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

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Motivation

- All societies must deal with the fact that some individuals will end up *old, sick, alone and poor*.
- Why?
  - Some individuals enter retirement with low wealth.
  - Significant risks after retirement.
    - Longevity
    - Medical expenses
    - Long-term care expenses
    - Spousal death
  - These risks are correlated.

Motivation

- Poverty among retirees is a challenge for society.
- Poor retirees often cannot self-insure by re-entering the labor force.
- **Questions:**
  - Is there a role for social insurance (SI) for the aged?
  - What is a good program?

U.S. Social Security Program (SS)

- Biggest SI program for retirees in U.S.
- SS outlays were 4.8% of GDP in 2011 and are growing.
- A large macroeconomics literature finds that a U.S.-style, pay-as-you-go, public pension program is bad public policy:
  - Bad in dynamically efficient OLG models
    (Auerbach and Kotlikoff, 1987).
  - Bad in dynastic models
    (Fuster, Imrohoroglu and Imrohoroglu, 2007).
  - Bad when individuals face life-time earnings risk
    (Conesa and Krueger, 1999).
  - Bad when the economy is open (Hong and Rios, 2007).
- Strongest argument in favor of SS:
  - It is even more costly to remove
    (Nishiyama and Smetters, 2007).

Is there a role for social insurance?

It would be a mistake to conclude from these results that there is no role for society to provide insurance to retirees.

Means-tested Social Insurance (MTSI) for Retirees

- U.S. also offers means-tested social insurance (MTSI) to retirees.
- Some MTSI programs for U.S retirees are:
  - Medicaid
  - Supplemental Social Security Income
  - Food Stamps
  - Housing and energy assistance programs
- We assess these programs using a quantitative model of the U.S. economy and find that they are highly valued.

Means-tested Social Insurance (MTSI) for Retirees

MTSI is valuable:

- It provides good insurance against longevity risk.
- It is particularly effective in insuring against: medical expenses, nursing home expenses, spousal death and low lifetime earnings.

Why?

- The transfers induced by the means-test line up well with states where demand for the insurance is highest.
- It is cheap
  - Largest program is Medicaid: expenditures for the aged are 0.6% of GDP.
  - Second largest program is SSI: outlays for the aged are 0.3% of GDP.

Quantitative Model of U.S. Economy: Overview

- 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

Quantitative Model of U.S. Economy: Overview

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

Quantitative Model of U.S. Economy: Overview

Assuming retirees foresee their death 1 period in advance allows us to:

- Capture high OOP expenses of HRS retirees in last year of life. (3.4 times larger than other years.)
- Eliminate accidental bequests. (They muddle welfare effects of policy changes.)
- Reproduce finding of Porterba et al. (2012). (Many HRS individuals die with very low levels of assets.)
  - 46% have less than $10,000 in financial assets
  - 50% have zero home equity

Quantitative Model of U.S. Economy: Overview

Exogenous risks faced by retirees:

- Survival and health status
  - Stochastic functions of age, sex, marital status, and previous health status
- Medical expenses
  - Do not affect household utility
  - Stochastic function of age, sex, marital status, current health status and death
  - Stochastic component consists of both
    - acute shocks
    - a small probability but large expense “nursing home” shock

Quantitative Model of U.S. Economy: Overview

- Social insurance (SI) includes
  - means-tested social insurance program (Medicaid/other old-age SI)
  - progressive PAYG social security program (includes spousal and survivor benefits)
  - Medicare (expenses are net of Medicare benefits, 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 uncollateralized borrowing

Working Household's Preferences

Utility function of a working-age household is

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

- l_f is non-market time of the female member
- preferences vary across education types $\mathbf{s} \equiv (s^m, s^f)$
- $1-\chi \in [0,1]$ is the degree of joint consumption
- $\phi(\mathbf{s})\mathbf{I}(l_f < 1)$ is the utility cost of female labor force participation

Retired Household's Preferences

Utility function of a retired household is

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

- $1-\chi \in [0,1]$ is the degree of joint consumption
- $N(d)$ is the number of household members given the marital status $d \in \{\text{married}, \text{widow}, \text{widower}\}$.

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

Retired Household's Problem

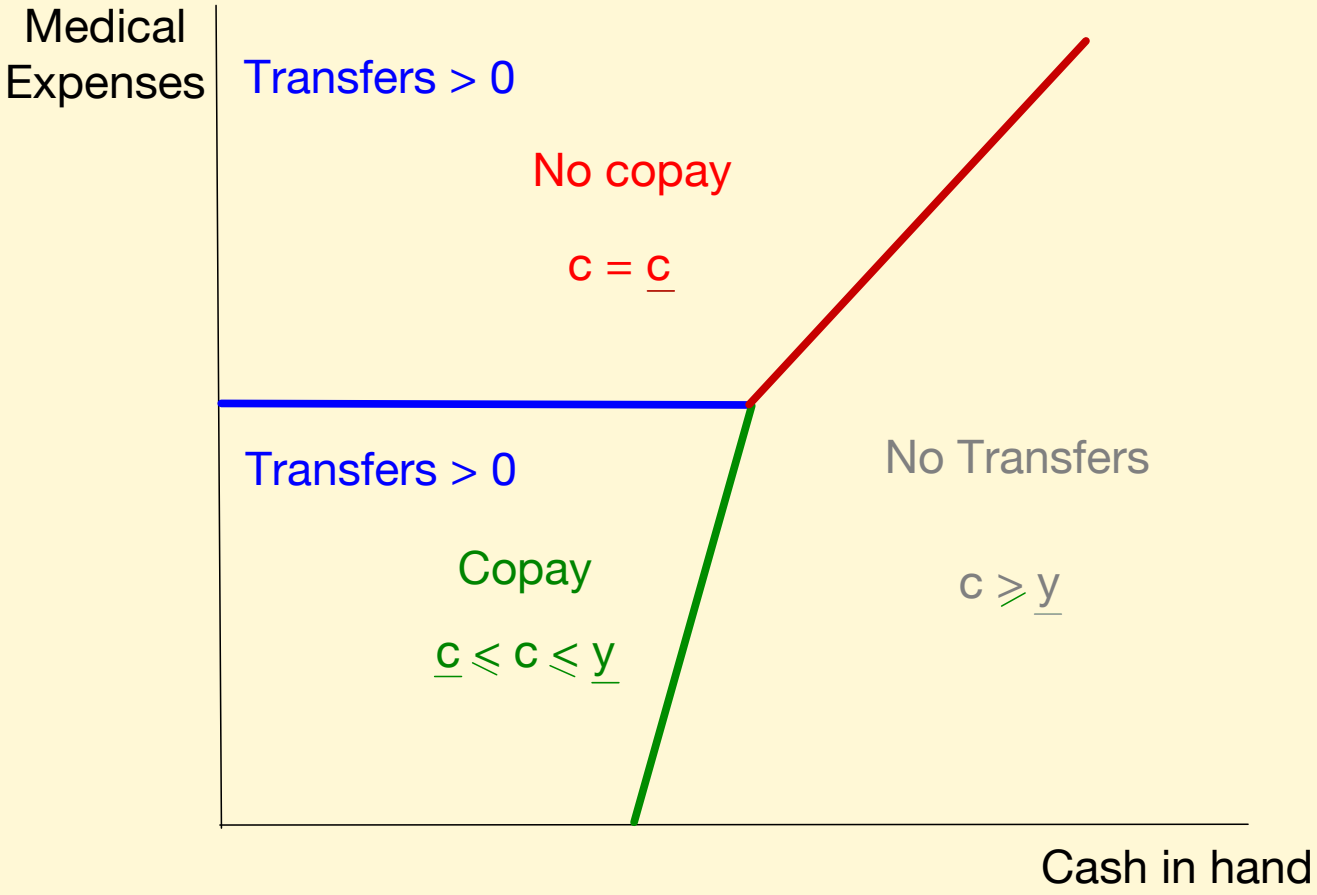
- The means-tested SI transfer function represents both Medicaid and other means-tested SI tranfers.
- It also captures the following features of Medicaid:
  - Medicaid requires copays.
  - copays are capped.
- Copays $\Rightarrow$ even retirees on means-tested SI face some medical expense risk.

Retired Household's Problem

Means-tested SI transfers to retirees are given by

$$Tr^R \equiv \max\left\{\underline{y}^d + \varphi M - I^R, \underline{c}^d + M - I^R, 0\right\}$$

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



Competitive Equilibrium

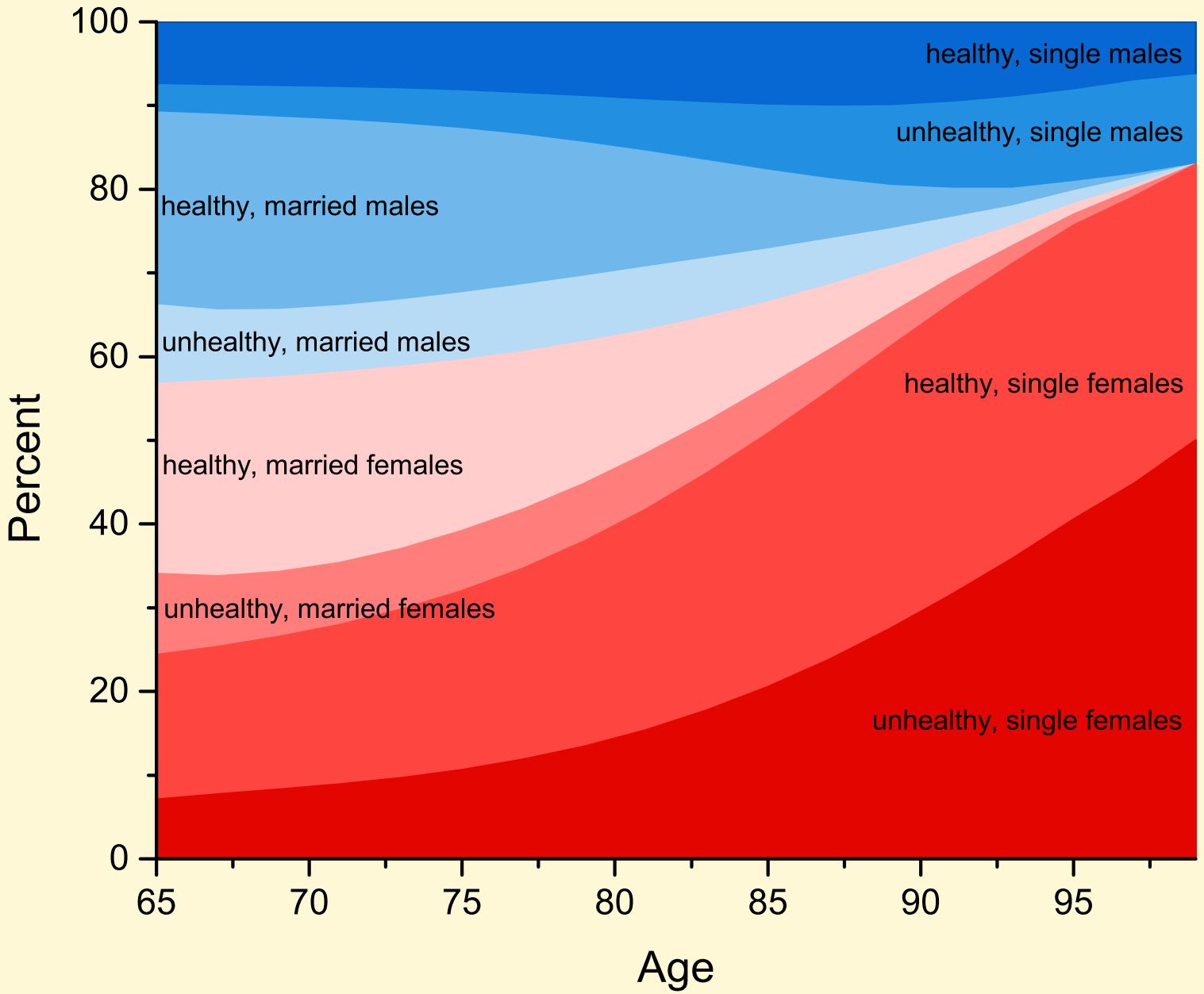
We consider a steady-state competitive equilibrium of a small open economy.

A Few Comments About the Calibration

- Stochastic components of the earnings and medical expense processes are not Gaussian.
- The earnings process includes an additional low earnings state which helps us
  - reproduce SS income distribution
  - improve model's matching of bottom tail of earnings distribution
- The medical expense process includes a large NH shock which helps us
  - capture the risk of a large and persistent NH shock
  - improves model's matching of upper tail of the medical expense distribution

A Few Comments About the Calibration

- We calibrate the model to reproduce this demographic structure:



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A Few Comments About the Calibration

- Age 65 marital distribution attained with a spousal death event at age 65.
- The likelihood of the death event is decreasing with male average earnings.
- Targets the marital distribution by permanent income in the data.

A Few Comments About the Calibration

- Consumption Floors:
  - Workers: $\underline{c}$ is 15% of average male earnings or \$7,100 in year 2000 dollars.
  - Retirees: $\underline{c}^{d}$ is very similar across marital groups and is approximately 16% of average male earnings or \$7,600 in year 2000 dollars.
- Means-test income thresholds: $\underline{y}^{d} \approx 2\underline{c}^{d}$ chosen so model reproduces take-up rates.
- Medicaid copay rate: $1 - \varphi$ is 20%.

  Target: average OOP expenses of Medicaid recipients/average OOP expenses of all retirees = 0.46.

Assessment: Medicaid Take-Up Rates

- Consumption floor calibration
  - Target: Take-up rates by marital status.
  - Assessment: Take-up rates 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

Findings

- What are the welfare effects of removing MTSI?
- Welfare is measured as an equivalent % variation in life-time consumption.
- **Assumption:**
  - Absent MTSI society provides a Townsendian consumption floor
  - Largest consumption floor that all households, indexed by education, agree on.

Welfare effects of removing MTSI

When MTSI is removed from our baseline economy

- Ex-ante newborn welfare falls

Economy	Baseline
Welfare, %	
Ex-ante	-4.87

Welfare effects of removing MTSI

When MTSI is removed from our baseline economy

- High school educated HH dislike MTSI removal the most

Economy	Baseline
Welfare, %	
Ex-ante	-4.87
By HH education type (female, male):	
high school, high school	-6.04
high school, college	-2.87
college, high school	-1.53
college, college	0

Welfare effects of removing MTSI

When MTSI is removed from our baseline economy

- Welfare of all types indexed by male permanent earnings quintile falls

Economy	Baseline
Welfare, %	
Ex-ante	-4.87
By male permanent earnings:	
quintile 1	-7.55
quintile 2	-5.43
quintile 3	-4.42
quintile 4	-3.65
quintile 5	-1.82

Welfare effects of removing MTSI

Why are welfare gains so large and so broadly based?

- Compare baseline economy to
  - economy with no medical expenses
  - economy with no earnings risk

Roles of medical expenses and life-time earnings risk

When medical expenses are absent

- Ex-ante welfare continues to fall when MTSI is removed but now disagreement among types

Economy	Baseline	No Medical Expenses
Welfare		
Ex-ante	-4.87	-0.26
By HH education type (female, male):		
high school, high school	-6.04	-0.34
high school, college	-2.87	-0.16
college, high school	-1.53	0.03
college, college	0	0.05

Roles of medical expenses and life-time earnings risk

When earnings risk is absent

- Welfare of all types now rises when MTSI is removed

Economy	Baseline	No Medical Expenses	No Earnings Risk
Welfare			
Ex-ante	-4.87	-0.26	0.64
By HH education type (female, male):			
high school, high school	-6.04	-0.34	0.34
high school, college	-2.87	-0.16	1.33
college, high school	-1.53	0.03	1.15
college, college	0	0.05	1.92

Reforming MTSI for Retirees

- Given that MTSI is highly valued by HH's in our economy would they like to increase its scale?

Reforming MTSI for Retirees

- **All** newborn like a 30% increase in MTSI if it is financed with a higher payroll tax.

	U.S. economy	30% up Payroll Tax
Welfare, %		
Average		0.54
By household education type (female, male):		
high school, high school		0.62
high school, college		0.35
college, high school		0.48
college, college		0.29
Means-tested SI		
take-up rates	12.9	23.7
govt. outlays, % GNP	0.75	1.44

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Reforming MTSI for Retirees

- Newborn households dislike 30% increase financed by a higher income tax instead.
- Disagreement over a 30% decrease (lowering income tax).

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

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Conclusion

- Removing MTSI in a quantitative model of the U.S. economy produces a large welfare loss.
- There are broad-based welfare gains if the scale of MTSI is increased by 30% financed by a payroll tax.
- If SS was removed, the fraction of retirees living off MTSI transfers would increase significantly but all ex-ante types would be better off.