CENTER for RETIREMENT RESEARCH at BOSTON COLLEGE

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HOW MUCH TO SAVE FOR A SECURE RETIREMENT

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Introduction

One of the major challenges facing Americans today is how to prepare for a secure retirement. While market ups and downs are unpredictable, people do have control over work and saving decisions that can significantly improve their retirement prospects. This *brief* uses a simple model to estimate what percent of earnings an individual must save to ensure a financially secure retirement depending on when he starts saving, when he retires, and how he invests his retirement savings.

The *brief* begins by describing the target replacement rate – retirement income relative to pre-retirement earnings – required to maintain pre-retirement living standards. The second section describes the simple model. The third section summarizes the results for individuals with average earnings. The fourth section discusses how the results differ for those with lower and higher earnings. The final section concludes that the age at which one begins to save and the age at which one retires are pivotal decisions in determining the required saving rate and can make the difference between a secure or insecure retirement. The Appendix contains detailed tables of the required saving rates for various levels of earnings.

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.[1] 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.

People clearly need less than their full pre-retirement earnings to maintain their standard of living once they stop working. First, they pay less in taxes. They no longer pay Social Security and Medicare payroll taxes, and they pay lower federal income taxes because – at most – only a portion of their Social Security benefits are taxable.[2] Second, they no longer need to save for retirement. Finally, most pay off their mortgage before they retire, or soon thereafter. A final factor often mentioned is the absence of work-related expenses, such as clothing and transportation. Although this often tops many analysts' lists, it is relatively small compared to taxes, saving, and the mortgage.

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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.[3] As of 2008, the Project estimated that households with earnings of $50,000 and over needed about 80 percent of pre-retirement earnings to maintain the same level of consumption (see Table 1). Households earning less needed a higher percentage, because they generally save very little for retirement and pay much less tax while working.

Table 1. Percent of Pre-Retirement Earnings 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).

Calculating Required Saving Rates

The question is how much individuals would have to save to end up with an 80-percent replacement rate. The answer depends on a number of factors.

- Earnings level. The lower the earnings the greater the portion provided by Social Security and the lower the individual's required saving rate.
- Rate of return. The higher the rate of return on assets, the lower the required saving rate.
- Age when saving begins. The earlier the individual starts saving, the lower the required rate for any given retirement age.
- Age of retirement. The later the individual retires, the lower the required rate.

The first step in determining the required saving rate is to calculate the percent of pre-retirement earnings that Social Security will replace. The Social Security Trustees publish the percent of earnings that Social Security will replace at age 65 and at the eventual Full Retirement Age of 67 for low, medium, high, and maximum earners (see Table 2).[4] Replacement rates for other ages from 62 to 70 were calculated using the appropriate actuarial adjustment for early retirement or delayed retirement credit for later retirement.[5]

Table 2. Current Law Social Security Replacement Rates, 2030 and Later

Earnings level	Age	
	67	65
Low	55.2%	48.9%
Medium	40.9	36.3
High	33.9	30.0
Maximum	27.2	23.9

Source: U.S. Social Security Administration (2010), Table F10.

The next step is to subtract Social Security's replacement rate from 80 percent to determine the percent of earnings that must be replaced by individual savings. The required saving rate will depend on the real return earned on accumulated assets, when the individual begins saving, and when the individual retires. (As most saving in the United States is done through employer-sponsored plans – primarily 401(k)s – the required saving rate should be viewed as the combined employer-employee contribution rate.) The real rates of return are assumed to range from 1 percent to 7 percent; all individuals are assumed to be age 25 in 2010 and start saving at either ages 25, 35, or 45; and retirement ages are assumed to range from 62 to 70.

The final issue is to determine the income drawn from retirement savings. The calculations in this *brief* assume the "4-percent rule." That is, an individual who retires at age 65 annually withdraws 4 percent of savings attained in that year. Those who retire earlier would withdraw somewhat less and those who retire later somewhat more.[6] Another option would be to purchase an inflation-indexed annuity, which yields very similar results.

An example will clarify the calculation. Take the case of an individual who is 25 in 2010, earns Social Security's medium earnings of $43,000, and retires at the Full Retirement Age of 67 in 2052. Under current law, Social Security will replace 41 percent of this individual's final inflation-adjusted earnings of $71,000;[7] so the individual has to save enough to replace 39 percent (80 percent minus 41 percent), or about $27,700. With the 4-percent rule, the individual

needs just under $660,000 in 2052. If the individual starts saving at 35 and earns a real return of 4 percent, he will need to save 18 percent of earnings each year. The following section describes the results for the average earner under other scenarios.

Required Saving Rates for the Medium Earner

The required saving rates for the medium earner, assuming a rate of return of 4 percent are presented in Table 3. (The Appendix presents the full results for the four levels of earnings, the three starting ages, the nine retirement ages, and seven rates of return on savings.) Two messages stand out. First, starting to save at age 25, rather than age 45, cuts the required saving rate by about two thirds. Second, delaying retirement from age 62 to age 70 also reduces the required saving rate by about two thirds. As a result, the individual who starts at 25 and retires at 70 needs to save only 7 percent of earnings to achieve an 80-percent replacement rate at retirement, roughly one tenth of the rate required of an individual who starts at 45 and retires at 62 – an impossible 65 percent.[8] But note that even that individual who starts at 45 has a plausible 18 percent required saving rate if he postpones retirement to age 70.

Table 3. Saving Rate Required for a Medium Earner to Attain an 80-Percent Replacement Rate with a 4-Percent Rate of Return

Retire at:	Start saving at		
	25	35	45
62	22%	35%	65 %
65	15	24	41
67	12	18	31
70	7	11	18

Source: Authors' estimates.

Retiring later is an extremely powerful lever for several reasons. First, because Social Security monthly benefits are actuarially adjusted, they are over 75 percent higher at age 70 than age 62. As a result, they replace a much larger share of pre-retirement earnings at later ages – 29 percent at 62 and 52 percent at 70 in our example – reducing the amount required from savings. Second, by postponing retirement, people have additional years to contribute to their 401(k) and allow their balances to grow. Finally, a later retirement age means that people have fewer years to support themselves on their accumulated retirement assets.

Up to now, the rate of return on assets has been held at 4 percent. Table 4 shows the impact of lower and higher rates of return for individuals who start at age 35. The 2-percent return is slightly less than the long-run rate of return on intermediate-term government bonds and the 6-percent return is slightly less than the long-run rate of return on large cap stocks. While higher returns require smaller contribution rates, they also come with increased risk. Even ignoring risk, the required saving differentials are less than those associated with dates for starting to save and the age of retirement. In fact, an individual can offset the impact of a 2-percent return instead of a 6-percent return by retiring at 67 instead of 62.

Table 4. Saving Rate Required for a Medium Earner to Attain an 80-Percent Replacement Rate with a Starting Age of 35, by Rate of Return

Retire at:	Real rate of return		
	2%	4%	6%
62	46%	35%	26 %
65	32	24	17
67	26	18	13
70	16	11	7

Source: Authors' estimates.

Required Saving Rates for Low and Maximum Earners

The story for low earners and maximum earners differs primarily because of Social Security. Under current law, at age 67 Social Security will replace 55 percent of pre-retirement earnings for our low earners and 27 percent of those earning the taxable maximum.

Lower Earners

Table 5 on the next page shows that lower earners have relatively modest required saving rates if they start early and, more importantly, if they postpone their retirement dates.

Table 5. Saving Rate Required for a Low Earner to Attain an 80-Percent Replacement Rate with a 4-Percent Rate of Return

Retire at:	Start saving at		
	25	35	45
62	18%	28%	52 %
65	11	17	30
67	8	12	20
70	3	4	7

Source: Authors' estimates.

Maximum Earners

Table 6 shows that individuals earning the taxable maximum over their lifetime require savings that far exceed the typical 401(k) arrangement of a 6-percent employee contribution with a 3-percent employee match. Even those who postpone retirement until age 70 will be required to save between 12 to 29 percent of earnings. But postponing retirement is the most effective way to get required saving rates into the realistic realm – particularly for those who begin saving later.

Table 6. Saving Rate Required for a Maximum Earner to Attain an 80-Percent Replacement Rate with a 4-Percent Rate of Return

Retire at:	Start saving at		
	25	35	45
62	26%	42%	77 %
65	19	30	53
67	16	25	42
70	12	17	29

Source: Authors' estimates.

These outcomes, of course, vary by the rate of return. But as can be seen in the Appendix, the effect of the rate of return on required saving rates, for workers at all earnings levels, is smaller than the effect of the age at which saving starts and, especially, the age of retirement.

Conclusion

People often ask how much individuals have to save for a secure retirement. This exercise takes an 80-percent replacement rate as the goal, assumes Social Security benefits remain as promised under current law, then calculates the required saving rates for individuals at different earnings levels, at different starting and ending ages, and at different rates of return. It would be easy to assume a different target replacement rate or different levels of Social Security replacement. Such changes, however, are unlikely to alter the basic message: starting early and working longer are far more effective levers for gaining a secure retirement than earning a higher return. This strategy of saving for a longer period of time is especially effective given the greater risk that comes from attempting to earn that higher return. And the further along an individual is in his career, the more effective working a few years longer becomes.

Endnotes

1 Technically people are interested in smoothing marginal utility, not consumption. If additional leisure enables the household to attain the same marginal utility at lower levels of consumption, it may be optimal to accept lower consumption after retirement. This is one explanation for 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).

2 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.

3 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.

4 See "Early or Late Retirement?" http://www.ssa.gov/OACT/quickcalc/early_late.html.

5 The low earner has career average earnings equal to about 45 percent of the national average wage index (AWI). The medium earner has career average earnings equal to about 100 percent of the AWI. The high earner has career average earnings equal to about 160 percent of the AWI. The AWI in 2010 was $43,084 and maximum taxable earnings were $106,800. Thus, the low-wage worker would earn $19,388 and the high-wage worker would earn $68,934.

6 We assume that, at retirement, households adopt a relatively conservative portfolio allocation invested mostly in bonds. Bengen (1994) shows that households adopting this strategy face a relatively low risk of outliving their wealth. We assume that the appropriate percentage drawdown rate is not affected by realized returns during the accumulation phase (i.e., that realized returns do not provide information about the distribution of prospective returns).

7 Wages are assumed to grow at 1.2 percent. This assumption is used by the Social Security Trustees (U.S. Social Security Administration, 2010) for the economy as a whole. Individual workers may experience more rapid increases as they gain seniority in jobs. More rapid wage growth will increase the required saving rate, all else equal.

8 A more sophisticated analysis would adjust the target replacement rate. That is, if an individual were indeed saving 48 percent of earnings, he would be living on 52 percent. The 80 percent target would no longer be relevant.

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APPENDIX

Table A1. Saving Rate Required for a *Low Earner* ($19,388 in 2010) to Attain an 80-Percent Replacement Rate, By Starting Age, Retirement Age, and Rate of Return

Start to contribute at age 25

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	31%	26%	22%	18%	14%	11%	9%
63	28	23	19	15	12	10	8
64	24	20	16	13	11	8	7
65	20	17	13	11	9	7	5
66	18	14	12	9	7	6	4
67	15	12	10	8	6	5	4
68	11	9	7	6	5	3	3
69	8	7	5	4	3	2	2
70	5	4	3	3	2	2	1

Start to contribute at age 35

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	42%	37%	33%	28%	24%	21%	18%
63	37	33	28	24	21	18	15
64	33	28	24	21	18	15	13
65	27	23	20	17	14	12	10
66	23	20	17	14	12	10	8
67	19	16	14	12	10	8	7
68	15	13	11	9	7	6	5
69	11	9	8	6	5	4	4
70	7	6	5	4	3	3	2

Start to contribute at age 45

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	67%	62%	57%	52%	48%	44%	40%
63	57	53	48	44	40	37	33
64	49	45	41	37	34	31	28
65	40	36	33	30	27	24	22
66	34	31	28	25	22	20	18
67	27	25	22	20	18	16	14
68	21	19	17	15	13	12	10
69	15	13	12	11	9	8	7
70	10	8	7	7	6	5	4

Note: The low earner has career average earnings equal to about 45 percent of the national average wage index.
Source: Authors' calculations.

Table A2. Saving Rate Required for a *Medium Earner* ($43,084 in 2010) to Attain an 80-Percent Replacement Rate, By Starting Age, Retirement Age, and Rate of Return

Start to contribute at age 25

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	39%	32%	27%	22%	18%	14%	11%
63	35	29	24	20	16	13	10
64	32	27	22	18	14	11	9
65	28	23	19	15	12	9	7
66	26	21	17	14	11	8	7
67	23	19	15	12	9	7	6
68	20	16	13	10	8	6	5
69	17	14	11	9	7	5	4
70	15	12	9	7	6	4	3

Start to contribute at age 35

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	53%	46%	40%	35%	30%	26%	22%
63	48	42	36	31	27	23	20
64	43	37	32	28	24	20	17
65	37	32	28	24	20	17	14
66	34	29	25	21	18	15	12
67	30	26	22	18	15	13	11
68	26	22	19	16	13	11	9
69	22	19	16	13	11	9	7
70	19	16	13	11	9	7	6

Start to contribute at age 45

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	83%	77%	71%	65%	60%	55%	50%
63	73	67	62	56	52	47	43
64	65	59	54	49	45	40	37
65	56	51	46	41	37	34	30
66	50	45	40	36	33	29	26
67	43	39	35	31	28	25	22
68	37	33	30	26	23	21	18
69	31	28	25	22	19	17	15
70	26	23	20	18	16	14	12

Note: The medium earner has career average earnings equal to about 100 percent of the average wage index.
Source: Authors' calculations.

Table A3. Saving Rate Required for a *High Earner* ($68,934 in 2010) to Attain an 80-Percent Replacement Rate, By Starting Age, Retirement Age, and Rate of Return

Start to contribute at age 25

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	43%	36%	29%	24%	19%	16%	13%
63	39	33	27	22	17	14	11
64	36	30	24	20	16	12	10
65	32	27	22	17	14	11	8
66	30	24	20	16	12	10	8
67	27	22	18	14	11	9	7
68	25	20	16	12	10	7	6
69	22	18	14	11	8	6	5
70	19	15	12	9	7	6	4

Start to contribute at age 35

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	58%	51%	44%	38%	33%	29%	25%
63	53	46	40	35	30	25	22
64	48	42	36	31	26	23	19
65	43	37	32	27	23	19	16
66	39	34	29	24	21	17	14
67	35	30	26	22	18	15	13
68	32	27	23	19	16	13	11
69	28	24	20	17	14	11	9
70	25	21	17	14	12	10	8

Start to contribute at age 45

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	91%	84%	77%	71%	65%	60%	55%
63	81	75	68	63	57	52	47
64	73	66	61	55	50	45	41
65	64	58	52	47	43	39	35
66	57	52	47	42	38	34	30
67	51	46	41	37	33	29	26
68	45	40	36	32	28	25	22
69	39	35	31	27	24	21	19
70	34	30	27	23	21	18	16

Note: The high earner has career average earnings equal to about 160 percent of the average wage index.
Source: Authors' calculations.

Table A4. Saving Rate Required for a *Maximum Earner* ($106,800 in 2010) to Attain an 80-Percent Replacement Rate, By Starting Age, Retirement Age, and Rate of Return

Start to contribute at age 25

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	46%	38%	32%	26%	21%	17%	14%
63	43	35	29	24	19	15	12
64	40	33	27	22	17	14	11
65	36	30	24	19	15	12	10
66	34	28	22	18	14	11	8
67	31	25	20	16	13	10	8
68	29	23	18	14	11	9	7
69	26	21	17	13	10	8	6
70	24	19	15	12	9	7	5

Start to contribute at age 35

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	63%	55%	48%	42%	36%	31%	27%
63	58	50	44	38	32	28	24
64	53	46	40	34	29	25	21
65	48	42	36	30	26	22	18
66	44	38	32	28	23	20	16
67	41	35	29	25	21	17	14
68	37	31	26	22	18	15	13
69	33	28	24	20	16	13	11
70	30	25	21	17	14	12	10

Start to contribute at age 45

Retire at:	Rate of return						
	1%	2%	3%	4%	5%	6%	7%
62	98%	91%	84%	77%	71%	65%	59%
63	89	81	75	68	62	57	52
64	80	73	67	61	55	50	45
65	71	65	59	53	48	43	39
66	65	59	53	47	43	38	34
67	58	52	47	42	38	33	30
68	52	47	42	37	33	29	26
69	47	42	37	33	29	25	22
70	42	37	33	29	25	22	19

Note: The maximum earner has career average earnings equal to Social Security's taxable wage ceiling.
Source: Authors' calculations.

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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.

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