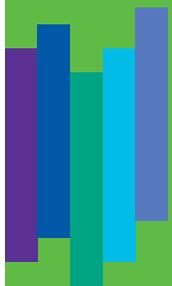


**INVESTMENT PRINCIPLES**  
INFORMATION SHEET FOR CFA PROFESSIONALS

**EVALUATING YOUR  
FINANCIAL NEEDS**

**HOW MUCH  
MUST BE SAVED  
TO RETIRE WELL**



5D |

## **IMPORTANT NOTICE**

The term "financial advisor" is used here in a general and generic way to refer to any duly authorized person who works in the field of financial services, including the following:

- Investment brokers
- Mutual fund brokers
- Scholarship plan dealers
- Exempt market dealers
- Portfolio managers
- Investment fund managers
- Life insurance agents
- Financial planners (F.Pl.)



Copyright © 2016 CFA Montreal. All rights reserved.  
Reproduction in whole or in part without written permission of  
CFA Society Montreal is prohibited.

# HOW MUCH MUST BE SAVED TO RETIRE WELL

How much must an investor save periodically to fund a comfortable retirement? This is not a simple question. There are many relevant variables to consider, but it is possible to develop a reasonable estimate that will give an indication of the scope of the savings effort that is required. Because there are so many unknowns, it must be periodically re-evaluated, especially when the investor's profile changes significantly. Unfortunately, the amount required is often much more than most individuals expect.

## THE MOST RELEVANT VARIABLES

The following are the most important variables that must be considered to answer this question:

- What is the current amount of accumulated savings and how is it distributed between taxable and non-taxable accounts?
- If the amount is nil, when will the savings effort start?
- What is the scope of the tax-exempt or tax-deferred opportunities that are available?
- How are the investor's income, lifestyle, and responsibilities expected to evolve? How will these changes affect his ability to save over time?
- Will the investor be able to combine his financial resources with those of a partner or spouse?
- What other sources of income are expected, apart from those resulting from personal savings?
- What is the average expected return on investment?
- What is the expected volatility and pattern of future returns?
- What is the planned retirement age?
- How much after-tax income is needed in retirement?
- What is the assumed life expectancy?

The situation of each individual is different. For example, some individuals may be on a career path that will lead to a significant increase in real (inflation-adjusted) income over time, whereas others may have a job with income that will simply keep pace with inflation. Some will have no children and have the benefit of a double income, whereas others may have several children whom they may put in private schools and help through college on a single income. Some may receive a substantial inheritance and benefit from an employer pension plan whereas others are entirely on their own and may have the responsibility of caring for a family member. Some may have been lucky enough to live in an environment where financial returns were very favourable and stable, whereas others may have planned to retire just before a market crash occurred. Finally, although our lifestyle certainly has an impact on our life expectancy and health, we certainly do not have full control over this aspect. Unfortunately, many retirement calculators oversimplify the challenge of estimating what must be done to fund a reasonable retirement, ignore performance uncertainty, and make implicit assumptions that are not transparent to the user. Thus their recommendations are difficult to take at face value.

How much income is required during retirement is clearly an issue of lifestyle and circumstances. Advisors often say that an income-replacement level of 70% is sufficient for a couple. Assuming the house is paid for (there are no rent payments), that there are no more contributions to children's education, and no further savings are required, it may even be possible to live on less than 70% of the previous income. Some research shows that most couples in such a situation are comfortable on less than 60% of their previous income. Furthermore, a retiree living alone will still need at least 70% of the income required for a retired couple. But these are only guidelines. Individuals approaching retirement should evaluate their financial needs on the basis of their own recent experience.

The following two tables present the input (assumptions) from the Excel tool.

### SIMPLE RETIREMENT CALCULATOR

Assumes Identical Asset Class Allocation in Taxable and Non Taxable Accounts

	Tax Rates & Turnover
Interest / Foreign Dividends	40%
Domestic Dividends	20%
Capital Gains	20%
Equity Turnover	40%

### THE LEVEL OF RETIREMENT INCOME MY SAVINGS WILL PROVIDE

A qualified advisor can help design a plan that takes into account the investor's specific characteristics and requirements. Because we cannot adapt this document to every situation, we will concentrate on the following question:

**What level of income at retirement can be expected from each \$1,000 of yearly savings (in real terms)?**

We will adjust this answer according to several parameters, including:

- the number of years of savings before retirement;
- the life expectancy after retirement;
- the asset allocation (the portfolio's expected return); and
- the efficiency of making full use of non-taxable programs.

Assuming the investor has already estimated the income he can expect at retirement from other sources (government and employer pension plans and even family support), this information will provide an estimate of the periodic savings required to reach the total amount of income needed during retirement and the importance of using non-taxable accounts to their full extent. This analysis can even be done on an Excel spreadsheet. In fact, we have built a simple Excel spreadsheet for illustration purposes. But a complete analysis would require investment planning software that can handle variable yearly contributions (for example, that will adjust contributions once the mortgage is fully paid or the kids have finished school), manage the asset location and asset allocation over time, integrate the impact of return uncertainty (not to be ignored), and consider different income alternatives (at retirement) and risk management features. The impact of uncertainty will be addressed in the next document.

Annual Savings Non-Taxable	\$1,000
Current Assets Non-Taxable	\$0
Annual Savings Taxable	\$1,000
Current Assets Taxable	\$0
Inflation Rate	2.0%

	Weight Investment Period	Weight Retirement Period	Income	Capital Gains	Fees	Return Before Tax Investment Period	Return Before Tax Retirement Period
<b>Fixed Income</b>	<b>30%</b>	<b>30%</b>	<b>3.00%</b>	<b>0.00%</b>	<b>1.00%</b>	<b>2.00%</b>	
<b>Domestic Equities</b>	<b>40%</b>	<b>40%</b>	<b>2.00%</b>	<b>5.00%</b>	<b>1.00%</b>	<b>6.00%</b>	
<b>Foreign Equities</b>	<b>30%</b>	<b>30%</b>	<b>2.00%</b>	<b>5.00%</b>	<b>1.00%</b>	<b>6.00%</b>	
<b>Portfolio</b>	<b>100%</b>	<b>100%</b>	<b>2.30%</b>	<b>3.50%</b>	<b>1.00%</b>	<b>4.80%</b>	<b>4.80%</b>
<b>Adjustment for Diversification Impact and Rebalancing</b>						<b>0.25%</b>	<b>0.25%</b>
<b>Real Return (inflation-adjusted)</b>						<b>3.05%</b>	<b>3.05%</b>
<b>Overall Tax Drain</b>						<b>1.15%</b>	<b>1.15%</b>
<b>Total Real Return After Tax</b>						<b>1.90%</b>	<b>1.90%</b>

The upper-left corner of the first table presents the assumed tax rates and equity turnover. In the upper-right section, the tool allows for the specification of annual contributions to taxable and non-taxable accounts and for the inflation-rate assumption. If it were a tax-deferred account instead of a non-taxable account, the contribution would have to be specified on an after-tax basis. For example, as we explained in 4b, a \$1,000 contribution to a tax-deferred account is equivalent to a \$600 contribution to a tax-exempt account, assuming a 40% tax rate. In this case, we have assumed two (after-tax) annual contributions of \$1,000 to each type of account. The contributions are assumed to match inflation over time.

The second table specifies the portfolio allocation during the accumulation period (savings) and the decumulation period (retirement) using three assets: domestic fixed income, domestic equities, and foreign equities. A standard allocation of 70% equities and 30% fixed income is used initially for both. As explained before, a Canadian investor would likely benefit from a lower domestic equity component than suggested in this example, but the proposed allocation may be appropriate for a U.S. investor. This document also allows us to specify the expected income, capital gains, and fees for each asset class.

The portfolio could be more diversified but the principles would remain the same.

Because this analysis extends over several decades, we have used simple but reasonable assumptions for expected returns:<sup>1</sup>

- 3% for fixed income, assuming a blended portfolio of government and investment-grade corporate bonds. This return is consistent with a 2% inflation rate.
- 7% for equities, assuming 2% from dividends, 2% from inflation, and 3% from long-term growth.

The nominal return before tax but after fees (assuming total all-in fees of 1%) is 4.8%, considering the 70/30 split. An excess return of 0.25% is added to take into account the benefits of diversification and of the rebalancing process (see document 4f). We assume that the investor does in fact have the discipline to do strict periodic rebalancing. But, after inflation, the portfolio's real return before tax is only 3.05%.<sup>2</sup> Finally, the tax drain is estimated and takes into account the portfolio turnover.<sup>3</sup> The expected real return after tax is 1.90%.

<sup>1</sup> These forecasts, especially for equities, implicitly assume (as discussed in document 3b) that current market valuations are fair, neither grossly overoptimistic nor pessimistic.

<sup>2</sup> In this document and the next, we use the term "portfolio real return" to represent the return that a portfolio generates in excess of inflation.

<sup>3</sup> Although the impact of portfolio turnover on the effective tax rate is a function of return on investment and duration of the investment period, it remains in a fairly narrow range unless the investment period is very short. Furthermore, it is significant only for a very low portfolio turnover rate.

The spreadsheet presents the results for four scenarios of investment duration (20 to 35 years) and four identical scenarios of longevity after retirement. Assuming retirement at 65, a 25-year longevity assumption corresponds to a 90-year life expectancy.<sup>4</sup> At age 65, Canadians and Americans have a life expectancy of about another 25 years. But a large proportion, perhaps 30% of them, will live past the age of 90. Thus it makes sense to assume we may live longer than the average life expectancy may indicate.

The following table presents the amount of savings (second column) that will have been accumulated in real terms (in terms of current dollar value) in the taxable and non-taxable accounts and the total of both accounts. These calculations assume that the asset allocation is identical in both accounts. Although it is possible to achieve a more efficient asset location from the tax point of view, we have shown in document 4b that this approach still leads to a fairly efficient portfolio. We do not recommend this approach but it does simplify the illustration.

Non-Taxable	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$27,831	\$1,879	\$1,607	\$1,429	\$1,305	\$1,113
25	\$37,819	\$2,554	\$2,184	\$1,942	\$1,773	\$1,513
30	\$49,426	\$3,338	\$2,854	\$2,538	\$2,317	\$1,977
35	\$62,913	\$4,248	\$3,633	\$3,231	\$2,949	\$2,517

Taxable	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$24,504	\$1,484	\$1,240	\$1,079	\$964	\$980
25	\$32,209	\$1,950	\$1,630	\$1,418	\$1,268	\$1,288
30	\$40,673	\$2,463	\$2,058	\$1,790	\$1,601	\$1,627
35	\$49,970	\$3,025	\$2,528	\$2,199	\$1,967	\$1,999

Total	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$52,335	\$3,363	\$2,847	\$2,508	\$2,269	\$2,093
25	\$70,028	\$4,504	\$3,814	\$3,360	\$3,041	\$2,801
30	\$90,098	\$5,800	\$4,912	\$4,328	\$3,918	\$3,604
35	\$112,883	\$7,274	\$6,162	\$5,430	\$4,916	\$4,515

The next four columns present the annual income the investor can expect, assuming different levels of longevity. A comparison of the results for taxable and non-taxable accounts shows that making full use of the non-taxable account creates tremendous value. The calculations assume the investor maintains the same asset allocation during

retirement. This assumption may not be appropriate if these portfolios are the sole source of expected income at retirement. But a retiree who had a defined-benefit retirement plan at work could most likely afford to maintain a higher level of risk during retirement. The last column presents the annual income resulting from applying the 4% income rule.

<sup>4</sup> For information on life expectancy see: <http://www.worldlifeexpectancy.com/your-life-expectancy-by-age>

The 4% rule is a simple rule of thumb used by some advisors to guide people planning for retirement: withdraw 4% of the initial capital balance each year (adjusted for inflation) and you have excellent odds of having enough money for 30 golden years.

The 4% rule has been criticized in recent years as being too generous in a low-interest-rate environment. But the examples we provide indicate that the income level for the 35-year horizon is very similar to those resulting from the 4% rule. But, as stated previously, our analysis does not incorporate the uncertainty of future returns, among other factors. This may explain our favourable results. In document 5e, we will relax this assumption, but for now let's accept the assumption of stable returns.

**THE AMOUNT OF SAVINGS REQUIRED**

**TO GENERATE \$30,000 OF REAL**

**AFTER-TAX INCOME**

The following table presents the annual income resulting from investing \$5,000 a year in a non-taxable account and \$7,500 in a taxable account. First, it is interesting to note that the real annual income is very similar in both accounts, despite the lower contributions to the non-taxable account. Tax-free return compounding is very profitable in the long run.

Non-Taxable	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$139,156	\$9,397	\$8,036	\$7,146	\$6,524	\$5,566
25	\$189,094	\$12,769	\$10,920	\$9,710	\$8,865	\$7,564
30	\$247,128	\$16,688	\$14,271	\$12,690	\$11,585	\$9,885
35	\$314,567	\$21,242	\$18,166	\$16,153	\$14,747	\$12,583

Taxable	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$183,780	\$11,127	\$9,299	\$8,089	\$7,233	\$7,351
25	\$241,567	\$14,626	\$12,223	\$10,633	\$9,507	\$9,663
30	\$305,044	\$18,469	\$15,435	\$13,427	\$12,005	\$12,202
35	\$374,773	\$22,691	\$18,963	\$16,496	\$14,749	\$14,991

Total	Real Savings	Longevity After Retirement				4% Rule
Years of Savings		20	25	30	35	
20	\$322,936	\$20,524	\$17,335	\$15,235	\$13,756	\$12,917
25	\$430,661	\$27,395	\$23,143	\$20,343	\$18,371	\$17,226
30	\$552,172	\$35,157	\$29,706	\$26,117	\$23,590	\$22,087
35	\$689,340	\$43,933	\$37,129	\$32,649	\$29,496	\$27,574

We may also be disappointed to realize that, to achieve this target of \$30,000 of real annual income, we must save for 35 years unless we expect a lower life expectancy. Furthermore, these results are based on a portfolio that generates stable yearly returns and has a 70% allocation to equities, even during retirement. The income penalty resulting from investing in a low-risk portfolio can be substantial over decades. For example, we could illustrate that an investor allocating his entire portfolio to fixed income during the accumulation and decumulation periods would, under the same scenarios as above, extract a yearly income that would be only 35% to 55% of the income stated above. Furthermore, a single-asset-class portfolio cannot extract any excess return from the rebalancing process. Thus the assumption of a 0.25% long-term return linked to rebalancing must be removed. As we explained in the section "Why Saving Is Important", retirement is, for most individuals, the most expensive objective and it requires the most planning. Investing in an excessively conservative portfolio for decades simply compounds the challenge.

Planning for retirement is complex and involves incorporating many variables into the analysis. This document concentrates on some of these variables but many more must be considered. For example, we have ignored potential access to other sources of retirement income, the possibility of receiving an inheritance, pooling financial resources with a partner, the existence of a current pool of savings, and more effective tax management. An actual portfolio should also have more style diversification in order to better balance risks and increase the effectiveness of the rebalancing process. Finally, we have also ignored the fact that there is tremendous market uncertainty. Returns on assets are not achieved in a straight line (financial crises do occur), and retirees may need some risk-mitigating strategies to avoid outliving their savings, especially if they have no access to other financial resources. This is the topic of the next document, and it is a vital issue.