# The National Retirement Risk Index: An update

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RETIREMENT
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# THE NATIONAL RETIREMENT RISK INDEX: AN UPDATE

By Alicia H. Munnell, Anthony Webb, and Francesca Golub-Sass*

## Introduction

The release of the Federal Reserve's 2010 *Survey of Consumer Finances* is a great opportunity to reassess Americans' retirement preparedness as measured by the National Retirement Risk Index (NRRI). The NRRI shows the share of working households who are "at risk" of being unable to maintain their pre-retirement standard of living in retirement. The Index compares projected replacement rates – retirement income as a percentage of pre-retirement income – for today's working households with target rates that would allow them to maintain their living standard and calculates the percentage at risk of falling short.

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 2007 SCF did not allow for a meaningful update, because stock market and housing prices plummeted right after the survey interviews were completed. Thus, the 2010 survey is the first opportunity to see how the financial crisis and ensuing recession have affected Americans' readiness for retirement.

The discussion proceeds as follows. The first section describes the nuts and bolts of constructing the NRRI and how the new SCF data were incorporated. The second section updates the NRRI using the 2010 SCF, showing that the percentage of households at risk increased by nine percentage points between the 2007 and 2010 surveys – 44 percent to 53 percent. The third section identifies the impact of various factors on the change. The final section concludes that the NRRI confirms what we already know: today's workers face a major retirement income challenge. Even if households work to age 65 and annuitize all their financial assets, including the receipts from reverse mortgages on their homes, more than half are at risk of being unable to maintain their standard of living in retirement.

## The Nuts and Bolts of the National Retirement Risk Index

Constructing the National Retirement Risk Index involves three steps: 1) projecting a replacement rate – retirement income as a share of pre-retirement
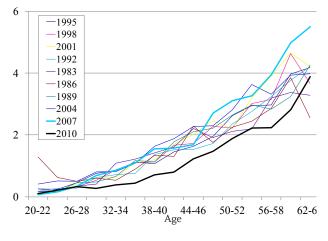
income – for each member of a nationally representative sample of U.S. households; 2) constructing a target replacement rate that would allow each household to maintain its pre-retirement standard of living in retirement; and 3) comparing the projected and target replacement rates to find the percentage 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.[1]  Retirement income from financial assets and housing is derived by projecting assets that households will hold at retirement, based on the stable relationship between wealth-to-income ratios and age evident in the 1983-2010 SCFs.  As shown in Figure 1, wealth-to-income lines from each survey rest virtually on top of one another, bracketed by 2007 values on the high side and 2010 values on the low side.  Financial assets and housing are estimated separately.[2]  In the case of housing, the projections 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.[3]

Sources of retirement income that are not derived from SCF reported wealth need to be estimated directly.  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 estimated earnings histories for each member of the household.  Earnings prior to retirement are calculated by creating a wage-indexed earnings history and averaging each individual's annual indexed wages over his lifetime.  Once estimated, the components are added together to get total projected retirement income at age 65.

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 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.[4]  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.
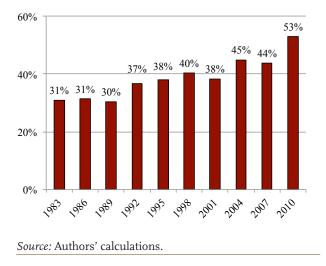
## Calculating the Index

The final step in creating the Index is to 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.

Updating the NRRI involved five main changes. First, households from the 2010 SCF replaced households from the 2007 SCF. Second, 2010 data were incorporated in the equations used to predict financial and housing wealth at age 65. Third, because a significant number of Baby Boomers have retired, the age groups were changed from Early Boomers, Late Boomers and Generation Xers to households ages 30-39, 40-49, and 50-59. Fourth, lower interest rates reduced the amounts provided by annuities. Finally, changes in the Home Equity Conversion Mortgage (HECM) rules lowered the percentage of house value that borrowers could receive in the form of a reverse mortgage at any given interest rate.[5]

Figure 2 shows the value of the NRRI in 2010 and estimates of a comparable measure back to 1983. The results indicate a significant increase in the NRRI over time. The upward trend between 1983 and 2010 reflects increased longevity, the scheduled increase in Social Security's Full Retirement Age from 65 to 67, and a sharp decline in interest rates. Even given the upward trend since 1983, the percentage at risk in 2010 represents a serious worsening of retirement prospects. The next section looks at the main factors contributing to the 2007-2010 jump.

Figure 2. The National Retirement Risk Index, 1983-2010



*Source:* Authors' calculations.

# The NRRI in 2007 and 2010

2007 was a terrific year, and 2010 was a terrible year as it came in the wake of the economic crisis. The combined effect of poor investment returns, lower interest rates, and the continuing rise in Social Security's Full Retirement Age increased the NRRI from 44 percent in 2007 to 53 percent in 2010 (see Table 1). Those in the bottom third experienced the smallest increase, mainly because they rarely hold equities and rely primarily on Social Security benefits, which were unaffected by the financial collapse. The following discussion describes each of the contributing factors in more detail.

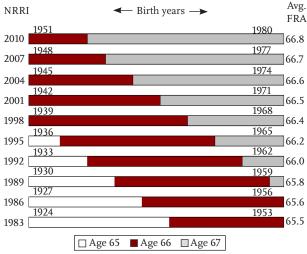Table 1. Percentage of Households "At Risk" at Age 65 by Income Group, 2007 and 2010

| Income group | 2007 | 2010 |
|---|---|---|
| All | 44% | 53% |
| Low income | 54 | 61 |
| Middle income | 43 | 54 |
| High income | 35 | 44 |

*Source:* Authors' calculations.

## *Increase in the Full Retirement Age*

Until it is fully phased in, the transition to a higher Full Retirement 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 (who turned 62 in 2000) and will be fully phased in for those born in 1960 (turning 62 in 2022). As 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 3 on the next page). The remainder of the 1983 population, born after 1938, faced a Full Retirement Age between 65 and 66. By 2001, almost all households were required to wait until at least 66 and many until 67 to receive full benefits. The share required to wait until 67 continued to increase for subsequent surveys. Declining Social Security replacement rates at 65 – the assumed retirement age in the NRRI – affect all households but have a particularly large impact on low-income households who depend almost entirely on Social Security for retirement income.

FIGURE 3. FULL RETIREMENT AGE FOR DIFFERENT NRRI COHORTS, 1983-2010



Note: The Full Retirement Age is rounded to 65, 66, and 67 for clarity, even though for many birth cohorts the retirement age will include fractions of a year.
*Source*: Authors' calculations from U.S. Social Security Administration (2012).

## Decline in Equity Values

From the peak of the stock market on October 9, 2007 – roughly the time that the 2007 SCF was conducted – until the end of the third quarter of 2010 – roughly the time of the 2010 survey – the Dow Jones Wilshire 5000 was down 24 percent (see Figure 4). Relative
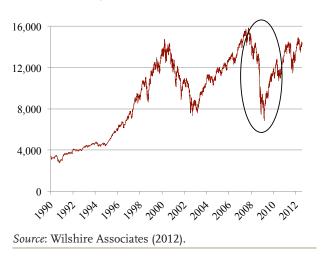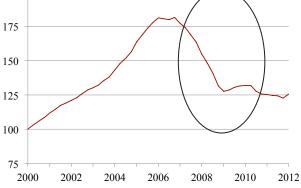
FIGURE 4. DOW JONES WILSHIRE 5000, 1990-2012



*Source*: Wilshire Associates (2012).

to long-run expected returns, the losses were even greater. The impact of these losses was concentrated among the top third of the income distribution, which holds 86 percent of all equities.

## Decline in Housing Values

In contrast, housing is important for *all* income groups.[6] Based on Federal Reserve data, house prices increased by 80 percent between the first quarter of 2000 and the fourth quarter of 2006 (see Figure 5).[7] Prices then declined sharply, falling by 24 percent between the 2007 and 2010 SCFs.

FIGURE 5. INDEX OF AVERAGE U.S. HOUSE PRICES, 2000-2012
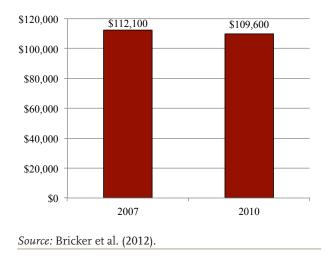


Note: 2000Q1=100.
*Sources*: Authors' calculations based on U.S. Board of Governors of the Federal Reserve System, *Flow of Funds Accounts*, 2009, 2011, and 2012; and U.S. Department of Commerce (2012).

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.[8] Second, the lower the interest rate the more a house can borrow through a reverse mortgage.[9] As discussed below, over the 2007-2010 period, nominal interest rates decreased sharply. Thus, this decline somewhat offset 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.
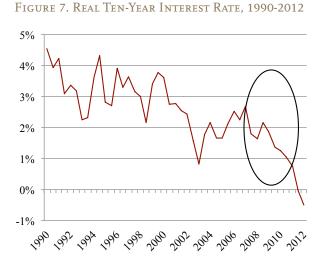
That is not the end of the story. At the same time that gross housing values fell, mortgage debt – which was very high in 2007 – remained virtually unchanged (see Figure 6). High levels of mortgage debt relative to the value of housing mean that some households will not only be ineligible to take out 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 2010.

FIGURE 6. MEDIAN HOUSEHOLD MORTGAGE DEBT, 2007 AND 2010, THOUSANDS OF 2010 DOLLARS



Source: Bricker et al. (2012).

## Decline in Interest Rates

As noted, real interest rates are another factor that changed noticeably between 2007 and 2010 (see Figure 7). 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.[10] 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

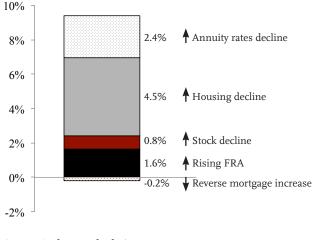FIGURE 7. REAL TEN-YEAR INTEREST RATE, 1990-2012



Note: Real interest rates equal the ten-year Treasury bond interest rate minus anticipated ten-year 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 (2012); and Federal Reserve Bank of Philadelphia (2012).

all three sources. As with reverse mortgages, 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 significantly to the deterioration in the NRRI.

# The Decline in the NRRI 2007-2010

Figure 8 (on the next page) decomposes the increase in the overall percentage 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 percentage of the value of the house that can be borrowed on a reverse mortgage. Half of the increase in the percentage at risk – 4.5 of 9.0 – was the result of the decline in house prices, reflecting the fact that housing is most households' largest asset.

FIGURE 8 INCREASE IN PERCENTAGE "AT RISK" FROM 2007 TO 2010 BY CONTRIBUTING COMPONENT



*Source*: Authors' calculations.

It is also possible to look at the percentage at risk in 2007 and 2010 by age (see Table 2). The pattern suggests that the two younger age groups were roughly equally impacted by the financial crisis, while households approaching retirement suffered substantially more.

TABLE 2. PERCENTAGE OF HOUSEHOLDS "AT RISK" AT AGE 65 BY AGE GROUP, 2007 AND 2010

| Age group | 2007 | 2010 |
|---|---|---|
| All | 44% | 53% |
| 30-39 | 53 | 62 |
| 40-49 | 47 | 55 |
| 50-59 | 32 | 44 |

*Source:* Authors' calculations.

Separate analyses for each age group reveal that the decline in real interest rates had a disproportionate effect on the oldest age group. The real interest rate fell by roughly a full percentage point between 2007 and 2010, which sharply reduced the amount that these households could receive from annuitizing their financial wealth and the proceeds from a reverse mortgage. As noted earlier, in the NRRI, older households are the only ones that are exposed to the full impact of the interest rate decline. This interest rate effect explains why the percentage at risk increased so much more for older households than for younger ones.

# Conclusion

Today's working households 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. At the same time, replacement rates are falling because of the extension of Social Security's Full Retirement Age and modest 401(k)/IRA balances. According to the 2010 SCF, median 401(k)/IRA balances for households approaching retirement were only $120,000. Finally, 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. In addition to the contracting retirement income systems, households have been hit by the financial crisis and ensuing recession. All these developments can be quantified and summarized in the National Retirement Risk Index.

The NRRI shows that, as of 2010, more than 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 – and annuitize all of their financial assets, including the receipts from a reverse mortgage on their homes. The NRRI clearly indicates that this nation needs more retirement saving.

# Endnotes

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

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

3  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 not widely used by consumers, they provide a convenient metric for calculating the lifetime income that can be obtained from a lump sum.  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.

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

5  The U.S. Department of Housing and Urban Development (HUD) has increased the annual mortgage insurance premium from 0.5 to 1.25 percent on all HECM loans.  See HUD (2010).

6  For households approaching retirement, housing consists of approximately the same percentage of total assets for all three income groups, when wealth is defined broadly to include both the present value of Social Security benefits and the benefits provided through defined benefit plans.  As a result, the decline in housing prices had a similar impact across the income spectrum.

7  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.*

8  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 will end up being less well prepared for retirement if they accumulate less housing wealth during their working lives.

9  The HECM formula uses the yield on 10-year Treasury bonds as a proxy.

10  This calculation is made by determining the expected present value of a joint life and two-thirds survivor annuity, using the 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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The Center for Retirement Research at Boston College was established in 1998 through a grant from the Social Security Administration. The Center's mission is to produce first-class research and educational tools and forge a strong link between the academic community and decision-makers in the public and private sectors around an issue of critical importance to the nation's future. To achieve this mission, the Center sponsors a wide variety of research projects, transmits new findings to a broad audience, trains new scholars, and broadens access to valuable data sources. Since its inception, the Center has established a reputation as an authoritative source of information on all major aspects of the retirement income debate.

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