Is There a Savings Crisis? Measuring the Adequacy of Household Retirement Wealth

David A. Love*
Paul A. Smith†
Lucy C. McNair‡

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Abstract

Dramatic structural changes in the U.S. pension system, along with the impending wave of retiring baby boomers, have given rise to a broad policy discussion of the adequacy of household retirement wealth. We contribute to this discussion by using new survey data to construct the most comprehensive measure of wealth for older households to date. We use this comprehensive wealth measure to assess the adequacy of retirement wealth for all households aged 51 and older, using two measures: an annuitized value of comprehensive wealth and the ratio of comprehensive wealth to the actuarial present value of future poverty lines. We find that most households have sufficient resources to finance adequate consumption in retirement, with a median annuity value of $32,000 per person ($40,000 after accounting for household economies of scale) and a median ratio of wealth to poverty of 3.56. About 12 percent of households, however, have insufficient wealth to consistently finance consumption equal to the poverty line over their expected lifetimes.

*Dept. of Economics, Williams College, Williamstown, MA 01267, david.love@williams.edu
†Federal Reserve Board, 20th and C St., NW, Washington, DC 20551, paul.a.smith@frb.gov
‡Federal Reserve Board, 20th and C St., NW, Washington, DC 20551, lucy.c.mcnair@frb.gov. We are grateful for Michael Palumbo's comments and insights. We also benefited from discussions with Pete Brady on this topic. Finally, we thank seminar participants at the Federal Reserve Board and the Richmond Federal Reserve Bank for many helpful suggestions. The views expressed herein are those of the authors and do not necessarily reflect those of the Board of Governors or the staff of the Federal Reserve System.

Retirement: You'll need far more than you think

We're already not saving enough. But new research indicates we've been underestimating our retirement income needs.

By Jeanne Sahadi, CNNMoney.com senior writer
September 22 2006: 2:28 PM EDT

Study: 43% not saving enough to retire well

By Kathy Chu, USA TODAY
Posted 6/6/2006 10:42 PM ET

You're still saving too little to retire

At least double your savings or work till you drop

By Paul B. Farrell, CBS.MarketWatch.com
Last Update: 12:02 AM ET May 22, 2003

SIA RETIREMENT STUDY SHOWS AMERICANS ARE 'DISSAVING'; FINDS GRIM SITUATION WORSENING

Wealth Effect from Housing Appreciation A Key Contributor to Recent Savings Deterioration

WASHINGTON, D.C., June 27, 2006

Most Americans fear retirement shortfall

Fidelity poll shows 83% of workers say they aren't putting enough away, but firm says that could be a good thing.

May 12, 2006: 1:08 PM EDT
NEW YORK (CNNMoney.com)

1 Introduction

Is there a savings crisis? The perception in the popular media seems to be that the situation is "grim" and "worsening." But is this portrayal accurate? The question is of particular interest to academic researchers because the U.S. is in the midst of three transitions that are changing the landscape of retirement savings: the imminent retirement of the baby boomers, the worsening financial health of Social Security and Medicare, and the replacement of traditional defined benefit (DB) pension plans with defined contribution (DC) plans.[1] These transitions are interrelated, and all three raise important questions about the adequacy of household savings. Are the baby boomers, who can expect to live longer than any preceding generation, financially prepared for retirement? Will the massive size of this generation, on top of longer-term demographic changes, place excessive strains on the two largest entitlement programs in the U.S.? And if so, are younger generations saving enough privately to offset potential decreases in benefits? Finally, how will the shift from DB to DC pensions affect the financial security of older Americans?

At the heart of these questions is the savings status of older Americans. A vast empirical literature has studied this question, including papers focused on baby boomers,[2] papers studying older cohorts,[3] papers calculating income-replacement rates,[4] and papers comparing observed savings to thresholds derived from stochastic life-cycle models or other models of savings behavior.[5] As we discuss below, the studies comparing replacement rates tend to find evidence of significant undersaving, while many of the others conclude that observed saving rates are largely consistent with optimizing behavior.

We contribute to this literature by introducing an expansive definition of comprehensive wealth and two notions of adequacy. The question we seek to answer is: including as many assets as we can measure, how much wealth do older Americans really have, and is it sufficient to finance basic needs in retirement? The main obstacle to answering this question is deciding on exactly what we mean by sufficient resources. After all, adequacy is necessarily a normative construct, meaning anything from subsistence consumption to the outcome of optimal life-cycle savings decisions. We settle on two measures, as described

[1] The popularity of DB plans among employers is at an all-time low, with DB plan terminations and freezes a common occurrence over the last several years. Recent legislation tightening the funding rules on DB plans is likely to increase the incentive for employers to move away from DB plans, as are proposed changes to the accounting treatment of corporate DBs. All told, the trends seem clearly in favor of DC plans at the expense of DBs, and some financial planners now advise workers with DBs to consider them risky assets, rather than the secure sources of retirement income they were often considered in the past.

[2] See CBO (1993); Bernheim (1992); Lusardi and Mitchell (2006); Wolff (2006).

[3] See Wolff (2002); Weller and Wolff (2005); Wolff (2006); Gale and Pence (2006); Haveman, Holden, Wolfe, and Sherlund (2006); Haveman, Holden, Wolfe, and Romanov (forthcoming); Hurd and Rohwedder (2006).

[4] See Bernheim (1992); Munnell and Soto (2005); Mitchell and Moore (1998); Moore and Mitchell (2000).

[5] See Engen, Gale, and Uccello (1999, 2005); Scholz, Seshadri, and Khitatrakun (2006); Brady (2006).

below.

We begin our analysis by constructing comprehensive balance sheets for a sample of households aged 51 and older in the 2004 Health and Retirement Survey. Our definition of comprehensive wealth begins with the usual categories of stocks, bonds, savings, retirement plans, businesses, housing, and real estate. We then add broader categories, such as the actuarial present values of Social Security, defined benefit plans, annuities, insurance, welfare, and, for current workers, future wages and other compensation. These present-value sources of wealth are often excluded from studies of household wealth, even though they are a central component of retirement resources.[6] And indeed, our results indicate that a substantial portion of comprehensive wealth, particularly among the less wealthy, is accounted for by these broader wealth categories—for example, combined Social Security and DB wealth account for about 30 percent of comprehensive wealth, on average, and about 60 percent among the least-wealthy households. Our results show that most households have fairly substantial retirement wealth, though the bottom ten percent do not. We find a mean comprehensive wealth of about \$900,000, and a median of about \$536,000. The 10th percentile is about \$107,000.

After developing balance sheets based on our notion of comprehensive wealth, we then create two measures of adequacy. The first is an annuitized stream of comprehensive wealth that tells us how much consumption individual households can expect to finance per person per year over their remaining lifetimes. Although this is not a direct test of adequacy, it allows us to analyze wealth in terms of annual consumption and thus brings us closer to the utility interpretation used in life-cycle models of saving. Under our baseline interest-rate assumption of 4.5 percent, we find an average annuity value of about \$51,000 per expected person-year, and a median value of \$32,000. However, those in the lowest third of lifetime earnings have a median of about half this amount, and the bottom 10 percent of this low-earning group has an annuity value of about \$4,700 per expected person-year—clearly insufficient to finance any definition of adequate consumption in the U.S. Accounting for household economies of scale, which allow couples to consume more per person than singles with the same per-capita income, we find \$73,000 of single-equivalent consumption per person at the mean, and \$40,000 at the median.

Next we employ a new measure of adequacy based on the actuarial present value of future poverty lines. Because poverty lines are designed to reflect the affordability of core expenditures such as food, they embody a concept of absolute adequacy. This notion of adequacy differs in both construction and intent from those in most previous studies

[6]Important exceptions include Wolff (2006), Weller and Wolff (2005), Wolff (2002), Gustman, Mitchell, Samwick, and Steinmeier (1997), Haveman, Holden, Wolfe, and Sherlund (2006), and Haveman, Holden, Wolfe, and Romanov (forthcoming).

of retirement wealth.[7] Our analysis indicates that most households have comprehensive wealth well above poverty levels: the mean ratio is 5.75, and the median is 3.76. Again, however, we see problems in the left tail—we find that about 12 percent of households fall below our poverty threshold.

Notions of the adequacy of savings and the optimality of post-retirement consumption could depend on such deviations from the classical life cycle model as precautionary savings and bequest motives. To investigate these ideas, we make use of several attitudinal variables in the HRS to examine how our results vary with health status and expectations over various post-retirement events (including longevity, inheritances, bequests, and health shocks). We find a positive relationship between health status and wealth, and offer several potential explanations for this result. We also find that most (but not all) of the relationships between household expectations and our adequacy measures are braodly consistent with standard interpretations of the life cycle model.

Our present value calculations are naturally sensitive to assumptions about inflation and interest rates. We compute comprehensive wealth and poverty using different plausible values of the real interest rate and inflation and find that, while the values indeed change, our main conclusions are generally robust to these alternative specifications.[8]

The rest of the paper proceeds as follows. Section 2 discusses alternative measures of wealth adequacy and then presents our two preferred specifications. Section 3 describes our data sources and our methodology for constructing the components of comprehensive wealth. Section 4 presents our calculations of the components of comprehensive wealth and shows how sensitive they are to alternative assumptions about interest rates and inflation. Section 5 presents measures of adequacy and their sensitivity to assumptions, and Section 6 concludes. An appendix provides further details on our dataset and imputations, derives our favored annuity factor, and shows that we find similar a similar distribution of comprehensive wealth when constructing analogous measures from the 2004 Survey of Consumer Finances.

2 Measuring the Adequacy of Retirement Wealth

To assess the wealth of retirees, it is necessary to establish a benchmark measure of adequacy; unfortunately,no consensus exists as to what measure to use. Previous researchers have examined the adequacy of savings using a variety of methods, including replacement

[7]Haveman, Holden, Wolfe, and Sherlund (2006) and Haveman, Holden, Wolfe, and Romanov (forthcoming) compare annuitized retirement wealth to poverty lines.

[8]One reason for the robustness of our results is that survival rates drop in old age, which has the effect of raising discount factprs and reducing the sensitivity of present-value calculations to inflation and interest rates.

rate concepts, simulated life cycle profiles, and empirical measures of the affordability of projected consumption paths. We discuss the advantages and disadvantages of some of these approaches below. We then describe our own measures of adequacy, which include the annuitized value of comprehensive wealth and the ratio of total household wealth to the expected present value of future poverty lines.

2.1 Previous Notions of Adequacy

A commonly used measures of adequacy is the replacement rate, defined as post-retirement income relative to pre-retirement income (see Bernheim, 1992; Munnell and Soto, 2005; Mitchell and Moore, 1998). Using this approach, wealth is said to be adequate if it is sufficient to generate a given replacement rate. A major problem with this approach is the arbitrariness of the benchmark threshold, which, in the literature, has typically ranged from 70 percent to 100 percent, and which generally has not been explicitly calibrated to standard models of saving. Consumption needs are often presumed to be lower after retirement, due to the removal of payroll taxes and other work-related expenses. But the household's post-retirement consumption problem differs in a much broader sense, due to the significant drop in the price of leisure (which could either increase or decrease consumption), the effect of rapidly declining survival probabilities, and the ability to finance consumption out of savings as well as income. As a result, there is no clear theoretical replacement rate against which to measure the adequacy of wealth. Thus, replacement rates are not really comparable across households: a relatively low replacement rate is not necessarily an indication of inadequate savings, and a relatively high rate does not necessarily indicate adequacy—particularly if pre-retirement income was itself not adequate. For these reasons, we avoid the use of replacement rates in our analysis.

An alternative approach to examining adequacy compares actual wealth patterns in the data with optimal accumulation patterns from a stochastic life cycle model (see Engen, Gale, and Uccello, 1999, 2005; Scholz, Seshadri, and Khitatrakun, 2006). The advantage of this method is that it derives from theoretical principles: working households save the amount necessary to provide the maximum level of smoothed consumption over their expected lifetimes. The stochastic model recognizes that each household experiences a unique set of earnings and mortality shocks over the life cycle, and thus low levels of observed wealth may be consistent with optimal behavior once we account for individual realizations of life cycle shocks. These papers find, perhaps surprisingly, that most households prepare adequately for retirement, with actual saving patterns in the neighborhood of what the life cycle model would predict. For example, Scholz, Seshadri, and Khitatrakun (2006) find that more than 80 percent of the households in the HRS saved more than their optimal life-cycle wealth targets, and that the deficits for most of those saving below the target were small.

Interpreting the results of these models, however, can be tricky. Dynamic stochastic life-cycle models generate optimal consumption paths that are conditional on a particular set of assumptions regarding mortality, preferences, and the sources and size of random shocks. To take well-known examples, decision rules for consumption are quite sensitive to different values of the coefficient of relative risk aversion, and the presence of bequest motives can substantially alter post-retirement consumption paths. Moreover, the concept of optimality does not fully address the issue of adequacy: model households who receive bad shocks might optimally arrive at retirement with no resources outside of Social Security, but they nonetheless lack adequate resources to fund a level of consumption that meets an absolute criterion such as a poverty line. Because we are interested in the question of adequacy, rather than optimality per se, in this paper we focus on the comparison to absolute measures rather than benchmarking to a life-cycle model.[9]

2.2 Annuitized Comprehensive Wealth and Poverty Line Wealth

In this paper, we develop two measures of adequacy: the annuitized value of comprehensive wealth, which measures the amount of consumption that a household can expect to finance per person per year, and the ratio of comprehensive wealth to the actuarial present value of future poverty lines. By using poverty lines, instead of replacement rates or optimal decision rules, we are consciously attempting to shift the focus of the analysis away from optimality and towards an objective measure of adequacy. A downside of using the poverty line as a measure of adequacy is that the official poverty thresholds in the U.S. are fairly arbitrary. The thresholds are based on a definition of absolute poverty established in 1964, which were computed as a multiple (e.g., 3 times for a family of three) of the Department of Agriculture's "economy food plan"—the least expensive of several plans that satisfied basic nutritional requirements. Although the thresholds were revised in subsequent years, the core concept of poverty as rooted in the affordability of adequately nutritious food expenditures remains the same.[10] This is, by construction, a limited and clearly arbitrary measure of adequate resources. Nonetheless, in addition to being a standard measure that is widely used in public policy, the poverty line also provides a generally accepted method for assessing the absolute adequacy of household resources, a notion conceptually distinct from the issue of optimality. Moreover, the official poverty thresholds are adjusted to account for household economies of scale and age, which enables us to incorporate basic life-cycle and demographic effects in our analysis.

[9] In work currently underway we use the same data to estimate a stochastic life-cycle model of dissaving in retirement.

[10] For more information on the history and definition of poverty thresholds, see Census (2004).

3 Data and Methodology

In this section we describe our data and our method for computing household wealth, and develop our measures of wealth adequacy: annuitized comprehensive wealth and poverty line wealth.

3.1 Data Source and Construction of Comprehensive Wealth

We use the 2004 wave of the Health and Retirement Study (HRS). [11] The HRS is a national panel data set consisting of an initial (1992) sample of 12,600 persons aged 51-61, with follow-ups every second year following. In 1998, the HRS was merged with a similar survey covering older households, and younger cohorts were also introduced. The youngest cohort (the "Early Baby Boomers," born 1948-1953) was introduced in the 2004 wave. Our sample draws on all cohorts of the HRS, but we restrict our analysis to households with a respondent or spouse aged 51 years or older. Our final sample size is 12,861 households.

To compute our measure of comprehensive wealth, we need to aggregate asset types that differ along many dimensions. Some are held as stocks of wealth, such as corporate equities, bonds, bank accounts, retirement accounts, houses and cars. Others consist of flow payments over time, such as wages and other compensation (for current workers) and traditional pensions and Social Security (for retirees). Further differences include whether the type of wealth pays off only in expectation (e.g., life insurance), includes protection against inflation (e.g., Social Security), or terminates payments with the death of the primary recipient (e.g., some pensions and annuities). In this discussion that follows, we explain the various adjustments and calculations we use to combine these different categories into a single measure of comprehensive wealth and show how we arrive at our present value measure of poverty.[12]

We begin with a fairly straightforward measure of traditional net worth. Net (nonretirement) financial wealth (FW) is the sum of stocks, bonds, checking accounts, CDs, Treasury securities, and other assets,[13] less non-vehicle, non-housing debts (such as credit card bal-

[11] Specifically, we use the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files, which are HRS data files that have been compiled and processed by RAND, and are often easier to use than the raw HRS data files. See the appendix for more details on our dataset and imputation methodology.

[12] The appendix provides a detailed description of our methodology as it applies to each source of wealth. Note that our measure of comprehensive wealth essentially treats all assets as perfectly fungible, an assumption which may overstate the value of total wealth for some households (e.g., more liquid assets may make it easier for households to pay for large out-of-pocket medical expenses such as nursing homes). In general, our goal is to measure total wealth, and not necessarily the utility value of that wealth. To get a sense of the welfare implications of different types of wealth, it is important to examine the components of wealth separately.

[13] "Other assets" is defined in the HRS to include (among other things) jewelry, money owed to the respondent by others, collections, trusts or estates for which the respondent is a beneficiary, and other annuities not elsewhere mentioned (presumably including variable annuities).

ances, medical debts, life insurance policy loans, or loans from relatives). Non-financial wealth (NFW) is the sum of vehicles, business, housing, and investment real estate, less any outstanding debt secured by these assets. To these measures we add retirement accounts such as IRA balances and balances from defined-contribution pension plans from current and previous jobs.

Once we compute households' net financial and nonfinancial wealth, the next step is to add the actuarial present values of defined benefit pensions, Social Security, insurance, annuities, welfare, and compensation.[14] For each source of wealth, we project forward income streams based on current or expected receipts of payments. We then discount these streams of payments, taking into account survival probabilities, cost-of-living adjustments (if any), and survivor's benefits. Our baseline calculations assume a real interest rate of 2.5 percent and an inflation rate of 2 percent.[15]

For households containing a worker, an important component of comprehensive wealth is expected future earnings. We account for projected labor income by assuming that wage and salary income grows at a one-percent real rate[16] until the age of 61. Thus, to the extent workers experience different wage growth or work more or fewer years, their actual resources in retirement will differ from our projections. To test the sensitivity of our results to this assumption, we repeat the exercise assuming workers retire at each of the ages 60 through 65.

Another form of compensation is employer matches to DC plans.[17] We calculate the current employer match in dollar terms and add it to current wages to calculate total compensation. We then discount the stream of total compensation through age 61 using the real interest rate minus one percent (to account for the assumed real growth) and the relevant conditional survival probabilities.

[14]See the appendix for the explicit formulas used to calculate the present values.

[15]A potential concern with our methodology involves our treatment, or non-treatment, of taxation. Most of the income generated from our various wealth components is subject to taxation of interest payments, capital gains, or conventional income. Ignoring the effects of taxation on the adequacy of savings obviously overstates the consumption value of a given annuitized stream of wealth. We abstract from the issue of taxation because it requires a detailed modeling of the actual income paths of each household. For example, withdrawals from DC plans are taxed as ordinary income. Without knowing the time path of DC withdrawals, however, it is not possible to select an appropriate tax schedule for households holding DC assets. Another problem involves assessing the tax liability of wealthier households who typically have more opportunities to shelter assets from the statutory tax burden. In light of these complications, we decided to ignore taxation completely, with the hope that the sin of omission was venial compared with that of commission.

[16]This is the same assumption as that used in the Social Security Administration's intermediate projection (SSA, 2006a).

[17]Future *employee* contributions to DC plans will be made out of labor income, so we do not need to include them. Future DB accruals have already been included as described above in the defined-benefit pension section.

3.2 Annuitized Comprehensive Wealth

We define comprehensive wealth as the sum of net financial and nonfinancial wealth, IRA and DC assets, and the actuarial present values of DB plans, Social Security, life insurance, annuities, welfare, and future wages and DC-plan matches. Our first measure of the adequacy of comprehensive wealth is its annuitized value—a measure of how much consumption each household can expect to finance per person per year over their remaining lifetimes.

We begin by abstracting from household economies of scale. We define household h's annuitized value of wealth as

$$AW_h = a_h CW_h, \tag{1}$$

where CW_h is household h's comprehensive wealth and the annuity factor a_h is defined as

$$a_h = \frac{i}{2 - \delta^{L_a} - \delta^{L_b}}. \tag{2}$$

In equation (2), i is the nominal discount rate (which we set at 4.5 percent in the baseline specification), δ is the discount rate, which is equal to $1/(1+i)$, and L_a and L_b indicate the two spouses' life expectancies (note that it does not matter which spouse is which in this calculation).[18]

For example, with a nominal interest rate of 4.5 percent and spousal life expectancies of 5 and 15 years, the resulting annuity factor would be .066. Thus, each member of the household could consume a level 6-1/2 percent of assets each year and expect to have zero assets upon the death of the surviving spouse.[19] To understand the intuition of the annuity factor, it helps to consider the extreme cases. If each life expectancy is only one year, the per-person annuity factor simplifies to $(1+i)/2$—that is, the household can consume everything, including a year's worth of interest, over the next year. Alternatively, as the sum of the life expectancies approaches infinity, the per-person annuity factor goes to $i/2$—the household can only consume interest, but none of the principal. As nominal interest rates rise, the annuity factor increases, since the household can afford to consume more each year. As interest rates fall toward zero, the annuity factor goes to $1/(L_a + L_b)$—households simply spread the principal equally over their remaining years.

There are four things to note about this measure. First, it implicitly assumes zero bequest motives and a willingness to fully consume all forms of wealth, including nonfinancial

[18] The derivation of this annuity factor is provided in the Appendix.

[19] If no spouse is present, we set L_b=0, and the expression collapses to

$$a_h = \frac{i}{1 - \delta^{L_a}}. \tag{3}$$

forms such as housing, businesses, and vehicles.[20] Second, it is calculated as if it were an actuarially fair annuity with no fees, loads, or expense charges. As is well known, the actual market for private annuities is less perfect (e.g., see Mitchell, Poterba, Warshawsky, and Brown, 1999). However, this reality is immaterial to the purpose of our measure, which is simply to rank households according to a uniform metric.[21] Third, the measure implicitly assumes no precautionary savings behavior. Browning and Lusardi (1996) derive a simple two-period model that shows that the introduction of a precautionary savings motive has similar effects to a lower discount rate—it acts to reduce the annuity value of a given level of wealth. Later in the paper we run sensitivity analyses of our annuity measure using lower discount rates; one interpretation is that these can incorporate a degree of precautionary savings motives.

Fourth, the measure does not by itself account for any economies of scale in household consumption. It simply places an expected value on how many dollars are available for consumption per person, per year. Generally, if a household has two surviving members in a given year, it could potentially finance more consumption per person per dollar of resources than could a single household, due to economies of scale. To quantify the effects of scale economies, we re-derive the annuity factor assuming couples need only 1.66 times a given singles' annuity in order to finance the same per-person consumption (this factor is used in Haveman, Holden, Wolfe, and Sherlund (2006).) In this case, the annuity factor for couples becomes

$$a_h = \frac{i}{1.66 - \delta^{L_a} - \delta^{L_b}}, \tag{4}$$

while the factor for singles remains as it was before.

3.3 Poverty Line Wealth

Our second measure of adequacy compares the actuarial present value of comprehensive wealth to the actuarial present value of future poverty lines. The poverty line applying to a given household depends on the number of adult members and their ages. For simplicity, we model four possible poverty lines, corresponding to singles aged 65 or older, singles under 65, couples in which one member is 65 or older, and couples in which both are under 65. Thus, to calculate the present value of a household's future poverty lines, we need to keep track of each spouse's age and then take an expectation over future survival states for both

[20] There is sometimes a debate among researchers about whether retirees are willing to consume their housing wealth (e.g., see Bernheim, 1992; Mitchell and Moore, 1998). Financial products that facilitate such consumption, such as reverse mortgages, are growing but are not yet widespread. Retirees can also consume housing by "downsizing" (i.e., selling their homes and moving to less-expensive quarters or living with relatives).

[21] For example, households could calculate this measure themselves and consume accordingly (i.e., self-annuitize) even in the presence of market imperfections.

spouses. The dollar values of the four poverty lines come from the U.S. Census Bureau (Census, 2004). These values are indexed to the Consumer Price Index (CPI-U).

We begin by defining a function $p(a_r, a_s, t)$ that maps ages and time into a household-specific poverty line. If either of the age arguments equals zero, the poverty threshold applies to a one-member household. For each time period t, we use one of the four distinct poverty lines described above.

For each household in the HRS, we then compute the following expected present value of the poverty line at time t:

$$PL_t = \sum_{\tau=a_r}^{119} \delta^{\tau-a_r} \big\{ \psi^r(\tau, a_r)\psi^s(\tau+\Delta, a_s)p(\tau, \tau+\Delta, t+\tau-a_r) + \psi^r(\tau, a_r)[1-\psi^s(\tau+\Delta, a_s)]p(\tau, 0, t+\tau-a_r) + [1-\psi^r(\tau, a_r)]\psi^s(\tau+\Delta, a_s)p(0, \tau+\Delta, t+\tau-a_r) \big\}, \quad (5)$$

where the three terms in the summation correspond to the events that both members are alive, only the respondent is alive, and only the spouse is alive. This value is then interpreted as the level of wealth that would be required to provide income equal to the poverty line, in expected value, over the remainder of the household's lifetime. The stream of poverty lines is discounted at the real rate, since the thresholds are indexed to inflation.

4 Composition of Comprehensive Household Wealth

4.1 Baseline Results

Applying the methodology outlined above, we are able to assemble our measure of comprehensive wealth. Table 1 presents estimates of the components of comprehensive wealth four our sample of 12,861 households in which the older member is at least 51 years old. We begin with the actuarial present value of future wages and other compensation (column 1 in the table). About a third of the sample holds this form of wealth, and it accounts for about 15 percent of comprehensive wealth, in the aggregate.[22] Among households with wage wealth, the mean value of about $420,000 accounts for about a third of their comprehensive wealth.

Turning to net financial wealth, we find that the mean value of $135,000 (including zeros) is more than 12 times the median of $10,500, indicating a very highly skewed distribution—and indeed, the Gini index for this measure is 89 percent.[23] The vast majority

[22]The shares are computed as the aggregate value of each component divided by aggregate comprehensive wealth, rather than as the average ratioacross households in the group.

[23]Because some households hold negative values of various wealth components, the Gini results should be interpreted with caution. Negative values, however, are confined to the extreme left tail of the distribution,

of households—about 90 percent—have non-zero (positive or negative) levels of financial wealth,[24] but on average, financial wealth accounts for a relatively small portion (15 percent) of comprehensive wealth.

We next consider nonfinancial assets, such as houses, vehicles, businesses and investment real estate, net of outstanding debt. This category represents the largest single component of comprehensive wealth. Again, about 90 percent of households hold this type of wealth, but the mean and median values (including zeros) of \$246,000 and \$100,000, respectively, are much higher than for financial wealth.

IRAs and 401(k) plans, shown in the third column, are still relatively new, and thus not universally represented in our sample of households older than 50.[25] About half of our sample households report IRA or DC balances. The accounts are, on average, relatively small in dollar terms, with a mean of \$174,000 and a median of \$60,000 among households who own them. The relatively small size of these accounts is sometimes cited as evidence of inadequate retirement savings. Our exercise is to determine the adequacy of savings after accounting for all forms of wealth.

About 38 percent of households over age 50 hold DB pension wealth, a share which is falling over time as DB plans are replaced by DCs. Nonetheless, for the cohorts under study, DBs are fairly large, averaging about \$271,000 and making up a quarter of wealth among those with DBs. Most households hold Social Security wealth, which averages about \$183,000 and accounts for about 20 percent of comprehensive wealth, among those who hold it. About 38 percent of households—a similar share to DBs—hold wealth in the form of annuity contracts and life insurance, but the mean expected present value is much smaller than it is for DB wealth. A relatively small share of households—about 13 percent—hold expected wealth in the form of future veterans' benefits and welfare payments. The mean value among holders is about \$107,000, or 4 percent of comprehensive wealth, on average. Overall, we find the mean value of comprehensive wealth to be a relatively robust \$900,000, with a median of about \$537,000.

The bottom row of the top panel shows the cumulative effect on the distribution of wealth from adding each additional component of wealth. Nonfinancial assets (column 3) are less skewed than financial assets (column 2), and including them lowers the GINI coefficient from 77 to 67 percent. Adding DCs and IRAs (column 4) leaves teh GINI unchanged, while including the present value of DB wealth (column 5) lowers it a few points to 64 percent. Adding Social Security wealth (column 6) has a more dramatic impact, reducing the GINI

to which the Gini indexes are relatively insensitive.

[24] About 15 percent of households have negative net financial wealth.

[25] While a 51-year old in 2004 could have had as many as 30 working years to save in an IRA and 20 years in a 401(k), most households of this age probably have not been participating since the earliest possible date, and older households have likely had far fewer working years in which to build up defined contribution balances.

to 57 percent. Finally, the inclusion of veterans' benefits and welfare (column 8) reduces the GINI coefficient to its "comprehensive" value of 56 percent.

4.2 Comparison to Previous Studies

These results are similar to previous studies that have estimated expanded concepts of household wealth.[26] For example, using the 2001 SCF, Wolff (2006) finds about a third of households have DB wealth and half have DC wealth, very close to our figures. He also finds that traditional net worth (excluding DC accounts) accounts for about 55 percent of "augmented wealth." Summing our columns (1) and (2), our analogous figure would be 42 percent, but we include forms of wealth in the denominator (such as wages, annuities and welfare) that Wolff does not. Similarly, Gustman and Steinmeier (1998) found that pension wealth accounted for about a quarter of total wealth in 1992, while Social Security accounted for another quarter of wealth. Combining DC and DB wealth, we find about 22 percent of comprehensive wealth is accounted for by pensions and 18 percent by Social Security, though again we include additional sources in the denominator that result in lower shares.

We find significantly more pension wealth than Wolff (2006), with mean values of $87,200 for DC wealth and $103,400 for DB wealth, compared to Wolff's estimates of $54,000 in DC wealth and $41,000 in DB wealth. Part of the difference is likely to due to sample differences (in particular, households of different ages and at different points in time), but, particularly with respect to the calculation of DB wealth, part is likely due to methodological differences.[27]

4.3 Sensitivity Analysis

To explore the sensitivity of our results to the discount-rate assumptions, we recompute the present values with alternative assumptions about real discount rates and inflation. Benefits that are indexed for inflation, such as Social Security and some DB plans, are affected only by changes in the real discount rate, while the other benefits are also affected by changes in inflation. The results, presented in Tables 2 and 3, show that the effect of alternative assumptions is important for the individual present value calculations, but smaller for the overall comprehensive wealth measure.

For example, lowering the real discount rate from 2.5 percent to 1 percent increases the mean present value of expected Social Security benefits by about $37,000, or 24 percent,

[26] See Wolff (1987, 1992, 2006); McGarry and Davenport (1997); Kennickell and Sunden (1997); Gustman, Mitchell, Samwick, and Steinmeier (1997); Gustman and Steinmeier (1998).

[27] Our general methodology is similar to Wolff's but there are differences in parameter values, such as survival probabilities and discount rates, that could cause differences in results. In addition, there may be differences in the calculation of expected spousal benefits.

while increasing it to 4 percent lowers the mean by about $27,000, or 17 percent. Similarly, lowering the nominal discount rate from 4.5 percent to 2 percent increases the mean present value of expected DB payments by about $27,000, or 26 percent, while increasing the nominal rate to 7 percent reduces the mean by about about $18,000, or 18 percent. The sensitivity of DB wealth to inflation is limited by the relatively high share (about 40 percent) of DB recipients who report inflation-indexed benefits (most often public-sector workers). The resulting percentage changes in comprehensive wealth, however, are only about half as big, since the present value calculations account for just under half of comprehensive wealth.

4.4 Age Profiles of Wealth Categories

We next examine how the components of comprehensive wealth vary by age. As shown in Table 4, we divide our sample into three age groups, which we refer to as "pre-retirees" (ages 51-61), "young retirees" (ages 62-75) and "older retirees" (ages 76 and above). Comparing the aggregate measure in the right column for each age group, we see that mean comprehensive wealth falls with each successive cohort. Older retirees have 41 percent less wealth than young retirees, and young retirees have 11 percent less than pre-retirees. The interpretation of this decline, however, is complicated by the fact that our single cross section of households makes it impossible to disentangle age and cohort effects. On the one hand, the decline in wealth appears to be consistent with a life-cycle framework in which older workers approach peak wealth accumulation, while retirees dissave to finance retirement consumption. But the change in wealth could also be due to lifetime differences in wealth accumulation across cohorts. In work currently underway, we are using previous waves from the HRS to examine how comprehensive wealth has changed over time for given cohorts.

Regardless of the age or cohort interpretation, the decline in wealth from the first to second cohort appears to stem largely from differences in the expected value of future wages. As we discuss below in more detail, the values of most of the other wealth categories are actually higher for the second cohort (consisting of young retirees). The most extreme example of this is financial wealth, which almost doubles from the first to second cohort. Financial wealth drops from the second to third cohort, but even the oldest retirees have far more financial assets than the cohort on the brink of retirement. This is consistent with the life-cycle view that earnings and savings peak around age 51-61, and thus that a large part of asset accumulation occurs during these years. One interpretation is that baby boomers have the resources (including future wages) to finance adequate consumption in retirement, but the actual post-retirement consumption paths will depend on their current consumption and savings decisions. To get a more complete perspective of the balance sheets of these different cohorts, we now consider the remaining wealth categories in more detail.

Given the economic importance of the transition from DB to DC plans, it is worth examining whether the transition can be observed at the cross-sectional level. Table 4 shows that mean DC and IRA wealth is essentially flat between the first two cohorts, but falls to less than a quarter of that level in the oldest cohort. The sharp decline between the last two age groups reflects reinforcing life-cycle effects and cohort effects. Given their advanced stage in the life cycle, older retirees have probably withdrawn a larger share of assets from DCs and IRAs. And because DCs and IRAs have only been available for approximately 30 years, older retirees have also had less opportunity to contribute to the accounts.

In contrast to the pattern for DCs and IRAs, DB wealth rises about 14 percent from the first to the second cohort, then falls by more than half in the oldest cohort. We can again interpret this in terms of cohort and life-cycle effects. As we discussed in the introduction, older households are more likely to be covered by DB plans, so the cohort effect has DB wealth rising with age. The life-cycle effect is more complicated. Because workers do not receive benefits until retirement age, the present value of a given benefit stream increases rapidly toward the onset of benefits. But after retirement, the actuarial value of remaining benefits falls because of the decrease in remaining life expectancy. For pre-retirees, the cohort and life-cycle effects move in tandem, which provides an explanation for the increase in DB wealth between the first two cohorts. Later in life, however, the life-cycle and cohort effects work in opposite directions, and we see a lower amount of DB wealth for the oldest cohort. These patterns are illustrated in the top panel of Figure 1, which plots the predicted values of a regression of DB wealth on a quartic in age. Figure 1 shows that mean DB wealth nearly triples from \$51,000 at age 51 to \$148,000 at 62, then gradually declines with age.

Looking at the evolution of wealth shares with age, Table 4 shows that the share from financial wealth rises steadily, as the shares from Social Security and DC fall.[28] These patterns can also be seen in the bottom panel of Figure 1, which plots the predicted values of separate regressions of each wealth component on a quartic in age. Financial wealth, the red line, declines only modestly with age, while nonfinancial wealth, Social Security, DB and DC all decline quite steeply. Figure 1 shows that mean comprehensive wealth falls from about \$1.1 million at age 51 to \$360,000 by age 90.

[28] The decline in the Social Security share includes some cohort effects as well as life-cycle effects, since Social Security benefits are typically higher for successive generations due to real wage growth. However, cohort effects are likely much stronger for DC plans than for Social Security.

5 Adequacy of Comprehensive Wealth

5.1 Annuity Value of Comprehensive Wealth

Table 5 presents the annuity values of comprehensive wealth by age and lifetime earnings. We use Social Security benefits, which are based on average lifetime earnings, to classify households into low, medium, and high lifetime earnings categories. Beginning with annuity values that do not account for household scale economies, the figures shown in the first row suggest most households have sufficient wealth to finance adequate consumption in retirement. The overall median annuity value of wealth is about $32,000 per person per year in expected value, and the mean is about $51,000.[29] Not all households, however, are as well situated. Households at the 10th percentile can finance just under $9,000 of consumption per expected person-year, which is unlikely to be enough to keep the household out of poverty throughout retirement.[30] Even on a per-person basis, couples have significantly larger annuity values than singles, with a median of $36,000 versus $26,000 for singles. The means, however, are much closer.

Not surprisingly, Table 5 shows a strong gradient by lifetime earnings, with the median increasing from $17,000 among the low-earning group to $28,000 for the middle group and $47,000 for the high-earning group. This is the pattern we would expect, since households with greater lifetime earnings are able to save more in order to finance greater consumption in retirement. Across ages, the median annuity values of comprehensive wealth are relatively constant, with a slight uptick at older ages. These patterns are shown in more detail in the lower panel of Figure 2, which plots the predicted values of regressions on a cubic in age.

A flat age profile is what would be predicted by the standard life-cycle model without bequests, in which assets are consumed at exactly the rate required to avoid surpluses or deficits at the end of the expected lifetime. Note that the profiles shown in Figure 2 conflate life-cycle effects, cohort effects, and survivorship effects (i.e., the fact that wealthier households are more likely to live to old ages). Nevertheless, abstracting from cohort and survivorship effects and treating the profile as a true life-cycle effect, we find that the median

[29] Thus, a couple at the median has sufficient comprehensive wealth to finance $64,000 of consumption per year while both are alive, and $32,000 per year after one dies. Recall that since the measure of wealth is comprehensive, the consumption to be financed with it is also comprehensive—e.g., it includes housing, vehicles and out-of-pocket medical expenditures. It does not include insured medical expenses, since we do not include the value of health insurance in comprehensive wealth.

[30] The 2004 poverty lines are $9,827 for a single under 65, $9,060 for a single 65 or over, $12,649 for a couple both under 65, and $11,418 for a couple of which at least one is 65 or over. Whether a household at the 10th percentile escapes poverty depends on the number of people and their ages, but even in the best case (i.e., the household consists of two people over age 65), the household may not escape poverty throughout retirement, since the poverty line rises with CPI and the annuity value is fixed by construction. The poverty ratio reported in the next section provides a more formal test of the adequacy of comprehensive wealth relative to poverty.

household is consuming assets at approximately the rate suggested by the life-cycle model. At the mean, there is a positive gradient with age, and at the 90th percentile, we observe a strong peak at about 62, followed by a dip in the mid-80s, followed by another increase at the oldest ages (which could be due to survivorship bias).

There could be three explanations for the positive slope at the mean. First, there could be cohort effects reflecting less saving among the upper quantiles of younger cohorts, relative to the older cohorts. For example, looking at the 90th percentile of annuity values, we see that the first two cohorts are fairly close, at about $85,000 and $95,000, but the third is significantly higher, at $133,000. This could indicate that the upper quantiles of the oldest cohort simply saved more over their lifetime because of relatively high risk aversion or other reasons. Second, there could be survivorship bias: the upper quantiles of the oldest cohort are higher not because they saved more, but because we lack data on the lower-wealth households that died before reaching these ages.

Finally, a third explanation is that the age gradient is neither a cohort effect nor a selection effect, but a true age effect. Under this explanation, the upper-quantile households are under-consuming relative to the Social Security life tables and relative to the standard life cycle model without bequest motives. Recall that the Social Security life tables do not distinguish based on wealth. Thus if higher-wealth households expect to live longer than the life tables imply, they would optimally consume less than the annuity values shown in Table 5. Similarly, if households had bequest motives or precautionary savings motives (e.g., with respect to the risk of large out-of-pocket medical expenses), they would optimally consume less. In either case, consuming less than the annuity value would result in asset growth over time, and thus higher annuity values for older households. Later in the paper we explore some of these possibilities by looking at how the results depend on expectations regarding longevity, medical expenditures, and potential bequests.

Returning to Table 5, the right-hand panel shows the results accounting for household economies of scale in consumption. The median value is $40,000 of per-person single-equivalent consumption, with a mean of $73,000. Relative to the benchmark case without scale economies, these levels are 26 percent higher at the median and 42 percent at the mean. The effect of accounting for scale economies increases with age and with lifetime earnings. These results help quantify the significant effect of household economies of scale in consumption on the well-being of couples in retirement. However, due to the relative arbitrariness of the adjustment factor, we report unadjusted annuity figures throughout the remainder of the paper.

5.2 Poverty Ratios

Next, we formalize the comparison of wealth to poverty by computing the ratio of comprehensive wealth to the actuarial present value of future poverty lines, which we call "poverty-line wealth." Poverty-line wealth varies across households because of differences in household-specific poverty lines, which are functions of the ages and survival probabilities of the household members. Poverty-line wealth can be interpreted as the level of wealth that would be sufficient to finance consumption equal the expected poverty line over the expected remaining lifetimes of the household members.

Table 8 shows that overall, households hold comprehensive wealth that is several multiples of their benchmark poverty-line wealth. The mean ratio is 5.75, and the median is 3.56. The ratios are strongly related to lifetime earnings, but even the lowest earnings group has a median ratio of 1.77. Not all households, however, exceed their poverty-line wealth thresholds. The ratio at the 10th percentile is 0.92, and among the lowest earnings group, the ratio at the 10th percentile is 0.75. The poverty ratios rise slightly with age at the median and relatively steeply at the mean.

Table 9 presents the distribution of poverty ratios in more detail. About 12 percent of households have poverty ratios below one, and another 9 percent have a ratio less than 1.5, which we refer to as "near poverty."[31] Not surprisingly, there is a close correlation between lifetime earnings and the share of households below or near the poverty line. Close to a third of our sample of households with low lifetime earnings has a ratio of poverty to wealth less than 1, and almost 45 percent of this group have a ratio less than 1.5. These shares drop rapidly, however, as we move up the lifetime earnings categories. For instance, only 4 percent of households with middle lifetime earnings have wealth below poverty, with 13 percent near poverty. In the highest-earnings group, there are almost no households at or near poverty. The majority of the highest-earnings households, more than 80 percent, have wealth levels at least three times poverty. Households in the youngest cohort are a bit more likely to be in poverty, a pattern that is consistent with the small positive relationship between age and our wealth measures at the 10th percentile.

5.3 Sensitivity Analysis

Annuity Value

To ensure that our conclusions are not driven by assumptions on parameter values or deinitions of wealth, we reconstruct our estimates under several alternative assumptions. Table 6 shows how the annuity value calculation changes under different assumptions about real

[31] Recall that our measure of comprehensive wealth includes expected welfare benefits; thus, we find that welfare payments do not guarantee consistent consumption above the poverty line in expected value.

interest rates and inflation.[32] The different assumptions change the annuity values by about 5 to 10 percent, but this is not enough to affect any of the major patterns or conclusions.

Table 7 provides annuity values for less comprehensive measures of wealth. Since there is some disagreement among researchers about whether housing wealth should be included (see Bernheim, 1992; Mitchell and Moore, 1998), we provide an alternative calculation that excludes nonfinancial wealth. Removing housing and other nonfinancial assets takes about $9,000, or nearly a third, off of the median annuity value of wealth, and $15,000 off of the mean. This adjustment has a larger effect on the annuity values of older households, for whom nonfinancial assets make up a larger share of wealth.

Excluding housing flattens out the age-path of mean annuitized wealth somewhat. Ignoring cohort effects and survivorhsip bias and treating this pattern as a pure life-cycle path, this flattening suggests that annuitized wealth excluding housing provides a consumption path that is closer to the flat path predicted by the life-cycle model. In the context of the life-cycle model, some households appear reluctant to tap equity from their houses, intend to leave their houses as bequests, or both. The bequest explanation, however, applies more to the wealthier households in our sample.

At the median, removing housing results in a declining age-path of annuitized wealth. Applying the same life-cycle interpretation suggests that for the median household, including housing in wealth provides a consumption path closer to the life-cycle prediction. The implication is that the typical household cannot anticipate bequeathing the full value of its house unless it plans on curtailing consumption expenditures during its remaining years of life. Thus, in the context of the standard life-cycle model, this pattern is consistent with wealthier households intending to leave their houses for their heirs, and a median household that intends to consume, rather than bequeath, its nonfinancial wealth.

Table 7 also presents calculations of annuitized wealth excluding both housing and all the present-value calculations. This narrow measure of wealth, which consists of financial wealth and retirement accounts, is sometimes used to gauge savings adequacy. Table 7 shows that, by this measure, savings is clearly inadequate, with a median annuity value of only $2,300 per person per year. It is doubtful, however, whether households really intend to finance retirement consumption out of financial assets alone. Indeed, because the annuity

[32] Examining the sensitivity of interest rates and inflation raises the question of whether we should really be applying the same rate of return to all of our assets. One concern in particular is that younger cohorts might, for a variety of reasons involving risk preference and access to tax-favored retirement accounts, hold a greater portion of retirement assets in equities. If this is true, and if these households expect their portfolios to grow at higher rates than those of older cohorts, then one might argue that the expected present values should take those higher growth rates into account. Here, we appeal to an equity premium argument. On a risk-adjusted basis, all assets should grow at the same rate after taking into account differences in other characteristics such as liquidity and fungibility. Since we know little about the preferences of households in the HRS, it is difficult to say whether portfolios with more equities make households better off in expected utility terms.

values of financial wealth rise steeply with age, households would be underconsuming if they were relying solely on financial assets. Thus, in the context of the life-cycle model, it appears that many households are relying on broader sources of wealth (such as pensions, Social Security and housing) to finance retirement consumption.

Poverty Ratios

The mean poverty ratios naturally depend on our assumptions about interest rates and inflation. Table 10 compares the average poverty ratios calculated with our baseline assumptions (2.5% real interest rate and 2% inflation) with four alternative assumptions that allow for higher and lower values of inflation and interest rates. For a given real interest rate, increasing the inflation rate from 1 percent to 3 percent decreases the poverty ratios by a fairly small amount—about 3 percent. The ratio falls because some of the wealth components in the numerator of the ratio are not indexed to inflation, while the poverty lines in the denominator are fully indexed.

While inflation has only a minor effect on the ratios, the real interest rate plays a larger role. Holding inflation constant, increasing the real interest rate from 1 percent to 4 percent increases the poverty ratios by about 15 percent. The intuition for the relatively large magnitude is that while the numerator contains some non-present-value components (e.g., financial wealth, retirement accounts, and housing), the denominator consists entirely of the discounted streams of future poverty lines, which are quite sensitive to changes in the discount rate. An increase in the real interest rate therefore decreases the present value in the denominator by more than it decreases the values in the numerator, causing a substantial increase in the size of the ratio.

Table 11 repeats the sensitivity exercise for the distribution of poverty ratios. Because the poverty line and many components of wealth are unaffected by inflation, the distribution of poverty ratios is relatively insensitive to the level of inflation. The level of real interest rates, however, has a modest impact on the distribution, with fewer households estimated to fall below the poverty threshold when real rates are higher. Since both the numerator and denominator of the poverty ratio are affected by real rates, this result shows that the effect on the denominator (i.e., a lower present value of future poverty lines when real rates are higher) outweighs the effect on the numerator (i.e., a lower present value of future wages, pensions, Social Security, life insurance and welfare).

Table 12 repeats the exercise of analyzing the effect on the results of using narrower measures of wealth. Excluding nonfinancial assets lowers the poverty ratio by 1.25 times poverty wealth at the median, and nearly two times poverty at the mean.[33] Further ex-

[33]Note that this measure is somewhat hard to interpret, since the poverty line implicitly includes housing costs.

cluding all the present value calculations drops wealth well below the poverty threshold at the median, with a ratio of just 0.26. The mean ratio for this narrow measure of poverty is 1.63.

Alternative Retirement Ages

Table 13 shows the effects of assuming alternative retirement ages (for current workers) to the age 62 used in our baseline case. As shown in the table, workers can increase their retirement assets by delaying retirement. For example, delaying retirement from age 62 to age 65 increases median comprehensive wealth by about $30,500, which increases the median annuity value of wealth by about $2,000 per person per year, or 5-1/2 percent. Under the age-65 assumption, the share of households with less than poverty wealth falls from 11.7 percent to 10.9 percent. These figures illustrate that the results do change with alternative assumptions on the retirement age, but overall the changes are relatively modest.

5.4 Wealth by Poverty Ratio

Table 14 breaks down the components of wealth by poverty ratio. Clearly, poverty households—those with wealth-to-poverty ratios less than one—have less of all assets (except, in some cases, veterans and welfare benefits). In addition to having negative mean financial assets, they are also less likely to own houses, retirement accounts, DB plans, or life insurance. Overall, the mean comprehensive wealth of poverty households is about $72,000, less than half of that of those near poverty, and only about 5 percent of that held by households with ratios of at least 3.0. Wealth shares clearly differ by poverty status, as well. A feature that stands out is the diminishing importance of Social Security for wealthier households. With each poverty classification, the share of Social Security declines markedly, from over half among poverty households to about 15 percent in the top group. Another noteworthy trend is that the share due to DB and DC pension assets increases with wealth. While these savings vehicles constitute only a tiny fraction of resources among poverty households, they account for over a fifth of total wealth in the top group. The mean annuity value of wealth for poverty households is about $6,200 per person per year, compared to over $78,900 per person per year for the top wealth group.[34]

The lower panel of Table 14 shows that poverty households are more likely to be younger, and are dramatically more likely to come from a lifetime of low earnings. Indeed, 86 percent of poverty households have had low lifetime earnings, suggesting that low human capital

[34] Recall that these figures would change if differential mortality rates were taken into account. In particular, the annuity value of a given amount of wealth would rise for the poorest households (who face shorter life expectancies) and fall for the wealthiest households.

or significant negative shocks early in life, such as a disabling illness or injury, are the root causes of their poverty in retirement.

5.5 Effect of an Unexpected Social Security Benefit Cut

Given the uncertain future of Social Security and the important role it plays for many older households, a question of interest is what would be the effect of a cut in Social Security benefits. Since we are not modeling savings decisions in this paper, we will restrict our simulation to unexpected benefit cuts (i.e., we ignore savings responses). We simulate two types of cut: first, an across-the-board reduction of 25 percent in the *present value* of benefits (which translates into significantly larger cuts for younger households), and second, a similar cut that excludes the lowest-earning third of workers.

The results are shown in 15. The effect of an across-the-board cut on the median household would be to reduce the annuitized value of wealth by about $2,500, or 8 percent. The ratio of wealth to poverty would fall from 3.56 to 3.29, and the share of households under the poverty threshold would go up by about three percentage points. Overall, these effects seem relatively modest; however, given a population of about 81 million individuals aged 51 and older in 2004, a three-point increase in poverty translates into nearly 2-1/2 million people. By age, the largest effect is on the middle cohort, and by lifetime earnings, the biggest impact is on those with medium earnings (in part because some of the lowest-earning households have no Social Security benefits at all). For the middle-earning group, the benefit cut reduces annuitized wealth by about 9 percent, and increases the share below poverty from 4 percent to 10 percent.

5.6 Regression Results

With only a cross-section, it is difficult to identify the importance of factors such as health uncertainty and bequests for the adequacy of savings since we cannot separate age and cohort effects. Nevertheless, if we are willing to assume that some of the variation in saving behavior we observe for different age groups in 2004 reflects differences in age rather than cohort, we can learn something by examining cross-sectional regression results. Tables 16 and 17 display the coefficient estimates of OLS regressions of annuitized wealth and the poverty ratio on a set of household characteristics. Both sets of results generally move in the same direction, so we will focus on the results pertaining to poverty ratios.

As we would expect from the results in our previous tables, the age of the oldest household member is strongly and positively correlated with the amount of wealth relative to poverty. The coefficient estimates for our four age groups (60-70, 70-80, 80-90, and 90+) are 0.96, 1.77, 2.69, and 5.23, with the last three significant at the 1% level. The tendency for annuitized wealth to rise with age raises the possibility that some households are under-consuming out of their total wealth. There are, of course, other interpretations. One possibility is that the cross-sectional regression is picking up cohort differences in saving parameters such as the coefficient of relative risk aversion and the discount rate. For example, one could point to the Depression generation's historically reinforced fear of losing wealth in the event of an economic crisis as an explanation for their higher-than-average poverty ratios. In contrast, the baby boomers, who have experienced comparatively benign economic events, might be less risk averse and more sanguine about the future. Another interpretation of the rising wealth-to-poverty ratios with age relies not on cohort differences, but rather on the differential fungibility of various wealth components. For example, households might be reluctant to use financial innovations such as reverse mortgages to draw down their home equity, in which case we would expect the poverty ratios to rise with age.[35] Finally, our age results could be picking up differences in the demographic changes experiences by different cohorts (Gale and Pence, 2006). For instance, older cohorts may have experienced higher-than-expected lifetime earnings relative to younger cohorts and saved more accordingly.

Fortunately, the HRS includes some questions that allow us to address the importance of expectations over life cycle variables such as mortality, health status, and bequests. Table 17 reports coefficient estimates for different expectations of health and inheritance. The first question asks about the probability of living about 10 more years. The coefficient estimate for respondents reporting probabilities lower than those in the Social Security life tables is -3.354, while the estimate for respondents reporting higher probabilities is 0.257. Neither, however, are statistically significant at the 10% level. To the extent that the estimates on expected longevity contain valid information, the result is consistent with predictions of the life cycle model regarding the effect of horizon length on saving decisions. Households that expect to die earlier will tend to draw down their assets more rapidly.

Most of the other variables in Table 17 generate predictions consistent with the life cycle model. Controlling for other factors, the poverty ratios of households strongly expecting to leave large bequests (greater than $100,000) are higher by about 5.361. In contrast, households that expect to *receive* bequests tend to have lower poverty ratios, but the relationship is not statistically significant. Consistent with the idea that leisure is a normal good, households that anticipate having to work past the age of 65 have lower wealth than those that expect to retire by that age. The relationship between a household's expectations about entering a nursing home and its level of wealth is somewhat nonlinear. Households that expect to move into a nursing home with a probability greater than 80% appear to have

[35]The present value of the poverty lines decreases mathematically with age, making the housing portion of wealth rise as a ratio of poverty.

lower poverty ratios (i.e., less wealth) than those whose expectations of entering a nursing home lie between 20% and 80%. As pointed out by (Kotlikoff, 1988), households often face an incentive to run down assets if they anticipate entering a nursing home. The relationship reverses direction, however, when we compare households with a medium probability of entering a nursing home with those with a high probability. One possible explanation is that these households also have better average health and therefore less incentive to self-insure against possible health and medical expense shocks.

The optimality of saving decisions can depend crucially on individuals' uncertainty about, and experience of, shocks to health status and medical expenses (Palumbo, 1999; French and Jones, 2004a; French, 2005). It is not immediately clear, however, exactly how the presence of health uncertainty should affect the adequacy of savings. On one hand, households facing either greater health uncertainty or higher predicted medical expenses should accumulate a larger buffer-stock of savings to self-insure against these expected costs. But on the other hand, *realizations* of medical expense shocks can reduce the existing balance sheets of households. Even households that predicted high future medical expenses would be likely to experience a substantial drop in wealth when these predictions are realized. The limitations of cross-sectional data prevent us from commenting on the evolution of savings in the face of health uncertainty, but we can discuss correlations of wealth with various measures of health status and medical costs.

Table 17 shows how our adequacy measures correlate with different measures of health. The HRS includes questions about individuals' self-reported health status. The omitted category in the regression is "excellent/very good." The coefficient estimates decline from -0.535 for "good" health to -1.232 for "fair/poor" health. A similar relationship emerges when we examine other health measures, such as the number of diagnosed conditions or body mass index. At first glance, out-of-pocket medical expenses appears to deviate from this pattern, with larger expenses corresponding to higher levels of wealth adequacy. But this result is probably just picking up the fact that wealthier households can afford larger out-of-pocket expenses such as private nursing homes.

A number of interpretations are consistent with the negative relationship between health status and wealth. First, because current health depends on past health (French and Jones, 2004b), and health is an important determinant of labor earnings, we can expect that many individuals in poor health also experienced relatively low lifetime earnings. Second, to the extent that adverse health outcomes increase out-of-pocket medical expenses, some of the households in poor health may have exhausted a large portion of savings on health expenditures. Third, if health status depends positively on lifetime earnings, as would be the case if preventative and ameliorative health expenses are normal goods, lower lifetime earnings would be associated with worse average health outcomes. Finally, because health status is correlated with expected mortality, the life cycle model predicts that, other factors held constant, households in poor health should dissave more rapidly since they face a shorter decision horizon.

Another way to characterize the relationship between household characteristics and wealth adequacy is to consider the probability of having wealth below poverty. Table 18 displays the coefficient estimates for a linear probability model of a poverty indicator on household characteristics. As in our other regressions, age and lifetime earnings are positively and significantly correlated with our measure of wealth. Households aged 70-80, for instance, are 13 percentage points less likely to be in poverty than those aged 51-60. Health status continues to be an important indicator of poverty. Households who report being in fair to poor health are about 3 percentage points more likely to have wealth below poverty than households who report being in good health.

The composition of assets is strongly related to the probability of being poor. According to the results in Table 18, households who own non-financial assets are almost 30 percentage points less likely to have wealth less than poverty than those without non-financial assets. This accords with our intuition that households without houses or cars are much more likely to be poor. Ownership of retirement assets such as IRAs, DBs, and DCs is worth 5 to 8 percentage points less probability of poverty, and Social Security is worth even more, about 11 percentage points. Since we our using Social Security as a proxy for lifetime earnings, the probability model is picking up two effects. First, lower lifetime earnings (expected Social Security payments) increase the probability a household will have wealth below poverty. Second, households with no expected Social Security benefits are even more likely to have inadequate wealth since these households are at the very bottom of the lifetime earnings distribution.

6 Conclusion

The retiring baby boomers, the prospect of Social Security and Medicare reforms, and the transition from traditional pensions to retirement accounts have focused policy makers' attention on the current and projected adequacy of retirement wealth in the U.S. Our study joins several others in an attempt to answer some fundamental questions about adequacy: How much wealth is enough? How many households have it? And, what is the distribution of resources?

We approached the first question by constructing two measures of adequacy: the annuitized value of comprehensive wealth and the ratio of comprehensive wealth to the expected present value of future poverty lines. While neither measure is derived from theory, both have desirable properties for studying the adequacy of savings. The annuitized comprehensive wealth tells us about the amount of consumption a household can expect to finance per person per year over their remaining lifetimes. The poverty line measure provides a straightforward notion of absolute adequacy that is built on a widely used framework for analyzing poverty in the U.S.

Consistent with the somewhat optimistic results in some of the previous studies,[36] we find that most households appear to have adequate resources for retirement. We find a mean comprehensive wealth of about \$900,000, and a median of about \$536,000. Under our baseline interest-rate assumption of 4.5 percent and ignoring household scale economies, we find an average annuity value of about \$51,000 per expected person-year, with a median of \$32,000. However, those in the lowest third of lifetime earnings have a median of about half this amount, and the bottom 10 percent of this low-earnings group has an annuity value of about \$4,700 per expected person-year, clearly insufficient to finance adequate consumption in the U.S. Accounting for economies of scale, we find to \$73,000 of single-equivalent consumption per person at the mean, and \$40,000 at the median.

Our analysis indicates that most households have comprehensive wealth well above the levels needed to finance poverty-line consumption: the mean ratio of wealth to the present value of future poverty lines is 5.75, and the median is 3.76. Again, however, we see problems in the left tail—the ratio at 10th percentile is 0.92, and among the lowest-earning third of households, the 10th percentile is 0.47, or less than half the amount needed to finance poverty-level consumption in expected value. Overall, we find that about 12 percent of households fall below the poverty-level wealth threshold, and among the lowest-earning third of households, the share is 31 percent.

With regard to the three trends that motivated our analysis, we find that the early wave of the baby boom generation appears to be on track to accumulating adequate retirement wealth. With a median of \$30,000 per person and a mean of \$47,000, their annuitized wealth per person is fairly robust. At 3.35, the median ratio of wealth to the present value of poverty lines indicates an adequate expected level of consumption over the retirement years. However, we find that about 27 percent of the early baby-boom cohort's comprehensive wealth is held in the form of expected future wages, and that the financial assets of this cohort is significantly lower than that of older cohorts. This is not surprising, since this cohort was still in its peak earnings and savings years in 2004. But it reconfirms that the baby boomers' consumption in retirement will depend on their current savings and consumption decisions.

We find that the balance sheets of older Americans are moderately sensitive to simulated Social Security benefit cuts, ignoring savings responses. In response to a 25 percent cut in

[36] See, for example, Engen, Gale, and Uccello (1999, 2005); Scholz, Seshadri, and Khitatrakun (2006), and Hurd and Rohwedder (2006).

the present value of benefits, the median annuity value of wealth falls about 7-1/2 percent, and the share under the poverty threshold increased from 12 to 15 percent.

Finally, we find evidence suggesting significant cohort effects resulting from the transition from DB to DC pension plans. The share of 51-61 year-olds with DB wealth is about 30 percent, compared to about 44 percent for older households. On the other hand, 61 percent of 51-61 year-olds hold retirement accounts, compared with half of 62-75 year-olds and less than a third of households over 75 (though of course this pattern includes life-cycle effects as well as cohort effects). Despite these trends, however, we do not find evidence of a steep deterioration in retirement adequacy for the younger households, suggesting that the transition to DC plans has thus far not been an obvious disaster for older households.

As noted above, this study is the first of several underway to examine the impact of these trends on household consumption and saving in retirement. Our first extension is to make full use of the longitudinal nature of the HRS, in order to answer questions about cohort versus life cycle saving patterns, and model empirical patterns of dissaving in retirement. Another extension involves adjusting our adequacy measures to reflect the precautionary behavior of households who face uncertain mortality, health, medical expenses, and income. One way to do this would be to subject households' annuitized wealth streams to uncertainty, then solve for the difference in consumption equivalents generated in a model with risk-neutral utility with those generated in model that allows for risk aversion. A related extension is to try to understand the effect of differences in liquidity (e.g., financial wealth vs, housing wealth vs. Social Security or DB wealth) on precautionary behavior and consumption.

Our findings, then, show a generally optimistic view of retirement savings adequacy among current older cohorts (including the leading edge of baby boomers), though with a notable pocket of inadequacy concentrated among those with the lowest lifetime earnings. However, our results should not be taken to imply that current household savings are necessarily sufficient in the long-run macroeconomic sense. The broad demographic trends at work over the next half century, including declining fertility and increasing longevity, imply that a higher household savings rate could, by increasing the size of the capital stock, significantly reduce the burden of higher taxes or lower spending that will otherwise fall on following generations. Viewed in this context, our findings are encouraging, to the extent that they show wealth accumulations at least do not appear to be declining among older households, but they do not show that household saving behavior is optimal in the intergenerational sense.

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A1: Data Source and Imputation Methodology

Data Source

Our primary data sources are the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files. These are HRS data files that have been compiled by RAND, and are often easier to use than the raw HRS data files. The RAND HRS Data File is a longitudinal file in which selected variables have been linked across the seven waves of the HRS. This file includes RAND-generated imputations of missing values. Many variables necessary for our analysis, including detailed DB and DC pension information, are not included on the RAND HRS Data File. For these variables, we use the 2004 RAND-Enhanced Fat File, which includes virtually all the raw HRS data.

A number of income and wealth variables from the 2004 RAND-Enhanced Fat File are missing for some households, but the HRS design includes "unfolding brackets" that provide ranges of values for many of the variables that are missing. We use the brackets to assign imputed values for households who indicate that they have a certain type of income or asset, but do not report the actual amount. If we have information indicating that a respondent should have a value for a particular variable but no information on a range for that value then we assign the missing value a zero. Otherwise, we use the range given by the HRS to impute missing values. Our goal is to match the distribution of imputed values to the distribution of actual values given by respondents.

In order to accomplish this goal, we first find the distribution of actual responses that fall into a given bracket. If there are no actual responses in a specific bracket, the missing value is assigned a zero. If there are, the distribution of actual values in a bracket is divided into ten deciles. Each imputee is randomly assigned a number between one and ten to impute the decile within the self-reported range. Finally, the missing value is replaced with a value that is one-third the distance between the start of the decile and the end of the decile. We use one-third because we find that the central tendency of the empirical distribution of many variables within a given range is often closer to a third than a half.

For example, if we know that a missing variable is between $5,000 and $10,000, we start with the sample of non-missing data between $5,000 and $10,000 and divide this sample into ten equal deciles (e.g., $5,000 to $5,500, etc., but where the decile breaks are not necessarily evenly spaced but rather determined by the empirical distribution). We then randomly assign an imputee to one of the deciles (e.g., the third), and give them the value that is one-third of the way through the selected decile (e.g.,$6,167).

Note that variables taken from the RAND HRS Data File are imputed by RAND using a different methodology. RAND uses a model-based imputation method and imputes more values than we do. However, we have compared the RAND imputation distribution to our imputation distribution for several variables and can not find any significant differences. For more specific information on the RAND imputation method, please refer to their documentation.

In all calculations, we use the preliminary 2004 weights provided by the HRS.

Present Value Calculations

This section provides a more detailed description of our present value methodology than is found in the main text. We discuss our present value calculations for DB plans, Social Security, annuities, life insurance, and welfare.

Defined Benefit Pensions

Calculating the actuarial present value of future DB pension payments requires a few assumptions. The HRS includes questions about both current pension benefits (for retirees) and expected future pension benefits (for those still working). Households are asked about the (current or expected) pension amount (and start date, if they have not yet begun), cost-of-living adjustments (COLAs), and survivors' benefits.[37] In the case of working households, we use the expected pension at retirement; this serves to include the value of benefits not yet accrued. This is parallel to our inclusion of expected future compensation in our calculation of comprehensive wealth.

We express the actuarial present value of DB payments for a plan that pays an annual amount d as

$$DBPV = d \sum_{\tau=a_r}^{119} \delta^{\tau-a_r} \big\{ \psi^r(\tau, a_r) + \theta[1 - \psi^r(\tau, a_r)]\psi^s(\tau + \Delta, a_s) \big\}, \tag{A-1}$$

where δ is the discount factor, a_r and a_s are the ages of the respondent and the spouse at the time of the survey, and θ is the fraction of benefits that will be passed on to the spouse in the event that the respondent dies.[38] The term $\psi^r(\tau, a_r)$ is the probability of the respondent's living to age τ conditional on being alive at age a_r, while $\psi^s(\tau + \Delta, a_s)$ represents the conditional survival probability of the spouse, where Δ is the age difference between the spouse and the respondent. Thus, the actuarial present value of pension wealth is just the annual pension benefit multiplied by the sum of discounted annual survival probabilities, with an extra term accounting for any payments made to the spouse after the death of the respondent.[39]

The conditional survival probabilities are based on the one-year age- and sex-specific

[37] Thus, we are using self-reported pension data to calculate pension wealth. The HRS also includes supplementary employer-provided pension data that in some cases may provide a more accurate measure of pension benefits (see Gustman and Steinmeier (1998)). The main differences between the self-reported measures that we use and the supplemental data involve workers' expectations of future pensions. Because most of our sample consists of retirees who are currently receiving pensions, we expect our results to be robust to our reliance on the self-reported data for workers.

[38] We ignore non-spouse beneficiaries. If there is no spouse, we set θ to zero.

[39] Bernheim (1987) argues that actuarial discounting is inappropriate for risk-averse individuals facing imperfect annuity markets, because such individuals would attach additional value to the otherwise unavailable insurance product. He suggests straight discounting (ignoring the probability of death) instead. However, he points out that his analysis rests on the premise that individuals place no value on the death-contingent value of assets (i.e., that there are no bequest motives). We treat the household as a unit, and explicitly value the death-contingent component of each individual's assets (e.g., survivors' benefits and life insurance). Thus we use the actuarial present value of DB and Social Security benefits. Note that we are only computing the amount of wealth, and not the utility value of that wealth. Similarly, we make no adjustment for the utility value of risk (e.g., longevity risk or the risk of a large medical-expense shock.)

conditional death probabilities in the Social Security Administration's 2002 Period Life Table (SSA, 2006b). Period life tables provide a snapshot of the mortality conditions prevailing in a single year, rather than the expected mortality experience of a given cohort over time. For young cohorts (e.g., children born in 2002), one might expect actual longevity to be significantly greater than shown in the 2002 period life table, since longevity generally improves over time. However, since our sample is of Americans aged 51 and older in 2004, we conclude that the 2002 period table (the most recent available) is a reasonable estimate of our sample's expected mortality experience.[40]

For DB plans with COLAs (about 40 percent of the reported plans), we use a discount factor δ equal to $1/(1+r)$, where r is the real interest rate. For plans without COLAs, we set δ equal to $1/(1+i)$, where i is the nominal interest rate. The baseline results in the paper assume a nominal interest rate of 4.5 percent and a real interest rate of 2.5 percent, implying 2 percent inflation. The present value measures are naturally sensitive to the value of δ, so as a robustness check, we also report results using different assumptions about real rates and inflation.

The HRS collects information on multiple pension plans for respondents and their spouses. Applying equation (A-1), we compute present values for each of these and then sum them to arrive at our final calculation for current pensions. Some current workers report that they expect to receive lump-sum payouts from their DB plans upon retirement. To include these plans, we simply discount the lump sum back to the current age:

$$DBLS = LS \sum_{\tau=a_r}^{a_r+N} \delta^{\tau-a_r} \psi^r(\tau, a_r), \tag{A-2}$$

where LS is the value of the lump-sum payment and N is the expected number of years remaining before the payout is received. We make no adjustment for survivor's benefits in the case of lump-sum payments.

Social Security

Computing the present value of of Social Security is quite similar to calculating DB wealth. The HRS includes questions about both current benefits for retirees and expected benefits for workers. Let ss^r_τ and $ss^s_{\tau+\Delta}$ denote the current or expected annual social security benefits of the respondent and the spouse at ages τ and $\tau+\Delta$ respectively. The actuarial present

[40]Note that these survival probabilities average together all households. Thus, to the extent that, for example, lower-wealth respondents face lower survival probabilities than higher-wealth respondents, our calculations will overstate the pension wealth of the lower-wealth groups, while understating the pension wealth of the higher-wealth groups. This bias could, in turn, affect the distributional calculations performed later in the paper. As a sensitivity test, we look at how our results vary according to respondents' own subjective survival probabilities relative to the life tables. In addition, in future work we hope to use wealth-adjusted survival probabilities to test the effect of differential mortality on our results. However, since differential mortality is apparent mostly at very old ages, its effect is likely to be small relative to the effect of discounting.

value of household Social Security benefits is given by

$$SSPV = \sum_{\tau=a_r}^{119} \delta^{\tau-a_r} \left[\Psi_1(ss^r_\tau + ss^s_{\tau+\Delta}) + \Psi_2 \max(ss^r_\tau, ss^s_{\tau+\Delta})\right], \tag{A-3}$$

where

$$\Psi_1 = \psi^r(\tau, a_r)\psi^s(\tau + \Delta, a_s)$$

is the conditional probability of both household members being alive, and

$$\Psi_2 = \psi^r(\tau, a_r) + \psi^s(\tau + \Delta, a_s) - 2\psi^r(\tau, a_r)\psi^s(\tau + \Delta, a_s)$$

is the conditional probability of exactly one household member being alive.[41] The first bracketed term in equation (A-3) captures the fact that if both household members are alive, their total benefits will generally equal the sum of their individual amounts. The second term in the brackets reflects the rules governing survivors benefits, whereby a retirement-age widow or widower typically receives 100% of the spouse's benefits if these exceed their own benefit amount.[42] Since Social Security benefits are adjusted for inflation, we discount using the real interest rate: $\delta = 1/(1 + r)$.

Respondents in the HRS are asked directly about the amount of current or expected spousal benefits. We take these amount at face value and assume that the reported benefits already reflect any adjustments due to the Social Security rules (e.g., the fact that individuals are typically entitled to the maximum of their own benefits and 50% of their spouse's).

Insurance, Annuities, and Welfare

Life insurance policies, annuities, and future welfare payments can constitute an important portion of household wealth. Life insurance wealth is a bit different from DB or Social Security wealth because life insurance is a contingent asset and therefore less liquid than other wealth components. Nonetheless, to ignore it would be to understate the total resources available to finance household consumption in retirement. We only include policies in which the spouse is named as a primary beneficiary.

We compute the actuarial present value of household life insurance as follows:

$$\begin{aligned} INPV = \sum_{\tau=a_r+1}^{119} & \delta^{\tau-a_r} \big\{\psi^r(\tau-1, a_r)[1 - \psi^r(\tau, a_r)]\psi^s(\tau + \Delta, a_s)FV_r - \psi^r(\tau, a_r)P_r \\ & + \psi^s(\tau + \Delta - 1, a_s)[1 - \psi^s(\tau + \Delta, a_s)]\psi^r(\tau, a_r)FV_s - \psi^s(\tau + \Delta, a_s)P_s\big\}, \end{aligned} \tag{A-4}$$

where FV_r and FV_s denote the face values of the insurance policies owned by the respondent and the spouse, and P_r and P_s are the corresponding annualized premiums. The first term in equation (A-4) is the expected payout of the respondent's insurance policy at age τ,

[41] To see the intuition of this expression, note that the equation for Ψ_2 is simply a rearrangement of $\psi^r(1 - \psi^s) + \psi^s(1 - \psi^r)$.

[42] Widows older than 60 but under the full retirement age generally receive 71-99% of the workers benefit amount.

where the expectation is taken over the probability that the respondent dies at a particular age τ while the spouse is still alive. The second term in the equation is the expected value of the premium payment, which occurs in the event that the respondent is still alive at age τ. The third and fourth terms are the same expectations applied to the spouse's policy.

Note that the actuarial present value of insurance would be zero if premiums were actuarially fair and perfectly observed in the data. However, the calculation of life insurance wealth is constrained by data limitations. We do not observe in the HRS the length of term policies, or their premiums.[43] In the absence of any data, we assume that term policies will remain in force throughout retirement, and that their premiums have been pre-paid (i.e., are zero in each year going forward). Thus, the only premiums that we account for are those associated with whole life policies. In addition, the HRS does not collect information on the cash value of whole life policies. As a result, we treat term life insurance and whole-life insurance identically in this calculation. That is, we ignore the cash value of whole life policies and instead calculate the present expected value of the face value, regardless of the type of policy.[44]

Our calculations of wealth from annuities and welfare payments are more straightforward. The formula for calculating the actuarial present value of annuities ($ANPV$) exactly parallels equation (A-1), where we make similar adjustments for COLAs and survivor benefits. Our measure of expected welfare payments includes veteran's benefits, food stamps, Supplemental Security Income (SSI), and other welfare. In this calculation, we assume that individuals who are currently receiving these payments will continue to receive the same inflation-indexed welfare payments as long as they live, and that those not currently receiving these payments never will—i.e., we do not model transitions in and out of welfare-receipt status. Since welfare benefits are typically indexed to inflation, we discount this stream of expected welfare payments using the real interest rate and the relevant conditional survival probabilities.

A2: Annuity Factor Derivation

This section of the appendix derives the annuity factor given by equation (2). We begin by assuming that a respondent (indexed by r) and a spouse (indexed by s) want to convert their comprehensive wealth into annuities to finance the same amount of consumption C per person per year. Let CW be the value of household wealth. Assume that the respondent expects to live T_r more years, and the spouse expects to live T_s more years. Without loss of generality, we can assume that $T_r < T_s$. Finally, let $\delta = 1/(1+i)$ be the nominal discount factor.

For the first T_r years, each member of the household expects to consume C per year.

[43] Term life insurance policies simply pay out the face value to the beneficiary in the event of the death of the insured, while whole life policies also include a cash-value account in which assets accrue that can be borrowed against or redeemed upon cancellation of the policy.

[44] Note that if we *were* able to include cash values as a separate liquid asset, we would need to adjust down the measure of face value accordingly in order to prevent double counting. We do not estimate the extra utility value of more liquid wealth in any of our measures.

The present value of the first T_r years of the household annuities is given by

$$\begin{aligned}2C(\delta + \delta^2 + ... + \delta^{T_r}) &= 2C\delta(1 + \delta + ... + \delta^{T_r - 1}) \\ &= 2C\delta\left(\frac{1}{1-\delta} - \frac{\delta^{T_r}}{1-\delta}\right),\end{aligned}$$

where the last step applies the formula for finite sums. After the respondent dies, the spouse consumes C per year for the remainder of her life. Viewed from the perspective of time t, this stream of payments is worth

$$\begin{aligned}C(\delta^{T_r+1} + \delta^{T_r+2} + ... + \delta^{T_s}) &= C\delta^{T_r+1}(1 + \delta + ... + \delta^{T_s - T_r - 1}) \\ &= C\delta^{T_r+1}\left(\frac{1}{1-\delta} - \frac{\delta^{T_s - T_r}}{1-\delta}\right).\end{aligned}$$

The sum of these two streams of payments is therefore

$$2C\delta\left(\frac{1}{1-\delta} - \frac{\delta^{T_r}}{1-\delta}\right) + C\delta^{T_r+1}\left(\frac{1}{1-\delta} - \frac{\delta^{T_s - T_r}}{1-\delta}\right).$$

We can rewrite this as

$$\frac{C\delta}{1-\delta}\left[2 - \delta^{T_r} - \delta^{T_s}\right] = \frac{C}{i}\left[2 - \delta^{T_r} - \delta^{T_s}\right].$$

If the household converts all of its wealth CW into an annuity to purchase these two streams of payments in expectation,

$$CW = \frac{C}{i}\left[2 - \delta^{T_r} - \delta^{T_s}\right],$$

or

$$C = aCW,$$

where

$$a = \frac{i}{2 - \delta^{T_r} - \delta^{T_s}}.$$

A3: HRS-SCF Comparison

A fundamental concern in constructing broader measures of wealth is data quality. As several papers have shown, the reporting of assets in household surveys can be seriously flawed, with ample mismeasurement and high rates of nonresponse (see Curtin, Juster, and Morgan, 1989; Smith, 1995; Juster and Smith, 1997; Kennickell and Starr-McCluer, 1997). While none of the surveys provide a perfect measure of wealth, Curtin, Juster, and Morgan (1989) argue that the Survey of Consumer Finances (SCF) is superior along several critical dimensions. The SCF, conducted every three years by the Federal Reserve Board, collects information on household finances from a nationally representative cross-section of Americans. The design of the SCF enables the survey to capture a more accurate picture of household finances than is possible in surveys that rely strictly on area-probability sampling (Kennickell, 2005). Curtin, Juster, and Morgan (1989) find that the SCF has lower rates of item nonresponse, relies less on imputation, captures more of the extreme tails of the wealth distribution, and, critically, provides a much closer match to aggregate wealth.[45] These qualities motivate our decision to use the SCF as a benchmark for our wealth measures in the HRS.

Treating the SCF as a benchmark raises the question of why we don't use that survey instead of the HRS for our main results. The main reason is that the current paper is part of a longer project that will eventually exploit the panel nature of the HRS to examine how uncertain longevity and medical expenses affect the saving decisions of older Americans. Establishing the quality of wealth measures in the 2004 HRS is then the first step in our construction of the panel data set.

Figure 3 compares kernel density estimates of age and comprehensive wealth in the two surveys, where comprehensive wealth is defined analagously for the two surveys. That is, we re-create our measure of comprehensive wealth using the 2004 SCF, which includes the vast majority of the information necessary to create comparable wealth measures. The HRS and the SCF densities are nearly identical for both age and comprehensive wealth, which leads us to conclude that the wealth measures are reasonably similar. This, in turn, gives us confidence that our results are not an artifact of mismeasurement in the HRS. As we extend our analysis back to earlier waves of the HRS, it will be informative to see whether the wealth measures in the HRS and SCF remain as close.

[45] In the 1984 surveys, for example, personal net worth in the SCF was about the same as that in the aggregate Flow of Funds data. Meanwhile, net worth values in the PSID and the SIPP were 76 percent and 62 percent of the value in the SCF. The SCF's ability to match aggregate wealth totals is largely due to its oversampling of extremely wealthy households, who account for a large fraction of financial assets. Juster and Smith (1997) attribute the SCF's higher rates of item response to its use of bracketed follow-up questions, a survey design feature shared by the HRS.

Table 1: Components of Comprehensive Wealth in 2004 (Thousands of 2004 Dollars)

All Households Aged 51 and Older

Statistics	Exp. PV of Wages thru 61 (1)	Financial Wealth (2)	Houses, RE, Veh. & Bus. (3)	DCs & IRAs (4)	Exp. PV of DB Plans (5)	Exp. PV of Soc. Sec. (6)	Exp. PV of Annuities & Life Ins. (7)	Exp. PV of Vet. Ben. & Welfare (8)	Grand Total: Comprehensive Wealth (9)
10th pctile	0.0	-3.0	0.1	0.0	0.0	0.0	0.0	0.0	106.7
50th pctile	0.0	10.5	100.5	0.1	0.0	131.6	0.0	0.0	536.6
90th pctile	460.0	289.0	500.0	216.0	300.0	343.3	56.9	16.3	1880.0
Mean	131.4	135.1	246.3	87.2	103.4	158.9	23.0	14.0	899.5
Std. Dev.	344.3	1244.6	775.8	534.9	396.8	126.8	217.7	62.8	1834.5
Pct with asset	31.3	90.5	91.0	50.1	38.2	86.7	38.1	13.1	99.7
Share of Total*	0.15	0.15	0.27	0.10	0.12	0.18	0.03	0.02	1.00
Gini	0.84	0.89	0.71	0.85	0.85	0.44	0.89	0.95	0.56
Cumulative Gini	0.84	0.77	0.67	0.67	0.64	0.57	0.57	0.56	0.56

Non-Zero Values Only

Statistics	Exp. PV of Wages thru 61 (1)	Financial Wealth (2)	Houses, RE, Veh. & Bus. (3)	DCs & IRAs (4)	Exp. PV of DB Plans (5)	Exp. PV of Soc. Sec. (6)	Exp. PV of Annuities & Life Ins. (7)	Exp. PV of Vet. Ben. & Welfare (8)	Grand Total: Comprehensive Wealth (9)
10th pctile	68.2	-4.0	7.0	6.0	18.8	56.4	2.6	2.3	108.4
50th pctile	285.1	18.0	120.0	60.0	129.4	154.9	23.6	49.7	538.8
90th pctile	859.3	320.0	532.0	400.0	613.0	355.6	125.3	271.9	1882.8
Mean	419.8	149.3	270.8	173.9	270.9	183.4	60.4	107.4	901.9
Std. Dev.	507.7	1307.4	809.4	745.4	605.8	118.6	349.3	142.0	1836.4
Share of Total*	0.34	0.15	0.28	0.13	0.25	0.20	0.04	0.08	1.00
Gini	0.49	0.88	0.68	0.70	0.62	0.36	0.70	0.61	0.57

*Share is calculated as ratio of means, rather than mean of ratios.

Source: Authors' calculations from the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files. Sample size = 12,861 households.

Table 2: Sensitivity of Wealth Components to Interest Rate and Inflation (Thousands of 2004 Dollars)

		Exp. PV of Wages thru 61	Exp. PV of DB Plans	Exp. PV of Soc. Sec	Exp. PV of of Annuities & Life Ins.	Exp. PV of of Vet. Ben. & Welfare	Grand Total: Comprehensive Wealth
$\pi = 1.0$	$r = 1.0$	140.3	130.4	196.3	30.9	16.5	983.1
	$r = 4.0$	123.6	94.7	131.6	21.8	12.2	852.6
$\pi = 3.0$	$r = 1.0$	140.3	114.2	196.3	24.3	16.5	960.2
	$r = 4.0$	123.6	85.3	131.6	18.0	12.2	839.4
$\pi = 2.0$	$r = 2.5$	131.4	103.4	158.9	23.0	14.0	899.5

Source: Author's calculations from the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files. Sample size = 12,861 households.

Table 3: Sensitivity of Wealth Components to Interest Rate and Inflation, Conditional on Non–Zero Assets (Thousands of 2004 Dollars)

		Exp. PV of Wages thru 61	Exp. PV of DB Plans	Exp. PV of Soc. Sec	Exp. PV of of Annuities & Life Ins.	Exp. PV of of Vet. Ben. & Welfare	Grand Total: Comprehensive Wealth
$\pi = 1.0$	$r = 1.0$	448.1	341.6	226.5	81.1	126.2	985.7
	$r = 4.0$	394.9	247.9	151.9	57.3	93.1	854.8
$\pi = 3.0$	$r = 1.0$	448.1	299.1	226.5	63.8	126.2	962.8
	$r = 4.0$	394.9	233.4	151.9	47.3	93.1	841.6
$\pi = 2.0$	$r = 2.5$	419.8	270.9	183.4	60.4	107.4	901.9

Source: Author's calculations from the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files. Sample size = 12,861 households.

Table 4: Expanded Measures of Houeshold Wealth in 2004 by Age (Thousands of 2004 Dollars)

Statistics	Exp. PV of Wages thru 61 (1)	Financial Wealth (2)	Houses, RE, Veh. & Bus. (3)	DCs & IRAs (4)	Exp. PV of DB Plans (5)	Exp. PV of Soc. Sec. (6)	Exp. PV of Annuities & Life Ins. (7)	Exp. PV of Vet. Ben. & Welfare (8)	Grand Total: Comprehensive Wealth (9)
Pre-retirees: Ages 51−61									
10th pctile	0.0	-8.0	1.0	0.0	0.0	0.0	0.0	0.0	139.3
50th pctile	141.8	6.0	96.0	12.0	0.0	151.8	0.0	0.0	724.2
90th pctile	731.5	225.2	486.6	270.0	356.6	353.4	79.3	24.0	2211.6
Mean	286.1	91.5	247.3	102.9	110.6	167.6	27.0	18.1	1051.2
Std.	471.3	374.3	755.2	399.5	347.8	130.9	80.3	76.6	1309.4
Pct with asset	64.8	90.0	93.2	61.3	30.3	82.7	42.4	12.0	99.5
Share of Total*	0.27	0.09	0.23	0.10	0.11	0.16	0.03	0.02	1.00
Gini	0.66	0.94	0.72	0.81	0.87	0.44	0.84	0.95	0.51
Cumulative Gini	0.66	0.64	0.60	0.60	0.58	0.52	0.52	0.51	0.51
Young Retirees: Ages 62−75									
10th pctile	0.0	-2.0	1.0	0.0	0.0	16.3	0.0	0.0	123.2
50th pctile	0.0	14.2	115.0	0.2	0.0	170.5	0.0	0.0	537.6
90th pctile	0.0	301.3	550.0	240.0	369.1	381.7	50.0	17.1	1816.6
Mean	19.5	177.8	281.8	106.0	126.5	194.4	19.3	14.0	939.4
Std.	96.1	1989.5	946.7	798.5	429.7	132.7	74.8	59.9	2570.6
Pct with asset	9.0	91.1	92.6	50.3	43.9	90.7	40.5	13.7	99.9
Share of Total*	0.02	0.19	0.30	0.11	0.13	0.21	0.02	0.01	1.00
Gini	0.96	0.90	0.71	0.86	0.81	0.38	0.88	0.95	0.57
Cumulative Gini	0.96	0.87	0.73	0.73	0.68	0.58	0.58	0.57	0.57
Older Retirees: Ages ≥ 76									
10th pctile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.2
50th pctile	0.0	22.6	91.0	0.0	0.0	78.1	0.0	0.0	292.5
90th pctile	0.0	400.0	441.0	80.0	123.9	187.7	17.9	9.0	1177.6
Mean	0.5	155.9	193.0	30.2	56.5	91.1	20.9	6.4	554.4
Std.	9.9	851.9	481.0	114.2	429.1	72.8	430.6	27.0	1279.3
Pct with asset	0.3	90.7	84.4	28.8	43.3	88.5	26.8	14.2	99.7
Share of Total*	0.0	0.28	0.35	0.05	0.10	0.16	0.04	0.01	1.00
Gini	1.00	0.82	0.68	0.90	0.86	0.42	0.96	0.94	0.58
Cumulative Gini	1.00	0.82	0.68	0.68	0.66	0.58	0.59	0.58	0.58

*Share is calculated as ratio of means, rather than mean of ratios.

Source: Authors' calculations from the RAND HRS Data File and the 2004 RAND-Enhanced Fat Files. Sample size = 12,861 households.

Table 5: Annuitized Comprehensive Wealth, by Age and Lifetime Earnings

		Without Scale Economies				With Scale Economies			
		Percentile				Percentile			
Age	Lifetime Earnings	10th	50th	90th	Mean	10th	50th	90th	Mean
All (51+)	All	9.1	31.5	96.1	51.2	9.8	39.6	129.2	72.6
	Single	7.8	26.0	98.1	50.3	7.8	26.0	98.1	50.3
	Married	12.2	35.9	95.2	52.1	17.6	52.4	149.1	94.4
	Low	4.7	17.0	76.2	37.4	5.1	19.4	96.3	53.2
	Middle	12.0	28.4	81.2	43.0	13.2	35.3	111.3	58.5
	High	20.4	47.2	120.1	72.9	25.7	60.4	163.4	105.7
51-61	All	7.8	30.3	84.7	42.7	5.2	37.1	102.8	51.6
	Low	3.4	15.6	66.2	29.3	4.0	17.3	77.1	33.7
	Middle	10.8	25.9	65.8	35.9	11.7	32.0	76.4	43.1
	High	19.9	44.0	101.5	58.1	24.4	54.6	128.9	72.0
62-75	All	9.6	30.9	94.7	52.5	10.7	40.0	124.9	67.1
	Low	5.5	16.3	74.0	39.6	5.9	18.9	93.7	48.0
	Middle	12.5	26.9	75.5	39.2	13.5	33.2	98.1	49.8
	High	21.1	48.3	124.9	79.3	27.5	63.0	167.3	104.1
≥76	All	10.1	34.6	132.9	65.4	11.0	45.7	194.6	120.2
	Low	7.0	21.5	115.0	50.9	7.4	27.1	149.5	99.8
	Middle	13.1	33.4	112.4	54.4	13.8	44.1	162.5	83.9
	High	22.5	62.2	191.1	114.3	26.7	88.0	352.6	237.8

Note: Comprehensive wealth per expected person-year, in thousands of 2004 dollars. Scale economies reflect an assumption that married couples can enjoy an equivalent amount of per-capita consumption as singles by spending 1.66 times the singles' expenditure (vs. a baseline of 2 times). Lifetime earnings grouped by position in distribution of Social Security benefits. See text for details. Sample size = 12,861 households.

Table 6: Sensitivity of Mean Annuitized Wealth to Interest Rate and Inflation

Age	Lifetime Earnings	$\pi = 1$		$\pi = 3$		$\pi = 2$
		$r = 1$	$r = 4$	$r = 1$	$r = 4$	$r = 2.5$
All (51+)	All	44.9	50.9	51.9	57.9	51.2
	Low	32.3	37.5	37.4	42.8	37.4
	Middle	38.4	42.5	43.8	47.9	43.0
	High	63.8	72.4	74.2	82.9	72.9
51-61	All	35.9	42.0	43.9	50.1	42.7
	Low	23.8	29.3	29.4	35.1	29.3
	Middle	30.8	35.2	37.7	41.9	35.9
	High	49.3	57.0	60.1	67.8	58.1
62-75	All	45.9	52.3	53.0	59.5	52.5
	Low	34.2	39.8	39.7	45.5	39.6
	Middle	34.7	38.5	39.9	43.8	39.2
	High	69.4	79.3	80.1	90.2	79.3
≥76	All	60.5	65.6	65.3	70.5	65.4
	Low	47.1	51.1	50.9	54.9	50.9
	Middle	50.3	54.4	54.4	58.8	54.4
	High	105.6	115.0	113.8	123.4	114.3

Note: Assuming no scale economies. Thousands of 2004 dollars. Sample size = 12,861 households.

Table 7: Alternative Measures of Annuitized Wealth

Cohort	Comprehensive Wealth		Ex. Nonfinancial Wealth		Ex. Nonfinancial & PV Wealth	
	Med.	Mean	Med.	Mean	Med.	Mean
All	31.5	51.2	22.2	36.1	2.3	14.5
51-61	30.3	42.7	23.8	32.6	1.7	8.4
62-75	30.9	52.5	21.2	36.4	2.5	16.3
≥76	34.6	65.4	20.6	42.3	4.1	23.4
Owns House	38.5	59.2	25.8	40.3	3.6	16.9
No House	13.3	22.1	12.9	20.9	0.1	6.1

Note: Thousands of 2004 dollars. Sample size = 12,861 households. About 78 percent of the sample owns a house.

Table 8: Ratio of Household Wealth to Poverty, by Age and Lifetime Earnings

		Percentile			
Age	Lifetime Earnings	10th	50th	90th	Mean
All (51+)	All	0.92	3.56	11.11	5.75
	Single	0.73	2.47	9.39	4.84
	Married	1.55	4.56	12.11	6.64
	Low	0.47	1.77	8.44	4.02
	Middle	1.26	3.19	9.45	4.81
	High	2.34	5.44	14.24	8.39
51-61	All	0.75	3.35	9.38	4.67
	Low	0.34	1.54	7.07	3.00
	Middle	1.06	2.92	6.99	3.90
	High	2.21	4.99	11.85	6.55
62-75	All	1.01	3.65	11.22	6.12
	Low	0.58	1.77	8.55	4.42
	Middle	1.30	3.07	8.73	4.52
	High	2.57	5.77	14.89	9.47
≥76	All	1.08	3.91	14.66	7.26
	Low	0.73	2.35	12.17	5.57
	Middle	1.36	3.84	12.25	6.04
	High	2.58	6.95	22.63	12.82

Note: Ratio of comprehensive household wealth to expected present value of the household-specific poverty line. Lifetime earnings grouped by position in distribution of Social Security benefits. See text for details. Sample size = 12,861 households.

Table 9: Distribution of Poverty Ratios, by Age and Lifetime Earnings

		Share with Poverty Ratio:			
Age	Lifetime Earnings	≤1.0	1.0-1.5	1.5-3.0	≥3.0
All (51+)	All	12	9	23	57
	Single	19	14	25	43
	Married	5	5	20	70
	Low	31	13	20	35
	Middle	4	13	30	53
	High	1	2	17	81
51-61	All	15	9	22	54
	Low	35	14	19	32
	Middle	9	13	30	48
	High	1	3	19	78
62-75	All	10	9	23	58
	Low	31	14	21	34
	Middle	2	13	33	51
	High	0	1	14	85
≥76	All	8	9	23	59
	Low	24	11	22	43
	Middle	2	11	27	60
	High	0	0	16	84

Note: Poverty ratio is ratio of comprehensive household wealth to expected present value of the household-specific poverty line. Lifetime earnings grouped by position in distribution of Social Security benefits. See text for details. Sample size = 12,861 households.

Table 10: Sensitivity of Mean Poverty Ratio to Interest Rate and Inflation

Age	Lifetime Earnings	$\pi = 1$ $r = 1$	$\pi = 1$ $r = 4$	$\pi = 3$ $r = 1$	$\pi = 3$ $r = 4$	$\pi = 2$ $r = 2.5$
All (51+)	All	5.36	6.24	5.26	6.17	5.75
	Low	3.70	4.39	3.65	4.36	4.02
	Middle	4.53	5.15	4.47	5.09	4.81
	High	7.82	9.17	7.65	9.03	8.39
51-61	All	4.30	5.20	4.17	5.08	4.67
	Low	2.68	3.38	2.61	3.33	3.00
	Middle	3.65	4.30	3.53	4.20	3.90
	High	6.08	7.27	5.88	7.11	6.55
62-75	All	5.67	6.66	5.58	6.59	6.12
	Low	4.05	4.86	4.01	4.82	4.42
	Middle	4.23	4.85	4.17	4.79	4.52
	High	8.77	10.38	8.62	10.25	9.47
≥76	All	6.93	7.64	6.88	7.60	7.26
	Low	5.31	5.84	5.30	5.83	5.57
	Middle	5.77	6.34	5.74	6.31	6.04
	High	12.22	13.53	12.11	13.43	12.82

Note: Thousands of 2004 dollars. Sample size = 12,861 households.

Table 11: Sensitivity of Share Below Poverty to Interest Rate and Inflation

Age	Lifetime Earnings	$\pi = 1$ $r = 1$	$\pi = 1$ $r = 4$	$\pi = 3$ $r = 1$	$\pi = 3$ $r = 4$	$\pi = 2$ $r = 2.5$
All (51+)	All	12	11	12	11	12
	Low	33	29	33	29	31
	Middle	4	4	4	4	4
	High	1	1	1	1	1
51-61	All	15	14	15	14	15
	Low	37	32	37	32	35
	Middle	9	10	9	10	9
	High	1	2	1	2	1
62-75	All	10	9	10	9	10
	Low	32	29	32	29	31
	Middle	2	2	2	2	2
	High	0	0	0	0	0
≥76	All	9	8	9	8	8
	Low	24	23	24	23	24
	Middle	2	1	2	1	2
	High	0	0	0	0	0

Note: Thousands of 2004 dollars. Sample size = 12,861 households.

Table 12: Alternative Poverty Ratios

Cohort	Comprehensive Wealth Med.	Comprehensive Wealth Mean	Ex. Nonfinancial Wealth Med.	Ex. Nonfinancial Wealth Mean	Ex. Nonfinancial & PV Wealth Med.	Ex. Nonfinancial & PV Wealth Mean
All	4.08	6.53	2.84	4.62	0.26	1.63
51-61	3.99	5.56	3.08	4.25	0.19	0.91
62-75	4.13	6.94	2.81	4.82	0.29	1.90
≥76	4.21	7.77	2.48	5.04	0.47	2.58
Owns House	4.36	6.72	2.97	4.58	0.42	1.90
No House	1.33	2.27	1.29	2.15	0.01	0.64

Note: Sample size = 12,861 households. About 78 percent of the sample owns a house.

Table 13: Sensitivity to Alternative Retirement Ages

	Assumed Retirement Age					
Statistic	60	61	62	63	64	65
Comprehensive Wealth						
median	516.3	524.8	536.6	545.9	555.7	566.7
mean	868.5	883.5	899.5	914.8	930.6	946.3
Annuitized Wealth*						
median	30.1	30.8	31.5	32.1	32.8	33.4
mean	49.9	50.5	51.2	51.8	52.4	53.1
Poverty Ratio						
median	3.43	3.49	3.56	3.62	3.68	3.76
mean	5.61	5.68	5.75	5.82	5.89	5.96
Share Below Poverty	12.3	12.0	11.7	11.4	11.1	10.9

*Assuming no household economies of scale. Age 62 is the baseline assumption on the retirement age. Sample size = 12,861 households.

Table 14: Measures of Wealth by Poverty Status

Statistic	Poverty Ratio ≤1.0	1.0-1.5	1.5-3.0	≥3.0
	Shares with type of wealth			
Components of Wealth				
PV of Wages	10	22	33	37
Financial Wealth	66	79	90	98
Nonfinancial Wealth	62	75	93	99
DCs and IRAs	10	16	37	69
PV of DB Plans	4	13	32	52
PV of Soc. Sec.	59	86	88	92
PV of Ann. & Life Ins.	6	11	31	52
PV of Vet. & Welfare	33	22	10	9
	Means (thous $) incl. zeros			
Components of Wealth				
PV of Wages	7.0	21.9	51.9	192.0
Financial Wealth	-8.4	1.8	11.9	216.5
Nonfinancial Wealth	14.4	24.7	60.3	374.1
DCs and IRAs	1.6	2.2	101.1	137.6
PV of DB Plans	1.2	3.1	19.0	161.0
PV of Soc. Sec.	42.0	84.1	128.4	197.2
PV of Ann. & Life Ins.	0.8	1.3	4.5	35.6
PV of Vet. & Welfare	13.6	13.8	9.3	15.7
Comprehensive Wealth	72.2	152.8	295.3	1329.6
Annuitized Wealth*	6.2	12.4	20.7	78.9
Mean Age	63.4	65.9	66.2	66.3
Married	21	25	46	63
Low Lifetime Earnings	86	47	27	20
Share of Sample	12	9	23	57

*Assuming no household economies of scale. Sample size = 12,861 households.

Table 15: Effect of Unexpected Social Security Benefit Cuts

Subsample	Share	Annuitized Wealth Med.	Annuitized Wealth Mean	Poverty Ratio Med.	Poverty Ratio Mean	Distribution of Poverty Ratio ≤1.0	Distribution of Poverty Ratio 1.0-2.0	Distribution of Poverty Ratio ≥2.0
All Households								
Baseline	100	31.5	51.2	3.56	5.75	12	17	71
25% cut across the board	100	29.0	48.9	3.29	5.50	15	18	67
25% cut excl. low earners	100	29.2	49.2	3.32	5.52	14	18	68
Age 51-61								
Baseline	44	30.3	42.7	3.35	4.67	15	16	69
25% cut across the board	44	28.5	40.9	3.12	4.48	17	17	66
25% cut excl. low earners	44	28.7	41.1	3.14	4.50	16	17	66
Age 62-75								
Baseline	33	30.9	52.5	3.65	6.12	10	18	72
25% cut across the board	33	27.8	49.8	3.30	5.80	14	18	67
25% cut excl. low earners	33	28.8	50.0	3.33	5.83	13	19	68
Age ≥76								
Baseline	23	34.6	65.4	3.91	7.26	8	17	74
25% cut across the board	23	32.1	62.9	3.66	6.98	12	17	70
25% cut excl. low earners	23	32.4	63.2	3.69	7.01	11	18	71
Low Lifetime Earnings								
Baseline	33	17.0	37.4	1.77	4.02	31	23	46
25% cut across the board	33	16.1	36.6	1.68	3.94	34	21	45
25% cut excl. low earners	33	17.0	37.4	1.77	4.02	31	23	46
Medium Lifetime Earnings								
Baseline	33	28.4	43.0	3.19	4.81	4	24	72
25% cut across the board	33	25.7	40.5	2.91	4.53	10	23	67
25% cut excl. low earners	33	28.4	43.0	2.91	4.53	10	23	67
High Lifetime Earnings								
Baseline	33	47.2	72.9	5.44	8.39	1	5	94
25% cut across the board	33	43.6	69.5	5.05	7.99	2	8	90
25% cut excl. low earners	33	47.2	72.9	5.05	7.99	2	8	90

Note: Sample size = 12,861 households.

Table 16: OLS Regression of Annuitized Wealth on Household Characteristics

Variable	Coeff.	Std. Error
Age 60-70	6.761	(4.011)*
Age 70-80	12.527	(4.540)***
Age 80-90	21.371	(5.122)***
Age 90+	51.087	(7.905)***
Lifetime Earnings: Medium	0.425	(2.761)
Lifetime Earnings: High	27.531	(3.157)***
Race: Black	-13.796	(3.319)***
Race: Other	-0.429	(5.706)
Race: Hispanic	-14.079	(4.318)***
Married	-15.971	(2.765)***
Self-Reported Health: Good	-4.994	(3.039)
Self-Reported Health: Fair/Poor	-11.330	(3.283)***
Diag. Cond.: 2-3	-3.083	(2.962)
Diag. Cond.: 4+	-7.630	(3.752)**
Body Mass Index: Overweight	-1.826	(2.987)
Body Mass Index: Obese	-5.018	(3.175)
Out-of-pocket Med. Exp.: Medium	5.636	(2.944)*
Out-of-pocket Med. Exp.: High	11.099	(3.037)***
Prob. Live 10 years: Less than Life Table	-2.012	(3.180)
Prob. Live 10 years: More than Life Table	3.165	(2.962)
Prob. Inherit Money: Medium	-6.349	(4.081)
Prob. Inherit Money: High	-6.740	(4.139)
Prob. Leave Bequest $\geq$\$100K: Medium	16.732	(3.544)***
Prob. Leave Bequest $\geq$\$100K: High	48.528	(2.920)***
Prob. Enter Nurs. Home w/in 5 Years: Medium	6.209	(3.398)*
Prob. Enter Nurs. Home w/in 5 Years: High	-3.019	(10.095)
Prob. Work Past 65: Medium	-3.079	(4.381)
Prob. Work Past 65: High	-8.199	(5.079)
Risk Aversion: Medium	3.747	(6.662)
Risk Aversion: High	0.267	(5.117)
Retirement Rel. to Pre-ret.: Same	13.435	(5.624)**
Retirement Rel. to Pre-ret.: Worse	-5.225	(7.895)
Constant	28.179	(5.537)***

Annuitized wealth in thousands of 2004 dollars. Sample size = 12,861 households. Not all households are asked all questions. See text for details.

Table 17: OLS Regression of Poverty Ratio on Household Characteristics

Variable	Coeff.	Std. Error
Age 60-70	0.961	(0.426)**
Age 70-80	1.768	(0.482)***
Age 80-90	2.685	(0.543)***
Age 90+	5.277	(0.839)***
Lifetime Earnings: Medium	-0.048	(0.293)
Lifetime Earnings: High	2.998	(0.335)***
Race: Black	-1.479	(0.352)***
Race: Other	-0.031	(0.606)
Race: Hispanic	-1.657	(0.458)***
Married	-0.161	(0.293)
Self-Reported Health: Good	-0.535	(0.322)*
Self-Reported Health: Fair/Poor	-1.232	(0.348)***
Diag. Cond.: 2-3	-0.256	(0.314)
Diag. Cond.: 4+	-0.772	(0.398)*
Body Mass Index: Overweight	-0.240	(0.317)
Body Mass Index: Obese	-0.676	(0.337)**
Out-of-pocket Med. Exp.: Medium	0.531	(0.312)*
Out-of-pocket Med. Exp.: High	1.208	(0.322)***
Prob. Live 10 years: Less than Life Table	-0.354	(0.337)
Prob. Live 10 years: More than Life Table	0.257	(0.314)
Prob. Inherit Money: Medium	-0.760	(0.433)*
Prob. Inherit Money: High	-0.667	(0.439)
Prob. Leave Bequest ≥$100K: Medium	1.646	(0.376)***
Prob. Leave Bequest ≥$100K: High	5.361	(0.310)***
Prob. Enter Nurs. Home w/in 5 Years: Medium	0.718	(0.361)**
Prob. Enter Nurs. Home w/in 5 Years: High	-0.331	(1.071)
Prob. Work Past 65: Medium	-0.405	(0.465)
Prob. Work Past 65: High	-1.069	(0.539)**
Risk Aversion: Medium	0.314	(0.707)
Risk Aversion: High	-0.086	(0.543)
Retirement Rel. to Pre-ret.: Same	1.564	(0.597)***
Retirement Rel. to Pre-ret.: Worse	-0.579	(0.838)
Constant	2.464	(0.588)***

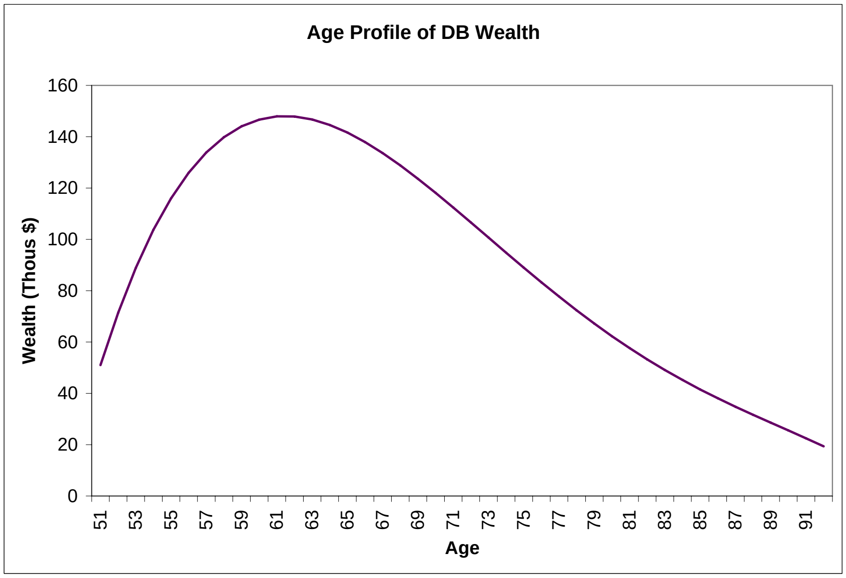
Sample size = 12,861 households. Not all households are asked all questions. See text for details.

Table 18: Linear Probability Model of Poverty Indicator on Household Characteristics

Variable	Coeff.	Std. Error
Age 60-70	-0.042	(0.008)***
Age 70-80	-0.085	(0.009)***
Age 80-90	-0.131	(0.011)***
Age 90+	-0.152	(0.016)***
Lifetime Earnings: Medium	-0.175	(0.007)***
Lifetime Earnings: High	-0.154	(0.007)***
Race: Black	0.024	(0.007)***
Race: Other	0.037	(0.012)***
Race: Hispanic	0.040	(0.009)***
Married	-0.003	(0.007)
Self-Reported Health: Good	0.010	(0.006)
Self-Reported Health: Fair/Poor	0.029	(0.007)***
Diag. Cond.: 2-3	0.015	(0.006)**
Diag. Cond.: 4+	0.009	(0.008)
Body Mass Index: Overweight	0.011	(0.006)*
Body Mass Index: Obese	0.019	(0.006)***
Out-of-pocket Med. Exp.: Medium	-0.053	(0.006)***
Out-of-pocket Med. Exp.: High	-0.050	(0.006)***
Prob. Live 10 years: Less than Life Table	0.010	(0.006)
Prob. Live 10 years: More than Life Table	0.010	(0.006)
Prob. Inherit Money: Medium	-0.008	(0.008)
Prob. Inherit Money: High	-0.016	(0.008)*
Prob. Leave Bequest $\geq$\$100K: Medium	-0.045	(0.007)***
Prob. Leave Bequest $\geq$\$100K: High	-0.051	(0.006)***
Prob. Enter Nurs. Home w/in 5 Years: Medium	-0.005	(0.007)
Prob. Enter Nurs. Home w/in 5 Years: High	-0.029	(0.021)
Prob. Work Past 65: Medium	-0.043	(0.009)***
Prob. Work Past 65: High	-0.016	(0.010)
Risk Aversion: Medium	-0.022	(0.014)
Risk Aversion: High	-0.010	(0.010)
Retirement Rel. to Pre-ret.: Same	0.001	(0.011)
Retirement Rel. to Pre-ret.: Worse	0.045	(0.016)***
Owns Nonfinancial Assets	-0.285	(0.008)***
Owns DC or IRA Assets	-0.052	(0.006)***
Owns DB Assets	-0.080	(0.005)***
Owns Social Security Assets	-0.113	(0.008)***
Owns Annuities or Life Insurance	-0.014	(0.007)**
Owns Vet. Ben. or Welfare Assets	0.033	(0.007)***
Constant	0.721	(0.014)***

Sample size = 12,861 households. Not all households are asked all questions. See text for details.

Figure 1: Age Profiles: DB Wealth and Wealth Components



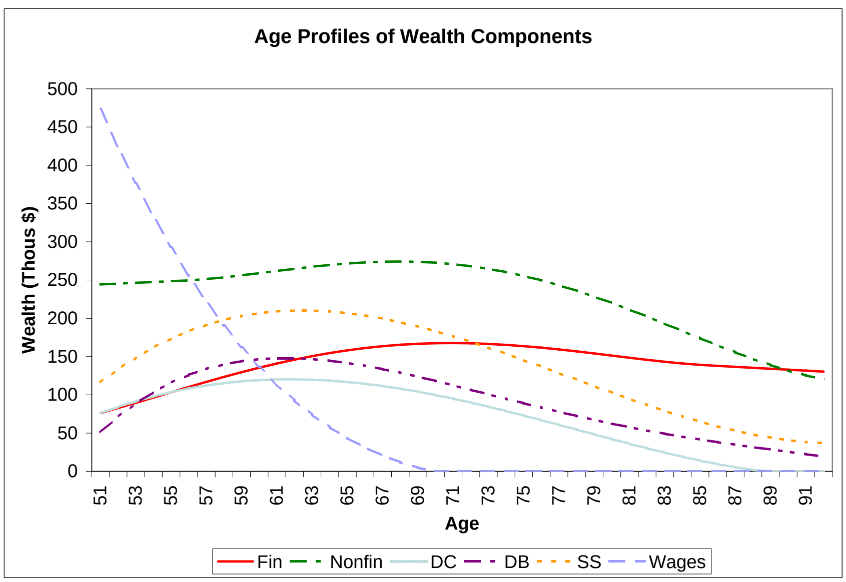
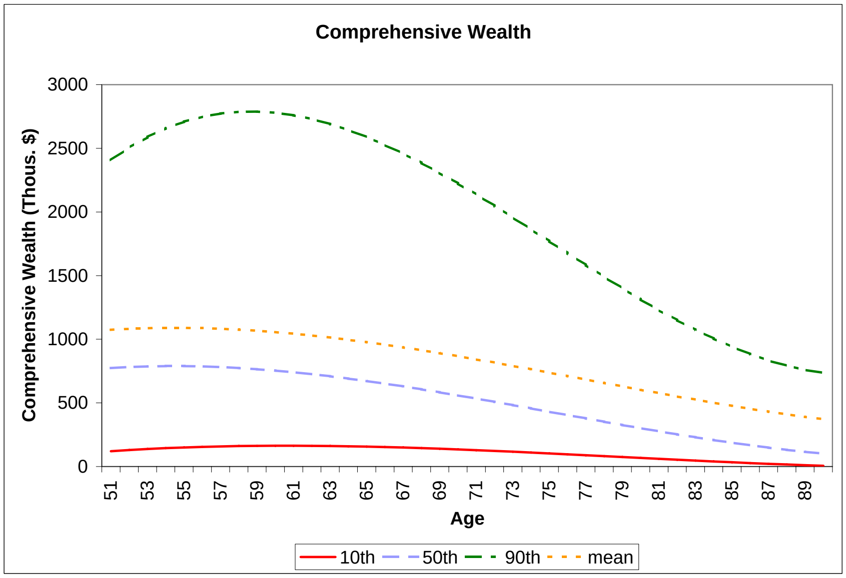


Figure 2: Age Profiles: Comprehensive Wealth and Annuitized Wealth



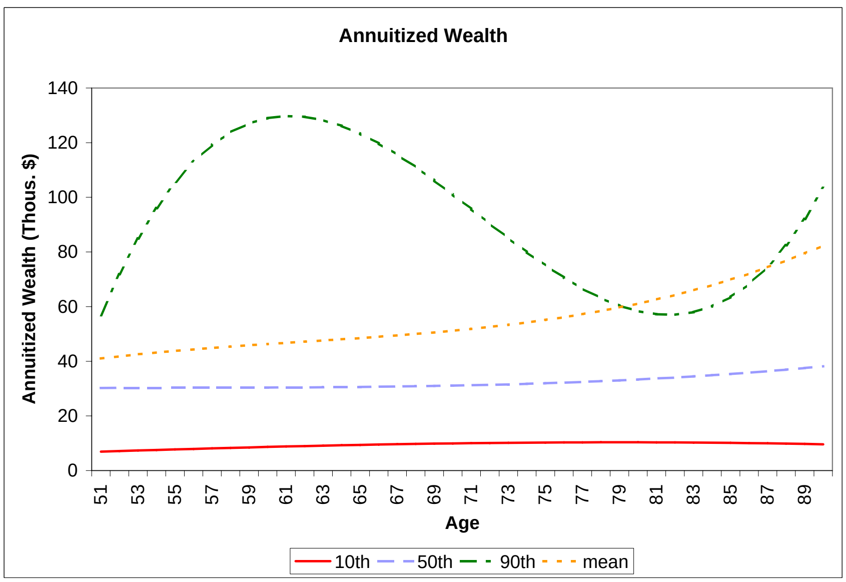


Figure 3: HRS-SCF Comparison: Age and Comprehensive Wealth