Does the Social Safety Net Improve Welfare? A Dynamic General Equilibrium Analysis

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Question

Main Question: what is the welfare cost/gain of US social safety net?

- Social safety net (or means-tested social insurance): Medicaid, in-kind/cash transfer programs (e.g. AFDC, food stamp).
- Provide a "safety net" by guaranteeing a minimum consumption floor.

Motivation

- Total spending on US means-tested social insurance is
  - *large*: *5.0 %* of GDP in 2004, and half of that is for health care.
  - *fastest* growing component of the US government spending
    - only 1.2% of GDP in 1964,
    - projected to rise further.(population aging,rising health care cost)
- Many policy proposals to reform means-tested social insurance.
  - Example: the recent US health care reform.
- Despite the facts above, relatively *little* academic work to quantify the welfare consequence of means-tested social insurance.
- This paper attempts to fill this gap in the literature.

Motivation (continue)

- Conventional wisdom:
  - Means-tested Social insurance improves welfare as it provides insurance against negative shocks, such as income and health shocks.
    - by guaranteeing a minimum consumption floor. (Insurance channel)
  - *But* some argued that: it may reduce welfare *because*
    - it discourages work and thus reduce labor supply (e.g. Moffitt (2002)).
    - it reduces precautionary saving (Hubbard, Skinner, and Zeldes (1995)).
- *Recent* empirical research: it crowds out private insurance, implying the insurance effect may be small.
  - Cutler and Gruber (1996a, 1996b): employer-sponsored health insurance.
  - Brown and Finkelstein (2008): individual health insurance.

What I Do

- Develop a quantitative dynamic general equilibrium model with incomplete markets and heterogenous agents
- Evaluate the tradeoff between these mechanism, and quantify the net welfare consequence.
- **Different** from standard incomplete markets models, I endogenize health insurance decisions.
  - captures the crowding-out effects on private health insurance.

What I Do (continue)

- A model of endogenous health insurance: can it account for the main features of the US health insurance market?

US Health Insurance Structure	
% of working-age population with	
Employer-sponsored health insurance	59.4%
Individual health insurance	4.4%
Medicaid	9.6%
No health insurance	26.7%
Employer-sponsored HI take-up rate	90.7%

Data source: MEPS

- Special attention to the uninsured puzzle: 47 millions Americans uninsured. (Gruber (2008))
  - Is the existence of means-tested social insurance a solution?

Preview of Main Results

- Means-tested social insurance generates a significant *welfare loss*.
  - (CEV: -1.6% of consumption each period)
- Why welfare loss?
  - Large crowding out effect on private health insurance,
    - offsetting the welfare gain from insurance provided by social insurance. (CEV:1.4% with fixed private health insurance)
  - Large negative effect on labor supply.
    - (CEV: 4.4% with fixed labor supply)
- The model matches the US health insurance structure.
- Provide an explanation for the puzzle: many Americans don't buy health insurance.
  - Means-tested social insurance accounts for approximately half of the uninsured Americans.
  - Intuition: since they (currently not qualified) would become qualified for social insurance after being hit by large health shocks.

The Model

- A 65-period OLG model with one period is one year.
  - Born in 21, retire in 65 and die in 85.
- One unit of time endowed each period: work or not work $l \in \{0, 1\}$.
- Preference: CRRA, $u = \frac{c^{1-\sigma}}{1-\sigma} - \zeta l$ with $\sigma = 2.0$
- Endogenous private health insurance choices h'
  - $h' = 1$: no health insurance
  - $h' = 2$: individual health insurance from the market.
  - $h' = 3$: employer-sponsored health insurance (if offered $e_h = 1$).
- Means-tested social insurance: a consumption floor ($\underline{c}$) financed by payroll tax τ_w. (following Hubbard, Skinner, Zeldes (1995))
- Health expense (m): an exogenous expense shock.

The Individual's Problem

- The individual's state in each period: $s = \{j, a, m, e_h, h, \epsilon, \eta\}$
  - Age: j. Asset: a. Health expense: m. Productivity: ϵ.
  - ESHI offer e_h: 0 (not offered), 1 (offered).
  - Health insurance status h: 1 (uninsured), 2 (individual HI), 3 (ESHI).
- Optimization problem $(P1)$ for an individual with state s.

$$V(s) = \max_{c,l,h'} u(c,l) + \beta P_j E[V(s')]$$

subject to

$$\begin{cases} \frac{a'}{1+r} + c + (1-\kappa_h)m + p_{h'} - \tau p_3 I_{h'=3} = \widetilde{w}\epsilon l(1-\tau) + a + Tr & \text{if} \quad j \leq R \\ \frac{a'}{1+r} + c + (1-\kappa_h)(1-\kappa_m)m + p_{h'} = SS(\eta) + a + Tr, & \text{if} \quad j > R \end{cases}$$

$l \in \{0,1\}$
$h' \in \{1,2,3\}$ if $e_h = l = 1$,
$h' \in \{1,2\}$ otherwise.

$$\widetilde{w} = w - c_e \text{ if } e_h = 1, \widetilde{w} = w \text{ otherwise.}$$

Social Insurance and Private Health Insurance

- Social Insurance: guaranteeing a minimum consumption floor $\underline{c}$.

$$\begin{cases} Tr = \max\{0, \underline{c} + (1-\kappa_h)m - a - \widetilde{w}\epsilon l(1-\tau)\}, & \text{if} \quad j \leq R \\ Tr = \max\{0, \underline{c} + (1-\kappa_h)(1-\kappa_m)m - a - SS(\eta)\}, & \text{if} \quad j > R \end{cases}$$

  - Financed by payroll taxes.

- Private health insurance markets
  - Employer-sponsored health insurance
    - community rated: no pre-existing conditions, same price for everyone (p_3).
    - premiums are exempted from taxation.
  - Individual health insurance
    - not community rated: price conditional on age and health status($p_2(j,m)$)
  - Insurance companies are competitive: prices are actuarially-fair values with a markup λ.

SS, Medicare, and Accidental Bequests

- **Medicare**
  - covers a κ_m fraction of health expense for the elderly.
  - financed by payroll taxes.
- **Pay-as-you-go Social Security**
  - SS payment to the elderly: $SS(\eta)$
  - financed by payroll taxes .
- **Accidental Bequests**: collected by the government, and redistributed back equally to the new-born.

The Representative Firm

- **The firm's profit maximization problem:**

$$\max_{L,K} Y - wL - (r+\delta)K,$$

with

$$Y = K^{\alpha}(AL)^{1-\alpha}.$$

  - K: capital; L: labor; Y: output; δ: capital depreciation rate.
  - A: Labor-augmented technology.

- **Firm's FOCs imply,**

$$w = (1-\alpha)A\left(\frac{K}{AL}\right)^{\alpha}$$

$$r = \alpha\left(\frac{K}{AL}\right)^{\alpha-1} - \delta$$

Stationary Equilibrium (sketch)

Definition: A **stationary equilibrium** is given by a collection of value functions $V(s)$, individual policy rules $\{a', l, h'\}$, the distribution of individuals $\Phi(s)$; aggregate factors $\{K, L\}$; prices $\{r, w, \widetilde{w}\}$; Social Security, Medicare, the social safety net; private health insurance contracts defined by pairs of price and coinsurance rate $\{p_h, \kappa_h\}$, such that,

1. Given prices, government programs, and private health insurance contracts, the value function $V(s)$ and individual policy rules $\{a', l, h'\}$ solve the individual's dynamic programming problem (P1).
2. Given prices, K and L solve the firm's profit maximization problem.
3. The capital and labor markets clear.
4. The government programs, the social safety net, Social Security, and Medicare are self-financing.
5. The health insurance companies are competitive.
6. The distribution $\Phi(s)$, evolves over time according to the equation $\Phi' = R_\Phi(\Phi)$, and satisfies the stationary equilibrium condition: $\Phi' = \Phi$.
7. The amount of initial assets of the new born cohort is equal to the amount of accidental bequests from the last period.

Quantitative Question and Strategy

- Quantitative question: what is the impact of means-tested social insurance on
  - individual welfare,
  - individual decisions: private health insurance, labor supply, saving.

- Quantitative strategy: (steady-state comparison)
  - Calibrate the benchmark model to the current US economy (in 2004).
  - Construct counterfactual economies with different $\underline{c}$ and τ_w.
  - Compare them to the benchmark economy.

Calibration

- Labor productivity ϵ: $ln\epsilon = a + y$.
  - a: age-specific deterministic component.
  - y: a persistent shock, has 5 states, follows a joint process with the probability of being offered ESHI.
- Health expense shock m.
  - Governed by a 6-state markov chain.
  - Categorize the distribution of total health expenditure into 6 bins $(25\%, 50\%, 75\%, 90\%, 95\%)$.
- Calibrated using Medical Expenditure Panel Survey (MEPS) dataset.

Calibration (continue)

- Social Insurance.
  - Floor $\underline{c}$: calibrated to match % of working popu. on Medicaid.
  - Result: $\underline{c} = \$9700$ ($5300 in 1984$), consistent with Hubbard et al (1995): $7000 in 1984 $.
  - Payroll tax τ_w: endogenously determined, $\tau_w = 5.3\%$

Parameter	Value	Source
σ	2	Macro literature
α	0.33	Macro literature
δ	0.06	Macro literature
β	0.97	Macro literature
τ_s	12.4%	US Social Security tax rate
κ_m	0.5	Attanasio, et al (2008)
τ_m	4.7%	
$\underline{c}$	$9,700	% of working pop. on Medicaid
τ_w	5.3%	
A	24500	Output per person: $40293
λ	0.11	Kahn et al. (2005)
π	0.2	Sommers(2002)
ζ	0.2E-4	Employment rate: 73%

Statistics of the Benchmark Economy

- Key Statistics of the Benchmark Economy

Statistics	Model	Data
Interest rate	3.2%	
Employment rate	72%	73%
Output per person	\$41007	\$40293
ESHI take-up rate	92.9%	90.7%
% of working popu. with		
Individual HI	3.7%	4.4%
ESHI	52.7%	59.4%
Medicaid	9.5%	9.6%
No HI	34.1%	26.7%

Data source: MEPS

- Fraction of Individuals on Medicaid by Age Group

Age Group	Model	Data
21-35	10.5%	10.4%
36-45	11.5%	8.8%
46-55	8.2%	7.0%
56-65	7.2%	6.4%
66-75	10.3%	12.9%
76-	23.2%	12.3%

Data source: MEPS

The Impact of Social Insurance

- Construct and compare a counterfactual economy with a floor \$100.

Statistic	Benchmark (with \$9700 floor)	Counterfactual (with \$100 floor)
Expected ave. lifetime utility	-1.59E-3	-1.57E-3
Welfare Consequence	n.a.	1.6%
% of working popu. with		
Individual HI	3.7%	18.2%
ESHI	52.7%	63.6%
Public HI	9.5%	$\leq$0.01%
No HI	34.1%	18.2%
ESHI take-up rate	92.9%	97.1%
ESHI premium	\$3323	\$3225
Social safety net tax rate τ_w	5.3%	$\leq$0.01%
Employment rate	72%	87%
Aggregate labor	0.89	0.95
Aggregate capital(in \$1000)	147	193
Output per person	\$41007	\$46755
Interest rate	3.2%	2.0%

Individual Welfare and Social Insurance

- Using consumption equivalent variation (CEV) as the welfare criteria.
  - CEV: the change in consumption each period required for a new born to achieve the same expected lifetime utility.
- Reducing the floor $\underline{c}$ from \$9700 to \$100,
  - generates a welfare loss of **1.6%** of consumption each period.
- Welfare result of social insurance by labor productivity.

Labor Productivity (from low to high)	1	2	3	4	5
Welfare gain/loss	-0.6%	0.9%	2.0%	2.8%	3.8%

Private Health Insurance and Social Insurance

- Large crowding out effect: as $\underline{c}$ is reduced from \$9700 to \$100,
  - % of working popu. with individual health insurance: 3.7%→18.2%.
  - % of working popu. with ESHI: 52.7%→63.6%.
- Crowding Out Effects by Labor Productivity

Labor Productivity Shock (from low to high)	1	2	3	4	5
Individual HI					
Benchmark	5.4%	4.6%	2.1	1.7%	3.0%
Counterfactual	33.8%	23.9%	10.9%	5.0%	2.6%
Employer-sponsored HI					
Benchmark	11.7%	46.8%	72.1	82.6%	87.5%
Counterfactual	38.2%	56.1%	73.9	84.1%	88.9%

Private Health Insurance and Social Insurance (continue)

- Important welfare implication: offsets the welfare gain from public insurance provided by Social Insurance.
- Experiment: fix the private health insurance choices, and then replicate the welfare analysis.
- Reducing the floor $\underline{c}$ from \$9700 to \$100 generates a *welfare loss* of **1.4%** of consumption each period.

Labor Supply and Social Insurance

- Large labor supply effect: as $\underline{c}$ increases from \$9700 to \$100,
  - Employment rate: 72%→87%. (Aggregate labor: 0.89 → 0.95.)
- Two sources of labor supply effect: (1) means-testing, (2) payroll tax.
  - Experiment: reduces $\underline{c}$ from \$9700 to \$100 while keeping payroll tax τ_w constant.
  - Labor supply effect: slightly smaller, employment rate: 72%→85%.
- Important welfare implication
- Experiment: replicate the welfare analysis while keep labor supply decisions constant.
- Reducing the floor $\underline{c}$ from \$9700 to \$100 generates a *welfare loss* of **4.4%** of consumption each period.

A Puzzling Fact about US Health Insurance Market

- A large number of Americans do not purchase any health insurance, i.e. 47 million.
- It has motivated many policy proposals.
- Should understand why, before designing any sensible policy.
- Gruber (2008): it is puzzling (at least quantitatively) after reviewing existing potential explanations
  - uncompensated care,
  - market frictions, etc.

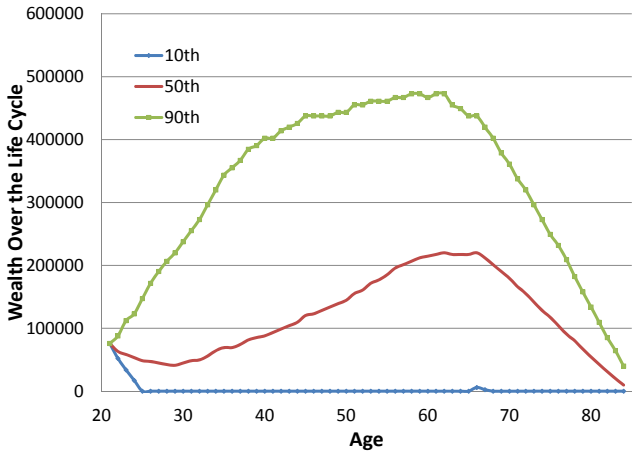
A Puzzling Fact (continue)

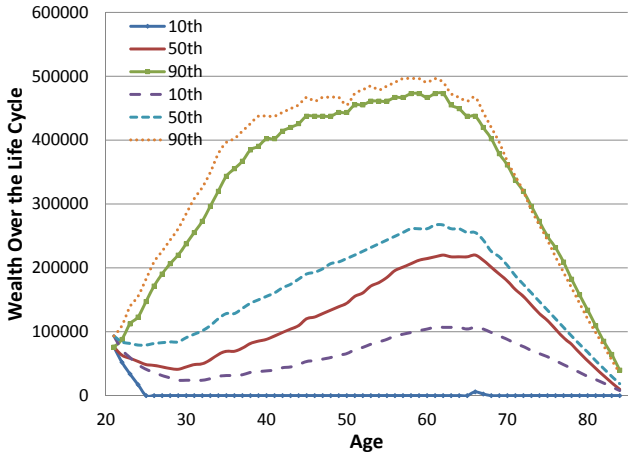
- This paper provides a promising explanation: the existence of means-tested social insurance.
  - Means-testing: implicit insurance to people who are now not qualified.
    - They would become qualified after being hit by large health shocks.
  - The implicit insurance from means-tested social insurance crowds out private health insurance.

- Quantitatively.
  - When reducing the floor $\underline{c}$ from \$9700 to \$100, % of working popu. without health insurance: 34.1% $\rightarrow$ 18.2%.
  - Approximately half of uninsured Americans are due to social insurance.

Saving and Social Insurance

- The seminal work by Hubbard, Skinner and Zeldes (1995):
  - Social insurance reduces precautionary saving.
  - The reason why many individuals do not save over the life cycle.
- My model differs along several dimensions: 1) general equilibrium, 2) endogenous health insurance, and 3) endogenous labor supply.
- Comparing to them. Do these results hold true here?





Saving and Social Insurance (continue)

- Comparing to Hubbard, Skinner and Zeldes (1995), the saving effect here is
  - is qualitatively similar,
  - but quantitatively much smaller.
- This is because of
  - general equilibrium effects
  - endogenous health insurance
- When the consumption floor is reduced from \$9700 to \$100,

Statistic	Aggregate capital (in \$1000)
Benchmark (GE and endo. HI)	147→193
PE model	147→213
Model (exog. HI)	147→210
Model (exog. labor)	147→193

Conclusion

- Means-tested social insurance generates a significant *welfare loss*.
  - Large crowding out effect on private health insurance.
  - Large negative labor supply effect.
  - Both are important for obtaining the welfare loss result.
- The model provides an quantitative explanation for a puzzling fact: a large number of Americans are uninsured.
  - Means-tested social insurance accounts for approximately half of the uninsured population.

- Future research: Europe has a higher consumption floor. Can the difference in means-tested social insurance account for the cross-country difference in labor supply. (e.g. Prescott (2004))

Literature Review

1. Hubbard, Skinner, Zeldes (1995): a life-cycle partial equilibrium model to quantify the effect of social safety net on precautionary saving.
   - This paper extends their model to a general equilibrium setting, and
   - endogenizes health insurance decision and labor supply decision.

2. Life-cycle models with incomplete markets and heterogenous agents.
   - Bewley (1986), Huggett (1993), Aiyagari (1994), Livshits, MacGee, and Tertilt (2007), etc.
   - Jeske and Kitao (2009), Pashchenko and Porapakkarm (2012), Hansen et al. (2012).
3. Public finance literature on the crowding out effect.
   - Cutler and Gruber (1996a,1996b), Brown and Finkelstein (2008), etc.