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Nursing Home Use Expectations and Wealth Accumulation Among Older Adults

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Abstract

Long-term care represents a significant cost to older adults in the US, and nursing home use is an important part of long-term care. It is therefore important to understand how older adults make nursing home-related decisions. This study analyzes the determinants of older adults' nursing home use expectations, their relationship with actual nursing home use in the future, and the association between nursing home use expectations and older adults' decisions regarding wealth accumulation. The findings indicate that older adults update their nursing home use expectations rationally and their nursing home use expectations have strong predictive power for actual nursing home use in the future, but these expectations are not statistically significantly associated with wealth accumulation.

Keywords: Nursing home use, subjective expectations, wealth accumulation, disparities

1. Introduction

Long-term care represents a significant cost to older adults in the U.S. For example, the median annual cost of a private room in a nursing home was \$100,375 and the median annual cost of a semi-private room was \$89,297 in 2018 (Genworth, 2020). Despite this high cost of care, only about 10% of older adults have private long-term care insurance and about one-third of all long-term care expenditures are paid out of pocket (Brown and Finkelstein, 2008). One reason for the small size of the private market is crowded out by Medicaid (Brown and Finkelstein, 2007; 2008), which covers long-term care for individuals whose assets are below a given threshold. These factors create competing incentives for individuals to accumulate wealth. Individuals who expect to enter the nursing home but may not qualify for Medicaid have an incentive to accumulate more wealth in order to pay for the high cost of long-term care. On the other hand, some individuals may have an incentive to reduce their wealth in order to qualify for the Medicaid program. Understanding how individual decisions regarding wealth accumulations respond to these competing incentives is important to evaluate income security during retirement and to design effective policy.

This study will contribute to our understanding of these individual decisions by evaluating the role of nursing home use expectations. Although there is a large literature on subjective expectations of various events such as mortality (Smith et al., 2001; Wang, 2014) and retirement (Ayyagari, 2018; Benitez-Silva and Dwyer, 2005), few studies have focused on expectations for nursing home use. Existing work has mostly used a static framework to identify factors associated with nursing home expectations (Holden et al., 1997; Lindrooth, 2000). We advance this literature by using a longer panel, more recent data, and a dynamic framework to evaluate nursing home use expectations. Specifically, we examine the determinants of nursing home use expectations, how individuals update their expectations in response to health shocks and other conditions, and the relationship between these expectations and actual nursing home use. More importantly, we examine the link between nursing home use expectations and wealth accumulation. To our knowledge, only one (working) paper has previously examined this relationship (Kleinjans and Lee, 2006). Our study extends this work in several important ways.

First, we use a longer panel and more recent data to improve the precision of the estimates. Second, we account for bias due to unobserved individual and state-level characteristics by using fixed effects regression models. Third, we examine heterogeneous effects at different points of the wealth distribution by using a quantile regression model.

We find that older adults update their nursing home use expectations in a rational way, and these expectations have strong predictive power for their actual nursing home use in the future, even after controlling for all the observable characteristics. However, older adults' nursing home use expectations are not significantly associated with their wealth accumulation, and this result is robust to various specification checks.

2. Literature Review

A large body of literature has evaluated whether subjective probabilities are predictive of the event in question. Understanding the determinants and impact of subjective expectations is important because individual decisions are typically based on subjective expectations. Further, as noted by Manski (2004), subjective expectations can provide information on unobserved heterogeneity and may be useful in relaxing assumptions of rational expectations. Previous studies have examined expectations about mortality (Smith et al. 2001, Hurd and McGarry 2002), retirement (Benitez-Silva and Dwyer 2005, Haider and Stephens 2007), job loss (Stephens 2004), Social Security income (Dominitz et al. 2002), and inheritance (Brown et al. 2010). In general, this literature finds that subjective expectations are rational and predictive of the actual event. However, few studies have focused on nursing home use expectations.

Holden et al. (1997) find that the factors affecting nursing home use expectations for men and women differ. Men have lower expectations if married while women's expectations decrease with the number of children they have. Women are more likely to be influenced by their parents' use of nursing home care. Both men and women increase their expectation of nursing home use in response to worsening health. Interestingly, the authors do not find an effect on nursing home use expectations based on home ownership or wealth. Overall, they conclude that individuals

form expectations in a manner that is consistent with observed lifetime use of nursing homes, and in a rational way, using information on important risk factors for nursing home entry. Lindrooth et al. (2000) use data from the Assets and Health Dynamics Among the Oldest Old (AHEAD) survey. They also find that nursing home use expectations are close to the actual probability of nursing home entry. Significant predictors of nursing home use expectations include age, education, access to informal care measured by marital status and the number of children, and health status measured by the number of activities of daily living (ADL), instrumental activities of daily living (IADL) and chronic risk factors such as incontinence, stroke, hip injuries, injuries due to falls etc. The authors find no evidence that Medicaid subsidies influence nursing home use expectations, since these expectations are similar for persons in the lowest income quartile, who are more likely to receive such subsidies, and those in higher income quartiles. The authors conclude that underestimation of the risk of nursing home entry does not explain low demand for long term care insurance. Finkelstein and McGarry (2003) find that, on average, nursing home expectations are close to actual nursing home use rates and are correlated with known risk factors. Kleinjans and Lee (2006) use data from the Health and Retirement Study (HRS) to examine the relationship between subjective nursing home use expectations and future nursing home use and savings. They find that subjective nursing home use expectations significantly predict future nursing home entry. They also find that savings increases with expectations of nursing home use, but there is no evidence of heterogeneous effects by wealth. The authors conclude that Medicaid eligibility for nursing home care does not impact the decision to save. Coe et al. (2015) examine expectations about informal caregiving by children and the purchase of long-term care insurance. They find that informal care expectations are influenced by nursing home use by a parent but not of an in-law. However, nursing home use by both parents and in-laws increases the probability of purchasing long-term care insurance. Henning-Smith and Shippee (2015) find that the majority of middle-aged adults do not expect to use long term services and supports in the future and these expectations are associated with their current living arrangements. Henning-Smith et al. (2015) find that lesbian, gay and bisexual middle-aged adults had greater expectations of needing long term care services in the future compared to heterosexual adults and were more likely to expect to use institutional care in old age rather than rely on care from family.

A related literature has examined how access to Medicaid affects savings with mixed findings. Although this literature does not specifically focus on eligibility for Medicaid nursing home benefits, its findings are relevant to our work. A highly cited paper by Gruber and Yelowitz (1999) finds that expansions of Medicaid eligibility to children and pregnant women in the 1980s and early 1990s reduced household net worth. Maynard and Qiu (2009) find that Medicaid significantly reduces savings among households in the middle of the net worth distribution. They do not find significant effects on the bottom or top net worth households. The authors conclude that Medicaid crowds out savings for the median household but not for the poorest households, and this heterogeneity is partly explained by the asset tests employed by Medicaid. Gallagher et al. (2020) use state variation in eligibility rules for Medicaid to study the propensity of households to save or repay debt from their tax refunds. They employ an instrumental variables approach based on the Affordable Care Act's Medicaid expansion to identify the effect of increased Medicaid eligibility on savings. They do not find a significant effect on the average household but there is evidence of considerable heterogeneity. The authors find that households not experiencing financial hardship save less when they have more access to Medicaid. Households experiencing financial hardship, on the other hand, increase their savings rate in response to greater access to Medicaid. These effects are more pronounced in states with lower bankruptcy exemption limits.

3. Data & Methods

3.1 Data

We use data from the 1998 to 2016 waves of the Health and Retirement Study (HRS)¹. The HRS is a biennial panel survey of a nationally representative sample of adults older than 50 years and their spouses.

The HRS is most suitable for our project for the following reasons. First, to the best of our knowledge, the HRS is the only dataset with information on both subjective expectations of

¹ We exclude data from survey waves prior to 1998 because questions regarding nursing home use expectations were not consistent prior to 1998.

nursing home use and actual nursing home use. Second, the HRS contains rich information on health, health care, health insurance, demographics, wealth, and family members for individuals most likely to be at risk for nursing home use. Third, the HRS is a panel survey that allows us to examine how expectations change over time in response to important life changes and whether they predict actual nursing home use in the future. The panel nature also allows us to account for unobserved time-invariant individual characteristics using fixed effects.

We use the restricted version of the HRS with state identifiers to control for unobserved, time-invariant state characteristics using state fixed effects and to merge in time-varying state-level characteristics (e.g. state spending on Medicaid and other cash assistance) which could potentially explain state variations in nursing home use. Data on state Medicaid spending is available from the National Association of State Budget Officers.

3.2 Methods

Our analysis takes the following steps to fill the gaps in the literature by providing a better understanding of nursing home use expectations, their relationship with actual nursing home use, and their influence on individuals' wealth accumulation.

A. What Explains Nursing Home Use Expectations Among Older Adults?

First, we examine the determinants of subjective expectations about future nursing home use among older adults, using the following linear regression model:

$$E_{its} = \beta_0 + \beta_1 X_{its} + Year_t + State_s + \mu_i + \varepsilon_{its}, (1)$$

where E_{its} is nursing home use expectations for individual i in state s and year t , based on the responses to the question, “(What is the percent chance) that you will move to a nursing home in the next five years?” X_{its} captures factors that influence nursing home use (Anderson and Newman, 2005). These factors include measures of functional impairment such as activities of daily living (ADLs) and instrumental activities of daily living (IADLs) which measure a person's ability to live independently given their health status, variables measuring the feasibility of staying out of nursing homes such as marital status and availability of informal caregivers (e.g.

children and other family members), life events (e.g. health status and health shocks), financial resources (e.g. family income), long-term care and other health insurance coverage, and state-level factors such as state Medicaid spending.

State fixed effects ($State_s$) capture unobserved time-invariant state characteristics that might influence nursing home use expectations and year fixed effects ($Year_t$) capture secular trends in these expectations. In addition, we exploit the panel nature of the HRS to include individual fixed effects (μ_i), which account for unobserved, time-invariant individual characteristics. Inclusion of individual fixed effects implies that the regression captures within person changes in nursing home use expectations. Thus, our econometric approach can eliminate bias due to unobserved time-invariant state and individual factors through the inclusion of fixed effects. Moreover, we use a richer set of individual and state characteristics as covariates than have been used by previous studies.

In an alternative specification, we include lagged expectations ($E_{i(t-1)s}$) on the right-hand side of Equation (1) to account for serial correlation in nursing home use expectations. Specifically, we use the Arellano-Bond estimator to estimate this model (Arellano and Bond, 1991; Roodman, 2009; Blundell and Bond, 2000; Forbes 2000).

This step allows us to identify the key factors that influence nursing home use expectations among older adults and provide a better understanding of how older adults update their nursing home use expectations in response to declines in functional status, health shocks, and other risk factors for nursing home use.

B. Do Nursing Home Use Expectations Predict Actual Nursing Home Use?

Second, to analyze whether nursing home use expectations can predict actual nursing home use, we use the following linear probability model:

$$R_{i(t+5)s} = \beta_0 + \beta_1 E_{its} + \beta_2 X_{its} + Year_t + State_s + \mu_i + \varepsilon_{its}, (2)$$

where $R_{i(t+5)s}$ is a binary indicator for whether person i in state s has used a nursing home within five years after her interview in year t . We collect the information on respondents' actual nursing home use based on their responses to several questions about their residential places at the time of interview and whether they have stayed at a long-term care facility overnight since the previous wave.² Because the HRS is biennial while the subjective nursing home use expectation refers to nursing home use in five years, we also check the exact move-in dates whenever possible for those who used the nursing home between year four and year six after the subjective expectations question. All the other variables are defined as in Equation (1). The key coefficient of interest is β_1 , which shows the effect of nursing home use expectations on the probability of actual nursing home use within the following five years.

In addition to the continuous measure of nursing home use expectations, we also estimate a specification using deciles of nursing home use expectations (0%, 1-10%, 11-20%, ... 91-100%) to capture any possible nonlinear impacts of these expectations on actual nursing home use.

Results from this step will show whether subjective expectations contain valuable information about older adults beyond what researchers can observe and are therefore a strong predictor of actual future nursing home use, conditional on observable individual risk factors.

C. Do Nursing Home Use Expectations Influence Wealth Accumulation?

Third, to analyze how nursing home use expectations correlate with wealth accumulation, we use the following linear regression model:

$$W_{its} = \beta_0 + \beta_1 E_{its} + \beta_2 X_{its} + Year_t + State_s + \mu_i + \varepsilon_{its}, (3)$$

where W_{its} is the wealth for older adult i in state s and year t . We use six measures of wealth available in the HRS --- total wealth including secondary residence; total wealth excluding Individual Retirement Accounts; total non-housing wealth; net value of real estate (not including

² For those who died within two, four, or six years since they answered the questions about nursing home use expectations, we use similar information from the exit interviews.

primary residence); net value of primary residence; net value of non-housing financial wealth --- to gauge their relationship between nursing home use expectations. The remaining variables are defined as before. The key coefficient of interest, β_1 , captures the effect of a one percentage point increase in nursing home use expectations on a certain measure of person i 's wealth.

In addition to linear regression, we also estimate quantile regression (QR) models at the 15th, 25th, 50th, 75th, and 85th quantiles. The QR method allows us to identify differential effects of nursing home use expectations at different points of the wealth distribution. For example, wealthy individuals may respond to a high probability of nursing home use by saving more in order to pay for high nursing home costs. On the other hand, less wealthy individuals may respond to a high probability of nursing home use by spending *down* their wealth to qualify for Medicaid. The QR model allows us to capture such heterogeneous effects and can be used to evaluate whether wealth inequality increases or decreases with nursing home use expectations.

D. Is There Any Heterogeneity?

Finally, the literature has found substantial differences in nursing home use by gender, race, education, marital status, and other measures of socio-economic status (e.g., Headen, 1992; Liu, McBride, and Coughlin, 1994). In addition, it is possible that there are substantial differences across different cohorts in the HRS (e.g., war babies, early baby boomers, etc.). We therefore also conduct aforementioned analyses separately for subgroups by gender, race, education, marital status, and cohorts to account for heterogeneity in the formation of the subjective expectations for nursing home use and the effects of these nursing home use expectations on actual nursing home use and on individuals' wealth accumulation.

4. Results

4.1 Summary Statistics

Our final analysis sample consists of 79,870 person-year observations of 19,505 unique individuals, each of whom on average was interviewed in four waves which span six years.

Table 1 shows summary statistics for this analysis sample. The average age for our analysis sample is 74.5. 84.6% are non-Hispanic white and 12.2% are black. 57.7% are female. 37.3% of the sample have a high school degree and 41.0% have a college degree. 60.7% of the sample are married at the time of interview, and more than half of our observations are from the HRS cohort (born between 1931 and 1941).

The mean subjective probability of moving to a nursing home within five years is 14.9%, while the actual probability of moving to a nursing home within five years is 12.9%. Each of our six wealth measures has a large standard deviation, indicating a wide range in the wealth distribution for our analysis sample regardless of the measure we use. We adjust all nominal dollars to the real 2010 dollars using the CPI.³

Table 1. Summary Statistics

Variable	Mean	Standard Deviation	Min	Max
NH Use Expectation	14.875	22.148	0	100
NH Use in Five Years	.129	.335	0	1
Total Wealth (including Secondary Residence)	546000	1270000	-1540000	5.20e+07
Total Wealth (Excluding IRAs)	449000	1130000	-1620000	5.02e+07
Total Non-housing Wealth	373000	1110000	-1460000	4.84e+07
Net Value of Real Estate (not Primary Residence)	52284.13	384000	-61200	3.69e+07
Net Value of Primary Residence	151000	273000	-1940000	2.86e+07
Net Value of Non-housing Financial Wealth	180000	651000	-1630000	4.12e+07
Age	74.489	6.905	64	109
Age Squared	5596.3	1060.939	4096	11881
Female	0.577	.494	0	1
White	.846	.361	0	1
Black	.122	.327	0	1
Other races	.032	.177	0	1
Hispanic	.07	.256	0	1
High School Degree	.373	.484	0	1
College Degree	.41	.492	0	1
Married	.607	.488	0	1
Cohort: AHEAD	.201	.401	0	1
Cohort: CODA	.142	.349	0	1
Cohort: HRS	.557	.497	0	1
Cohort: WB	.065	.246	0	1
Cohort: EBB	.027	.163	0	1
Cohort: MBB	.003	.056	0	1
# Living Brothers	1.086	1.319	0	14
# Living Sisters	1.297	1.44	0	14
# Core Respondents in HH	1.994	.992	1	15

³ The CPIs are obtained here: <http://www.ssa.gov/oact/STATS/avgcpi.html>.

Variable	Mean	Standard Deviation	Min	Max
# Living Children	3.302	2.185	0	22
Table 1. Summary Statistics (cont)				
Self-Reported "Fair" or "Poor" Health	.278	.448	0	1
#ADLs where R Reports any Difficulty	.326	.857	0	5
#IADLs where R Reports any Difficulty	.224	.669	0	5
CESD: # of R's Depression Indicators in the Past Week	1.369	1.837	0	8
# Chronical Conditions R Ever Had	2.276	1.416	0	8
BMI	27.28	5.352	9.3	82.7
Ever Drinks Any Alcohol	.481	.5	0	1
Ever Smoked	.571	.495	0	1
Smoke Now	.092	.289	0	1
Total Cognition Summary Score	21.937	4.942	0	35
Out-of-Pocket Medical Expenditure	2994.111	8368.089	0	840000
Any Home Health Care Covered by Federal Government Health Insurance Program	.09	.287	0	1
Covered by Medicare	.972	.164	0	1
Covered by Medicaid	.968	.176	0	1
Covered by Medicaid	.076	.265	0	1
# Private Health Insurance Plans Covered by Health Insurance from a Current or Previous Employer	.588	.581	0	21
Covered by Spouse's Health Insurance from a Current or Previous Employer	.215	.411	0	1
Covered by Other Health Insurance Plan	.11	.313	0	1
Covered by Long-Term Care Insurance	.241	.427	0	1
Covered by Life Insurance	.143	.35	0	1
Earnings	.62	.485	0	1
Total Household Income	4921.112	22214.01	0	888000
Currently Receiving Any Pension Income	57655.84	247000	0	6.33e+07
State Spending on Medicaid	.433	.552	0	1.358
State Spending on TANF	12938.63	12987.14	178.1	81740
State Spending on Other Cash Assistance Programs	824.137	1513.511	0	5944
Year	519.205	1189.585	0	4815
N	2007.08	5.639	1998	2016
	79870			

4.2 Estimation Results

A. What Explains Nursing Home Use Expectations Among Older Adults?

In Table 2 (columns 1-3) we present estimates of the impact of various determinants on subjective probability of nursing home use in five years. We present three different specifications: the first being the exogenous demographic and family controls, the second being all the controls including potentially endogenous measures of health status and insurance status, and the third being all the controls but without individual fixed effects. The last specification provides information on the possible effects of time-invariant individual characteristics. All the specifications include state and year fixed effects, and standard errors are clustered at the individual level.

We find that age, being married, and number of people in the household are negatively and statistically significantly associated with expected future nursing home use, while age squared, having bad health (fair or poor health vs. excellent, very good, or good health), numbers of ADL and IADL, value of mental health indicator, number of health conditions, out-of-pocket medical spending, and long-term care insurance status are positively and statistically significantly associated with future nursing home use expectations. Among those time-invariant characteristics, being female and having high school or college education are positively and statistically significantly associated with future nursing home use expectations.

We estimate the difference and system GMM models developed by Arellano-Bond (1991), Arellano-Bover (1995), and Blundell and Bond (1998). These models include both a lagged dependent variable and individual fixed effects, allowing us to simultaneously account for time invariant, unobserved individual specific factors and serial correlation in nursing home use expectations. The estimation results are shown in Table 2 in columns 4 (partial set of controls) and 5 (complete set of controls). The sample sizes are smaller than those in columns 1-3 because the Arellano-Bond estimator uses lagged nursing home use expectations. Lagged nursing home use expectations are positively and statistically significantly associated with current nursing home use expectations, and the estimation results for other control variables are very similar to those in the first three columns.

Table 2. Determinants of Nursing Home Use Expectations.

	NH Use Expectation Exogenous X	NH Use Expectation Complete X	NH Use Expectation Without Indivi. FE	NH Use Expectation Exogenous X	NH Use Expectation Complete X
Lagged NH Use Expectation				0.084*** (0.009)	0.080*** (0.009)
Age	-1.486*** (0.386)	-1.212*** (0.412)	-0.671** (0.263)	0.092 (0.367)	-0.046 (0.385)
Age Squared	0.009*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.002 (0.002)	0.003 (0.003)
Married	-1.239*** (0.392)	-0.902** (0.408)	0.442** (0.194)	-0.042 (0.267)	0.422 (0.278)
# Living Brothers	-0.011 (0.235)	0.068 (0.244)	-0.111* (0.062)	-0.179* (0.094)	-0.161* (0.095)
# Living Sisters	0.068 (0.218)	0.076 (0.228)	-0.161*** (0.056)	-0.141 (0.087)	-0.089 (0.088)
# Core Respondents in HH	-0.268* (0.138)	-0.285** (0.145)	-0.811*** (0.087)	-0.449*** (0.116)	-0.618*** (0.119)
# Living Children	-0.042 (0.173)	-0.032 (0.175)	-0.385*** (0.036)	-0.378*** (0.056)	-0.363*** (0.057)
State Spending on Other Cash Assistance Programs	0 (0.000)	0 (0.000)	0 (0.000)	-0.001** (0.000)	-0.001 (0.000)
State Spending on TANF	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
State Spending on Medicaid	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Self Reported "Fair" or "Poor" Health		1.481*** (0.270)	2.818*** (0.216)		2.104*** (0.281)
# ADLs where R Reports any Difficulty		0.632*** (0.170)	0.672*** (0.137)		0.629*** (0.171)
# IADLs where R Reports any Difficulty		0.750*** (0.223)	1.081*** (0.181)		1.140*** (0.234)
CESD: # of R's Depression Indicators in the Past Week		0.488*** (0.068)	0.635*** (0.053)		0.481*** (0.069)
# Chronical Conditions R Ever Had		0.464*** (0.163)	0.717*** (0.064)		0.828*** (0.093)
BMI		-0.005 (0.047)	-0.035** (0.016)		-0.054** (0.024)
Ever Drinks Any Alcohol		-0.089 (0.278)	-0.089 (0.165)		0.033 (0.234)
Smoke Now		0.066 (0.607)	-0.481* (0.278)		-0.17 (0.433)
Total Cognition Summary Score		-0.023 (0.028)	0.078*** (0.020)		0.01 (0.027)
Out-of-Pocket Medical Expenditure		0.000**	0.000***		0.000***

	(0.000)	(0.000)	(0.000)
Any Home Health Care	0.074	-0.181	-0.535
	(0.326)	(0.318)	(0.360)
Covered by Federal Government Health Insurance Program	3.073*	-0.061	-0.458
	(1.631)	(1.273)	(1.951)
Covered by Medicare	-3.595**	0.401	0.338
	(1.575)	(1.204)	(1.815)
Covered by Medicaid	0.175	-0.879**	0.251
	(0.536)	(0.364)	(0.521)
# Private Health Insurance Plans	0.23	0.549	0.696
	(0.406)	(0.401)	(0.474)
Covered by Health Insurance from a Current or Previous Employer	-0.198	-0.105	-0.283
	(0.507)	(0.468)	(0.564)
Covered by Spouse's Health Insurance from a Current or Previous Employer	-0.761	-0.439	-0.144
	(0.564)	(0.487)	(0.611)
Covered by Other Health Insurance Plan	-0.312	0.108	-0.035
	(0.483)	(0.463)	(0.552)
Covered by Long-Term Care Insurance	0.961**	3.279***	2.652***
	(0.399)	(0.224)	(0.328)
Covered by Life Insurance	0.073	0.646***	0.307
	(0.285)	(0.166)	(0.237)
Earnings	0	-0.000***	0
	(0.000)	(0.000)	(0.000)
Total Household Income	0	0	-0.000**
	(0.000)	(0.000)	(0.000)
Currently Receiving Any Pension Income	0.172	0.594***	0.637***
	(0.243)	(0.149)	(0.208)
Female		0.918***	1.151***
		(0.177)	(0.261)
Black		0.335	-0.003
		(0.286)	(0.425)
Other race		-0.617	-1.192*
		(0.461)	(0.678)
Hispanic		0.664*	-0.078
		(0.370)	(0.553)
High School		1.387***	0.935***
		(0.238)	(0.352)
College		1.844***	1.466***
		(0.252)	(0.357)
Ever Smoked		-0.605***	-0.702***
		(0.168)	(0.269)
Cohort: AHEAD		0.414	-0.329
		(1.198)	(1.657)

Table 2. Determinants of Nursing Home Use Expectations (cont).

	NH Use Expectation	NH Use Expectation	NH Use Expectation	NH Use Expectation	NH Use Expectation
	Exogenous X	Complete X	Without Indivi. FE	Exogenous X	Complete X
Cohort: AHEAD			-0.325 (1.193)	-1.462 (1.646)	-0.461 (1.640)
Cohort: CODA(Children of the Depression)			-0.14 (1.186)	-1.282 (1.624)	-0.124 (1.622)
Cohort: HRS			-2.127* (1.237)	-3.302* (1.705)	-1.968 (1.705)
Cohort: WB(War Babies)			-2.332* (1.308)	-3.101* (1.834)	-1.483 (1.857)
Cohort: EBB(Early Baby Boomers)			-4.448*** (1.586)	-4.667** (2.308)	-3.606 (2.413)
Cohort: MBB(Mid Baby Boomers)			1.736 (8.106)	0 (0.000)	0 (0.000)
Constant	70.265*** (19.120)	60.331*** (20.027)	16.502 (10.067)	-3.503 (14.263)	-1.308 (14.933)
N	79870	79870	79870	62401	58595

Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01

B. Do Nursing Home Use Expectations Predict Actual Nursing Home Use?

In Table 3 (columns 1-3) we present estimates of the impact of subjective probability of nursing home use on the actual nursing home use in five years. We again present three specifications with different sets of controls as for Table 2.

As we can see, regardless of the model specification used, subjective probabilities of nursing home use positively and statistically significantly predict actual nursing home use in five years. The estimated coefficients are between 0.00023 and 0.00025 and are significant at the 0.1% level in specifications with individual fixed effects (the coefficient is larger and also significant in the specification without individual fixed effect). These estimated coefficients mean that a one percentage point increase in subjective probability of nursing home use is associated with 0.023-0.025 percentage point increase in the probability of actual nursing home use in five years, with everything else controlled for. This result indicates that older adults in our sample have rational expectations regarding their future nursing home use and nursing home use expectations are a good indicator of actual nursing home use. Furthermore, the statistically significant estimates for subjective nursing home use expectation, conditional on a rich set of

control variables that are normally used to predict nursing home use in a standard analysis, suggest that there is non-trivial *personal* information in individuals' subjective expectations which go beyond what researchers can observe and control for. It is thus important to collect and make use of subjective nursing home use expectations.

Table 3. Nursing Home Use Expectations and Actual Nursing Home Use in Five Years.

	NH Use Expectation Exogenous X	NH Use Expectation Complete X	NH Use Expectation Without Indivi. FE	NH Use Expectat ion Exogeno us X	NH Use Expectation Complete X	NH Use Expectation Without Indivi. FE
NH Use Expectation	0.00025*** (0.000)	0.00023*** (0.000)	0.001*** (0.000)			
NH Use Expectation (0%, 10%]				-0.001 (0.004)	-0.003 (0.004)	0.004 (0.004)
NH Use Expectation (10%, 20%]				0.006 (0.006)	0.006 (0.006)	0.015** (0.006)
NH Use Expectation (20%, 30%]				0.001 (0.006)	-0.002 (0.007)	-0.002 (0.006)
NH Use Expectation (30%, 40%]				0.01 (0.011)	0.009 (0.012)	0.030** (0.012)
NH Use Expectation (40%, 50%]				0.002 (0.005)	0.001 (0.006)	0.015*** (0.005)
NH Use Expectation (50%, 60%]				0.019 (0.018)	0.016 (0.019)	0.053*** (0.020)
NH Use Expectation (60%, 70%]				0.064*** (0.022)	0.067*** (0.023)	0.069*** (0.027)
NH Use Expectation (70%, 80%]				0.023** (0.012)	0.026** (0.012)	0.045*** (0.013)
NH Use Expectation (80%, 90%]				0.046** (0.022)	0.038* (0.022)	0.105*** (0.027)
NH Use Expectation (90%, 100%]				0.046** (0.020)	0.038* (0.021)	0.102*** (0.021)
N	56165	56165	56165	56165	56165	56165

Standard errors in parentheses. Other control variables are the same as in Table 2 and their estimates are available upon request. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In addition to nursing home use expectations, age, number of people in the household, BMI, cognitive ability, out-of-pocket medical spending, whether using home care, having Medicaid, health insurance plan by employer, or other types of health insurance coverage, and whether having life insurance are negatively and statistically significantly associated with future nursing home use. Furthermore, age squared, self-reported bad health, numbers of ADL and IADL, total household income, and number of private health insurance plans are positively and statistically significantly associated with future nursing home use. Among those time-invariant characteristics, being white, black, or Hispanic is negatively and statistically significantly associated with future nursing home use, while having high school or college degree is positively and statistically significantly associated with future nursing home use.

To capture any possible nonlinear impacts of subjective nursing home use expectations on actual nursing home use, we also estimate three specifications where we replace the continuous nursing home use expectations with deciles of nursing home use expectations (0%, 1-10%, 11-20%, etc.). Results (Table 3, columns 4-6) show that having a subjective expectation of future nursing home within the ranges of 61-70%, 71-80%, 81-90%, and 91-100% is positively and statistically significantly associated with actual nursing home use, and the impacts of the rest of the determinants in this specification are very similar to those in columns 1-3.

C. Do Nursing Home Use Expectations Influence Wealth Accumulation?

The results on the effects of subjective probability of nursing home use in five years on wealth accumulation are presented in Table 4. We show the main estimated coefficients on nursing home use expectations for the six different measures of wealth mentioned above. Panel A shows the main estimates for specifications with only exogenous controls, Panel B shows the main estimates for specifications with the full set of controls, and Panel C shows the results for specifications without individual fixed effects. The estimated coefficients for the rest of the control variables are available upon request.

Table 4. Relationship between Nursing Home Use Expectations and Household Wealth.

	Total Wealth (Including	Total Wealth (Excluding IRAs)	Total Non- housing Wealth	Net value of real estate (not	Net value of primary residence	Net value of non- housing
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	Secondary Residence)			primary residence)		financial wealth
Panel A: Exogenous Controls						
NH Use Expectation	-93.101 (132.132)	-35.155 (125.428)	2.626 (123.510)	-73.483 (49.997)	-89.535*** (30.629)	72.436 (91.972)
N	79870	79870	79870	79870	79870	79870
Panel B: Complete Controls						
NH Use Expectation	-62.760 (132.537)	-18.664 (126.583)	23.557 (125.698)	-75.709 (53.339)	-83.151*** (28.248)	69.848 (94.005)
N	79870	79870	79870	79870	79870	79870
Panel C: Complete Controls, No Individual Fixed Effects						
NH Use Expectation	338.794** (172.151)	345.345** (161.942)	452.950*** (157.760)	-125.267*** (47.236)	-114.325*** (32.459)	641.468*** (117.890)
N	79870	79870	79870	79870	79870	79870
Panel D: Exogenous Controls Lagged NH Use						
Expectation	-361.035** (162.197)	-319.083** (155.908)	-226.367 (154.483)	-77.864 (83.011)	-126.779*** (28.542)	-108.839 (94.687)
N	69727	69727	69727	69727	69727	69727
Panel E: Complete Controls Lagged NH Use						
Expectation	-297.265* (170.614)	-250.162 (163.992)	-178.957 (161.317)	-57.695 (80.138)	-103.399*** (33.252)	-70.060 (99.345)
N	62440	62440	62440	62440	62440	62440
Panel F: Complete Controls, No Individual Fixed Effects Lagged NH Use						
Expectation	-137.195 (161.438)	-104.166 (155.285)	12.640 (151.120)	-103.607 (63.553)	-123.421*** (33.584)	177.592* (104.526)
N	62440	62440	62440	62440	62440	62440

Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01

As shown in Table 4, subjective probability of nursing home use, though statistically significantly predicts actual nursing home use, is not statistically significantly associated with any change in wealth accumulation, with the exception of net value of primary residence,

regardless of which set of control variables we use. Only in the specification that excludes individual fixed effects (Panel C) do we find statistically significant estimates for subjective probabilities of future nursing home use. This difference highlights the importance of controlling for individual fixed effects.

When we move to results on the association with lagged subjective probability of nursing home use and wealth accumulation (Panels D-F), we see that lagged subjective expectations are negatively and statistically significantly associated with total wealth (including secondary residence) and net value of primary residence, while excluding individual fixed effects again leads to different results.

To identify differential effects of nursing home use expectations at different points of the wealth distribution, we also estimate quantile regression (QR) models at the 15th, 25th, 50th, 75th, and 85th percentiles. Panels A and C of Table 5 show results for specifications with exogenous controls; Panels B and D show results for specifications with complete controls. Panels A and B deal with contemporaneous nursing home use expectations, while Panels C and D deal with lagged nursing home use expectations.⁴ Here again only the main estimated coefficients are shown. As is clear from the table, nursing home use expectations are not significantly associated with wealth accumulation, regardless of the percentile or the set of control variables we use.

Table 5. Relationship between Nursing Home Use Expectations and Household Wealth Using Quantile Regression.

	Total Wealth (Including Secondary Residence)	Total Wealth (Excluding IRAs)	Total Non- housing Wealth	Net value of real estate (not primary residence)	Net value of primary residence	Net value of non-housing financial wealth
Panel A: Contemporaneous NH Use Expectations, Exogenous Controls						
15%	-113.528 (14099.700)	-70.336 (6800.055)	-25.321 (23373.117)	-54.030 (3647.265)	-75.254 (357.872)	22.717 (14404.092)

Table 5. Relationship between Nursing Home Use Expectations and Household Wealth Using Quantile Regression (cont).

	Total Wealth (Including	Total Wealth	Total Non- housing Wealth	Net value of real estate	Net value of primary residence	Net value of non-housing
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⁴ Results for specifications without individual fixed effects are available upon request.

	Secondary Residence)	(Excluding IRAs)		(not primary residence)		financial wealth
25%	-108.738 (12308.924)	-62.058 (5806.688)	-19.187 (20689.194)	-57.753 (3353.474)	-78.685 (311.221)	33.932 (12674.710)
50%	-95.165 (7670.297)	-38.432 (8777.160)	-2.128 (14225.399)	-67.262 (3179.286)	-89.385 (320.874)	62.594 (9148.673)
75%	-75.974 (5669.803)	-5.756 (18164.016)	27.471 (13067.676)	-96.163 (6554.797)	-101.561 (548.183)	114.286 (10011.775)
85%	-67.469 (7707.786)	8.585 (22620.028)	41.232 (17652.167)	-109.628 (8771.310)	-106.555 (663.448)	138.901 (13354.616)
N	79870	79870	79870	79870	79870	79870

Panel B: Contemporaneous NH Use Expectations, Complete Controls

15%	-59.427 (5451.473)	-33.746 (15282.586)	21.659 (8557.961)	-50.219 (2752.230)	-79.149 (471.921)	17.554 (4821.190)
25%	-60.230 (4734.860)	-30.122 (13282.733)	22.107 (7489.195)	-55.287 (2534.488)	-80.109 (409.533)	29.630 (3740.359)
50%	-62.422 (3053.093)	-20.159 (8121.566)	23.245 (5129.272)	-68.450 (2660.034)	-83.097 (270.860)	59.687 (8101.896)
75%	-65.527 (2809.265)	-6.149 (5114.132)	25.184 (4632.900)	-105.227 (6064.595)	-86.507 (328.829)	112.930 (20461.784)
85%	-66.927 (3716.358)	0.150 (7229.412)	26.116 (6302.696)	-126.604 (8539.164)	-87.902 (407.584)	138.469 (26584.412)
N	79870	79870	79870	79870	79870	79870

Panel C: Lagged NH Use Expectation, Exogenous Controls

15%	-449.882 (2201.216)	-372.642 (4861.724)	-282.946 (8072.346)	-44.907 (4311.923)	-125.257 (407.622)	-53.949 (4421.649)
25%	-428.703 (1893.207)	-360.006 (4232.673)	-269.963 (7094.105)	-51.908 (3887.223)	-125.611 (353.764)	-66.979 (3849.934)
50%	-368.718 (2936.101)	-323.721 (2876.768)	-235.015 (6993.290)	-68.849 (3356.386)	-126.750 (622.613)	-97.413 (3108.292)
75%	-284.036 (6114.911)	-273.767 (3388.068)	-173.684 (13497.581)	-114.146 (5729.095)	-128.046 (1191.128)	-156.031 (4789.486)
85%	-245.865 (7658.356)	-251.852 (4348.257)	-144.247 (17538.189)	-134.654 (7604.232)	-128.549 (1424.663)	-185.916 (6440.043)
N	69727	69727	69727	69727	69727	69727

Table 5. Relationship between Nursing Home Use Expectations and Household Wealth Using Quantile Regression (cont).

Total Wealth (Including	Total Wealth (Excluding IRAs)	Total Non- housing Wealth	Net value of real estate (not primary residence)	Net value of primary residence	Net value of non-housing financial wealth
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	Secondary Residence)					
Panel D: Lagged NH Use Expectation, Complete Controls						
15%	-414.759 (13291.540)	-332.528 (4709.343)	-265.277 (62436.203)	-32.107 (4492.078)	-107.909 (2619.993)	1.894 (13108.682)
25%	-386.408 (8959.538)	-312.418 (4071.804)	-244.447 (54476.205)	-37.237 (4254.945)	-106.830 (2270.963)	-16.227 (11372.792)
50%	-307.171 (63867.813)	-257.579 (3198.415)	-191.483 (34436.456)	-51.060 (6153.252)	-103.488 (1194.347)	-55.432 (7703.810)
75%	-195.603 (1.43e+05)	-180.555 (4832.046)	-101.273 (9085.479)	-87.680 (16398.595)	-99.671 (212.893)	-128.969 (3000.572)
85%	-145.001 (1.79e+05)	-145.973 (6132.991)	-56.489 (20950.031)	-108.794 (22804.832)	-98.179 (583.057)	-165.280 (4804.890)
N	62440	62440	62440	62440	62440	62440

Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01

D. Heterogeneity

Finally, the literature has found substantial differences in nursing home use by gender, race, education, marital status, and other measures of socio-economic status (e.g., Headen, 1992; Liu, McBride, and Coughlin, 1994). In addition, it is possible that there are substantial differences across different cohorts in the HRS (e.g., war babies, early baby boomers, etc.). We therefore will also conduct aforementioned analyses separately for subgroups by gender, race, education, marital status, and cohorts to account for heterogeneity in the formation of the subjective expectations for nursing home use and the effects of these nursing home use expectations on actual nursing home use and on individuals' wealth accumulation. Main coefficients are reported in Table 6. It is clear from the table that there is indeed some heterogeneity. For the determinants of nursing home use expectations, we do not see much difference in the association between lagged and current nursing home use between male and female and between the HRS cohort and all the other cohorts. However, lagged nursing home use expectations are not associated with current nursing home use expectations for those with more than high school education, not married at the time of interview, and those white respondents.

When we turn our attention to whether nursing home use expectations can predict future nursing home use (Table 7), we see that the answer is no for those without a high school degree, not married at the time of interview, and those non-white respondents.

As for whether (lagged) nursing home use expectation can predict future nursing home use, Table 8 shows that expectations of white male respondents from the HRS cohort who have at least a high school degree and are married at the time of interview are more likely to be predictive of their future nursing home use than those for their counterparts, but when we move to quantile regression (result table available upon request), we see again that none of the subsamples show any statistically significant association between nursing home use and expectations, the same as what we find for the entire sample.

5. Conclusion

Using a long and rich panel data in a dynamic framework, we examine the determinants of nursing home use expectations, how individuals update their expectations in response to health shocks and other conditions, the relationship between these expectations and actual nursing home use, and the link between nursing home use expectations and wealth accumulation.

We find that older adults update their nursing home use expectations rationally, and these expectations can predict their actual nursing home use in the future beyond all the observable characteristics. These expectations, however, cannot predict older adults' decisions regarding wealth accumulation. We also find large heterogeneity across different subgroups.

Table 6. Relationship between Lagged and Current Nursing Home Use Expectations by Subsamples.

Y: NH Use Expectation	Male	Female	< High School	>= High School	Not Married	Married	White	Non-White	HRS Cohort	Non-HRS Cohorts
Lagged NH Use Expectation	0.086*** (0.014)	0.081*** (0.011)	0.091*** (0.011)	0.000 (0.000)	0.000 (0.000)	0.074*** (0.012)	0.092*** (0.009)	0.000 (0.000)	0.071*** (0.011)	0.098*** (0.014)
N	26185	36216	38749	23652	25146	37255	53465	8936	36856	25545

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Nursing Home Use Expectations and Actual Nursing Home Use in Five Years by Subsamples.

Y: NH Use	Male	Female	< High School	>= High School	Not Married	Married	White	Non-White	HRS Cohorts	Non-HRS Cohorts
Panel A: Continuous NH Use Expectations										
NH Use Expectation	0.00025*	0.00021**	0.00012	0.00038***	0.00018	0.00026**	0.00024***	0.00014	0.00022**	0.00023*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Categorical NH Use Expectations										
NH Use Expectation (0%, 10%]	-0.004	-0.002	0.001	-0.010	0.001	-0.003	-0.002	-0.007	-0.007	0.004
	(0.006)	(0.006)	(0.005)	(0.007)	(0.008)	(0.005)	(0.004)	(0.011)	(0.004)	(0.008)
NH Use Expectation (10%, 20%]	0.009	0.004	-0.002	0.020**	-0.015	0.016**	0.004	0.017	0.010	-0.001
	(0.009)	(0.008)	(0.008)	(0.010)	(0.012)	(0.007)	(0.006)	(0.017)	(0.007)	(0.011)
NH Use Expectation (20%, 30%]	0.005	-0.007	0.002	-0.008	-0.010	0.007	-0.007	0.039**	0.004	-0.008
	(0.010)	(0.009)	(0.008)	(0.010)	(0.012)	(0.008)	(0.007)	(0.020)	(0.007)	(0.011)
NH Use Expectation (30%, 40%]	-0.022	0.037**	0.015	-0.004	0.007	0.013	0.017	-0.046	-0.003	0.025
	(0.016)	(0.016)	(0.014)	(0.019)	(0.021)	(0.014)	(0.013)	(0.029)	(0.014)	(0.019)
NH Use Expectation (40%, 50%]	0.005	-0.003	-0.007	0.011	0.001	0.002	-0.001	0.011	0.001	0.002
	(0.009)	(0.007)	(0.007)	(0.009)	(0.010)	(0.007)	(0.006)	(0.014)	(0.007)	(0.008)
NH Use Expectation (50%, 60%]	-0.008	0.031	-0.007	0.056*	0.036	0.001	0.020	-0.017	0.031	0.006
	(0.030)	(0.024)	(0.024)	(0.030)	(0.034)	(0.022)	(0.020)	(0.050)	(0.024)	(0.028)
NH Use Expectation (60%, 70%]	0.078**	0.061**	0.075**	0.051	0.067*	0.072**	0.067***	0.067	0.067**	0.062*
	(0.037)	(0.029)	(0.029)	(0.037)	(0.035)	(0.030)	(0.026)	(0.049)	(0.032)	(0.033)
NH Use Expectation (70%, 80%]	0.040**	0.020	0.017	0.036*	0.014	0.032**	0.027**	0.025	0.026	0.025
	(0.020)	(0.015)	(0.016)	(0.019)	(0.018)	(0.016)	(0.013)	(0.030)	(0.016)	(0.018)
NH Use Expectation (80%, 90%]	0.014	0.043*	0.046	0.023	0.005	0.066**	0.052**	-0.019	0.007	0.063*
	(0.045)	(0.025)	(0.030)	(0.032)	(0.031)	(0.033)	(0.025)	(0.041)	(0.028)	(0.034)
NH Use Expectation (90%, 100%]	0.034	0.041*	0.024	0.061	0.042	0.032	0.053**	-0.013	0.029	0.043
	(0.038)	(0.025)	(0.025)	(0.037)	(0.028)	(0.032)	(0.025)	(0.040)	(0.034)	(0.027)
N	23910	32255	35006	21159	21842	34323	48288	7877	30080	26085

Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table 8. Relationship between Nursing Home Use Expectations and Household Wealth by Subsamples (cont).

	Total Wealth (Including Secondary Residence)	Total Wealth (Excluding IRAs)	Total Non- housing Wealth	Net value of real estate (not primary residence)	Net value of primary residence	Net value of non- housing financial wealth
Married						
NH Use Expectation	70.919 (209.957)	104.634 (203.916)	173.783 (202.938)	-77.355 (83.742)	-85.645** (42.905)	209.777 (150.938)
N	48463	48463	48463	48463	48463	48463
Lagged NH Use Expectation	-530.827** (236.407)	-466.144** (224.560)	-426.268* (224.544)	-153.298 (119.063)	-69.302 (45.953)	-222.106* (126.371)
N	36697	36697	36697	36697	36697	36697
White						
NH Use Expectation	-58.871 (161.004)	-4.798 (153.944)	39.569 (152.854)	-93.164 (65.217)	-91.289*** (33.664)	88.531 (114.409)
N	67591	67591	67591	67591	67591	67591
Lagged NH Use Expectation	-394.115* (205.663)	-321.320 (197.957)	-241.642 (195.167)	-64.238 (97.235)	-121.044*** (38.166)	-91.360 (120.758)
N	53331	53331	53331	53331	53331	53331
Non-White						
NH Use Expectation	8.556 (88.619)	-27.377 (80.632)	23.917 (68.176)	31.358 (38.286)	-28.591 (40.675)	-5.378 (38.999)
N	12279	12279	12279	12279	12279	12279
Lagged NH Use Expectation	235.716** (117.414)	139.189 (106.921)	141.802 (86.732)	-12.357 (44.325)	32.376 (60.157)	26.782 (32.579)
N	9109	9109	9109	9109	9109	9109
HRS Cohort						
NH Use Expectation	-48.008 (157.582)	-14.804 (146.709)	-2.257 (147.350)	-9.522 (62.463)	-64.933** (28.946)	-52.497 (96.540)
N	44514	44514	44514	44514	44514	44514
Lagged NH Use Expectation	-151.442 (240.539)	-126.547 (229.471)	-130.728 (227.859)	-152.983** (70.666)	-44.227 (38.063)	12.861 (121.120)
N	36141	36141	36141	36141	36141	36141
Non-HRS Cohorts						
NH Use Expectation	-50.366	-3.941	69.970	-142.792	-92.466*	211.519

	(218.160)	(211.670)	(209.396)	(87.021)	(50.618)	(167.996)
N	35356	35356	35356	35356	35356	35356
Lagged NH Use						
Expectation	-444.955*	-376.307	-215.356	64.412	-169.479***	-161.069
	(236.533)	(230.771)	(221.457)	(154.354)	(57.308)	(160.212)
N	26299	26299	26299	26299	26299	26299

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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