Social Security, Endogenous Retirement and Intrahousehold Cooperation

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Motivation

- Puzzles in the empirical literature on retirement:

1. Large peak in retirement profile of Americans at age 62; smaller peak at "regular" retirement age of 65

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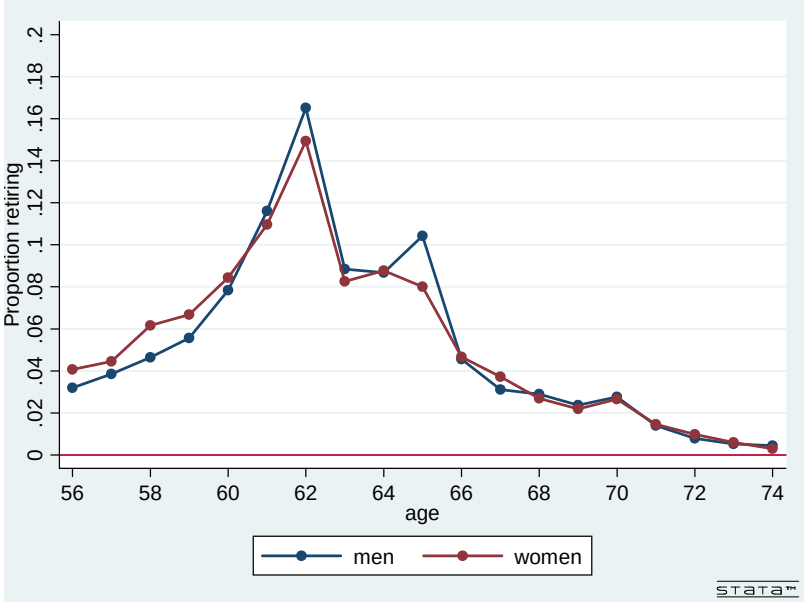
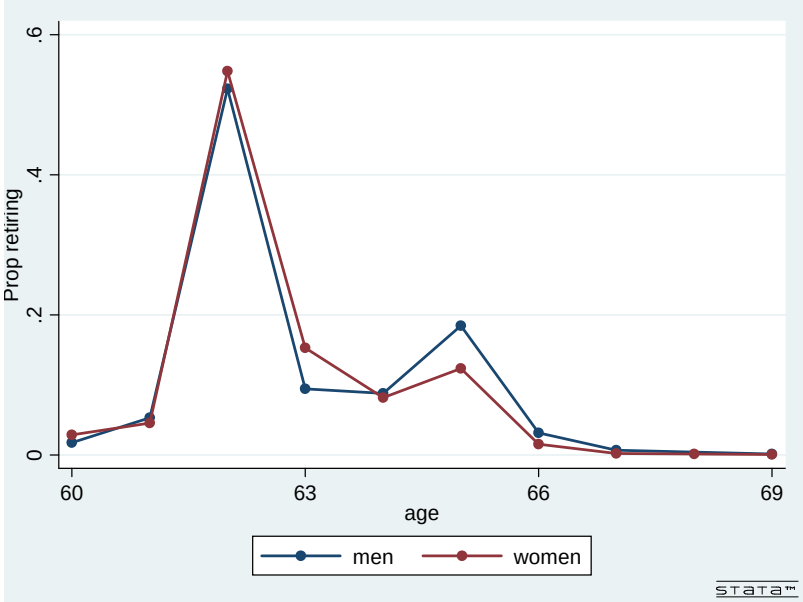


(a) Self-assessed retirement



(b) Benefit claiming

Motivation

- Puzzles in the empirical literature on retirement:

1. Large peak in retirement profile of Americans at age 62; smaller peak at "regular" retirement age of 65
2. Joint retirement of couples: 64% husbands and wives in the 1998-2006 files (1932-1942 birth cohort) of the HRS retire within two years of each other

Motivation cont.

- Neither of these facts seems very consistent with basic lifecycle theory:
  1. Delayed retirement benefits under Social Security are approximately actuarially fair
  2. Benefit increases about 7% for each year retirement is delayed: should be very appealing for women and healthy workers
  3. Men and women have different earnings profiles, and different incentives to retire under SS
- Indeed, a “standard” cooperative life cycle model suggests that about half of married women and 60% of married men wait until after their 66th birthday to retire

Potential explanations

1. Declining health leads individuals to retire as soon as possible

2. Members of couples may benefit from *complementarities in leisure* during retirement
   - e.g. Jimenez-Martin, Azcona & Martinez-Granado [2000], Coyle [2004], Maestas [2001]
   - Explains both early and joint retirement

3. Couples are *non-cooperative* in their career and retirement decisions
   - e.g. Gustman & Steinmeyer [2004]
   - “Competition” between spouses sensitive to rules governing Social Security

Additional aspects of retirement

- Additional aspects of retirement transitions
  1. “Bridge jobs”: Cahill et al [2005]
  2. Social Security Disability Insurance (SSDI)

Layout of presentation

1. Compare three life cycle models of the household:
    1. Standard “benchmark” model: household “planner” solves joint problem
    2. “Benchmark” + complimentarities in leisure
    3. “Benchmark” + non-cooperation over career and retirement decisions
2. How well does each model do at fitting data on retirement patterns and program use?
3. What is the importance and welfare consequences of current Social Security policy in each model?

A basic household model

- In a standard household model, a “household planner” maximizes a weighted function of the respective continuation functions of the spouses:

$$U_j(x_M) = \max_y \lambda \Upsilon_j^f(x_M) + (1-\lambda)\Upsilon_j^m(x_M)$$

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$$\Upsilon_j^i(x_M) = u^i(c^*, l_m^*, l_f^*) + E\beta_i[\Upsilon_{j+1}^i(x_M^{*'})]$$

Here, * indicates the planner's optimal solutions for

$$y = \{l_f, l_m, c, a', lfs^f, lfs^m\}$$

where lfs^i indicates spouse i's current labour force status and a' are carry-forward assets

Additional notation

- State vectors are $x_M = \{a, x_f, x_m\}$ where $x_i = \{w_i^{lfs}, \delta_i, e_i\}$ = {current wage, current health status, social security benefit accumulation}
- $lfs \in \{C, NC, R, A\}$ = {career job, non-career job, retired, applying for benefits }
- Household period budget:

$$n_m w_m^{lfs} + n_f w_f^{lfs} + (1 + r)a + b(.) = c + a^{'}$$

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$$n_m w_m^{lfs} + n_f w_f^{lfs} + (1 + r)a + b(.) = c + a^{'}$$

where $r = .042$; n is labour; b(.) are net benefits

lfs states and transitions

- While $lfs = C$, the individual works full time or else loses career job

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- For workers 62 and over, receipt of regular retirement benefits (SSR) is automatic upon application. For individuals under 62, disability benefits are received with probability p_δ, and unsuccessful applicants face cost c_A.

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- Individuals who work full time in state *NC* move with probability $p_C = .15$ into higher-wage career each period
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- Benefit claimants (SSD or SSR) may leave the rolls and return to state *NC* any time before age 75

Cooperative and non-cooperative regimes

- Assumption: individuals do not have outside options (no divorce in current model)
- However, individuals may behave non-cooperatively over their work decisions.
- Each period, the household planner chooses $\{lfs^f, lfs^m\}$ from feasible set so as to maximize U
- However, individuals may deviate from the planner's optimum:
  - By quitting a career job
  - By claiming a disability that impairs work
  - By taking up regular retirement benefits after age 62

Cooperative and non-cooperative regimes cont.

- An individual i, with spouse $-i$, has two choices: accept the planner's *lfs* allocation and resulting c^*, l^*, or deviate by choosing payoff $\hat{\Upsilon}^{lfs}$, with planner's associated $\hat{c}^*, \hat{l}^*$ as follows:

$$\hat{\Upsilon}j^{i,C} = \max\{p(\delta)\hat{\Upsilon}_j^{i,R,lfs_{-i}|A} + (1-p(\delta))\hat{\Upsilon}_j^{i,NC,lfs_{-i}|A}, \quad \hat{\Upsilon}_j^{i,C,lfs_{-i}|C}, \quad \hat{\Upsilon}_j^{i,NC,lfs_{-i}|NC}\}$$

$$\hat{\Upsilon}j^{i,NC} = \max\{p(\delta)\hat{\Upsilon}_j^{i,R,lfs_{-i}|A} + (1-p(\delta))\hat{\Upsilon}_j^{i,NC,lfs_{-i}|A}, \quad \hat{\Upsilon}_j^{i,NC,lfs_{-i}|NC}\}$$

$$\hat{\Upsilon}j^{i,R} = \max\{\hat{\Upsilon}_j^{i,R,lfs_{-i}|R}, \quad \hat{\Upsilon}_j^{i,NC,lfs_{-i}|NC}\}$$

- Note that non-cooperation over retirement is a form of *internal threat point* (Lundberg et al [1991]), and so members of a couple take their spouse's response into consideration when deviating from the planner's optimum

Non-cooperative retirement

- Husbands and wives play a period-by-period Nash game, similar to that developed by Gustman & Steinmeyer [2004]
- When both spouses are in *lfs* state *NC* or *R*, then the game is a simple 2x2 Nash game; if first spouse is in *lfs* C, the game is 3x2; if both are *C*, then the game is 3x3
- Career workers solve by backward induction: first solving the smaller game associated with quitting
- Assumptions governing outcomes:
  1. No mixed strategies
  2. When no Nash equilibrium exist in a subgame, couple accepts planner's allocation in that subgame
  3. When multiple Nash equilibria exist in a subgame, couple accepts the planner's allocation in that subgame

Preferences

Standard preferences for individual i with spouse $-i$:

$$u_i(c, l_i) = \frac{[(\psi_c \frac{c}{\tilde{\eta}_j})^{\gamma_i}(l_i)^{1-\gamma_i}]^{1-\omega_i}}{1-\omega_i}$$

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Complementaries-in-leisure:

$$u(c, l_i) = \frac{[(\psi_c \frac{c}{\tilde{\eta}_j})^{\gamma_i}(l_i + l_{rr}\psi_l \min[l_i, l_{-i}])^{1-\gamma_i}]^{1-\omega_i}}{1-\omega_i}$$

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Complementaries-in-leisure:

$$u(c, l_i) = \frac{[(\psi_c \frac{c}{\tilde{n}_j})^{\gamma_i}(l_i + l_{rr}\psi_l \min[l_i, l_{-i}])^{1-\gamma_i}]^{1-\omega_i}}{1-\omega_i}$$

- ψ_c: share of personal consumption from household public consumption
- ψ_l: utility gain from joint retirement (formal or informal)
- $\tilde{n}$ captures life cycle dependency effects (e.g. children)
- l_{rr} is an indicator function for neither spouse currently working

Health and mortality

- Individuals live to a maximum of 90 years, with mortality uncertain
- Health follows 3-stage markov process: Healthy, recovering, disabled/sick
- Poor health reduces disposable time at rate $\chi(\delta)$ (calibrated to match labour supplies by δ status) and increases mortality risk
- Health and health-dependent mortality calculated from the 1980-1997 files of the PSID

Career and non-career wages

- Evolution of wages between career and non-career jobs for 1932-1942 birth cohort estimated by pooling the 1992-2006 waves of the HRS and 1981-1997 waves of the PSID.
- Individuals are in “career” (full time, no recent job displacement) and “non-career” (part time or recent job displacement) jobs
- Switching regression between career and non-career regimes
- Variance of wages is heteroskedastic in age, and wage residuals are serially correlated

Estimated wage parameters

Table: Wage equation parameters: Career and non-career workers

	Career workers		Non-career workers	
	Women	Men	Women	Men
age	.340 (.780)	.587 (.092)	-.678 (.0163)	-1.631 (.808)
age^2	-.0066 (.0159)	-.0118 (1.033)	.0149 (.808)	.0328 (.021)
age^3	.00004 (.00011)	.00007 (.00004)	-.00011 (.00011)	-.00022 (.002)
cons	-4.30 (12.7)	-7.32 (10.2)	10.9 (13.3)	29.0 (16.9)
σ_{me}	.030 (.049)	.028 (.092)	.134 (.016)	.052 (.047)
ρ	.923 (.042)	.891 (1.033)	.984 (.016)	.803 (.026)
$\dot{\gamma}_0$	.532 (.158)	.737 (.00004)	.057 (.0010)	1.849 (.448)
$\dot{\gamma}_1$	-.023 (.0065)	-.031 (1.033)	-.0016 (.0010)	-.076 (.0174)
$\dot{\gamma}_2$	.000297 (.000068)	.000337 (.000040)	.000015 (.00015)	.000799 (.00017)
N	5236	5593		
Wald(9)	451.3	268.0		

Policy environment: Features of Social Security

1. Disability benefits for workers under 62
2. Regular retirement benefits claimable between ages 62 and 75, with reductions in benefits for workers under 65 and increases in benefits for workers over 65 up to 70
   - Reflects benefits adjustment schedule as of 2000
3. Spousal benefits: lower-earning spouse in a couple receives max of her own or 50% of her partner's benefit
4. Widow benefits: Surviving spouse receives greater of her own or her deceased partner's benefit

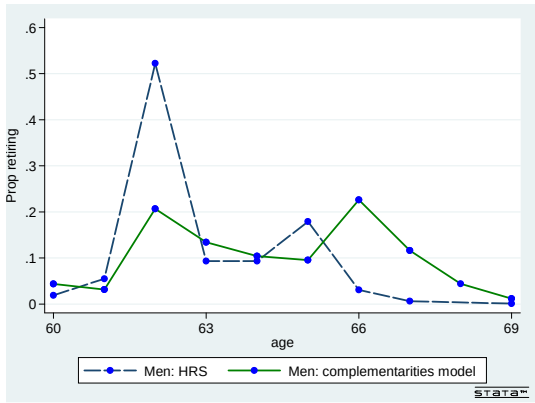
Calibrated parameters: three models

Parameter	Benchmark	Non-coop	Compl.	Target	Target value
γ_f	.45	.41	.44	Unmarried healthy female labour supply 25-60	32.0 hrs
γm	.47	.47	.47	Unmarried healthy male labour supply 25-60	39.6 hrs
ω_f	3.0	3.0	3.0	Assigned	n/a
ωm	2.5	2.5	2.5	Assigned	n/a
β_f	.985	.982	.984	HH wealth-income ratio for homes w female member	2.50
βm	.983	.977	.980	HH wealth-income ratio for homes w male member	2.35
$\chi(\delta_{2f})$	15	22	14	Unmarried female labour supply $\mid \delta_f = 2$	22.5 hrs
$\chi(\delta_{3f})$	45	40	45	Unmarried female labour supply $\mid \delta_f = 3$	9.6 hrs
$\chi(\delta_{2m})$	12	15	11	Unmarried male labour supply $\mid \delta_m = 2$	26.4 hrs
$\chi(\delta_{3m})$	53	50	52	Unmarried male labour supply $\mid \delta_m = 3$	9.0 hrs
$p(\delta_1)$	.16	.18	.19	Share of new SSD recipients among pop with $\delta = 1$	.2%
$p(\delta_2)$	.27	.21	.24	Share of new SSD recipients among pop with $\delta = 2$	1.5%
$p(\delta_3)$	.36	.63	.33	Share of new SSD recipients among pop with $\delta = 3$	5.7%
c_A	1.01	1.02		Total share of SSD application ending in success	50%
λ	.57	.55	.58	Married male labour supply	44.8 hrs
$\psi_C(M)$	.71	.72	.71	Joint labour supply of married households	70.7 hrs
$\psi_L(M)$	n/a	n/a	.254	Share of individuals not working by age 64	.81

Results: Benefit claiming of husbands in the three models

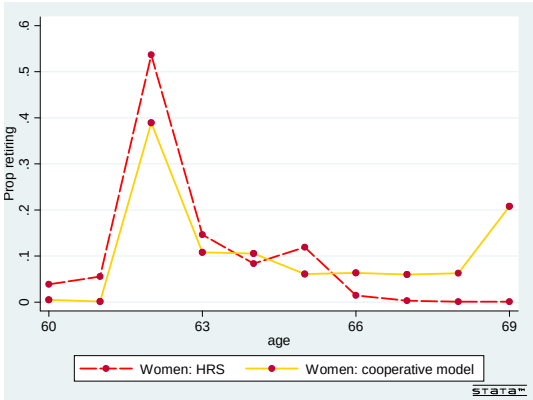
(c) Benchmark model
Cumulative difference: .722

(d) Non-cooperative model
Cumulative difference: .362

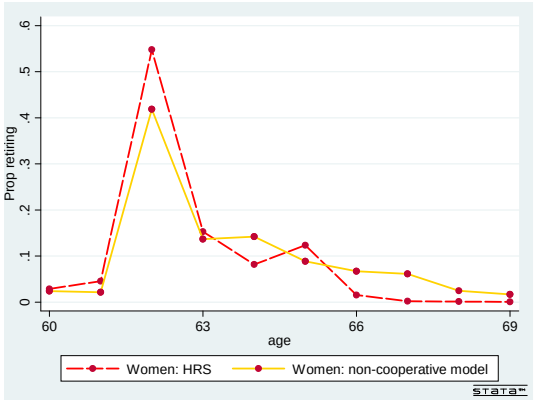


(e) Complementarities model
Cumulative difference: .633

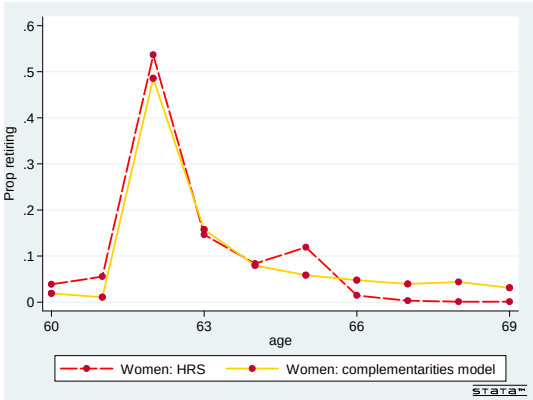
Results: Benefit claiming of wives in the three models



(f) Benchmark model
Cumulative difference: 1.029

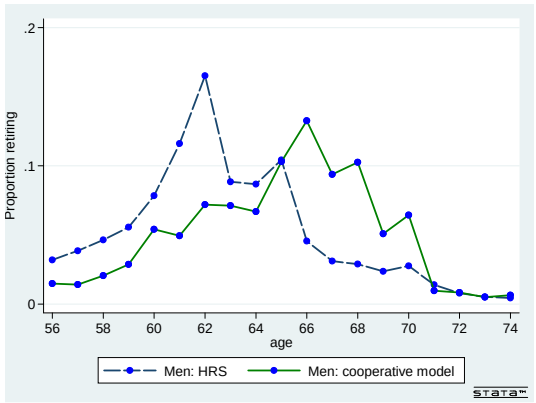


(g) Non-cooperative model
Cumulative difference: .369

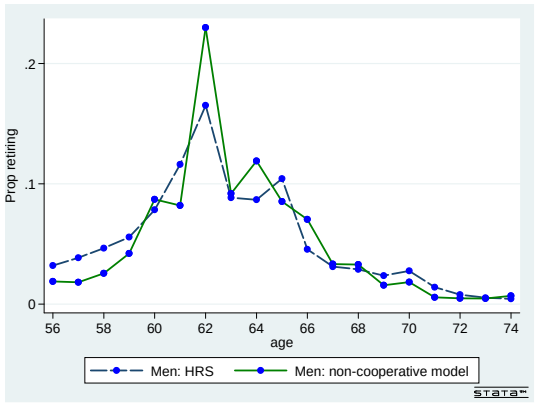


(h) Complementarities model
Cumulative difference: .351

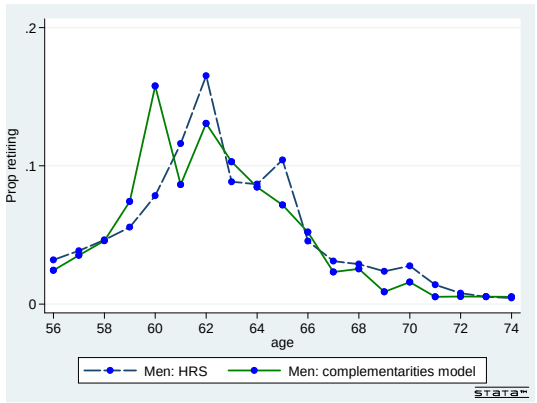
Results: Self-assessed If exit of husbands in the three models



(i) Benchmark model
Cumulative difference: .504

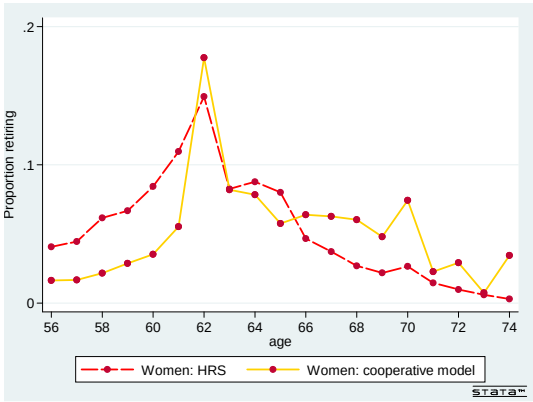


(j) Non-cooperative model
Cumulative difference: .328

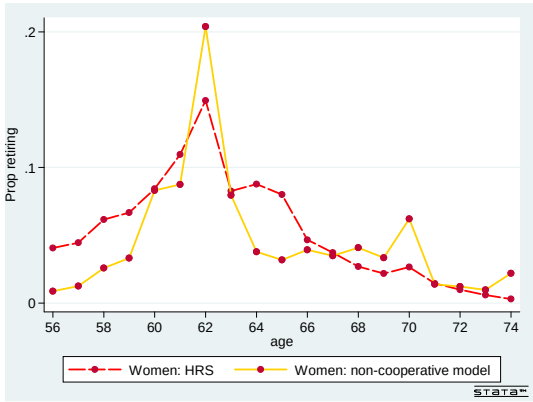


(k) Complementarities model
Cumulative difference: .297

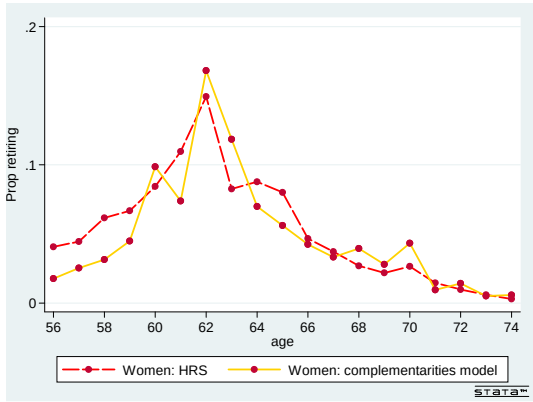
Results: Self-assessed If exit of wives in the three models



(l) Benchmark model
Cumulative difference: .601



(m) Non-cooperative model
Cumulative difference: .273



(n) Complementarities model
Cumulative difference: .288

Joint retirement

Table: Husband retirement minus wife retirement in years

Difference in years	HRS 1998-2006	Benchmark model	Non-coop model	Compl-in-leis model
-6	0.2	13.9	1.0	5.1
-4	4.6	10.0	0.5	3.5
-2	3.7	4.8	0.4	2.1
0	72.8	39.1	80.1	51.5
+2	10.1	5.8	12.1	12.1
+4	8.4	12.0	8.1	20.5
+6	0.2	14.3	0.5	5.3

Explaining the results: Complementarities in leisure

- Both the non-cooperative and the complementarities models strongly improve on the benchmark household model in capturing patterns of retirement of married households
- In the complementarities model, the reason is obvious: couples get a utility boost from joint unemployment and the first availability of Social Security benefits induces them to retire
- However, many husbands delay benefit claiming until age 65 or later in order to increase household income and his wife's income following his death. Thus, the model fits *self-assessed retirement*, but does less well matching *benefit claiming*

Explaining the results: Non-cooperation

- Spouses' career choices impose positive externalities on each other.
- As a result, one spouse (typically the husband)'s personal preferences may come in conflict with the planner's preferences leading to a deviation into retirement.
- Since the hh perfectly perceives next period's deviations, the marginal payoff from retiring this year instead of next does not decrease over the retirement period, even as the costs of doing so rise.
- The remaining spouse (typically the wife) can remain working, but her incentive to do so is reduced:
  1. The husband's increased leisure raises the hh's MPC, reducing the additional saving from work
  2. Additional increases in her personal benefit are muted by her entitlement to receive her husband's larger benefit upon his death, and potentially also the spousal benefit.

Retirement patterns: SSD

Table: Transitions into and out of SSDI

	SSA data (Autor & Duggan [2006])	Non-coop	Compl-in-leis
Exit by death	42.0%	23.8%	23.0%
Exit by retirement	44.0%	61.1%	52.4%
Exit by return to work	12.0%	15.1%	24.6%

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- All models underestimate mortality of disabled population
- However, non-coop model generates more realistic likelihood of return-to-work

Retirement patterns: bridge jobs

Table: Share of individuals using two-step retirement

	HRS data (Cahill et al [2005])	Benchmark	Non-coop	Compl-in-leis
Men	66.0%	49.5%	69.7%	51.5%
Women	61.0%	33.7%	52.5%	41.7%

Retirement patterns: bridge jobs

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- Benchmark and complementaries models both seriously underestimate use of bridge jobs in comparison to non-cooperative model
- Also: positive correlation between use of bridge jobs and quality of health in data and in non-cooperative model

Policy implications

Table: Lifetime utility under four policy experiments

Regime	Non-coop		Compl-in-leis	
	Wives	Husbands	Wives	Husbands
Value functions				
Policy benchmark	*-2.030*	-2.394	*-1.955*	*-2.378*
50% benefit cut	**-2.095**	**-2.436**	**-2.009**	**-2.422**
SSD elim	-2.038	-2.397	-1.956	-2.383
Spouse ben elim	-2.048	*-2.390*	-1.967	-2.379

Table entries are ex-ante expected life time utilities under each model and policy experiment. Bolded entries denote the worst payoffs across the policy regimes. Blue italicized entries represent the best payoffs across policy regimes.

Conclusions and future work

- Two household models to explain observed retirement patterns among U.S. couples born between 1932 and 1942 compared to a standard "benchmark" life cycle model:
  1. Complementarities in leisure
  2. Non-cooperative
- Nesting models?
- What about singles?
- What about younger cohorts?