MEDICAID, MEDICAL SPENDING, AND THE SAVINGS OF THE ELDERLY

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Agenda: we want to understand

- What drives wealth accumulation patterns in old age?
  - Medical spending?
  - "Why do the Elderly Save? The Role of Medical Expenses", JPE 2010
- How do social insurance programs (such as Medicaid) affect:
  - savings?
  - medical spending?
  - "Medicaid Insurance in Old Age", in progress

Literature: late life savings

- Hurd (1989), Hurd, McFadden, Merrill (2001)
  - Poor people die younger than rich people
  - Accounting for this link is crucial for estimation of life cycle models
- Hubbard, Skinner, Zeldes (1995), Palumbo (1999)
  - Early dynamic programming models of savings
  - Medical spending important, but not central for understanding savings
  - Key issue: poor measures of medical spending
  - Missing medical spending before death, imputed nursing home spending

"Why do the Elderly Save? The Role of Medical Expenses"

- **What do we do?** Estimate a structural model of savings after retirement allowing for heterogeneity in:
  - income
  - medical expenses
  - life expectancy
- **What are we trying to understand?** The saving of the elderly:
  - Many elderly individuals keep lots of assets.
  - High income individuals deplete their assets more slowly than low income individuals.

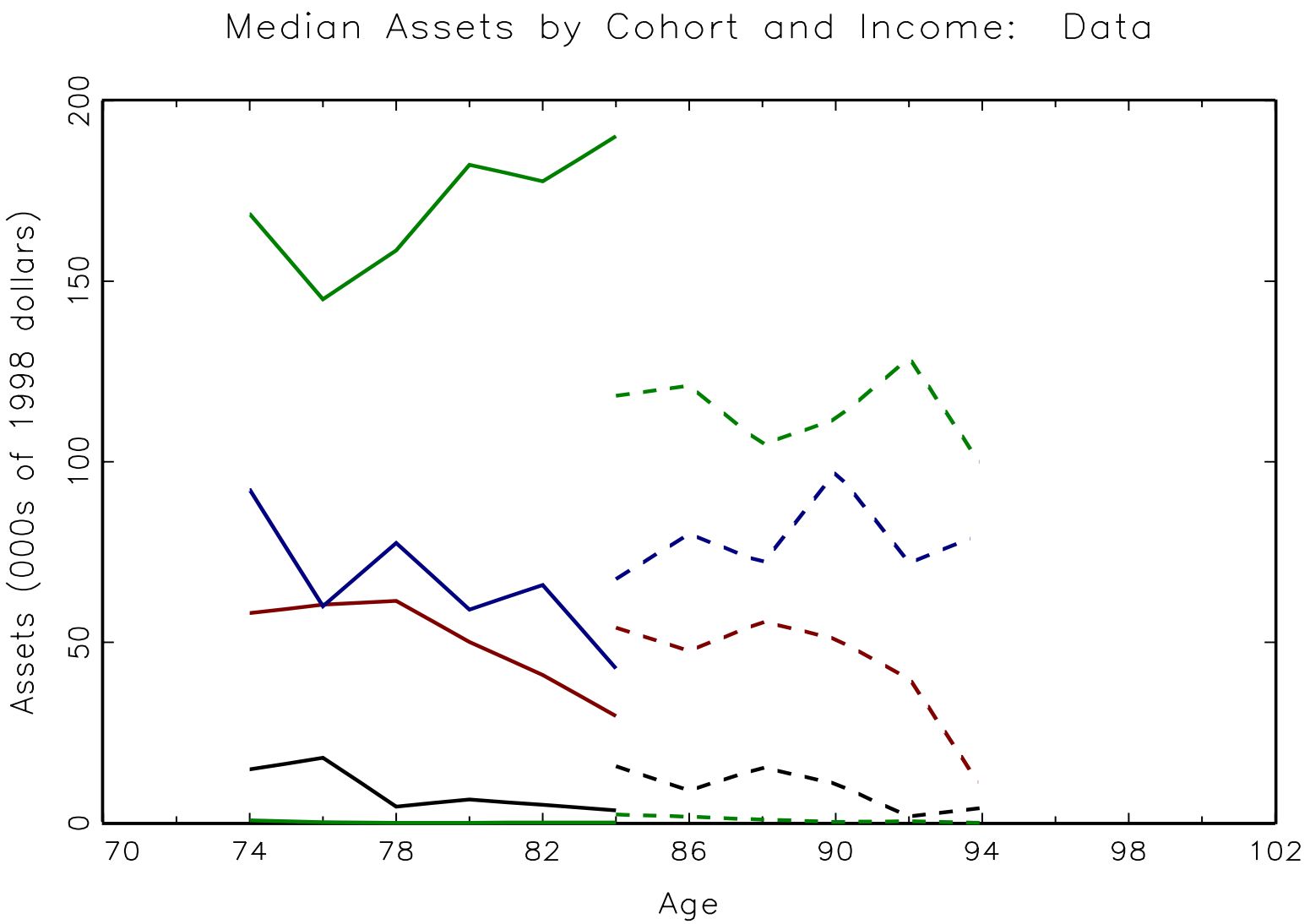


Figure 1: AHEAD data (unbalanced panel)

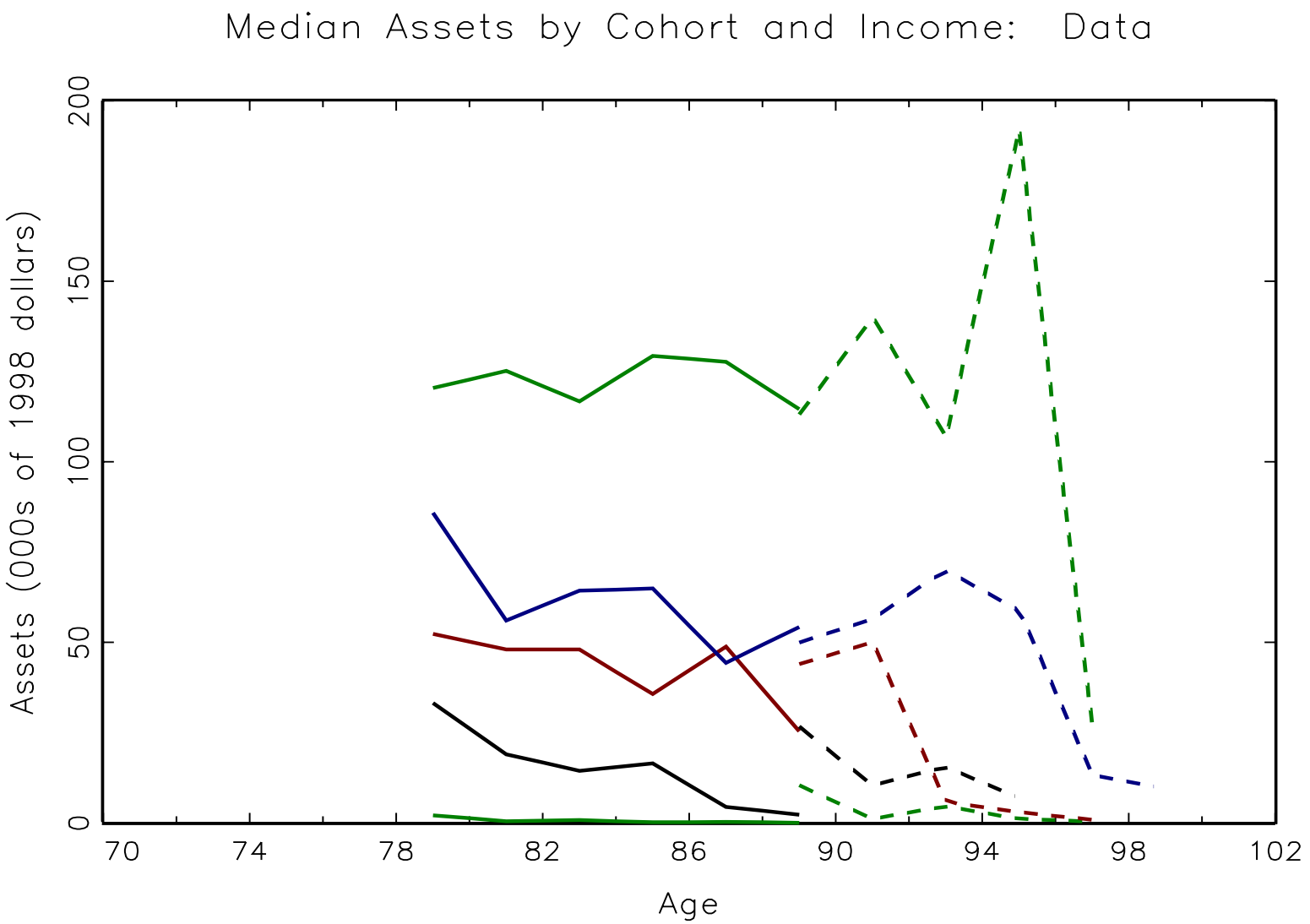


Figure 2: AHEAD data (unbalanced panel)

Contributions

- Estimate medical expenses using better data (from the AHEAD) and more flexible functional forms.
  - Medical expenses rise quickly with age and PI.
- Construct and estimate a rich model of saving.
  - Reasonable parameter estimates
  - Model fits the data extremely well.
- Find that medical expenses and social insurance are important in understanding the elderly's savings.
- Results are robust to:
  - including a bequest motive
  - making medical expenditures endogenous

Model

- **Singles only,** abstract from spousal survival.
- **Households** maximize total expected lifetime utility.
- **Flow utility** from consumption (CRRA). Utility can vary with health.
- **Rational expectations.** Beliefs about mortality rates, health cost distribution, etc., are estimated from the data.
- **Bequest motive.** Functional form follows De Nardi (2004): bequests are a luxury good.

Uncertainty

- **Health status:** age-, gender- and permanent-income-specific Markov chain.
- **Survival:** function of gender, age, health status, and permanent income.
- **Medical expenses:** has both deterministic and stochastic components, deterministic component a function of gender, age, health status, and permanent income.
- **Income:** deterministic function of gender, age, and permanent income.

Constraints

- Budget constraint:

$$a_{t+1} = a_t + y_n(ra_t + y_t, \tau) + b_t - m_t - c_t.$$

$y_n(.) =$ post-tax income; $y_t =$ "non-interest" income;
$\tau =$ tax parameters; $b_t =$ government transfers;
$m_t =$ medical expenses.

- Transfers support a consumption floor (Hubbard, Skinner, Zeldes (1995)):

$$b_t = \max\{0, c_{min} + m_t - [a_t + y_n(ra_t + y_t), \tau)]\}.$$

- Borrowing constraint:

$$a_{t+1} \geq 0.$$

Recursive formulation

$$V_t(x_t, g, I, h_t, \zeta_t) = \max_{c_t, x_{t+1}} \Bigg\{ [1 + \delta h_t] \frac{c_t^{1-\nu}}{1-\nu}$$

$$+ \ \beta s_{g,h,I,t} E_t \Big(V_{t+1}(x_{t+1}, g, I, h_{t+1}, \zeta_{t+1}) \Big)$$

$$+ \ \beta (1 - s_{g,h,I,t}) \theta \frac{(x_t - c_t + k)^{(1-\nu)}}{1-\nu} \Bigg\}$$

$x_t =$ cash-on-hand $= a_t + y_n(ra_t + y_t, \tau) + b_t - m_t$

$g =$ gender; $\quad I =$ permanent income

$h_t =$ health status ($0 \Rightarrow$ bad, $1 \Rightarrow$ good)

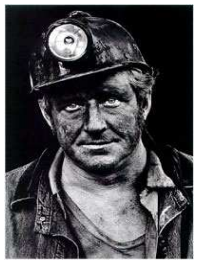
$\zeta_t =$ persistent health cost shock

Method of simulated moments

- Match median assets by permanent income quintile, cohort and age.
- 101 moment conditions.

Econometric problem: mortality bias

- Sample composition changes: High PI people and women live longer.



- In an unbalanced panel, this causes observed assets to **increase** with age
- Our solution: Allow mortality rates to depend on permanent income, health, and gender.

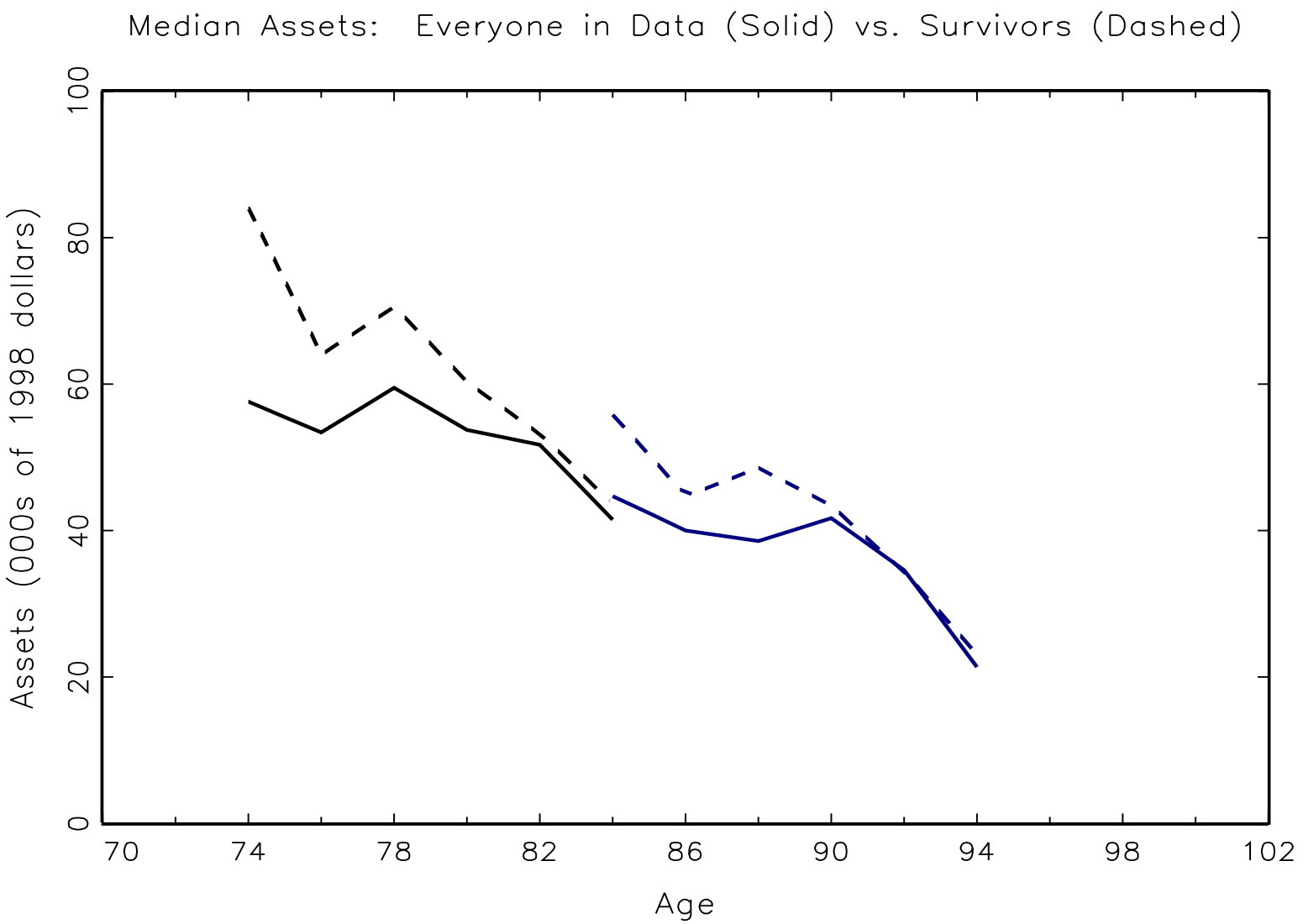


Figure 3: Median assets by birth cohort, AHEAD data

- Our solution: Allow mortality rates to depend on permanent income, health, and gender.

AHEAD data

- Household heads aged 70 or older in 1993/4
- Consider only the retired singles
- Follow-up interviews in 1995/6, 1998, 2000, 2002, 2004, 2006
- Asset data begins in 1996 (1994 asset data faulty), uses 2,688 individuals
- Use full, unbalanced panel

Results from first step estimation

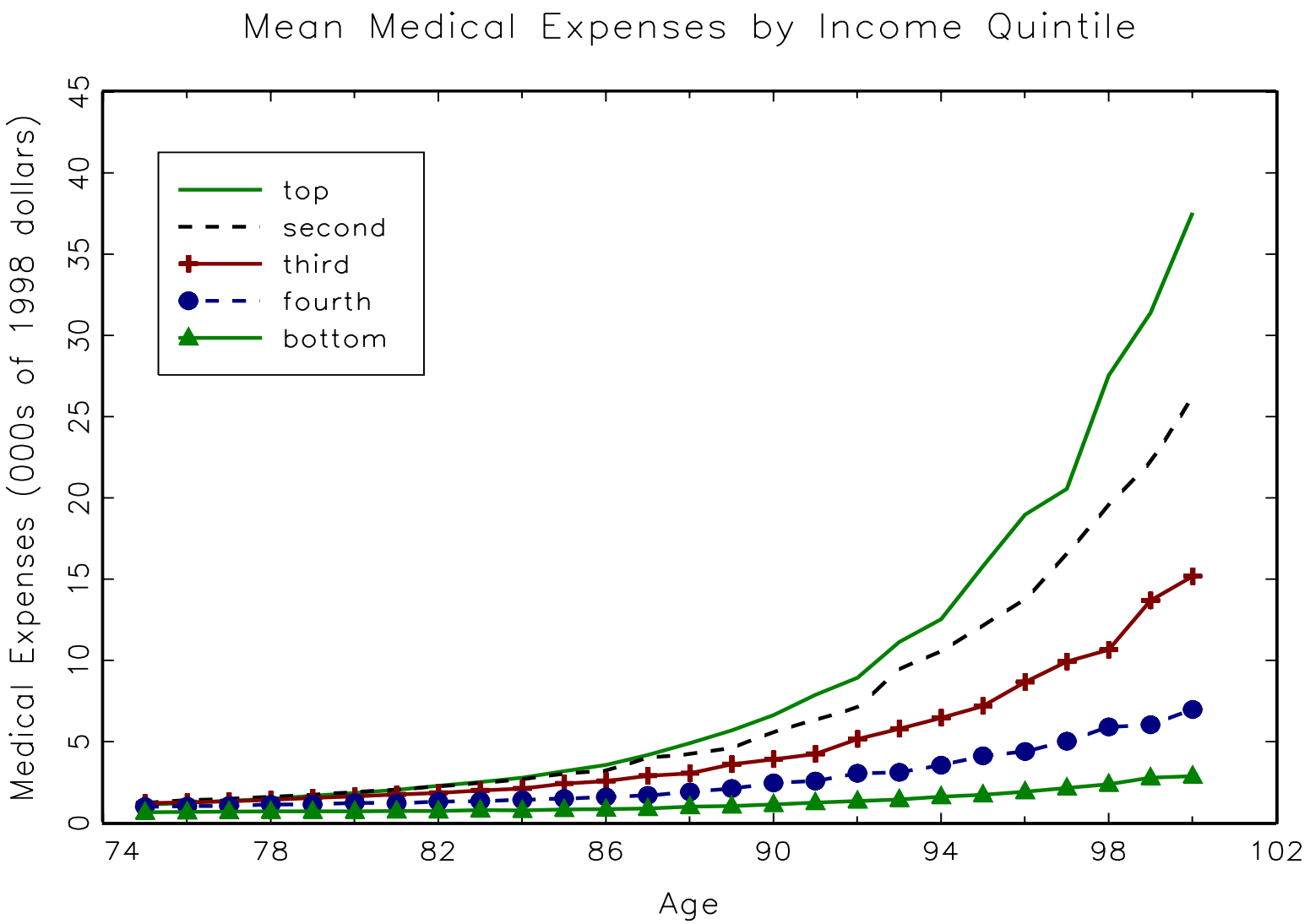


Figure 4: Average medical expenses, AHEAD data

Doesn’t Medicare cover these expenses?

- Medicare: provides health insurance to virtually everyone age 65+.
- But does not cover key services, such as nursing home stays.
- Nursing home expenses make up for a large chunk of out of pocket medical spending for those aged 90+.
- Medicaid assists 70% of nursing home residents.

Income Quintile	Healthy Male	Unhealthy Male	Healthy Female	Unhealthy Female	All
bottom	7.6	5.9	12.8	10.9	11.1
second	8.4	6.6	13.8	12.0	12.4
third	9.3	7.4	14.7	13.2	13.1
fourth	10.5	8.4	15.7	14.2	14.4
top	11.3	9.3	16.7	15.1	14.7
Men					9.7
Women					14.3
Healthy					14.4
Unhealthy					11.6

Table 1: Life expectancy at age 70

Results from second step estimation

Parameter	Benchmark (1)	Health (2)	Bequests (3)	All (4)
ν: coeff. relative risk aversion	3.81	3.75	3.84	3.66
	(0.50)	(0.47)	(0.55)	(0.55)
β: discount factor	0.97	0.97	0.97	0.97
	(0.04)	(0.05)	(0.05)	(0.04)
δ: pref. shifter, good health	0.0	-0.21	0.0	-0.36
	NA	(0.18)	NA	(0.14)
c_{min}: consumption floor	2,663	2,653	2,665	2,653
	(346)	(337)	(353)	(337)
θ: bequest intensity	0.0	0.0	2,360	2,419
	NA	NA	(8,122)	(1,886)
k: bequest curvature (in 000s)	NA	NA	273	215
	NA	NA	(446)	(150)
Overidentification statistic	82.3	80.6	81.5	77.5
P-value	87.4%	88.5%	85.4%	90.5%

Table 2: Estimated Structural Parameters

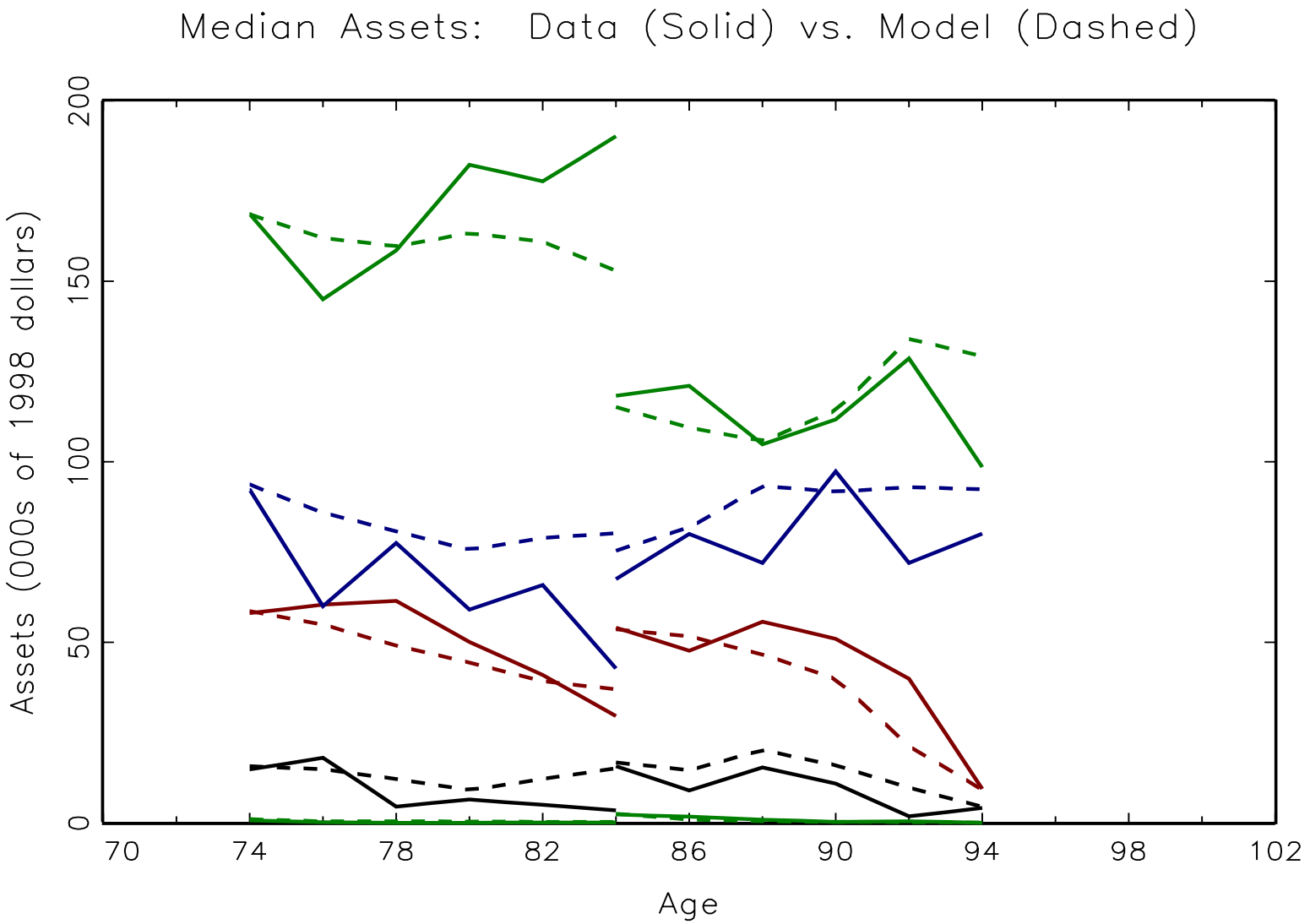


Figure 5: Median assets by cohort and PI quintile: data and benchmark model

Distribution of bequests: data and model

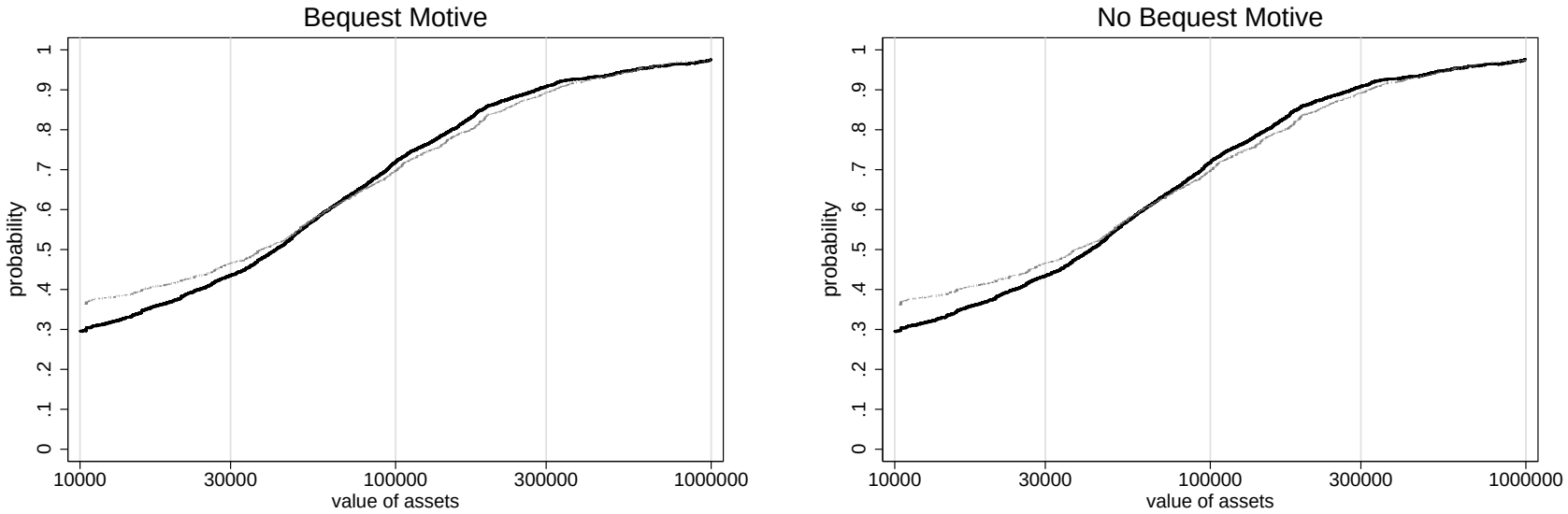


Figure 6: Cumulative distribution function of assets held 1 period before death: data and model.

Legend: solid line is model, lighter line is data.

Experiment

- Fix preference parameters at baseline estimates, vary other parameters.
- Eliminating out-of-pocket medical expenditures has a big effect on savings.

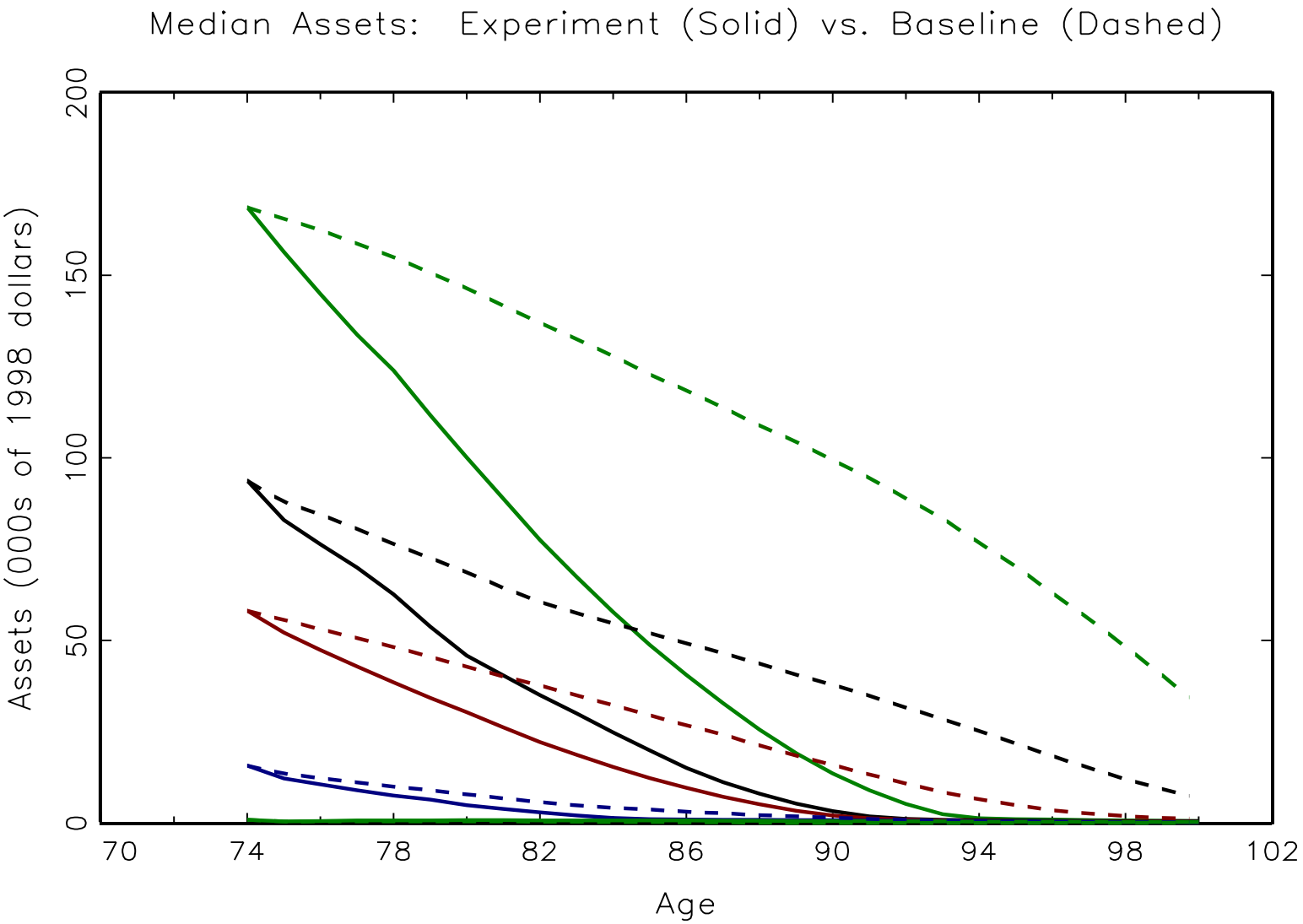


Figure 7: Benchmark and model with no medical expenditures

Key Question

- Are results robust to allowing for endogenous medical expenditure?

Endogenous medical expenditure model

- Retirees receive utility from
  - Medical goods: utility depends on age, health, shocks.
  - Consumption of other goods (as before).
- Flow utility:

$$u(c_t, m_t, h_t, \zeta_t, \xi_t, t) = \frac{1}{1-\nu} c_t^{1-\nu} + \mu(t, h_t, \zeta_t, \xi_t) \frac{1}{1-\omega} m_t^{1-\omega},$$

  where: m_t = medical expenditures; $\mu(\cdot)$ = medical "preference shifter".
- Medical expenditure does not affect health and/or survival.
  - Most studies find variations in medical expenditures have little effect on health outcomes.

Two key features of the insurance system

- Private and public health insurance (including Medicare)
  - pay a share of total medical expenditure $m_t(1 - q(t, h_t))$
- Social insurance programs (Medicaid and SSI)
  - Means-tested *utility* floor
  - For each medical needs shock, we compute how much expenditure is needed to achieve a baseline flow utility level.
  - This allows transfers to vary with medical needs but not with endogenous expenditure decisions.

Additional moment conditions

- In addition to matching asset profiles, we also match:
  - mean and 90^{th} percentile of medical spending, conditional on age and permanent income
  - 1^{st} and 2^{nd} autocorrelations of logged medical spending

Results for endogenous expenditure model

- Estimated parameters: $\nu = 2.15$; $\omega = 3.19$; $\beta = 0.99$.
- Model fits asset and medical expenditure data well.
- **Medical spending is still important:** Eliminating out-of-pocket medical expenditures still has a big effect on savings.

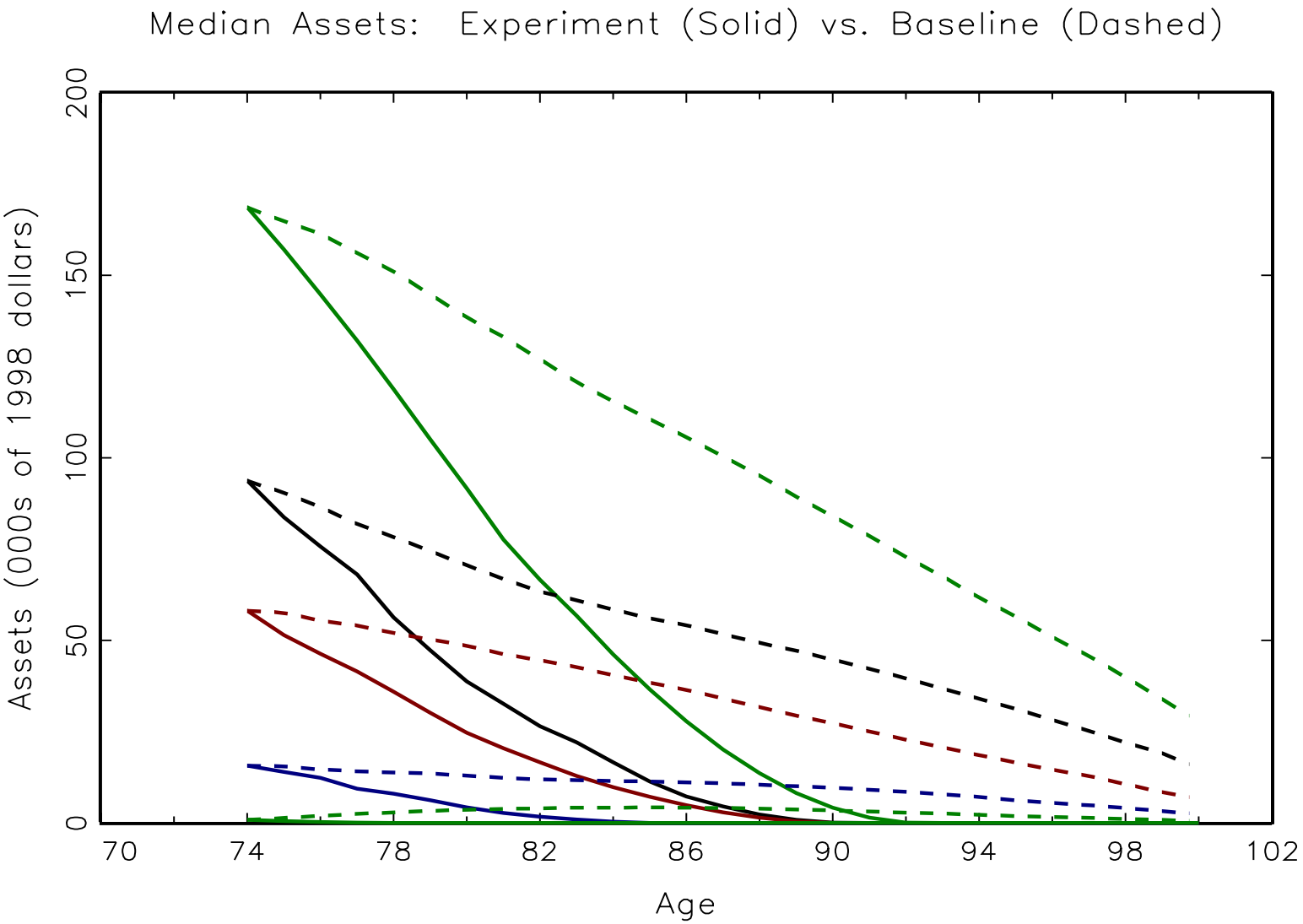


Figure 8: Benchmark and model with no medical expenditures

Conclusions from DFJ (2010)

- Model fits data well with reasonable preference parameter values.
- Key elements include:
  - heterogeneous lifespans
  - medical expenses that rise with age and PI
  - consumption floor
  - Interactions of these features important: DFJ (AER, 2009)

Where is the literature going?

- Assessing the robustness of results to
  - Alternative ways of modeling medical spending: Yogo (2009)
  - Alternative moment conditions: Lockwood (2012), Ameriks et al. (2012)
- Understanding the importance of medical spending in different contexts
  - Kopecky and Koreshkova (2011): general equilibrium
  - Brown and Finkelstein (2006): insurance markets
  - French and Jones (2012): retirement
  - DeNardi, French, Jones (2012): Medicaid

“Medicaid Insurance in Old Age,” in progress

- **Medicaid insurance: the questions**
  - How does Medicaid affect medical expenses and savings?
  - How redistributive is it?
  - What are its welfare benefits?
- Use previous model (with endogenous medical expenses) to study Medicaid

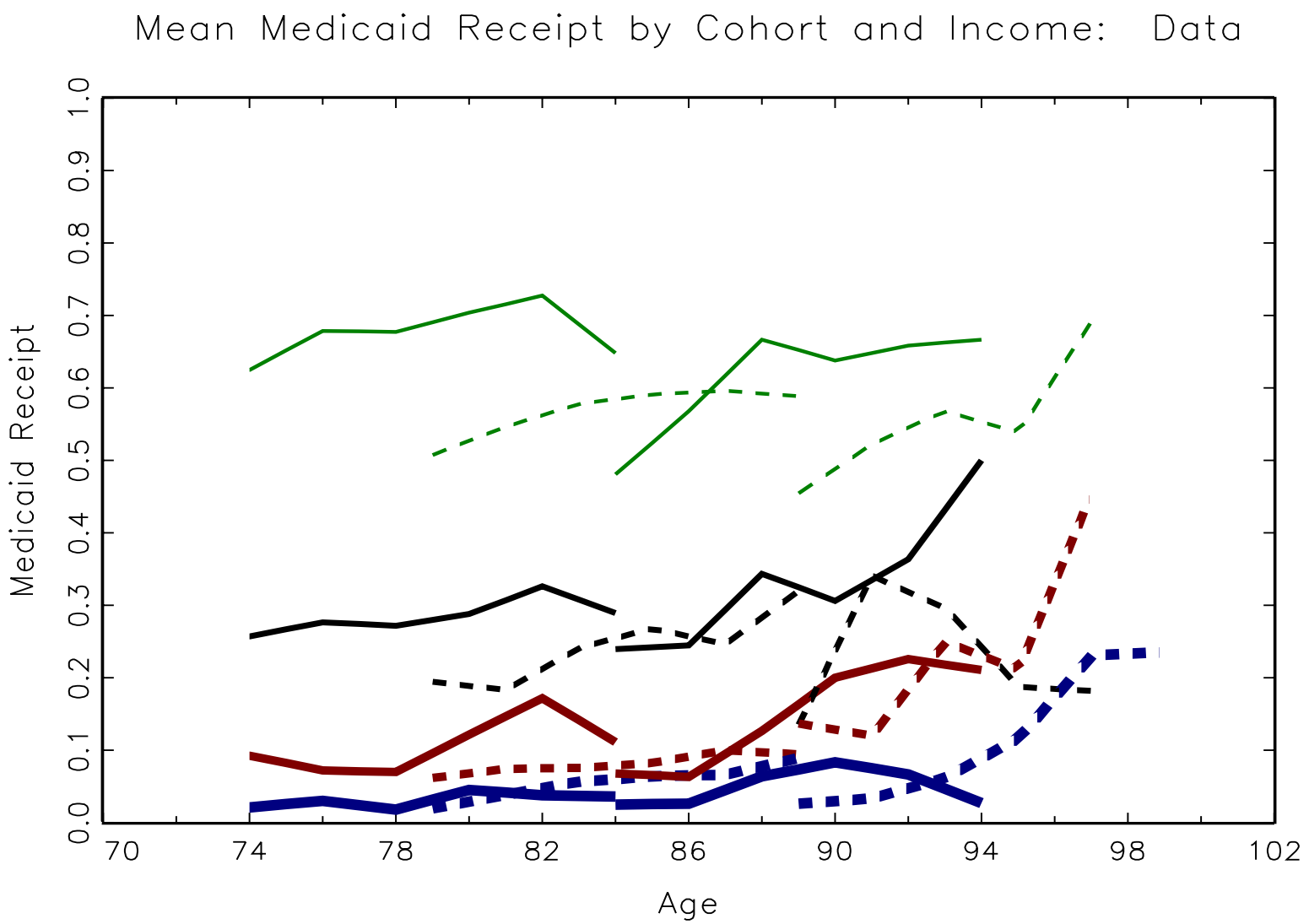
Literature on Medicaid/Medicare insurance

- Lots of work on health effects, hundreds of regressions.
- Little work on financial consequences on savings and medical expenses:
  - Medicaid affects savings/insurance choices of both low- and higher-income people: Scholz et al. 2006; Brown and Finkelstein 2008; De Nardi et al. 2010
  - Nursing homes and medical costs affect aggregate savings in an important way: Kopecky and Koreshkova 2011
- Most papers assume exogenous medical expenditure and/or little heterogeneity.

Important elements we consider

- Heterogeneity
- Two pathways to qualify for Medicaid
- Endogenous medical expenses
- Medicaid application decision
- A nursing home state

Medicaid recipiency



Fraction receiving Medicaid by age, birth cohort and income quintile.

Two Medicaid pathways?

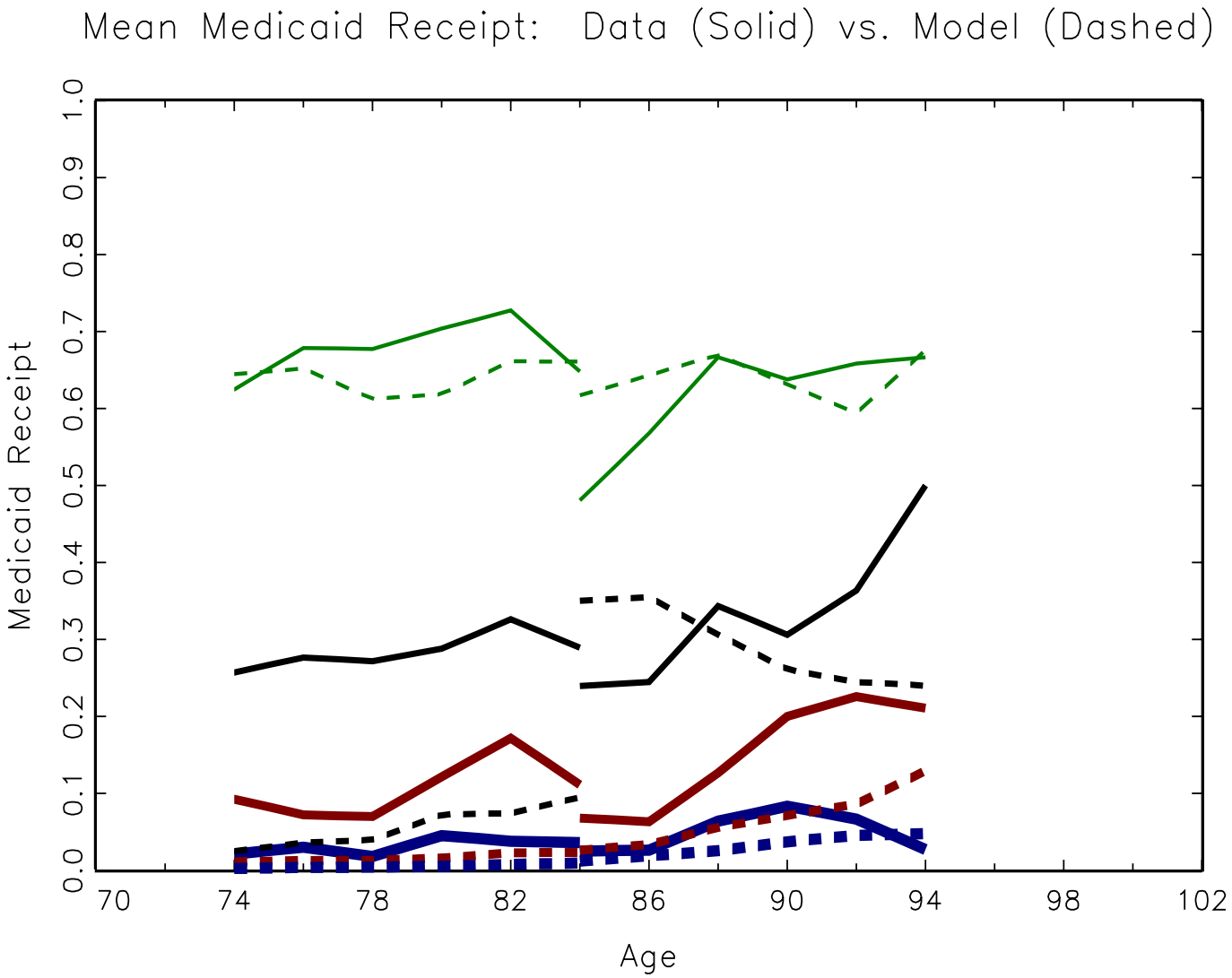
Two pathways to qualify for Medicaid

- Having low assets and income: *categorically needy*
- Being impoverished by large medical expenses, such as long nursing home stays: *medically needy*

$\Rightarrow$ Two different types of insurance by permanent income.

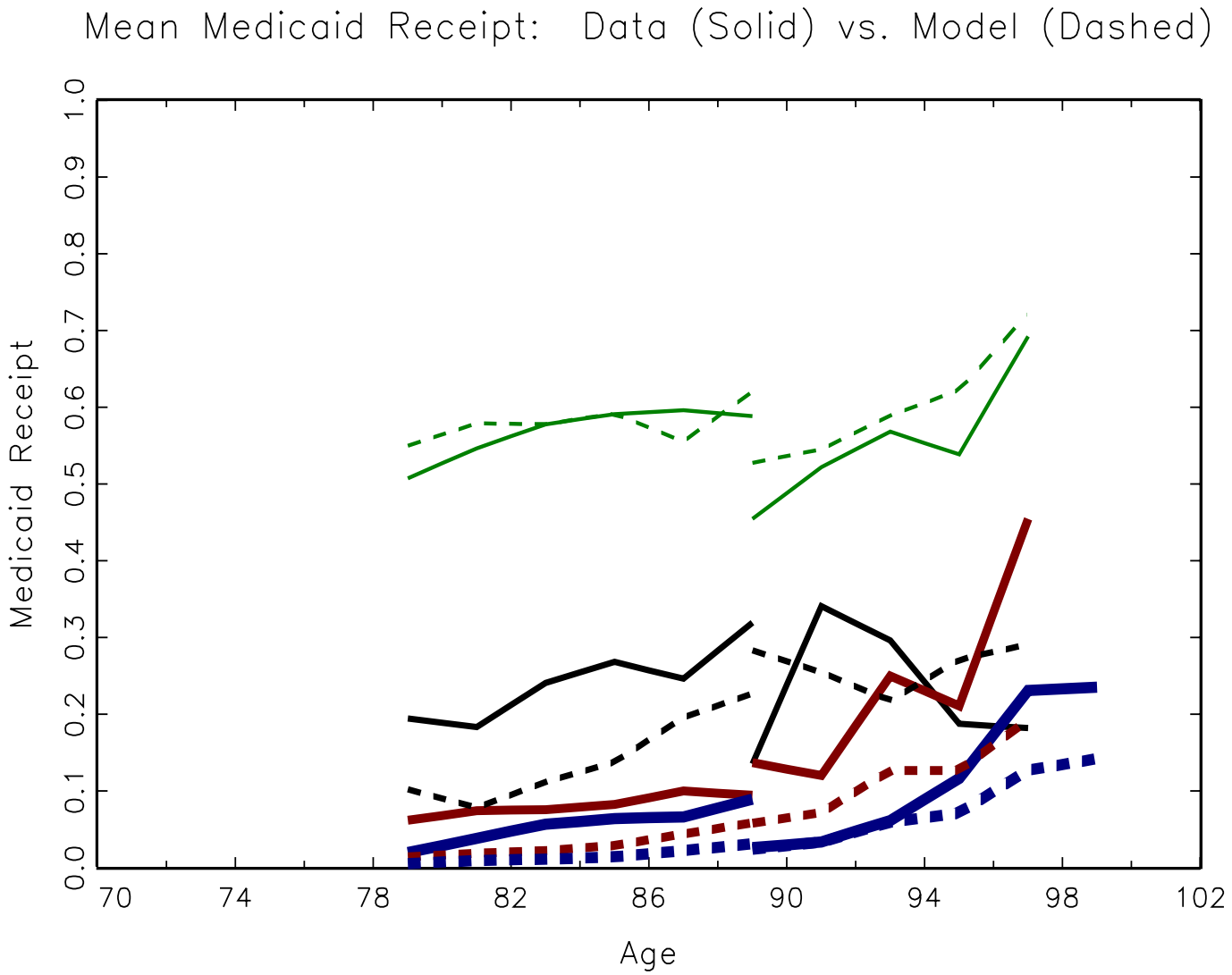
$\Rightarrow$ Implications for savings, redistribution, and welfare.

Medicaid recipiency: Initial results



Average Medicaid recipiency by cohort and PI group: data and model.

Medicaid recipiency: Initial Results



Average Medicaid recipiency by cohort and PI group: data and model.

Conclusions and future plans

- What we have learned to date: Carefully modeling Medicaid is important to understand savings and medical expenses
- What we are working on
  - Estimating model
  - Evaluating Medicaid redistribution
  - Computing the costs and benefits of Medicaid for people of different genders, permanent income, wealth...
  - Performing policy experiments evaluating the costs and benefits of the different Medicaid pathways.

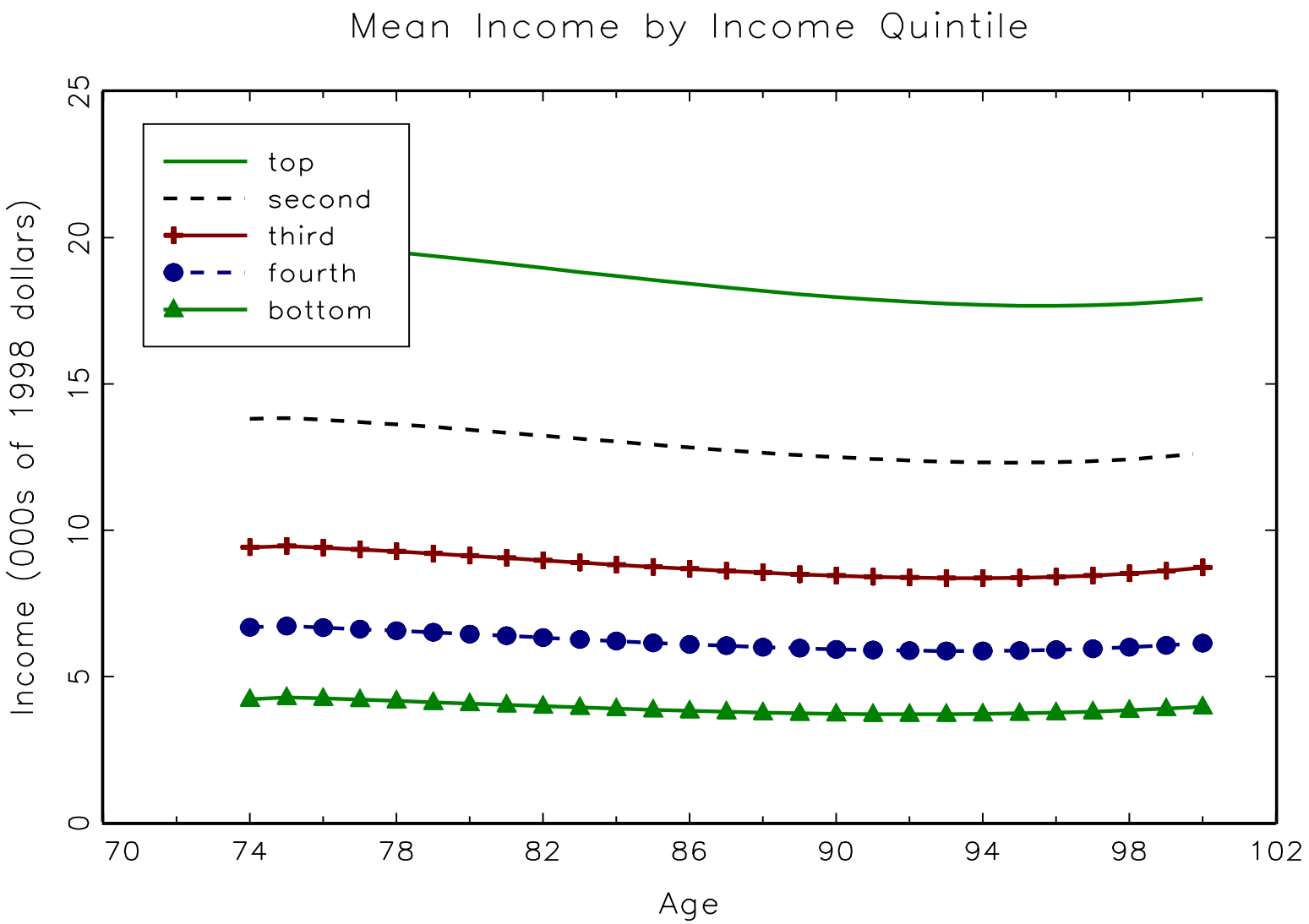


Figure 9: Average income, AHEAD data

Constraints in detail

$$x_{t+1} = \max\{x_t - c_t + y\Big(r(x_t - c_t) + y_{t+1}, \tau\Big) - m_{t+1}, c_{\min}\},$$

$$y_{t+1} = y(g, h, I, t+1),$$

$$x_t \geq c_{min},$$

$$c_t \leq x_t,$$

$$\ln(m_{t+1}) = m(g, h_{t+1}, t+1, I) + \sigma(g, h_{t+1}, I, t+1)\psi_{t+1},$$

$$\psi_{t+1} = \zeta_{t+1} + \xi_{t+1}.$$

Income Quintile	Healthy Male	Unhealthy Male	Healthy Female	Unhealthy Female	All
			Percentage living to age 85		
bottom	10.1	6.9	35.7	28.6	28.8
second	13.7	9.3	41.1	34.1	35.3
third	17.8	12.3	46.4	40.2	38.9
fourth	23.3	16.6	51.7	45.5	45.2
top	27.8	21.2	57.1	49.9	46.5
			Percentage living to age 95		
bottom	0.6	0.4	6.3	5.1	5.0
second	0.9	0.6	7.9	6.7	6.7
third	1.3	0.9	9.6	8.4	7.8
fourth	2.0	1.4	11.6	10.2	9.5
top	2.6	2.0	13.8	11.8	10.0

Method of simulated moments: details

- Consider household i of birth cohort c in calendar year t, belonging to the qth permanent income quintile.
- Let a_{qct} denote the model-predicted median asset level.
- Moment condition for GMM criterion function:

$$E\Big(I\{a_{it} \leq a_{qct}\} - 1/2 \mid q, c, t, \text{hh } i \text{ alive at } t\Big) = 0.$$

- Convert into an unconditional moment:

$$E\Bigg(\Big[I\{a_{it} \leq a_{qct}\} - 1/2\Big] \times I\{q_i = q\} \times I\{c_i = c\}$$
$$\times I\{\text{hh } i \text{ alive at } t\} \;\Big|\; t\Bigg) = 0.$$

Econometric problem 1: cohort effects

- Older HHs are born in earlier years and have lower lifetime incomes $\Rightarrow$ understate asset growth and saving.
- Our solution: Cohort- and permanent income-specific moments; cohort-specific initial conditions.

Endogenous medex: recursive formulation

$$V(t, a_t, g, h_t, I, \zeta_t, \xi_t) = \max_{c_t, m_t, a_{t+1}} \left\{ \frac{c_t^{1-\nu}}{1-\nu} + \mu(t, h_t, \zeta_t, \xi_t) \frac{m_t^{1-\omega}}{1-\omega} \right.$$

$$\left. + \ \beta s_{g,h,I,t} E_t \Big(V(t+1, a_{t+1}, g, h_{t+1}, I, \zeta_{t+1}, \xi_{t+1}) \Big) \right\},$$

subject to:

$$a_{t+1} = a_t + y_n(r a_t + y_t) + b(t, a_t, g, h_t, I, \zeta_t, \xi_t)$$
$$- c_t - m_t q(t, h_t),$$

and other constraints.

Medical expenditures: data and model

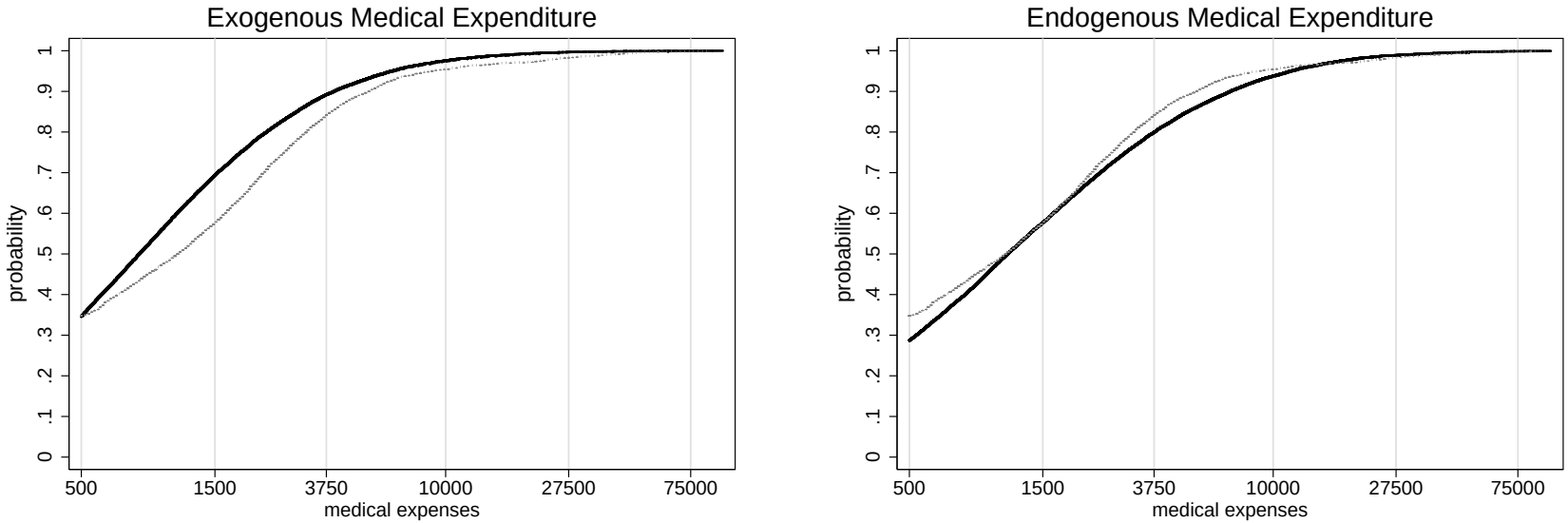


Figure 10: Cumulative distribution function of medical expenses: data and the exogenous (left panel) and endogenous (right panel) medical expenditure models.
Legend: solid line is model, lighter line is data.

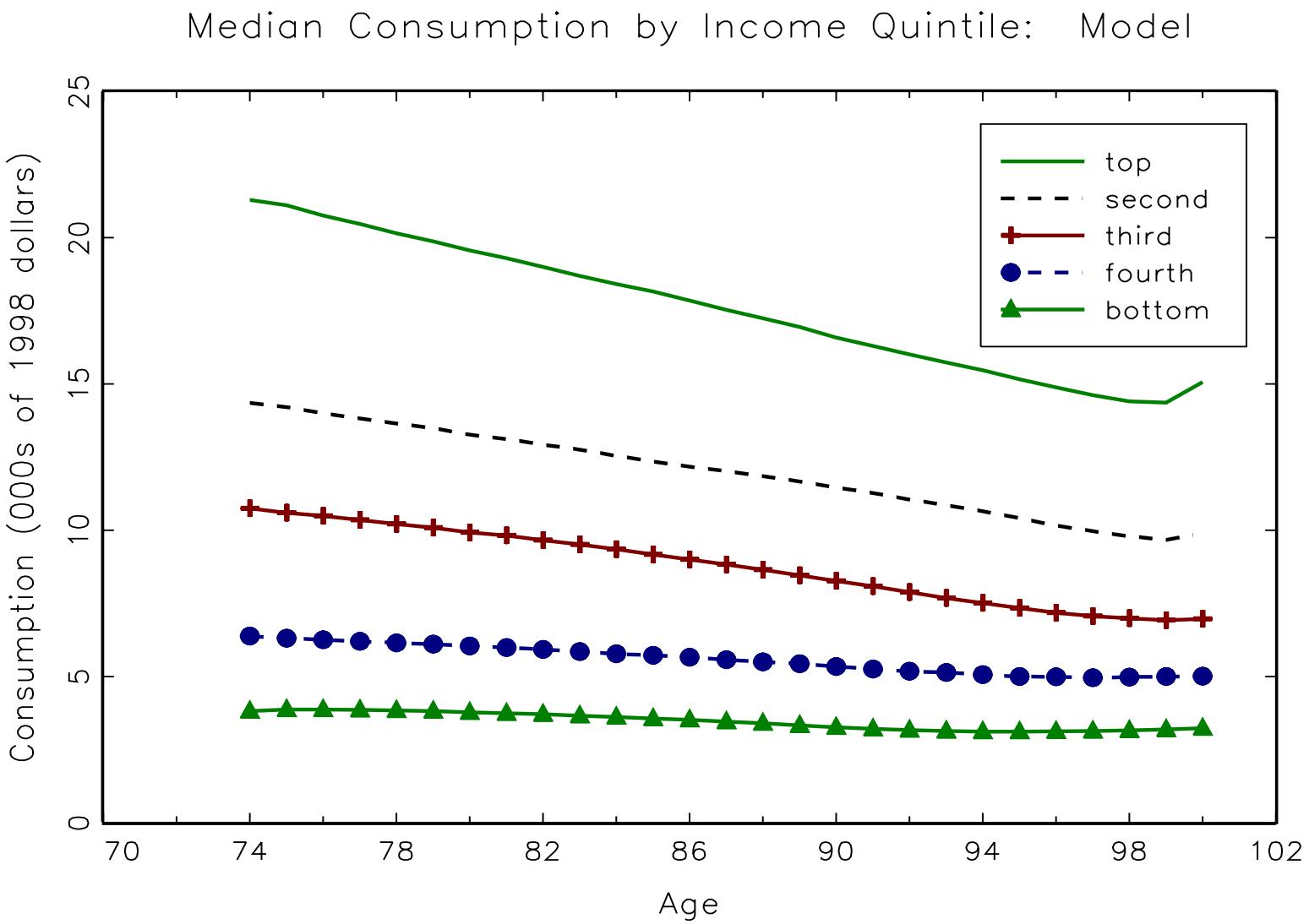


Figure 11: Median consumption by cohort and PI quintile: benchmark model