Long-Term Care Insurance with State-Dependent Preferences

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SCSE, Août 2021

Introduction

- Long Term Care: "the day-to-day help with activities such as washing and dressing, or help with household activities such as cleaning and cooking"
- Long Term Care Insurance Puzzle: *Why is there so little LTC insurance, even though risk is high (30% to 50%) and LTC is costly (thousands of per month)?*
- Lot of literature, many reasons, *on supply side* (adverse selection, rationing effects which increase prices) and *demand side* (crowding out from social programs, substitution with informal family care, risk misperceptions, bequest motives, lack of knowledge of the product and of the LTC costs and institutional support, narrow framing)

Introduction

- **One additional reason: state-dependent preferences.**
  Many goods/services less attractive/more difficult to consume when dependent (travel, restaurant, leisure,...).

- But other factor : **change in the composition of consumption**, with LTC (including health) consumption more important.

- Aggregate effect of dependency on marginal utility of income at equilibrium not clear.

- State-dependency studied in several empirical papers but not so much in theoretical literature.

- Empirical papers (Finkelstein *et al.* (2013), Hong *et al.* (2015), Koijen *et al.* (2016)) suggest that marginal utility of income is lower when dependent, at equilibrium.

Our Objective

1. better understand impact of state-dependency on LTC insurance and consumption behavior (as opposed to, say, actuarial unfairness),

2. and to link with empirical literature/obtain testable implications.

The Model (1)

- Two states of the world: a(utonomous) and d(ependent).
- Two goods: daily-life consumption c and LTC (including health) consumption z.
- The agent's utility when autonomous is

$$U_a(c, z) = u_a(c)$$

  while it is

$$U_d(c, z) = u_d(c) - h(z)$$

  when dependent.
- In case of dependency, $h(z)$ accounts for the health status of the individual.

The Model (2)

- The utility of "daily-life" consumption is *state-dependent* with

$$\begin{aligned} u_i'(.) &> 0, u_i''(.) < 0\,,\ \forall i \in \{a,d\}, \lim_{c\to 0} u_i'(c) = \infty, \\ u_a(x) &> u_d(x) \text{ and } u_a'(x) > u_d'(x). \end{aligned}$$

- We assume $h(z) \geq 0$, $h'(z) \leq 0$, $h''(z) \geq 0$ and $h'(0) \to -\infty$.

- Individuals differ in income w, with same probability p of dependence.

The Model (3)

- They buy LTC insurance: premium t, and transfer $\kappa\frac{t}{p}$ if dependent, with $\kappa \leq 1$ is the degree of actuarial fairness.

- They choose LTC insurance (t) and health expenditures (z) to maximize

$$EU(t,z) = (1-p)u_a(c_a) + p[u_d(c_d) - h(z)],$$

where $c_a = w - t$ is consumption if autonomous while $c_d = w - t + \kappa\frac{t}{p} - z$ is consumption if dependent.

Main results: LTCI coverage is always at most partial

- **Proposition 1: Some agents do not buy any insurance and no one buys full insurance ($c_a^* > c_d^*$), even if $\kappa = 1$.**
  FOC for t is

$$\frac{\partial EU}{\partial t} = (\kappa - p)u_d'(c_d) - (1-p)u_a'(c_a) \leq 0.$$

  $\longrightarrow$ Equilibrium insurance transfer only covers part of LTC expenditures (no difference between US-style and Canada-style contracts).

Main results: comparative statics with respect to w

- **Proposition 2** shows that LTC expenditures z^*, z^0 are a normal good, as well as non-LTC expenditures $c_d^*, c_a^*, c_d^0, c_a^0$,
  ... but that the amount of insurance t^* need not increase with income, unlike with non state-dependent preferences.

$$\begin{aligned}\frac{\partial^2 EU}{\partial t \partial w} &= \left[(\kappa - p)u_d''(c_d^*) - (1-p)u_a''(c_a^*)\right] - (\kappa - p)u_d''(c_d^*)\frac{dz^*}{dw} \\ &= (\kappa - p)\{u_d'(c_d^*)[R_a^A(c_a^*) - R_d^A(c_d^*)] - u_d''(c_d^*)\frac{dz^*}{dw}\}\end{aligned}$$

- 2 effects at play:
  - *A direct effect* of w on t^*: increase in w affects the balance of marginal utilities across states $\rightarrow$ ambiguous,
  - *An indirect effect*: w increases z^* and calls for higher insurance levels $t^* \rightarrow$ positive.
- When preferences are not state-dependent **and** insurance is actuarially fair, the first term disappears $\Rightarrow$ t^* increases with w.

Main results: comparative statics with respect to w

- **Proposition 3**: The insurance rate ($\tau^* = t/w$) need not decrease nor increase
- depends on relative risk aversion coefficients, and on income elasticities of health expenditures.

Main results: comparison of equilibrium marginal utilities across states (1)

- Utilities across states:

$$V_a = u_a(c_a^*) = u_a(w_a). \quad (1)$$
$$V_d = u_d(c_d^*) - h(z^*) = u_d(w_d - z^*) - h(z^*), \quad (2)$$

with the income in each state of nature being:

$$w_a = w - t^*,$$
$$w_d = w - t^*(1 - \frac{\kappa}{p}).$$

- This leads to

$$\frac{1-p}{\kappa - p}\frac{dV_a}{dw_a} = \frac{1-p}{\kappa - p}u_a'(c_a^*) \geq u_d'(c_d^*) = \frac{dV_d}{dw_d}, \quad (3)$$

with a strict inequality only if $t^* = 0$.

Main results: comparison of equilibrium marginal utilities across states (1)

- **Proposition 4**: The only case where marginal utility of income is lower when dependent **at equilibrium** is when (i) preferences are state-dependent, and (ii) no insurance is bought at equilibrium.

- Degree of actuarial fairness plays no role.

- **Intuition**: if agents buy insurance with state-dependent preferences, either they equalize marginal utilities (if $\kappa = 1$) or end up with **higher** marginal utility when dependent if $\kappa < 1$.

- **Prop. 4 is consistent with empirical evidence**:
  Finkelstein et al. (2013) prove that marginal utility of income when dependent is lower. This implies that 1) few people buy insurance in equilibrium and 2) preferences are state-dependent.

Iso-elastic utility functions (1)

- Then we move closer to the empirical literature, and assume iso-elastic utilities for both types of consumption:

$$u_d(x) = \gamma u_a(x)$$

where $\gamma \in]0, 1[$ is the same for all agents, with

$$u_a(x) = \frac{x^{1-\beta}}{1-\beta},$$

and $\beta < 1$.

$$h(z) = A - \frac{z^{1-\alpha}}{1-\alpha},$$

where A is a large positive constant and $\alpha < 1$.

Iso-elastic utility functions (2)

- We follow the empirical literature (see Bajari *et al.*, 2014; De Nardi *et al.*, 2016 and Achou, 2020) and assume that *the relative risk aversion coefficient regarding health/LTC expenditures is higher than the one regarding non-LTC consumption* : $\beta < \alpha$.

- We show that this generates *a low elasticity of LTC expenditures to income*, which is confirmed empirically by Blundell *et al.* (2020)

- **Proposition 6:** the share of premium in income ($\tau^* = t^*/w$) decreases with w up to a threshold $\tilde{w}$ above which $\tau^* = 0$.

- Gives testable implication.

- Existing empirical literature has looked at the *fraction* of people *holding* LTC insurance by wealth/income decile, but not at the *amount* of LTC insurance.

Conclusions

- Lower marginal utility of daily-life consumption when dependent (for any given consumption level) can explain why agents do not insure or under-insure.
- Results robust to the degree of actuarial fairness of LTC insurance contracts.
- At equilibrium, lower marginal utility of income when dependent necessitates state-dependence of utilities (for given consumption levels) + no insurance.
- Share of LTC insurance in income should decrease with income.