Saving for Future Health Expenditures: Evidence from the Health and Retirement Study

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Economic theory of inter-temporal choice predicts that rational individuals will save for future needs. One of the motives for saving is as a precaution against expected, but uncertain future health risks. This precautionary motive has received a fair amount of attention in the empirical literature, but has yet to be definitively demonstrated. In this study, we use data from the Health and Retirement Study (HRS) to examine the effect of predicted future health care expenses on current wealth holdings. We find that, controlling for selection effects and endogeneity, predicted out-of-pocket health care expenses have a significant effect on current period wealth holdings.

Previous research examining poor health as a motive for savings has addressed both the effect of future spending uncertainty on savings behavior and the effect of expected future spending levels on savings (e.g., Chou, Liu, & Hammitt, 2003; Kennickell & Lusardi, 2006; Kong, Lee, & Lee, 2008; Hsu 2013; Starr-McCluer, 1995; Yilmazer & Scharff, 2014). The evidence has been mixed. Some have found, consistent with theory, that a reduction in uncertainty through insurance (Chou et al., 2003; Kong et al., 2008) leads to a decline in savings, while others have found an unexpected positive effect of insurance on savings (Starr-McCluer 1995). The literature is also unclear about whether health risks and their corresponding expected future expenses lead to increased savings. Kennickell and Lusardi (2006) find that individuals with expected future health expenses have a higher level of desired precautionary wealth, but find no evidence that they act on that preference. Similarly, Yilmazer and Scharff (2014) find that individuals with health risks do not save significantly more.

One factor complicating the analysis in each of these studies is the fact that health and wealth are endogenous. For example, while insurance may reduce the need for savings, those who are wealthier are more likely to both have insurance and spend more on health care. More relevant to this study, while higher expected future out-of-pocket spending may theoretically be a good determinant of wealth, operationally, wealth is an equally valid determinant of out-of-pocket spending. Thus, a positive relationship between the two cannot be definitively attributed to precautionary motives.

This study utilizes the panel structure of the HRS to predict an individual-level out-of-pocket spending variable, which is independent of wealth. This variable is then used as a determinant of wealth. Our central hypothesis is that future health risks, manifested through predicted future out-of-pocket health care expenses, leads to increased wealth (savings).

Methods

The basic empirical model used to assess savings is adapted from Yilmazer and Scharff (2014),

$$\frac{W_{it}}{Y_i^P} = \alpha_{0+}\beta_1 H_{it+n} + \mathbf{X_{it}'\gamma} + e_{it}$$

where W_{it} is household wealth for individual i at time t, H_{it+n} is the manifestation of a health risk at future time t+n, and X_{it} is a vector of control variables. Consistent with others, alternative definitions of wealth are also used in the empirical analysis.

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We derive the permanent income variable in a manner similar to Starr-McCluer (1995), using the measure originally developed by King and Dicks-Mireaux (1982). This method essentially calculates a predicted value for permanent income through a two-stage model that corrects for employment selection effects.

Out-of-pocket spending is used to measure H_{it+n}. As discussed above, however, the actual value of H_{it+n} cannot be used because it is endogenously related to wealth. Instead, we predict out-of-pocket spending using the following equation:

$$\mathrm{pred}(H_{it+n}) = \alpha_0 + Z'_{it}\beta + X'_{it}\gamma + e_{it}$$

where Z is a vector of current period condition and other health-related variables, while X is a vector of current period demographic variables. H_{it+n} is predicted separately for multiple time periods. Current period explanatory variables are used to reflect the fact that this is the information future health care consumers use to assess savings needs. To account for the fact that out-of-pocket spending is skewed, an alternative log(H_{it+n}) measure is also used.

Data

Data from waves 1 and 2 through 6 of the HRS are used in the analysis. The sample is limited to couples that remain together and remain in the study across the first six waves. The sample is further limited to those that have positive wealth holdings in wave 1. Finally, observations for which out-of-pocket expenditure variables are imputed, rather than measured directly, are omitted. The final sample consists of 3,040 older households.

The descriptive statistics of key household variables used in the analyses are presented in Table 1. Most variables are taken from wave one. The exception is the out-of-pocket expenditure variable, which is taken from waves 3 through 6. Wave 2 out-of-pocket expenditures were not used because the vast majority were imputed and the measure only covered the previous year, as opposed to the previous two years for waves 3 through 6. The average household held $258,000 in wealth and had a permanent income of $62,390. Predicted out-of-pocket spending averaged between $2,575 in wave 4 and $4,319 in wave 6, reflecting increasing costs as respondents aged.

Table 1

Household Variables

	Mean	Std. Dev.
Household wealth ÷ 1,000	258.72	495.52
Ln(Household wealth ÷ 1,000)	4.79	1.31
Wealth ÷ permanent income	5.22	17.04
Ln(Wealth ÷ permanent income)	0.83	1.28
Permanent income	62.39	39.94
Wave 3 Out-of-pocket spending	2884.27	2552.01
Wave 4 Out-of-pocket spending	2575.21	1737.60
Wave 5 Out-of-pocket spending	2625.19	1044.01
Wave 6 Out-of-pocket spending	4319.34	3649.66

Note. Also included, but not reported: 7 census division variables, household size.

Condition variables, used in the spending prediction models, are reported in Table 2. Relatively low numbers of persons were afflicted with each reported condition in wave 1.

Descriptive statistics for individual control variables, used in multiple models, are presented in Table 3. Individuals in the sample are older and less likely to be minorities than the population as a whole. Most have life insurance and most believe they will die before age 85. Most are risk averse and do not engage in risky behavioral activities.

Table 2

Condition Variables

	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
High blood pressure	0.37	0.48	0.28	0.45
Diabetes	0.09	0.28	0.07	0.25
Cancer	0.03	0.16	0.07	0.25
Lung disease	0.06	0.23	0.06	0.23
Heart disease	0.13	0.33	0.07	0.26
Stroke	0.03	0.16	0.01	0.12
Psychological problems	0.06	0.24	0.11	0.31
Arthritis	0.30	0.46	0.37	0.48
Back problems	0.33	0.47	0.30	0.46
Health limited work	0.16	0.36	0.15	0.36
# of activity limitations (1-5)	0.10	0.45	0.11	0.51

Results

Selectivity corrected earnings regressions were used to calculate permanent income for male and female spouses separately. For each spouse, a first stage probit model for full-time employment was used to calculate an inverse mills ratio that was used in a second stage earnings model. Both the first and second stage models were highly significant for both male and female spouses. Individual and population based predicted measures were combined to calculate permanent income for the household (see Starr-McCluer, 1995). The average permanent income for a household was $62,390.

To predict out-of-pocket spending a total of eight regressions were used. Four were used to predict out-of-pocket expenditures, and four were used to predict log(out-of-pocket expenditures). For illustrative purposes, the results for the wave 4 log(out-of-pocket expenditures) equation are presented in Table 4. A number of wave 1 condition variables affected wave 4 out-of-pocket spending for both men and women, including high blood pressure, psychological problems, and activity limitations. Insurance variables were also significant, especially for men.

The central result can be found in Table 5. Predicted out-of-pocket spending is regressed against a number of wealth variables. The result is consistent with theory. In most cases, predicted spending is positively and significantly related to current wealth. However, this is only true when nonlinear measures of predicted spending are used. Other variables in the equation are significant with expected signs.

Table 3

Individual Control Variables

	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
Age	57.25	5.20	53.26	5.75
Black	0.09	0.29	0.09	0.28
Other race	0.03	0.17	0.03	0.17
Hispanic	0.08	0.27	0.08	0.27
High school	0.51	0.50	0.62	0.48
Associate's degree	0.03	0.18	0.05	0.21
Bachelor's degree	0.14	0.34	0.10	0.29
Master's degree	0.07	0.26	0.05	0.22
Doctorate	0.03	0.18	0.01	0.09
Life insurance	0.83	0.37	0.74	0.44
Prob. live to 85	41.83	29.62	48.11	30.31
Risk averse	0.69	0.46	0.67	0.47
Planning horizon	0.44	0.50	0.39	0.49
Smoker	0.24	0.43	0.23	0.42
Heavy drinker	0.02	0.13	0.00	0.07
Obese	0.20	0.40	0.22	0.42
Exercises	0.20	0.40	0.20	0.40

Conclusion

Previous studies have not been able to demonstrate precautionary savings for health care spending. This study employed prediction models to minimize endogeneity and demonstrate a positive relationship between future need and current savings. This suggests that individuals will save for anticipated future health expenditures. This has important implications for policy. Specifically, it suggests that educational efforts designed to inform investors of future financial needs may be fruitful. Furthermore, it illustrates the importance of having consistent health care policy that does not result in frequent major shifts in health care pricing. Such policy will facilitate investors' own predictive decision making.

Table 4

Out-of-Pocket Spending, Dependent Variable: Wave 4 ln(Out-of-Pocket)

	Male Coefficients	Female Coefficients
Age	-0.020	0.286***
Age^2	0.000	-0.003***
Hispanic	-0.468**	-0.462**
Health	0.006	0.038
High blood pressure	0.397***	0.160**
Diabetes	0.186	0.557***
Cancer	-0.116	-0.100
Lung disease	0.288**	0.110
Heart disease	0.012	-0.005
Stroke	-0.367*	-0.072
Psychological problems	0.402***	0.206**
Arthritis	-0.129*	0.104
Back problems	-0.012	-0.078
Health limited work	0.089	0.231**
# of activity limitations (1-5)	-0.148*	-0.055
Medicare	-1.312***	1.203*
Medicaid	-1.374***	-0.939
Champus/VA	-1.413***	-0.405
Other govt. insurance	-1.648***	0.196
Employer coverage	0.018	0.153
Other coverage	0.458***	0.376**
Long-term care insurance	0.987***	0.081
BMI	0.026***	-0.015**
Exercises	-0.117	-0.028
Smoker	-0.177*	-0.068
Risk averse	-0.205***	-0.073
Adjusted R^2	0.117	

Note. Also included, but not reported: 7 census division variables, 4 race variables.

Table 5

Models of Precautionary Savings

	$\ln\left(\frac{\text{Wealth}}{Y_P}\right)$	ln(Wealth)	$\frac{\text{Wealth}}{Y_P}$	$\frac{\text{Wealth}}{Y_P}$	Wealth	Wealth
Ln(Out-of-pocket $)	0.070***	0.059***				
(Out-of-pocket $)/1,000			0.014	0.515**	0.587	20.047***
(Out-of-pocket $)^2/1 mill.				-0.266**		-9.923***
(Out-of-pocket $)^3/1 bill.				0.003**		0.127***
Male Demographics						
Age	0.158***	0.163***	0.107	0.116	30.485*	30.873*
Age^2	-0.001***	-0.001***	0.001	0.001	-0.243	-0.248
Hispanic	-0.393***	-0.436***	-4.272**	-4.307**	-147.780**	-148.768**
High school graduate	0.256***	0.326***	1.053	1.051	21.869	21.518
Associates degree	0.339***	0.417***	10.345***	10.549***	165.191***	172.770***
Bachelor's degree	0.496***	0.592***	2.113*	2.083*	73.605**	72.293**
Master's degree	0.242**	0.347***	2.868*	2.845*	12.501	11.406
Doctorate	0.969***	0.895***	5.418***	5.250**	296.064***	289.263***
Female Demographics						
Age	0.015	0.046	-0.148	-0.316	11.956	5.461
Age^2	0.000	0.000	0.003	0.004	-0.055	0.008
Hispanic	0.232	0.203	1.844	1.787	72.647	70.789
High school graduate	0.367***	0.422***	1.834*	1.699*	59.277**	54.339**
Associates degree	0.481***	0.547***	2.791	2.672	114.587**	110.185**
Bachelor's degree	0.441***	0.520***	0.941	0.796	42.581	37.266
Master's degree	0.659***	0.744***	1.620	1.427	165.982***	158.816***
Doctorate	0.563**	0.698***	1.583	1.366	57.833	49.915
Preference Identifiers						
Smoker (M)	-0.283***	-0.292***	-2.388***	-2.345***	-77.581***	-75.706***
Smoker (F)	-0.103*	-0.078	1.170	1.114	-0.793	-3.078
Obese (M)	-0.125**	-0.104**	-0.681	-0.706	-27.196**	-28.302
Obese (F)	-0.193***	-0.221***	-1.293*	-1.216	-51.067	-48.183**
Exercises (M)	0.197***	0.193***	0.593	0.667	58.312***	61.340***
Exercises (F)	0.057	0.048	1.831**	1.853**	42.148*	42.947*
Heavy drinker (M)	-0.165	-0.188	-1.364	-1.394	-44.269	-45.339
Heavy drinker (F)	-1.192***	-1.080***	-1.996	-2.273	-133.537	-143.982
Financial Variables						
Permanent income (Y_P)	-0.009***	0.004***	-0.054***	-0.054***	1.425***	1.452***
Health insurance(M)	-0.025	-0.003	-1.679**	-1.735**	-32.280	-34.665
Health insurance (F)	-0.009	-0.003	-0.506	-0.344	-19.314	-12.951
Prob. live to 85 (M)	0.001	0.001	0.013	0.013	0.539*	0.555*
Prob. live to 85 (F)	0.002**	0.002**	0.007	0.006	0.534*	0.506*
Risk averse (M)	0.089*	0.071	1.294*	1.427**	30.233	35.544*
Risk averse (F)	-0.069	-0.060	0.007	0.078	-0.075	2.415
Planning horizon (M)	0.123***	0.135***	1.178*	1.132*	40.617**	38.882**
Planning horizon (F)	0.176***	0.191***	1.523**	1.490**	58.675***	57.426***
Life insurance (M)	0.196***	0.167	0.288	0.135	-3.135	-8.876
Life insurance (F)	0.049	0.075	-0.936	-0.946	-23.504	-23.843
Adjusted R^2	0.236	0.292	0.049	0.050	0.095	0.098
N	3,040	3,040	3,040	3,040	3,040	3,040

Note. Also included, but not reported: 7 census division variables, household size, 4 race variables.

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