Health and Wealth in a Lifecycle Model

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This Paper

- We formulate a lifecycle model, solved household-by-household, where health investments (including time-use decisions) affect utility and longevity.
  - By modeling investments in health, we endogenize life-tables (longevity).
  - We model the process of health production starting at the beginning of working life (following Grossman).
- We allow consumption and health to be either complements or substitutes in preferences.
- The framework allows us to analyze the effects of policy changes on health investments and life tables.

Objectives

- To better understand the joint distribution of health and wealth across households.
  - A considerable amount of attention has been given to the "health-wealth gradient." With an explicit model, we can explore the interplay of these fundamental aspects of household wellbeing.
- To better understand differences in longevity across households and the degree to which policy and resources affect these differences.
- Health-consumption complementarities, if they are strong, can sharply affect the amount of wealth households optimally need accumulate in old age.

Data

- Our data are from the Health and Retirement Study.
  - We use data from 1992 through 2008.
  - This includes the AHEAD (born before 1924),
  - CODA (1924-30),
  - Original HRS (1931-41),
  - War Baby (1942-47), and
  - Early Boomer (1948-53) cohorts.

Facts

- Self-reported health declines with age.
    - Health depreciates.
- High lifetime income households exercise more than others (and presumably invest more in health in other ways).
- There is a strong positive correlation between health and wealth.
- There is a strong negative correlation between lifetime income and mortality for men and women.

Our Strategy (from 30,000 feet)

- We write down a parsimonious but computationally challenging economic model for married and single households in the HRS.
  - Households choose consumption, while individuals choose their leisure, time investments in health, and monetary investments in health annually over their lifetimes.
  - Earnings are uncertain and individuals can be hit with adverse annual health shocks.
- We specify the complete economic environment.
  - The structure of preferences.
  - A health production function.
  - The tax and transfer system; the arrival and departure of children; interest rates; and expectations.
- We calibrate the model, choosing 19 parameters of the economic environment to reproduce 19 moments of the data (including the probability of dying across age groups, annual medical expenses across age groups, and net worth for household types at a specific age).

Staying at 30,000 feet...

- What makes a good model versus a not-so-good model?
  - We try to match features of the data, beyond those that we calibrate to. Distributions are particularly challenging. We have 19 parameters, histories of earnings and other input data, and the structure of the economic model.
  - We then match model predictions to data from 11,172 households.
- If the model does a good job matching patterns in the cross-section, we can further use it to look at changes over time and more subtle features of the data.
- We can also alter aspects of the institutional environment (such as our styled version of Medicare) to gain insights into policy.
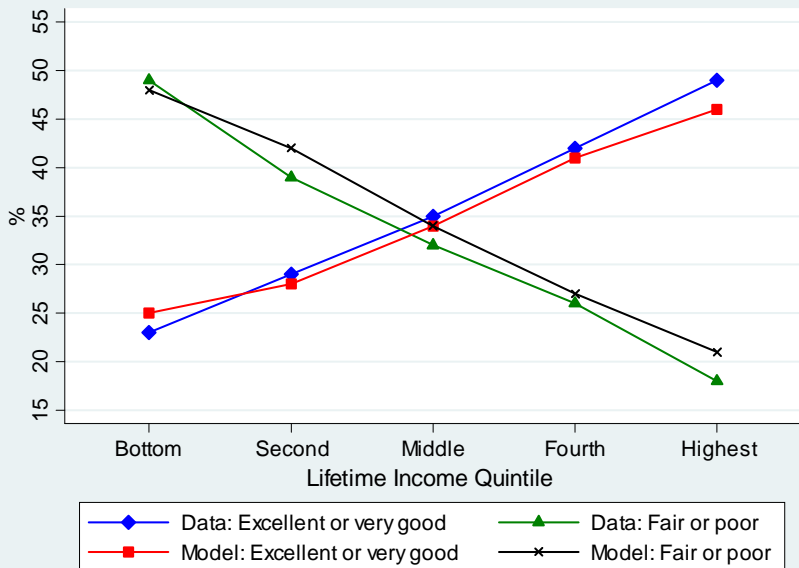
Figure: Self-Reported Health Status in 2008: Model vs Data

Consumption and Health: Complementarity in Preferences is Important

TABLE 3

MEAN CONSUMPTION BY HEALTH STATUS AND LIFETIME EARNINGS

| Earnings | Bottom Quintile | | Second Quintile | | Middle Quintile | | Fourth Quintile | | Highest Quintile | |
Health	Model	Data	Model	Data	Model	Data	Model	Data	Model	Data
Excellent	0.95	0.93	1.04	1.02	1.16	1.15	1.24	1.29	1.54	1.68
Very Good	0.79	0.75	0.93	0.91	1.12	1.20	1.20	1.23	1.44	1.55
Good	0.71	0.69	0.91	0.88	1.01	1.00	1.15	1.13	1.36	1.38
Fair	0.65	0.64	0.84	0.73	0.92	0.87	1.05	1.04	1.31	1.29
Poor	0.60	0.61	0.76	0.71	0.83	0.79	0.96	0.92	1.28	1.24

We Match Mortality Patterns (and also for Younger Households!)

TABLE 5
TEN-YEAR SURVIVAL PROBABILITIES, MODEL vs DATA

Lifetime Income	Age60 Data	Age60 Model	Age 75 Data	Age 75 Model
Bottom Quintile	0.77	0.76	0.54	0.52
Second Quintile	0.83	0.81	0.54	0.53
Middle Quintile	0.86	0.84	0.52	0.55
Fourth Quintile	0.90	0.87	0.62	0.60
Highest Quintile	0.92	0.89	0.64	0.62

Complementarity is Very Important to Match the Evolution of Wealth
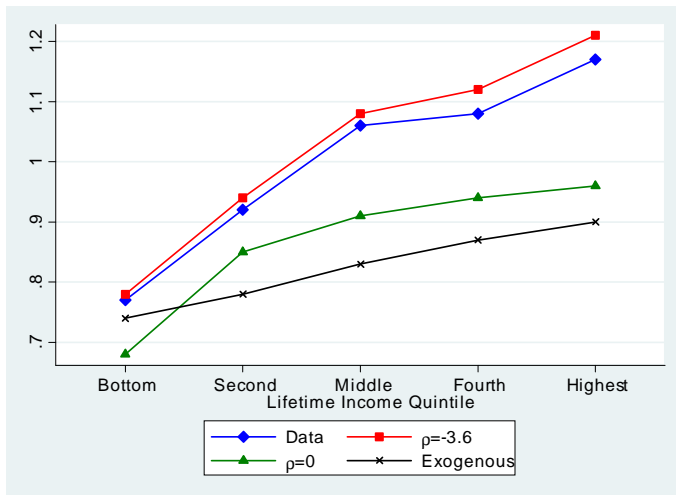
Median Ratio of Net Worth in 2008 to Net Worth in 1998

Teasing Out "Insurance," "Investment," and "Income" Effects on 10-Year Survival

TABLE 9

SHORT- AND LONG-RUN EFFECTS ON MORTALITY OF ELIMINATING

OUR STYLIZED MEDICARE PROGRAM

Lifetime Income	Age 60			Age 75		
	Baseline	No Med	LR	Baseline	No Med	LR
Bottom Quintile	0.76	0.72	0.68	0.52	0.47	0.42
Second Quintile	0.81	0.74	0.71	0.53	0.48	0.44
Middle Quintile	0.84	0.79	0.77	0.55	0.51	0.48
Fourth Quintile	0.87	0.82	0.81	0.60	0.53	0.52
Highest Quintile	0.89	0.85	0.86	0.62	0.57	0.58

We Illustrate the Tradeoff People May Make Between Health and Consumption

TABLE 11

LONG-RUN EFFECTS OF ELIMINATING MEDICARE ON
NET WORTH, ENDOGENOUS vs. EXOGENOUS

| | Median Net Worth ($) in 1998 | | | |
| | Endogenous Health | | Exogenous Health | |
Lifetime Income	Model	No Medicare-LR	Model	No Medicare-LR
Bottom Quintile	31,456	52,064	32,485	123,697
Second Quintile	53,483	73,452	48,232	164,307
Middle Quintile	93,708	117,405	89,109	232,012
Fourth Quintile	163,695	185,232	153,075	323,433
Highest Quintile	353,129	364,988	343,607	594,457

A Key Point of Our Work

- With endogenous life expectancies, eliminating the stylized "Medicare" program has much smaller effects on wealth accumulation.
    - Households can choose not to spend on medical care later in life when hit with a bad shock
    - This option is not available in models where medical expenses are exogenous

Conclusions

- The model accounts for a large fraction of the variation in medical expenses and assets at the household level
  - We also do well matching 2008 data, though we calibrate primarily to 1998 moments.
- Consumption decisions and asset accumulation are interrelated. Complementarity between consumption and health is important in understanding wealth differences
- Policy can have meaningful long-term impact on life tables
- When consumers have (some) control over when to die, the poor do not tend to engage in as much precautionary savings when the transfer program (our stylized version of Medicare) is eliminated.