

Replacement Rate/Savings Rate Converter

Assumptions

Retirement Age	65
Pre-Retirement Investment Return	7%
Salary Increase Rate	5%
Mortality age 48-65	0.75%
Annuity Factor	16

Some readers may note that 7% is less than the 9.6% average return of large cap stocks over 1926-2008 and others may note that it is higher than the negative return over 1999-2008. The return assumption was developed based on current long-term US Treasury yields (about 4.5%), an equity risk premium of 3.5%, and an assumption that the employee will invest 70% of his portfolio in stocks on average. The salary increase assumption is based on a 2.5% expected inflation implied by the yields on nominal Treasury Bonds vs. TIPS plus a 1% across-the-board real increase, plus 1.5% for promotions. The ratio of the return and salary increases is the only thing that matters, so an increase in expected inflation that raised both or rapid economic growth that raised both in real terms would just cancel out. We assumed that at retirement participants will buy inflation-indexed annuities that are hedged by the sponsor with TIPS providing a real yield of 2%.

Replacement Rate

	Years over which you save								
% of Pay Saved	5	10	15	20	25	30	35	40	45
2%	1%	1%	2%	3%	4%	5%	6%	7%	9%
4%	1%	3%	4%	6%	8%	10%	12%	14%	17%
6%	2%	4%	6%	9%	12%	15%	18%	22%	26%
8%	3%	5%	8%	12%	15%	19%	24%	29%	34%
10%	3%	7%	10%	15%	19%	24%	30%	36%	43%
12%	4%	8%	13%	18%	23%	29%	36%	43%	51%
14%	4%	9%	15%	21%	27%	34%	42%	51%	60%
16%	5%	11%	17%	23%	31%	39%	48%	58%	69%
18%	6%	12%	19%	26%	35%	44%	54%	65%	77%
20%	6%	13%	21%	29%	39%	49%	60%	72%	86%

Required Savings Rate

	Years over which you save								
Desired Rep Rate	5	10	15	20	25	30	35	40	45
5%	16%	8%	5%	3%	3%	2%	2%	1%	1%
10%	32%	15%	10%	7%	5%	4%	3%	3%	2%
15%	47%	23%	14%	10%	8%	6%	5%	4%	4%
20%	63%	30%	19%	14%	10%	8%	7%	6%	5%
25%	79%	38%	24%	17%	13%	10%	8%	7%	6%
30%	95%	45%	29%	20%	16%	12%	10%	8%	7%
35%	111%	53%	33%	24%	18%	14%	12%	10%	8%
40%	126%	60%	38%	27%	21%	16%	13%	11%	9%
45%	142%	68%	43%	31%	23%	18%	15%	12%	11%
50%	158%	75%	48%	34%	26%	21%	17%	14%	12%
55%	174%	83%	53%	37%	29%	23%	18%	15%	13%
60%	189%	90%	57%	41%	31%	25%	20%	17%	14%
65%	205%	98%	62%	44%	34%	27%	22%	18%	15%

Required Savings Rate to Replace 35% of Pay Until Age 65 (Average Soc Sec Benefit is About 35%)

Age at Retirement	Years over which you save							
	5	10	15	20	25	30	35	40
48	91%	43%	27%	20%	15%	12%	N/A	N/A
50	82%	39%	25%	18%	13%	11%	N/A	N/A
52	73%	35%	22%	16%	12%	9%	N/A	N/A
54	63%	30%	19%	14%	10%	8%	7%	N/A
56	53%	25%	16%	11%	9%	7%	6%	N/A
58	42%	20%	13%	9%	7%	6%	4%	4%
60	31%	15%	9%	7%	5%	4%	3%	3%
62	19%	9%	6%	4%	3%	2%	2%	2%
64	7%	3%	2%	1%	1%	1%	1%	1%

Deferral Years

5	1.0989
10	1.2077
15	1.3271
20	1.4584
25	1.6027
30	1.7613
35	1.9356
40	2.1271
45	2.3375

These factors apply if you save early in your career and then stop saving. For example, if you save 10% for 20 years from age 20 to age 40 and then stop saving, but wait to collect your benefit until age 65, you would replace:

10% savings for 20 years	16%
Deferral Factor	1.6027
Total Replacement Rate	26%

All of the figures on these tables assume that you are trying to replace a given percentage of your pre-savings income. For small savings rates, this doesn't matter, but can make a big difference at large savings rates. To give an extreme example, suppose that you work for one year making \$52,000 and are able to live so frugally that you spend only \$2,000 and save \$50,000. At a young age, you might be able to invest \$50,000 and turn it into a reliable annual income stream of \$2,000. While this will replace only $\$2,000 / \$52,000 = 4\%$ of your pre-retirement income, it will replace 100% of your pre-retirement spending and therefore (if you can truly live on \$2,000) it should be enough. In the tables above, we would display this as a 4% replacement rate.