The importance of modeling couples and singles

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Based on work with

- Borella and Yang (2018), (2019a), (2019b)
- French, Jones, and McGee (2021)

Why model couples and singles? Part 1

- Women and people in couples make up a large fraction of
  - Labor market participants
  - Total hours worked
  - Total earnings

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  - Total earnings
- Wages, labor market participation, hours worked, and savings differ
  - By gender
  - By marital status

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  - Taxation
  - Old age social security benefits (public pensions)
  - Welfare program (both eligibility criteria and program generosity)

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- In the U.S.
  - Taxation
  - Old age social security benefits (public pensions)
  - Welfare program (both eligibility criteria and program generosity)
- Lot of work on these programs, but most ignores that
  - Couples and singles might react differently to reform
  - The effects of program rules for the secondary earner
  - Program rules mid affect primary and secondary earner differently

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- Couples and singles can imply very heterogenous behavior and elasticities
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- Drop part of the data, for instance women
- Either same paper or other paper, use results to calibrate models or draw inference on whole economy

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- Yesterday, ES conference: effects of taxation and old age Social Security on couples and singles, Borella, De Nardi, and Yang (BDY, 2019b)

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- Yesterday, ES conference: effects of taxation and old age Social Security on couples and singles, Borella, De Nardi, and Yang (BDY, 2019b)
- Today: importance of modeling couple and singles more generally
  - Borella, De Nardi, Yang (BDY, 2018)
  - De Nardi, French, Jones, McGee (DFJM, 2021)

BDY, 2018

- What do many papers do?
- Only use data on men (women are "complicated")
- These models or estimated preferences or elasticities are then used to draw inference about the whole economy (by same paper or others)
- Could this possibly be a problem?

BDY, 2018

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  - Labor participation
  - Hours worked
  - Labor income
  - Net worth
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- What are the implications in terms of labor supply elasticities?
- If we ignore something in our model, can we just drop it from the data?

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- Economy 1: "No couples, only men"
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- Economy 3: "Couples and singles"
  - Model: Couples and singles. Everyone chooses labor. Spouses also save and consume jointly
  - Calibration: data for couples and single men and women

Data and Methodology

- Data
  - PSID: working period
  - HRS: retirement period

Data and Methodology

- Data
  - PSID: working period
  - HRS: retirement period
- Methodology
  - Pick the 1941-1945 birth cohort and follow it over their life cycle
  - Take its initial conditions and exogenous processes from data (data inputs)
  - Study the evolution of its endogenous variables and match them to data (data outputs)

Fraction of couples and single men and women by age

Age Group	25	35	45	55	65
Fraction of married women	0.43	0.42	0.40	0.39	0.37
Fraction of married men	0.43	0.46	0.44	0.43	0.44
Fraction single women	0.07	0.07	0.10	0.12	0.13
Fraction of single men	0.07	0.05	0.06	0.06	0.06

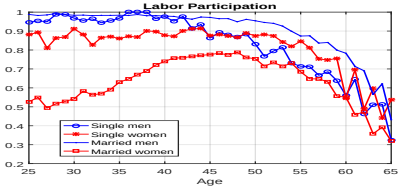
- Single decision makers are a minority in the data.
- Among the working age workers single men are only about 6%.

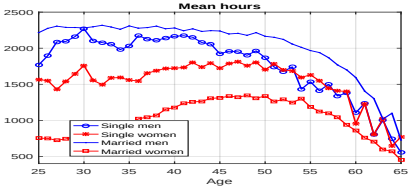
Women and people in couples as a fraction of workers, hours, or earnings

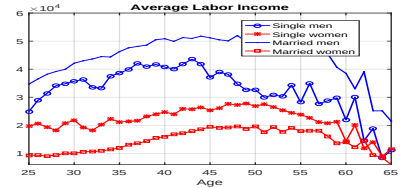
Age Group	25	35	45	55	65
Fract. women among workers	0.37	0.40	0.46	0.46	0.44
Fract. hours worked by women	0.28	0.31	0.39	0.40	0.40
Fract. earnings by women	0.24	0.22	0.30	0.27	0.27
Fract. in couples among workers	0.86	0.85	0.84	0.82	0.78
Fract. hours worked by couples	0.86	0.86	0.84	0.83	0.80
Fract. earnings by couples	0.88	0.87	0.86	0.87	0.85

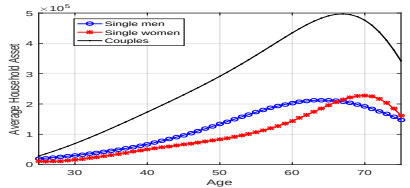
- The aggregates are comprised of large fraction of women and people in couples

Single and coupled men and women over the life cycle









Key data facts, summary

- Single decision makers are a minority in the data
- Aggregates are comprised of large fraction of women and people in couples
- Behavior by gender and marital status is very heterogeneous

More general model

- Lifecycle model
- Partial equilibrium, cohort level analysis
- Period length: one year

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  - Alive for sure
  - Face shocks to their labor productivity
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  - Singles and people in couples can choose whether to work and hours
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  - Fixed cost of working
- Retirement stage (t_r to T)
  - Exogenous probability of death. Thus, people in couples might lose their spouse.

Household preferences

- Discount factor: β.
- Singles:

$$v(c_t, l_t) = \frac{(c_t^{\omega} l_t^{1-\omega})^{1-\gamma} - 1}{1-\gamma}$$

- Couples:

$$w(c_t, l_t^1, l_t^2) = \frac{((\frac{c_t}{2})^{\omega}(l_t^1)^{1-\omega})^{1-\gamma} - 1}{1-\gamma} + \frac{((\frac{c_t}{2})^{\omega}(l_t^2)^{1-\omega})^{1-\gamma} - 1}{1-\gamma}$$

- Labor participation cost (time cost): $\phi_t^{i,j}$.
- j = marital status, i = gender.

Recursive problem for working-age singles

$$W_t^{s,i}(a_t^i, \epsilon_t^i) = \max_{c_t, a_{t+1}, n_t} \left[v(c_t, 1 - n_t - \phi_t^{i,1} I_{n_t}) + \beta E_t W_{t+1}^{s,i}(a_{t+1}^i, \epsilon_{t+1}^i) \right]$$

$$Y_t = e_t^{i,j} \epsilon_t^i n_t \tag{1}$$

$$c_t + a_{t+1}^i = (1 + r) a_t^i + (1 - \tau_{SS}) Y_t \tag{2}$$

$$a_t \geq 0, \quad n_t \geq 0, \quad \forall t \tag{3}$$

Recursive problem for retired singles

$$R_t^{s,i}(a_t) = \max_{c_t, a_{t+1}} \left[v(c_t, 1) + \beta s_t^{s,i} R_{t+1}^{s,i}(a_{t+1}) \right] \tag{4}$$

$$c_t + a_{t+1} = (1 + r) a_t + Y_r^{i,j} \tag{5}$$

$$a_t \geq 0, \quad \forall t \tag{6}$$

Recursive problem for working-age couples

$$W_t^c(a_t, \epsilon_t^1, \epsilon_t^2) = \max_{c_t, a_{t+1}, n_t^1, n_t^2} \Big[w(c_t, 1 - n_t^1 - \phi_t^{1,2} I_{n_t^1}, 1 - n_t^2 - \phi_t^{2,2} I_{n_t^2}) + \beta E_t W_{t+1}^c(a_{t+1}, \epsilon_{t+1}^1, \epsilon_{t+1}^2) \Big] \tag{7}$$

$$Y_t^i = e_t^{i,j} \epsilon_t^i n_t^i \quad i = 1, 2 \tag{8}$$

$$c_t + a_{t+1} = (1 + r) a_t + (1 - \tau_{SS})(Y_t^1 + Y_t^2) \tag{9}$$

$$a_t \geq 0, \quad n_t^1, n_t^2 \geq 0, \quad \forall t \tag{10}$$

Recursive problem for retired couples

$$R_t^c(a_t) = \max_{c_t, a_{t+1}} \Big[w(c_t, 1, 1) + \beta s_t^{c,1} s_t^{c,2} R_{t+1}^c(a_{t+1}) + \beta s_t^{c,1}(1 - s_t^{c,2}) R_{t+1}^{s,1}(a_{t+1}) + \beta s_t^{c,2}(1 - s_t^{c,1}) R_{t+1}^{s,2}(a_{t+1}) \Big] \tag{11}$$

$$c_t + a_{t+1} = (1 + r) a_t + (Y_r^{1,c} + Y_r^{2,c}) \tag{12}$$

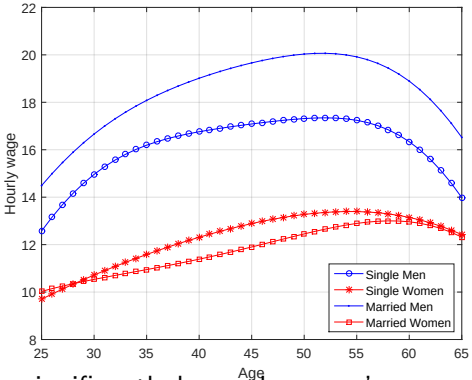
$$a_t \geq 0 \quad \forall t \tag{13}$$

Exogenous parameters common across economies

Parameters		Value
r	Interest rate	4%
γ	risk aversion coefficient	2
τ_{SS}	Social Security tax rate on employees	3.8%

Table: Calibration of the interest rate, risk aversion, and Social Security tax rate

PSID: Wages over the life cycle (in $1998)



- Women's wages are significantly lower than men's wages
- Single men's wages are significantly lower than married men's wages

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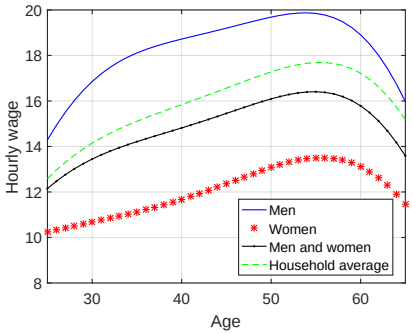


- Some different ways of using the data depending on the model and our strategy

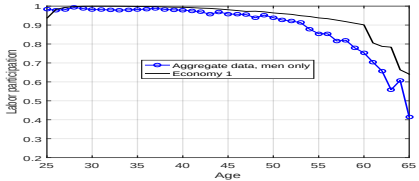
Results

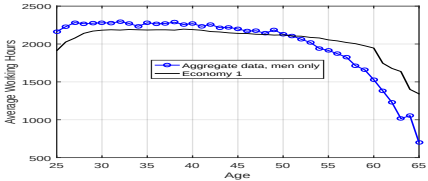
- Economy 1: "No couples, only men"
  - Only heterogenous by age and realized earnings shocks
  - Only labor supply and saving decisions by men
  - Calibrated using data on men
- Economy 2: "No couples, men and women together" calibrated using data on both men and women together, as individual-level data.
- Economy 3: A richer life-cycle economy
  - Heterogeneous by gender, marital status, wages, and life expectancy
  - Everyone can choose to supply labor, and spouses also save and consume jointly
  - Calibrated using data for married and single men and women

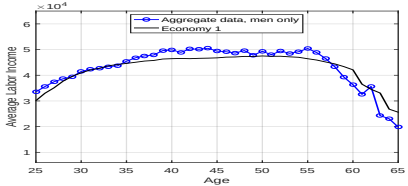
Economy 1: The singles economy, calibrated parameters

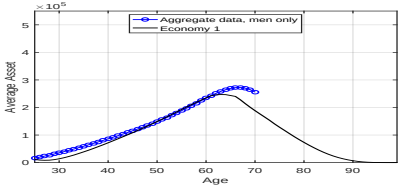
- Model: single decision maker
- Calibration: data on men only
- Calibrated parameters: discount factor, weight on consumption, participation cost, Social Security benefit
- Targets: SS budget balance, participation and average assets and hours at age 50

The singles economy, profiles fit

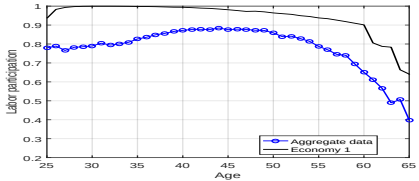


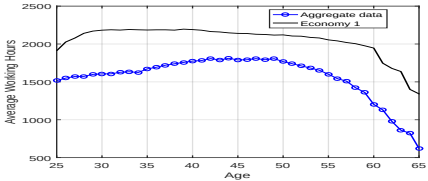


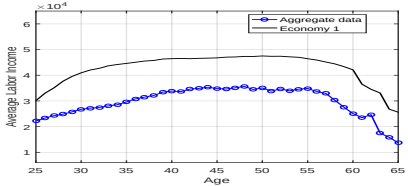


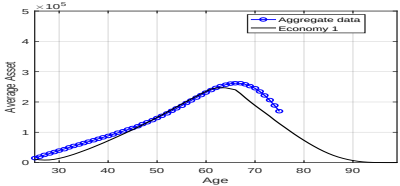


Aggregating up the profiles by gender and marital status





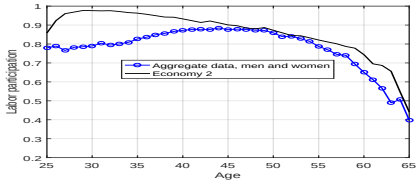


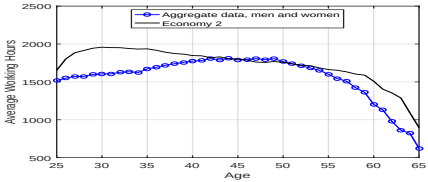


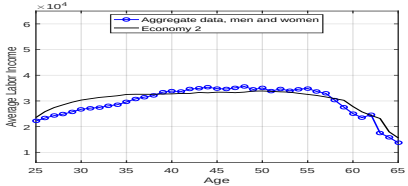
Economy 2: The singles economy, calibrated parameters

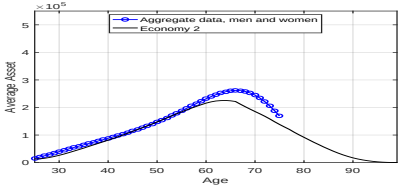
- Model: single decision maker
- Calibration: data on men and women together
- Calibrated parameters: discount factor, weight on consumption, participation cost, Social Security benefit
- Targets: SS budget balance, participation and average assets and hours at age 50

Aggregating up the profiles by gender and marital status





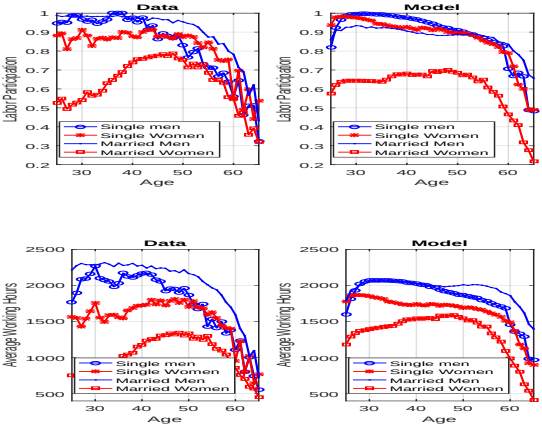




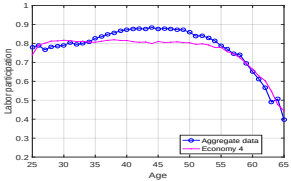
Economy 3: Couples and singles economy

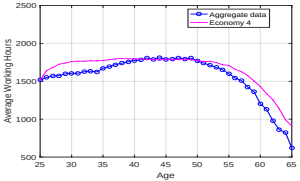
- Model: couples and singles
- Calibration: data on men and women
- Calibrated parameters: discount factor, weight on consumption, participation cost (men, single women, and married women), Social Security benefit
- Targets: SS budget balance, participation and average hours (single and married men and women) at age 50 and average assets at 50 (couples, single men and women)

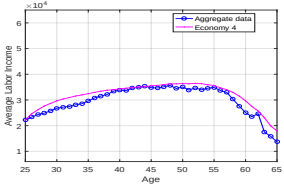
The couples and singles economy, profiles fit

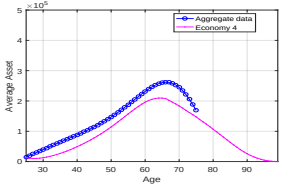


Aggregating up the profiles by gender and marital status









Aggregating up the profiles, what have we learned?

- The economy with only men, calibrated using men
  - Overestimates participation by 10 percentage points
  - Overestimates average hours by about 500 hours
  - Overestimates average earnings by age
- Adding women in the calibration helps in fitting the aggregates.
- The couples economy does a much better job of fitting aggregate behavior by age

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Compensated elasticities by age (singles economies)

	Participation in economy		Hours in economy	
Age	1	2	1	2
30	0.01	0.25	0.49	1.13
40	0.06	0.58	0.47	1.59
50	0.24	0.53	0.73	1.75
60	0.36	2.68	0.74	1.87

- Elasticity increases by age.
- Economy 1 has the lowest elasticity.

Compensated elasticity by age (couples economy)

	Participation					Hours				
	Single		Married			Single		Married		
	M	W	M	W	All	M	W	M	W	All
30	0.02	0.23	0.07	1.02	0.39	0.11	0.75	0.37	1.01	0.59
40	0.34	0.54	0.22	1.85	0.86	0.67	0.99	0.66	2.26	1.29
50	0.99	1.50	0.49	1.76	1.06	1.40	1.96	0.95	2.14	1.49
60	0.83	3.42	0.91	1.59	1.30	1.68	3.57	1.42	2.14	1.80

- Large heterogeneity
- Larger elasticity for women

Conclusions from BDY 2018

- Most people are in couples and much labor market activity is done by women
- Be really careful about the "marriage" between your model, your data selection, and your question and...
- The conclusions you draw based on your results
- Consider modeling these aspects whenever feasible and sensible

DFJM, 2021

- Can we better understand retirement savings by modeling both couples and singles?
  - Couples save differently compared to singles, even after retirement
  - Couples become singles and give out bequests when first one dies
  - Last survivor also leaves bequest

DFJM, 2021

- Can we better understand retirement savings by modeling both couples and singles?
  - Couples save differently compared to singles, even after retirement
  - Couples become singles and give out bequests when first one dies
  - Last survivor also leaves bequest
- What can we learn about precautionary savings and bequest motives when also modeling couples?

DFJM, 2021

- Understanding savings of couples and singles during retirement

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- *Life transitions* and *older households' savings*

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- Role of bequest motives?
- Role of medical expenses & survival risk?

Data

- AHEAD Cohort of the HRS
- Households heads aged 72 or older in 1996, data every 2 years until 2016

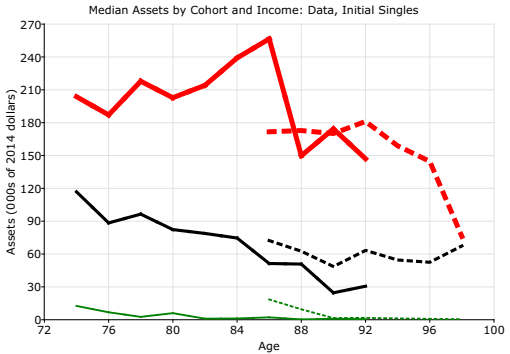
Data

- AHEAD Cohort of the HRS
- Households heads aged 72 or older in 1996, data every 2 years until 2016
- Detailed information from "exit interviews" and "post-exit interviews"
  - Estates
  - End-of-life expenses
  - Wealth transfers to spouse+other heirs

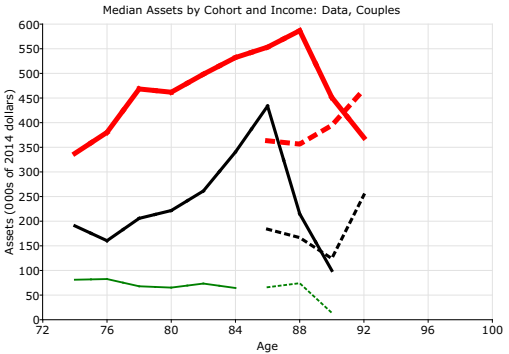
Facts

- Singles (especially low income singles) decumulate wealth
- Couples accumulate wealth
- Large wealth drops around death of first household member

Wealth

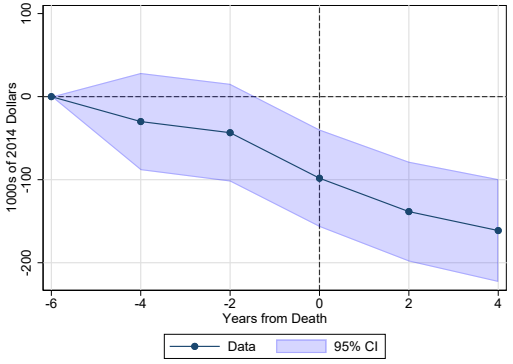


(a) Initial Singles

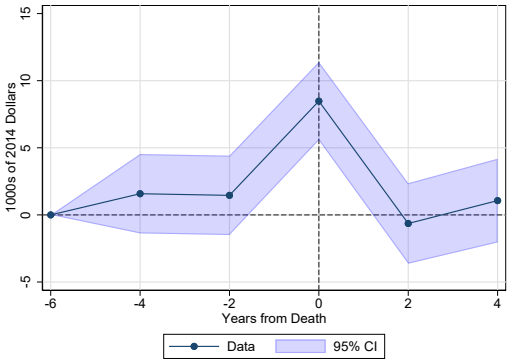


(b) Current Couples

Wealth and Medical Expenses around Death



(a) Net worth



(b) OOP medical spending

- Wealth drops $160,000 around spousal death. Medical spending jumps $27,000
- Transfers to non-spousal heirs average $79,000

Model Overview

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  - When first household member dies
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  - Rich pay out of pocket, poor covered by Medicaid
  - End-of-life expenses
- Health and longevity: Rich, married, healthy live longer

Two-step Estimation Strategy

- First step: estimate parameters of income, health, mortality, and medical expense processes.
- Second step: choose preference parameters and consumption floor using the method of simulated moments (MSM) to match
  - Wealth and Medicaid

Estimated Bequest Motives

$$\phi_j \frac{(b+\kappa_j)^{(1-\nu)}}{1-\nu},$$

when first ($j=1$) and last ($j=0$) spouse dies

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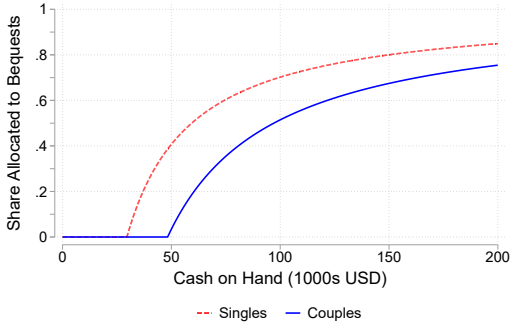

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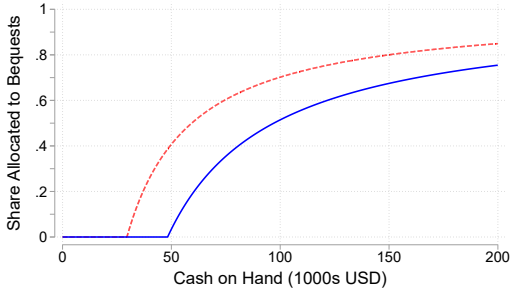
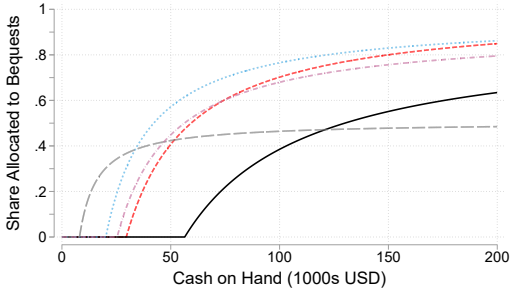
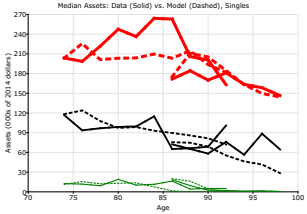
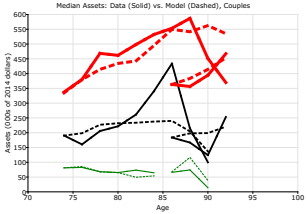
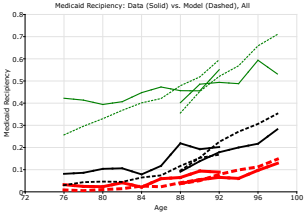




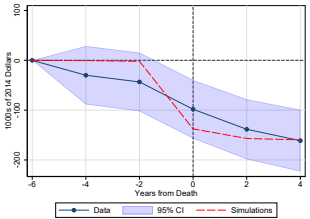
Model Fit: Wealth and Medicaid

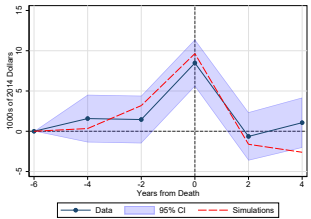






Validation: Wealth and OOP Around Death



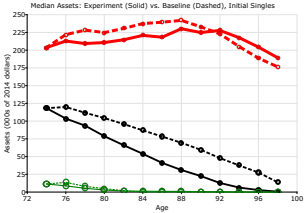


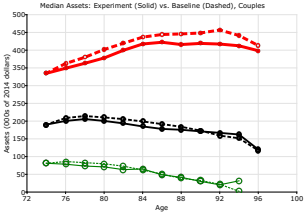
- Model fits wealth drops and medical spending around death

Understanding Savings Motives

- Experiments: re-solve and re-simulate model
  1. Set medical spending to zero
  2. Eliminate bequest motives
  3. No medical spending and no bequest motives
- Fix age-74 distribution of state variables, utility parameters

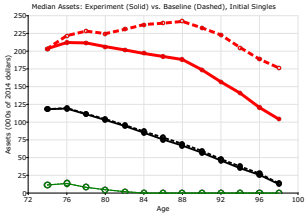
What is the Role of Medical Spending?

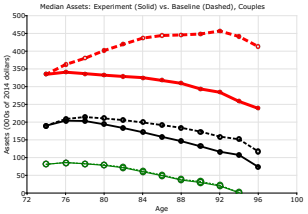




- Singles: medical spending most important for middle income
- Couples: less important

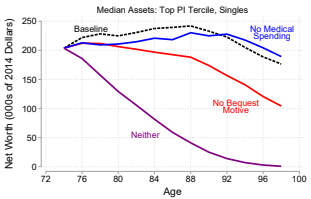
What is the Role of Bequest Motives?

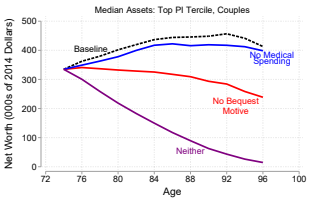




- Singles: bequest motives more important for high income
- Couples: important for middle income as well

How does Medical Spending Interact with Bequest Motives?





- Interactions are important
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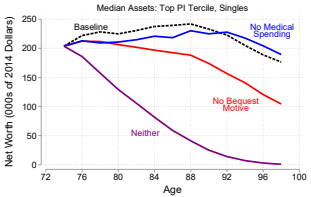

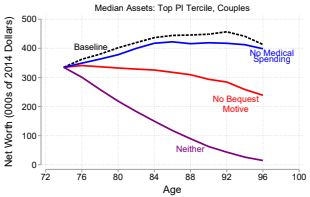

- Interactions are important
- Medical spending more important when no bequest motives
- But this paper shows that bequest motives are important

DFJM 2021

- We establish the following facts
  - Singles decumulate wealth as they age
  - Couples accumulate wealth as they age
  - Wealth drops significantly at the death of a spouse

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- We establish the following facts
  - Singles decumulate wealth as they age
  - Couples accumulate wealth as they age
  - Wealth drops significantly at the death of a spouse
- Estimate a rich model of savings and find that
  - Medical expenses, including end-of-life: important
  - Transfers to heirs: even more important
  - Interaction of bequest motives and medical expenses: crucial

Conclusions

- Modeling both singles and couples is important for many questions
- Consider modeling them