's Problem: Staying

$$V_1(i, b, s, m, x, h, a) = \max_{a'} \{u(c, h, s, 1)$$
$$+ \beta \mathbb{E}_{m>0} V(i+1, b, s', m', x', h, a') + \beta \mathbb{E}_{m'=0} v(h + a')\}$$

subject to:

$$c + a' + x + h\delta = (1 + \tilde{r})a + \psi_s b$$
$$a' \geq -h(1 - \lambda_i)$$
$$\tilde{r} = \begin{cases} r & \text{if } a \geq 0 \\ r + \iota & \text{if } a < 0 \end{cases}$$

- λ_i: age-dependent collateral constraint.
- $h\delta$: Maintenance cost.
- ι: Mortgage interest premium.

Model: Homeowner's Problem: Moving-Out

$$V_0(i, b, s, m, x, h, a) = \max_{a' \geq 0} \{ u(c, h, s, 1)$$

$$+ \beta \mathbb{E}_{m' > 0} V(i+1, b, s', m', x', 0, a') + \beta \mathbb{E}_{m'=0} v(a') \}$$

subject to:

$$\widetilde{c} + a' + x + h(\kappa + \delta) = h + (1 + \widetilde{r})a + \psi_s b$$

$$c = \begin{cases} \max\{\psi_s \underline{c}, \widetilde{c}\} & \text{if } a' = 0 \\ \widetilde{c} & \text{otherwise} \end{cases}$$

- $h\kappa$: house selling cost.

Estimation, Stage 1: Initial Distribution at Age 65

	U.S.	Sweden
Health status		
1 (excellent)	0.445	0.377
2 (good)	0.323	0.331
3 (poor)	0.231	0.292
Tenure		
Homeowner	0.885	0.812
Renter	0.115	0.188
Net financial asset position		
Saver	0.792	0.731
Borrower	0.208	0.269

- Distribution of $(65, b, s, m, h, a)$ constructed using HRS/SHARE.
- U.S. more *optimistic* in health assessment.
- Sweden slightly lower ownership, higher indebtedness.

Estimation, Stage 1: Income Bins

	1	2	3	4	5
U.S.	6,858	12,404	17,947	25,918	42,722
Sweden	8,027	11,214	13,352	17,425	27,352

After-tax income. 2000 PPP-Adjusted US dollars.

- Higher inequality in the U.S.

Estimation, Stage 1: Health Transition Probabilities

		U.S.							

U.S.

Age 65

	Dead	Excellent	Good	Poor
Excellent	1.3	72.8	21.5	4.4
Good	2.2	25.8	53.3	18.7
Poor	9.6	6.1	20.7	63.7

Age 75

	Dead	Excellent	Good	Poor
Excellent	3.9	60.1	26.9	9.2
Good	6.6	21.1	46.9	25.4
Poor	16.3	3.8	17.6	62.3

Age 85

	Dead	Excellent	Good	Poor
Excellent	10.5	46.8	27.1	15.6
Good	14.7	17.0	37.8	30.5
Poor	28.8	5.1	13.2	52.9

Age 95

	Dead	Excellent	Good	Poor
Excellent	28.5	29.5	19.8	22.3
Good	32.9	12.9	26.8	27.5
Poor	56.9	4.2	13.6	25.3

Sweden

Age 65

	Dead	Excellent	Good	Poor
Excellent	0.4	67.6	23.7	8.3
Good	2.7	17.6	44.8	34.8
Poor	0.0	3.7	23.4	72.9

Age 75

	Dead	Excellent	Good	Poor
Excellent	3.8	54.3	20.8	21.0
Good	0.8	16.4	40.0	42.8
Poor	18.4	12.1	10.7	58.9

Age 85

	Dead	Excellent	Good	Poor
Excellent	8.2	45.2	22.3	24.3
Good	6.1	5.2	42.6	46.2
Poor	20.2	0.0	17.0	62.8

Age 89-93

	Dead	Excellent	Good	Poor
Excellent	25.5	32.7	24.5	17.4
Good	16.8	11.8	33.5	38.0
Poor	13.9	0.0	7.4	78.8

Estimation, Stage 1: Housing Costs

Parameter	Description	Value
δ	Maintenance cost of housing[1]	0.017
κ	House selling cost	0.066
r	Saving interest rate[1]	0.040
ι	Mortgage interest premium[1]	0.016

[1] Annualized value.

Estimation, Stage 2: Estimated Parameters

Parameter	Description	Value
β	Discount factor[1]	0.957
η	Consumption aggregator	0.739
σ	Coefficient of RRA	1.792
ω_1	Extra-utility from ownership	2.484
γ	Strength of bequest motive	0.539
ζ	Bequest utility shifter	28,177
$\underline{c}$	Consumption floor per adult[1]	6,398
λ_{65}	Collateral constraint for age-65	0.444
λ_{73}	Collateral constraint for age-73	0.773
λ_{81}	Collateral constraint for age-81	0.989
λ_{89}	Collateral constraint for age-89	0.998
λ_{99}	Collateral constraint for age-99	0.996

[1] Biennial value.

- Very tight collateral constraint for age 80+ (Caplin (2002)).
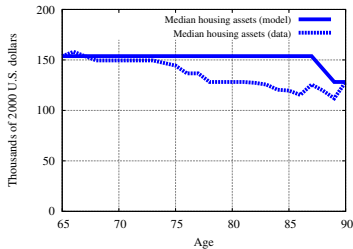
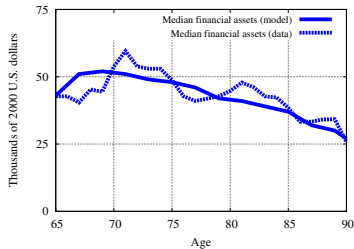# Estimation, Stage 2: Model Fit - U.S.
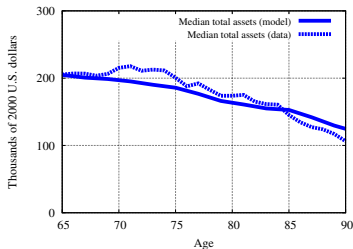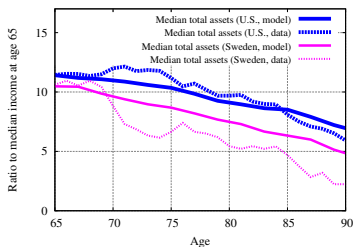

(a) Median Net Worth
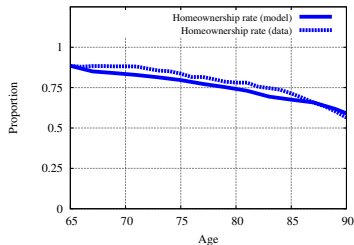
(b) Homeownership Rate

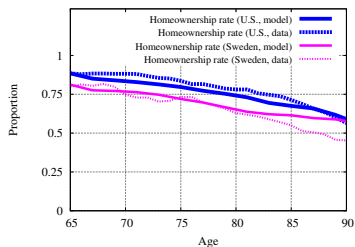(c) Median Housing Assets

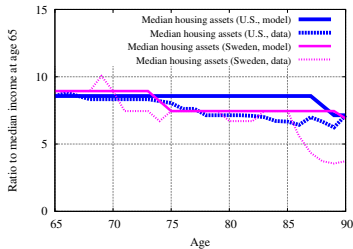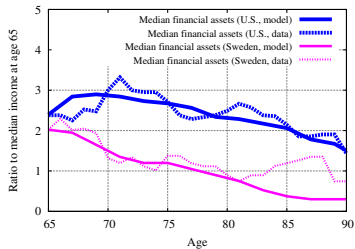(d) Median Financial Assets

Experiment: Swedish "Counterfactual"

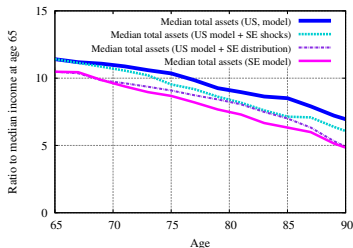(a) Median Net Worth

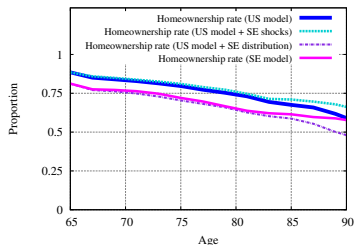(b) Homeownership Rate

(c) Median Housing Assets
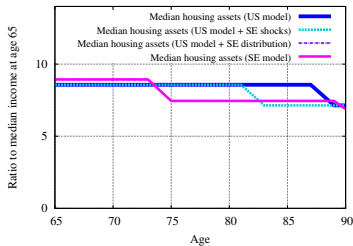
(d) Median Financial Assets

Experiment: Risk vs Initial Type Distribution

(a) Median Net Worth

(b) Homeownership Rate

(c) Median Housing Assets

(d) Median Financial Assets

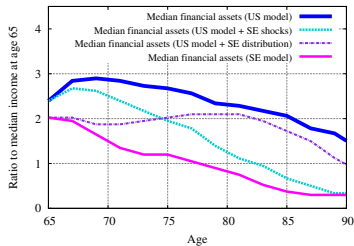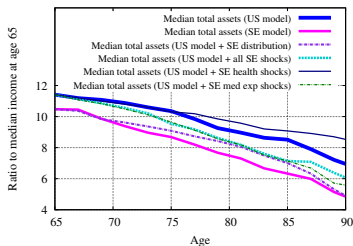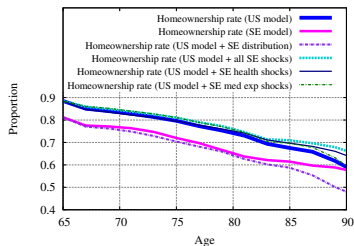# Experiment: Which Risks?

(a) Median Net Worth

(b) Homeownership Rate
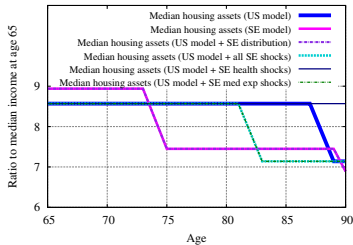
(c) Median Housing Assets
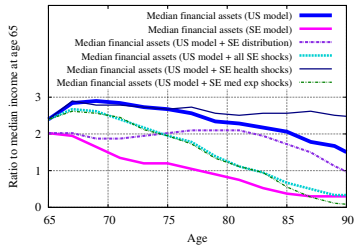
(d) Median Financial Assets

Experiment: Summary

- Use U.S.-Swedish differences in:
  - Health, mortality, and healthcare expense risks.
  - Initial (age-65) type distribution.

- Differences in healthcare expense risks account for:
  - Most of the differences in financial asset decumulation.
  - Half of the differences in net worth decumulation.

- Differences in initial type distribution account for:
  - Differences in life-cycle profiles of housing.

Concluding Remarks

- Health expense risks affect (dis)saving patterns of elderly households, especially financial assets.
  - Consistent with cross-country data.

- Half of U.S.-Swedish differences in wealth decumulation unexplained.
  - Housing and mortgage markets?
  - Policy (social safety net, tax)?
  - Social norm (bequest pattern)?

References

Ameriks, John, Andrew Caplin, Steven Paufer, and Stijn van Nieuwerburgh, "The Joy of Giving or Assisted Living? Using Strategic Surveys to Separate Public Care Aversion from Bequest Motives.," *Journal of Finance*, 2011, *66* (2), 519–561.

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