

# HEALTH CARE COSTS DRIVE UP THE NATIONAL RETIREMENT RISK INDEX

BY ALICIA H. MUNNELL, MAURICIO SOTO, ANTHONY WEBB, FRANCESCA GOLUB-SASS, AND DAN MULDOON\*

---

## Introduction

The National Retirement Risk Index has shown that even if households work to age 65 and annuitize all their financial assets, including the receipts from reverse mortgages on their homes, 44 percent will be 'at risk' of being unable to maintain their standard of living in retirement. More realistic assumptions regarding earlier retirement and reluctance to annuitize 401(k) balances or tap housing equity would put the percentage 'at risk' even higher. But these previous analyses have not addressed rapidly rising health care costs. When these costs are included explicitly, the percentage of households 'at risk' increases dramatically.

This *brief* explores how rapidly rising health care costs enter the NRRI calculations. It begins with a recap of the NRRI, then describes the health care landscape facing older Americans, and finally reports the results of incorporating retirement health care costs explicitly into the Index. The results show that

once health care is considered explicitly, the percentage of households that will be 'at risk' rises from 44 percent to 61 percent. As always, the percent 'at risk' is greater for those at the low end of the income distribution. And later cohorts show more 'at risk' than earlier ones due to the combined effect of a contracting retirement income system and continually rising health care requirements.

## A Recap of the NRRI

To quantify the effects of the changing landscape, the National Retirement Risk Index provides a measure of the percent of working-age American households who are 'at risk' of being financially unprepared for retirement. The Index calculates for each household in the 2004 *Survey of Consumer Finances* a replacement rate — projected retirement income as a

---

\* Alicia H. Munnell is the Director of the Center for Retirement Research at Boston College (CRR) and the Peter F. Drucker Professor of Management Sciences at Boston College's Carroll School of Management. Mauricio Soto and Anthony Webb are research economists at the CRR. Francesca Golub-Sass and Dan Muldoon are research associates at the CRR. The Center gratefully acknowledges Nationwide Mutual Insurance Company for its exclusive financial support of the National Retirement Risk Index (NRRI). The authors wish to thank Jeffrey Brown, Gary Burtless, and Robert Clark for very insightful comments. These comments raised several important issues that required extensive discussion in the footnotes. Any remaining omissions are solely those of the authors. This *brief* provides updated results of the NRRI; prior Index-related publications are available at <http://www.bc.edu/crr/nrri.shtml>.

percent of pre-retirement earnings — and compares that replacement rate with a target replacement rate derived from a life-cycle consumption smoothing model. Those who fail to come within 10 percent of the target are defined as ‘at risk,’ and the Index reports the percent of households ‘at risk.’

The results as updated to 2006 show that 44 percent of households will not be able to maintain their standard of living in retirement even if they retire at age 65, which is above the current average retirement age. An analysis by age group indicates that the situation gets more serious over time (see Table 1). About 35 percent of the Early Boomers (those born between 1948 and 1954) will not have an adequate retirement income. This share increases to 44 percent for the Late Boomers (those born between 1955 and 1964), and then rises to 48 percent for the Generation Xers (those born between 1965 and 1974).<sup>1</sup>

TABLE 1. PERCENT OF HOUSEHOLDS ‘AT RISK’ BY BIRTH COHORT AND INCOME GROUP

Income group	All	Early Boomers 1948-1954	Late Boomers 1955-1964	Generation Xers 1965-1974
All	44%	35%	44%	48%
Top third	37	33	36	41
Middle third	41	28	44	46
Bottom third	54	45	54	60

Source: Munnell, Golub-Sass, and Webb (2007).

This pattern of increasing risk reflects the changing retirement landscape.<sup>2</sup> 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 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. 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 to 401(k) plans. In theory 401(k) plans could provide adequate retirement income. But individuals make mistakes at every step along the way and the median balance for household heads approaching retirement is only \$60,000.<sup>3</sup> Finally, most of the working-age population saves virtually nothing outside of their employer-sponsored pension plan.

## The NRRI and Health Care

The original NRRI does not explicitly identify health care consumption, but rather incorporates it as a component of *total* household consumption in the process of calculating the target replacement rates. The implicit assumption is that spending on health care is a substitute for other forms of consumption, such as food, wine, and travel. This assumption implies that retired households can rearrange their basket of consumption — consuming more health care and less food, wine, and travel — and still maintain their standard of living.<sup>4</sup>

An alternative — and probably more realistic — way to treat retiree health care expenses is as a “tax” that people have to pay in retirement.<sup>5</sup> Viewing health care from this perspective, the household’s goal then becomes one of maintaining its non-health care consumption (food, wine, travel, etc.) in retirement. In this scenario, households will be ‘at risk’ if they do not have enough resources to maintain non-health care pre-retirement consumption.

In the NRRI framework, this option means changing the target replacement rates. Health care expenses are subtracted from households’ income during their working years and during retirement. Replacement rate targets are then recalculated — households know about health care expenses and adjust their consumption patterns throughout their life. Since non-health care consumption will be lower than *total* consumption, the target replacement rates excluding health care will actually be lower with the health care “tax” than in the base-case NRRI. But to this lower target must be added the money required to finance retiree health care expenses. The two requirements together — the resources required to maintain non-health care consumption and the money required for retiree health care expenses — will involve higher target replacement rates than the base-case NRRI. As in the base case, NRRI targets are calculated separately for each household type and income group.

## Retiree Health Care Expenses

The major health care expenses faced by retired households include premiums for Medicare Part B (which covers physician and outpatient hospital services) and Part D (which covers drug-related expenses); co-payments related to Medicare covered

services; and health care services that are not covered by Medicare. In 2007, the Centers for Medicare and Medicaid Services estimated that Medicare out-of-pocket expenses amounted to \$3,800 per year for a single individual (see Table 2). For a couple, the amount would be \$7,600. In addition to the Medicare expenses are expenditures on items not covered by Medicare, such as dental care, eye glasses, hearing aids, etc. These items may amount to another \$500 for a single person, \$1,000 for a couple.<sup>6</sup> These figures are averages; health care spending can vary significantly by individuals. Those who have bad health habits and/or chronic illnesses likely incur higher costs, while those who have good health habits and/or few illnesses would spend less.

TABLE 2. AVERAGE OUT-OF-POCKET MEDICARE EXPENSES FOR RETIRED INDIVIDUALS, 2007

Medicare component	Amount
Part B: Premium	\$1,122
Copayments	969
Part D: Premium	264
Copayments	1,142
HI Cost Sharing	287
Total Medicare Cost	3,783

Source: Centers for Medicare and Medicaid Services (2007a).

These annual health care costs are projected to grow over time. The Centers for Medicare and Medicaid Services publish annual premiums for the various components, from which growth rates can be calculated. The growth rate is projected to average 5.9 percent per year for the next 20 years and 4.9 percent thereafter. But the Medicare Trustees note that the projected growth for Medicare Part B premiums required by current law may be understated because Congress has repeatedly overridden dollar caps on payments to physicians. While the current law projections assume that Congress limits payments for physician services in the future, the Trustees also offer two alternative assumptions for the physician payment schedule — that in inflation-adjusted terms the schedule stays constant and that it increases by 2 percent annually. To be conservative, we have adopted the assumption that the schedule stays constant (as shown in Table 3).<sup>7</sup>

TABLE 3. NOMINAL AVERAGE ANNUAL GROWTH RATE OF MEDICARE BENEFICIARY OUT-OF-POCKET EXPENSES FOR SELECTED PERIODS AND SCENARIOS

Period	Current law	Physician payment schedule in inflation-adjusted terms		Projected inflation
		Stays constant	Increases by 2 percent	
2007-2027	5.9%	6.1%	6.4%	2.8%
2027-2077	4.9	5.1	5.5	2.8

Sources: Authors' calculations from Centers for Medicare and Medicaid Services (2007a, 2007b).

With today's amounts and assumed growth rates, it is possible to project annual out-of-pocket medical expenditures for retirees into the distant future. These annual figures can then be cumulated for each cohort and expressed in present value terms. This calculation shows the amount of after-tax money that households of differing ages will need to have on hand at the beginning of their retirements to cover the expected expenditures over their remaining lifetimes. For purposes of the NRRI, the calculation is framed in terms of the annuity that would need to be purchased to cover annual out-of-pocket medical expenses during retirement.<sup>8</sup> The value for single individuals is the average for males and females. As shown in Table 4, for a couple retiring in 2010, the required annuity is roughly \$206,000.<sup>9</sup> It more than doubles over the next thirty years.

TABLE 4. REQUIRED ANNUITY TO COVER PROJECTED OUT-OF-POCKET HEALTH CARE COSTS, 2010-2040, 2007 DOLLARS

Year of retirement	Required annuity	
	Single	Couple
2010	\$102,966	\$205,932
2020	141,752	283,503
2030	188,899	377,798
2040	245,767	491,534

Sources: Authors' calculations based on U.S. Bureau of Labor Statistics (2007); Centers for Medicare and Medicaid Services (2007a, 2007b); Internal Revenue Service (2007); and U.S. Social Security Administration (2003).

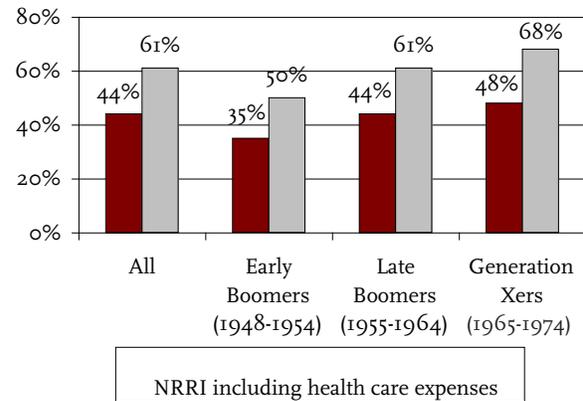
## Impact of Retiree Health Care Expenditures on the NRRI

In order to calculate the effect of retiree out-of-pocket expenses on the NRRI, it is necessary to calculate new target replacement rates that enable households to smooth their non-out-of-pocket health care spending over their lifetime. This calculation thus requires removing out-of-pocket health care spending both before and after retirement.<sup>10</sup> We have assumed out-of-pocket medical expenses for the working-age population of \$1,400 for a single person and \$1,900 for a couple in 2007.<sup>11</sup> These costs are projected to grow 3 percent annually in real terms, reflecting the Medicare assumptions for the period 2007-2040. With health care eliminated, target replacement rates are then calculated using a standard economic model whereby households maximize their well-being by smoothing their wage-indexed level of non-health care consumption across their lifetime.<sup>12</sup> This is exactly the same procedure used previously for calculating replacement rates for the NRRI. As noted above, these target replacement rates are lower than in the base-case NRRI.

The next step is to add to these targets the amount necessary to cover retiree health care expenses. Since households were already paying some out-of-pocket medical expenses during their working years, the relevant figure is the increment in out-of-pocket expense upon retirement.<sup>13</sup> The income from an annuity to cover these incremental health care costs is then added to the numerator of the target replacement rates calculated above to derive the “target replacement rates with health care.” An example might help. In the original NRRI, the target replacement rate for a two-earner couple in the middle third of the income distribution was 76 percent. When that same couple smooths its non-health care consumption, the target replacement rate initially drops to 70 percent.<sup>14</sup> Adding the income required to cover incremental retiree health care expenses then raises the combined target to 92 percent.<sup>15</sup> (See Appendix for further details.)

To determine the percent ‘at risk’ involves comparing projected replacement rates for each household with the relevant target replacement rate with health care. Those households that do not come within 10 percent of their target replacement rate are classified as ‘at risk.’ The results of this comparison are shown in Figure 1. Overall, explicitly including health care raises the percent of households ‘at risk’ from 44 percent to 61 percent. Because health care costs are rising rapidly and the income system is contracting,

FIGURE 1. EFFECT OF HEALTH CARE ON THE NATIONAL RETIREMENT RISK INDEX, 2006



Source: Authors' calculations.

a much larger percent of later cohorts will be ‘at risk’ than earlier ones. The NRRI rises from 50 percent for Early Boomers to 68 percent for Generation Xers.

The pattern of households also varies by income class, with a much larger share of those ‘at risk’ in the bottom third than in the top third (see Table 5). As discussed in earlier *briefs*, part of this pattern reflects the fact that low-income households rely almost exclusively on Social Security benefits, which are scheduled to decline sharply relative to pre-retirement earnings. But health care spending is also a powerful force putting large numbers of low-income households ‘at risk.’ This is despite the fact that households in the bottom third of the income distribution only spend about 70 percent of what middle-income households spend, partly because some households in this group have their premiums and copayments covered by Medicaid.<sup>16</sup>

TABLE 5. PERCENT OF HOUSEHOLDS ‘AT RISK’ BY BIRTH COHORT AND INCOME GROUP, INCLUDING HEALTH CARE EXPENSES, 2006

Income group	All	Early Boomers (1948-1954)	Late Boomers (1955-1964)	Generation Xers (1965-1974)
All	61%	50%	61%	68%
Top third	53	48	52	59
Middle third	57	44	57	67
Bottom third	72	58	74	80

Source: Authors' calculations.

## Additional Risks

While the new NRRI-health care analysis presented above shows that about 60 percent of households will be ‘at risk’ of not being able to maintain their pre-retirement non-health care level of consumption, the situation is potentially even more serious. First, this analysis assumes that households recognize the burden of health care expenses and plan accordingly during their working years. But if, instead, their retirement health care spending is a surprise, their non-health consumption would have to fall sharply. Second, a substantial number of households will face long-term care costs, such as those associated with nursing home care, which have not been considered in the preceding analysis.

### What if People Don’t Plan?

The NRRI-health care analysis assumes households recognize that they want to smooth their non-health care consumption and that they save appropriately over their working years to achieve this goal. An alternative is that households do not recognize the drain that health care spending will impose in retirement and continue to smooth their *total* consumption, as under the original NRRI formulation. Under this scenario, they will be surprised by the large bite that health care costs take after retirement, forcing a precipitous drop in their non-health care consumption. Table 6 shows that the percent of households that will be ‘at risk’ is significantly higher in the surprise scenario than in the scenario where households explicitly smooth their non-health care consumption.

TABLE 6. EFFECT OF HEALTH CARE SURPRISE ON THE NATIONAL RETIREMENT RISK INDEX, 2006

NRRI	All	Early Boomers (1948-1954)	Late Boomers (1955-1964)	Generation Xers (1965-1974)
Original	44 %	35 %	44 %	48 %
Including health care expenses	61	50	61	68
Health care “surprise”	67	54	68	76

Source: Authors’ calculations.

## Cost of Long-term Care

More than two thirds of those over age 65 will require long-term care at some point in their lives (see Table 7).<sup>17</sup> Of this group, 40 percent will require care for two years or more. With an average daily rate of \$213 (\$77,745 a year) for a private room in a nursing home in 2007, nursing home care can be financially draining.<sup>18</sup> Even those lucky enough to remain in their homes will find that home health aides are expensive. In 2006, the average hourly rate for a home health aide was \$19.<sup>19</sup>

None of these costs are included in the NRRI results presented above. Thus, the rational household attempting to smooth non-health-care consumption will have to cut back substantially if it requires home health or nursing home care. In terms of the NRRI, long-term care will raise the percent ‘at risk’ above the numbers reported in Table 5.

TABLE 7. PROJECTED NEED FOR LONG-TERM CARE FOR INDIVIDUALS WHO TURNED 65 IN 2005

Long-term care required	Percent of individuals
No care	31 %
1 year or less	17
1-2 years	12
2-5 years	20
5 years or more	20

Source: Kemper, Komisar, and Alecxih (2005).

## Conclusion

Ensuring a secure retirement for an aging population is one of the major challenges facing the nation. While many current retirees are doing quite well, the outlook for the Baby Boomers and Generation Xers is somewhat bleak. The National Retirement Risk Index has shown that even if households work to age 65 and annuitize all their financial assets, including the receipts from reverse mortgages on their homes, 44 percent will be ‘at risk’ of being unable to maintain their standard of living in retirement. Once health care is introduced explicitly into the Index calculations, the percent ‘at risk’ increases to 61 percent. That is, 61 percent of households will be unable to maintain their pre-retirement non-health care level

of consumption in retirement. The number could be considerably higher if households do not plan rationally and once long-term care costs are taken into account.

As discussed in earlier reports on the NRRI, the situation is not hopeless. Sensitivity analyses of the Index show that changing retirement and savings behavior can substantially reduce the percent of households 'at risk.' To change behavior, individuals must first understand the challenges they face. The message of this *brief* is that it is critical for today's workers to anticipate large health care expenditures in retirement and adjust their retirement and saving plans accordingly if they want to avoid a major reduction in their non-health care consumption. In addition to these financial planning decisions, individuals could also adopt healthier lifestyles in an effort to reduce their health care needs over the long term. The bottom line is that a little more work, a little more saving, and a little more exercise could go a long way to strengthening retirement security.

## Endnotes

- 1 This sample does not include Early Boomers born before 1948 or Generation Xers born after 1974.
- 2 For more detail on the changing retirement landscape, see Center for Retirement Research at Boston College (2006).
- 3 This amount includes Individual Retirement Account (IRA) balances, because most of the money in IRAs is rolled over from 401(k) plans. For further details on 401(k) missteps, see Munnell and Sundén (2006).
- 4 The original NRRI assumes that households purchase a single consumption good that includes both health and non-health care elements and that the marginal utility of consumption does not vary with age. These assumptions imply that health care and non-health care consumption are perfect substitutes and that households aim to maintain their pre-retirement consumption in retirement. While this framework might represent optimal behavior on the part of the household, it could also result in implausible reductions in non-health care consumption after retirement. In the original NRRI model for theoretical target replacement rates, for example, the presence of exogenous out-of-pocket medical expenses — over which the household has no choice — implies a reduction of non-health consumption of about 40 percent. The reason is that, under the original NRRI framework, households smooth total consumption (health care consumption + non-health care consumption) and the response to the increase in health expenditures in retirement is to reduce non-health care consumption. The approach taken by this *brief* raises the bar for retirement preparedness by assuming that households smooth non-health care consumption instead of total consumption. An interpretation of this approach is that health care is required consumption — without health care, households might not be able to enjoy other forms of consumption. Although this approach might seem extreme, it is not necessarily so. The question is the extent to which the health of the individual, which is the product of health care spending, affects the marginal utility he receives from non-health consumption. For example, declining health after retirement could lower the marginal utility of non-health care consumption at retirement, which would result in

lower savings during the work life, lower replacement rate targets — households would actually desire to decrease their non-health consumption during retirement — and would decrease the amount of households ‘at risk.’ On the other hand, increases in health care consumption — and the better health that such spending produces — could raise the marginal utility of non-health care consumption at retirement. This change would result in higher savings during the work life, higher replacement rate targets — households would actually desire to increase their non-health consumption during retirement — and would increase the amount of households ‘at risk.’ Thus, the impact of increased health care expenditure on the marginal utility of non-health care consumption is unclear. Our calculations assume no change in marginal utility, which means that they do not represent a maximum in the percent of households ‘at risk.’

5 This *brief* treats out-of-pocket medical expenses as exogenous — medical expenses are required each year at the average level — similar to Kotlikoff (1988), Hubbard, Skinner, and Zeldes (1995), and Palumbo (1999). In fact, an important portion of the out-of-pocket expenses at retirement is derived from Medicare premiums, which can be considered exogenous to a particular household. A breakdown of the out-of-pocket medical expenses highlights the importance of exogenous Medicare premiums: medical expenses of a household that spends only half of the copayments and other expenses are about 70 percent of those of a household that spends the average copayments and other expenses.

6 Authors’ estimates based on Neuman et al. (2007) and Centers for Medicare and Medicaid Services (2007a).

7 Typically the payments physicians receive are based on a fee schedule that allocates a certain dollar amount for different services. This schedule is updated each year based on the sustainable growth rate mechanism, which compares actual payments to a target level. Spending on physician payments has exceeded target levels every year since 2001 and, as such, under current law the physician payment schedule is set to be reduced annually by between four and five percent every year until 2016. However, since 2003, the reductions have been reversed with new legislation allowing for updates between zero percent and an increase of 1.7 percent. Given that legislation in each of the past five years has overridden the scheduled reduction in physician payments, our

assumption is that this will continue to be the case. The Centers for Medicare and Medicaid Services examine two alternative scenarios for the physician payment schedule: 1) Remain constant: ‘Zero Percent Physician Update;’ and 2) Increase according to the Medicare Economic Index, which is around two percent a year. Our calculations assume the ‘Zero Percent Physician Update.’

8 The assumption is that the annuity is purchased with after-tax dollars and that the annuity income is taxed in accordance with current law. Because of the tax on annuity income, the amount to be annuitized exceeds actual health care expenditure by enough to cover the required tax payments. The annuity is also assumed to be actuarially fair. Even though households cannot purchase actuarially fair annuities in the market, this concept provides the best measure of future health care expenses.

9 The estimates for out-of-pocket medical expenses used in this *brief* are averages. Some households would need more and some would need less, and these differences might be systematically related to factors such as employer-provided post-retirement health benefits or health status. The NRRI analysis offers a broad view of the number of households ‘at risk’ in retirement without making inferences about specific households in the sample.

10 In order to explicitly add medical spending to the NRRI — which is based on replacement rates — this calculation assumes level health care expenditure during retirement. In reality, out-of-pocket health care costs are likely to rise with age after retirement, and with proximity to death. The effect on the present value of medical costs is ambiguous. If most costs are incurred at advanced ages, it reduces their present value. But the household may wish to set aside additional funds to take advantage of the improvements in medical technology that may have occurred by the time major medical care is required.

11 The \$1,400 figure (\$1,900 for couples) corresponds to the average out-of-pocket expenses for the working-age population. This population includes a mix of younger individuals with low medical expenses and older individuals with high medical expenses — including those in their 50s without employer-provided medical insurance. See Desmond, et al. (2007); and U.S. Bureau of Labor Statistics (2007). This procedure may understate out-of-pocket spending for older workers.

12 The projected increase in out-of-pocket medical costs might be largely the result of projected improvements in medical care and introductions of new medical technologies that will improve retirees' health. These factors may, in turn, affect how individuals wish to allocate consumption between their working lives and retirement.

13 To calculate the annual difference in out-of-pocket expenses between years in retirement and working age involved annuitizing the sum of the net present value of the difference between projected out-of-pocket expenses for each year of retirement and the estimated out-of-pocket expenses in the final year of work (e.g. for a person in the cohort turning 65 in 2013, \$1,672 was subtracted from each subsequent year's Medicare costs; for couples the amount was \$2,280).

14 As in the original NRRI, the amount of income to maintain level consumption includes money to cover taxes.

15 Because health care costs are rising so rapidly, targets that consider health care explicitly vary by cohort. The above number refers to a couple born between 1960 and 1962.

16 High-income households spend about 115 percent. The ratio of low-income to middle-income expenses and high-income to middle-income expenses are the averages found by previous research. The documented ratios for low-income to middle-income expenses are about 60 percent for the first quintile of income and 90 percent for the second quintile — reflecting the fact that individuals at the very bottom are covered by Medicaid. The 70 percent figure is the estimated ratio for the first tercile ( $2/3*60 + 1/3*90$ ). For the high-income to middle-income ratios, the documented range is between 109 and 117 percent. See Caplan and Brangan (2004), Crystal et al. (2000), Goldman and Zissimopoulos (2003) and Neuman et al. (2007).

17 About 90 percent of elderly households do not have any type of long-term care insurance. An important explanation of the low private insurance coverage has to do with the last resort nature of the Medicaid program that serves as a limited form of long-term care insurance (see Brown and Finkelstein, 2008 forthcoming).

18 Metlife Mature Market Institute (2007). The average daily rate for a semi-private room in a nursing home is \$189, or \$68,985 a year.

19 Metlife Mature Market Institute (2006).

## References

- Brown, Jeffrey and Amy Finkelstein. 2008 (forthcoming). "The Interaction of Public and Private Insurance: Medicaid and Long-Term Care Insurance Market." *The American Economic Review*.
- Caplan, Craig and Normandy Brangan. 2004. "Out-of-Pocket Spending on Health Care by Medicare Beneficiaries Age 65 and Older in 2003." *Data Digest*. Washington, DC: AARP Public Policy Institute.
- Center for Retirement Research at Boston College. 2006. "Retirements At Risk: A New National Retirement Risk Index." Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Centers for Medicare and Medicaid Services. 2007a. *Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*. Washington, DC: U.S. Department of Health and Human Services.
- Centers for Medicare and Medicaid Services. 2007b. "Projected Medicare Part B Expenditures under Two Illustrative Scenarios with Alternative Physician Payment Updates." Memorandum from M. Kent Clemens. Washington, DC: U.S. Department of Health and Human Services.
- Crystal, Stephen, Richard W. Johnson, Jeffrey Harman, Usha Sambamoorthi, and Rizie Kumar. 2000. "Out-of-Pocket Health Care Costs Among Older Americans." *Journal of Gerontology: Social Sciences* 55B(1): S51-S62.
- Desmond, Katherine A., Thomas Rice, Juliette Cubanski, and Patricia Neuman. 2007. "The Burden of Out-of-Pocket Health Spending Among Older Versus Younger Adults: Analysis from the Consumer Expenditure Survey, 1998-2003." *Medicare Issue Brief*. Menlo Park, CA: Kaiser Family Foundation.
- Goldman, Dana P. and Julie M. Zissimopoulos. 2003. "High Out-of-Pocket Health Care Spending by the Elderly." *Health Affairs* 22(3): 194-202.
- Hubbard, R. Glenn, Jonathan Skinner, and Stephen P. Zeldes. 1995. "Precautionary Saving and Social Insurance." *Journal of Political Economy* 103(2): 360-399.
- Internal Revenue Service. 2007. *1040 Instructions 2007*. Washington, DC: U.S. Department of the Treasury. Available at: <http://www.irs.gov/pub/irs-pdf/i1040.pdf>
- Kemper, Peter, Harriet L. Komisar, and Lisa Alecxih. 2005. "Long-Term Care Over an Uncertain Future: What Can Current Retirees Expect?" *Inquiry* 42(4): 335-350.
- Kotlikoff, Laurence J. 1988. *What Determines Saving?* Cambridge: MIT Press.
- Metlife Mature Market Institute. 2006. *The MetLife Market Survey of Nursing Home & Home Care Costs*. Westport, CT. Available at: <http://www.metlife.com/WPSAssets/18756958281159455975V1F2006NHHCMarketSurvey.pdf>.
- Metlife Mature Market Institute. 2007. *The MetLife Market Survey of Nursing Home & Assisted Living Costs*. Westport, CT. Available at: <http://www.metlife.com/WPSAssets/84950851901193758502V1F2007NH.AL.pdf>.
- Munnell, Alicia H. and Annika Sundén. 2006. "401(k) Plans Are Still Coming Up Short." *Issue in Brief* 43. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Munnell, Alicia H., Francesca Golub-Sass, and Anthony Webb. 2007. "What Moves the National Retirement Risk Index? A Look Back and an Update." *Issue in Brief* 7-1. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Neuman, Patricia, Juliette Cubanski, Katherine A. Desmond, and Thomas H. Rice. 2007. "How Much 'Skin in the Game' Do Medicare Beneficiaries Have? The Increasing Financial Burden of Health Care Spending, 1997-2003." *Health Affairs* 26(6): 1692-1701.
- Palumbo, Michael G. 1999. "Uncertain Medical Expenses and Precautionary Saving Near the End of the Life Cycle." *Review of Economic Studies* 66: 395-421.
- U.S. Bureau of Labor Statistics. 2007. *Consumer Price Index*. Available at: <http://www.bls.gov/cpi>.
- U.S. Social Security Administration. 2003. *Life Table Functions for Males and Females born 1925-2000 based on the Alternative II Mortality Probabilities from the 2003 Trustees Report*. Unpublished Data.

---

# APPENDIX

---

## Updating Replacement Rates to Explicitly Account for Health Care Expenses

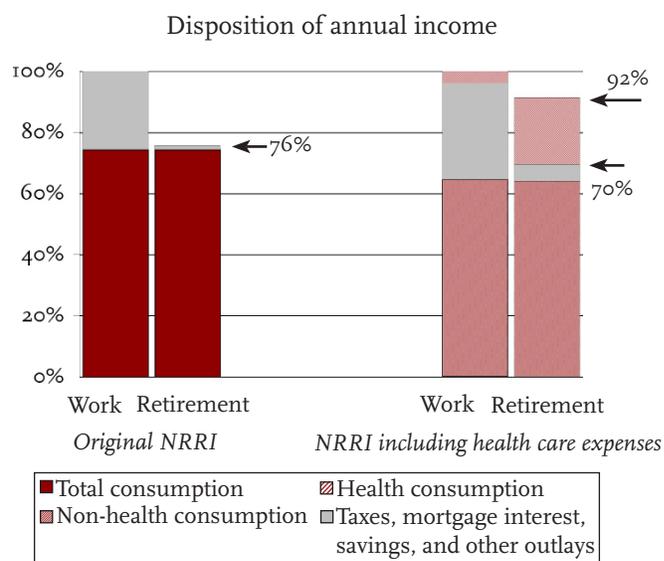
Target replacement rates are defined as the replacement rates that households need in retirement in order to maintain the same standard of living they enjoyed during their working years. This appendix explains how the targets change from the original NRRI to the NRRI incorporating health care expenditures.

### Original NRRI Targets

The calculation of these targets is based on a simplified life-cycle model in which households smooth their wage-indexed consumption across their lifetime. This means that households' real consumption rises across their working life to keep up with the general increases in living standards of society, measured by real wage growth. This is done to make the targets consistent with the observed replacement rates from the *Survey of Consumer Finances* (the foundation for much of the data used in the NRRI) — which uses a wage-indexed measure in the denominator. The original NRRI model takes into account earnings from employment, returns on investments, taxes, the purchase of a house with the aid of a mortgage, Social Security and defined benefit pension income. It allows households to save and borrow throughout their lives, and it uses the current structure of federal, state and Social Security taxes.

Figure A-1 illustrates how health care expenses affect the target replacement rates. The left panel of the figure shows that, for a two-earner household in the middle of the income distribution, the original NRRI calculations produce a target replacement rate of 76 percent. The bottom portion of the bars indicates the share of household income consumed. The top portion of the bars represents the share of household income used to cover taxes, saving, and other non-consumption expenditures such as mortgage payments (which build up housing equity and, therefore, represent a form of saving). The gray bar is much lower in retirement because households tend to have lower taxes, they no longer have to save for retirement, and they often have paid off their mortgage.

FIGURE A1. EFFECT OF HEALTH CARE ON TARGET REPLACEMENT RATE



Source: Author's calculations.

### Incorporating Health Care into Replacement Rate Targets

In order to calculate the effect of retiree out-of-pocket expenses on the NRRI, it is necessary to calculate new target replacement rates that enable households to smooth their non-out-of-pocket health care spending over their lifetime. The calculation requires explicitly accounting for out-of-pocket health care spending both before and after retirement. The result can be illustrated in two steps, as indicated in the right panel of the figure. First, the expectation of higher health care expenditures after retirement means that the individual should lower his non-health care consumption (the bottom portion of the bars) throughout his life. Therefore, the resulting target replacement rate initially drops from 76 percent under the original NRRI to 70 percent. The next step is to add to the target the amount necessary to cover retiree health care expenses (the top portion of each bar). With this adjustment, the final replacement rate becomes higher (92 percent) than in the original NRRI.

CENTER FOR  
RETIREMENT  
RESEARCH  
AT BOSTON COLLEGE

---

### About the Center

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 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.

### Affiliated Institutions

American Enterprise Institute  
The Brookings Institution  
Center for Strategic and International Studies  
Massachusetts Institute of Technology  
Syracuse University  
Urban Institute

### 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](mailto:crr@bc.edu)  
Website: <http://www.bc.edu/crr>

**ACCESS ALL NRRI PUBLICATIONS ON OUR WEBSITE AT:**  
**[WWW.BC.EDU/CRR/NRRI.SHTML](http://WWW.BC.EDU/CRR/NRRI.SHTML)**

---

© 2008, by Trustees of Boston College, Center for Retirement Research. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that the authors are identified and full credit, including copyright notice, is given to Trustees of Boston College, Center for Retirement Research.

The research reported herein was pursuant to a grant from Nationwide Mutual Insurance Company. The findings and conclusions expressed are solely those of the authors and do not necessarily reflect the views of Nationwide Mutual Insurance Company or the Center for Retirement Research at Boston College.