Evaluating Long-Term Care Policy Options, Taking the Family Seriously

Workshop on Long-Term Care at SCOR (Paris)

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Our question

What are the effects of long-term-care (LTC) policies?

- Evaluate policy options in the U.S. context based on . . .
  - Germany's public LTC insurance program, and
  - changes to the size in Medicaid spending
- . . . for:
  - families' behavior: will government insurance merely crowd-out family insurance?
  - labor supply of caregivers
  - the government budget
  - savings rates
  - welfare for young and old generations

Our main contributions

- Document importance of family-provided care and its economic correlates using the U.S. *Health and Retirement Survey* (HRS)
- Build fully-dynamic non-cooperative model with altruistically- and exchange-motivated transfers

  $\Rightarrow$ allows for savings for both child and parent
  (key for modeling means-tested Medicaid!)

  $\Rightarrow$ gives rise to variety of care arrangements and its financing
- Family as partial insurance against LTC risk

  $\Rightarrow$ implications for precautionary savings
- Calibrate model, using a quantitatively realistic life cycle, family, and risk structure

  $\Rightarrow$ analyze a set of policy reforms

  $\Rightarrow$ open up family margin in response to policy changes

Data summary I: Big picture

Sample: HRS (2000-2010) respondents with at least one helper due to functional limitations.

- Almost 2/3 of all hours of care are provided informally.
- Few heavy helpers provide lion's share of care:
  - Couple: spouse crucial.
  - Single: children and nursing homes are key.
- Determinants of informal care:
  - Presence of spouse/partner, children
  - Childrens' opportunity cost in labor market
  - Elderly's wealth: "threshold effect" at low wealth

Data summary II: Caregiving by children

Sample: *disabled* (90+ hours monthly care) widow(er)/single respondents

- Care arrangements:
  - 44.7% of respondents obtain informal care (most often from daughter)
  - 33.5% obtain Medicaid-financed nursing-home care
  - 21.8% are private payers of nursing-home care
- Typically one heavy-helper child
- Compensation of (heavy-helper) children for informal care:
  - Co-residence common: typically a transfer to child
  - Signing over home ownership during lifetime
  - Potential bequests: protect assets from spend-down!

  $\Rightarrow$ Rationalize through intra-family bargaining channel
- But: Heavy help also takes place without measurable compensation $\Rightarrow$ role for altruism

Empirical motivation for modeling

Our data suggests a model in which:

1. IC always a feasible choice, though provision is time-intensive
2. Vast majority of care goes to elderly with severe limitations
3. Informal caregiving centered on *one* caregiver (spouse, child)
4. IC more likely with low-opportunity-cost children
5. Caregiving children receive compensation

Model: Demographics

Continuous-time overlapping-generations (OLG) model:

- Population growth rate g
- Individuals have **two life stages**:
  1. Kid: 35 to 65 years old.
  2. Parent: 65 to 95 years old.
- Each **family** consists of two decision units:
  1. **Parent** generation of age $j_p \in [65, 95)$
     $\Rightarrow$ 1 household with male and female
  2. **Kid** generation of age $j_k = j_p - 30$
     $\Rightarrow 1 + \nu$ household, each with male and female
- **Generational transition**:
  - Parent dies for sure at $j_p = 95$.
  - Kid generation splits into $(1 + \nu)$ parent agents .
  - New kid generation is matched to them.

Parent generation

- Parent's state:
  1. age $j_p \in [65, 95)$,
  2. wealth $a^p \geq 0$,
  3. fixed productivity type $\varepsilon_p \in E \equiv \{e_1, \ldots, e_n\}$
  4. Disability state: $s \in \{0, 1\}$.
- Hazards for disability, death, and medical-spending shocks $\Rightarrow$ contingent on j^p, ε^p (and s)
- Care need for male is deterministic; male obtains exogenous fraction of care from spouse and remainder formally.

Kid generation

- Kid generation's state:
  1. age $j_k = j_p - 30$,
  2. wealth $a^k \geq 0$,
  3. productivity $\varepsilon_k \in E$.
- ε_k: Poisson process capturing earnings risk
- β: male earnings share $\Rightarrow$ Kid generation loses $(1 - \beta)$ of wage when providing informal care

Incomplete markets with altruistic agents

We build on `Barczyk & Kredler (2014a,b)`:

- a^p, a^k: Each generation saves in riskless asset
  - r: return
  - $\underline{a} = 0$: no-borrowing constraint
- $g^p, g^k \geq 0$: Agents can give **altruistically-motivated gifts** to each other
- **No commitment** to future actions $\Rightarrow$ **removes indeterminacy** in:
  - within-family wealth distribution
  - timing of transfers

$\Rightarrow$ **Equilibrium**: Gifts only flow when recipient is constrained.

Care decision

When $s = 1$, family chooses one of the following (**Nash bargaining** in each instant):

1. $h = 1$: **Informal care (IC)**.
   - Both parent and kid have to agree.
   - Monetary transfer $Q \geq 0$ from parent to kid
     $\Rightarrow$ determined by Nash bargaining

2. $h = 0$: **Formal care**
   Once $h = 0$ is chosen, parent decides:

   a) $m = 1$: **Medicaid (MA)**.
      - Parent must hand in all remaining wealth and pension flow.
      - Government provides consumption floor C_{ma}.

   b) $m = 0$: Buy **privately-paid care (PP)** on market.

Preferences

- **Flow felicity**:
  - Healthy parents and kids: $u^i(c_i) = c_i^{1-\gamma}/(1-\gamma)$
    $\Rightarrow$ adjust for generation size and household economies of scale
  - Disabled parents:

$$u^p(\cdot) = \begin{cases} u(c^p) & \text{if IC,} \\ u(c^p - C_f) & \text{if PP,} \\ u(C_{ma}) & \text{if MA.} \end{cases}$$

  where C_f: utility penalty in PP.

- **Flow utility**: Imperfect altruism.

$$U^k = u^k + \alpha^k u^p, \qquad U^p = u^p + \alpha^p u^k.$$

  where $\alpha^p, \alpha^k \in [0,1]$.

- Both agents discount at common rate $\rho > 0$.

Production

There are two competitive sectors with constant-returns-to-scale technologies in labor:

1. consumption good (numeraire)
2. nursing homes: care services at price p_{bc}
   $\Rightarrow$ We interpret $p_{bc} + c^p$ as private-pay (PP) nursing-home expenditures.

Government

The government runs a balanced budget with the following items:

1. Regular policy:
   1.1 Income taxation
   1.2 Social-security contributions and benefits
   1.3 Covering medical shocks for broke agents
   1.4 Other expenditures (fixed)
2. LTC policy:
   2.1 $p_{bc} + y_{ma}$: expenditures for MA nursing-home slot
   2.2 s_{ic}: IC subsidy (to caregiver)
   2.3 s_{pp}: PP subsidy (to parent)

Timing HJBs Eq'm Def'n

Characterizing the care decision

Proposition: Suppose $a^p > 0$, $a^k > 0$. Then:

- The kid's *reservation transfer* to give IC is

$$\underline{Q}^k = \frac{(\Delta y_{ic} - s_{ic}) V^k_{a^k} - (\bar{C}_f + p_{bc} - s_{pp}) V^k_{a^p}}{\underbrace{V^k_{a^k} - V^k_{a^p}}_{>0}}$$

- The parent's *willingness to pay* for IC is

$$\bar{Q}^p = \frac{(\bar{C}_f + p_{bc} - s_{pp}) V^p_{a^p} - (\Delta y_{ic} - s_{ic}) V^p_{a^k}}{\underbrace{V^p_{a^p} - V^p_{a^k}}_{>0}}.$$

- **IC takes place iff** $\bar{Q}^p \geq \underline{Q}^k$, and the equilibrium transfer being

$$Q^* = \max\left\{0, \omega \bar{Q}^p + (1-\omega)\underline{Q}^k\right\}.$$

Calibration: direct identification

- Estimate directly from HRS:
  - Disability hazards
  - Death hazards
  - Medical-expenditure process
- From government statistics:
  - $p_{bc} + y_{ma}$: Medicaid reimbursement rate
  - p_{bc}: care-related nursing-home cost
  - Taxes and social-security system
- Standard: Productivity process (based on U.S. Census, 2000).

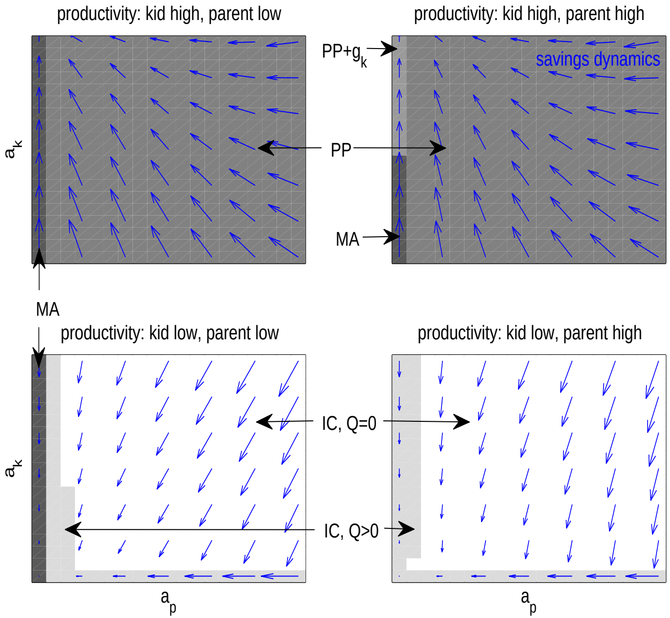
Calibration targets and identification

Calibration target	Data	Model
Median wealth (ages 70-75)	\$178,600	\$178,600
Informal care	44.7%	44.7%
Total PP/MA spending	0.821	0.821
Parent (healthy) gift	\$1,548	\$1,548
Kid gift to parent (PP)	\$620	\$620
Exchange transfer	\$9,878	\$9,878
Parameter	**Description**	**Value**
ρ	Discount rate	0.1280
$\bar{C}_f$	Formal-care consumption penalty	\$4,050
C_{ma}	Medicaid consumption floor	\$4,650
α^p	Parent altruism	0.4781
α^k	Kid altruism	2.7×10^{-4}
ω	Kid bargaining weight	0.050

Notes: coefficient of relative risk aversion is $\gamma = 3.8$ following De Nardi et al. (2010)

- median wealth $\Rightarrow$ rate of time preference ρ
- percentage of IC recipients $\Rightarrow$ consumption penalty from nursing home $\bar{C}_f$
- ratio total PP/MA spending $\Rightarrow$ consumption floor C_{ma}
- mean gifts from and to healthy parents $\Rightarrow$ altruism α^k, α^p
- exchange transfer $\Rightarrow$ kid's bargaining weight ω

The model in action: care choices and dynamics



Policy experiments I: Subsidies (non-means-tested)

Amounts based on Germany's LTC policy:

(1) Informal care (IC) subsidy (s_{ic}): \$4,375 per year

(2) Private-payer (PP) subsidy (s_{pp}): \$11,460 per year

	Care type (%)			Costs (as $\Delta\tau$)				Ex-ante CEV	
LTC policy	IC	MA	PP	$\Delta\tau =$	$\Delta\tau_s$	$\Delta\tau_{ma}$	$\Delta\tau_{inc}$	short run	long run
Status quo	44.7%	33.5%	21.8%						
$s_{ic}\uparrow$	59.0	23.6	17.4	0.11	0.25	-0.20	0.06	**0.380**	**-0.033**
$s_{ic}\uparrow$ (to young)	59.0	23.6	17.4	-0.01	0.13	-0.20	0.06	0.323	0.012
$s_{pp}\uparrow$	23.6	32.1	44.3	0.22	0.32	-0.03	-0.07	-0.098	-0.275
$s_{ic}\uparrow + s_{pp}\uparrow$	44.0	22.9	33.1	0.25	0.47	-0.21	-0.01	**0.352**	**-0.193**

Notes: IC = informal care; MA = Medicaid; PP = private payer; CEV: consumption equivalent variation.

- $s_{ic}\uparrow$ strongly crowds-in IC and crowds-out MA:
  - cost of subsidy $\Rightarrow$ tax hike
  - less reliance on Medicaid $\Rightarrow$ tax cut
  - less labor supply $\Rightarrow$ tax hike
- $s_{pp}\uparrow$ crowds-out IC, but crowds-out MA only slightly
- $s_{ic}\uparrow + s_{pp}\uparrow$ leaves IC unchanged, crowds-out MA, crowds-in PP

mechanisms

Policy experiments II: Changes to Medicaid

Changes to Medicaid: 20% change in y_{ma}.

Assumption: C_{ma} changes by the same percentage.

	Care type (%)			Costs (as $\Delta\tau$)				Ex-ante CEV	
LTC policy	IC	MA	PP	$\Delta\tau =$	$\Delta\tau_s$	$\Delta\tau_{ma}$	$\Delta\tau_{inc}$	short run	long run
Status quo	44.7%	33.5%	21.8%						
MA↑	40.3	40.2	19.5	0.20		0.21	-0.01	0.111	-0.361
MA↓	50.1	25.5	24.4	-0.22		-0.20	-0.02	-0.360	0.288
MA↓+s_{ic} ↑	62.8	18.1	19.2	-0.03	0.26	-0.34	0.05	**0.221**	**0.300**

Notes: IC = informal care; MA = Medicaid; PP = private payer; ; CEV: consumption equivalent variation.

- MA↑ crowds-out IC but does not help to expand tax base from additional labor supply
- MA↓ crowds-in IC, taxes fall – but not enough to avoid welfare loss in short run
- MA↓ + s_{ic} ↑ crowds in IC substantially at expense of MA ⇒ welfare gains across board

Changes to Medicaid: Heterogeneity in welfare gains

CEV for currently-alive generations (children and parents)

	$MA\downarrow$				$MA\downarrow + s_{ic}\uparrow$			
	children		*parents*		*children*		*parents*	
group	average	% + for	average	% + for	average	% + for	average	% + for
all	-0.889	3.5%	-3.907	6.4%	+0.374	82.3%	+0.451	75.3%
below 80	-0.415	7.1%	-3.269	6.5%	+0.367	91.5%	+0.571	77.0%
above 80	-1.175	0.0%	**-5.728**	6.2%	+0.566	88.7%	+0.109	70.7%
low-prod kid	-1.360	5.1%	-4.779	0.0%	+0.235	66.3%	+0.583	74.0%
high-prod kid	-0.415	1.5%	-2.864	15.3%	+0.484	94.3%	+0.736	78.1%
low-prod parent	-0.784	8.0%	**-6.896**	0.1%	+0.377	85.0%	**-1.669**	49.5%
high-prod parent	-0.478	1.0%	-1.240	14.7%	+0.387	92.0%	+2.340	97.6%

Notes: average is over CEV. "% + for" means fraction out of the group with positive CEV.

- MA↓ widespread welfare losses, especially for poor and old
- MA↓ + $s_{ic}\uparrow$ most welfare losses are undone. Exception: low-productivity parents.

Conclusions

- *Empirical*: Importance of informal caregiving and economic determinants of informal care in the U.S.
- *Theoretical*:
  1. `Barczyk & Kredler (2014a,b)`:
     - **Determinacy** for intra-family wealth distribution and transfers
     - **Both agents** can save.
  2. This paper:
     - Calibrated quantitative OLG model
     - Both altruistically-motivated **and** exchange-motivated transfers
     - Variety of empirically plausible **care arrangements**
- *Policy*:
  1. MA-spending-cut: increases IC and decreases payroll tax; disliked by current generations but liked by future generations
  2. MA-spending-cut with IC subsidy: strong increase in IC and large decrease in MA; **cheap policy**, liked by majority of current and future generations
  3. German-style policy (menu of IC and PP subsidy): very popular among current generations, but largest tax hike.
     Better: only IC subsidy (PP subsidy benefit those who need it least)

Extra slides

Literature

1. Macro literature on old-age risks: no family
    - *Retirement savings puzzle*
        - Medical-expense risk
          Hubbard et al. (1995), DeNardi et al. (2010)
        - LTC is major uninsured financial risk
          Brown & Finkelstein (2007, 2008, 2011), Finkelstein & McGarry (2006)
        - *Medicaid aversion* (survey evidence)
          Ameriks et al. (2011)
        - Nursing-home risk drives precautionary savings
          Kopecky & Koreshkova (2014)
    - Analysis of Medicare and Medicaid policy
      Attanasio et al. (2011), DeNardi et al. (2013), Braun et al. (2015)
2. Applied micro literature: care crowds out labor supply of females ⇒ macro implications not studied
   Johnson & Sasso (2006), Van Houtven et al. (2013), Skira (2014)

⇒ **We aim to bring together 1. and 2.**

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Timing protocol (at each t)

stage 1	Family decides on IC (Nash bargaining, transfer $Q \geq 0$)
stage 2	Altruistic gifts are given (especially relevant if no IC)
stage 3	No IC: parent decides if Medicaid or private-pay nursing home
stage 4	Consumption-savings decision (unless in Medicaid)

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Hamilton-Jacobi-Bellman (HJB) equations

- States:
  1. j: parent's age
  2. $x = (a^k, a^p, \varepsilon^k, \varepsilon^p)$: family's financial state
  3. $s \in \{0,1\}$: LTC need if $s = 1$
- If $a^p > 0$, $a^k > 0$ (no gifts, no Medicaid):

$$\rho V^k(j,x,1) = V_j^k + \max_{c^k,h^k}\left\{u^k(c^k) + \alpha^k u^p(c^p;\cdot) + \dot{a}^k V_{a^k}^k + \dot{a}^p V_{a^p}^k\right\} + JT^p,$$

$$\rho V^p(j,x,1) = V_j^p + \max_{c^p,h^p}\left\{u^p(c^p;\cdot) + \alpha^p u(c^k) + \dot{a}^p V_{a^p}^p + \dot{a}^k V_{a^k}^p\right\} + JT^k,$$

$$\text{s.t.} \quad h = h^k h^p,$$

$$\dot{a}^k = ra^k + wy(j,\varepsilon^k)(1+\nu) + h[Q + s_{ic} - (1-\beta)w(j,\varepsilon^k)] - c^k,$$

$$\dot{a}^p = ra^p + n^p P(\varepsilon^p) - hQ - (p_f - s_{pp})(1-h) - c^p - M^p.$$

- When healthy ($s = 0$): remove red terms, add terms for LTC hazard.
- Constrained case ($a^p = 0, a^k = 0$): also altruistic gifts g^k, g^p.

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Equilibrium definition

A recursive **Markov-perfect equilibrium** is given by value functions for the kid, V^k, and the parent, V^p, policy rules for the kid, $\{g^k, c^k\}$, and the parent, $\{g^p, m, c^p\}$, an informal-care (IC) rule, h, and a transfer function, Q^*, such that:

Given prices and a government policy, $\{s_{ic}, s_{pp}, C_{ma}\}$,

1. the value function V^p satisfies the parent's HJB, the maximum being attained by the policies $\{g^p, m, c^p\}$, taking as given the kid's policy rules, $\{g^k, c^k\}$;
2. the value function V^k satisfies the kid's HJB, the maximum being attained by the policies $\{g^k, c^k\}$, taking as given the parent's policy rules, $\{g^p, m, c^p\}$;
3. the IC decision rule, h, and the transfer rule, Q^*, are the Nash-bargaining solution between kid and parent.

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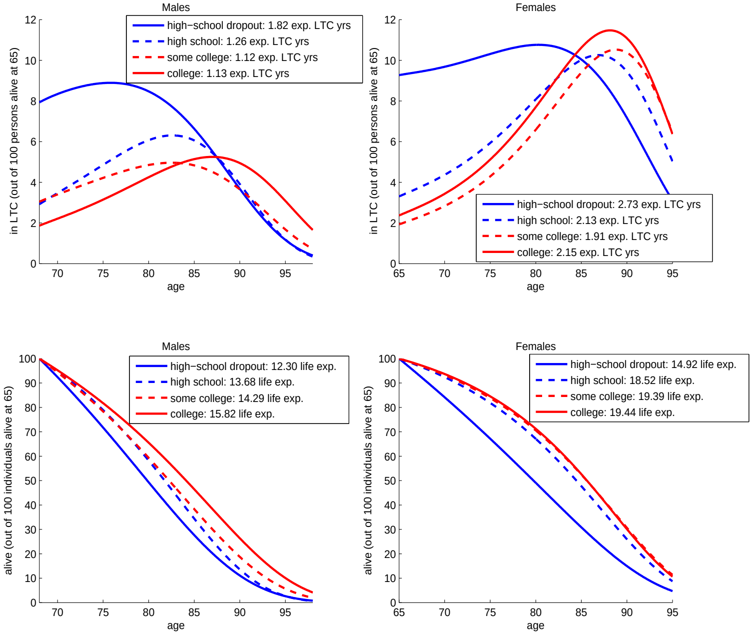
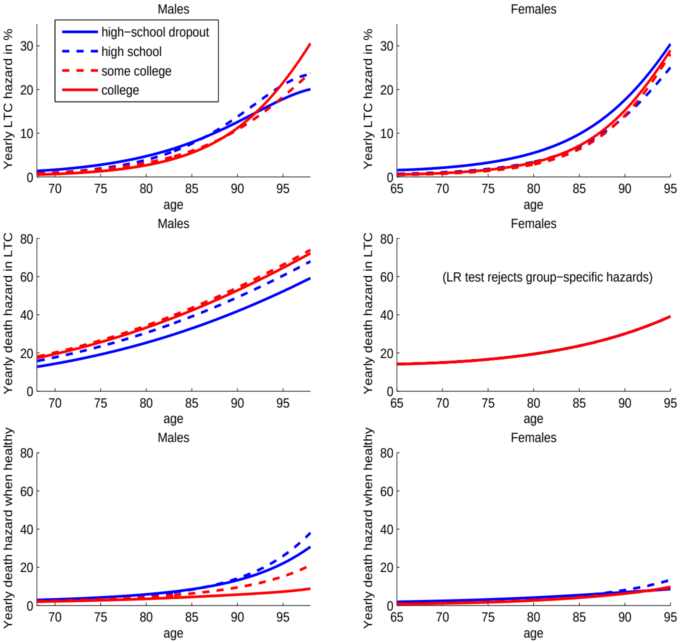

Males
high−school dropout: 1.82 exp. LTC yrs
high school: 1.26 exp. LTC yrs
some college: 1.12 exp. LTC yrs
college: 1.13 exp. LTC yrs
in LTC (out of 100 persons alive at 65)
age
Females
high−school dropout: 2.73 exp. LTC yrs
high school: 2.13 exp. LTC yrs
some college: 1.91 exp. LTC yrs
college: 2.15 exp. LTC yrs
in LTC (out of 100 persons alive at 65)
age
Males
high−school dropout: 12.30 life exp.
high school: 13.68 life exp.
some college: 14.29 life exp.
college: 15.82 life exp.
alive (out of 100 individuals alive at 65)
age
Females
high−school dropout: 14.92 life exp.
high school: 18.52 life exp.
some college: 19.39 life exp.
college: 19.44 life exp.
alive (out of 100 individuals alive at 65)
age



Males
Females
high−school dropout
high school
some college
college
Yearly LTC hazard in %
Yearly death hazard in LTC
Yearly death hazard when healthy
(LR test rejects group−specific hazards)
age

Table: Females: life expectancy at age 65 by educational attainment.

Source	$<$ high school	high school	some college	college
Data	14.92	18.52	19.39	19.44
Model	15.79	18.94	19.64	19.76

Table: Females: expected duration of LTC, conditional on LTC, by educational attainment.

Source	$<$ high school	high school	some college	college
Data	2.73	2.13	1.91	2.15
Model	2.35	1.98	1.83	2.05

Table: Males: life expectancy at age 65 by educational attainment.

Source	$<$ high school	high school	some college	college
Data	12.30	13.68	14.29	15.82
Model	12.86	13.94	14.60	16.03

Table: Males: expected duration of LTC, conditional on LTC, by educational attainment.

Source	$<$ high school	high school	some college	college
Data	1.82	1.28	1.12	1.13
Model	1.48	1.15	1.01	1.07

Welfare mechanisms: Add one friction at a time

1. **Complete markets and contracts**/utilitarian planner: No MA, sets $s_{ic} = s_{pp} = 0$.

$$h_{sp} = 1 \qquad \text{iff} \qquad w_g(1-\beta) < p_{bc} + C_f.$$

2. **Distortionary taxation** of labor: Efficient family decision:

$$h = 1 \qquad \text{iff} \qquad w_n(1-\beta) + s_{ic} < p_{bc} - s_{pp} + C_f$$

   $MPC_{ic} < MPC_{pp} \Rightarrow s_{pp}$ good, s_{ic} bad – but quantitatively weak.

3. **No insurance markets**: s_{ic}, s_{pp}, MA all good...
   ...but s_{ic} and MA target the vulnerable.
4. **Medicaid**: Means test distorts savings (+ technologically inferior)
5. **No commitment within family**: Kid wants to shirk when $s = 1$
   - Rich families solve problem by wealth accumulation: Bequest induces IC, otherwise resource transfer to parent in PP (no bequest!)
   - Poor parents don't save – s_{ic} helps to overcome commitment issues.

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