

Narrow Framing and Long-Term Care Insurance

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We propose a model of narrow framing in insurance and test it using data from a new module we designed and fielded in the Health and Retirement Study. We show that respondents subject to narrow framing are substantially less likely to buy long-term care insurance than average. This effect is distinct from, and much larger than, the effects of cautiousness, risk aversion, or adverse selection, and it offers a new explanation for why people underinsure their later-life care needs.

1 Introduction

Long-term care (LTC) expense is one of the largest financial risks confronting the nation's growing elderly population. Long-term care includes a wide range of health and personal care services including provision of medication as well as dressing, showering, eating, and toileting. Such services may be delivered either at home, or in a nursing home or assisted living facility.¹ Though people's duration and intensity of LTC needs will vary, it is anticipated that some 70 percent of Americans will require long-term care at some point (Brown and Finkelstein, 2008): an average 65-year old can anticipate requiring long-term care for about three years, with women needing it longer than men. Long-term care is also very expensive

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¹See Brown and Finkelstein (2011) or Fang (2014) for recent surveys.

in the United States: the median cost of care for a private room in a nursing home was \$240/day (\$87,600/year) in 2014 (Genworth 2014), or more than twice the household income of seniors on average (RWJ 2014). Moreover, the costs of long-term care can be prohibitive, with 10-20 percent of people requiring nursing home care for longer than five years (Brown and Finkelstein, 2009).

Given the inherent riskiness of LTC costs and the important potential benefits of having long-term care insurance, it may be surprising that few Americans actually purchase such coverage. Currently only eight percent of the American population has LTC insurance, and such private insurance pays for less than 12 percent of long term care expenditures (RWJ 2014). Public spending, mostly via the means-tested Medicaid program, covers over 60 percent of long-term care expenditures.² In this light, economists have proposed two main reasons why Americans do not buy long-term care insurance, namely crowding-out by Medicaid (Pauly, 1990; Brown and Finkelstein, 2008), and insurers working to weed out those mostly likely to need the care via strict underwriting (Hendren 2013).³

The present paper proposes yet an additional reason for why people may not buy long-term care insurance, namely 'narrow framing' or people's tendency to make decisions in isolation. That is, psychologists have noted that many people fail to account for other risks they also face, particularly when making complex decisions (c.f., Tversky and Kahneman, 1981; Kahneman and Lovallo, 1993; and Read, Loewenstein, and Rabin, 1999). Such an approach might seem to make decisions under uncertainty simpler, but it can also be quite costly: For instance, individuals who frame their decisions narrowly may choose first-order stochastically-dominated options (Tversky and Kahneman, 1981; Rabin and Weizsacker, 2009) and fail to diversify (Eyster and Weizsacker, 2011).

A large literature from psychology and behavioral economics documents the pervasiveness of narrow framing in the financial realm. For instance, this phenomenon implies that people are more likely to accept investments when returns are aggregated in terms of a portfolio,

²Private LTC insurance is also uncommon outside of the United States. Among the OECD countries, for example, private insurance covers around two percent of total LTC spending. The source of expenditure varies substantially, with over 60 percent out of pocket in Switzerland to one hundred percent public expenditure in France (OECD Health System Accounts, 2010). See Colombo (2011) for a discussion of the long-term care market in other countries.

³Many other factors may also contribute to the small size of the LTC insurance market. For instance, insurance loads in this arena appear to be unusually large compared to other insurance markets, although Brown and Finkelstein (2011) show that even these loads are not large enough to explain the small size of the market. Moreover, large loads may be a consequence of the small market, rather than its cause, due to the impossibility of benefiting from economies of scale. Nursing homes may crowd out the provision of care by family members (Pauly, 1990), although this observation does not explain why people without children also fail to purchase long-term insurance. Additional explanations include the possibility of using one's home equity to pay for care (Davidoff, 2010); a decrease in marginal utility following health deterioration (Finkelstein, Luttmer, and Notowidigdo, 2013); or the idea that bequests are luxury goods (Lockwood, 2014).

versus when they are shown each asset's returns separately (Redelmeier and Tversky, 1992; Langer and Weber, 2001). Likewise, people take less risk when they are shown returns more, versus less, frequently (Gneezy and Potters, 1997). Narrow framing is also an important ingredient of theories seeking to explain risk aversion over small gambles (Rabin and Thaler, 2001; Safra and Segal, 2008).⁴

Narrow framing may be especially problematic for those making decisions about insurance. The purpose of insurance is to alleviate the impact of losses, so failure to evaluate the potential benefits of avoiding the losses alongside the costs of insurance can make buying an insurance product seem undesirable. Indeed our theoretical model shows that individuals will buy less insurance the more they narrow frame. Consistent with this view, Kunreuther and Pauly (2012: 1) have argued that "there is a tendency to view insurance as a bad investment when you have not collected on the premium you paid the insurer. It is difficult to convince people that the best return on an insurance policy is no return at all." Yet there is little empirical evidence regarding the impact of narrow framing in insurance. One exception is Brown et al. (2008) who suggested that many people perceive life annuities as "risky investments." That study found that 72 percent of survey respondents elected an annuity when it was described in terms of consumption flows, but only 21 percent chose it when annuity payments were described in isolation.

To test our theory, we developed and fielded a new module for the Health and Retirement Study (HRS), which allows us to classify people according to how likely they are to narrow frame. We find that, all else equal, individuals who are subject to narrow framing are between 40 and 66 percent less likely to buy long-term care insurance than average. Our estimates are statistically significant and economically large, and they imply that the narrow framing effect is an order of magnitude larger than the effect of adverse selection, cautiousness, and risk aversion.

The paper proceeds as follows: Section 2 presents a simple model to motivate our empirical analysis. Section 3 discusses the data, and Section 4 presents our main empirical findings. A final Section concludes.

⁴Kahneman, Knetsch, and Thaler (1991) argue that narrow framing and loss aversion explain the observed tendency to stick to one's original situation, known as the *status quo* bias. Benartzi and Thaler (1995) and Barberis and Huang (2008) argue that these can also explain the large difference between returns on stocks and bonds, known as the equity premium puzzle. Narrow framing is also a key ingredient of the idea of mental accounting, which states that people categorize and evaluate outcomes in separate non-fungible accounts (Thaler 1980; 1999). See Read, Loewenstein, and Rabin (1999) for a survey.

2 Model

To describe the phenomenon we study, it is helpful to consider a simple model of insurance with narrow framing drawn from Gottlieb (2014). We posit that an individual is subject to a financial loss of $L > 0$ with probability $p \in (0, 1)$. Insurance policies are available with a proportional loading factor $l \in [0, 1 - p)$, meaning that each dollar of coverage costs $p + l$. (Insurance is actuarially fair if the loading factor l is zero.)

The consumer must evaluate lotteries according to the sum of a *consumption utility function* which satisfies the standard assumptions of expected utility theory, and a *gain-loss utility function*.⁵ Formally, the *consumption utility function* $U : \mathbb{R}_{++} \rightarrow \mathbb{R}$ is strictly increasing, strictly concave, and differentiable. The *gain-loss utility function* is

$$\mathcal{V}(X) = \begin{cases} v(X) & \text{if } X \geq 0 \\ -\lambda v(-X) & \text{if } X < 0 \end{cases}, \quad (1)$$

where $v : \mathbb{R}_+ \rightarrow \mathbb{R}$ is a weakly concave, twice-differentiable function satisfying $v(0) = 0$, and $\lambda > 1$ captures the individual's loss aversion.⁶ The consumer maximizes the sum of consumption utility and α times the gain-loss utility, where the parameter α captures the degree of narrow framing. When $\alpha = 0$, the individual is a standard expected utility maximizer. When $\alpha > 0$, he also takes into account gain-loss utility and is, therefore, subject to narrow framing. Moreover, the higher α , the greater the amount of narrow framing.⁷

Let W denote the individual's initial wealth and I the insurance coverage purchased (the "indemnity" amount). Expected consumption utility is then:

$$pU(W - L + (1 - p - l)I) + (1 - p)U(W - (p + l)I).$$

Buying insurance coverage I corresponds to participating in a lottery that pays $[1 - (p + l)]I$ with probability p and $-(p + l)I$ with probability $1 - p$. The expected gain-loss utility from insurance is then:

$$p\mathcal{V}((1 - p - l)I) + (1 - p)\mathcal{V}(-(p + l)I).$$

The individual therefore views insurance as a risky investment which is profitable if the indemnity received from the insurance company exceeds the premium paid. That is, the

⁵This global-plus-local formulation follows, among others, Barberis and Huang (2001), Barberis, Huang, and Santos (2001), Barberis and Xiong (2012), Koszegi and Rabin (2006, 2007, 2009), Rabin and Weizsacker (2009), and Heidhues and Koszegi (2008).

⁶Tversky and Kahneman (1992) suggested a power utility with functional form $v(X) = X^\alpha$, $\alpha \in (0, 1]$. The use of the same value function for gains and losses avoids unnecessary notation but is not important for our results.

⁷This specification is equivalent to using any weighted sum of consumption and gain-loss utility.

gain-loss utility evaluates insurance in isolation.

The necessary and sufficient condition for zero insurance to maximize expected consumption utility is:

$$p(1-p-l)U'(W-L) - (1-p)(p+l)U'(W) \leq 0.$$

Taking into account gain-loss utility as well, the necessary local condition for zero insurance to maximize total utility is:

$$p(1-p-l)U'(W-L) - (1-p)(p+l)U'(W) \leq \alpha \{p(1-p)(\lambda-1) + l[\lambda(1-p) + p]\} v'(0)$$

Since $\lambda > 1$ and $l \geq 0$, the expression inside brackets is strictly positive. Thus the right-hand side is strictly increasing in α , meaning that individuals who narrow frame more are less likely to buy insurance. Formally, let Θ_α denote the levels of wealth, loss amounts, loss probabilities, and insurance loads (W, L, p, l) for which zero insurance is optimal as a function of the degree of narrow framing α . The following proposition establishes that the set of parameters for which the individual prefers not to purchase insurance is increasing in the degree of narrow framing:

Proposition 1. *Let $\alpha_1 > \alpha_0$. Then $\Theta_{\alpha_0} \subset \Theta_{\alpha_1}$ and the inclusion is strict.*

Proposition 1 presents the main testable prediction from our model: controlling for other characteristics, individuals who narrow frame are less likely to purchase insurance.

Before we move to empirical evidence on this hypothesis, it is instructive to contrast Proposition 1 with the celebrated theorem of Mossin (1968) which shows that individuals who maximize expected utility will buy full insurance when the (proportional) load l is zero and partial insurance when the load is positive. Typically, non-expected utility theories have indifference curves that are either smooth or have a kink at the point of full insurance. Accordingly, they predict that consumers will demand either just as much or *more* insurance than does expected utility theory (c.f., Segal and Spivak, 1990). By contrast, when individuals frame their insurance purchases narrowly, they will buy *less* insurance than with expected utility. Hence, our model departs from Mossin's theorem in the opposite direction, relative to standard first-order risk aversion models. In particular, individuals who narrow frame strongly enough will buy no insurance even when the insurance policies are actuarially fair ($l = 0$), i.e.,

$$\alpha \geq \frac{U'(W-L) - U'(W)}{(\lambda-1)v'(0)}.$$

Importantly, individuals in our model view insurance as risky investments, which are profitable if the total amount received from the insurance company exceeds the premium. Hence, the gain-loss utility takes the point of zero insurance (status quo) as the reference

point against which outcomes are compared. While this is consistent with the evidence described in the introduction, our results would change under different reference points. For example, individuals who evaluate outcomes relative to full insurance have standard non-expected utility preferences and, therefore, buy more insurance than under expected utility. We return to the discussion of different reference points in the conclusion.

3 Data

To test our hypothesis, we devised and fielded a special module for the 2012 Health and Retirement Study (HRS), a nationally representative and in-depth panel study of around 19,000 age-eligible Americans over the age of 50 who are interviewed every other year for life (NIA 2014). At baseline, every respondent is resident in the community; thereafter the HRS continues to follow respondents even if they move into assisted living or some other arrangement. Each wave, the HRS also includes several experimental modules which are randomly assigned to a subset of respondents. The purpose of these modules is to evaluate new questions and examine alternative ways to get at concepts of interest to researchers. Responses to each module can be linked to respondent variables in the Core survey as well. We therefore designed a short survey (see Appendix A) which was one of 10 experimental modules assigned randomly to the HRS sample and given to about 1,900 HRS respondents. Response rates averaged 85% for about 1,700 completed surveys per module. While the main body, or the Core, of the survey takes more than an hour to complete, modules are limited to an average length of 2-3 minutes per person. Our module focused on the central question of whether people are sensitive to framing, and if so, how this influences the outcome of most interest here, namely whether they have long-term care insurance.⁸ Following Hendren (2013), we drop respondents living in a nursing home at the time of the survey, as they probably would not qualify for LTC insurance. We obtain essentially the same estimates when we include them.

Narrow Framing of Losses

To explore whether people narrowly frame losses, our HRS module presented respondents with a several questions about hypothetical choices involving risk. Our particular interest focuses on two hypothetical questions exposing respondents to narrow framing and loss aversion in a public policy context, based on work by Tversky and Kahneman (1981).

In the first presentation, the following policy-type risk question was asked:⁹

⁸For variable definitions see Appendix A.

⁹By departing from questions involving money lotteries, these questions permit us to measure loss aversion

Imagine that the United States is preparing for the outbreak of an epidemic expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Scientists estimate that the outcome of each program is as follows:

- If Program A is adopted, 300 people will be saved.
- If Program B is adopted, there is a 50-50 chance that either 600 people will be saved or none will be saved.

Which program would you favor: Program A or Program B?

In the second presentation, the following question was posed:

Imagine that the United States is preparing for the outbreak of an epidemic expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Scientists estimate that the outcome of each program is as follows:

- If Program A is adopted, 300 people will die.
- If Program B is adopted, there is a 50-50 chance that either none will die or 600 people will die.

Which program would you favor: Program A or Program B?

We randomly assigned participants in terms of who saw the first or second presentation first, and all participants responded to both questions. Their answers were uncorrelated with the order in which the questions were asked.

Individuals who do not narrow frame should pick the same program in both questions. As described by Tversky and Kahneman (1981), those who narrow frame and have a gain-loss utility function that is concave over gains and convex over losses (as in equation (1)) may choose the safe program when outcomes are described as gains (first question) and the risky program when described as losses (second question). Accordingly, we use the subjects' responses to construct a narrow framing measure, **Narrow Framing**, which takes a value of 1 if the respondent selected the safe option in the "300 will be saved" condition and the risky option in the "300 will die" condition, and 0 otherwise.¹⁰ In our analysis sample, 25 percent

in individuals who are otherwise averse to gambling for reasons unrelated to risk preferences (e.g., for religious reasons).

¹⁰Details on variable coding appear in Appendix B.

of respondents chose the safe option in the first question and the risky option in the second one, and they are then categorized as subject to narrow framing.

To verify whether this pattern reflects narrow framing of losses rather than random mistakes, we also checked the other possible violation of transitivity, namely, picking the risky program in the first question and the safe program in the second one. This pattern was chosen by about 5 percent of respondents. Our results are unchanged if we drop them from our sample, if we classify them as narrow framers, or if we include them along with those who do not narrow frame.

Other Controls

To control for other potential explanations for our results in multivariate models, we also include several additional factors (for details see Appendix Tables A and B). Included in the set are measures of risk aversion, cautiousness, possible uninsurability, and loss aversion. The risk aversion questions focus on lotteries with large stakes and the measure we derive ranges from 1 to 4 indicating coefficients of relative risk aversion implied by respondents' answers (Barsky et al. 1997). In the bulk of our analysis, we mainly discuss results using module respondents who also have risk aversion measures available for them. Yet the HRS discontinued these questions post-2006, so we only have risk aversion measures for the one-third of our respondents who entered the survey prior to that year.¹¹ This sample restriction is not endogenous, however, and our results are qualitatively unchanged if we drop the risk aversion question and re-estimate results using the entire sample. Loss aversion (or, more generally, first-order risk aversion) is captured with several questions about possible small investments and we translate respondents' answers into a loss aversion scale ranging from 1-8, with the higher values indicating ever-higher levels of loss aversion.¹²

To measure cautiousness, we follow Finkelstein and McGarry (2006) and create a variable from the 2012 HRS Core indicating the percent of sex-appropriate annual medical exams each individual undertook. Thus if the respondent was female, she received a score based on whether she had had a flu shot, a mammogram and pap smear, and a cholesterol test. Men received scores based on whether they had had a flu shot, a prostate test, and a cholesterol test. To account for the possibility that a respondent might have private information regarding his need for long-term care, as well as to account for possible non-insurability, we follow Finkelstein and McGarry (2006) and Hendren (2013) by controlling for respondents'

¹¹Fortunately, the risk preference measures for those respondents asked the questions in different waves are substantially stable over time (Sahm 2012).

¹²As Rabin (2000) shows, risk aversion cannot explain risk aversion over lotteries with small stakes. Accordingly, lotteries involving small stakes can be used to measure the loss aversion coefficient λ from equation (1). This approach is also used, for example, by Fehr and Goette (2007).

subjective probability of needing LTC. This is measured by their answer to the question: “What is the percent chance (0–100) that you will move to a nursing home in the next five years?”

Key socio-economic control variables are also included such as the respondent’s sex, age, marital status, educational attainment, and race/ethnicity. We also control for several health indicators, including a count of physical functioning limitations, a self-reported health variable, and indicators of whether the respondent smoked, had drinking problems, or a variety of diseases (diabetes, heart/lung problems, high blood pressure, stroke, cancer, or arthritis). Finally, we also include a cognition score, which is a summary measure of work recall and mental status (see Appendix B for details). Interestingly, cognition scores were uncorrelated with narrow framing in our dataset.

4 Results

In our analysis sample, one-quarter of respondents were narrow framers, in that they selected the safe option in the “300 will be saved” condition and the risky option in the “300 will die” condition. Interestingly, there are virtually no significant correlations of other variables and being a narrow framer: the only significant result at conventional levels is for the Male variable, which has only an 8 percent correlation coefficient. In particular, risk aversion, cautiousness, and the health variables are not importantly associated with being a narrow framer.

Multivariate Analysis

Our main goal is to determine whether narrow framing reduces the demand for LTC insurance, after controlling for other variables. We therefore estimate two sets of multivariate models (Probit and OLS) of the probability of having LTC insurance. Table 1 presents our key results. For clarity, in the text we only present the set of factors most commonly used to explain demand for insurance to date – namely, risk aversion, cautiousness, and subjective probability of needing care – as well as narrow framing. (The full set of coefficient estimates appears in Appendix B.)

Columns 1 and 3 report results for a simple model that includes only narrow framing in each case; Columns 2 and 4 are our preferred specifications where the lengthier vector of controls is included. Including the controls is influential, particularly in the Probit case, but in all cases and as predicted by the model, individuals who are more subject to narrow framing are significantly less likely to purchase LTC insurance. The statistically significant coefficients imply a large economic effect: other things equal, being subject to narrow framing reduces

Table 1. Multivariate Models of Determinants of Long-Term Care Insurance: Probit and OLS

Sample: Module respondents with risk aversion, not living in nursing homes.

Dependent Variable: Has LTC Insurance

	Probit models				Linear Probability models			
Narrow Framing	-0.090	***	-0.059	***	-0.090	***	-0.093	***
	[0.030]		[0.019]		[0.030]		[0.031]	
Risk Aversion			-0.004				-0.006	
			[0.012]				[0.016]	
Cautious			0.046				0.064	
			[0.037]				[0.048]	
PercentChanceNH			0.001				0.001	
			[0.001]				[0.001]	
N	514		514		514		514	
R-sq	0.016		0.169		0.012		0.125	

Note: * Significant at 0.10 level, ** Significant at 0.05 level, *** Significant at 0.01 level. Missing controls included; robust standard errors clustered on households.

Analysis sample consists of the 514 respondents to the 2012 HRS module nonresident in a nursing home, and having risk aversion measures. Marginal effects are reported for Probit models. Also included in columns (2) and (4) are controls for age, sex, race/ethnicity, marital status, cognition, health (ADL count, smoking, drinking, depression, diabetes, stroke, heart problems, high blood pressure, lung problems, cancer, arthritis, and loss aversion dummy variables, along with dummies for missing control variables. Robust standard errors are reported, with observations clustered on households. For more detail and results for extended sample, see Appendices A and B.

the demand for LTC insurance by 5.9 (9.3) percentage points according to the extended Probit (OLS) model. Compared to the base LTC insured rate of 14 percent in this sample, the estimates imply that narrow framing reduces long-term care insurance demand by 42 (66) percent, on average.

These are very large effects, particularly in comparison with the other key variables. Risk aversion, cautionsness, and the subjective probability of needing care all have the correct sign but are not statistically significant at conventional levels. Moreover, their magnitudes are remarkably small in comparison with narrow framing. For example, according to our estimates, a 10 percentage point increase in the chance of needing care would increase the demand for LTC insurance by a single percentage point. That is, it would take a 59 (93) percentage point increase in the probability of needing nursing home care for adverse selection, measured by our subjective probability question, to generate the same effect as narrow framing.

Table 2 presents coefficient estimates for the same variables when we omit the 27 respondents who violated transitivity in the opposite direction than the one predicted by Prospect

Theory, namely those who picked the risky program in the “300 will be saved” and the safe program in the “300 will die” question. The estimates are nearly identical to those in Table 1: that is, LTC demand is lower by about half for narrow framers, all else equal.

Table 2. Multivariate Models of Determinants of Long-Term Care Insurance: Probit and OLS

Sample: Module respondents with risk aversion, not living in nursing homes, not violating transitivity.

Dependent Variable: Has LTC Insurance

	Probit models				Linear Probability models			
Narrow Framing	-0.091	***	-0.059	***	-0.091	***	-0.092	***
	[0.031]		[0.021]		[0.031]		[0.032]	
Risk Aversion			-0.004				-0.006	
			[0.012]				[0.017]	
Cautious			0.062				0.087	*
			[0.039]				[0.050]	
PercentChanceNH			0.001				0.002	
			[0.001]				[0.001]	
N	487		487		487		487	
R-sq	0.017		0.167		0.013		0.124	

Note: * Significant at 0.10 level, ** Significant at 0.05 level, *** Significant at 0.01 level. Missing controls included; robust standard errors clustered on households.

Analysis sample consists of the 487 respondents to the 2012 HRS module nonresident in a nursing home, having risk aversion measures, and not violating transitivity. Marginal effects are reported for Probit models. Also included in columns (2) and (4) are controls for age, sex, race/ethnicity, marital status, cognition, health (ADL count, smoking, drinking, depression, diabetes, stroke, heart problems, high blood pressure, lung problems, cancer, arthritis, and loss aversion dummy variables, along with dummies for missing control variables. Robust standard errors are reported, with observations clustered on households. For more detail and results for extended sample, see Appendices A and B.

When we broaden our sample to include all HRS respondents to our experimental module (results appear in Appendix B), results are quite similar in that the Narrow Framing variable is consistently statistically significant at the 1% level. Of course since we cannot control on risk aversion in the full sample, other variables correlated with risk aversion do become more significant (e.g., cautiousness and educational attainment). In this larger sample, the magnitude of the Narrow Framing coefficient is attenuated somewhat, to 3 (4) percentage points in the Probit (OLS) model. This still represents a one-quarter to one-third reduction in narrow framers’ probability of having LTC insurance compared to the 12 percent mean in this larger sample.¹³

¹³This is not because omitting risk aversion is problematic; indeed when we run the regressions omitting risk aversion in our analysis sample, the results are the same as when we include risk aversion. This suggests

5 Conclusion

We show that narrow framers have a substantially lower demand for long-term care insurance, and the result is robust to controlling on a host of factors including health, cautiousness, risk aversion, probability of needing LTC, and socio-demographics. Moreover narrow framing is a more important deterrent to people’s LTC insurance purchases compared to factors previously suggested including risk aversion and private information.

Future work could investigate the importance of narrow framing in other insurance contexts, since economists have been surprised by the low demand for new insurance products that, in theory, should be highly demanded. For instance, there has been little demand for home equity insurance protecting homeowners against house price drops, despite the fact that residential equity is the largest and least well-diversified component of most families’ wealth in America (Shiller, 2008). Home equity insurance is largely immune from adverse selection and moral hazard concerns because they are mainly indexed policies, so standard insurance theory suggests that people should be willing to pay a considerable amount for them. Narrow framing may explain why consumers are uninterested in buying these policies.

We should also mention that, while our model predicts that individuals will be reluctant to buy insurance, there are several markets in which consumers seem to be “too eager” to buy insurance. Sydnor (2010), for example, finds that deductible choices in home insurance imply unrealistically large levels of risk aversion. Many consumers also insure small durable goods.¹⁴ One possible cause for this divergence in preferences may be the effect of framing in different insurance markets, which could shift peoples’ reference points. For example, in markets where insurance is relatively uncommon, remaining uninsured may be the natural reference point, whereas, in markets where most people have insurance, buying insurance may be the most appropriate reference point. This would be consistent with a model with endogenous reference points as Koszegi and Rabin (2006, 2007). In this paper, we also abstracted from probability weighting, which has been shown to be important in some insurance markets.¹⁵ Understanding which behavioral theories are most relevant to each market is likely a fruitful avenue for future research.

that HRS respondents not asked the risk aversion questions are less susceptible to narrow framing in the LTC context, perhaps implying some heterogeneity between cohorts not captured by the demographic and other controls.

¹⁴See, for example, Cutler and Zeckhauser (2004).

¹⁵See, for example, Barseghyan et al. (2013) and Abito and Salant (2015).

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Appendix A: Variable Construction and Descriptive Statistics

The empirical analysis in the main text of the paper focuses on our dependent variable of most interest, **Has LTC insurance**. This variable is derived from responses to the RAND 2012 HRS Core where the question for variable *r1lhiltc* was worded as follows:

- [Not including government programs, do] you now have any long-term care insurance which specifically covers nursing home care for a year or more, or any part of personal or medical care in your home?

The response is coded =1 if *r1lhiltc*=1; =0 else.

We also control on four important factors: **LossAverse Framing; Risk averse; Cautious; and PercentChance NH**.

As described in the text, narrow framing variable is formulated from answers to two of our module questions that reveal the existence of dissonance in respondents' answers to two policy-type questions (which one a respondent saw first was determined randomly). Such hypothetical preference questions regarding narrow framing and loss aversion in a public policy context, based on work by Tversky and Kahneman (1981). By departing from the investment context, these questions permit us to measure loss aversion in individuals who are otherwise averse to investments for reasons unrelated to risk preferences (e.g., for religious reasons).

- Imagine that the United States is preparing for the outbreak of an epidemic expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Scientists estimate that the outcome of each program is as follows:
 - If Program A is adopted, 300 people will be saved.
 - If Program B is adopted, there is a 50-50 chance that either 600 people will be saved or none will be saved.

Which program would you favor: Program A or Program B?

The second policy-type risk question was as follows:

- Imagine that the United States is preparing for the outbreak of an epidemic expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Scientists estimate that the outcome of each program is as follows:
 - If Program A is adopted 300 people will die.
 - If Program B is adopted, there is a 50-50 chance that either none will die or 600 people will die.

Which program would you favor: Program A or Program B?

Then the **LossAverseFraming** variable is defined as =1 if the respondent selected the safe option in the "saved" condition above and the risky option in the "will die" condition, and 0 else.

Risk averse: Early waves of the HRS included hypothetical gamble questions widely used in empirical research on risk aversion (Barsky et al., 1997). These questions were, however, discontinued after 2006, so we only have risk aversion measures available for the one-third of our respondents who entered the survey prior to that year. These risk preference measures prove to be substantially stable over time for those respondents asked the questions in several different waves (Sahm 2012).¹

¹ Risk preference measures are substantially stable over time for those respondents receiving the same questions in several different waves (Sahm 2012).

Cautious: Following Finkelstein and McGarry (2006), we create a variable from the 2012 HRS Core indicating the percent of sex-appropriate annual medical exams each individual undertook. Thus if the respondent was female, she received a score out of 4 based on whether she had had a flu shot, a mammogram and papsmear, and a cholesterol test. Men received scores out of 3 based on whether they had had a flu shot, a prostate test, and a cholesterol test.

PercentChanceNH: This variable indicates the respondent's self-reported chance out of 100 of being in a nursing home in the next 5 years ($r*pnhm5y$ in the Core HRS). If the variable was missing, we created a missing variable flag and imputed a median among those not missing if $age \geq 65$; else = 0.

Other Controls

All demographic controls are taken from the respondent's HRS Core interview in the RAND files; missing values were recoded to missing and a dummy added in the list of regressors.

Age=na501-birthyr or na501-nx067_r;

Male =1 if gender=1; male=0 if male=2;

White=1 if raracem=1, 0 else;

Hispanic=rahispan;

Married=1 if $1 \leq r11mstat \leq 3$; 0 if $3 \leq r11mstat \leq 8$; and

Education year=schlyrs if schlyrs ≤ 17 .

We used several controls for respondent health taken from the HRS Core, constructed as follows:

Good health: healthgood=1 if $1 \leq r11shlt \leq 3$; 0 if $4 \leq r11shlt \leq 5$

Cognition score: rcogtot= $r*cogtot$

ADL summary: radla= $r11adla$

Smoking: r10smoken

Depression: depression=1 if $r10cesd \geq 3$, 0 else

Drinking problem: drink=1 if $r10drinkn \geq 3$; 0 else

Diabetes: diabetes=1 if $r10diab=1$ or 3; diabetes=0 if $r10diab=0$ or 4

Stroke: stroke=1 if $r10strok=1, 2$ or 3; stroke=0 if $r10strok=0$ or 4

Heart condition: heart=1 if $r10heart=1$ or 3; heart=0 if $r10heart=0$ or 4

High blood pressure: highbp=1 if $r10hibp=1$ or 3; highbp=0 if $r10hibp=0$ or 4

Lung disease: lung=1 if $r10lung=1$ or 3; lung=0 if $r10lung=0$ or 4

Cancer: cancer=1 if $r10cancr=1$ or 3; cancer=0 if $r10cancr=0$ or 4

Arthritis: arthritis=1 if $r10arthr=1$ or 3; arthritis=0 if $r10arthr=0$ or 4

Loss Aversion

Two presentations (A and B) in the module get at loss aversion; which one a respondent was asked first depended on random assignment, and everyone saw both versions by the end of the module. Presentation A posed the risky choice as having to pay \$100 to undertake a risky investment, while Presentation B offered the risky investment as a chance of winning money or having to pay.

When a respondent was randomized to Presentation A of the module, we noted this fact (in a randomization question order variable) and then asked him the following:²

² The entire module with all branches appears in the Online Appendix.

- Suppose that a relative offers you an investment that costs you \$100. If you agree to this investment, there is a 50-50 chance that you would receive either \$215 or nothing. Would you agree to this investment?

If the answer was affirmative, the person received a less-good offer:

- Now instead, suppose that a relative offers you an investment that costs you \$100. If you agree to this investment, there is a 50-50 chance that you would receive either \$207 or nothing. Would you agree to this investment?
If still affirmative, an even less-good offer was as follows:
- Now, suppose that a relative offers you an investment that costs you \$100. If you agree to this investment, there is a 50-50 chance that you would receive either \$203 or nothing. Would you agree to this investment?

If the answer to the first question was negative, the branching led to a more attractive offer:

- Now instead, suppose that a relative offers you an investment that costs you \$100. If you agree to this investment, there is a 50-50 chance that you would receive either \$230 or nothing. Would you agree to this investment?

If the respondent still said no, he or she would see a yet more attractive offer:

- Now suppose that a relative offers you an investment that costs you \$100. If you agree to this investment, there is a 50-50 chance that you would receive either \$400 or nothing. Would you agree to this investment?

Thereafter (or first, if the respondent had been randomized to Presentation B first), the following question was posed:

- Suppose that a relative offers you an investment opportunity for which there is a 50-50 chance you would receive \$115 or have to pay \$100. Would you agree to this investment?

An affirmative answer led to this follow-up:

- Now instead, suppose that the same relative offers you a different investment opportunity for which there is a 50-50 chance you would receive \$107 or have to pay \$100. Would you agree to this investment?

And again an affirmative answer led to this less attractive offer:

- Now suppose that the same relative offers you a different investment opportunity for which there is a 50-50 chance you would receive \$103 or have to pay \$100. Would you agree to this investment?

A refusal to accept the first question led to a more positive offer:

- Now instead, suppose that the same relative offers you a different investment opportunity for which there is a 50-50 chance you would receive \$130 or have to pay \$100. Would you agree to this investment?

And another refusal led to this:

- Now suppose that the same relative offers you a different investment opportunity for which there is a 50-50 chance you would receive \$300 or have to pay \$100. Would you agree to this investment?

We then translate participants' answers to these module questions into a loss aversion scale, where the reference category refers to the lowest level of loss aversion (**LA1**). We create seven additional dummy variables (**LA2-8**) indicating ever-higher levels of loss aversion.

<i>Variable</i>	<i>Analysis sample</i>		<i>Extended sample</i>	
	<i>Mean</i>	<i>StDev</i>	<i>Mean</i>	<i>StDev</i>
Has LTC insurance (0,1)	0.14	0.35	0.12	0.32
Narrow framing (0,1)	0.25	0.43	0.22	0.42
Risk averse (1-4)	3.36	1.01		
Cautious (0-1)	0.72	0.30	0.67	0.31
PercentChanceNH (0-100)	5.50	14.34	8.29	18.11
Age (yrs)	63.29	5.17	66.23	11.19
Male (0,1)	0.38	0.49	0.41	0.49
White (0,1)	0.80	0.40	0.72	0.45
Hispanic (0,1)	0.10	0.30	0.12	0.32
Married (0,1)	0.74	0.44	0.65	0.48
Education (yrs)	13.15	2.85	12.81	2.98
Good health (0,1)	0.74	0.44	0.73	0.45
Cognition score (12-33)	23.07	2.05	22.44	3.88
ADL summary (0-5)	0.21	0.76	0.27	0.81
Smoking (0,1)	0.16	0.37	0.16	0.36
Depression (0,1)	0.20	0.40	0.22	0.42
Drinking problem (0,1)	0.13	0.33	0.10	0.30
Diabetes (0,1)	0.26	0.44	0.23	0.42
Stroke (0,1)	0.07	0.26	0.08	0.27
Heart condition (0,1)	0.22	0.42	0.23	0.42
High blood pressure (0,1)	0.59	0.49	0.59	0.49
Lung disease (0,1)	0.09	0.29	0.09	0.28
Cancer (0,1)	0.11	0.31	0.14	0.34
Arthritis (0,1)	0.60	0.49	0.56	0.50
Loss averse 2 (0,1)	0.01	0.11	0.02	0.13
Loss averse 3 (0,1)	0.01	0.08	0.01	0.10
Loss averse 4 (0,1)	0.06	0.24	0.04	0.21
Loss averse 5 (0,1)	0.02	0.13	0.02	0.15
Loss averse 6 (0,1)	0.01	0.12	0.02	0.12
Loss averse 7 (0,1)	0.11	0.31	0.11	0.31
Loss averse 8 (0,1)	0.61	0.49	0.63	0.48
N	487		1,589	

Notes: The analysis sample consists of the 487 respondents to the 2012 HRS module having risk aversion measures, nonresident in a nursing home, and not violating transitivity (see text). The extended sample includes all respondents to the HRS module.

Appendix B. Additional Results for Analysis and Full Sample

	Probit models				OLS			
	<i>Analysis sample</i>		<i>Extended sample</i>		<i>Analysis sample</i>		<i>Extended sample</i>	
Narrow framing	-0.091 *** [0.031]	-0.059 *** [0.021]	-0.041 ** [0.018]	-0.029 ** [0.014]	-0.091 *** [0.031]	-0.092 *** [0.032]	-0.041 ** [0.018]	-0.042 ** [0.018]
Risk aversion		-0.004 [0.012]				-0.006 [0.017]		
Cautious		0.062 [0.039]		0.080 *** [0.023]		0.087 * [0.050]		0.088 *** [0.024]
PercentChanceNH		0.001 [0.001]		0.001 ** [0.000]		0.002 [0.001]		0.001 ** [0.001]
Age		0.001 [0.004]		-0.001 [0.001]		0.001 [0.005]		-0.002 [0.001]
Male		-0.029 [0.027]		-0.017 [0.014]		-0.036 [0.037]		-0.016 [0.018]
White		-0.003 [0.033]		0.002 [0.016]		-0.011 [0.039]		0.000 [0.018]
Hispanic		0.000 [0.051]		-0.015 [0.023]		0.014 [0.050]		-0.002 [0.023]
Married		0.005 [0.029]		0.036 *** [0.014]		0.009 [0.036]		0.04 ** [0.018]
Education year		0.019 *** [0.005]		0.014 *** [0.003]		0.024 *** [0.006]		0.015 *** [0.003]
Healthgood		-0.004 [0.034]		0.027 * [0.016]		0.001 [0.038]		0.03 [0.019]
Cognition		0.008 [0.006]		0.001 [0.002]		0.009 [0.008]		0.000 [0.002]

(cont)

	Probit models				OLS			
	Analysis sample		Extended sample		Analysis sample		Extended sample	
ADL summary	-0.011		0.009		-0.010		0.008	
	[0.025]		[0.009]		[0.020]		[0.011]	
Smoking	0.006		-0.003		0.019		-0.001	
	[0.036]		[0.020]		[0.041]		[0.020]	
Depression	-0.030		-0.019		-0.040		-0.026	
	[0.032]		[0.016]		[0.037]		[0.018]	
Drink	-0.044 *		-0.010		-0.077 *		-0.020	
	[0.025]		[0.021]		[0.044]		[0.027]	
Diabetes	-0.027		-0.001		-0.039		-0.008	
	[0.026]		[0.016]		[0.036]		[0.020]	
Stroke	-0.071 **		-0.026		-0.085 *		-0.041	
	[0.028]		[0.023]		[0.048]		[0.029]	
Heart	0.028		0.009		0.033		0.014	
	[0.035]		[0.017]		[0.044]		[0.022]	
High blood pressure	0.006		0.006		0.008		0.007	
	[0.026]		[0.014]		[0.037]		[0.018]	
Lung	0.049		0.002		0.049		-0.003	
	[0.065]		[0.025]		[0.060]		[0.029]	
Cancer	0.081 *		0.032		0.09		0.043	
	[0.048]		[0.021]		[0.061]		[0.027]	
Arthritis	-0.028		0.000		-0.036		-0.001	
	[0.026]		[0.014]		[0.037]		[0.019]	
Loss averse 2 (0,1)	-0.088 ***		0.034		-0.053		0.056	
	[0.014]		[0.062]		[0.060]		[0.063]	
Loss averse 3 (0,1)	-0.083 ***		-0.083 ***		-0.011		-0.102 ***	
	[0.014]		[0.008]		[0.056]		[0.026]	
Loss averse 4 (0,1)	-0.014		-0.015		-0.025		-0.033	
	[0.051]		[0.032]		[0.070]		[0.040]	
Loss averse 5 (0,1)	-0.090 ***		-0.011		-0.052		-0.009	
	[0.015]		[0.050]		[0.046]		[0.046]	
Loss averse 6 (0,1)	0.266		0.113		0.264		0.125	
	[0.281]		[0.091]		[0.189]		[0.082]	
Loss averse 7 (0,1)	0.054		0.039		0.076		0.046	
	[0.055]		[0.031]		[0.068]		[0.034]	
Loss averse 8 (0,1)	-0.004		0.001		-0.004		0.001	
	[0.033]		[0.019]		[0.045]		[0.023]	
N	487	487	1,589	1,589	487	487	1,589	1,589
R-sq	0.017	0.167	0.004	0.119	0.013	0.124	0.003	0.078

Note: * Significant at 0.10 level, ** Significant at 0.05 level, *** Significant at 0.01 level. Missing controls included, robust standard errors clustered on household. See Appendix A for samples. Marginal effects are reported for Probit models. Also included in columns (2) and (4) are dummies for missing control variables.