

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

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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 heterogeneous because **means-tested SI** has large negative incentive effects on the poor

and suggested:

- It may be welfare-enhancing to have **both programs**.

Overview

- **Objective:** Assess the welfare and incentive effects of SS and means-tested SI programs in the US.
- In particular, we ask
 - Is there any role for public SI programs for retirees?
 - If yes, what combination of programs is preferred?
- We answer these questions using a model that takes into account that retirees are not only subject to lifetime earnings and survival risk but also health, medical expense, and spousal death risk.

Our Answers

- Is there any role for public SI programs for retirees?

Yes, when medical expenses and their associated risks are taken into account, individuals prefer an economy with SI programs of the size currently offered in the US to one without.

Our Answers

- If yes, what combination of programs is preferred?

We find results consistent with Friedman's claim:

- A means-tested SI program of the scale in the US is preferred by all newborn households to an economy with either SS only or both programs.
- This is despite the fact that means-tested SI has significant negative incentive effects on the behavior of poorer households as Feldstein emphasized.

Motivation: Risks

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

- There is evidence that **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

Quintile	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
	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

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

Percentage of Retired Women Moving from Each Quintile to Quintile 1

Quintile	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
	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.

Motivation: Risks

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

- There is evidence that **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
 - choose consumption, savings, female labor supply
 - retire exogenously at age 65
 - after retirement:
 - married, widows, widowers
 - differ by health status of members
 - choose consumption, savings
 - die with certainty at age 100
 - do not have access to private insurance markets
 - face no-borrowing constraint

Model: Key Features

- Individuals have uncertain
 - market productivity
 - death (foreseen 1 period in advance)
 - old-age health status
 - old-age medical expenses
- 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 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)
- Financed (along with government expenditures) by
 - progressive income taxes
 - payroll tax
 - proportional capital income tax

Working Household's Problem

Working-age household solves

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

subject to ...

age	j
assets	a
average earnings	$\bar{e} \equiv \{\bar{e}^m, \bar{e}^f\}$
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

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

subject to

$$c \geq 0, \quad 0 \leq l_f \leq 1, \quad a' \geq 0,$$

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

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

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

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

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

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

Retired Household's Problem

Retired household solves

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

subject to ...

age

j

assets

a

average earnings

$\bar{e} \equiv \{\bar{e}^m, \bar{e}^f\}$

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

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

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

subject to

$$c \geq 0, \quad a' \geq 0,$$

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

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

$$y^R \equiv S(\bar{e}, d) + (1 - \tau_c)ra,$$

$$T_y^R \equiv \tau_y^R((1 - \tau_c)ar, S(\bar{e}, d), d, M),$$

$$I^R \equiv a + y^R - T_y^R,$$

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

Utility Functions

- Utility of a **working-age household** is

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

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

- Utility of a **retired household** is

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

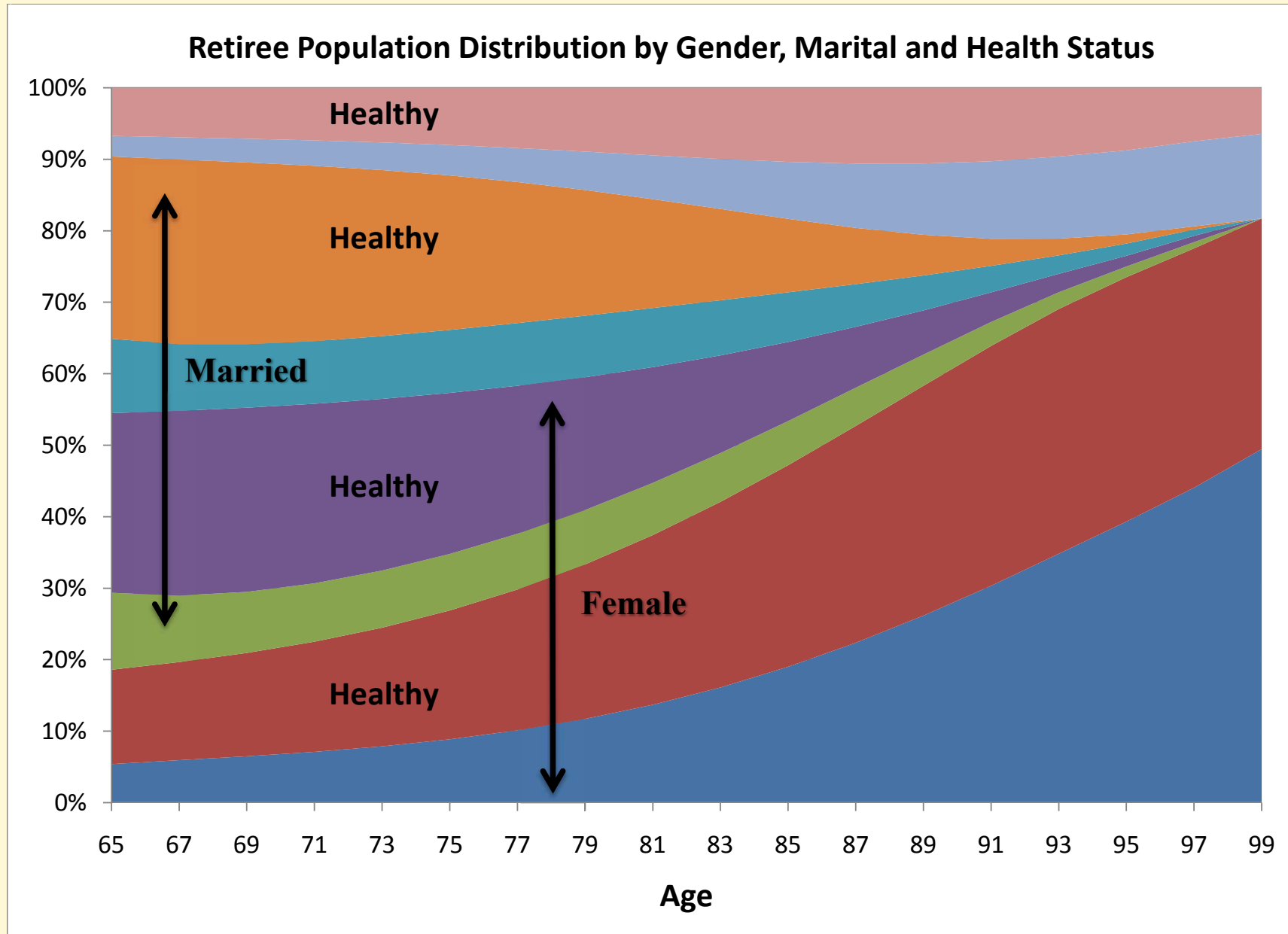
where the number of household members N depends on d .

Competitive Equilibrium

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

Calibration: A few highlights

- We calibrate the model to reproduce this demographic structure.



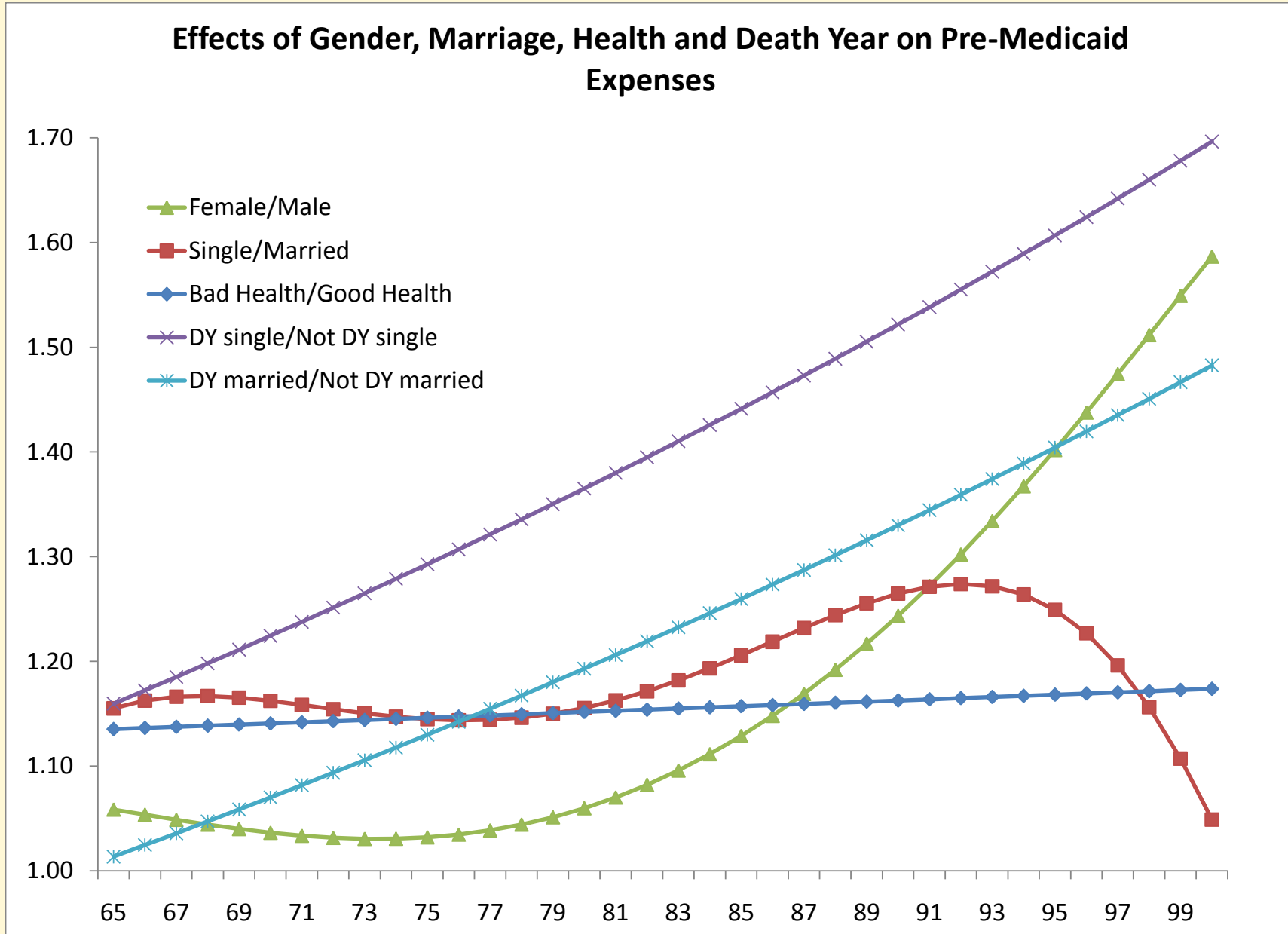
Calibration: A few highlights

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.



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			
<i>Married</i>			
data	0.07	0.07	0.11
model	0.05	0.07	0.12
<i>Widows</i>			
data	0.22	0.19	0.24
model	0.21	0.23	0.25
<i>Widowers</i>			
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.

Some details:

- Shut-down SS by removing benefits and reducing payroll taxes
- Shut-down means-tested SI by setting consumption floor very low (\approx \$50 a year) and reducing income taxes
- 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	0.57
Consumption	0.52	0.36
Wealth	2.53	0.89
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	0.57
Consumption	0.52	0.36
Wealth	2.53	0.89
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 gain from the introduction of SI is **-10%**.

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	0.57	0.69
Consumption	0.36	0.41
Wealth	0.89	1.31
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	0.57	0.69
Consumption	0.36	0.41
Wealth	0.89	1.31
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 much more effective form of insurance against medical-expense-related risks than social security.
- When **medical expenses are zero**:
 - average welfare gain from the removal of means-tested SI is **-0.3%**.

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

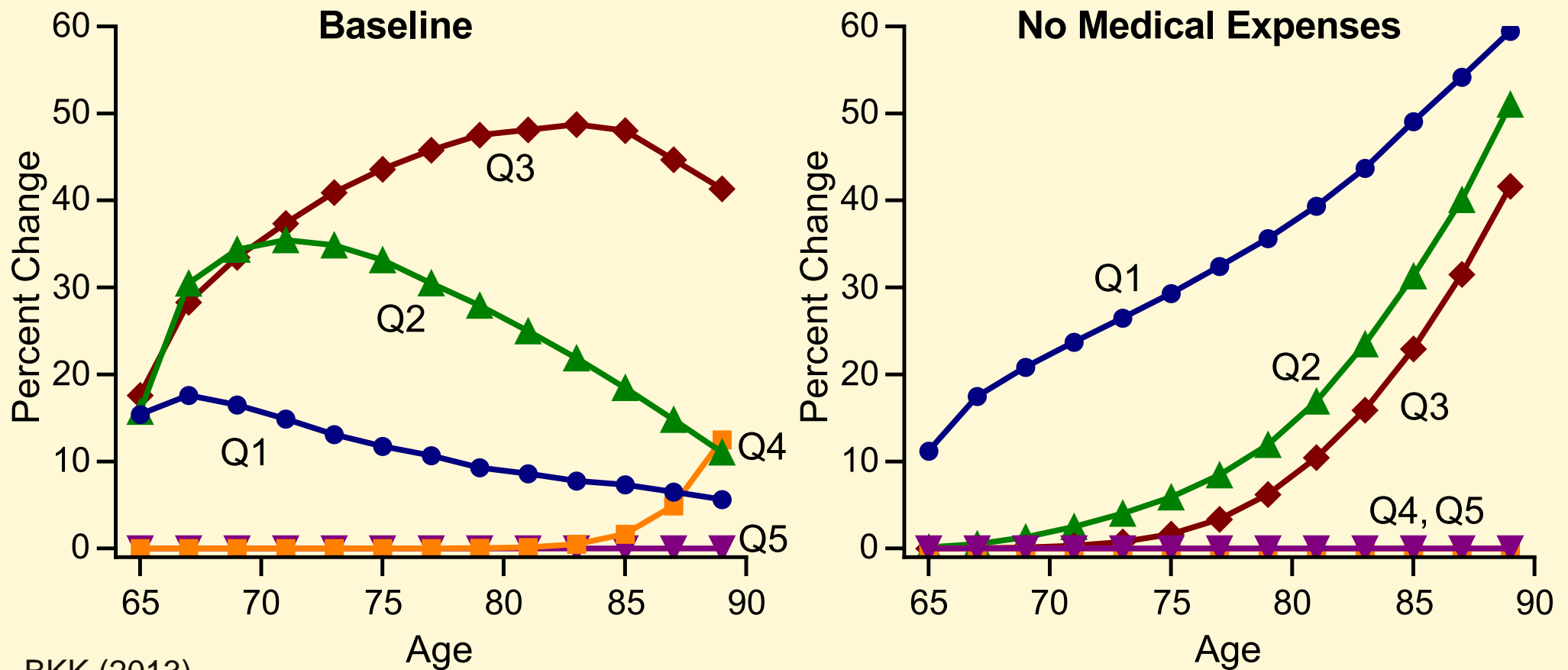
- Now let's consider what happens when SS is removed...

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



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 provided by SS is now provided by means-tested SI.
2. **Incentive effect:** 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

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

Two reasons:

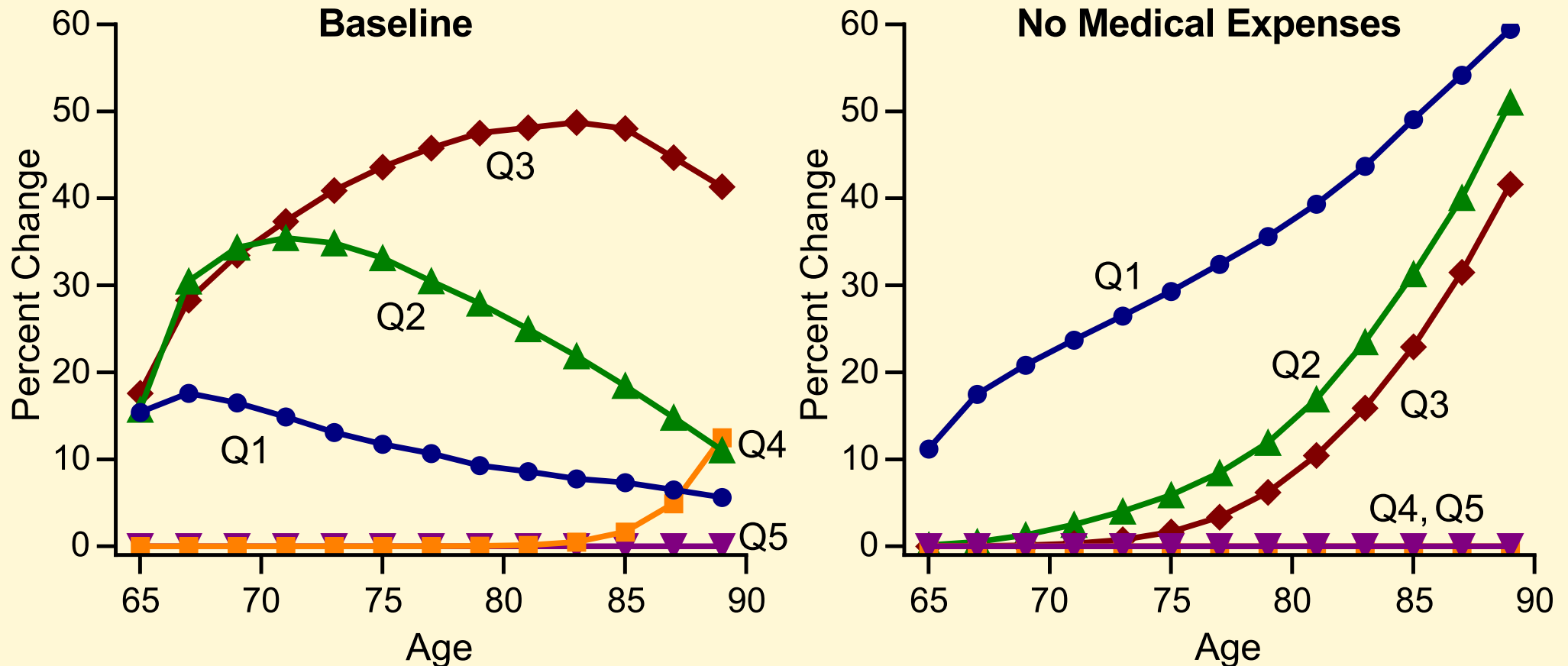
1. **Insurance effect:** Some of the insurance provided by SS is now provided by means-tested SI.
2. **Incentive effect:** Removing SS exacerbates the negative incentive effects that means-tested SI has on savings behavior.
 - Means-tested SI induces some poorer households to consume early and roll directly 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.

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
- And take-up rates increase monotonically with age

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



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

Why do medical expenses change so much the impact of SS removal on take-up rates?

- Now the increase in take-up rates is due primarily to the insurance effect.
- Without medical expenses: the incentive effect is much smaller.
 - Why? Medical expenses lower the expected return on savings.

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	0.57	0.70
Consumption	0.36	0.41
Wealth	0.89	1.39
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	0.57	0.70
Consumption	0.36	0.41
Wealth	0.89	1.39
Prop. Tax	0.0	-0.04
Welfare, %	0.0	11.8

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

- So far, we have only looked at the welfare effects of different combinations of programs keeping the scale fixed.
- 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: Changes in the Scale of Means-tested SI

- Given how much households like means-tested SI we also ask whether they might like the current scale increased...

Robustness: Changes in the Scale of Means-tested SI

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

	No change	30% up Income	30% up Payroll	30% down Income
Tax Adjusting				
Welfare				
Average	0.0	-0.44	0.54	0.04
<i>By household education type (female, male):</i>				
high school, high school	0.0	-0.24	0.62	-0.13
high school, college	0.0	-0.91	0.35	0.45
college, high school	0.0	-0.69	0.48	0.28
college, college	0.0	-1.20	0.29	0.65
Means-tested SI				
take-up rates	12.9	24.1	23.7	6.0
government outlays, % GNP	0.75	1.50	1.44	0.30

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

Quintile	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
	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

Quintile	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
	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 Men Moving from Each Quintile to Quintile 1

Quintile	65–74 Year-olds		75–84 Year-olds		85+ Year-olds	
	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+.

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:

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