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Many view the soon-to-retire Baby Boomers as woefully unprepared for their golden years. Bernheim (1992) suggested this cohort was saving just one-third of what they needed to retire comfortably. Christine Weller of the Economic Policy Institute stated that "the average American household has virtually no chance to reach an adequate retirement savings in the next 50 years" (Dugas, 2002). One recent report declared 43 percent of American households "at risk" of substantial declines in retirement income, even after factoring in financial and housing wealth (Munnell, Webb, and Delorme, 2006).

Other economists have taken a more sanguine view of American levels of saving (for example Engen, Gale, and Uccello, 1999). Baby Boomers may not be accumulating enough, but at least they're saving more than their parents did (Sabelhaus and Manchester, 1995; Keister and Deeb-Sossa, 2001). Households don't need to save because of reduced expenses as children leave the household (Scholz and Seshadri, 2006), or because they can rely on programs such as Medicaid and Supplemental Security Income once they retire (Pauly, 1990; Hubbard, Skinner, and Zeldes, 1995; Scholz, Seshadri, and Khitatrakun, 2006).

And many feel that Baby Boomers just don't need to spend as much once they retire because of their greater ability to cut back on expenses (Brock, 2004). Aguiar and Hurst (2005a, b) find that retired households spend less money and engage in more "home production" such as shopping for lower prices, even while maintaining the quality and quantity of caloric intake through retirement. Finally, if Americans are failures at saving enough for retirement, why are some retirees so happy?

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As one wrote to the *New York Times* (as quoted in Loewenstein, Prelec, and Weber, 1999): "You can get by on a lot less when you're retired, without really depriving yourself of anything important. . . . If I had known earlier how much 'wealth' derives from such simple pleasures, I would have retired a lot sooner." Indeed, some financial planners have evolved into "life planners" who encourage clients to reevaluate their life priorities rather than accept the status quo of meaningless materialism (Eisenberg, 2006).

This paper attempts to reconcile these widely diverging views of saving adequacy. The seemingly simple question of "Am I saving enough for retirement?" is apparently not so simple at all. Instead, it touches on a variety of deeper issues in economics, psychology, and health policy. As a starting point, several observations seem to hold true. First, wealth requirements necessary to maintain steady consumption through retirement are indeed daunting for many households, even those with generous 401(k) plans and high incomes. (Readers are warned that life-cycle retirement wealth targets presented below may lead to feelings of financial inadequacy.) Most households cannot save enough to guard against all future contingencies, such as dramatically lower rates of return on investments or unexpected earnings losses near planned retirement.

Second, while smoothing consumption through retirement may not be the *sine qua non* of retirement planning, it's not entirely clear what *is* needed for retirement security. In theory, prospective retirees know they can always move to smaller houses or to less-expensive regions of the country, or cook at home rather than eat out, but how will their future selves feel about calling the moving van or seeking out less-expensive stores? There is no simple answer to this question because retirement is such a heterogeneous experience, one that depends on health and temperament as well as wealth (Kelly, 1958). Still, one can conclude that many newly retired households both anticipate a modest decline in consumption, and adjust to it.

The final observation is that retirement encompasses both age 66, when healthy households can easily substitute home cooking for more expensive prepared food, and age 86, when few can substitute home production for purchased health care. Growth rates for out-of-pocket health care spending have kept pace with overall health care cost growth, and thus continue to outstrip GDP growth, and they may accelerate as firms jettison retiree health benefits. These health care cost projections are perhaps the scariest beast under the bed. Fronstin (2006) estimates that a 55-year-old couple in 2006, planning to retire at age 65, would need to accumulate more than $400,000 during the next 10 years in order to afford supplemental health costs, beyond what Medicare already covers, through age 90. Even in the near term, projections based on the Health and Retirement Study suggest that by 2019, nearly one-tenth of elderly retirees will be devoting more than half of their total income to out-of-pocket health expenses. Thus, saving for retirement may ultimately be less about the golf condo at Hilton Head and more about being able to afford a wheelchair lift, private nurses, and a high-quality nursing home.

Retirement Saving in a Life-Cycle Model

A good starting point for calculating retirement saving is the standard life-cycle model in which consumption (adjusted for family size) is flat over the life cycle and so is "smoothed" through retirement. Thus, households save while working in order to finance income shortfalls during retirement. Of course, depending on levels of risk, and on how the rate at which individuals discount future consumption compares to the after-tax interest rate, a flat path of consumption may not be optimal, but it is a reasonable first start, and is consistent with observed growth rates in consumption near retirement (Bernheim, Skinner, and Weinberg, 2001).

How Much Wealth Do You Need to Smooth Consumption Through Retirement?

The first task of this paper is to calculate how much wealth you *should* own to smooth consumption. These calculations are performed only for those aged 40 and up. Readers in their 20s and 30s should be maximizing their workplace matching contributions (Benartzi and Thaler, this issue), seeking automatic saving mechanisms such as house mortgages, and hoping that their generation can still look forward to solvent Social Security and Medicare programs.

I will focus here on nonhousing net worth, under the working assumption that most households value the option of remaining in one's house until declining health forces a move or a sale (Lusardi and Mitchell, 2006). To calculate nonhousing net worth, count up 401(k) plan balances, IRAs, business equity, stock investments, equity in second houses, and so forth, but do not count defined benefit pension plans that pay a fixed amount at retirement, or prospective Social Security payments; these will both be included as components in retirement income flows. Now take the ratio of net nonhousing wealth to before-tax income.

The next step is to calculate the hypothetical target wealth that would allow for smoothing consumption through retirement. Note that the intertemporal budget constraint specifies that (a) current nonhousing net wealth plus (b) the present value of lifetime net earnings, pension flows, and Social Security benefits is equal to (c) the present value of lifetime nonhousing consumption plus bequests. Ignoring bequests for the moment, the unknown wealth level (a)—that is, the difference between (c) and (b)—is the level of current wealth that would ensure a consumption path sustainable through retirement as long as the household shall exist. This target wealth is "The Number"; if current assets are below "The Number," you're not saving enough, or you need to plan for a reduction in consumption at retirement.[1] In a simplified life cycle, just a few parameters are necessary to calculate this target wealth: 1) current age, expected retirement age, marital status, and retirement planning horizon; 2) the expected real rate of return or interest

[1] "The Number," the subject of Eisenberg's (2006) breezy book, is a bit different because it is the amount of money one needs to retire *today* to pursue one's life goals.

rate; 3) the mortgage payment rate as a fraction of earnings, where the mortgage is assumed to be paid off by retirement; 4) the saving rate, as a fraction of before-tax earnings; 5) the retirement "replacement rate" β, or the fraction of retirement annuity flows divided by preretirement earnings.

Retirement annuity flows should include any income from a defined benefit pension plan, but for many Baby Boomers (and most academics), the only guaranteed income transfers will consist of Social Security benefits. These are anticipated to pay an annual maximum of $33,390 (in 2006 dollars) in 2031 for an age-65 individual with spousal benefits, or $45,240 if both members of the family contribute to the 2006 maximum of $94,200. Amounts are more if retirement is deferred, and could turn out to be less if Social Security is trimmed back under the weight of its long-term obligations.[2] Thus I adopt a final household value of $\beta = 0.3$, which is consistent with a final working-year income of $120,000 and Social Security payments of $40,000. (I ignore here the possibility of converting wealth to annuities, which would allow households to increase β at the expense of current wealth.)

The first row of Table 1 displays asset–income ratios for a set of benchmark parameters: a replacement ratio β of 30 percent, real interest rate of 3 percent, retirement at age 65, planning horizon of age 95, 20 percent average and marginal tax rate, mortgage payments comprising 20 percent of income, and the flow of new savings equal to 7.5 percent of before-tax earnings. (Relatively few Americans work until 65, but academics do tend to retire later than the general population.) At age 40, the nonhousing-wealth-to-income ratio is 1.8; it rises to 2.9 at age 50 and peaks at 5.1 when retirement occurs.

Sensitivity of "The Number"

The first sensitivity analysis, in row 2 of Table 1, shows the importance of housing wealth in attenuating the need to accumulate nonhousing wealth for retirement. Renters would need to set aside 8.6 times income by the time they retire to afford both nonhousing consumption (as above) plus 30 years of future rental payments. Thus paying off the mortgage by retirement reduces nonhousing wealth requirements substantially.

Target wealth is also sensitive to changes in the saving rate; the wealth–income ratio at age 40 is −0.5 when the saving rate is 15 percent, and 3.1 when the saving rate is 2.5 percent (rows 3 and 4). One puzzle is why wealth requirements at retirement are so much larger for the household saving 2.5 percent (5.8 times income) instead of 15 percent (3.8 times income.) The resolution is to note that the high saving household has gotten used to lower rates of consumption while working, so less is needed to smooth consumption through retirement. Raising saving rates therefore yields a "double dividend" in life-cycle

[2] An alternative approach is to take current wealth as given and calculate necessary replacement rates, with more elaborate models accounting for sources of investment, longevity, or health risk (VanDerhei, 2006).

Table 1
Target Nonhousing-Wealth-to-Income Ratios in a Life-Cycle Model

Row	*Model specification*	*Age 40*	*Age 45*	*Age 50*	*Age 55*	*Age 60*	*At retirement*
1	Simple life-cycle benchmark	1.8	2.3	2.9	3.6	4.3	5.1
2	Nonhomeowner	3.7	4.5	5.2	6.0	7.8	8.6
3	Higher saving rate (15%)	−0.5	0.3	1.1	1.9	2.8	3.8
4	Lower saving rate (2.5%)	3.1	3.6	4.1	4.6	5.2	5.8
5	Late retirement (age 70)	0.9	1.4	1.9	2.5	3.1	4.5
6	Early retirement (age 60)	2.7	3.3	4.0	4.7	5.5	5.5
7	Early death (age 85)	1.0	1.5	2.0	2.6	3.2	3.9
8	Replacement rate $\beta = 0.6$, retired at 62, 5% saving rate, nonhomeowner	1.8	2.3	2.7	3.3	3.9	4.2
9	Earnings and consumption growth of 2% until retirement	3.2	3.6	4.0	4.4	4.7	5.1
10	Consumption decline at retirement (by 20%)	0.6	1.1	1.6	2.1	2.7	3.4

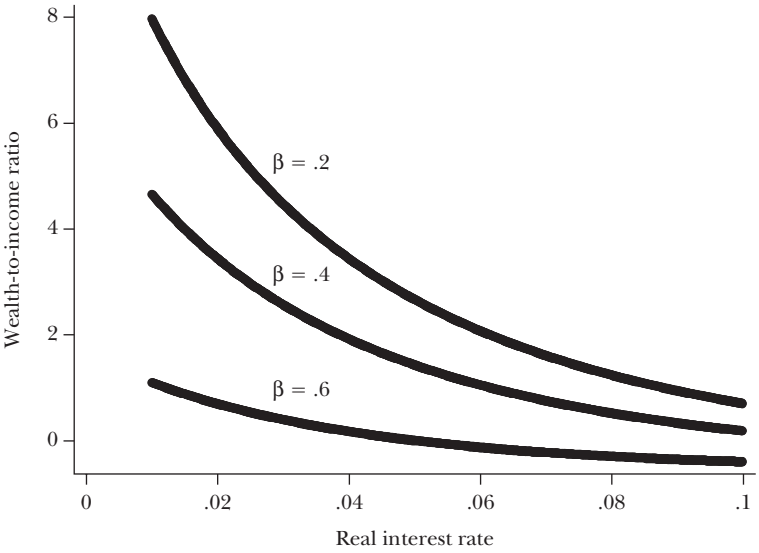
Notes: Wealth-to-income ratios necessary to ensure smooth consumption through the household's lifetime. Baseline life-cycle simulation parameters: 3 percent real interest rate; no growth in earnings; retirement planning horizon of 95; retirement age of 65; 7.5 percent saving rate; 20 percent mortgage payment; and 20 percent marginal and average tax rate.

saving by stimulating asset accumulation and attenuating future required consumption.

Extending retirement age to 70 (row 5), not uncommon among academics, sharply reduces required wealth accumulation at all ages, while retiring early at 60 (row 6) raises wealth accumulation. As row 7 demonstrates, dying early is another approach to ensuring retirement security. A scenario that might be plausible for a lower-income worker who doesn't own a house—a replacement ratio of $\beta = 0.6$, a retirement age of 62, and a saving rate of 5 percent—yields a wealth/income target of 1.8 at age 40, rising to 4.2 at retirement (row 8). Finally, allowing earnings to grow in real terms at 2 percent, coupled with consumption growth of 2 percent until retirement, leads to even larger wealth requirements relative to the benchmark, since consumption growth also raises the level of retirement consumption (row 9).

Figure 1 demonstrates the sensitivity of retirement savings to two important factors: the income replacement ratio β and the interest rate. The target retirement wealth ratio is graphed for different values of the replacement rate β (0.2, 0.4, and 0.6) and the interest rate. Note that the wealth target is not particularly sensitive to the interest rate when $\beta = 0.6$. When the household saves 7.5 percent of earnings, pays a mortgage of 20 percent of earnings, and pays income taxes, what's left over for consumption is sufficiently small to be taken care of by retirement income flows. Thus high replacement rates help to insure against the risk of interest rate fluctuations. By contrast, when saving requirements are much greater, as in the case

Figure 1
The Impact of the Interest Rate on Required Life-Cycle Wealth Accumulation



Note: This graph shows how changes in assumptions about future real interest rates affect target wealth values to ensure consumption smoothing, evaluated at age 50. The model is as described in the notes to Table 1. The association between the interest rate and wealth–income ratios are shown for different replacement rates of retirement income relative to preretirement income: $\beta = 0.2$ (20 percent of pretax income), 0.4, and 0.6.

where $\beta = .2$, "The Number" is highly sensitive to adverse outcomes in equity and bond markets. It ranges from below one (that is, wealth less than current income) for a 10 percent rate of return, to 8.0 for a laggard 1 percent return.[3]

This model ignores many factors potentially relevant to retirement planning, such as tax-deferred accounts (where balances are typically pretax dollars before being distributed from the account), the progressivity of the tax code, children's expenses (including college or bail bonds), mortgage payments, estate planning, and a variety of other factors. To handle this additional complexity, I turn to ESPlanner, a commercial retirement planning program built on the same life-cycle framework simulated in Table 1, but with all these other factors relevant for saving plans built in.[4] I use several representative income levels based on the 2005 annual

[3] This model assumes a steady state with constant real interest rates. Were interest rates to fluctuate, the calculations would be affected by simultaneous changes in the market value of assets held by the household.

[4] It was programmed originally by Jagdeesh Gohkale and Laurence Kotlikoff. Kotlikoff (2006) argues persuasively that this model provides better financial advice than popular alternatives. In the program, I determined target wealth iteratively to within a tolerance of under $50 between actual and recommended consumption.

American Economic Association survey of economics departments, kindly supplied by John Siegfried (Vanderbilt University, Tennessee) and Charles Scott (Loyola College, Maryland).

The income distribution is based on median earnings at schools (not individuals), but the percentiles are weighted by the number of faculty at each institution. I begin with what is a relatively low baseline academic-year income for full professors, $68,000, at the 10th percentile (from the bottom) of B.A.-granting colleges. This rises to $88,000 for the median and $126,000 at the 95th percentile. By contrast, the 10th percentile salary for full professors at Ph.D.-granting institutions is $104,000, the median $134,000, and the 95th percentile $184,000. To span these ranges, I adopt multiples of $68,000, reaching as high as $272,000 to capture the hypothetical income of very well-compensated dual working households (or a part-time finance professor). These calculations cannot be generalized to the wealth requirements of low-income households whose saving needs may be more modest owing to more generous replacement rates in Social Security or from Social Security Disability Insurance (Bernheim, Berstein, Gokhale, and Kotlikoff, 2000, although see VanDerhei, 2006).

Table 2 provides these target wealth holdings by age for single and married households for a variety of income and demographic scenarios. The detailed inputs are described in the notes to Table 2; the surprising feature is how important all of these additional variables are for retirement planning. The house is assumed to be worth 2.5 times income, and the mortgage balance, with 20 years remaining, is initially equal to twice income. The equivalence scale of a spouse is assumed to augment consumption by 0.6, while each child increases the consumption requirements of the household by .25.[5] I assume a baseline saving rate equal to 7.5 percent of pretax income, with 5 percent to a 401(k) and 2.5 percent to nonretirement assets, split equally between bonds and stocks. This is a flow measure, and underestimates the real saving rate, which includes capital gains, the reinvestment of interest and dividend income, and any appreciation in housing equity. An important assumption implicit in this model is that once the house mortgage is paid off, monthly payments are diverted to saving, not consumption.

Consider the simplest case, of a single person with income of $68,000 and whose contingency planning allows for a 95-year lifespan. As in the previous analysis, I focus solely on nonhousing wealth. The first row in Table 2 shows that wealth at age 40 necessary to sustain a constant consumption flow is just $14,000. By retirement, nonhousing wealth has grown to $272,000, somewhat below the prescribed wealth-to-income ratio in Table 1. For households with children (row 2), target wealth levels in a household with $68,000 in income are higher during their 40s in anticipation of college expenses. For single households earning $136,000

[5] The total equivalence scale for two adults and two children in this model, 2.1, matches the OECD-modified equivalence scale (although they place slightly more weight on children and less on adults); for a very succinct introduction, see Organisation for Economic Co-operation and Development (2005).

Table 2
Target Measures of Nonhousing Wealth Using ESPlanner
(in thousands of dollars)

Row	*Marital status, income, other variables*	*Age 40*	*Age 45*	*Age 50*	*Age 55*	*Age 60*	*Retirement date (age 65)*
1	Single, $68,000, house	14	46	86	136	201	272
2	Married, $68,000, house, two children	39	78	84	99	156	221
3	Single, $136,000, house	282	382	501	637	804	964
4	Single, $136,000, no house	580	719	871	1,040	1,226	1,357
5	Married, $136,000, house, two children	167	315	399	506	693	850
6	Married, $136,000, house, two children, defined benefit plan	40	67	32	3	30	95
7	Single, $204,000, house	702	897	1,125	1,385	1,694	1,972
8	Married, $204,000 house, two children	118	219	291	416	669	924
9	Married, $204,000 house, two children, 1% return	430	532	594	704	925	1,120
10	Married, $272,000 house, two children	316	469	590	807	1,170	1,533
11	Single, $136,000, house, two children (0.7 equivalent)	18	78	101	200	394	585
12	Married, $204,000, two children, nursing home expenses	477	633	764	955	1,282	1,609
13	Married, $204,000, two children, nursing home expenses, 15% saving	138	320	481	699	1,059	1,427

Notes. All calculations performed using ESPlanner. Baseline parameter values: Inflation rate 3 percent; nominal return 6 percent; saving rate 5 percent in a 401(k), 2.5 percent in non-tax-preferred assets (split evenly between money market and stocks); house value is 2.5 times household income; mortgage balance is 2.0 times household income; property tax rate is 0.68 times house value (Ladd and Bradbury, 1988); mortgage payments for 20-year loan at 6.5 percent ($632 per month per $100,000 mortgage). For defined benefit plan, payments are 30 percent of final-year income. The home mortgage is assumed paid off by age 60. Two children are ages 8 and 10 when adult is age 40; equivalence scales for children are 0.25 (as in Attanasio, Banks, Meghir, and Weber, 1999); $20,000 per year of college expenses in 2006 dollars for incomes of $136,000 or more, $10,000 per year for the $68,000 income household. In the medical expenses scenario, there are tax-deductible out-of-pocket expenditures for a nursing home stay for the last 5 years of spouse's life. These are assumed to be $40,000 annually (in 2006) but in each year such costs rise at a 3% real annual rate, so that by 2056 they are $175,000 for each of the five years. The household is assumed to reside in Pennsylvania for state tax purposes. *Single scenario:* Single, life expectancy of 95. *Married scenario:* Equivalence scale of 0.6 for spouse; life expectancy of male is 85; life expectancy of female is 95; $250,000 is held in a term life insurance policy.

annually (row 3), wealth requirements are substantially greater, $964,000 at retirement, because the progressivity of Social Security payments leads to a lower replacement rate β. Home ownership reduces target wealth (row 4 versus row 3) because the homeowner need not save against future rental payments during retirement (as in the example above), and because of the extra saving gained by paying off the mortgage at age 60.

For married households with two children and income of $136,000, saving requirements are $167,000 at age 40, rising to $850,000 prior to retirement (row 5). In the presence of a defined benefit plan that pays 30 percent of before-tax income,

however, wealth requirements drop substantially, with prescribed wealth of only $95,000 at age 65 (row 6). This is because combined Social Security and pension payments match the consumption of the empty-nest couple (and the surviving spouse) quite closely. As one moves up the income distribution (rows 7–10), target wealth measures rise accordingly, but the wealth-to-income ratio for these higher income groups is actually a bit lower; for example, the wealth-to-income at retirement for the household earning $136,000 (row 5) is 6.2, but is only 5.6 for the household earning $272,000 (row 10). This pattern largely reflects the progressivity in the tax code leading to less-than-proportional increases in lifetime consumption streams.

A comparison of rows 8 and 9 suggests a somewhat smaller interest elasticity of target wealth than that suggested by the earlier simulations, in part because the discount rate is less important for college expenses, and also because of declining total expenditures as first children, and then a spouse, leave the household. Table 2 also demonstrate that the presence of children, with equivalent scale measures of 0.7, actually *reduces* required wealth accumulation (row 11 compared to row 3), and that wealth requirements necessary to plan for a future in which the spouse spends five years in a nursing home are indeed daunting (row 12 compared to row 8). These topics are taken up in more detail below.

How Much Money Do You Really Need to Enjoy Retirement?

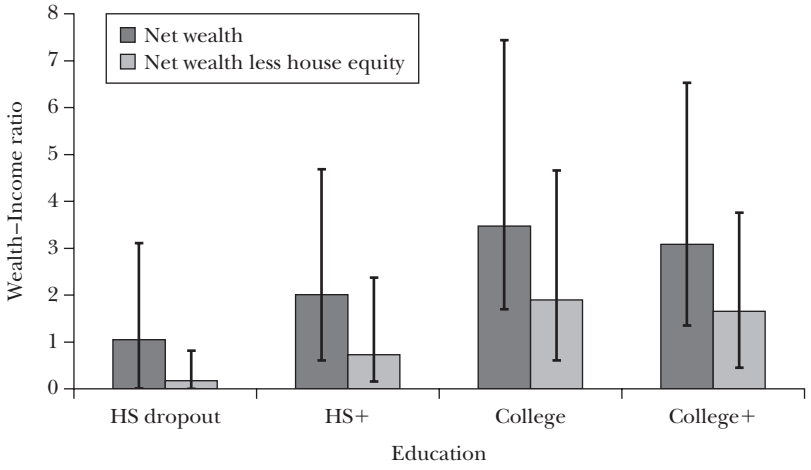
As noted above, a variety of studies show that most American households fail to meet saving goals suggested by certainty life-cycle models (Ameriks and Utkus, 2006; Warshawsky and Ameriks, 2000; Shackleton, 2003; Munnell, Webb, and Delorme, 2006; Mitchell and Moore, 1998; Lusardi and Mitchell, 2006). Figure 2 shows that even Baby Boomers aged 51–55 with postgraduate degrees fall short of the conventional savings targets calculated above; the median nonhousing-wealth-to-income ratio is 1.7, with the 25th percentile just 0.5 (Lusardi and Mitchell, 2006). Many well-educated Baby Boomers will likely need to scale back consumption at retirement. But does this mean that they've failed to save "enough"? Here I consider several explanations for why consuming less at retirement might not imperil retirement security.

Housing Equity Can Be Used to Finance Consumption during Retirement

Some financial planners have noted how much retirees could save simply by unleashing their housing equity and moving to towns such as Henderson, Nevada, where living costs are less than half that in New York (Brock, 2004, p. 74).[6] A more limited approach would be to purchase a smaller house or condominium in the

[6] Of course, this strategy begs the question of why housing costs are so low in Henderson, Nevada.

Figure 2
Wealth–Income Ratios by Education Group: Early Baby Boomers (51–55) in 2004



Source: Calculations by Annamaria Lusardi based on the 2004 Health and Retirement Study (HRS) sample as defined in Lusardi and Mitchell (2006).
Notes: The bars show median wealth-to-income ratio by income category, and the brackets denote the interquartile range (25^{th} to 75^{th} percentile distribution). $N = 2631$. HS is "high school."

same town. If one is planning to downsize in the future, it's okay to add some part of housing equity to the retirement nest-egg available for nonhousing consumption—but the value should be discounted, perhaps at a risky rate of return. In practice, Venti and Wise (1989) have shown that recent retirees are about as likely to move into *more*-expensive as less-expensive housing. The exception occurs when there are adverse transitions such as widowhood or serious illness, at which point households are more likely to tap into housing equity (Venti and Wise, 2004). Thus, average housing equity tends to decline with age, particularly among older households (Hurd, 2003).

Still, future retirees are typically unwilling to commit to having to move to a smaller house. Lusardi and Mitchell (2006) found nearly 70 percent of respondents to the Health and Retirement Survey aged 70 and under felt there was a minimal (10 percent or less) chance of selling their house to pay for retirement (see also Smeeding, Torrey, Fisher, Johnson, and Marchand, 2006). Reverse mortgages allow retirees to borrow money against housing equity, to be repaid upon death; however, their use has not been widespread (Sun, Triest, and Webb, 2006).

A middle ground recognizes the option value of housing equity for future uncertain contingencies. Housing equity is perhaps the best hedge against future catastrophic health care costs, because such equity is often exempted from Medicaid asset limits, and because patients with expensive chronic illnesses who require specialized health care would need to vacate their house in any case (Skinner,

2004). Even if these adverse events don't occur, home equity can still provide a bequest to children or to other worthy causes (Dynan, Skinner, Zeldes, 2002).

With Children Gone (Or a Spouse Lost), Consumption Expenses Are Lower During Retirement

Any parent will bemoan the expenses of raising children, ranging from diapers early in the life cycle to college education and helping out with housing down-payments later. For this reason, parents may reasonably expect a decline in family expenses as the children depart. The importance of children in life-cycle consumption and saving was emphasized by Scholz, Seshadri, and Khitatrakun (2006) and Scholz and Seshadri (2006), who found 80 percent of U.S. households were optimally saving for retirement after accounting for the timing and influence of children on optimal consumption plans. Equivalence scales were used to adjust household consumption for differences in the size and composition of the household. Their equivalence scale, from Citro and Michael (1995), implied that a married couple with two children now consuming $40,000 can smooth person-equivalent consumption by planning for $24,600 in expenditures once the children have left, and for $17,000 following the departure of a spouse.[7]

The importance of equivalence scales can also be seen in ESPlanner by comparing row 11 in Table 2 (a single parent with two children) against row 4 (a single person without children). (In row 11, the ESPlanner default equivalence scale of 0.7 per child is used.) Target wealth at age 40 is $18,000 for the household with children, and $282,000 for the household without! Despite the additional expense of college, retirement saving is diminished for the parent with children because her annual consumption at retirement is just $49,301, rather than the $63,445 required for the single household.

In other words, parents are already used to getting by on peanut butter, given that a large fraction of their preretirement budget has been devoted to supporting children, so it's not difficult to set aside enough money to keep them in peanut butter through retirement. By contrast, childless households with the same income accustomed to caviar and fine wine must set aside more assets to maintain themselves in the style to which they have become accustomed. This assumption is central to why the Scholz, Seshadri, and Khitatrakun (2006) and Scholz and Seshadri (2006) studies and Kotlikoff's own studies using ESPlanner show that many households are saving too *much* for retirement (Darlin, 2007). In practice, whether parents should plan to continue consuming just peanut butter is not entirely clear, particularly if they want to substitute into more consumption for themselves. And even a peanut butter diet might not be sufficient if they value strategic bequests and the warm glow from *inter vivos* transfers.

[7] The classic study of how demographic factors affect life-cycle consumption is Attanasio, Banks, Meghir, and Weber (1999), who find more modest effects of children and spouses on consumption.

There Are Ample Opportunities to Economize While Retired

It is reasonable to believe that households need not spend as much during retirement, given the sudden increase in available time.[8] In this view, retirement is an opportunity to substitute leisure, or home production, for market expenditures, given that the "price" of labor inputs into the household production (or the reservation wage) has just fallen (Ghez and Becker, 1975). For example, retirees now have more time to cook spaghetti sauce at home rather than buy prepackaged sauce, or shop for lower-cost but equally nutritious food. And it is certainly true that if households can plan on a decline of (say) 20 percent at retirement, their target wealth while younger declines substantially, from a wealth–income ratio of 2.3 to only 1.1 at age 45 (Table 1, row 10).

Consider an economic model in which leisure (inclusive of home production) and consumption expenditures are combined to create contemporaneous utility Z. For those who retire voluntarily, Z will rise simply because the "shadow" wage rate, or the implicit cost of time spent in home production, has declined, leading to a jump in hours spent at home. This can be shown in Figure 3, where the contemporaneous utility Z jumps up discontinuously at retirement. It is straightforward to show in a constant-elasticity-of-substitution utility function that consumption smoothing is optimal only when the intertemporal elasticity of substitution of Z—or the ease of substituting utility from one time period to the next—is equal to the intratemporal elasticity of substitution between consumption and leisure.[9]

Intuition might suggest that optimal consumption expenditures should drop discretely at retirement, as is shown in Figure 3. However, this result holds only when the intertemporal elasticity of substitution of Z is less than the intratemporal elasticity of substitution between consumption and leisure—meaning that households can more easily substitute leisure for consumption than shift household production of utility (or Z) to later in life. Conversely, when the intratemporal elasticity is less than the intertemporal elasticity, optimal consumption is predicted to *rise* at retirement, meaning that households would save more so they could really enjoy themselves during their retirement years.

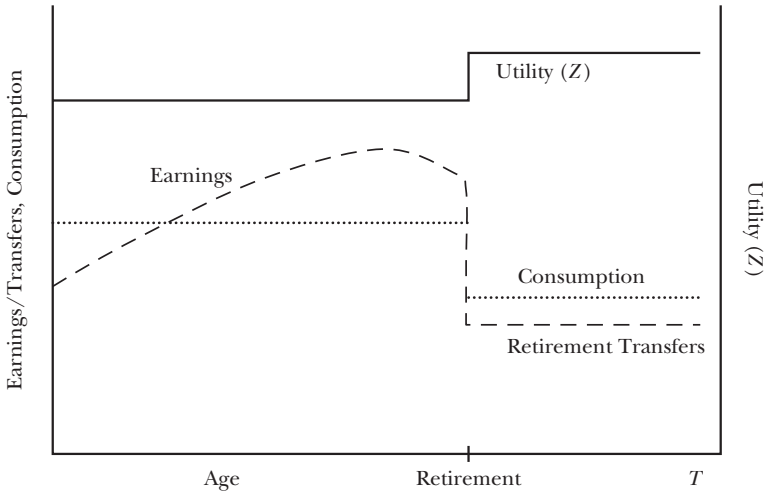
There is mixed evidence on the relative magnitude of these elasticities; some imply a rise in optimal consumption at retirement (for example, Ziliak and Kniesner, 2005), while others imply a decline. Aguiar and Hurst (2005a) find that recently retired households are remarkably efficient in home production, saving

[8] It might appear that retiring from a job frees up expenditures on commuting, work-related clothing, and other expenses associated with employment. However, work-related expenses do not appear to account for much of the consumption decline (Bernheim, Skinner, and Weinberg, 2001).

[9] The intratemporal elasticity is related closely to the labor supply elasticity. In standard notation, lifetime utility $U = (1\text{-}1/\gamma)^{\text{-}1} \sum_t Z_t^{1\text{-}1/\gamma} (1+\delta)^{1\text{-}t}$ and $Z_t = (C_t^{1\text{-}1/\rho} + \eta L_t^{1\text{-}1/\rho})^{[1/(1\text{-}1/\rho)]}$ with C and L denoting consumption and leisure, δ the time preference rate, ρ the intratemporal elasticity of substitution between consumption and leisure, γ the intertemporal elasticity of substitution across the household production of utility (Z), and η measuring the relative taste for leisure. Alternatively, smoothing holds when consumption and leisure are strongly separable.

Figure 3

Household Production Model: Leisure and Contemporaneous Utility *Z* Rises at Retirement, Consumption Declines



Note: Utility *Z* is a function of consumption and leisure. Because leisure rises so much at retirement *Z* jumps up despite the decline in market expenditures or "consumption." Note that for other parameters of the household production function, consumption may actually rise optimally at retirement.

large amounts in their market expenditures while maintaining both the quality and quantity of food. Similarly, Aguiar and Hurst (2005b) find that in a cross-section of shoppers in Denver, prices paid for identical supermarket items varied systematically across demographic groups, with higher-income and middle-aged people paying more, and younger and older households less.

Distinguishing between consumption and home production of utility can potentially resolve a puzzle in the data; 73 percent of retirees wished they had saved more (Hurd and Zissimopoulos, 2003), yet the majority of voluntary retirees are as happy or happier being retired (Loewenstein, Prelec, and Weber, 1999; Charles, 2002; Bender, 2004). These retirees may not have saved enough for the retirement they thought they wanted, but the additional leisure cannot help but to raise their utility and create good cheer. The story is different when retirement is involuntary because of job separation or poor health, which occurs for 37 percent of the Health and Retirement Study (Bender, 2004). For this group, subjective well-being declines (Charles, 2002), a decline that could also reflect a much diminished household production function.

There is a remarkable heterogeneity in the saving adequacy of households, even in academic settings (Bernheim, Berstein, Gokhale, and Kotlikoff, 2002). Perhaps 20 percent of households arrive at retirement with generous replacement rates β and asset-to-income ratios, and these households do smooth consumption or even increase consumption by a small amount. These households also spend

more time cooking and shopping (Schwerdt, 2005). But for the one-third of the population with inadequate replacement rates and wealth accumulation, consumption declines by 20 percent or more, because of the unrelenting discipline of the budget constraint (Bernheim, Skinner, and Weinberg, 2001). Households largely anticipate the decline (Hurd and Rohwedder, 2006), with the exception of those who didn't plan well for retirement, where nearly one-quarter are surprised by how high their expenses are at retirement (Ameriks, Caplin, and Leahy, forthcoming). What we don't know is whether this heterogeneity in wealth accumulation at retirement reflects natural variation in the household production function (some are better at making spaghetti sauce than others) or heterogeneity in psychological biases towards saving (Bernheim and Rangel, 2005).[10]

Evidence that favors psychological explanations for variations in wealth accumulation come from the literature on 401(k) plan participation, in which simple changes in program participation default rules, so that workers must opt out of a 401(k) rather than opt in, had a dramatic impact on participation rates (Madrian and Shea, 2001; Choi, Laibson, Madrian, and Metrick, 2004). In this issue, Benartzi and Thaler discuss this default rule as well as other default rules involving issues such as the level of contributions to a retirement savings account over time and how those savings are invested. Similarly, Lusardi (1999) and Ameriks, Caplin, and Leahy (2003) suggest that simply planning for retirement encourages greater savings, while Lusardi and Mitchell (2006) find that financial literacy—whether households understand compound interest—is also associated with higher levels of wealth. From this perspective, the lack of wealth at retirement for many Americans may not be the consequence of well-formed preferences, but instead of procrastination or inertia.

However, behavioral models cut both ways in terms of whether retirees will be happy with the savings choices they made earlier in life, because these models also have demonstrated that people have the ability to adapt to new circumstances. For example, paraplegics report happiness levels that are not so far from lottery winners (Brickman, Coates, and Janoff-Bulman, 1978). By comparison, learning to live with a 20 percent decline in consumption at age 66 shouldn't be too difficult, particularly for those in comfortable economic circumstances. If households are able to replicate the same nutritional consumption flow postretirement with relatively little effort, as in Aguiar and Hurst (2005a), it could even prompt households to wonder why they hadn't economized on expensive food expenditures years before.

Some retirement planners go one step further, taking on the role of life-cycle therapist and trying to understand what makes Baby Boomers happy. As Eisenberg (2006, p. 251) gently admonishes, "[Y]ou're simply trapping yourself in a never ending cycle of acquisition and you haven't even taken a stab at figuring out what

[10] Another possibility is variation in time-preference rates. However, Bernheim, Skinner, and Weinberg (2001) found no evidence that consumption growth rates differed across these groups prior to retirement, when households should be least likely to encounter liquidity constraints.

it would cost to do what you really want." In other words, why work until age 65 to maintain a $150,000 per year consumption habit if by retiring early, one can live a fulfilling life on "only" $100,000 annually? Recognizing that money may not buy happiness, Eisenberg suggests instead that retirement may be better spent in early-morning meditation, spending a few hours writing "the great American novel," and then volunteering at a community center. But when the client becomes too sick or frail to write a novel and needs volunteers to visit her—then what?

The Real Worry: Growing Out-of-Pocket Health Care Costs

Models of retirement planning with perfect certainty are likely to understate the risks from poor health. First, there are risks to future income and wealth from poor health prior to retirement. In a 10-year period, seven out of ten adults aged 51–61 developed health problems, lost their jobs, or lost spouses owing to divorce or death (Johnson, Mermin, and Uccello, 2006; also see Smith, 2005). Most of these shocks had a sharp adverse impact on wealth: among couples, a new medical condition caused a 17 percent decline in wealth for couples, work disability caused a 16 percent decline, and divorce a 44 percent decline, presumably the consequence of uninsured legal fees and other contingencies (Johnson, Mermin, and Uccello, 2006). Typically, complex dynamic programming models call for higher levels of precautionary saving to guard against such risks.

Once retired, health care is a commodity where opportunities for substitution between leisure and market expenditures are limited. Poor health both restricts the ability of elderly people to engage in home production (for example, if they can no longer drive around to search for low prices) while increasing demand for expensive health care.[11] Also, the elderly face substantial financial risk from health care expenditures (McGarry and Shoeni, 2005; Goldman and Zissimopoulos, 2003; French and Jones, 2004).

Currently, Medicare requires a 20 percent copayment and a one-day deductible for hospital stays. Most retirees have a "Medigap" plan that covers these out-of-pocket liabilities, while Medicaid picks up the difference for those with low-incomes who are eligible. But the percentage of private-sector employers offering retiree health benefits has eroded, from 20 percent in 1997 to just 13 percent in 2002 (Fronstin, 2005). Even academic institutions are shedding their retiree health benefits; only 76 percent offered such benefits in 2004, and many of those are planning to drop coverage within the next five years (Fronstin and Yakoboski, 2005). As noted earlier, a 55-year-old couple retiring in 2016 will need to accumulate more than $400,000 over the next decade to pay for Medigap

[11] Victor Fuchs of Stanford (personal communication) maintains that the marginal utility of consumption is higher, not lower, as infirmities and disabilities accumulate at older ages. He offers as examples, taxis, first-class airplane seats, higher quality beds, household help, and other amenities.

insurance (Fronstin, 2006), and this sum does not include protection from nursing home expenditure risk.

To capture the distribution and growth of these expenditures, out-of-pocket medical expenditures for households age 75–84 were estimated from 1993 and 2004 in the Health and Retirement Study (HRS); these are shown in Figure 4. In 1993, 2 percent of households experienced out-of-pocket expenses in excess of 50 percent of their before-tax income. (This probably understates the true distribution because the initial sample comprised noninstitutionalized households.) By 2004, this fraction had risen to 6 percent, with an additional 9 percent paying between 25–50 percent of income. These estimates do not reflect unpaid bills written off by hospitals, or patients who fail to comply with their prescription drug regimens or clinic appointments because of difficulty in paying.

The future course of out-of-pocket expenditures is more worrisome. Figure 4 shows projected medical expenditures in 2019 based on 1993–2004 real annual growth rates in income (1.2 percent) and a modest 4 percent annual real growth in out-of-pocket expenditures.[12] The fraction of households spending more than one-half of their income in out-of-pocket expenditures is projected to rise to 9 percent. In another study, median out-of-pocket health care expenditures for retiree couples were predicted to rise from $5,760 in 2000 to $16,400 in 2030, or 35 percent of their future after-tax income (Johnson and Penner, 2004).

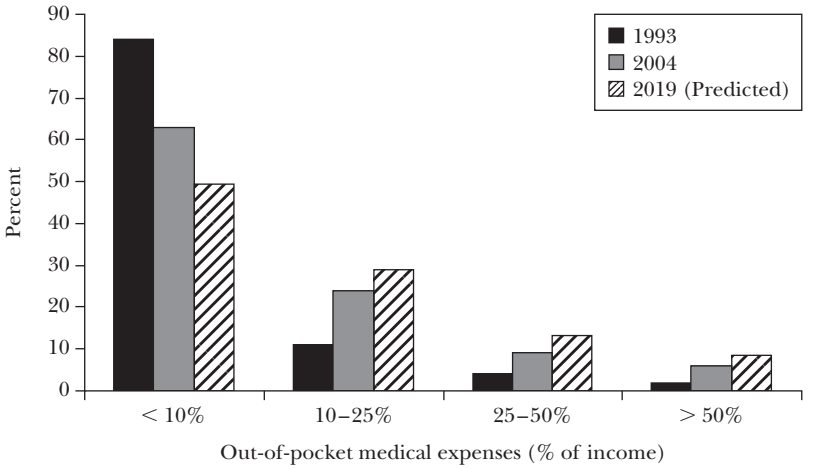
Past trends may not predict the future. The Medicare drug benefits are likely to reduce the burden of out-of-pocket medical expenditures; but the continued loss in retiree health benefits, and the hike in Part B (physician) premiums for high-income households (Foster and Clemens, 2006), will exacerbate it. Certainly, the prospect of an uninsured (but tax-deductible) five-year nursing home stay for the widow of our hypothetical household in Table 2 leads to a hike of more than $600,000 in target wealth at retirement, as shown by comparing row 12 with row 8, albeit one that can in part can be cushioned by saving more (row 13).

Rising health care costs in the presence of a Medicaid "safety net" could have quite heterogeneous effects on people currently working. Some might respond to future health care costs by increasing retirement saving rates in anticipation of higher out-of-pocket health care expenses. But others would prefer not to save against these future contingencies and rely instead on government social insurance programs, particularly those such as Medicaid and Supplemental Security Income (SSI) that are only available to people with low wealth (Hubbard, Skinner, and Zeldes, 1995). But Medicaid and SSI are not in themselves the most appealing of options. For example, Medicaid restricts the dollar amount of resources one can

[12] The 7.2 percent real growth in out-of-pocket expenditures estimated using the Health and Retirement Survey data is probably too high given the downward bias in 1993 expenditures. The 4 percent estimate comes from the real per capita growth in out-of-pocket health expenditures (including insurance premiums) between 1980 and 2005 from Catlin, Cowan, Heffler, Washington, and the National Health Expenditure Accounts Team (2007).

Figure 4

Out-of-Pocket Medical Expenditures as a Percentage of Before-Tax Household Income, Age 75–84, in 1993, 2004, and 2019 (Predicted)



Note: N = 1,728 (1993) and N = 1,954 (2004 and predicted 2015). All dollar amounts adjusted by the GDP deflator and estimated using population weights. Observations excluded if household income is less than $5,000 in 2004 dollars. The 2004 measure asked about the past two years of spending, so one-half the reported amount is presented. For the prediction, a real growth rate of 1.2 percent for income and 4.0 percent for out-of-pocket expenditures are assumed.

leave to a spouse and does not pay for a number of medical services for chronic illness, such as wheelchair or stair lifts, safety devices, and nursing aides.[13] Medicaid also limits the choice of nursing homes, because Medicaid rates are below private pay rates.[14] As Arrowood (2005) notes: "Think long and hard about counting on Medicaid for [long-term care]. You might not get what you had expected."

Conclusions

The question of how much one should be saving for retirement touches on many issues in economics, psychology, and health. While there is much that we don't know, and much that may be unknowable, the literature does offer several lessons. First, greater accuracy in calculating required saving rates or assets can only be a good thing, even if it means wrestling with child equivalence scales, retirement dates, household

[13] For an example of adaptive equipment not allowed by the Wisconsin Medicaid program, see ⟨http://dhfs.wisconsin.gov/medicaid/updates/2004/2004-75att.htm⟩, accessed May 22, 2006.

[14] "While many nursing-home residents rely on Medicaid, you'll most likely have a much easier time finding an available bed in the nursing home of your choice if your loved one can at least pay for the first six months or year out-of-pocket." In "Nursing Homes Don't Come Cheap" (FOXNews.com, 2005).

structure, future interest rates, and other values. In using ESPlanner, I was struck by how many factors—far more than just the standard economic variables—had enormous effects on target wealth. Even a simple spreadsheet program can engender that critical wake-up call to think more about planning for retirement.

But the best laid plans can be undone by a messy divorce, a disabling disease, or a stock market crash. In theory, one could use dynamic programming models in a world of risk to solve for the optimal saving plan, but doing so would simply drive home the point that it's never possible to be entirely prepared for retirement. One wants to avoid that sense of futility and avoidance expressed in a 1997 *New Yorker* cartoon by Roz Chaz: "Who can plan, like, next week? Because an asteroid could smash into the Earth tomorrow, so what's the point?"

Second, planning to smooth *household* expenditures through retirement is a reasonable target, particularly given that wealth requirements for Baby Boomers may be substantially greater than those of their parents. As noted above, saving incrementally more each year is a good strategy, because it both raises wealth accumulation, and makes it easier to sustain consumption in the future. Substantial evidence exists that saving programs run through employers—like IRA and 401k accounts—can be redesigned in a number of ways to encourage greater participation and wise portfolio choices (Benartzi and Thaler, this issue).

Third, planning for consumption smoothing doesn't mean one has to maintain consumption spending through retirement. One could plan on getting by with less just after retirement (as in Aguiar and Hurst, 2006a), while leaving some assets untouched for future contingencies. Housing wealth is ideal for this type of risk, since equity in the house can be directly transferred to purchase an apartment in an assisted living development, or to help pay nursing home bills. These considerations may explain why households might sensibly hold on to their housing wealth longer than is predicted under standard life-cycle models (Sun, Triest, and Webb, 2006). A more modest goal is to keep enough assets to install a walk-in shower or wheelchair-accessible ramps, but to rely on the government for extended long-term care.

One also wants to guard against obsessive oversaving—scrimping for years only to die before enjoying it—and the difficult part of retirement planning is in finding that balance. Nor will the balance be the same for every household; retirement planning *should* mirror individual psychological preferences or even biological differences in brain functioning reflecting tradeoffs between the thrill of shopping today and the impulse to save for the future (McClure, Laibson, Loewenstein, and Cohen, 2004; Knutson, Rick, Wimmer, Prelec, and Loewenstein, 2007).

Fourth, retirement planning is complex and uncertain even in the absence of fundamental changes in public policy. Short of asteroids, there are likely to be major changes in Social Security and health care insurance during the next few decades (Fuchs and Emanuel, 2005). A movement towards universal health insurance coverage could lead us closer to the system of care in the United Kingdom, where the ability to pay for private health care allows patients to jump the queues

and get their hip replacements sooner (Aaron and Schwartz, 2005). Thus, private wealth may become even more valuable should health care reform provide universal basic coverage without the extras.

Finally, the best hope for future retirement prospects lies in strong and equitable macroeconomic income growth, coupled with moderation in health expenditures and a favorable fiscal balance to fund Social Security and Medicare obligations. Of course, even with these favorable trends, a healthy 401(k) plan won't ensure a happy retirement, but it's certainly a good place to start.

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References

Aaron, Henry J., and William B. Schwartz (with Melissa Cox). 2005. *Can We Say No? The Challenge of Rationing Health Care.* Washington DC: The Brookings Institution Press.

Aguiar, Mark, and Erik Hurst. 2005a. "Consumption versus Expenditure." *Journal of Political Economy,* October, 113(5): 919–48.

Aguiar, Mark, and Erik Hurst. 2005b. "Lifecycle Production and Prices." National Bureau of Economic Research Working Paper 11601.

Ameriks, John, Andrew Caplin, and John Leahy. 2003. "Wealth Accumulation and the Propensity to Plan." *Quarterly Journal of Economics,* August, 118(3): 1007–47.

Ameriks, John, Andrew Caplin, and John Leahy. Forthcoming. "Retirement Consumption: Insights from a Survey." *Review of Economics and Statistics.*

Ameriks, John, and Stephen P. Utkus. 2006. *Vanguard Retirement Outlook 2006.* New York: Vanguard Center for Retirement Research.

Arrowood, Janet. 2005. "Medicaid versus LTC Insurance." Investopedia.com, March 10.

Attanasio, Orazio, James Banks, Costas Meghir, and Guglielmo Weber. 1999. "Humps and Bumps in Lifetime Consumption." *Journal of Business & Economic Statistics,* January, 17(1): 22–35.

Bender, Keith A. 2004. "The Well-Being of Retirees: Evidence Using Subjective Data." Center for Retirement Research Working Paper 2004-24, Boston College.

Bernheim, B. Douglas. 1992. *Is the Baby Boom Generation Preparing Adequately for Retirement?* Merrill Lynch.

Bernheim, B. Douglas, Solange Berstein, Jagadeesh Gokhale, and Laurence J. Kotlikoff. 2002. "Saving and Life Insurance Holdings at Boston University—A Unique Case Study."http://www.esplanner.com/Download/CaseStudy6-1-02.pdf (accessed January 20, 2007).

Bernheim, B. Douglas, Lorenzo Forni, Jagadeesh Gokhale, and Laurence J. Kotlikoff. 2000. "How Much Should Americans Be Saving For Retirement?" *American Economic Review,* May, 90(2): 288–92.

Bernheim, B. Douglas, and Antonio Rangel. 2005. "Behavioral Public Economics: Welfare and Policy Analysis with Non-Standard Decision Makers." National Bureau of Economic Research Working Paper 11518.

Bernheim, B. Douglas, Jonathan Skinner, and Stephen Weinberg. 2001. "What Accounts for the Variation in Retirement Wealth Among U.S. Households?" *American Economic Review,* 91(4): 832–57.

Brickman, Philip, Dan Coates, and Ronnie Janoff-Bulman. 1978. "Lottery Winners and Accident Victims: Is Happiness Relative?" *Journal of Personality and Social Psychology,* 36(8): 917–27.

Brock, Fred. 2004. *Live Well on Less than You Think.* New York: Henry Holt.

Catlin, Aaron, Cathy Cowan, Stephen Heffler, Benjamin Washington, and the National Health Expenditure Accounts Team. 2007. "National Health Spending in 2005: The Slowdown Continues, *Health Affairs*, January/February, 26(1): 142–53.

Charles, Kerwin K. 2002. "Is Retirement Depressing? Labor Force Inactivity and Psychological Well-Being in Later Life." National Bureau of Economic Research Working Paper 9033.

Choi, James J, David Laibson, Brigitte C. Madrian, and Andrew Metrick. 2004. "Saving for Retirement on the Path of Least Resistance." Unpublished paper, Harvard University.

Citro, Constance F., and Robert T. Michael. 1995. *Measuring Poverty: A New Approach.* Washington, DC: National Academy Press.

Darlin, Damon. 2007 "A Contrarian View: Save Less and Still Save Enough for Retirement." *The New York Times,* January 27.

Dugas, Christine. 2002. "Retirement Crisis Looms as Many Come Up Short." *USA Today*, July 19.

Dynan, Karen E., Jonathan Skinner, and Stephen P. Zeldes. 2002. "The Importance of Bequest and Life-Cycle Saving in Capital Accumulation: A New Answer." *American Economic Review,* May, 92(2): 274–78.

Eisenberg, Lee. 2006. *The Number: A Completely Different Way to Think About the Rest of Your Life.* New York: Free Press.

Engen, Eric M., William G. Gale, and Cori E. Uccello. 1999. "The Adequacy of Retirement Saving." *Brookings Papers on Economic Activity,* no. 2, pp, 65–165.

Foster, Richard, and M. Kent Clemens. 2006. "Additional Information Regarding Comparisons of Beneficiary Income and Out-of-Pocket Costs for Medicare Supplementary Medical Insurance." Memo, Centers for Medicare and Medicaid Research (May 1). http://www.cms.hhs.gov/ReportsTrustFunds/downloads/Beneficiaryoop.pdf (accessed May 23, 2006).

FOXNews.com. 2005. "Nursing Homes Don't Come Cheap," September 2. http://www.foxnews.com/story/0,2933,167743,00.html (accessed May 23, 2006).

French, Eric, and John Bailey Jones. 2004. "On the Distribution and Dynamics of Health Care Costs." *Journal of Applied Econometrics,* 19(4): 705–21.

Fronstin, Paul. 2005. "Employment-Based Health Benefits: Trends in Access and Coverage." EBRI [Employee Benefit Research Institute] Issue Brief No. 284. (August.)

Fronstin, Paul. 2006. "Savings Needed to Fund Health Insurance and Health Care Expenses in Retirement." EBRI [Employee Benefit Research Institute] Issue Brief No. 295. (July.)

Fronstin, Paul, and Paul Yakoboski. 2005. "Options and Alternatives to Fund Retiree Health Benefits." TIAA-CREF Institute Policy Brief. (July).

Fuchs, Victor R., and Ezekiel J. Emmanuel. 2005. "Health Care Reform: Why? What? When?" *Health Affairs,* 24(6): 1399–1414.

Ghez, Gilbert, and Gary Becker. 1975. *The Allocation of Time and Goods over the Life Cycle.* New York: Columbia University Press and National Bureau of Economic Research.

Goldman, Dana P., and Julie M. Zissimopoulos. "High Out-of-Pocket Health Care Spending by the Elderly." *Health Affairs*, May/June 2003, 194–202.

Hubbard, R. Glenn, Jonathan Skinner, and Stephen P. Zeldes. 1995. **"**Precautionary Saving and Social Insurance." *Journal of Political Economy,* April, 103(2): 360–99.

Hurd, Michael D. 2003. "Bequests: By Accident or Design?" In *Death and Dollars*: *The Role of Gifts and Bequests in America,* eds. Alicia Munnell and Annika Sundén, 93–118. Washington DC: Brookings Institution Press.

Hurd, Michael D, and Susann Rohwedder. 2006."Some Answers to the Retirement–Consumption Puzzle." National Bureau of Economic Research Working Paper 12057. (February.)

Hurd, Michael, and Julie Zissimopoulos. 2003. "Saving for Retirement: Wage Growth and Unexpected Events." Working Paper 2003-045. University of Michigan Retirement Research Center. (April.)

Johnson, Richard W., and Rudolph G. Penner. 2004. "Will Health Care Costs Erode Retirement

Security?" Center for Retirement Research at Boston College Issue Brief 23 (October.)

Johnson, Richard W., Gordon B.T. Mermin, and Cori E. Uccello. 2006. "How Secure are Retirement Nest Eggs?" Center for Retirement Research at Boston College Issue Brief 45. (April.)

Keister, Lisa, and Natalia Deeb-Sossa. 2001. "Are Baby Boomers Richer Than Their Parents? Intergenerational Patterns of Wealth Ownership in the United States." *Journal of Marriage and the Family,* May, 63(2): 569–79.

Kelly, Harry M. 1958. "Financial Planning for Retirement." *Journal of Educational Sociology,* April, 31(8): 306–17.

Kotlikoff, Laurence. 2006. "Is Conventional Financial Planning Good for your Financial Health." Unpublished paper, February 2006.

Knutson, Brian, Scott Rick, G. Elliott Wimmer, Drazen Prelec, and George Loewenstein. 2007. "Neural Predictors of Purchases." *Neuron,* vol. 53 (January 4): 147–56.

Ladd, Helen, and Katharine L. Bradbury. 1988. "City Taxes and Property Tax Bases." *National Tax Journal,* December, 41(4): 503-23.

Loewenstein, George, Drazen Prelec, and Roberto Weber. 1999. "What, Me Worry? A Psychological Perspective on Economic Aspects of Retirement." In *Behavioral Dimensions of Retirement Economics,* ed. Henry J. Aaron, 215–52. Washington DC: The Brookings Institution.

Lusardi, Annamaria. 1999. "Information, Expectations, and Savings for Retirement." In *Behavioral Dimensions of Retirement Economics,* ed, Henry J. Aaron, 81–124. Washington DC: The Brookings Institution.

Lusardi, Annamaria, and Olivia S. Mitchell. 2006. "Financial Literacy and Planning: Implications for Retirement Wellbeing." http://www.dartmouth.edu/~alusardi/Papers/FinancialLiteracy.pdf.

Madrian, Brigitte, and Dennis Shea. 2001. "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior." *Quarterly Journal of Economics,* 116(4): 1149–87.

McClure, Samuel M., David I. Laibson, George Loewenstein, and Jonathan D. Cohen. 2004. "Separate Neural Systems Value Immediate and Delayed Monetary Rewards." *Science,* October 15, 306(5695): 503–7.

McGarry, Kathleen, and Robert F. Schoeni. 2005. "Widow(er) Poverty and Out-of-Pocket Medical Expenditures near the End of Life." *Journal of Gerontology: Social Sciences,* 60B(3): S160–S168.

Mitchell, Olivia S., and James F. Moore. 1998. "Can Americans Afford to Retire? New Evidence on Retirement Saving Adequacy." *The Journal of Risk and Insurance,* September, 65(3): 371–400.

Munnell, Alicia, Anthony Webb, and Luke Delorme. 2006. "Retirements at Risk: A New National Retirement Index." Boston College Center for Retirement Research. (June).

OECD. 2005. "What Are Equivalence Scales?" http://www.oecd.org/dataoecd/61/52/35411111.pdf (accessed September 9, 2006).

Pauly, Mark. 1990. "The Rational Nonpurchase of Long-Term-Care Insurance." *The Journal of Political Economy,* February, 98(1): 153–68.

Sabelhaus, John, and Joyce Manchester. 1995. "Baby Boomers and Their Parents: How Does Their Economic Well-Being Compare in Middle Age?" *Journal of Human Resources,* Fall, 30(4): 791–806.

Scholz, John Karl, and Ananth Seshadri. 2006. "Children and Household Wealth." http://www.ssc.wisc.edu/~scholz/Research/Children.pdf.

Scholz, John Karl, Ananth Seshadri, and Surachai Khitatrakun. 2006. "Are Americans Saving 'Optimally' for Retirement?" *Journal of Political Economy,* August, 114(4): 607–43.

Schwerdt, Guido. 2005. "Why Does Consumption Fall at Retirement? Evidence from Germany." *Economics Letters,* 89(3): 300–305.

Shackleton, Robert. 2003. "Baby Boomers' Retirement Prospects: An Overview." Congressional Budget Office, United States Congress. (November.) http://www.cbo.gov/ftpdocs/48xx/doc4863/11-26-BabyBoomers.pdf.

Skinner, Jonathan. 2004. "Comment on 'Aging and Housing Equity: Another Look.'" In *Perspectives on the Economics of Aging,* ed. by David A. Wise, 176–180. Chicago: The University of Chicago Press.

Smeeding, Timothy, Barbara Boyle Torrey, Jonathan Fisher, David S. Johnson, and Joseph Marchand. 2006. "No Place Like Home: Older Adults and Their Housing." Boston College, Center for Retirement Research WP 2006-16. (August.)

Smith, James P. 2005. "Consequences and Predictors of New Health Events." In *Analyses in the Economics of Aging,* ed. David A. Wise, 213–37. Chicago: University of Chicago Press and National Bureau of Economic Research.

Social Security Advisory Board (SSAB). 2005. *Retirement Security: The Unfolding of a Predictable Surprise.* Washington DC: Social Security Advisory Board. (May.)

Sun, Wei, Robert K. Triest, and Anthony Webb. 2006. "Optimal Retirement Asset Decumulation Strategies: The Impact of Housing Wealth." Center for Retirement Research Working Paper 2006-22, Boston College, November.

Van Derhei, Jack. 2006. "Measuring Retirement Income Adequacy: Calculating Realistic Income Replacement Rates." EBRI [Employee Benefit Research Institute] Issue Brief No. 297. (September.)

Venti, Steven F., and David A. Wise. 1989. "Aging, Moving and Housing Wealth." In *Economics of Aging*, ed. David A. Wise, 9-48. Chicago: The University of Chicago Press.

Venti, Steven F., and David A. Wise. 2004. "Aging and Housing Equity: Another Look." In *Perspectives on the Economics of Aging*, ed. David A. Wise. Chicago: The University of Chicago Press.

Warshawsky, Mark J., and John Ameriks. 2000. "How Prepared are Americans for Retirement?" In *Forecasting Retirement Needs and Retirement Wealth,* ed. Olivia S. Mitchell, P. Brett Hammond, and Anna M. Rappaport, 33–67. Philadelphia: University of Pennsylvania Press.

Ziliak, James P., and Thomas J. Kniesner. 2005. "The Effect of Income Taxation on Consumption and Labor Supply." *Journal of Labor Economics,* October, 23(4): 769–96.

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4. John Burnett, Kevin Davis, Carsten Murawski, Roger Wilkins, Nicholas Wilkinson. 2017. Measuring the Adequacy of Retirement Savings. *Review of Income and Wealth* **18**. . [Crossref]
5. Julia Carolina Rafalski, Alexsandro Luiz De Andrade. 2017. Desenvolvimento da Escala de Percepção de Futuro da Aposentadoria (EPFA) e Correlatos Psicossociais. *Psico-USF* **22**:1, 49-62. [Crossref]
6. Robert J. Bianchi, Michael E. Drew, Adam N. Walk, Osei K. Wiafe. 2016. Retirement Adequacy of Indigenous Australians: A Baseline Study. *Economic Papers: A journal of applied economics and policy* **35**:4, 359-374. [Crossref]
7. Simon Rottke, Alexander Klos. 2016. Savings and Consumption When Children Move Out. *Review of Finance* **20**:6, 2349-2377. [Crossref]
8. Florian Pelgrin, Pascal St-Amour. 2016. Life cycle responses to health insurance status. *Journal of Health Economics* **49**, 76-96. [Crossref]
9. Bonnie-Jeanne MacDonald, Lars Osberg, Kevin D. Moore. 2016. How Accurately does 70% Final Employment Earnings Replacement Measure Retirement Income (In)Adequacy? Introducing the Living Standards Replacement Rate (LSRR). *ASTIN Bulletin* **46**:03, 627-676. [Crossref]
10. Christian E. Weller. The Looming Retirement Shipwreck 41-55. [Crossref]
11. M.P. Keane, S. Thorp. Complex Decision Making 661-709. [Crossref]
12. Melanie Lührmann, Marta Serra-Garcia, Joachim Winter. 2014. Teaching teenagers in finance: does it work?. *Journal of Banking & Finance* . [Crossref]
13. Gopi Shah Goda, Colleen Flaherty Manchester, Aaron J. Sojourner. 2014. What will my account really be worth? Experimental evidence on how retirement income projections affect saving. *Journal of Public Economics* **119**, 80-92. [Crossref]
14. Annamaria Lusardi, Olivia S. Mitchell. 2014. The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature* **52**:1, 5-44. [Abstract] [View PDF article] [PDF with links]
15. Amir Hetsroni, Zachary Sheaffer, Uri Ben Zion, Mosi Rosenboim. 2014. Economic Expectations, Optimistic Bias, and Television Viewing During Economic Recession. *Communication Research* **41**:2, 180-207. [Crossref]
16. Leona Tam, Utpal Dholakia. 2014. Saving in Cycles. *Psychological Science* **25**:2, 531-537. [Crossref]
17. Thomas Post, Helmut Gründl, Joan T. Schmit, Anja Zimmer. 2014. The Impact of Investment Behaviour for Individual Welfare. *Economica* **81**:321, 15-47. [Crossref]
18. Garry F. Barrett, Milica Kecmanovic. 2013. Changes in subjective well-being with retirement: assessing savings adequacy. *Applied Economics* **45**:35, 4883-4893. [Crossref]
19. Anders Carlander, Daniel Peterson, Amelie Gamble, Tommy Gärling, Lars-Olof Johansson, Martin Holmen. 2013. Choices of savings options related to trust in banks' competence, benevolence and stability. *Journal of Financial Services Marketing* **18**:2, 121-136. [Crossref]

20. Leona Tam, Utpal M. Dholakia. 2013. The Consequences and Correction of Inflation in Personal Savings Estimates in Specific Future Time Frames. *Journal of Behavioral Decision Making* **26**:2, 139-151. [Crossref]
21. Jeremy Cochran, Kerri Anne Crowne, Caryl E. Carpenter. 2012. Impact of Older-Worker-Friendly Organizational Policies on Retirement Attitudes and Planning. *Organization Management Journal* **9**:3, 170-178. [Crossref]
22. Ron J.G. van Schie, Bas Donkers, Benedict G.C. Dellaert. 2012. Savings adequacy uncertainty: Driver or obstacle to increased pension contributions?. *Journal of Economic Psychology* **33**:4, 882-896. [Crossref]
23. Eric Bonsang, Tobias J. Klein. 2012. Retirement and subjective well-being. *Journal of Economic Behavior & Organization* **83**:3, 311-329. [Crossref]
24. JOHANNES BINSWANGER, DANIEL SCHUNK. 2012. What is an adequate standard of living during Retirement?. *Journal of Pension Economics and Finance* **11**:02, 203-222. [Crossref]
25. Lee M. Lockwood. 2012. Bequest motives and the annuity puzzle. *Review of Economic Dynamics* **15**:2, 226-243. [Crossref]
26. Johannes Binswanger, Katherine Grace Carman. 2012. How real people make long-term decisions: The case of retirement preparation. *Journal of Economic Behavior & Organization* **81**:1, 39-60. [Crossref]
27. Hui Shan. 2011. Reversing the Trend: The Recent Expansion of the Reverse Mortgage Market. *Real Estate Economics* no-no. [Crossref]
28. Yoonkyung Yuh. 2011. Assessing Adequacy of Retirement Income for U.S. Households: A Replacement Ratio Approach. *The Geneva Papers on Risk and Insurance - Issues and Practice* **36**:2, 304-323. [Crossref]
29. James J. Choi, David Laibson, Brigitte C. Madrian. 2010. $100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans. *Review of Economics and Statistics* 110414214307058. [Crossref]
30. HENDRIK P. VAN DALEN, KÈNE HENKENS, DOUGLAS A. HERSHEY. 2010. Perceptions and expectations of pension savings adequacy: a comparative study of Dutch and American workers. *Ageing and Society* **30**:05, 731-754. [Crossref]
31. Elsa Fornero, Annamaria Lusardi, Chiara Monticone. Adequacy of Savings for Old Age in Europe 13-41. [Crossref]
32. Christian Gollier. Risk and Portfolio Choices in Individual and Collective Pension Plans 43-66. [Crossref]
33. Brian Jacobsen, Christian Chan, Olivia Barbee. 2010. Balancing Longevity Risk and Market Risk in Target Date Funds. *Rotman International Journal of Pension Management* **3**:2, 58-63. [Crossref]
34. Giovanni Mastrobuoni,, Matthew Weinberg. 2009. Heterogeneity in Intra-Monthly Consumption Patterns, Self-Control, and Savings at Retirement. *American Economic Journal: Economic Policy* **1**:2, 163-189. [Abstract] [View PDF article] [PDF with links]
35. Linda G. Martin. 2009. Interventions to Improve Late Life. *Population and Development Review* **35**:2, 331-340. [Crossref]
36. Voon Phua, James W. McNally. 2008. Men Planning for Retirement. *Journal of Applied Gerontology* **27**:5, 588-608. [Crossref]