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How do the risks of living long and facing high medical expenses affect the elderly's saving behavior?

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This article shows that the elderly, especially those with high lifetime incomes, maintain large asset holdings to account for the possibility of their living a long time and facing high medical expenses.[1]

Although the elderly have a lot of wealth, we still do not fully understand their patterns of saving behavior.[2] Many elderly individuals keep large amounts of wealth even as they near the ends of their lives.[3] Furthermore, as one study[4] shows, income-rich households are especially frugal. Figure 1 illustrates these tendencies with a sample of single Americans from the *Asset and Health Dynamics Among the Oldest Old* (AHEAD) data set—an auxiliary survey of the University of Michigan's *Health and Retirement Study*. It shows median assets by "permanent income" (PI)[5] quintile for individuals who were aged 72–81 in 1995 and still alive in 2002. Assets decline with age, but slowly; and as PI grows, assets decline less and less. Assets for the cohort aged 82–91 in 1995 (not shown in figure 1) exhibit similar patterns, although they decline somewhat more rapidly.

1. Median net worth of single people aged 72–81 in 1995

PI quintile	Assets in 1995	Assets in 2002
	(- - - - - - *thousands of 1998 dollars* - - - - - -)	
Bottom	2.1	0.3
Second	21.8	13.9
Third	59.2	45.4
Fourth	81.9	59.3
Top	154.4	142.5

NOTES: Permanent income (PI) is the sum of Social Security benefits plus defined benefit pension income. Assets (or net worth) are the sum of all assets less mortgages and other debts. The *Asset and Health Dynamics Among the Oldest Old* has information on the value of housing and real estate, autos, liquid assets (including money market accounts, savings accounts, and Treasury bills), individual retirement accounts, Keogh plans, stocks, the value of farms or businesses, mutual funds, bonds, and "other" assets.

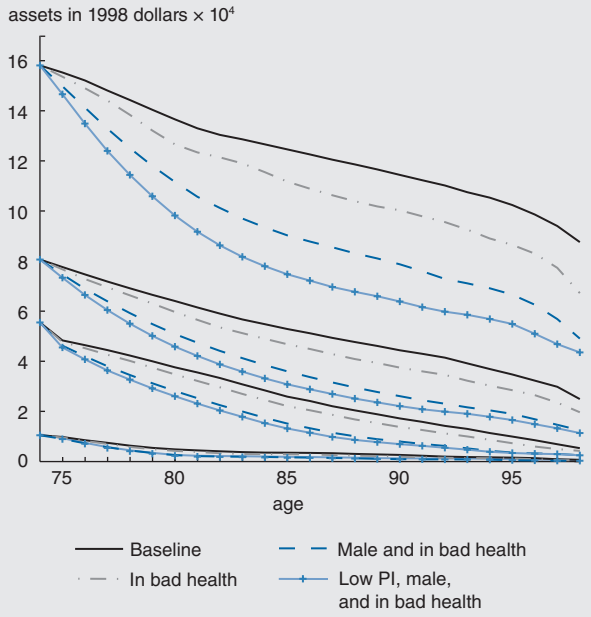
SOURCE: Authors' calculations based on data from the University of Michigan, Institute for Social Research, Survey Research Center, *Asset and Health Dynamics Among the Oldest Old*.

A country's saving affects its level of investment—and, ultimately, its level of wealth. Understanding the elderly's saving behavior is essential to understanding how tax and transfer policies will affect a country's saving. For example, the effect of medical spending on saving rates has entered the debate on whether the Chinese government should nationalize health care.[6] Nationalizing health care might reduce saving because nobody would need to save for medical care when they become old.

Among the motivations for saving are the risks of living long and having high medical expenses in old age. These motivations are likely to be especially strong in the United States for two reasons. First, the U.S. government pension scheme, Social Security, replaces only about 45% of pre-retirement income. Second, despite nearly universal health insurance for the elderly through Medicare, many medical services, such as nursing home care, are virtually uninsured.

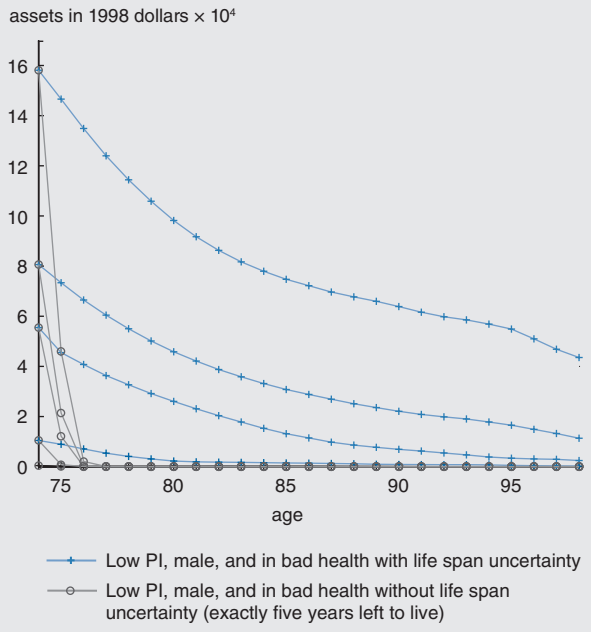
In recent research,[7] we quantify the importance of these forces by estimating and simulating a rich model of saving behavior. Our work builds upon earlier analyses of life-cycle saving.[8] Our model accounts for differences across PI groups in terms of life spans and medical expenses, as well as the risks of living especially long and having especially high medical expenses. The model fits the data well—it matches, among other things, the asset patterns shown in figure 1—which

2. Median net worth under different mortality assumptions



NOTES: Permanent income (PI) is the sum of Social Security benefits plus defined benefit pension income. The sample comprises the birth-year cohort aged 72–76 in 1995 from the *Asset and Health Dynamics Among the Oldest Old*, broken down into PI quintiles (the lowest one's median net worth is so low that it does not appear here).
SOURCE: De Nardi, French, and Jones (2009b).

3. Median net worth with and without life span uncertainty



NOTES: Permanent income (PI) is the sum of Social Security benefits plus defined benefit pension income. The sample comprises the birth-year cohort aged 72–76 in 1995 from the *Asset and Health Dynamics Among the Oldest Old*, broken down into PI quintiles (the lowest one's median net worth is so low that it does not appear here).
SOURCE: De Nardi, French, and Jones (2009b).

gives us confidence in its predictions. We find that the risks of living long and facing high medical expenses go a long way toward explaining the elderly's saving decisions. Specifically, these risks can explain why the elderly, and especially the income-rich elderly, run down their assets so slowly.

Life expectancy and life span uncertainty

Life spans vary greatly in both predictable and unpredictable ways. Using mortality rates estimated from the AHEAD, we find that rich people, women, and healthy people live much longer than their poor, male, and sick counterparts. Two extremes illustrate this point: An unhealthy 70-year-old man at the 20th percentile of the PI distribution expects to live only six more years, i.e., to age 76. In contrast, a healthy 70-year-old woman at the 80th percentile of the PI distribution expects to live 17 more years, thus making it to age 87. Such significant differences in life expectancy could, all else being equal, lead to significant differences in saving behavior.

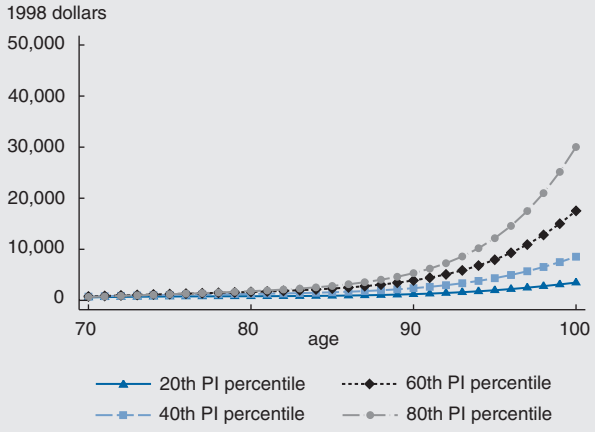
To better understand how predictable variations in life expectancy affect saving behavior, we use our model to simulate the net worth of the AHEAD birth-year cohort whose members were aged 72–76 in 1995. Figure 2 displays net worth profiles generated by our model for PI quintiles. The solid lines in figure 2 show median net worth for the baseline model. Consistent with the evidence presented in figure 1, the median net worth of the lowest PI quintile is close to zero and hence does not even show up in the figure. All other households decumulate their net worth very slowly, with those in the highest PI group starting off at almost $160,000 in median net worth at age 74 and retaining over $100,000 until well over age 90. This, too, is consistent with the empirical evidence.

The other lines in figure 2 reflect increasingly pessimistic assumptions about how long people expect to live. For the dashed-dot lines, we adjust each individual's survival probabilities to those of someone who is always in bad health and has no chance of going back to good health. This reduces life expectancy at age 70 by two to four years, depending on gender and permanent income. For the dashed lines, we assume that besides being always sick, everyone has the life expectancy of a male, which is four to five years less than that of a female. Finally, for the crossed lines, we add the effect of being at the lowest possible PI level to all of the other effects. Under this worst-case scenario, every 70 year old expects to live five more years.

Each incremental reduction in expected life span generates a noticeable drop in net worth, with the largest effects (in absolute terms) for the highest PI households. For people who are aged 90 and older and in the highest PI quintile, being always sick reduces median assets by around $15,000. For the same people, being male and sick reduces assets by a further $20,000; and being poor, male, and sick results in assets dropping nearly another $20,000. In short, predictable differences in life expectancy related to health, gender, and permanent income are important to understanding savings patterns across these groupings, and the effect of each factor is of a similar order of magnitude.

In addition to the systematic differences just discussed, individuals face significant uncertainty over their life spans. For example, a healthy 70-year-old woman at the 80th percentile of the permanent income distribution, who expects to live 17 years more, faces a 14% chance of living 25 years more, to age 95. Even an unhealthy man at the 20th percentile

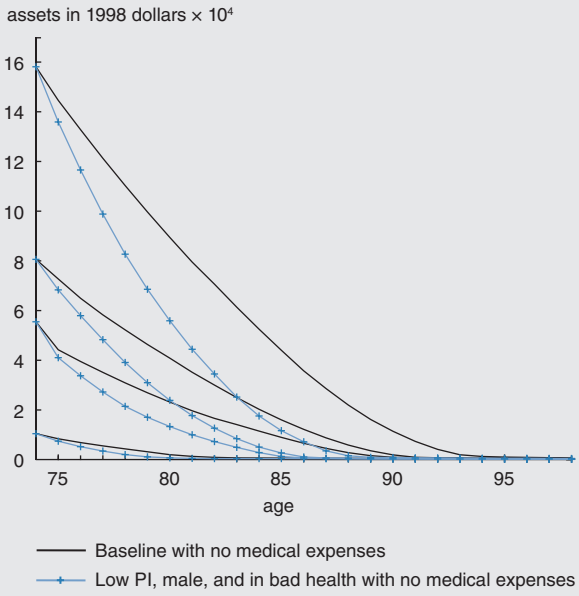
4. Average out-of-pocket medical expenses



NOTES: Permanent income (PI) is the sum of Social Security benefits plus defined benefit pension income. The sample comprises only women born in 1922 who are in good health from the *Asset and Health Dynamics Among the Oldest Old*.

SOURCE: De Nardi, French, and Jones (2006).

5. Median net worth with no medical expenses



NOTES: Permanent income (PI) is the sum of Social Security benefits plus defined benefit pension income. The sample comprises the birth-year cohort aged 72–76 in 1995 from the *Asset and Health Dynamics Among the Oldest Old*, broken down into PI quintiles (the lowest one's median net worth is so low that it does not appear here).

SOURCE: De Nardi, French, and Jones (2009b).

faces an 8% chance of living to age 85—more than twice his expected life span of six years. The risk of living far past one's expected life span is large and, under incomplete annuitization, a potentially important reason why so many elderly people run down their assets so slowly.

To illustrate the effects of life span uncertainty, we present in figure 3 two sets of simulations. First, as in figure 2, the crossed lines show predicted net worth when everyone faces the mortality rates of an unhealthy man with low permanent income. This man has an expected life span of five years, but faces the risk of living much longer. For the circled lines, this risk is eliminated; all individuals in these simulations expect to live exactly five years and then die. When the risk of living longer than five years is eliminated, so is the value of having assets after five years; thus, individuals deplete their net worth by the end of their fifth year. In contrast, most individuals facing uncertain life spans still have significant asset holdings after five years, even when facing the most pessimistic survival prospects. This comparison shows that at realistic levels of annuitization, the risk of outliving one's expected life span has a large effect on the elderly's saving behavior.

Medical expenses

Figure 4 shows out-of-pocket medical expenses—which include expenses for hospital appointments, nursing home stays, and doctor visits, as well as drugs and insurance premiums—for women born in 1922 who are in good health. Figure 4 shows that medical expenses rise rapidly with age, especially for those with high income. For example, a healthy woman at the 80th percentile of the PI distribution (gray line) sees her average annual medical expenses rise from less than $2,000 at age 70 to about $30,000 at age 100. This feature of the data proves crucial to explaining the asset decumulation of the elderly. Medical expenses that rise with age provide elderly households a strong incentive to save, and medical expenses that rise with permanent income encourage the rich to be especially frugal.

Figure 5 shows the simulated asset profiles that arise when there is life span uncertainty *but no medical costs* for the baseline (solid lines) and an unhealthy man with low PI (crossed lines). The importance of medical expenses in household saving decisions can be seen by comparing the solid and crossed lines in figure 2 with those in figure 5. Compared with the model with medical expenses in figure 2, the model with no medical costs in figure 5 implies a much faster rate of asset decumulation. Not surprisingly, this change is most pronounced for people in the top PI quintile, who otherwise would have faced the most dramatic increase in medical expenses.

Collectively, figures 2–5 suggest that a significant part of the elderly's saving behavior can be explained by health-related factors: predictable and unpredictable variations in life spans, as well as out-of-pocket medical expenses.

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[1] This article has been adapted from Mariacristina De Nardi, Eric French, and John B. Jones, 2009a, "Life expectancy, medical expenses, and old age saving," *Vox*, February 14, available at www.voxeu.org/index.php?q=node/3068.

[2] See Edward N. Wolff, 2004, "Changes in household wealth in the 1980s and 1990s in the U.S.," Levy Economics Institute of Bard College, working paper, No. 407, May, table 11, which shows that over a third of U.S. household wealth resides in households whose heads are 65 or older.

[3] See Michael D. Hurd, 1990, "Research on the elderly: Economic status, retirement, and consumption and saving," *Journal of Economic Literature*, Vol. 28, No. 2, June, pp. 565–637.

[4] Karen E. Dynan, Jonathan Skinner, and Stephen P. Zeldes, 2004, "Do the rich save more?," *Journal of Political Economy*, Vol. 112, No. 2, April, pp. 397–444.

[5] By permanent income, we mean average lifetime income. We measure this as the sum of Social Security benefits plus defined benefit pension income.

[6] Edward Wong, 2009, "China announces subsidies for health care," *New York Times*, January 21, available at www.nytimes.com/2009/01/22/world/asia/22beijing.html.

[7] Mariacristina De Nardi, Eric French, and John B. Jones, 2006, "Differential mortality, uncertain medical expenses, and the saving of elderly singles," National Bureau of Economic Research, working paper, No. 12554; Mariacristina De Nardi, Eric French, and John B. Jones, 2009b, "Life expectancy and old age savings," *American Economic Review*, Vol. 99, No. 2, May, pp. 110–115; and Mariacristina De Nardi, Eric French, and John B. Jones, 2010, "Why do the elderly save? The role of medical expenses," *Journal of Political Economy*, Vol. 118, No. 1, February, pp. 39–75.

[8] Laurence J. Kotlikoff, 1989, "Health expenditures and precautionary savings," in *What Determines Savings?*, Laurence J. Kotlikoff (ed.), Cambridge, MA: MIT Press, pp. 141–162; R. Glenn Hubbard, Jonathan Skinner, and Stephen P. Zeldes, 1994, "The importance of precautionary motives in explaining individual and aggregate saving," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 40, No. 1, June, pp. 59–125; Michael G. Palumbo, 1999, "Uncertain medical expenses and precautionary saving near the end of the life cycle," *Review of Economic Studies*, Vol. 66, No. 2, April, pp. 395–421; Li Gan, Guan Gong, Michael Hurd, and Daniel McFadden, 2004, "Subjective mortality risk and bequests," National Bureau of Economic Research, working paper, No. 10789, September; and John Karl Scholz, Ananth Seshadri, and Surachai Khitatrakun, 2006, "Are Americans saving 'optimally' for retirement?," *Journal of Political Economy* , Vol. 114, No. 4, August, pp. 607–643.