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LONG-TERM CARE: HOW BIG A RISK?

BY LEORA FRIEDBERG, WENLIANG HOU, WEI SUN, AND ANTHONY WEBB*

Introduction

Long-term care is expensive. In 2012, the average annual cost of a semi-private room in a nursing home was \$81,030, while home health care averaged \$21 an hour.¹ Medicare – the health insurance program for the elderly – provides only limited coverage, while Medicaid only covers the long-term care costs of the indigent. Despite the substantial financial risk, few single individuals over 65 buy long-term care insurance – a behavior sometimes called the long-term care insurance puzzle.

This *brief* summarizes a new study that models the lifetime risk of requiring long-term care.² The model can be used to estimate how many single individuals should optimally buy long-term care insurance, yielding some surprising results. The first section describes the long-term care insurance puzzle. The second section explains the methodology. The third section presents the results. They show that previous research understates the risk of going into care but overstates the average duration of stay of those ever institutionalized. The use of corrected care status transition probabilities reduces estimates of the value of insurance and strengthens the claim of previous research that most single individuals should not buy insurance given the availability of Medicaid.

Furthermore, many short-duration stays in nursing homes are covered by Medicare. Excluding such stays further reduces the value of insurance. The final section concludes that these findings partially solve the long-term care insurance puzzle.

The Long-term Care Insurance Puzzle

Although long-term care is a substantial risk for older Americans, only about 13 percent of single individuals buy long-term care insurance.³ One plausible explanation for this puzzle is Medicaid crowd-out. While Medicare only pays for nursing home care in restricted circumstances, Medicaid coverage is much more expansive for those who meet the program's means test. Importantly, Medicaid has secondary payer status, so that if an individual of moderate means purchases insurance, much of the benefit accrues to the government in the form of lower Medicaid payments, rather than to the individual in the form of higher consumption. Yet, if an individual does not buy insurance, Medicaid stands to bear much of the cost if care exhausts the individual's assets.

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Prior Estimates of the Value of Long-Term Care Insurance

Brown and Finkelstein (2008) demonstrate the importance of Medicaid crowd-out of long-term care insurance purchases among single individuals. They estimate the theoretical willingness-to-pay for insurance, defined as the maximum amount an individual would be willing to give up at age 65 for the right to purchase long-term care insurance at market premiums. When willingness-to-pay is negative, the individual would not willingly buy insurance.⁴

The Brown and Finkelstein model shows that only 33 percent of men and 41 percent of women, those in the top wealth percentiles, would optimally choose insurance. Their predicted coverage rate substantially exceeds the observed coverage rate of only 13 percent. Thus, although Medicaid crowd-out explains why most individuals would choose not to purchase, the Brown and Finkelstein model requires other explanations, such as myopia, poor product design, and ignorance of the risk of requiring care and of the limits on Medicare coverage.

Both Brown and Finkelstein and the new study summarized in this *brief* focus solely on single individuals. This limitation is not significant; though most long-term care policies are purchased by couples, over three quarters of nursing home residents age 65 and over are single.⁵

Prior Estimates of How Many Need Care

An important input into the Brown and Finkelstein model is a care status transition matrix, developed by Robinson (1996), based on *National Long-Term Care Survey* (NLTCS) data from 1982-89. This matrix shows monthly probabilities, varying with age and gender, of an individual transitioning between five care states: healthy, requiring home health care, living in an assisted living facility, living in a nursing home, and deceased. Modeling these transition probabilities at monthly, as opposed to annual, intervals captures the many nursing home stays that are of short duration.

A recent study (Hurd, Michaud, and Rohwedder 2014) calculates the lifetime risk of needing care using data from the *Health and Retirement Study* (HRS), which is up-to-date and has the advantage of following the same individuals for up to 17 years.

Their analysis suggests that the Robinson model understates the probability of ever entering care and overstates the average duration of stay of those who enter care. An important reason why the Robinson model underestimates the likelihood of ever using care is that individuals who are assigned institutionalized status in the model rarely leave it. In reality, many individuals return from institutional care to the community after short stays, even without an improvement in health status.⁶

Use of the Robinson model may yield biased estimates of willingness-to-pay for long-term care insurance. Economic theory predicts that, when choosing whether to buy such a product, individuals will care about not only the average duration of stay, but also the risk of spending an extended period in care. If nursing home use is a relatively high-probability, low-cost occurrence, individuals are likely to place less value on insurance. Using a correct care status transition matrix in models of the insurance purchase decision may reduce the percentage of individuals with a positive willingness-to-pay to a level closer to that observed in the data, thereby at least partially solving the long-term care insurance puzzle.

Hurd, Michaud, and Rohwedder do not report monthly transition probabilities, and it is impossible to recover them directly from the HRS data.⁷ The following section explains how the current study combines data from the HRS and the NLTCS to estimate updated and accurate monthly care status transition probabilities, which are used to calculate willingness-to-pay.

Methodology

The new study's methodology consists of five steps. First, it uses NLTCS data updated to 2004 to calculate monthly probabilities of transitioning among various health states and uses those probabilities to create lifetime health status histories from age 65 for a large number of simulated individuals. Second, it analyzes patterns of lifetime care usage among HRS households. Third, it estimates monthly probabilities of transitioning between care states for the simulated individuals, conditional on age, gender, and health status. These probabilities are chosen so that the statistics characterizing patterns of lifetime care usage among the simulated individuals match those obtained from the HRS. Fourth, it converts these

conditional probabilities into unconditional probabilities, varying only with age and gender. Finally, it uses unconditional probabilities in an optimal saving model to calculate willingness-to-pay for long-term care insurance, and compares the results with those of Brown and Finkelstein. For more details on each step, see the Appendix.

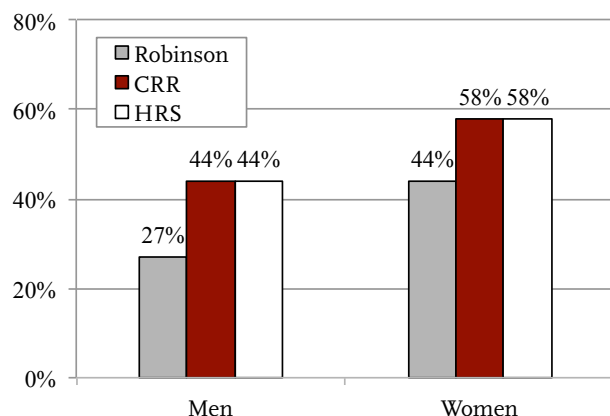
Results

The results are presented in two stages: 1) the new estimates of usage patterns and cost of long-term care; and 2) the effects of these estimates on individuals' willingness-to-pay for insurance.

New Usage and Cost Estimates

The first exercise compares the percentages of men and women age 65 that the Robinson and Center for Retirement Research (CRR) models predict will ever use nursing home care with usage in the HRS, and the average duration of stay, conditional on ever using care. For both men and women, the Robinson model substantially underestimates the probability of ever using care. In contrast, the CRR model more closely matches the HRS data. For example, the HRS data show that 44 percent of men and 58 percent of women will ever use care, and the CRR model predicts identical percentages (see Figure 1a). In contrast, the Robinson model predicts that 27 and 44 percent will ever use care.

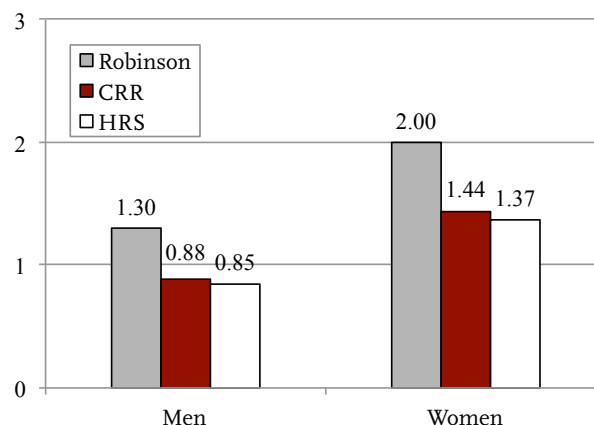
FIGURE 1A. PERCENTAGE OF PEOPLE EVER USING NURSING HOME CARE AT OR AFTER AGE 65



Sources: Brown and Finkelstein (2008); and Friedberg et al. (2014).

With respect to the duration of care, HRS data show that, conditional on using care, men and women will spend averages of 0.85 and 1.37 years in care, nearly identical to the CRR model's predictions and significantly lower than those of the Robinson model (see Figure 1b).

FIGURE 1B. AVERAGE DURATION OF NURSING HOME CARE, CONDITIONAL ON USING CARE, IN YEARS



Sources: Brown and Finkelstein (2008); and Friedberg et al. (2014).

The Robinson model nonetheless continues to do a good job of predicting the duration of care averaged over all individuals, including those who never enter care, because the underestimation of the risk of ever using care almost exactly offsets the overestimation of the average duration of stay, conditional on entry. This result makes it still fit for its original purpose, which was to assist insurance companies and regulators in pricing long-term care insurance.

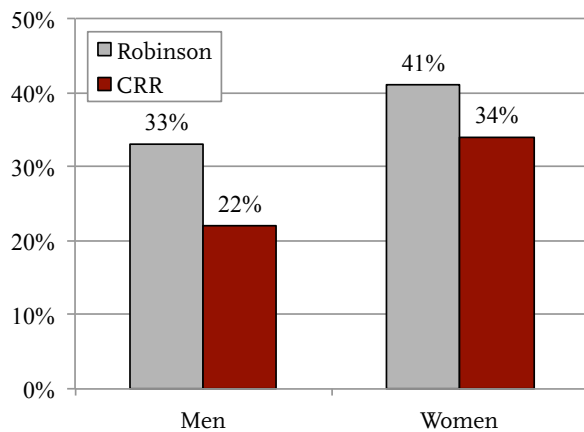
Table A1 in the Appendix compares sample statistics of the Robinson model and the current CRR study with those observed in the HRS. The CRR model matches well with the raw HRS statistics.

New Estimates of Willingness-to-Pay for Insurance

To calculate the impact of the CRR results on estimates of willingness-to-pay for long-term care insurance, the study recalculates the Brown and Finkelstein estimates of willingness-to-pay, using the new care status transition matrix.⁸

Figure 2 reports the percentages of single men and women who have a positive willingness-to-pay. Using the Robinson transition matrix, 33 percent of men and 41 percent of women have a positive willingness-to-pay for long-term care insurance. When the revised transition matrix is used, only 22 and 34 percent have a positive willingness-to-pay, and the value they place on insurance is substantially lower. Use of the revised transition matrix thus reduces the discrepancy between observed coverage rates and those predicted by a model of optimal behavior, by one half in the case of unmarried men.

FIGURE 2. PERCENTAGE OF SINGLE INDIVIDUALS WITH POSITIVE WILLINGNESS-TO-PAY FOR LONG-TERM CARE INSURANCE, BY GENDER



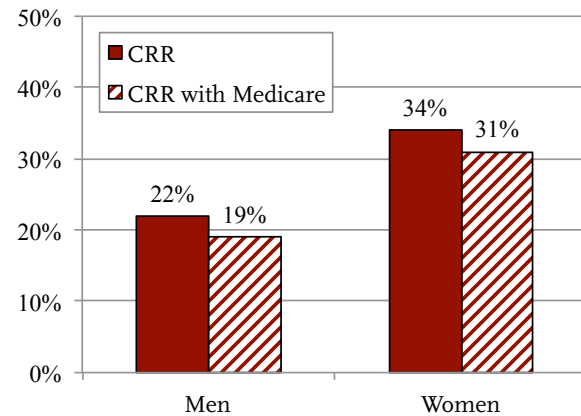
Sources: Brown and Finkelstein (2008); and authors' calculations.

The Brown and Finkelstein model assumes that Medicare does not cover any nursing home costs. In reality, Medicare is the primary payer for a maximum of 100 days when care is provided in a skilled nursing facility following a hospital stay of more than three consecutive days. It is not possible to identify episodes of Medicare-covered care in the HRS data. But the new study predicts that 50 percent of men and 39 percent of women who use nursing home care never have a stay exceeding three months. These stays comprise 12 and 9 percent of the total number of nights spent in nursing homes. As Medicare covered approximately 15 percent of nursing home costs during the time period under consideration,⁹ and presum-

ably also nursing home nights, it seems likely that many of these short stays are covered by Medicare. The study thus calculates an upper-bound estimate of the effect of Medicare on willingness-to-pay by assuming that the first three months of *all* episodes of care are covered by Medicare.¹⁰

Figure 3 compares willingness-to-pay for long-term care insurance, under the assumption used in Figure 2, namely that no care costs are covered by Medicare, with an alternative in which the first three months of each episode is covered. In each case, it uses the revised transition matrix. When Medicare covers the first three months of care, only 19 percent of men and 31 percent of women have a positive willingness-to-pay, compared with 22 and 34 percent when it is assumed that Medicare does not cover any costs. Thus, the availability of Medicare as an insurance alternative likely plays a small but significant role in explaining low levels of private insurance coverage.¹¹

FIGURE 3. IMPACT OF MEDICARE ON PERCENTAGE OF SINGLE INDIVIDUALS WITH POSITIVE WILLINGNESS-TO-PAY FOR LONG-TERM CARE INSURANCE, BY GENDER



Source: Authors' calculations.

Conclusion

Previous research showed that some 30-40 percent of elderly single individuals should optimally purchase long-term care insurance, far higher than the actual 13-percent coverage rate. Our new study shows that the long-term care transition matrix used in previous research overstates the financial risk posed by long-term care. Use of a more accurate transition matrix substantially reduces the willingness-to-pay of individuals who make optimal saving and insurance decisions. This finding strengthens the claim that, due to Medicaid crowd-out, few individuals would choose to buy insurance even if they were rational, far-sighted, and well-informed. Although it is optimal for only a small percentage of single individuals to buy insurance, Brown and Finkelstein show that many more would be willing to purchase a supplemental policy that could transform Medicaid into comprehensive, non-means-tested insurance. But policymakers have yet to devise a means of permitting such policies while at the same time containing Medicaid costs.

Endnotes

1 Metlife Mature Market Institute (2012).

2 Friedberg et al. (2014).

3 Authors' calculations, based on 2010 HRS data for individuals age 65 and over.

4 Negative willingness-to-pay means that one would be willing to pay to be relieved of a hypothetical obligation to purchase.

5 Authors' calculations based on 2010 HRS data. In a future study, we will compute the willingness-to-pay for long-term care insurance of married couples.

6 The Robinson model does incorporate adjustments to create churning out of care. But these appear to be insufficient.

7 HRS participants are asked about the month and year of their last three entries and exits from care. But there are too many missing and inconsistent entries to permit the extraction of useful data on entry and exit dates.

8 To show the effect of changes in the distribution of durations of stay, the project assumes that the money's worth of long-term care insurance is identical under both the Robinson and the CRR care utilization models, with money's worth equaling:

$$1 - \frac{\text{EPV (Benefits)}}{\text{EPV (Premiums)}}$$

In reality, the CRR model yields slightly higher money's worth for men and slightly lower money's worth for women.

9 The 15-percent figure is from Congressional Budget Office (2004). More recent data suggest that the percentage of nursing home costs covered by Medicare may be rising over time; using the National Health Expenditure Accounts, the Centers for Medicare & Medicaid Services estimated it to be 25 percent in 2011.

10 The new study shows that stays of less than three months and the first three months of longer stays comprise 32 percent and 28 percent of total nursing home nights among men and women, respectively, double the 15 percent of nights that Medicare actually covers. The calculations assume the purchase of a policy with a three-month elimination period.

11 When Medicare pays for the first three months of care, low-wealth individuals have a slightly higher willingness-to-pay for insurance, although their willingness-to-pay remains negative. This tendency reflects their preference for a cheaper policy with a three-month elimination period.

References

- Brown, Jeffrey R. and Amy Finkelstein. 2008. "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market." *American Economic Review* 98(3): 1083-1102.
- Centers for Medicare & Medicaid Services, Office of the Actuary. 2012. "National Health Expenditure Projections 2012-2022." Washington, DC.
- Congressional Budget Office. 2004. *Financing Long-Term Care for the Elderly*. Washington, DC.
- Duke University. *National Long-Term Care Survey, 1982-2004*. Durham, NC.
- Friedberg, Leora, Wenliang Hou, Wei Sun, Anthony Webb, and Zhenyu Li. 2014. "New Evidence on the Risk of Requiring Long-Term Care." Working Paper 2014-12. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Hurd, Michael, Pierre-Carl Michaud, and Susann Rohwedder. 2014. "The Lifetime Risk of Nursing Home Use." In *Discoveries in the Economics of Aging*, edited by David A. Wise, 81-109. Chicago: University of Chicago Press.
- MetLife Mature Market Institute. 2012. *Market Survey of Long-Term Care Costs*. New York, NY.
- Robinson, Jim. 1996. "A Long-Term Care Status Transition Model." Presented at the 1996 Bowles Symposium: "The Old-Age Crisis: Actuarial Opportunities." Atlanta, GA: Georgia State University.
- University of Michigan. *Health and Retirement Study, 1996-2010*. Ann Arbor, MI.

APPENDIX

Appendix

This appendix describes in more detail the five main steps involved in the study's methodology.

Calculating health status transition probabilities

Using data from the NLTCs, the study calculates monthly probabilities, varying with age and gender, of transitioning among different health states, ranging from healthy to various degrees of impairment to dead. The estimation technique is identical to that used by Robinson (1996), with the exception that the study uses more recent data, for 1989-2004, and incorporates a time trend to capture changing overall health status. Using the above transition probabilities, the study then simulates 10,000 monthly health status histories, starting at age 65.

Calculating patterns of lifetime care use of HRS individuals

The starting point is individuals age 75-79 in 1998, for whom we observe care histories until 2010, when they were age 87-91. To obtain longer care histories that cover both older and younger ages, they are then spliced with individuals age 87-91 in 1998, who had almost all died by 2010, and with individuals who turned 65 between 1996 and 2000 and who were age 75-79 in 2010; the result is complete care histories from age 65 until death, under the assumption that the likelihood of needing care conditional on health has not changed over this period. The study splices individuals based on age, gender, number of activity of daily living (ADL) limitations, marital status, and current nursing home status. For example, an institutionalized single male age 77 in 2010 with two ADLs will be spliced to a similar male age 77 in 1998 to obtain the likely post-age 77 history. The study then calculates the percentages of men and women who ever use nursing home care, the average age of entry, mean duration of stay, and the percentages who stay more than one, three, and five years, who leave a nursing home alive and who have more than one stay in care.

Calculating care status transition probabilities

The study then estimates monthly probabilities of the 10,000 simulated individuals transitioning from one of four initial care states – healthy, receiving home health care, or living in an assisted living facility or nursing home – to one of five care states – the initial care states, plus deceased – conditional on age, gender, and health status at the start and the end of the month. It uses these monthly transition probabilities to create care status histories for each simulated individual as a function of that individual's health status history. The study calculates the same statistics characterizing the patterns of care usage mentioned above for the HRS care histories.

Converting the conditional to unconditional transition probabilities

The study converts the conditional to unconditional transition probabilities by calculating the percentages of simulated individuals in each care state at each age who transition to each of the five possible care states.

Using the unconditional probabilities to calculate willingness-to-pay

The calculations of willingness-to-pay in an optimal saving model make use of computer code generously provided by Jeffrey Brown and Amy Finkelstein. The program is first run using the Robinson (1996) transition matrix and is re-run using the revised transition matrix.

TABLE A1. COMPARISON OF NURSING HOME USAGE – ROBINSON AND CRR MODELS AND *HEALTH AND RETIREMENT STUDY* (HRS) DATA

	Men			Women		
	Robinson model	CRR model	HRS data	Robinson model	CRR model	HRS data
<i>Mean years in care:</i>						
Unconditional	0.35	0.39	0.37	0.88	0.83	0.80
Conditional on ever using	1.30	0.88	0.85	2.00	1.44	1.37
<i>Percentage of users with:</i>						
Any care	0.27	0.44	0.44	0.44	0.58	0.58
1 year+ in care	0.33	0.24	0.22	0.42	0.37	0.36
3 years+ in care	0.12	0.07	0.08	0.22	0.14	0.15
5 years+ in care	0.05	0.02	0.02	0.12	0.07	0.07
<i>Mean age of first use</i>	83	82	80	84	83	82
<i>Probability of:</i>						
Leaving alive	0.65	0.84	0.62	0.66	0.84	0.66
Only one stay, conditional on entry	0.93	0.65	0.65	0.90	0.58	0.55

Sources: Robinson data are as reported in Table 1 of Brown and Finkelstein (2008) with the exception of the probability of only one stay, which is authors' calculations. CRR and HRS data are authors' calculations.

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