Old, Sick Alone, and Poor: A Welfare Analysis of Old-Age Social Insurance Programs

R. Anton Braun

Federal Reserve Bank of Atlanta

Karen A. Kopecky

Federal Reserve Bank of Atlanta

Tatyana Koreshkova

Concordia University and CIREQ

CIGS Conference on Macroeconomic Theory and Policy

June 2013

Overview

In 1972, Friedman argued:

- There is no need for a universal social security (SS) program in the US.
- Means-tested social insurance (SI) programs are sufficient in insuring against old-age risks.

Feldstein (1987) showed:

- SS can be better than means-tested SI when individuals are heterogenous because means-tested SI has large negative incentive effects on the savings behavior of the poor.

Overview

- Objective: Assess the welfare and incentive effects of SS and means-tested SI programs in the US.

- In particular, we ask

  - Is there a role for any SI for retirees?

  - If yes, what combination of programs is preferred?

Overview

We answer these questions using a model in which retirees are subject to

- health
- medical expense and
- spousal death risk

in addition to

- lifetime earnings and
- survival risk.

Our Answers

Is there a role for any SI for retirees?

- Yes, individuals prefer an economy with SI programs of the size currently offered in the US to one without.
- Medical expenses and their associated risks play an important role in this result.

Our Answers

What combination of programs is preferred?

- Despite that
  - Means-tested SI has the negative incentive effects on poorer households emphasized by Feldstein
  - and SS dampens these effects

  We find results consistent with Friedman's claim:

  All newborn prefer means-tested SI of the scale in the US to either SS alone or both programs.

- Why? Insurance benefits of means-tested SI are large even for rich.

Motivation: Risks

We model old-age health, medical expense, and spousal death risk because:

- **Fact:** Poor health, hospital stays, nursing home stays and widowhood are all associated with

  higher probabilities and persistence of impoverishment.

- We measure impoverishment as movement into the 1st quintile of the wealth distribution.

Motivation: Risks

- Nursing home stays are associated with higher probabilities and persistence of impoverishment.

Percentage of Retirees Moving from Each Quintile to Quintile 1

	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
Quintile	**None**	**NH Stay**	**None**	**NH Stay**	**None**	**NH Stay**
1	75.7	87.9	74.6	86.0	69.3	75.6
2	18.0	25.6	17.4	23.7	20.2	31.8
3	3.8	9.6	4.5	11.8	7.1	14.3
4	1.0	5.3	1.8	5.0	3.5	8.2
5	0.5	3.3	0.5	3.9	1.5	4.6

Source: Authors' calculations using 1992–2010 HRS data on retirees 65+.

Motivation: Risks

We model old-age health, medical expense, and spousal death risk because:

- **Fact:** Poor health, hospital stays, nursing home stays and widowhood are all associated with

  higher probabilities and persistence of impoverishment.

- We measure impoverishment as movement into the 1st quintile of the wealth distribution.

- And SS and means-tested SI partially insure individuals against these risks.

Model: Key Features

- Full-lifecycle, OLG, GE model
- Households
  - become active at age 21 (period = 2 years)
  - While working:
    - are married couples
    - differ by education status of members
    - face uncertainty over male and female's labor productivity
    - choose consumption, savings, female labor supply

Model: Key Features

- Households
  - retire exogenously at age 65
  - While retired:
    - married, widows, widowers
    - have uncertain
      - death (foreseen 1 period in advance)
      - health status
      - medical expenses
    - choose consumption, savings
    - die with certainty at age 100

Model: Key Features

- Survival and health status
  - are exogenous shocks
  - determined by age, sex, marital status, and previous health status
- Medical expenses
  - are exogenous expense shocks
  - do not affect household utility
  - depend on age, sex, marital status, current health status and death
  - include a small prob. but large expense “nursing home” shock

Model: Key Features

- Social insurance (SI) includes
  - progressive PAYG social security program (includes spousal and survivor benefits)
  - means-tested social insurance program (Medicaid/other old-age SI)
  - Medicare (all expenses are net of Medicare, include Medicare earnings tax)
- SI financed (along with government expenditures) by
  - progressive income taxes
  - payroll tax
  - proportional capital income tax
- No private insurance and no borrowing

Retired Household's Problem

Retired household solves

$$V(j, a, \bar{\mathbf{e}}, \mathbf{h}, \varepsilon_M, d, d') = \max_{c, a'} \Big\{ U^R(c, d)$$

$$+\beta E\Big[\sum_{d''=0}^{2} \pi_j(d''|\mathbf{h}', d') V(j+1, a', \bar{\mathbf{e}}, \mathbf{h}', \varepsilon_M', d', d'')|\mathbf{h}, \varepsilon_M \Big] \Big\}$$

subject to ...

age	j
assets	a
average earnings	$\bar{\mathbf{e}} \equiv \{\bar{e}^m, \bar{e}^f\}$
health status	$\mathbf{h} \equiv \{h^m, h^f\}$
household medical expense shocks	$\varepsilon_M \equiv \{\varepsilon_{M,1}, \varepsilon_{M,2}\}$
marital status	$d \in \{0, 1, 2\}$

Retired Household's Problem

Retired household solves

$$V(j, a, \bar{\mathbf{e}}, \mathbf{h}, \varepsilon_M, d, d') = \max_{c, a'} \Big\{ U^R(c, d)$$

$$+\beta E\Big[\sum_{d''=0}^{2} \pi_j(d''|\mathbf{h}', d') V(j+1, a', \bar{\mathbf{e}}, \mathbf{h}', \varepsilon'_M, d', d'')|\mathbf{h}, \varepsilon_M \Big] \Big\}$$

subject to

$$c \geqslant 0, \quad a' \geqslant 0,$$
$$c + M + a' = a + y^R - T_y^R + Tr^R.$$

$M \equiv \Phi(j, \mathbf{h}, \varepsilon_M, d, d')$ medical expenses

$y^R \equiv S(\bar{\mathbf{e}}, d) + (1 - \tau_c) r a$ income

$T_y^R \equiv \tau_y^R \left((1 - \tau_c) a r, S(\bar{\mathbf{e}}, d), d, M \right)$ income taxes

Tr^R means-tested SI transfer

BKK (2013)

Retired Household's Problem

Means-tested SI transfers to retirees are given by

$$Tr^R \equiv \begin{cases} \max\left\{\underline{y}^d + \varphi M - I^R, \underline{c}^d + M - I^R, 0\right\}, & \text{if } \underline{y}^d > I^R - M, \\ 0, & \text{otherwise,} \end{cases}$$

where $I^R \equiv a + y^R - T_y^R$ is cash-in-hand.

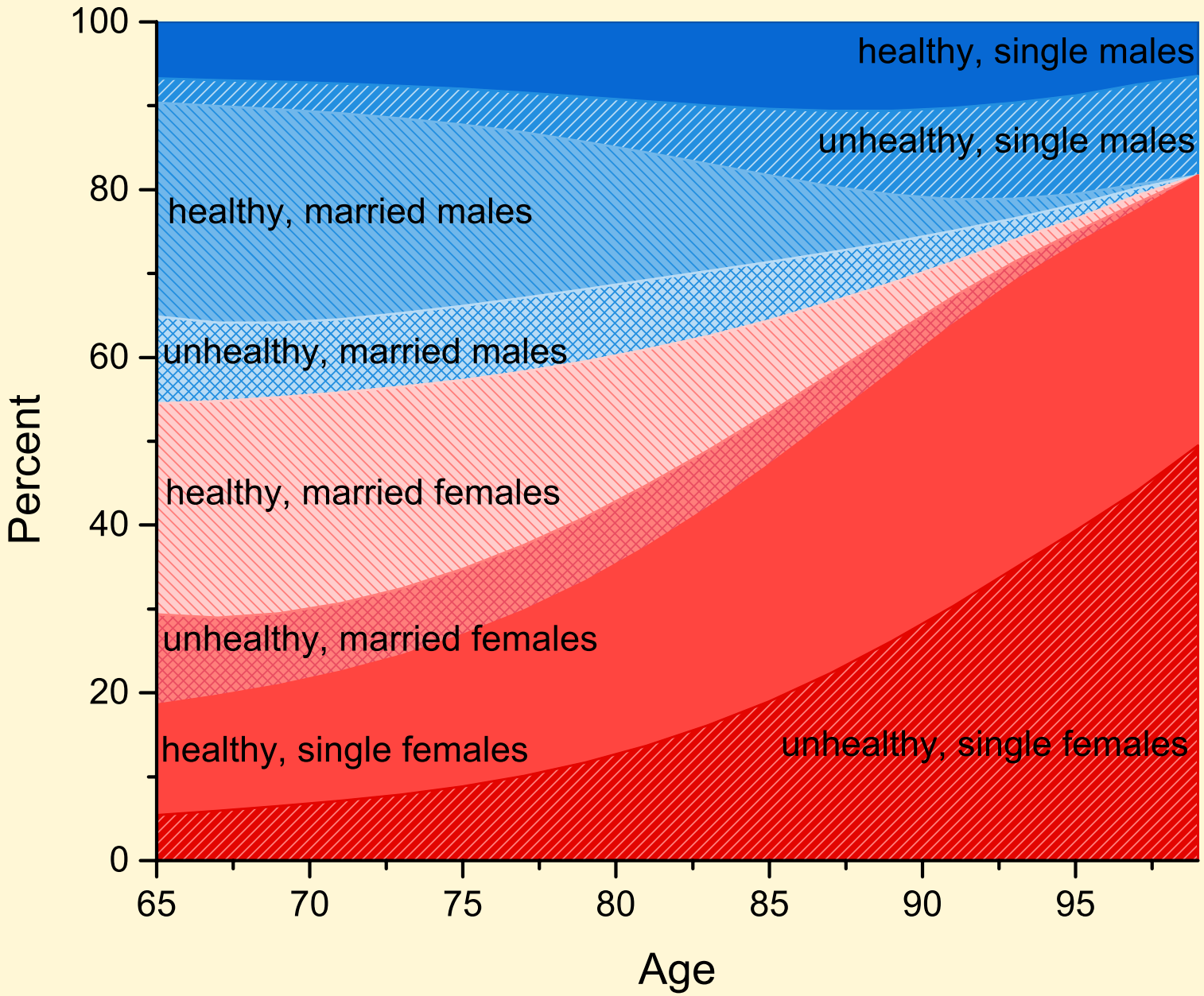
- Retirees on Medicaid must pay a Medicaid copayment of $(1-\varphi)M$.
- We cap the copayment such that the minimum level of consumption is $\underline{c}^d$.

Competitive Equilibrium

We consider a steady-state competitive equilibrium of a small open economy.

Calibration: A few highlights

- We calibrate the model to reproduce this demographic structure:



BKK (2013)

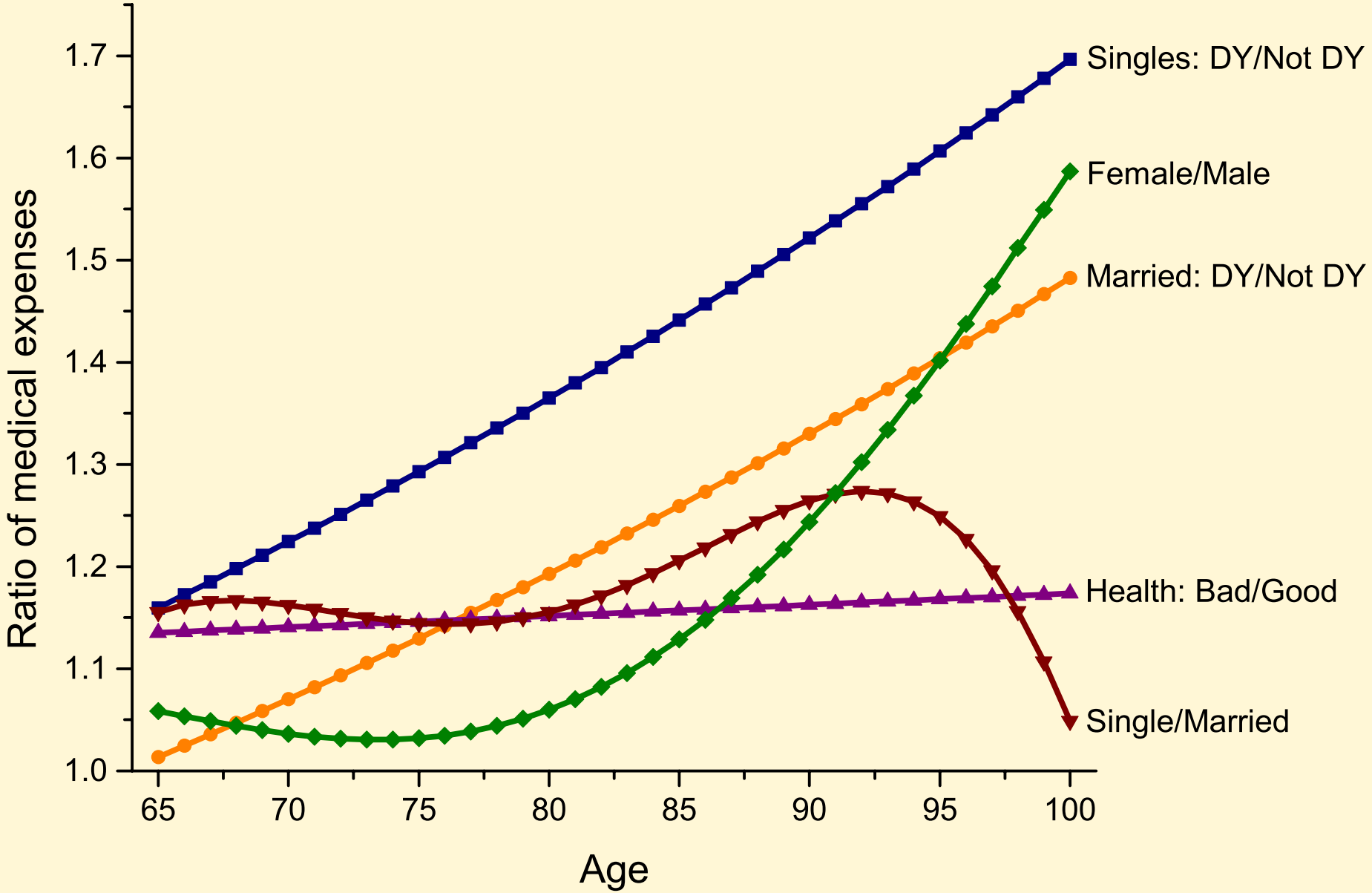
Calibration: A few highlights

Pre-Medicaid Medical Expense Process

- Stochastic component of expenses is calibrated to estimates from French and Jones (2004) and data on NH stays and expenses.
- We estimate the deterministic component using HRS data.
- Cohort and income effects are controlled for in the estimation.

Calibration: A few highlights

- Estimated effects of various factors on pre-Medicaid expenses:



BKK (2013)

Assessment: A few highlights

- We set the consumption floors for retirees to target Medicaid take up rates by marital status.
- The model does a good job reproducing them by age groups.

Medicaid Take-Up Rates

Age	65–74	75–84	85+
Marital Status			
Married			
data	0.07	0.07	0.11
model	0.05	0.07	0.12
Widows			
data	0.22	0.19	0.24
model	0.21	0.23	0.25
Widowers			
data	0.19	0.15	0.19
model	0.17	0.16	0.17

Assessment: A few highlights

The model also matches well

- Flows into Medicaid by age and marital status
- Average OOP medical expenses by age and marital status
- The conditional probabilities and persistence of impoverishment already discussed

Review of Questions

What does the model say about the following questions:

- Is there any role for public SI programs for retirees?
- If yes, what combination of programs is preferred?

Experiments

To find out we:

- Consider 4 versions of the baseline model: 'no SI', 'SS only', 'means-tested SI only', and 'both (U.S. economy)'
- Consider same economies but with no medical expenses to understand their role.

How we shut-down each program:

- SS: Remove benefits and reduce payroll taxes
- Means-tested SI: Set consumption floor very low ($\approx$ \$50 a year) and reduce income taxes

Experiments

Some details:

- All experiments are revenue-neutral: G/Y fixed
- Use proportional income tax/transfer to satisfy govt budget const.
- Welfare is measured as an equivalent % variation in lifetime consumption.

Role of Public SI in Our Model

- First, is there any role for public SI programs for retirees?
- To find out compare the 'no SI' economy to the economy with both programs...

Role of Public SI in Our Model

When both programs are introduced into the 'no SI' economy:

- Output, consumption, wealth and female labor supply all fall

	No SI	Both (U.S. Economy)
Output	1.00	0.74
Consumption	0.71	0.50
Wealth	3.47	1.22
Working Females' Hours	0.39	0.34
Female LFP	0.49	0.46

Role of Public SI in Our Model

When both programs are introduced into the 'no SI' economy:

- Output, consumption, wealth and female labor supply all fall
- Despite this average newborn welfare increases

	No SI	Both (U.S. Economy)
Output	1.00	0.74
Consumption	0.71	0.50
Wealth	3.47	1.22
Working Females' Hours	0.39	0.34
Female LFP	0.49	0.46
Welfare, %	0.00	2.22

Role of Public SI in Our Model

Why does newborn welfare increase?

- Medical expenses and their associated risks increase the insurance value of SS and means-tested SI.

- When medical expenses are zero:

  average welfare decreases from the introduction of both programs by 10.0%.

Which combination is preferred? Both v. SS Only

- Given that there is a role for old-age public SI:

  What combination of programs is preferred?

- To find out compare the economy with both programs to economies with either means-tested SI or SS removed.

- First consider removing means-tested SI...

Which combination is preferred? Both v. SS Only

When means-tested SI is removed:

- Output, consumption, wealth and female labor supply all increase.

	Both (U.S. Economy)	SS Only
Output	0.74	0.81
Consumption	0.50	0.56
Wealth	1.22	1.80
Working Females' Hours	0.34	0.38
Female LFP	0.46	0.52

Which combination is preferred? Both v. SS Only

When means-tested SI is removed:

- Output, consumption, wealth and female labor supply all increase.
- But removing means-tested SI leads to a large welfare loss.

	Both (U.S. Economy)	SS Only
Output	0.74	0.81
Consumption	0.50	0.56
Wealth	1.22	1.80
Working Females' Hours	0.34	0.38
Female LFP	0.46	0.52
Welfare, %	0.00	-7.33

Which combination is preferred? Both v. SS Only

Why does newborn welfare fall so much?

- Retirees face more risk in our baseline model due to the presence of medical expenses.
- Means-tested SI is a very valuable form of insurance against medical-expense-related risks even when SS is available.
- When medical expenses are zero:

  average welfare falls from the removal of means-tested SI by 0.3%.

Which combination is preferred? Both v. Means-tested SI Only

- Now let's consider what happens when SS is removed...

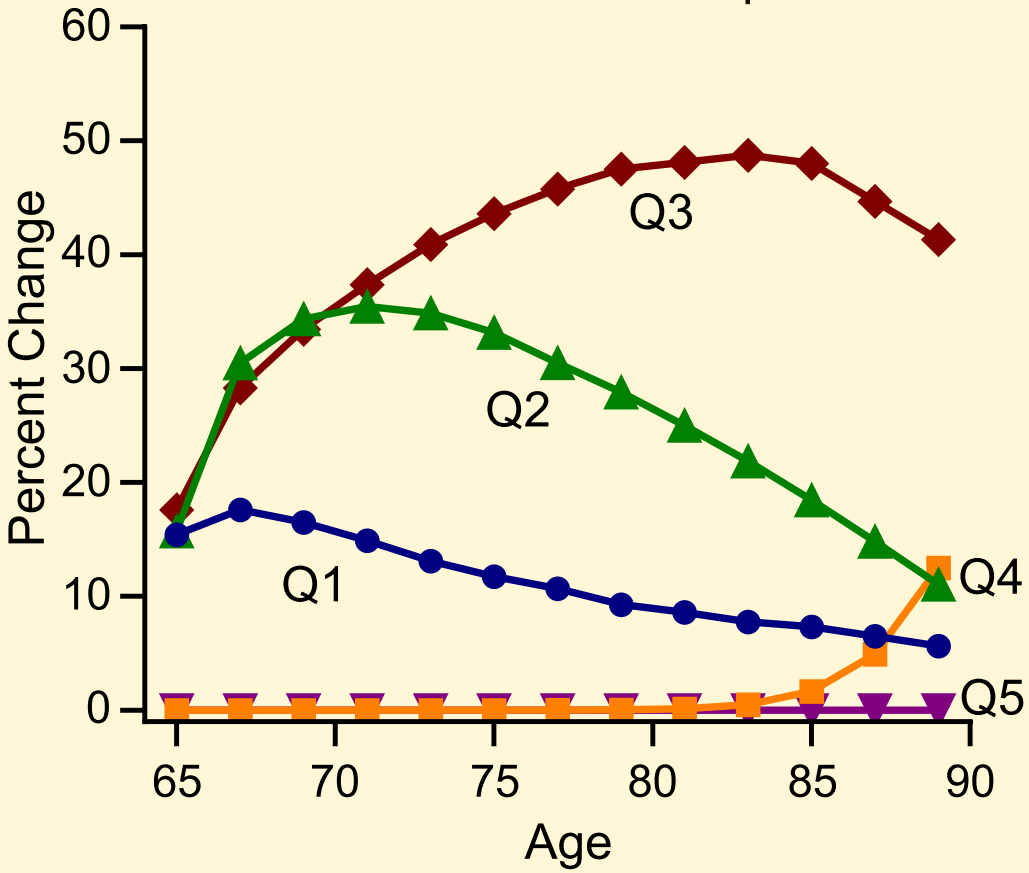
Which combination is preferred? Both v. Means-tested SI Only

When SS is removed:

- Take-up rates of means-tested SI by poorer households increase significantly.
- Both at later ages and the fraction who roll on at 65.

Percent increase in means-tested SI take-up rates when SS is removed

Q1–Q5 are male PE quintiles



BKK (2013)

Which combination is preferred? Both v. Means-tested SI Only

Why do means-tested SI take-up rates increase?

Two reasons:

1. Insurance effect: Some of the insurance against survival and medical expense risk provided by SS is now provided by means-tested SI.

Which combination is preferred? Both v. Means-tested SI Only

Why do means-tested SI take-up rates increase?

Two reasons:

2. Incentive effect:
   - Means-tested SI induces some poorer households not to save for retirement.
   - These households roll directly onto means-tested SI at age 65.
   - SS forces these households to save increasing their expected return from private savings.
   - As a result some households choose to save on their own that would not have otherwise.

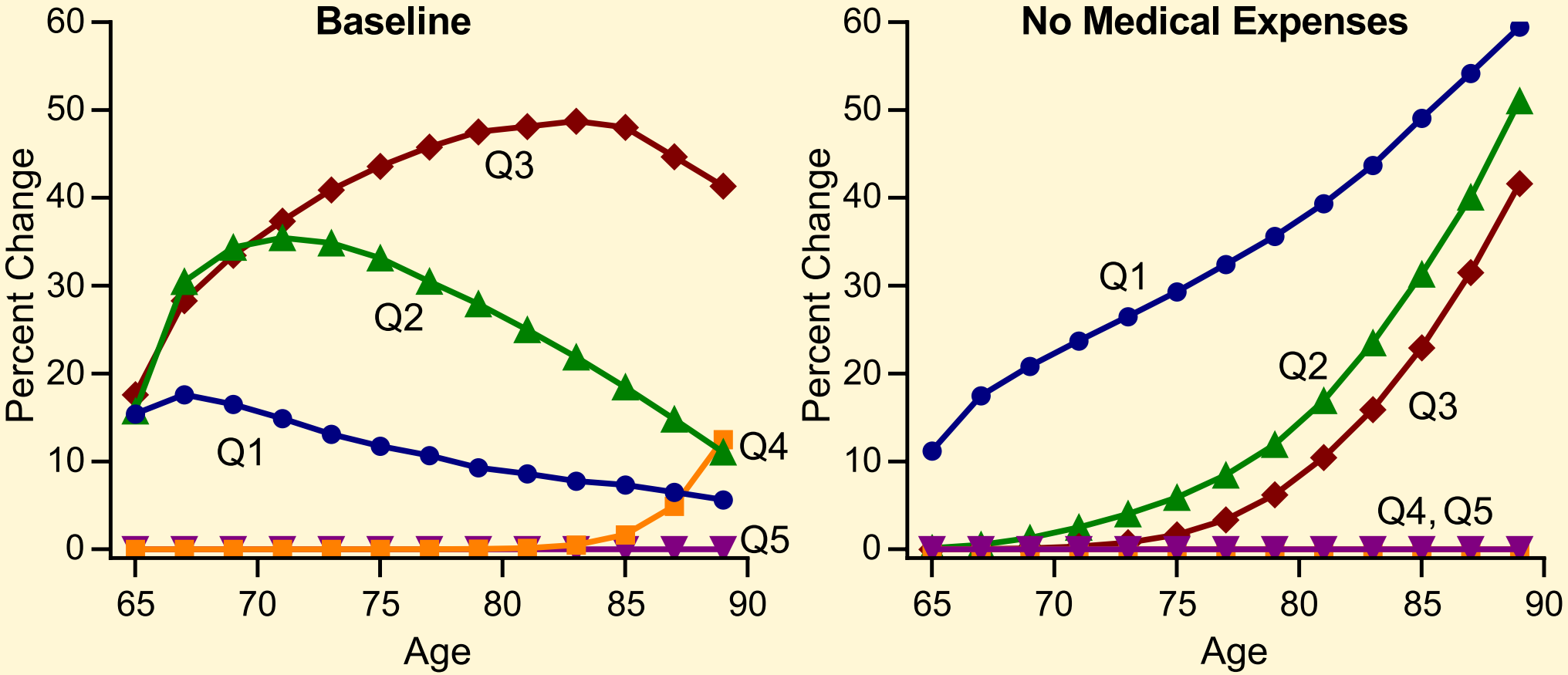
   Thus removing SS exacerbates the negative incentive effects that means-tested SI has on savings behavior.

Which combination is preferred? Both v. Means-tested SI Only

The impact of removing SS on take-up rates looks very different when there are no medical expenses.

Percent increase in means-tested SI take-up rates when SS is removed

Q1–Q5 are male PE quintiles



BKK (2013)

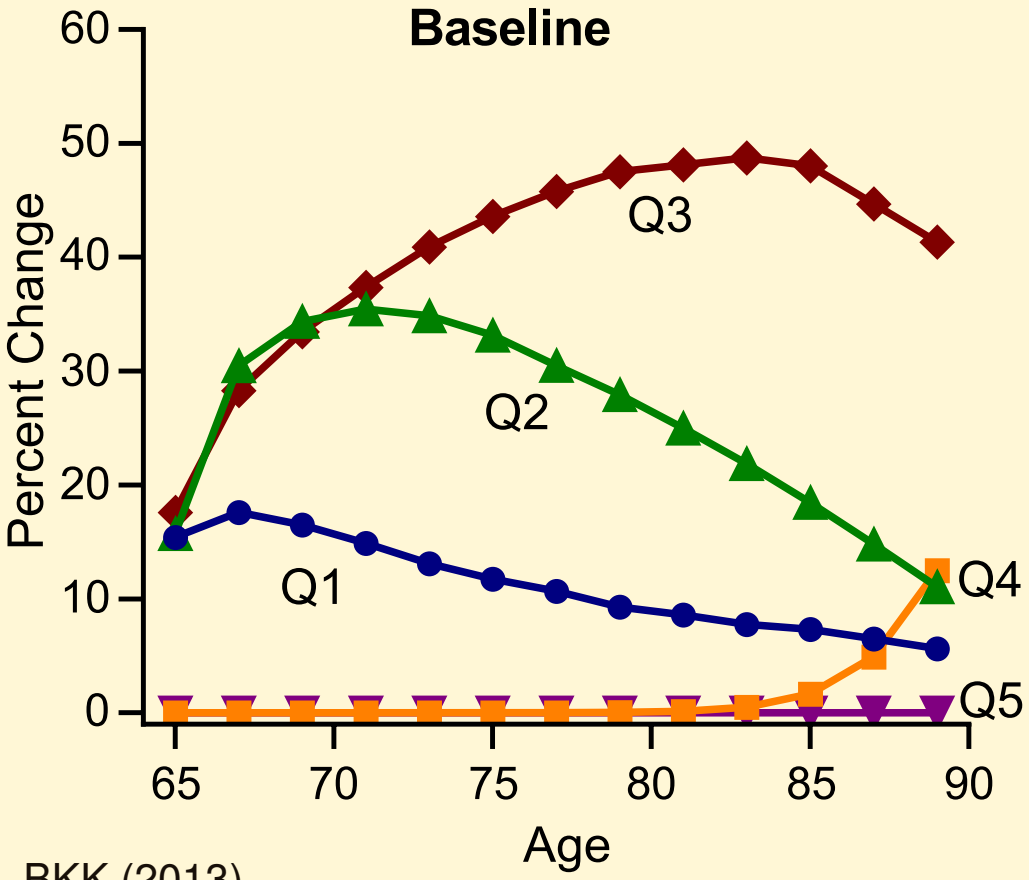
Which combination is preferred? Both v. Means-tested SI Only

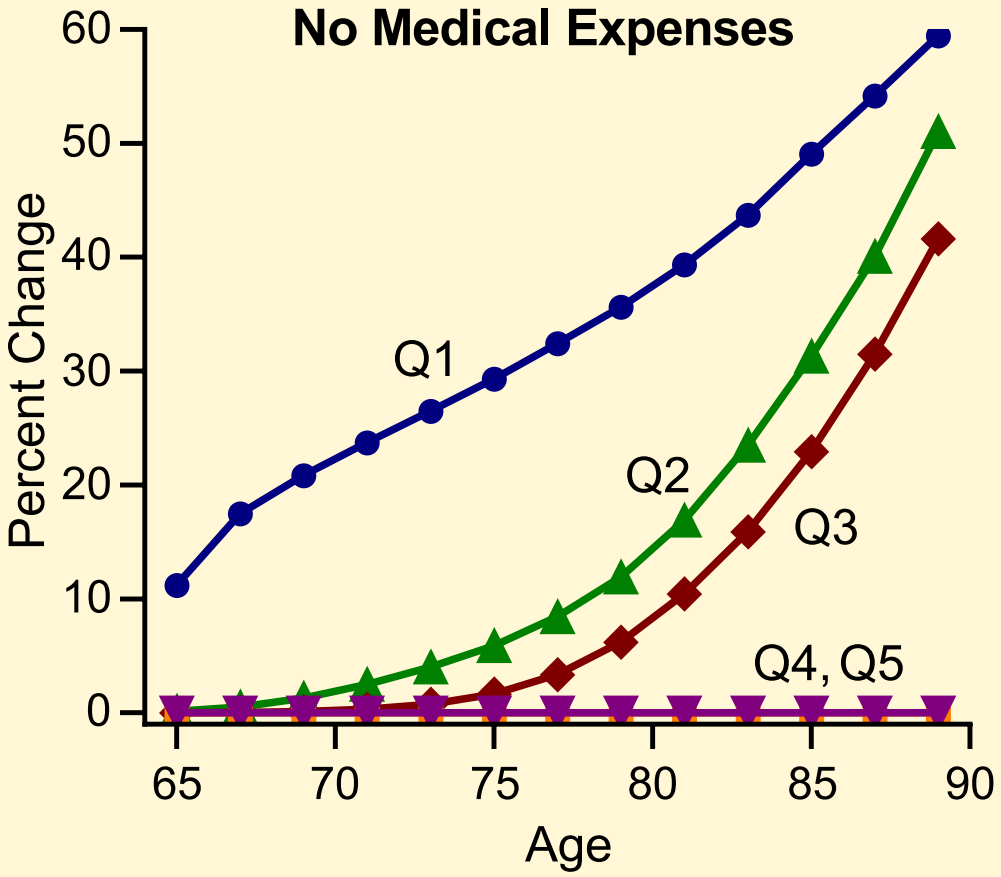
When SS is removed from the 'no medical expense' economy:

- The increase in take-up rates increases monotonically with age.
- Why? Insurance against survival risk that was provided by SS is now provided by means-tested SI.

Percent increase in means-tested SI take-up rates when SS is removed

Q1–Q5 are male PE quintiles





BKK (2013)

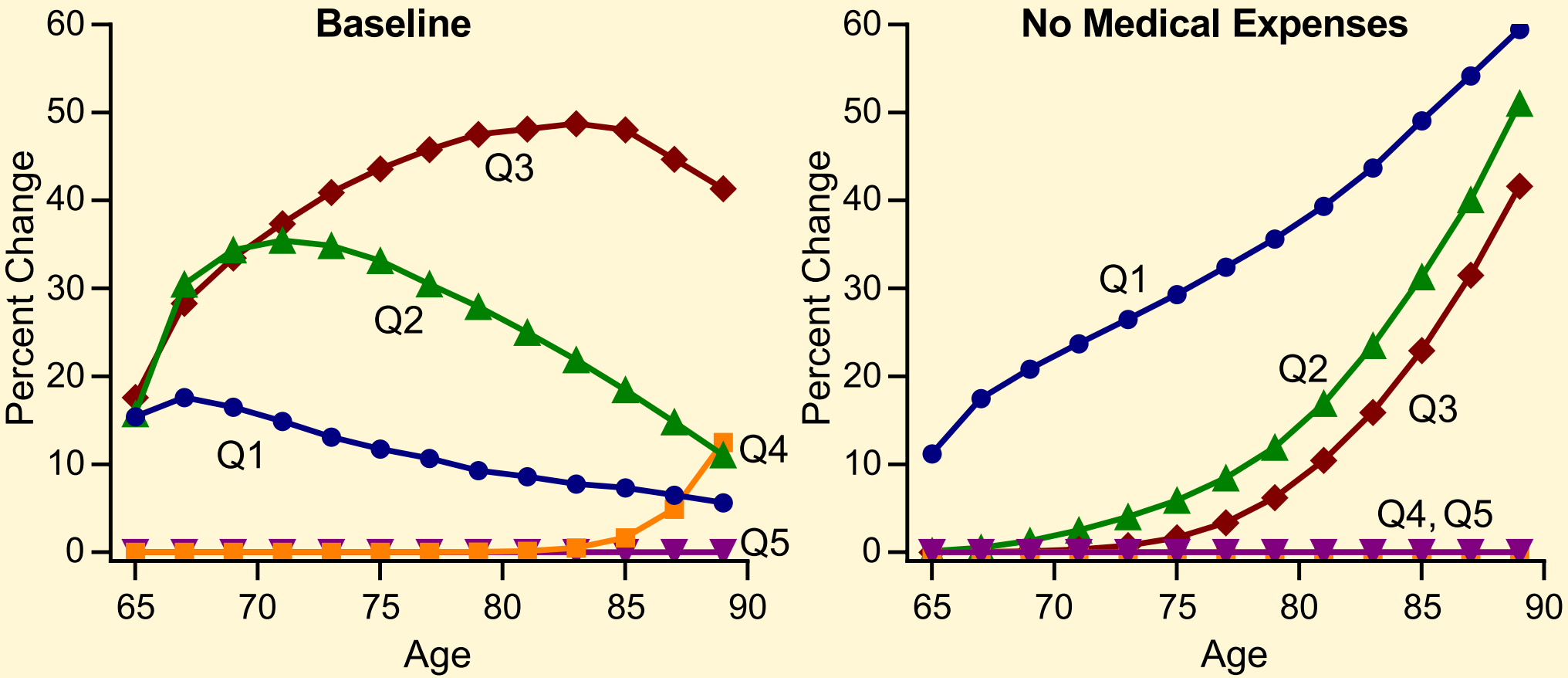
Which combination is preferred? Both v. Means-tested SI Only

When SS is removed from the 'no medical expense' economy:

- Now only about 10% of Q1 roll in at age 65
- Why? Without medical expenses the negative incentive effect is small.

Percent increase in means-tested SI take-up rates when SS is removed

Q1–Q5 are male PE quintiles



BKK (2013)

Which combination is preferred? Both v. Means-tested SI Only

Overall, removing SS results in:

- Means-tested SI take-up rates increasing from 13% to 34%.
- Government outlays on means-tested SI increase from 0.75% to 2.5% of GNP.

Which combination is preferred? Both v. Means-tested SI Only

Overall, removing SS results in:

- Means-tested SI take-up rates increasing from 13% to 34%.
- Government outlays on means-tested SI increase from 0.75% to 2.5% of GNP.
- Despite this wealth increases and taxes fall.

	Both (U.S. Economy)	Means-tested SI Only
Output	0.74	0.81
Consumption	0.50	0.56
Wealth	1.22	1.91
Prop. Tax	0.0	-0.04

Which combination is preferred? Both v. Means-tested SI Only

Overall, removing SS results in:

- Means-tested SI take-up rates increasing from 13% to 34%.
- Government outlays on means-tested SI increase from 0.75% to 2.5% of GNP.
- Despite this wealth increases and taxes fall.
- And newborns experience a large welfare gain.

	Both (U.S. Economy)	Means-tested SI Only
Output	0.74	0.81
Consumption	0.50	0.56
Wealth	1.22	1.91
Prop. Tax	0.0	-0.04
Welfare, %	0.0	11.8

BKK (2013)

So which combination is preferred?

Our results support Friedman's claim:

- Average newborn welfare is highest in the economy with means-tested SI only.
- Moreover, **all** newborns prefer this economy.
- This is despite the fact that means-tested SI has large negative incentive effects on the behavior of poorer households and that SS dampens these effects.

	Both (U.S. Economy)	SS Only	Means-tested SI Only
Welfare, %	0.00	-7.33	11.8

Robustness: Changes in the Scale of Means-tested SI

- We have found that households like means-tested SI but what if anything can we say about the optimal scale?
- To see, we consider changing the size of means-tested SI in our baseline economy where SS is of the scale in the U.S.

Robustness: Changes in the Scale of Means-tested SI

- Whether households want an increase or a decrease depends on how financed.

		Tax Adjusting		
	U.S. economy	Income 30% up	Income 30% down	Payroll 30% up
Welfare				
Average		-0.44	0.04	0.54
By household education type (female, male):				
high school, high school		-0.24	-0.13	0.62
high school, college		-0.91	0.45	0.35
college, high school		-0.69	0.28	0.48
college, college		-1.20	0.65	0.29
Means-tested SI				
take-up rates	12.9	24.1	6.0	23.7
govt. outlays, % GNP	0.75	1.50	0.30	1.44

BKK (2013)

Robustness: Changes in the Scale of Means-tested SI

- Feldstein (1986) argues that if the scale of means-tested SI is small enough, individuals, especially the poor, will prefer SS.
- To evaluate this claim, we experiment with adding SS to economies with different consumption floors.
- We find:
  - The floors have to be extremely low, $\approx$ \$5 a year, for individuals to obtain small welfare gains from SS.
  - If medical expenses are zero, there is no floor that will make SS preferred.

Robustness: To Modeling Assumptions

- Foreseeing death and open economy
  - Our results are robust to these two assumptions.
- We do not change the scale of Medicare
- exogenous medical expenses
- private insurance markets

Robustness: To Modeling Assumptions

- Foreseeing death and open economy

- We do not change the scale of Medicare
  - Since Medicare is a PAYG benefit program our conjecture is that, like SS, newborns would prefer an economy without it.
- Exogenous medical expenses

- Abstract from private insurance markets

Robustness: To Modeling Assumptions

- Foreseeing death and open economy
- We do not change the scale of Medicare
- Exogenous medical expenses
  - Modeling the market for medical care would be a significant extension of our model.
- Abstract from private insurance markets

Robustness: To Modeling Assumptions

- Foreseeing death and open economy
- We do not change the scale of Medicare
- Exogenous medical expenses
- Abstract from private insurance markets
  - There are significant supply-sides problems in some of these markets.
  - Moreover, every society has to deal with the fact that some people will end up old, sick, alone and poor.

Additional Impoverishment Transitions

- Poor health is associated with higher probabilities and persistence of impoverishment.

Percentage of Retirees Moving from Each Quintile to Quintile 1

	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
Quintile	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**
1	69.7	80.9	70.8	79.3	67.8	73.1
2	15.6	22.6	15.1	22.1	17.7	27.5
3	3.4	5.5	3.8	7.2	7.8	8.2
4	0.9	2.2	1.3	4.1	4.1	4.7
5	0.4	1.5	0.5	1.3	1.4	2.8

Source: Authors' calculations using 1992–2010 HRS data on retirees 65+.

Additional Impoverishment Transitions

- Hospital stays are associated with higher probabilities and persistence of impoverishment.

Percentage of Retirees Moving from Each Quintile to Quintile 1

	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
Quintile	**None**	**Hospital Stay**	**None**	**Hospital Stay**	**None**	**Hospital Stay**
1	75.3	79.0	73.1	78.8	71.0	70.8
2	18.1	18.9	16.9	18.2	20.9	22.9
3	3.6	5.1	3.8	6.6	7.8	7.7
4	0.9	1.6	1.7	2.5	4.0	4.3
5	0.6	0.4	0.6	0.6	2.2	1.3

Source: Authors' calculations using 1992–2010 HRS data on retirees 65+.

Additional Impoverishment Transitions

- Widowhood is associated with higher probabilities and persistence of impoverishment.

Percentage of Retired Women Moving from Each Quintile to Quintile 1

	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
Quintile	**Married**	**Widowed**	**Married**	**Widowed**	**Married**	**Widowed**
1	72.5	80.0	69.6	75.9	80.2	76.1
2	17.3	22.9	17.2	20.6	28.1	28.0
3	3.4	6.5	4.4	6.9	8.1	11.5
4	1.0	1.6	1.1	2.4	3.7	6.2
5	0.4	1.1	0.3	0.5	2.6	2.8

Source: Authors' calculations using 1992–2010 HRS data on retirees 65+.

- Men look very similar.

Additional Impoverishment Transitions

- Widowhood is associated with higher probabilities and persistence of impoverishment.

Percentage of Retired Men Moving from Each Quintile to Quintile 1

	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
Quintile	**Married**	**Widowed**	**Married**	**Widowed**	**Married**	**Widowed**
1	74.5	75.7	73.9	79.0	70.7	73.9
2	18.3	24.1	17.4	18.8	15.0	19.2
3	3.9	12.2	3.5	9.6	4.6	8.1
4	1.3	3.5	2.0	2.0	4.1	4.3
5	0.7	1.7	0.9	1.8	0.0	4.0

Source: Authors' calculations using 1992–2010 HRS data on retirees 65+.

Working Household's Problem

Working-age household solves

$$V(j, a, \bar{\mathbf{e}}, \varepsilon_e, \mathbf{s}) = \max_{c, l_f, a'} \left\{ U^W(c, l_f, \mathbf{s}) + \beta E\left[V(j+1, a', \bar{\mathbf{e}}', \varepsilon_e', \mathbf{s}) | \varepsilon_e \right] \right\}$$

subject to ...

age	j
assets	a
average earnings	$\bar{\mathbf{e}} \equiv \{\bar{e}^m, \bar{e}^f\}$
productivity shocks	$\varepsilon_e \equiv \{\varepsilon_e^m, \varepsilon_e^f\}$
education types	$\mathbf{s} \equiv \{s^m, s^f\}$

Working Household's Problem

Working-age household solves

$$V(j, a, \bar{\mathbf{e}}, \varepsilon_e, \mathbf{s}) = \max_{c, l_f, a'} \left\{ U(c, l_f, \mathbf{s}) + \beta E\left[V(j+1, a', \bar{\mathbf{e}}', \varepsilon_e', \mathbf{s}) | \varepsilon_e \right] \right\}$$

subject to

$$c \geqslant 0, \quad 0 \leqslant l_f \leqslant 1, \quad a' \geqslant 0,$$

$$\bar{e}^{i\prime} = (e^i + j\bar{e}^i)/(j+1), \quad i \in \{m, f\},$$

$$c + a' = a + y^W - T_y^W + Tr^W,$$

$$y^W \equiv e^m + e^f + (1 - \tau_c) r a,$$

$$e^i \equiv w \Omega^i(j, \varepsilon_e, s^i)(1 - l_f \mathbf{I}_{i=f}), \quad i \in \{m, f\},$$

$$T_y^W \equiv \tau_y \left(y^W - \tau_e(e^m) e^m - \tau_e(e^f) e^f \right) + \tau_e(e^m) e^m + \tau_e(e^f) e^f,$$

$$Tr^W \equiv \max \left\{ 0, \underline{c} - \left[a + y^W - T_y^W \right] \right\}.$$

Utility Functions

- Utility of a working-age household is

$$U^W(c, l_f, s) = 2\frac{(c/(1+\chi))^{1-\sigma}}{1-\sigma} + \psi(s)\frac{l_f^{1-\gamma}}{1-\gamma} - \phi(s)\mathbf{I}(l_f < 1),$$

where $1-\chi \in [0,1]$ is the degree of joint consumption.

- Utility of a retired household is

$$U^R(c, d) = 2^{N-1}\frac{\left(c/(1+\chi)^{N-1}\right)^{1-\sigma}}{1-\sigma} + \psi^R\frac{l_f^{1-\gamma}}{1-\gamma},$$

where the number of household members N depends on d.

Competitive Equilibrium

We consider a steady-state competitive equilibrium of a small open economy.

Given a fiscal policy and a real interest rate r in equilibrium

1. Individuals optimize
2. Firms maximize profits
3. Markets for goods and labor clear
4. Consistency conditions hold
5. Transfers to newborns equal accidental bequests
6. SS Benefits = SS Payroll Tax Revenue
7. GovtExp is such that:

$$\begin{aligned} &\text{IncomeTaxes} + \text{MedicareTaxes} + \text{CorporateTaxes} \\ &\quad = \text{Transfers} + \text{GovtExp} \end{aligned}$$