CFA Montréal

INVESTMENT PRINCIPLES

INFORMATION SHEET FOR CFA PROFESSIONALS

EVALUATING YOUR FINANCIAL NEEDS

FINANCIAL RISKS, RISK MITIGATION, AND COMMON SENSE

5E

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

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FINANCIAL RISKS, RISK MITIGATION, AND COMMON SENSE

It is much easier to build a retirement program on the assumption that real portfolio returns will be stable. The reality is somewhat more complex, as both the level of long-term portfolio return and its volatility are unknown. Moreover, the risks investors face during the accumulation and decumulation periods vary: financial risks have greater consequences toward the end of the accumulation period and during the retirement period.

For example, the impact on total financial wealth of an economic and financial crisis that occurs 15 years before retirement can most likely be reversed by the time retirement occurs. Furthermore, an individual may still have the option of working a few more years to make up for any losses if the projected wealth accumulation is not met. It is not a happy prospect but the opportunity may still be available. But imagine the situation of an individual who, in 2007, had planned to retire two years later and was setting the process in motion. Would the 2008 financial crisis have forced him to reconsider his entire plan at this crucial moment? Was it even too late to reconsider? Also, consider an individual facing the same financial crisis at the beginning of his retirement. Would this investor have panicked and sold part of his equity exposure just before the equity markets reversed course?

The financial environment toward the end of the accumulation period and especially during the first 10 years of the retirement period has a tremendous influence on the sustainable level of retirement income. Fortunately, part of this uncertainty can be managed with common sense, appropriate risk-mitigating methodologies, and the use of other financial products, such as annuities and life insurance.

THE TWO CHALLENGES FACED BY RETIREES

Retirees face two significant challenges. First, real returns on government bonds are currently low by historical standards. For example, the 4% rule, which consists of cashing-in an income amount indexed to inflation equal to 4% of original wealth, was established when real returns on Treasury bonds were as high as 2.6% on average.[1] But in recent years real returns on Treasury bonds have been much lower. Periods of negative real returns have even been observed. Lower real returns on safe assets affect expected fixed-income and equity performance alike. In the case of bonds, this situation leads to lower income yield. In the case of equities, it affects the expected capital gains. Finally, we cannot, with any certainty, make the argument that real returns on Treasury bonds will eventually rise to long-term historical levels. In fact, recent research indicates that structural forces may have reduced real returns for the foreseeable future.

Second, even if we are right about long-term return expectations, market volatility significantly reduces our ability to maintain a stable income during retirement. Consider the two following scenarios. An investor has $1 million in assets and expects to receive a stable real income (inflation adjusted) each year for 30 years. The compounded portfolio returns are 6% in each case but the patterns of performance are different. Yearly inflation is stable at 2%. The following table presents the return assumptions and the real annual investment income that the investor could expect from his portfolio.

	Scenario 1	Scenario 2
Nominal Return Year 1	-40%	6%
Nominal Return Years 2 and 3	29.1%	6%
Nominal Return Years 4-30	6.7%	6%
Compounded Return	6%	6%
Sustainable Real annual Income	$49,195	$57,280

In scenario 1, a financial crisis leads to a 40% loss in the first year. A performance of 29.1% is recorded in each of the following two years, allowing the portfolio to regain the 40% loss on a compounded basis at the end of the third year. Performances of 6.69% are recorded in the following years, leading to a 6% compounded return over 30 years. In scenario 2, the return was stable each year. Despite the fact that both scenarios have identical long-term compounded returns, the higher-volatility scenario leads to a 14% lower level of income. Retiring at the start of a bear market can be a catastrophic scenario. As we will see, the consequences can be even worse.

The analyses that follow concentrate on the decumulation period. We assume a new retiree has accumulated $1 million, divided equally between non-taxable and taxable accounts. His income plan assumes a life expectancy of 30 years after retirement. Three portfolio allocations are considered: 30-40-30 (fixed income, domestic equities, and foreign equities); 50-30-20; and 70-20-10.[2] We will refer to these portfolios as Growth, Balanced, and Conservative. Assumptions about long-term expected returns, total fees (1.0%), and taxes are as specified in document 5d. But we also consider the uncertainty of returns. The following table presents the annualized expected long-term real return after fees and taxes and the expected volatility for each portfolio allocation.[3] Volatilities are based on actual experience since the late 1970s.

	Growth	Balanced	Conservative
Expected Real Return	2.5%	1.7%	0.9%
Expected Volatility	11%	9%	8%

[1] Finke, M., Pfau, W.D., and Blanchett, D., "The 4% Rule is Not Safe in a Low-Yield World", 2013.
[2] Actual portfolios should include a diversity of styles to reduce risk and improve the efficiency of the rebalancing process.
[3] To simplify, the real-return estimate is a blended rate combining the expected after-tax return for the taxable portfolio and the untaxed return for the non-taxable portfolio.

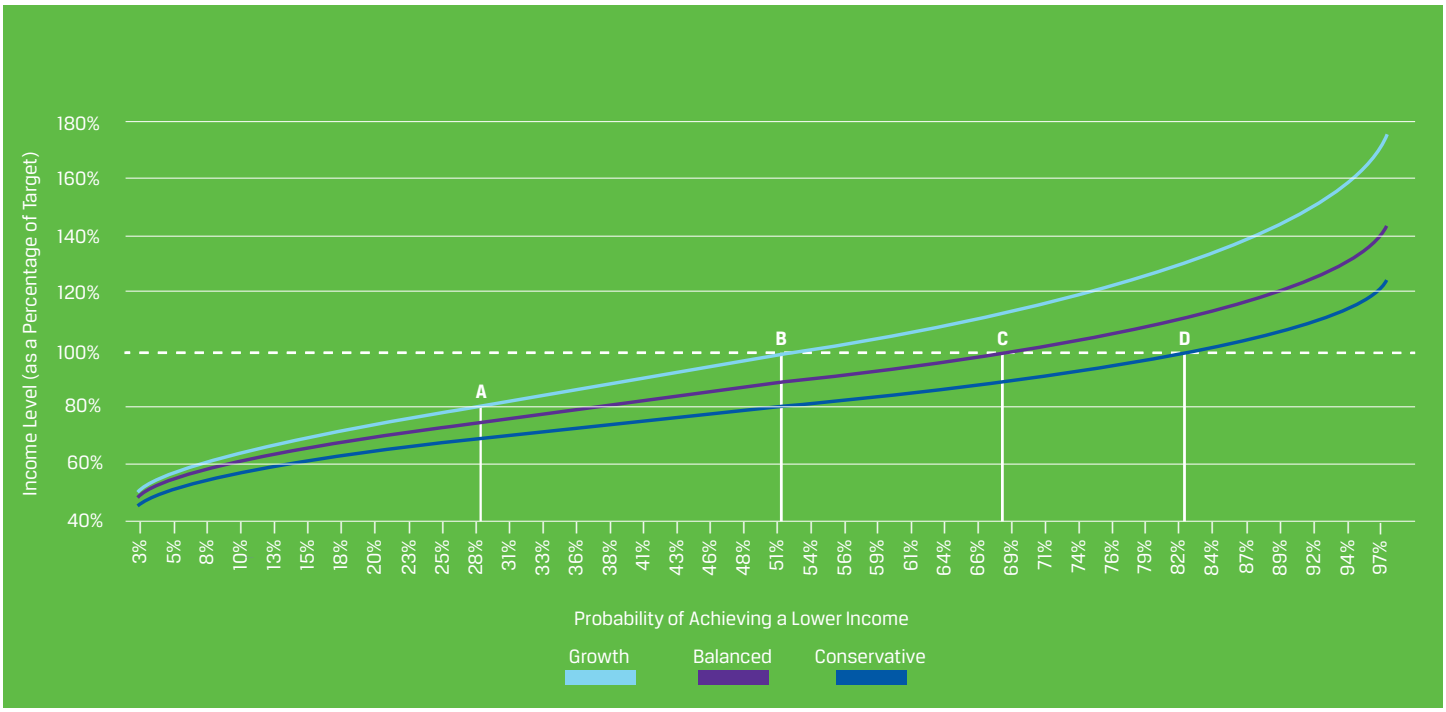
The analyses are based on a series of Monte-Carlo simulations (10,000 runs for each situation). Thus each simulation is based on 10,000 scenarios of 30 annual portfolio returns obtained from a distribution having the expected returns and volatilities specified in the table.[4] Our objectives are simple. First, we calculate the expected annual real income that can be sustained for 30 years, assuming a stable real return of 2.5%. Then we integrate return uncertainty to determine:

- the likelihood that the expected income derived from a stable real return cannot be sustained;
- the probability that the 4% income rule cannot be sustained; and
- the specific impact of the return pattern on the level of sustainable income.

Assuming a constant real rate of return of about 2.5% (resulting from the Growth allocation), an individual with a $1 million portfolio (half untaxed) could extract a real after-tax income (inflation-adjusted) of about $47,000 a year for 30 years before running out of money (or 4.7% of the initial wealth). Therefore, let's assume this is the income the retiree wishes to cash out every year. Let's also assume that the retiree maintains the same income amount whatever the asset allocation he has selected, in order to understand the consequences of running a low-risk portfolio while maintaining a high level of income.

The following figure presents the proportion of the targeted level of income of $47,000 the retiree can expect to receive in the presence of return uncertainty in order of worst to best scenarios. We have excluded from the figure the worst 2.5% and the best 2.5% of scenarios (so 9,500 scenarios are left) in order to avoid discussing extreme tail circumstances. The same information is presented for all three portfolio allocations. We can conclude the following:

SUSTAINABLE INCOME (LEVEL AND PROBABILITY)



[4] For the purpose of the simulation, the returns specified in the table (which are real compounded returns) are converted to nominal (inflation-adjusted) periodic returns.

Assuming a Growth allocation, there is about a 50% probability (see B in the figure) that an income level greater than the target amount (100% of $47,000 or more) can be sustained, hence a 50% probability that it cannot. There is also substantial downside risk. Although unlikely, some return scenarios could lead to a sustainable level of income that would be only half as much. Similarly, there is about a 25% probability (see A) that the sustainable level of income would be 80% or less than the targeted level. In these situations, if the retiree were to maintain the targeted level of income, he would run out of money well before the end of the 30-year period.

- If the portfolio is invested more conservatively while the income target is maintained, the probability of not meeting the target rises to 68% (see C) and 82% (see D) for the Balanced and Conservative portfolios, respectively. We must conclude that the target income amount must be coherent with the investment strategy.
- Even though the more conservative allocation lead to a more stable expected outcome, surprisingly, the worst-case results are not necessarily better. Although the Growth allocation is riskier, it offers better odds of achieving a specific level of lower income. We must conclude that the give-up in expected return resulting from a more conservative allocation has a significant impact on income over a period as long as 30 years. If risk is defined as the probability of not achieving a real retirement income of $47,000, then the more conservative allocation is actually riskier.

Consequently, we must also conclude that a withdrawal rate of 4.7% is imprudent, whatever the risk of the portfolio. We also tested the failure rates that would result from applying the 4% income rule. They are respectively 32%, 43%, and 59% for the Growth, Balanced, and Conservative allocations. Even a 4% withdrawal rate appears too high if the objective is to have a low probability of running out of assets.

As discussed previously, we are also interested in understanding the role played by the pattern of returns in explaining the sustainable level of yearly income. When a simulation is used, the results are affected by at least two factors:

- The compounded return realized over the entire horizon. Is it more or less than was expected?
- The pattern of returns that leads to each compounded return. How many return shocks occurred and when did they occur?

In other words, we could be right about the long-term compounded return of the portfolio but still fare miserably because of the specific pattern of return, or we could benefit from a more stable return pattern but be wrong about the long-term compounded return.

To isolate the importance of the pattern of returns, we ran the simulation for the Growth portfolio a second time but forced each set of return scenario to produce a real return of exactly 2.5%. Thus, whatever the volatility and pattern of returns generated by the simulation, the average compounded real return after fees and taxes over 30 years was 2.5%. We then compared these results with the unconstrained simulation.

The results (not given) show that the pattern of returns is more important than the level of long-term return. On average, 40% of the income gaps of unfavourable scenarios is explained by lower-than-expected real rates of return while 60% of the deficiencies can be attributed to the patterns of returns.

The simulations also show that the average portfolio returns observed during the first 10 years for the worst 25% of scenarios are a full 2% below those of the final 20 years for the same scenarios, thus illustrating that performances during those first 10 years have a significant influence on financial well-being.

A complete financial planning exercise needs to account for both the level of compounded annual return as well as its pattern. Moreover, our analysis demonstrates the importance of managing the possibility of unfavourable patterns.

HOW TO APPROACH THE UNCERTAINTY ISSUE?

To answer this question, let's clarify one aspect. In theory, there is a way not to ever run out of income but the approach may not be pleasing to retirees or implementable in real life. But the explanation will help the discussion that follows. Let's assume we invest according to the Growth portfolio allocation and use the assumption of a long-term 4.5% compounded nominal return (2.5% real return net of fees and taxes + 2% inflation). As stated previously, if the real rate of return were constant, a real income level of $47,000 could be sustained. But we cannot count on real returns to be stable or on the expected long-term real return to be exactly met. The following table illustrates two series of returns for five years. The first series assumes a stable nominal return of 4.5% while the second assumes a financial crisis followed by a recovery. The cumulative value of a $1 investment is also presented in both cases and the two values are equal after five years.

	Stable Return		Crash Scenario			
	Real Return	Cumulative Value	Real Return	Cumulative Value	Ratio	Income Amount
Year One	4.5%	$1.045	-20.0%	$0.800	77%	$36,220
Year Two	4.5%	$1.091	-15.0%	$0.680	62%	$29,470
Year Three	4.5%	$1.141	25.0%	$0.850	75%	$35,261
Year Four	4.5%	$1.193	25.0%	$1.063	89%	$42,190
Year Five	4.5%	$1.246	17.2%	$1.245	100%	$47,291

The table shows that, after one year, the markets delivered only 77% of the cumulative value that was expected. After two years it was 62%. Only after five years did the cumulative value match the long-term return expectation. A way to avoid ever running out of income would be to cash-in annually a level of income equal to the targeted amount times the ratio of targeted cumulative value that was achieved. Obviously, not all retirees have the flexibility of accepting a lower level of income. Furthermore, reducing income by more than 30% may simply not be feasible. But a combination of three approaches could be used to reduce the likelihood of running out of income in our lifetime.

First – Common Sense

It is impossible to accurately forecast expected returns and patterns of returns no matter how hard we try. What we know is that today's low real rates of return on Treasury securities are a good indication that asset returns are likely to be less than they have been historically. Investors in today's financial markets may find they need a greater allocation to corporate bonds and equities to achieve the returns they need to meet their income objective. Furthermore, we have to remain realistic both in terms of risk and expected returns. We should not overstate what can reasonably be expected in terms of retirement income.

Thus, the expected long-term real return on our investment portfolio must be reasonable and account for current market conditions. If the real rate of return on Treasury bonds is low and if the price-earnings ratio on equities is abnormally high (see document 3b), it would be difficult to foresee high average long-term returns for these assets. Furthermore, the impact of fees and taxes must be incorporated.

Second, as with any financial project, a reasonable buffer should be considered from the start. The real income target must be less than what is derived from an estimated average real return. For example, being able to tolerate a 20% decline in income during difficult periods will reduce the likelihood of exhausting the portfolio by about half. Hence a 50% likelihood of exhausting all assets is reduced to 25%. It may seem like 20% is a lot, and it is, but nevertheless we should plan our expenses to account for such possibilities. But if adverse financial conditions reverse themselves, the reduction in income could be re-evaluated.

Second – Alternatives to an Investment Portfolio Only

Investors who wish to reduce the impact of worst-case scenarios should consider income alternatives other than their investment portfolio. These alternatives imply taking advantage of instruments whose pricing is based on expected longevity, such as annuities and specific types of life insurance.

Pfau (2015) has done interesting work on the role that the Single Premium Immediate Annuity (SPIA) and Whole Life Insurance can play in a retirement strategy.[5] In his analyses, he compares three options:[6]

- Option 1: Investment Portfolio + Term Life
- Option 2: Investment Portfolio + Joint Life (couple) SPIA + Term Life
- Option 3: Investment Portfolio + Single Life SPIA + Whole Life.

Using a Monte Carlo simulation, he presents the expected wealth distribution at retirement (age 65) for individuals currently aged 35 and 50, although the discussion that follows is limited to the first case. He then estimates the distribution of total income from all sources at age 66 as well as the legacy wealth at age 66 and 100. As should be obvious, purchasing insurance reduces the ability to grow the investment portfolio during the accumulation period and purchasing an annuity reduces the size of the investment portfolio during the decumulation period.

Option 2 or option 1 — which is better? Because the payout on an SPIA is largely dependent on expected longevity, the contractual payout rate per dollar of purchased annuity is fairly high at 6.7% for a single life and 5.6% for both.[7] But part of the high payout is explained by the fact that it is not inflation-adjusted. For example, in our previous example, we assumed that the real income payout rate on the investment portfolio would be 4.7% if we assumed a stable 2.5% real return. If we remove the inflation adjustment, the nominal income payout rate will be 6.1%. Assuming that the insurance company stays in business (government guarantees on annuity contracts are usually not offered), the payout received under the annuity contract will be as specified for as long as the individual or both spouses live, whereas the one expected under the investment portfolio remains uncertain and lower in most cases. But the drawback is that an annuity leaves no legacy wealth.

The results show that a strategy that combines an investment portfolio and an SPIA can improve the total income during retirement at the expense of less legacy wealth. This may help create the return buffer that was discussed in the previous document.

Option 3 or option 2 — which is better? Option 3 replaces the joint-life SPIA by a single-life SPIA because of the existence of a Whole Life policy purchased when the retiree is 35 years old. Thus the payout ratio on the annuity is higher, and the spouse is protected and compensated against adverse events through the Whole Life policy. The Whole Life policy offers a minimum death benefit that will grow over time, its premium is eventually covered by the policy dividends, and its cash value also increases over time. Since the Whole Life policy acts as a sort of fixed-income asset, the asset allocation integrates this aspect, meaning the investment portfolio is more heavily weighted with equities.

The results show that option 3 has income benefits similar to those of option 2 but the legacy impact is much more significant. In some cases, it is even greater than with option 1.

Financial innovation may give rise to other insurance-type products that could be more appropriate. The point we have tried to make is simply that introducing some insurance products in combination with an investment portfolio can help mitigate the risk of outliving one's savings.

Third – Risk Management

This is an aspect that is not well covered in the literature. We have long made the argument that it is difficult to forecast asset returns, but we also argued in document 3f that effective rebalancing approaches improve compounded returns. Some rebalancing approaches are risk-based. These approaches rely on forecasts of volatility and dependence (correlations) to manage total portfolio risk (allocation).

For example, some rebalancing approaches seek to maintain constant portfolio volatility, whereas others seek to cap portfolio volatility at a maximum level. Finally, unlike return forecasts, which have proved to be unreliable most of the time, risk forecasts have proved to be much more accurate. Eventually, these approaches could be used to help manage the risk of decumulation.

[5] Pfau, W.D. (2015), "Optimizing Retirement Income by Combining Actuarial Science and Investments," One America Financial Partners.
[6] Going through all the details of these analyses is beyond the scope of this document; interested parties should read the Pfau article.
[7] It is worth noting that Pfau assumes in his analyses that the annuity payout rate is 1% above the rate available on average in early 2015 because he makes the assumption that the real rate on Treasury bonds will be at least 1% higher in 30 years when the 35-year-old individual retires.

The Role of Target-Date Funds

Target-date funds (TDFs) are investment funds that invest in a mix of assets and gradually shift the asset allocation to gradually reduce market risk as each individual approaches his target retirement date. For example, such funds may have an allocation to equities as high as 80% or more when the investor is 20 years from retirement, but the allocation may be reduced to about 50% as the investor approaches retirement, and it may be further reduced after retirement (in the case of TDFs that offer postretirement solutions). Thus these products assume that the main determinant of strategic asset allocation is the time to retirement or the time after retirement.

Of course, TDFs still leave the investor exposed to a significant financial crisis close to retirement (assuming the equity allocation is about 50% or perhaps more), and the expected return on the portfolio will decline over time and could become fairly low after retirement. These products usually do not take into account the fluctuations in market risk over time nor do they usually incorporate investors' specific characteristics related to risk tolerance, life expectancy (which may vary according to lifestyle and current health situation, not only age and sex), and overall financial situation. For example, it remains to be proved that simply reducing equity exposure over time is the best long-term risk management approach for all investors. Nevertheless, some versions of these products have very low fees, and research has found that investors in such funds are less likely to react emotionally to market events. They are more likely to be stable investors and they tend to achieve much better performances than autonomous investors. Thus although it remains to be proved that target-date funds are the best solution to retirement planning from a structural point of view, they may be an appropriate solution for many average investors. They provide low-cost, diversified portfolios that are systematically and periodically rebalanced.

Retirement planning is complex because there are so many uncertain variables, such as long-term expected returns, pattern of returns, inflation, longevity, health and taxation. We need to make appropriate, intelligent, and cost-effective investment plans because we need as much income buffer as possible to face the many uncertainties that lie ahead. In the end, it is all about appropriate expertise, proper planning, and common sense. Our ambitions must be consistent with our means.

This document completes our educational effort. It may be useful in this context to go back to the 10 investment principles investors should live by, which were stated in the opening document. These principles should now have significant meaning for all of us as investors and advisors.