



# HOW PREPARED ARE STATE AND LOCAL WORKERS FOR RETIREMENT?

By Alicia H. Munnell, Jean-Pierre Aubry, Josh Hurwitz, and Laura Quinby\*

---

## INTRODUCTION

A widespread perception is that state-local government workers receive high pension benefits which, combined with Social Security, provide more than adequate retirement income. The perception is consistent with multiplying the 2-percent benefit factor in most plan formulae by a 35- to 40-year career and adding a Social Security benefit. But this calculation assumes that individuals spend enough of their career in the public sector to produce such a retirement outcome. This *brief* summarizes the results of a paper that uses the *Health and Retirement Study* (HRS) and actuarial reports published by state and local pension systems to test the hypothesis that state-local workers have more than enough money for retirement.<sup>1</sup>

The first section explores how much income people need in retirement and raises some conceptual is-

sues involved in constructing replacement rates. The second section presents replacement rates derived from Social Security and from employer-sponsored plans for individual workers in the private and state-local sectors. The third section replicates the analysis for households. The fourth section reports how non-pension financial assets affect the replacement rate picture. The fifth section summarizes the actuarial report evidence. The sixth section concludes.

The major finding from the HRS analysis is that most households with state-local employment end up with replacement rates that, while on average higher than those in the private sector, are well below the 80 percent needed to maintain pre-retirement living standards. Even those households with a long-service state-local worker – those who spend more than half of their careers in public employment – have a median replacement rate, including Social Security, of only

\* 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. Jean-Pierre Aubry is the assistant director of state and local research at the CRR. Josh Hurwitz and Laura Quinby are research associates at the CRR. This research was funded by a grant from Great-West Retirement Services. The authors would like to thank Beth Almeida, Frank Caine, and Nathan Scovronick for helpful comments.

LEARN MORE →

Search for other publications on this topic at:  
[crr.bc.edu](http://crr.bc.edu)

72 percent. And this group accounts for less than 30 percent of households with a state-local worker. The remaining 70 percent of households with a short- or medium-tenure state-local worker have replacement rates of 48 percent and 57 percent, respectively. Adding income from financial assets still leaves most households short of the target.

Data from the actuarial reports provide part of the explanation for these lower-than-anticipated replacement rates. Only 32 percent of workers who leave state-local employment each year claim an immediate benefit. These individuals have more than 20 years of service on average and receive a benefit equal to 49 percent of their pre-retirement earnings. But another 27 percent leave state-local employment with a deferred benefit based on their earnings at termination, which will decline in value between termination and claiming as wages and prices rise, so it will amount to less than 10 percent of their projected earnings at retirement. And 40 percent leave without any promise of future benefits. The other part of the explanation is that most households with a state-local worker contain a person employed in the private sector, and replacement rates for private sector workers are considerably lower since many end up with nothing more than Social Security.<sup>2</sup>

## THE “REPLACEMENT RATE” CONCEPT

Replacement rates are used to gauge the extent to which older people can maintain their pre-retirement levels of consumption once they stop working.<sup>3</sup> The most direct approach would be a comparison of household consumption while working with consumption after retirement. But such data are rarely available. An indirect approach is to compare pre- and post-retirement income.<sup>4</sup> This section briefly reviews what might be considered an adequate level of replacement income and describes some of the conceptual issues involved in constructing replacement rates.

### WHAT REPLACEMENT RATE DO PEOPLE NEED IN RETIREMENT?

People clearly need less than their full pre-retirement income to maintain their standard of living once they stop working. One big difference before and after retirement is the extent to which income is taxed. When people are working, their earnings are subject

to both Social Security and Medicare payroll taxes and federal personal income taxes. After retirement, they no longer pay payroll taxes, and they pay lower federal income taxes because only a portion of Social Security benefits are taxable. Under current law, individuals with less than \$25,000 and married couples with less than \$32,000 of “combined income” do not have to pay taxes on their Social Security benefits. Above those thresholds, recipients must pay taxes on either 50 or 85 percent of their benefits.<sup>5</sup>

A second reason why retirees require less than their full pre-retirement income is that they no longer need to save a portion of that income for retirement. In addition to contributing to 401(k) plans, many households try to pay off their mortgage before they retire. In retirement, these households no longer need to save and, in fact, can draw on their accumulated reserves. Thus, a greater share of their income is available for consumption.

A final factor often mentioned is that work-related expenses, such as clothing and transportation, are either no longer necessary or are much reduced. Although this factor often tops many analysts’ lists, it is relatively small compared to taxes and saving.

While all analysts cite the same factors for why retirees need less than their full pre-retirement income, they employ different approaches to calculating precisely how much less. The RETIRE Project at Georgia State University has been calculating required replacement rates – that is, retirement income as a percent of pre-retirement earnings – for decades.<sup>6</sup> As of 2008, the Project estimated that a couple with an income of \$50,000 required 81 percent of pre-retirement earnings to maintain the same level of consumption (see Table 1). Couples earning \$90,000 needed 78 percent, and couples earning \$20,000 needed 94 percent, because they save very little before retirement and enjoy less in the way of tax reduction.

TABLE 1. PERCENT OF PRE-RETIREMENT SALARY REQUIRED TO MAINTAIN LIVING STANDARDS, 2008

Pre-retirement earnings	Two-earner couples	Single workers
\$20,000	94	88
\$50,000	81	80
\$90,000	78	81

Source: Palmer (2008).

## CONSTRUCTING REPLACEMENT RATES

Constructing replacement rates raises a number of issues. The first question is the relevant measure of pre-retirement earnings. Social Security – the primary source of monthly cash income for today’s elderly Americans – replaces a portion of “average indexed monthly earnings” (AIME), which is essentially the 35 highest years of earnings indexed to the present by wage growth.<sup>7</sup> Employer-sponsored defined benefit plans – the other source of monthly income – typically replace a portion of the worker’s annual earnings during the last three or five years of employment, which tend to be the worker’s highest earnings with that employer. Thus pre-retirement income could be defined as: 1) some measure of lifetime earnings; 2) earnings with a particular employer; or 3) earnings just prior to retirement. This study uses earnings just before retirement, defined as the highest five in the last ten years adjusted for inflation, because it provides a measure of the end-of career standard of living that workers seek to maintain in retirement.

A second consideration is defining when “pre-retirement” ends and retirement begins. With the growth of bridge jobs, it is often impossible to define precisely the work/retirement divide. For this reason, this study focuses on the first year that workers start receiving Social Security benefits. In the case of couples, retirement is defined as when both members of the household are receiving benefits.

A third consideration is the unit of analysis. Replacement rates have largely been calculated on an individual worker basis, even though the great majority (roughly 80 percent) of Americans enters retirement as part of a married couple household. The general presentation of replacement rates on an individual worker basis no doubt reflects the fact that Social Security and employer pension benefits are based on individual worker earnings. This *brief* also presents individual replacement rates. But households consume on a joint basis, so we calculate replacement rates for couples and single-person households as well.

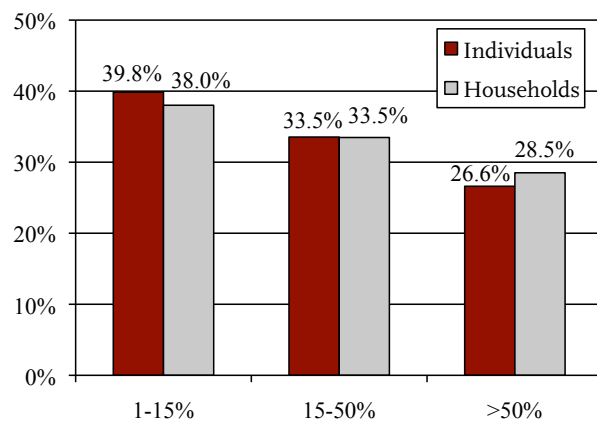
## REPLACEMENT RATES FOR INDIVIDUALS

To calculate replacement rates, this *brief* uses the *Health and Retirement Study* (HRS), a nationally-representative longitudinal survey of older Americans. The HRS contains detailed information on earnings before retirement and on Social Security and pension benefits as well as 401(k)/IRA balances, and is

thus ideal for this study.<sup>8</sup> The original HRS sample consisted of 12,652 individuals from 7,607 households with respondents 51 to 61 years old in 1992 (born between 1931 and 1941), and their spouses. The survey has been re-administered every two years. Although the HRS has subsequently added younger cohorts, this analysis uses the original HRS sample and follows this group through the 2008 survey.<sup>9</sup> The final sample consists of 8,900 newly retired workers and 4,469 newly retired households.

For this sample, the task is to calculate replacement rates first for Social Security and then for Social Security and employer-sponsored defined benefit and defined contribution plans, and to present the results for individuals who spent their entire career in the private sector and those who worked in the state-local sector. For those in the public sector, replacement rates are reported by the percent of career spent in that sector: 1-15 percent, 15-50 percent, and more than 50 percent.<sup>10</sup> As shown in Figure 1, roughly one third of households and individuals are in the middle group, somewhat more in the short-tenure group, and somewhat fewer in the long-tenure group.

FIGURE 1. DISTRIBUTION OF STATE AND LOCAL WORKERS BY TENURE



Source: Authors’ calculations from the University of Michigan, *Health and Retirement Study* (HRS) (1992-2008).

The first step is to calculate *total* earnings just prior to retirement. The HRS restricted data contain only the *covered* earnings records for individual workers. Since earnings are top-coded at the Social Security maximum taxable earnings for each year, the calculation of actual career-average earnings for some individuals requires imputations. For individuals with coded earnings at the cap, their total earnings

are imputed using regression results from an estimated wage equation.<sup>11</sup> The total earnings history is then used to calculate the highest five in the last ten years adjusted for inflation for each individual.

The Social Security replacement rate is simply the benefits for the relevant retirement age divided by the calculated pre-retirement earnings. The results are shown in Table 2 below. Social Security alone provides a median replacement rate for private workers of 29 percent and for state-local workers of 26 percent.

The next step is to include income from defined benefit and defined contribution plans. In both cases, income was calculated as the annuitized value of pension wealth. The argument for taking this approach in the case of defined benefit as well as defined contribution plans is that simply reporting the first year benefit would understate the value of state-local defined benefit pensions since these benefits are adjusted annually – at least partially – for inflation. Both defined benefit and defined contribution wealth come from data posted on the HRS website; these numbers are derived from the restricted pension data provided by the employer. The data are presented at ages 50, 55, 60, 62, and 65, and we selected the observation closest to the individual's retirement age.<sup>12</sup> Unfortunately, the wealth data were available only for a portion of our sample, so we had to calculate defined benefit pension wealth from reported benefits for the remaining individuals using the same assumptions about inflation and asset returns.<sup>13</sup>

Individuals were identified as having a defined contribution plan in one of two ways – either they have defined contribution wealth or they indicated in the first (1992) wave that they were covered by an employer-sponsored defined contribution plan. For

those with coverage but without a measure of defined contribution wealth, IRA balances are set equal to pension wealth because most of the assets in these accounts are rollovers from 401(k) plans and the earnings on those rollovers.<sup>14</sup> For those with wealth, IRA balances are combined with defined contribution assets. For those without pension coverage, IRA assets are included in total financial wealth.<sup>15</sup>

The next step is to derive a stream of annual income by applying annuity factors to the defined benefit and defined contribution wealth. The annuity factors vary by gender and marital status. In addition, an 18-percent increase in cost due to adverse selection, marketing, and other factors is applied to annuities purchased in the private market.<sup>16</sup> Married men are assumed to opt for a joint-and-survivor annuity that provides 50 percent of the benefit to the surviving spouse. The replacement rates reported here are based on nominal annuities, under which the purchasing power of benefits will decline over time; replacement rates based on real (inflation-adjusted) annuities, which produce lower initial levels of replacement, are reported in the Appendix.

Table 2 shows the impact of income from employer-sponsored plans on the replacement rates of single individuals for private sector and state-local workers. Adding the annuitized value of defined benefit and defined contribution wealth to Social Security brings the median replacement rate to 42 percent for private sector workers and to 54 percent for workers with some state-local employment. For those with state-local government experience, the replacement rate increases with the percent of career spent in the public sector.<sup>17</sup>

TABLE 2. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR INDIVIDUAL WORKERS BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	29.2	32.4	27.6	26.4	27.8	26.5	23.4
Social Security + pensions <sup>b</sup>	41.7	32.4	49.1	53.6	46.6	53.3	69.8
Addendum: percent of sample	76	35	41	24	10	8	6

<sup>a</sup> The denominator is the individuals' top five years of earnings indexed for inflation.

<sup>b</sup> For those with pension coverage, IRA assets are included in defined contribution wealth; for those without pension coverage, IRA assets are classified as part of financial assets.

Source: Authors' estimates from 1992-2008 HRS.

TABLE 3. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR HOUSEHOLDS BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	32.0	35.7	30.9	29.3	29.7	29.4	28.3
Social Security + pensions <sup>b</sup>	46.9	35.7	52.0	57.4	47.6	57.0	71.8
Addendum: percent of sample	67	24	43	33	13	11	9

a. The denominator is the individuals' top five years of earnings in the last ten years indexed for inflation.

b. For those with pension coverage, IRA assets are included in defined contribution wealth; for those without pension coverage, IRA assets are classified as part of financial assets.

Source: Authors' estimates from 1992-2008 HRS.

## HOUSEHOLD REPLACEMENT RATES

Household replacement rates from Social Security are determined by dividing household Social Security benefits calculated at the relevant retirement age by the earnings prior to retirement. Household income from the annuitized value of defined benefit and defined contribution assets (including IRAs for those with defined contribution coverage) is summed for individuals in the households. As before, household replacement rates are estimated at the first year in which both members of the household are retired.<sup>18</sup> Dividing these values by the earnings measure produces pension replacement rates.

Replacement rates for households by employment status are shown in Table 3. All the replacement rates are slightly higher than those shown for individuals in Table 2, but the pattern remains the same. Replacement rates are higher in the state-local sector than in the private sector, primarily because almost 40 percent of private sector households have no employer-sponsored pension benefits. Within the public sector, replacement rates increase with tenure from 48 percent for households with a short-tenured employee to 72 percent for those with a long-tenured worker. Again, median replacement rates do not reach the 80 percent target for most households with state-local employment.

## THE IMPACT OF NON-PENSION FINANCIAL ASSETS

The final exercise with the HRS explores the impact of non-pension financial assets on replacement rates. Financial wealth comes from the RAND subset of the HRS and includes stocks, bonds, savings and checking accounts, certificates of deposit, and any other account, minus non-housing debt.

In order to make the calculations economically meaningful, the definition of pre-retirement income needs to be expanded to include a measure of pre-retirement income from financial assets. Non-pension financial wealth was not annuitized; rather income was derived by applying a nominal return to asset values. The nominal return on financial assets was 5.1 percent, consistent with the assumptions used throughout the analysis. The results are shown in Table 4 on the next page. Adding income from financial assets closes the gap somewhat, but still leaves most state-local households short of the 80-percent target.

TABLE 4. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR HOUSEHOLDS, INCLUDING FINANCIAL ASSETS, BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	30.3	34.0	29.1	27.1	27.8	27.3	25.8
Social Security + pensions <sup>b</sup>	44.8	34.0	50.0	53.1	43.4	54.2	67.5
Social Security + pensions <sup>b</sup> + Financial assets <sup>c</sup>	51.0	40.5	55.6	60.2	50.9	61.3	72.7

<sup>a</sup> The denominator is the individuals' top five years of earnings in the last ten years indexed for inflation plus income from financial assets.

<sup>b</sup> For those with pension coverage, IRA assets are included in defined contribution wealth; for those without pension coverage, IRA assets are classified as part of financial assets.

<sup>c</sup> The real return on financial assets is assumed to be 2.3 percent.

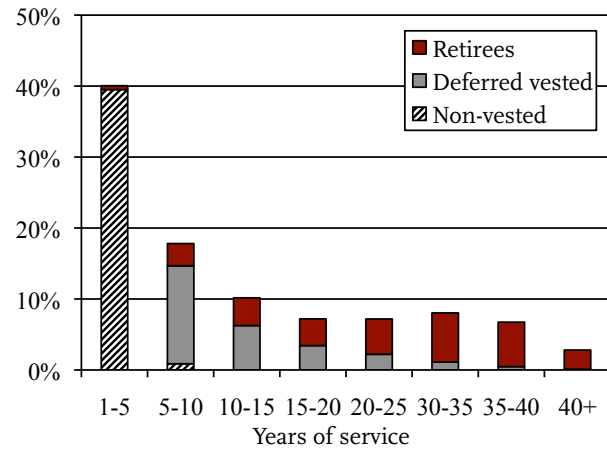
Source: Authors' estimates from 1992-2008 HRS.

## INSIGHTS FROM THE ACTUARIAL DATA

To provide some insight on why actual replacement rates for workers with state-local experience are lower than generally thought, this section provides evidence on benefit status and replacement rates for those leaving some of the nation's largest public pension systems in 2010. These systems are CalPERS, Connecticut SERS, Florida RS, Kentucky TRS, New Jersey PERS, New Jersey TRS, Ohio Schools, Ohio Teachers, Texas ERS, Texas TRS, and Wisconsin RS. Together, these plans represent 18 percent of the nation's liabilities and 22 percent of the members.

First, using each system's actuarial valuation, it is possible to generate the population of those with at least one year of service who leave public sector employment in a given year, either by quitting before vesting, quitting with deferred benefits, or retiring. The valuations contain data on the demographics of active employees (sex, age, tenure, and salary) and on the probability of retirement – when an employee leaves active service and immediately begins receiving benefits – and of separation – when an employee leaves state-local employment but does not immediately claim benefits because they are not eligible or did not vest. Applying the probabilities of retirement and separation to the population of active members according to their sex, age, and tenure yields the population of those who left state-local active service. Those who leave with under five years of tenure are deemed as not vested. Figure 2 presents the distribution by tenure and benefit status for the 11 large plans identified above.

FIGURE 2. DISTRIBUTION OF LEAVERS IN ELEVEN LARGE PLANS BY TENURE AND BENEFIT STATUS, 2011

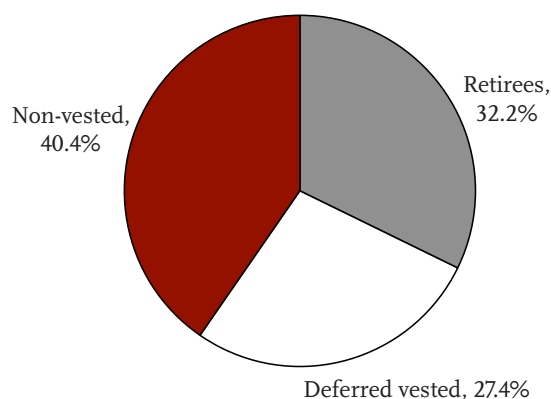


Note: See endnote 19.

Source: Authors' estimates from various actuarial reports.

Of those who leave with at least one year of service, only 32 percent claim benefits immediately, 27 percent will receive a deferred benefit based on their earnings at termination, and 40 percent leave without any promise of future benefits (see Figure 3 on the next page).<sup>20</sup>

FIGURE 3. PERCENT OF LEAVERS IN ELEVEN LARGE PLANS BY BENEFIT STATUS



Source: Authors' estimates from various actuarial reports.

The next step is to estimate replacement rates for those who have left state-local employment. For this exercise, the focus is on a subset of plans where workers are covered by Social Security – CalPERS, New Jersey PERS, New Jersey TRS, Texas ERS, and Wisconsin RS.<sup>21</sup> In the case of the non-vested, the answer is easy – the replacement rate is zero.<sup>22</sup> For those who retire immediately, the calculation is straightforward: the annual benefit divided by the last year's salary. The annual benefit is calculated by applying the benefit formula to the relevant earnings base, usually the last three years.

For the deferred vested, the benefit calculation is also straightforward: the benefit formula applied to the earnings base in the three years before separation. In order to understand the importance of these deferred benefits at retirement, however, it is necessary to compare them with earnings at that time. This calculation requires some assumptions. First, we assume that the separator will claim his benefit at the system's normal retirement age, generally around age 60. Second, we apply each system's salary growth assumption to estimate the separator's salary at that age. Since the average age of those with deferred benefits is 44 (see Table 5), the value of these benefits is seriously eroded by inflation and salary growth.

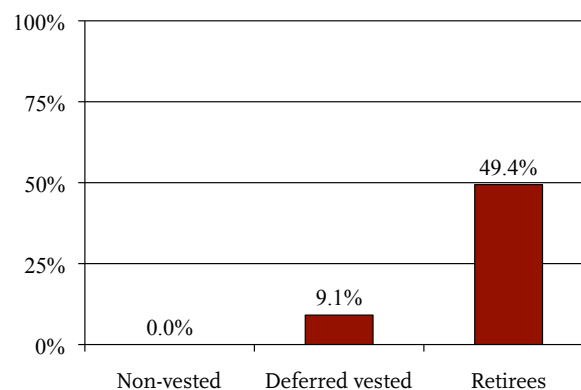
TABLE 5. AGE AND TENURE OF LEAVERS BY BENEFIT STATUS, 2011

Characteristics	Non-vested	Deferred benefit	Retired
Average age	37.7	44.3	61.0
Average tenure	2.2	11.7	22.8

Source: Authors' estimates from various actuarial reports.

The average replacement rates for those with non-vested, deferred, and immediate benefits by tenure are presented in Figure 4. Those who leave without vesting usually receive only a refund of their contributions with modest interest and no benefits from the plan. Those who leave mid-career receive deferred benefits that amount to less than 10 percent of earnings at retirement. And those who claim immediately around age 60 receive benefits equal to 49 percent of final earnings. These differentials are roughly consistent with the patterns that emerge from the HRS data.

FIGURE 4. REPLACEMENT RATES FOR STATE-LOCAL WORKERS BY BENEFIT STATUS



Source: Authors' estimates from various actuarial reports.

## CONCLUSION

This study addresses the widespread perception that state-local workers have more than adequate income in retirement. The perception is consistent with multiplying the 2-percent benefit factor in most plan formulae by a 35- to 40-year career and adding a Social Security benefit. But this calculation assumes that individuals spend enough of their career in the public sector to produce such a retirement outcome. Analysis of replacement rates of state-local workers in the HRS suggest that households with even long-career state-local employees fall short of the target replacement rate of 80 percent of pre-retirement earnings.

The explanation for these lower-than-anticipated replacement rates is twofold. First, as the actuarial data show, only 32 percent of workers who leave state-local employment each year claim an immediate benefit. These individuals have more than 20 years of service on average and receive a benefit equal to 49 percent of their pre-retirement earnings. But another 27 percent leave state-local employment with a deferred benefit based on their earnings at termination, which will decline in value between termination and claiming as wages and prices rise, so it will amount to less than 10 percent of their projected earnings at retirement. And 40 percent leave without any promise of future benefits. Second, most households with a state-local worker contain a person employed in the private sector, and replacement rates for private sector workers are considerably lower since many end up with nothing more than Social Security.

## ENDNOTES

1 Munnell et al. (2011).

2 According to our calculations from the HRS, of married couples with a state-local worker, 23 percent include two state-local workers, 58 percent include a state-local and a private-sector worker, and 19 percent include a state-local worker and a non-worker. Roughly 40 percent of private sector households rely only on Social Security and receive no employer-sponsored pension.

3 Technically people are interested in smoothing marginal utility, not consumption. To the extent that they get pleasure from leisure in retirement, they may maintain overall utility with lower levels of consumption after they stop working. The enjoyment of leisure may explain what the literature calls the “retirement-consumption puzzle” – namely, the fact that consumption appears to drop as people retire. See Bernheim, Skinner and Weinberg (2001); Banks, Blundell and Tanner (1998); and Hurd and Rohwedder (2003).

4 In an extension of the replacement rate approach to test whether people are saving optimally for retirement, two recent studies (Engen, Gale, and Uccello (1999) and Scholz, Seshadri, and Khitatrakun (2004)) compare people’s actual behavior with the behavior that comes out of simulation models. In these simulations, households attempt to smooth their consumption over their remaining lives as they are buffeted by shocks to their wages, employment, and health. Because of these shocks, households with very similar characteristics can end up with very different levels of wealth. These simulations have generally produced results where households’ actual levels of preparedness look very much like the numbers generated by the simulations, suggesting that people respond rationally to life’s events.

5 The percent of Social Security benefits subject to personal income taxation is as follows. Individuals with “combined income” between \$25,000 and \$34,000 include 50 percent of benefits; over \$34,000 they include 85 percent. Couples with “combined income” between \$32,000 and \$44,000 include 50 percent of benefits; over \$44,000 they include 85 percent. “Combined income” is adjusted gross income as reported on tax forms plus nontaxable interest income plus one half of Social Security benefits.

6 For an array of pre-retirement earnings levels, they calculate federal, state, and local income taxes and Social Security taxes before and after retirement. They also use the Bureau of Labor Statistics *Consumer Expenditure Survey* to estimate consumer savings and expenditures for different earnings levels.

7 In the case of retirement, the AIME is determined in two steps. First, the worker’s annual taxable earnings after 1950 are updated, or indexed, to reflect the general earnings level in the indexing year, which is age 60. Earnings in years after 60 are not indexed but instead are counted at their actual value. A worker’s earnings prior to age 60 are indexed by multiplying them by the ratio of the average wage in the national economy for the indexing year to the corresponding average wage figure for the year to be indexed. Second, the AIME is calculated by taking the highest 35 years of wage-indexed earnings between ages 22 and 62 and dividing that total by the number of months in that period.

8 See Juster and Suzman (1995) for a detailed overview of the survey.

9 The HRS expanded the sample dramatically in 1998 and 2004, with the addition of the War Babies (born between 1942 and 1947) and Early Boomers (born between 1948 and 1953), respectively. The latest sample addition, made in 2010, was the inclusion of the Mid Boomers (born between 1954 and 1959). Like the original sample, these three additional cohorts are interviewed every two years.

10 For couples with two state-local workers, the household is classified by the tenure of the longest tenure worker.

11 About 15 percent of the final sample of individuals used in this study required imputations for at least one year of earnings. To impute earnings for those at the maximum taxable earnings, a random-effects, Tobit regression is applied to all of the available data, with earnings below the cap as the dependent variable. The explanatory variables include age, age squared, categorical variables for gender, college degree and race, and dummies for each decade.

12 A small fraction (about two percent) of respondents in the HRS sample indicated having a pension plan with both defined benefit and defined contribution characteristics. Data on defined contribution

assets in these “combined” plans were often not available, so they are grouped together with defined benefit plans.

13 The resulting numbers for both defined contribution and defined benefit plans are comparable to those reported by Gustman and Steinmeier (1999).

14 Increasingly, of course, IRA accumulations will also include rollovers from defined benefit and cash balance plans.

15 Median defined contribution wealth for those with coverage is \$67,000 (excluding IRA assets) and median defined benefit wealth is \$97,000. These results are fully consistent with those from other studies.

16 Premium loads on annuities vary with annuity type and with the age of purchase. They also vary between companies and over time, and are somewhat sensitive to the choice of interest rate used to calculate expected present values. Mitchell et al. (1999), Table 3, report loads that are typically on the order of 18 percent.

17 The HRS reports the year that the individual began work in the state-local sector, and the year that state-local employment ended. Subtracting one year from the other provides the total years spent in the state-local sector; those years are then divided by the total length of the individual’s career, as reported in the RAND data.

18 This calculation is done by estimating the annuity value for defined benefit and defined contribution pensions for each member of the household starting at his or her retirement age and then projecting this value to the year in which the second member of the household retires.

19 New Jersey PERS and TRS are different from most plans. For most plans, the vesting period is five years. For New Jersey PERS and TRS, the vesting requirement depends on the type of retirement. Those who leave service before the normal retirement age must have ten years of tenure in order to claim a deferred benefit. Those who retire directly from active service at the normal retirement age have no minimum tenure requirement. These provisions result in a small number of retirees with less than five years of tenure, and some non-vested separators with over five years of tenure.

20 This pattern is similar to that found by the State of Maine Unified Retirement Plan Task Force (2010).

21 Connecticut SERS and Florida RS are omitted due to insufficient data.

22 Unlike private sector 401(k) plans, most state and local pensions feature mandatory participation. State-local employees who terminate without vesting in the plan receive a refund on their contributions with a modest rate of interest. Although these refunds are likely quite small, they do have the opportunity to grow over time.

## REFERENCES

- Banks, J., Blundell, R. and S. Tanner, S. 1998. "Is There a Retirement-Savings Puzzle?" *American Economic Review* 88(4): 769–88.
- Bernheim, D., Skinner, J. and S. Weinberg. 2001. "What Accounts for the Variation in Retirement Wealth among US Households?" *American Economic Review* 91(4): 832–57.
- Engen, Eric, William Gale, and Cori Uccello. 1999. "The Adequacy of Retirement Saving." *Brookings Papers on Economic Activity* 2: 65-165.
- Gustman, Alan and Thomas Steinmeier. 1999. "Effects of Pensions on Savings: Analysis with Data from the Health and Retirement Study." *Carnegie-Rochester Conference Series on Public Policy* 50(June): P271-324.
- Hurd, Michael and Susann Rohwedder. 2003. "The Retirement Consumption Puzzle: Anticipated and Actual Declines in Spending at Retirement." Working Paper 9586. Cambridge, MA: National Bureau of Economic Research.
- Juster, F. Thomas and Richard Suzman. 1995. "An Overview of the Health and Retirement Study." *Journal of Human Resources* 30(Supplement): pp. S7-S56.
- Mitchell, Olivia S., James M. Poterba, Mark J. Warshawsky, and Jeffrey R. Brown. 1999. "New Evidence on the Money's Worth of Individual Annuities." *American Economic Review* 89(5): 1299-1318.
- Munnell, Alicia H., Jean-Pierre Aubry, Josh Hurwitz, and Laura Quinby. 2011. "How Prepared Are State and Local Government Workers for Retirement?" Working Paper 2011-15. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Palmer, Bruce A. Palmer. 2008. "2008 GSU/AON RETIRE Project Report." Research Report Series No. 08-1 (June). Atlanta, GA: J. Mack Robinson College of Business, Georgia State University.
- Scholz, John Karl, Ananth Seshadri, and Surachai Khitatrakun. 2004. "Are Americans Saving 'Optimally' for Retirement?" Working Paper 10260. Cambridge, MA: National Bureau of Economic Research.
- State of Maine Unified Retirement Plan Task Force. 2010. *Task Force Study and Report: Maine State Employee and Teacher Unified Retirement Plan*. Augusta, ME.
- University of Michigan. *Health and Retirement Study* (HRS), 1992-2008. Ann Arbor, MI.

---

# APPENDIX

---

## REPLACEMENT RATES CALCULATED ON THE BASIS OF INFLATION-ADJUSTED ANNUITIES

TABLE A1. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR INDIVIDUAL WORKERS BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	29.2	32.4	27.6	26.4	27.8	26.5	23.4
Social Security + pensions <sup>b</sup>	38.9	32.4	43.7	50.1	43.7	49.0	63.5
Addendum: percent of sample	76	35	41	24	10	8	6

TABLE A2. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR HOUSEHOLDS BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	32.0	35.7	30.9	29.3	29.7	29.4	28.3
Social Security + pensions <sup>b</sup>	43.5	35.7	47.0	51.9	43.8	52.0	62.7
Addendum: percent of sample	67	24	43	33	13	11	9

TABLE 4. MEDIAN REPLACEMENT RATES<sup>a</sup> FOR HOUSEHOLDS, INCLUDING FINANCIAL ASSETS, BY EMPLOYMENT HISTORY

Retirement income source	Private sector			State-local sector			
	All	Without pensions	With pensions	All	Percent of career spent in state-local sector		
					1-15%	15-50%	>50 %
Social Security	30.3	34.0	29.1	27.1	27.8	27.3	25.8
Social Security + pensions <sup>b</sup>	41.5	34.0	44.6	48.3	40.6	48.9	58.3
Social Security + pensions <sup>b</sup> + Financial assets <sup>c</sup>	47.3	40.5	50.3	55.3	48.0	54.9	66.4

<sup>a</sup> The denominator is the individuals' top five years of earnings indexed for inflation.

<sup>b</sup> For those with pension coverage, IRA assets are included in defined contribution wealth; for those without pension coverage, IRA assets are classified as part of financial assets.

<sup>c</sup> The real return on financial assets is assumed to be 2.3 percent.

Source: Authors' calculations from 1992-2008 HRS.

## 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 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.

## AFFILIATED INSTITUTIONS

American Enterprise Institute  
The Brookings Institution  
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://crr.bc.edu>

