The National Retirement Risk Index: After the crash

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Introduction

The National Retirement Risk Index measures the share of American households who are 'at risk' of being unable to maintain their pre-retirement standard of living in retirement. The Index results from comparing households' projected replacement rates – retirement income as a percent of pre-retirement income – with target rates that would allow them to maintain their living standard. The results showed that even if households work to age 65 and annuitize all their financial assets, including the receipts from reverse mortgages on their homes, in 2004 43 percent would have been 'at risk' of being unable to maintain their standard of living in retirement.

The NRRI was originally constructed using the Federal Reserve's 2004 *Survey of Consumer Finances* (SCF). The SCF is a triennial survey of a nationally representative sample of U.S. households, which collects detailed information on households' assets, liabilities, and demographic characteristics. The release of the Federal Reserve's 2007 *Survey of Consumer Finances* seemed like a great opportunity to re-assess Americans' retirement preparedness.

The problem is that the 2007 SCF reflects a world that no longer exists. Interviews were conducted between May and December, a period during which the Dow Jones reached 14,000 and housing prices were only slightly off their peak. Between the time of the interviews and the second quarter of 2009, direct equity holdings of households declined by $7 trillion and housing values dropped by $3 trillion.

Thus, two updates are required – one to show what the NRRI looked like in 2007 and one to show what it looks like in mid-2009. As prelude to the updates, Section I describes the changing retirement landscape and Section II reviews the nuts and bolts of constructing the NRRI. Section III updates the NRRI using the 2007 SCF, showing little change in the percent of households 'at risk.' Section IV then projects what the NRRI would have looked like had the *Survey of Consumer Finances* been conducted in the second quarter of 2009, revealing that the share of households 'at risk' has increased to 51 percent in the wake of the financial crisis. Section V concludes that the NRRI confirms what we already know – namely that today's workers face a major retirement income challenge.

The Changing Retirement Landscape

Americans weaned on post-war affluence have come to expect an extended period of leisure at the end of their work life. And, indeed, the majority of today's retirees are able to afford a decent retirement. However, this group is living in a "golden age" that will fade as Baby Boomers and Generation Xers reach traditional retirement ages in the coming decades.

   This gloomy forecast is due to the changing retirement income landscape. Baby Boomers and Generation Xers will be retiring in a substantially different environment than their parents did. The length of retirement is increasing as the average retirement age hovers at 63 and life expectancy continues to rise.[1] At the same time, replacement rates are falling for a number of reasons. First, at any given retirement age, Social Security benefits will replace a smaller fraction of pre-retirement earnings as the Full Retirement Age rises from 65 to 67 (see Figure 1).[2]
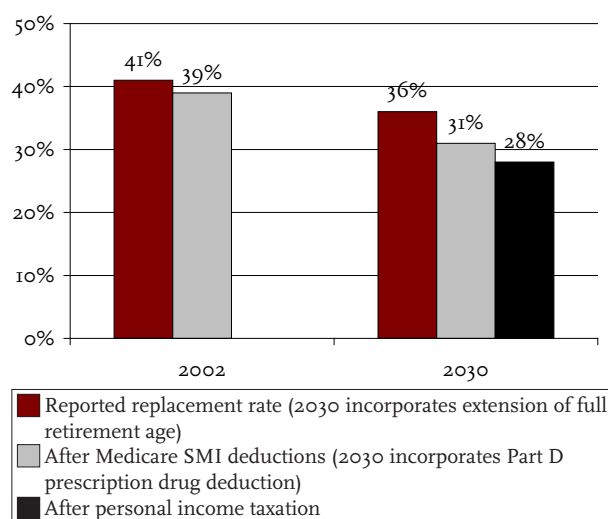
Source: Authors' updates based on Munnell (2003).

   Second, while the share of the workforce covered by a pension has not changed over the last quarter of a century, the type of coverage has shifted from defined benefit plans, where workers receive a life annuity based on years of service and final salary, to 401(k) plans, where individuals are responsible for

their own saving (see Figure 2). In theory 401(k) plans could provide adequate retirement income, but many individuals make mistakes at nearly every step along the way. As a result, according to the 2007 *Survey of Consumer Finances*, the median 401(k)/IRA balance for participants approaching retirement was only $78,000.[3]

   Third, most of the working-age population saves

FIGURE 2. PERCENT OF WORKERS WITH PENSION
COVERAGE BY TYPE OF PLAN, 1983 AND 2007
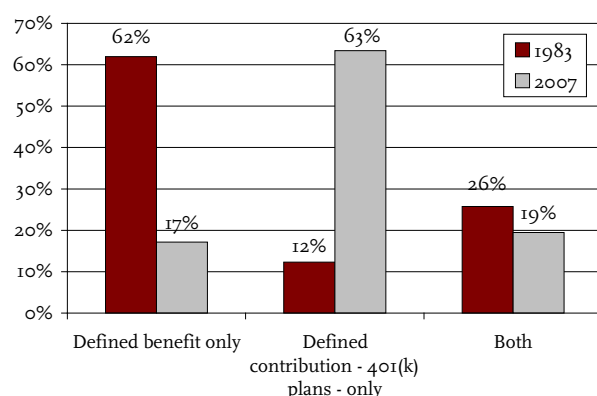
Source: Authors' calculations based on U.S. Board of Governors of the Federal Reserve System (2007).

virtually nothing outside of their employer-sponsored pension plan. And fourth, asset returns in general – and bond yields in particular – have declined over the past two decades so a given accumulation of retirement assets will yield less income.[4] In addition to a rising period of retirement and falling replacement rates, out-of-pocket medical expenses are projected to consume an ever-greater proportion of retirement income. All these developments can be quantified and summarized in the National Retirement Risk Index.[5]

Nuts and Bolts of the NRRI

Constructing the National Retirement Risk Index involves three steps: 1) projecting a replacement rate – retirement income as a share of pre-retirement income – for each member of a nationally representative sample of U.S. households; 2) constructing a target replacement rate that would allow each household to maintain its pre-retirement standard of living in retirement; and 3) comparing the projected and target replacement rates to find the percent of households 'at risk.'

Projecting Household Replacement Rates

The exercise starts with projecting how much retirement income each household will have at age 65. Retirement income is defined broadly to include all of the usual suspects plus housing.[6] For financial assets in 401(k) plans and other accounts, the projections are based on wealth-to-income patterns by age group from the 1983-2004 SCF surveys; these patterns turn out to be strikingly similar over the whole period (see Figure 3). For defined benefit pension income, the projections are based on the amounts reported by survey respondents. For Social Security, benefits are calculated directly based on earnings histories for each member of the household. For housing, the projections rely on SCF data and are used to calculate two distinct sources of income: the rental value that homeowners receive from living in their home rent free and the amount of equity they could borrow from their housing wealth through a reverse mortgage.[7] Once estimated, the components are added together to get total projected retirement income at age 65.[8]

To calculate projected replacement rates, we also need income *prior* to retirement. The items that comprise pre-retirement income include earnings, the return on 401(k) plans and other financial assets, and

Source: Authors' updates from Delorme, Munnell, and Webb (2006) based on 1983-2004 SCF.

imputed rent from housing. In essence, with regard to wealth, income in retirement equals the annuitized value of all financial and housing assets; income before retirement is simply the return on those same assets.[9] Earnings prior to retirement are calculated by creating a wage-indexed earnings history and averaging each individual's annual indexed wages over his or her lifetime. Average annual income from wealth is calculated by applying a real return of 4.6 percent to projected wealth prior to retirement. Average lifetime income then serves as the denominator for each household's replacement rate.

Estimating Target Replacement Rates

To determine the share of the population that will be 'at risk' requires comparing projected replacement rates with a benchmark rate. A commonly used benchmark is the replacement rate needed to allow households to maintain their pre-retirement standard of living in retirement. People clearly need less than their full pre-retirement income to maintain this standard once they stop working since they pay less in taxes, no longer need to save for retirement, and often have paid off their mortgage. Thus, a greater share of their income is available for spending. Target replacement rates are estimated for different types of households assuming that households spread their income so as to have the same level of consumption in retirement as they had before they retired.

Calculating the Index

The final step in creating the Index is to simply compare each household's projected replacement rate with the appropriate target. Households whose projected replacement rates fall more than 10 percent below the target are deemed to be 'at risk' of having insufficient income to maintain their pre-retirement standard of living. The Index is simply the percentage of *all* households that fall more than 10 percent short of their target.
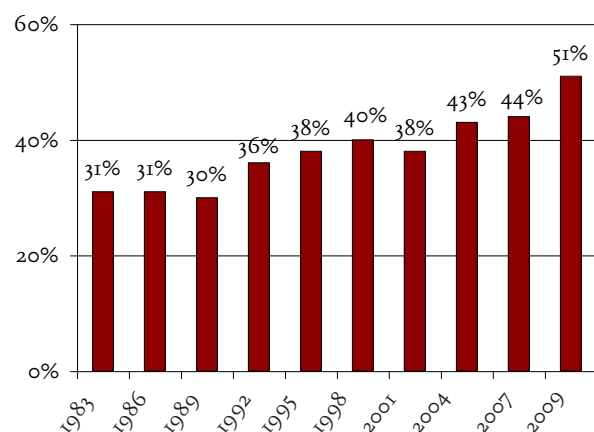
Figure 4 on the next page shows the value of the NRRI since 1983 and includes the updates for 2007 and the second quarter of 2009. The following sections explain the reasons for the various changes.
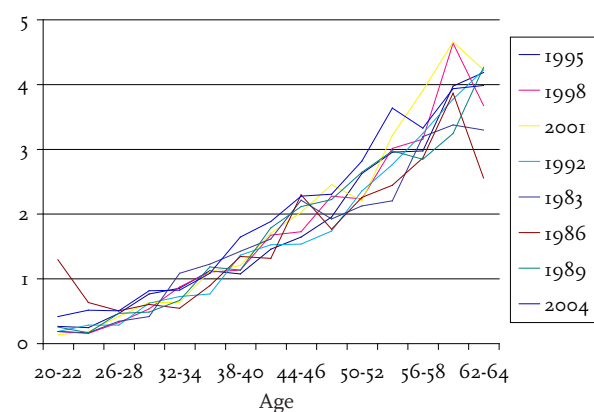
FIGURE 4. THE NATIONAL RETIREMENT RISK INDEX, 1983-2009

Source: Munnell, Golub-Sass, and Webb (2007); and authors' calculations from the 2007 SCF.

The NRRI for 2007

Updating the NRRI to 2007 involves replacing house-holds from the 2004 SCF with households from the 2007 SCF. As noted above, 2007 was a terrific year. Thus, it is not surprising that the NRRI remained vir-tually unchanged (see Table 1), despite the fact that an increasing proportion of households will be subject to the reduction in benefits associated with the increase in Social Security's Full Retirement Age.

A word about the changing Full Retirement Age is useful because, until it is fully phased in, the transi-tion to a higher age will continue to affect the NRRI. Under legislation enacted in 1983, the increase in the Full Retirement Age began with those born in 1938 (turning 62 in 2000) and will be fully phased in for those born in 1960 (turning 62 in 2022). As

TABLE 1. PERCENT OF HOUSEHOLDS 'AT RISK' AT AGE 65 BY INCOME GROUP, 2004 AND 2007

Income group	2004	2007
All	43%	44%
Low income	53%	57%
Middle income	40%	40%
High income	36%	35%

Source: Authors' calculations.

a result, in 1983 about half the households in the age range considered by the NRRI were born before 1938 and could claim full benefits at 65 (see Figure 5). The remainder of the 1983 population, born after 1938, faced a Full Retirement Age between 65 and 66. By the time of the 1989 SCF, a small portion of households, born after 1954, faced a Full Retirement Age greater than 66 and less than 67. By 2004, all households were required to wait until at least 66 and many until 67 to receive full benefits, and the share required to wait until 67 continued to increase in the 2007 survey and in the projections for 2009. Declin-ing Social Security replacement rates primarily affect low-income households who depend almost entirely on Social Security for retirement income.

FIGURE 5. FULL RETIREMENT AGE FOR DIFFERENT NRRI COHORTS, 1983-2009
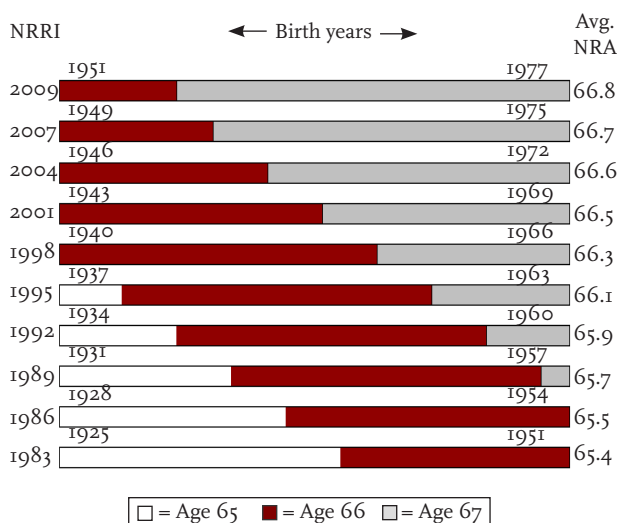
Note: The Full Retirement Age is rounded to 65, 66, and 67 for clarity, even though for many birth cohorts the retire-ment age will include fractions of a year.
*Source:* Authors' calculations from U.S. Social Security Administration (2009).

The NRRI for 2009

Updating the NRRI for 2009 requires revaluing fi-nancial assets and housing held by each household in the 2007 SCF.[10] The other factors affecting the Index over the two-year period are a sharp decrease in inter-est rates and the continuing reduction in the Social Security replacement rate.

The Decline in Equity Values

From the peak of the stock market on October 9, 2007 – roughly the time of the 2007 SCF – until the end of the second quarter of 2009, the Dow Jones Industrial Average was down 40 percent, the Standard & Poor's 41 percent, and the broadest gauge of market activity – the Dow Jones Wilshire 5000 – 40 percent (see Figure 6). This steep decline has important implications for American households because of the dramatic shift in the nature of pension coverage and the expansion in the ownership of equities. In terms of the NRRI, updating the SCF required reducing each household's equity holdings by about 40 percent.

FIGURE 6. DOW JONES WILSHIRE 5000, JANUARY 1, 1990-JUNE 30, 2009
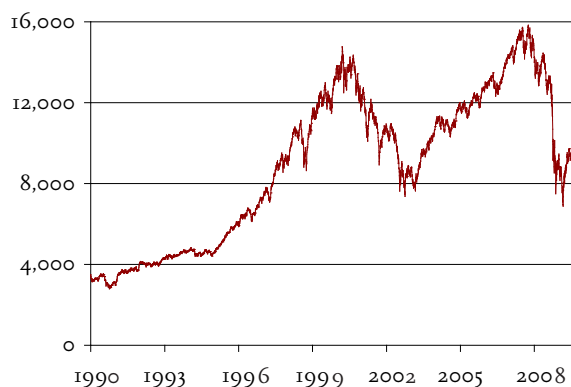
Source: Wilshire Associates (2009).

Figure 7 shows movements in average house prices over the period January 2000-March 2009, based on Federal Reserve Board Flow of Funds Accounts data.[11] House prices increased by 80 percent between the first quarter of 2000 and the fourth quarter of 2006. Prices then declined sharply, falling by 18.8 percent between the second quarter of 2007 and the first quarter of 2009.

Changes in housing wealth affect the NRRI in a couple of ways, one of which interacts with interest rates. First, the lower the value of housing the less a household can extract at retirement in the form of a reverse mortgage.[12] Second, the amount that can be borrowed through a reverse mortgage de-

FIGURE 7. INDEX OF AVERAGE U.S. HOUSE PRICES, 2000-2009
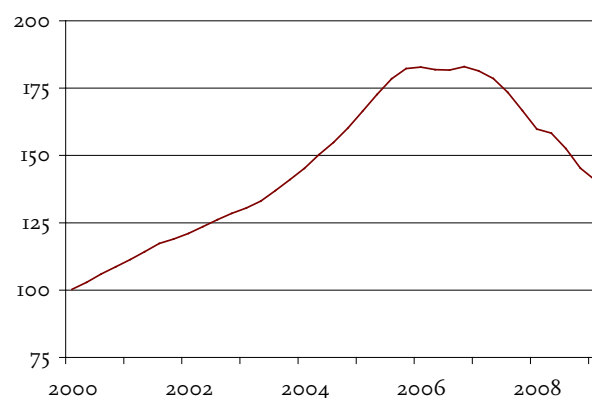
Note: 2000Q1=100.
Sources: Authors' calculations based on the U.S. Board of Governors of the Federal Reserve System, Flow of Funds Accounts, June 11, 2009 Release, and U.S. Department of Commerce (2009).

pends crucially on interest rates. Interest payments are added to the loan principal over the life of the loan. The higher the interest rate, the more rapidly the outstanding balance will increase. As discussed below, over the 2007-2009 period, real interest rates decreased sharply. Thus, the nominal decline in interest rates slightly offsets the decrease in the value of housing by increasing the dollar amount that households can potentially withdraw from their houses in retirement. The NRRI "tapers" the quantitative impact of the interest rate decline on reverse mortgage allowances by including all of the interest rate change for households approaching retirement, part of the change for mid-aged households, and none of the change for the youngest.

Unfortunately, that is not the end of the story. At the same time that gross housing values fell, mortgage debt – which was very high in 2007 – remained unchanged. High levels of mortgage debt relative to the value of housing mean that some households will not only be ineligible to take out a reverse mortgage, but will also face substantial mortgage payments during retirement. This mortgage effect further adds to the burden created by the decline in housing prices, so that housing has a significant negative impact on the NRRI between 2007 and 2009.

The Decline in Interest Rates

As noted, real interest rates are another factor that changed noticeably between 2007 and the second quarter of 2009 (see Figure 8). Lower interest rates mean that households get less income from annuitizing their wealth. A retiree with $100,000 will receive $492 per month from an inflation-indexed annuity when the real interest rate is 3.0 percent compared to $413 per month when it is 1.5 percent.[13] The NRRI assumes that three types of wealth are annuitized at retirement: financial assets, 401(k) balances, and money received from a reverse mortgage on the household's primary residence. Lower interest rates reduce the annuity income from all three sources. The NRRI "tapers" the quantitative impact of the interest rate decline by including all of the change for households approaching retirement, part of the change for mid-aged households, and none of the change for the youngest. Nevertheless, the decline in interest rates through its impact on annuity prices adds to the deterioration in the NRRI.
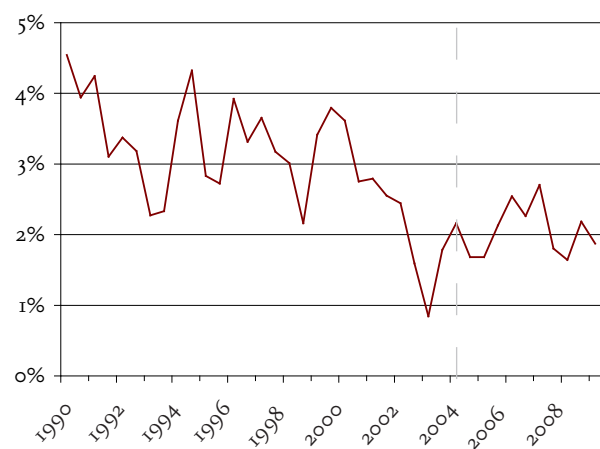
Note: Real interest rates equal the ten-year Treasury bond interest rate minus anticipated inflation for 1990-2004 and, thereafter, the ten-year rate for Treasury Inflation Protected Securities (TIPS).
Sources: Authors' calculations based on U.S. Board of Governors of the Federal Reserve System (2009b); and Federal Reserve Bank of Philadelphia (2009).

The 2009 NRRI

The combined effect of declining asset values, declining interest rates, and the continuing rise in Social Security's Full Retirement Age increases the NRRI for 2009 to 51 percent (see Table 2). Because the top two thirds of the income distribution hold most of the assets, these groups experienced the biggest increases in the percent of households 'at risk.' Those in the bottom third suffered the smallest losses, mainly because they do not hold equities and have modest amounts of home equity.

TABLE 2. PERCENT OF HOUSEHOLDS 'AT RISK' AT AGE 65 BY INCOME GROUP, 2004, 2007, AND 2009

Income group	2004	2007	2009
All	43%	44%	51%
Low income	53%	57%	60%
Middle income	40%	40%	47%
High income	36%	35%	42%

Source: Authors' calculations.

Figure 9 on the next page decomposes the increase in the overall percent 'at risk' into the effects of 1) the increase in the Social Security Full Retirement Age, 2) the decline in the stock market, 3) the decline in the housing market, and 4) the decline in annuity rates, less 5) the increase in the percent of the value of the house that can be borrowed on a reverse mortgage. Almost three quarters (73 percent) of the increase in the percent 'at risk' was the result of the decline in house prices, reflecting the fact that housing is most households' largest asset.

It is also possible to look at the pattern of the NRRI by cohort (see Table 3 on the next page). The pattern suggests that each cohort suffered a roughly proportional increase in the percent of households 'at risk.' This outcome is the inevitable result of the experiment undertaken. Essentially, we asked what the NRRI would have looked like if the *Survey of Consumer Finances* had been conducted in the second quarter of 2009 rather than in the last half of 2007. This approach calculates the percent of households 'at risk' by applying the NRRI algorithm to our estimates of 2009 household wealth. The algorithm assumes that households with low wealth-to-income ratios fall
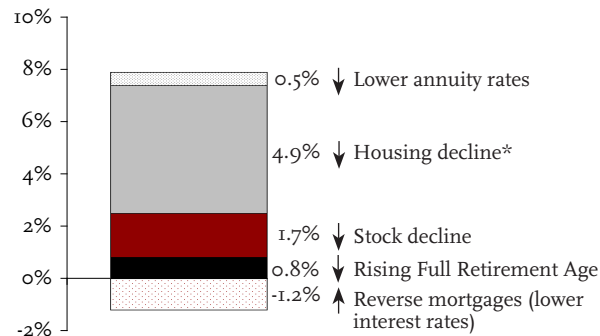
* Decline as of Q1 2009, Q2 not yet available.
Source: Authors' calculations.

further behind. This assumption is reasonable when the low wealth-to-income ratio reflects a low savings rate, but may be less reasonable when it is the result of a one-time investment loss. In other words, young households may in fact enjoy higher returns going forward and catch up, so the holdings of young and old will not end up having been equally affected. In this case, the new numbers overstate the increase in the percent of households 'at risk' among younger households.

Table 3. Percent of Households 'At Risk' at Age
65 by Cohort, 2004, 2007, and 2009

Age group	2004	2007	2009
All	43%	44%	51%
Early boomers	35%	37%	41%
Late boomers	44%	43%	48%
Gen Xers	49%	49%	56%

Source: Authors' calculations.

On the other hand, the exercise may understate the impact of the financial crisis on retirement security for two reasons. First, not only did the ranks of the 'at risk' increase, but those already 'at risk' are more 'at risk' as a result of the financial crisis. Similarly, those 'not at risk' are *less* 'not at risk' than they had been before the crisis. Second, the crisis may potentially hasten the decline of defined benefit plans in the private sector. If additional plan sponsors freeze or terminate their plans, individuals – particularly those in mid-career – could likely experience a reduction in their expected defined benefit wealth. No adjustment was made for this contingency in the NRRI calculation.

Conclusion

Ensuring retirement security for an aging population is one of the most compelling challenges facing the nation. Yet the National Retirement Risk Index shows that in 2009 half of today's households will not have enough retirement income to maintain their pre-retirement standard of living, even if they work to age 65, which is above the current average retirement age. Even if the stock market should bounce back, the housing bubble is unlikely to reappear. And as defined benefit plans fade in an environment where total pension coverage remains stagnant, Social Security's Full Retirement Age moves to 67, and life expectancy increases, the outlook will get worse over time. The NRRI clearly indicates that this nation needs more retirement saving.

Endnotes

1 Recently, labor force participation rates among older workers have been rising. However, the average retirement age – defined as the age at which more than half of the population is not participating in the labor force – remains below 65, which is the assumed age of retirement used in the NRRI baseline calculation.

2 The Full Retirement Age (FRA) is the age at which individuals are eligible to receive their full Social Security benefit. The increase in the FRA is a form of benefit cut – either individuals wait longer to claim their full benefit and receive it for fewer years or they claim before age 67 and receive a reduced benefit.

3 IRA balances are included because much of the money in these accounts comes from employer-sponsored plans.

4 Bond prices and interest rates move in opposite directions. Over the past two decades, bond returns have been boosted by declines in nominal interest rates as both inflation expectations and real interest rates have declined. Going forward, bond returns will be much lower, unless interest rates decline yet further from levels that are at historic lows.

5 Center for Retirement Research at Boston College (2006).

6 The Index does not include income from work, since labor force participation declines rapidly as people age.

7 For 401(k) assets, other financial wealth, and housing wealth, the assumption is that households convert the wealth into a stream of income by purchasing an inflation-indexed annuity – that is, an annuity that will provide them with a payment linked to the Consumer Price Index for the rest of their lives. For couples, the annuity provides the surviving spouse two-thirds of the base amount. While inflation-indexed annuities are neither easily available nor popular with consumers, they provide a convenient tool for converting a lump sum of wealth into a stream of income. And while inflation-indexed annuities provide a smaller initial benefit than nominal annuities, over time they protect a household's purchasing power against the erosive effects of inflation.

8 Both mortgage debt and non-mortgage debt are subtracted from the appropriate components of projected wealth.

9 As with the components of retirement income, both mortgage debt and non-mortgage debt are subtracted from the appropriate components of pre-retirement income.

10 We treat each household in the 2007 SCF as now representing a 2009 household of the same age, but with a birth year two years later. We then adjust each household's balance sheet to reflect the declines in the housing and stock markets, thus capturing household level variation in exposure to the stock market. The SCF does not contain geographic identifiers, and it is therefore not possible to capture the impact of geographic variations in declines in house prices. We assume that the impact on overall financial preparedness of larger than average declines in some markets is offset by the impact of smaller than average declines elsewhere.

11 Housing values are calculated using the quarterly values of household real estate reported in the Flow of Funds Accounts, adjusted for new investment in real estate. Bosworth and Smart (2009) show that SCF house values aggregate closely to those reported in the Flow of Funds.

12 Older households are unambiguously worse off as a result of the decline in house prices. Younger households who have not yet entered the housing market are better off because they now need to spend less money to consume the same amount of housing services. But they end up being less well prepared for retirement because they accumulate less housing wealth during their working lives.

13 This calculation is made by determining the expected present value of a joint life and two-thirds survivor annuity using the current ten-year Treasury Inflation Protected Security (TIPS) interest rate and then calculating annuity rates at other interest rates, using the same expected present value. In practice, insurance companies offering inflation-linked annuities do not hedge their liabilities by investing in TIPS, and the duration of annuities exceeds ten years. But calculations based on an assumption that insurers price annuities by reference to the yield on ten-year Treasury bonds provide reasonable estimates of the effect of *changes* in interest rates on annuity rates.

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Contact Information

Center for Retirement Research
Boston College
Hovey House
140 Commonwealth Avenue
Chestnut Hill, MA 02467-3808
Phone: (617) 552-1762
Fax: (617) 552-0191
E-mail: crr@bc.edu
Website: http://www.bc.edu/crr

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