

Long-term Care Insurance, Annuities, and the Under-Insurance Puzzle

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May 25, 2015

Long-term Care Background

- Need long-term care (LTC) if need help with the activities of daily living (ADL)
- ADL include: eating, dressing, bathing, walking across a room, and getting in or out of bed
- In U.S., public provision of long-term care when in need of help with ADL is complicated—LTC is not a typical health expenditure covered by Medicare

LTC Costs Can Be Large

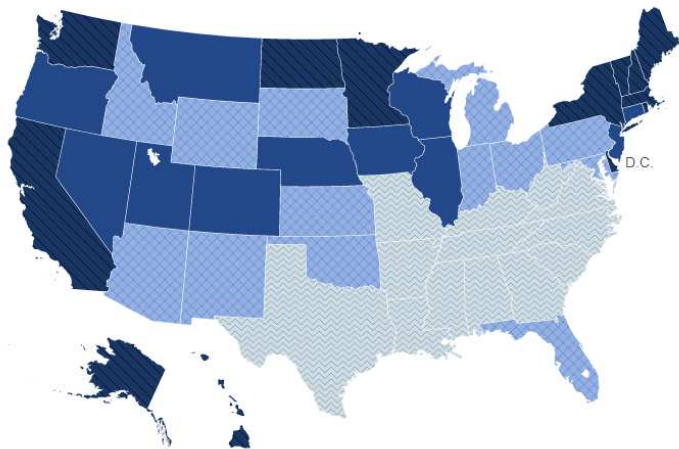
\$34,320 - \$41,756 annually

\$41,756 - \$45,760 annually

\$45,760 - \$50,222 annually

\$50,222 - \$57,200 annually

Home Health Aide

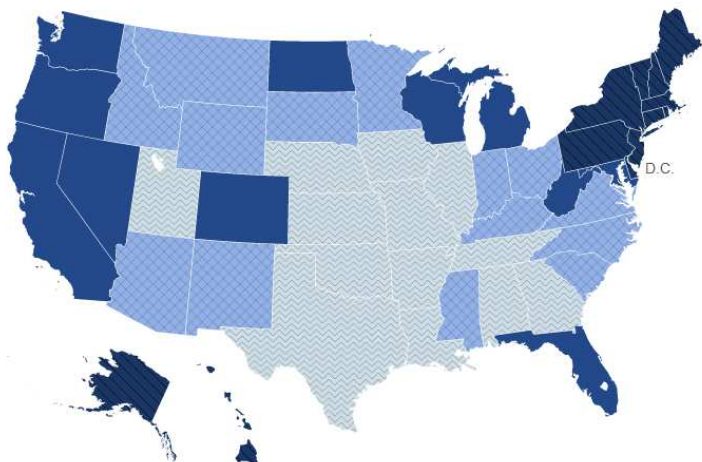


Data Source: Genworth Cost of Care Study 2013

LTC Costs Can Be Large



Nursing Home (Private Roo... ▾



Private Long-term Care Insurance

- Private LTC insurance held by less than 10% of population
 - Low demand for good available insurance product?
 - High demand for good unavailable insurance product?
- Long-term care insurance market
 - Escalating premiums
 - Poor reimbursement model
 - High loads
- Room for improvement?
 - Depends on counterfactual demand

Outline

- Motives and Model
 - Same insurance product in model and data?
- Survey Methods
 - Survey questions to estimate individual-specific preference parameters
 - Survey questions to directly elicit demand for insurance
- Compare model-implied and direct measures of insurance demand
- Main finding: lower demand for good LTCI than models imply (both LTCI and annuities) and higher demand than current holdings suggest

Drivers of Savings and Insurance Purchases

- High LTC costs
 - Brown and Finkelstein (2008)
 - De Nardi, French, and Jones (2010)
- Strong bequest motive
 - Kotlikoff and Summers (1981), Lockwood (2014)
 - Luxury (De Nardi (2004))
- State-dependent utility
 - How do people value expenditure across health states?
 - Arrow (1974), Finkelstein, Luttmer, Notowidigdo (2013), Koijen, Van Nieuwerburgh, Yogo (2015), Ameriks, Briggs, Caplin, Shapiro, Tonetti (2015a)
- Heterogeneity: observables and unobservables

Health and Government

- Health transitions conditional on age, health, and gender $\pi(s'|t, s, g)$
 - Good health ($s=0$)
 - Sick ($s=1$)
 - In need of LTC ($s=2$)
 - Dead ($s=3$)
- A retiree can choose to utilize means tested government care
 - If in good or poor health ($s = 0, 1$), then $c = \omega_G$ and $a' = 0$
 - If in need of LTC ($s = 2$), then $e_{LTC} = \psi_G$ and $a' = 0$

Health-dependent Utility Functions

- Healthy or Sick ($s=0,1$)

$$U(c) = \frac{c^{1-\sigma^i}}{1-\sigma^i}$$

- Need LTC ($s=2$)

$$U(e_{LTC}) = \theta_{LTC}^i \frac{(e_{LTC} + \kappa_{LTC}^i)^{1-\sigma^i}}{1-\sigma^i}$$

- Bequests ($s=3$)

$$v(b) = \theta_{beq}^i \frac{(b + \kappa_{beq}^i)^{1-\sigma^i}}{1-\sigma^i}$$

The Vanguard Research Initiative

- Difficult to separately identify motives using standard HRS data on wealth (weak identification of preference parameters)
- Need to engineer questions to separate motives
- Need for appropriate sample
- Vanguard Research Initiative (VRI)
- Website: <http://ebp-projects.isr.umich.edu/VRI/>

Strategic Survey Questions

- Strategic Survey Questions (SSQs) are designed to provide data on preferences using answers to strongly identifying hypothetical questions
- The structure of SSQs:
 - describe hypothetical environment
 - describe hypothetical state
 - describe hypothetical future
 - describe hypothetical choice set
 - verify understanding
 - record a choice
- Simple CRRA lottery example

SSQ Method

- Illustrate for trade off ADL state ($s = 2$) and healthy state ($s = 0$)
- Specify wealth (W), chance LTC needed ($1 - \pi$)
- Choice set: Arrow securities (x_1, x_2) given a relative price of x_2 (p_2)
 - In the survey, we set $p_2 = \frac{1}{1-\pi}$.

SSQ 2 Math Problem

- The maximization problem:

$$\begin{aligned} \max_{x_1, x_2} \quad & \pi \frac{x_1^{1-\sigma}}{1-\sigma} + (1-\pi) \frac{\theta_{LTC} (x_2 + \kappa_{LTC})^{1-\sigma}}{1-\sigma} \\ & x_1 + p_2 x_2 \leq W \\ & x_1, x_2 \geq 0; \quad x_2 \geq -\kappa_{LTC}. \end{aligned}$$

SSQ 2 Word Problem: Environment

Suppose you are 80 years old, live alone, rent your home, and pay all your own bills. Now, suppose that there is a chance that you will need help with ADLs in the next year. If you need help with ADLs you will need long-term care.

- There is a **25%** chance that you **will** need help with ADLs for all of next year.
- There is a **75%** chance that you **will not** need any help at all with ADLs for all of next year.

You have **\$100,000** to divide between two plans for the next year. This choice will affect your finances for next year alone. At the end of next year you will be offered the same choice with another \$100,000 for the following year.

SSQ 2 Word Problem: Choice

- Plan C is hypothetical ADL insurance that gives you money if you **do** need help with ADLs.
 - For every \$1 you put in Plan C, you will get **\$4** to spend if you need help with ADLs.
 - From that money, you will need to pay all your expenses including long-term care at home or in a nursing home and any other wants, needs, and discretionary purchases.
- Plan D gives you money only if you **do not** need help with ADLs.
 - For every \$1 you put in Plan D, you will get **\$1** to spend if you **do not** need help with ADLs.
 - From that money, you will need to pay for all of your wants, needs, and discretionary purchases.

SSQ 2 Word Problem: Rules

Here are the rules for this scenario.

- You can only spend money from Plan C or Plan D next year. You do not have any other money.
- If you want to be able to spend whether or not you need help with ADLs, you need to put money into both plans.
- If you need help with ADLs, all money in Plan D is lost.
- If you do not need help with ADLs, all money in Plan C is lost.
- Any money that is not spent at the end of next year cannot be saved for the future, be given away, or be left as a bequest

SSQ 2 Word Problem: Rules

- You must make your choice before you know whether you need help with ADLs. Once you make your choice, you cannot change how you split your money.
- Regardless of whether or not you need help with ADLs, your hospital, doctor bills, and medications are completely paid by insurance.
- Other than Plan C, you have no other resources available to help with your long-term care. **You** have to pay for any long-term care you may need from Plan C.
- There is **no public-care option or Medicaid** if you do not have enough money to pay for a nursing home or other long-term care.
- An impartial third party that you trust will verify whether or not you need help with ADLs immediately, impartially, and with complete accuracy.

Comprehension Check

Subset of stated comprehension questions:

- Money in Plan C is available
 - Only if you do not need help with ADLs
 - Only if you do need help with ADLs
 - Whether or not you need help with ADLs
 - Neither if you need help with ADLS or do not
- If you cannot take care of yourself next year, can anyone take care of you for free?
 - Yes
 - No

Recording a Response: SSQ 2 Slider

[Click here for complete scenario](#)

Please make your decision on splitting money into Plan C and Plan D by clicking on the scale below. To put more money in Plan C, move the slider to the left. To put more money in Plan D, move the slider to the right. The numbers in the boxes will change as you move the slider to let you know how much you will receive if you need long term care and if you do not.

Please move the slider to see how it works. When you are ready, place the slider at the split you want and click NEXT to enter your choice.



Plan C
\$120,000

You will have the
above amount if you
need help with ADLs.

Plan D
\$70,000

You will have the
above amount if you
do not need help with
ADLs.

SSQ 3 Math Problem

- SSQ 3 on LTC vs. bequests
- Seek to specify the following optimization problem:

$$\max_{\{x_1, x_2 | x_1 + x_2 = W\}} \frac{\theta_{LTC}(x_1 + \kappa_{LTC})^{1-\sigma}}{1-\sigma} + \frac{\theta_{beq}(x_2 + \kappa_{beq})^{1-\sigma}}{1-\sigma}$$
$$x_1, x_2 \geq 0; \quad x_1 \geq -\kappa_{LTC}; \quad x_2 \geq -\kappa_{beq}.$$

- Use $W = \$100,000; \$150,000; \$200,000$

SSQ 3 Word Problem

Suppose you are 85 years old, live alone, rent your home, and pay all your own bills. You know with certainty that you will live for only 12 more months and that you will need help with *ADLs for the entire 12 months.

You have **\$100,000** that you need to split into Plan E and Plan F.

- Plan E is reserved for your spending. From Plan E, you will need to pay all of your expenses, including long-term care and any other wants, needs, and discretionary purchases.
- Plan F is an irrevocable bequest.

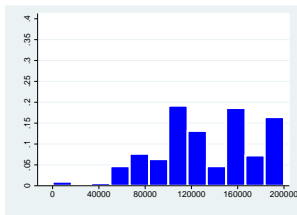
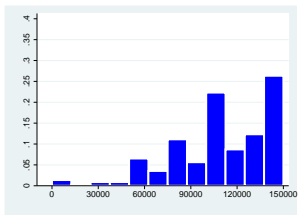
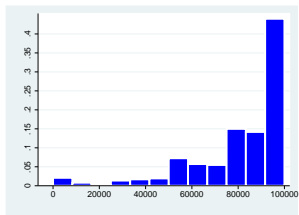
SSQ 3 Rules

Here are the rules for this scenario.

- You have no money other than the \$100,000.
- Other than Plan E, you have no other resources available to help with your long-term care. You have to pay for any long-term care you may need from Plan E.
- Any money in Plan E that you do not spend cannot be given away or left as a bequest.
- You have full insurance that covers all of your hospital, doctor, and medications, but you have no long-term care insurance.
- There is no public-care option or Medicaid if you do not have enough money to pay for a nursing home or other long-term care.

SSQ 3 Response Histogram

- Explore credibility of SSQ responses
- As in Manski 2004 on probabilities, look for internal coherence.



Respondents' Understanding

- Three interesting “post-survey” questions

Overall, how clear were the tradeoffs that the hypothetical scenarios asked you to consider?		Overall, how well were you able to place yourself in the hypothetical scenarios and answer these questions?		How much thought had you given to the issues that the hypothetical scenarios highlighted before taking the survey?	
Response	Percent	Response	Percent	Response	Percent
Very Clear	51.8	Very Well	23.1	A lot of thought	29.5
Somewhat Clear	39.7	Moderately Well	60.5	A little thought	52.1
Somewhat Unclear	7.4	Not very well	14.2	No thought	18.4
Very Unclear	1.1	Not very well at all	2.2		

Model-implied ADLI Demand

- Use SSQ responses to estimate individual preferences
 - Maximum likelihood given responses are reported with normally-distributed error
- Use estimated preferences in life-cycle saving model to recover demand for hypothetical LTC insurance
- Activities of daily living insurance
 - is an Arrow security that pays out in state when need help with ADL
 - is priced to be actuarially fair (conditioning on age, gender, health)
 - has no default risk
 - is inflation protected

Individual's Problem

$$V(a, y, t, s, h, g) = \max_{a', c, e_{LTC}, G} \mathbb{I}_{s \neq 3} (1 - G) \{U_s(c, e_{LTC}) + \beta E[V(a', y, t + 1, s', h')]\} \\ + \mathbb{I}_{s \neq 3} G \{U_s(\omega_G, \psi_G) + \beta E[V(0, y, t + 1, s', h')]\} + \mathbb{I}_{s=3} \{v(b)\}$$

s.t.

$$a' = (1 - G)[(1 + r)a + y(t) - c - e_{LTC} - h] \geq 0$$

$$e_{LTC} \geq \chi \text{ if } (G = 0 \wedge s = 2)$$

$$e_{LTC} = \psi_G \text{ if } (G = 1 \wedge s = 2)$$

$$c = \omega_G \text{ if } (G = 1 \wedge (s = 0 \vee s = 1))$$

$$b = \max\{(1 + r)a - h', 0\}$$

$$U_s(c, e_{LTC}) = \mathbb{I}_{s \in \{0,1\}} \frac{c^{1-\sigma}}{1-\sigma} + \mathbb{I}_{s=2} \theta_{LTC} \frac{(e_{LTC} + \kappa_{LTC})^{1-\sigma}}{1-\sigma}$$

$$v(b) = \theta_{beq} \frac{(b + \kappa_{beq})^{1-\sigma}}{1-\sigma}$$

ADLI Purchase Decision

- Actuarially fair pricing means expect zero profits from sale of insurance product
- Price $p(t, s, g)$, such that spending $\$ \tilde{y} \times p(t, s, g)$ purchases payout \tilde{y} per year when need LTC
- Given p , demand for ADLI as a function of idiosyncratic states is

$$D(a, y, t, s, h, g) = \arg \max_{\tilde{y}} V(a - p(t, s, g)\tilde{y}, \hat{y}, t, s, h, g)$$
$$\hat{y} = y + \tilde{y}$$

Model-implied ADLI Demand

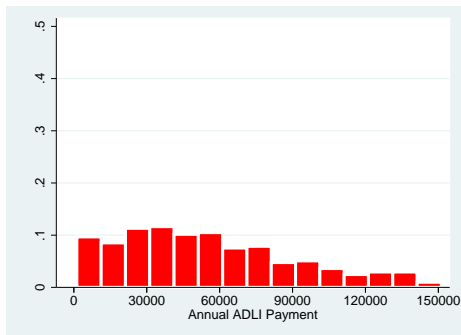


Figure: Figure omits the 32.1 percent of individuals with zero demand.

Directly Elicited ADLI Demand

- Use survey to recover stated demand for identical product
- Describe and confirm understanding of hypothetical LTC insurance

Survey Description of ADLI

Please suppose that you are offered a hypothetical new form of insurance called ***ADL insurance** with the following features:

- You pay a one-time, nonrefundable lump sum to purchase this insurance.
- If you need help with activities of daily living (*ADLs), you will immediately receive a monthly cash benefit indexed for inflation.
- For each **\$10,000** you pay for this insurance, you will receive **\$Y** per month indexed for inflation in any month in which you need help with *ADLs
- The monthly cash benefit is set at the time of purchase and is not dependent on your actual expenses.
- There is **no restriction** on the use of the insurance benefits. You are free to use benefits in any way you wish: to pay for a nursing home; a nurse to help at home; for some other form of help; or in literally any other way you would like.
- An impartial third party who you trust will verify whether or not you need help with *ADLs immediately, impartially, and with complete accuracy.
- The insurance is priced fairly based on your gender, age, and current health.
- There is no risk that the insurance company will default or change the terms of the policy.

Directly Elicited ADLI Demand

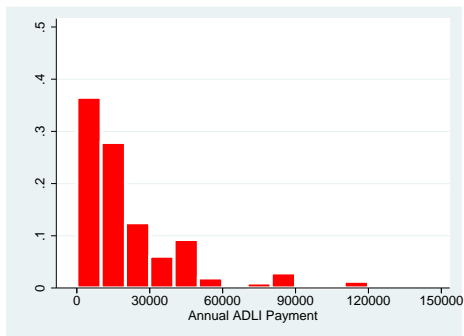
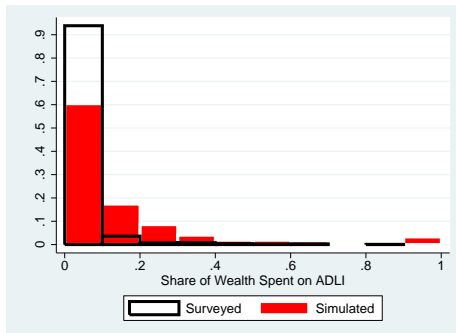


Figure: This figure omits the 71.2 percent of individuals with zero stated demand.

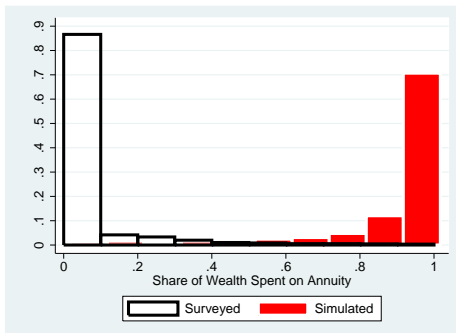
Model-implied vs. Stated ADLI Demand

- Higher stated demand than observed holdings suggest
- Model overpredicts demand significantly



Model-implied vs. Stated Annuity Demand

- Repeat for annuities
- Surveyed and modeled demands measured for idealized product
- Even more significant overprediction



More Analysis in Paper

- Regressions of survey answers on many observables
 - higher demand if higher subjective probability of needing LTC
 - lower demand for those with favorable view of publicly provided LTC
- Comparing preferences for those with positive vs. zero demand

Why the Puzzles?

- Want to know why model overpredicts demands so significantly
- Use difference in demand estimates to check for misspecification
 - Develop a method to detect systematic patterns:
 - $D_i - S_i = G(x_i, \Theta_i, q_i)$
 - $G(x_i, \Theta_i, q_i) \approx g_x(x_i) + g_\Theta(\Theta_i) + g_q(q_i)$
 - g_x, g_Θ non-parametrically approximated; g_q linear
 - $D_i - S_i = \beta^x C_i^x + \beta^\Theta C_i^\Theta + \Gamma q_i + \epsilon_i$
- A priori, the family is of interest given reduced form and small bequest motive (altruism?)
- VRI Survey 3 measures intergenerational transfers

Past Inter-vivos Giving Predicts Demand

	ADLI difference	Annuity difference
Transfers	0.348** (.097)	0.191** (.070)
$\mathbb{I}_{Transfer > 20k}$	13,889* (4,659)	8,251 (4,654)
\mathbb{I}_{child}	5,025 (4,697)	4,321 (4,959)

Table: Bootstrap standard errors to account for preference parameters as generated regressors.

Conclusion

- Differences in model and stated ADLI demands are large and significant
 - Suggests existing LTCI products part of reason for low holdings and also that current models overpredict demand
- Difference is predicted significantly by the presence of intergenerational transfers
- Evidence that model is missing a motive related to the family
 - Ongoing work is developing a model of the family and intergenerational concerns
- Method can be applied more generally

Big Picture

- Well known that workhorse model misses important features of data
 - How to develop richer models?
 - Observable vs. unobservable heterogeneity
 - Need better measures of important observables and methods to estimate unobservable heterogeneity