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The Efficient Income Frontier: Improving Retirement Outcomes with a Different Approach

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IMPROVING RETIREMENT OUTCOMES WITH A DIFFERENT APPROACH

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Traditional financial planning methods often used in the earning and saving (accumulation) stage of life may not work during the retirement and spending (decumulation) stage because retirees must account for additional considerations and variables. Mean-variance optimization, which focuses solely on investment risk and returns, has been widely accepted as an effective way for investors to construct portfolios that optimize the risk-return trade-off. Although this is a valuable approach if the singular goal is asset growth when saving for retirement, it is ineffective for retirement-income planning because it does not account for the additional risks, goals, and variables one must consider when spending down those assets.

When individuals transition from working/saving to retirement/spending, their mindsets and priorities transition as well. Instead of needing a specific rate of return to accumulate wealth, retirees become more concerned with achieving specific outcomes, i.e., reducing the risk of running out of money, maintaining pre-retirement lifestyle, and leaving a legacy. Although investment returns play a role in achieving such outcomes, the relationship between the two is not one-for-one, because retirement poses additional risks not captured simply by the volatility of returns.

The Efficient Income Frontier (EIF) is an outcomes-based framework that directly considers additional risks that are unique to retirement in helping to identify optimal portfolios. Much like mean-variance

When analyzing portfolios through this outcomes-based (as opposed to expected-return) lens, we identified new conclusions around optimal retirement portfolio construction not possible through traditional mean-variance or total-return frameworks.

optimization, EIF is based on the risk-return trade-off, but it uses outcomes-based metrics that cover these key risks and are more relevant to actual retiree goals.¹

When analyzing portfolios through this outcomes-based (as opposed to expected-return) lens, we identified new conclusions around optimal retirement portfolio construction not possible through traditional mean-variance or total-return frameworks. First, EIF's efficient frontier of optimal portfolios is usually made up of portfolios predominantly including equity allocations combined with income annuities (primarily single premium immediate annuities, which are pension-like solutions that provide guaranteed lifetime income). Second, bond-heavy portfolios, which are considered conservative in accumulation portfolios, often are just the opposite during the decumulation phase; they pose risk because they lack the return potential of equities and the ability to duration-match an individual's lifespan that income annuities provide. Third, designing optimal retirement portfolios is heavily dependent on a retiree's spending-to-wealth ratio.

While accumulating assets for retirement, risk tolerance and expectation of returns are key variables. But once in retirement, the amount of desired spending is a new and distinct variable that drives optimal outcomes.

BACKGROUND—WHY DECUMULATION IS DIFFERENT

For roughly 70 years, modern portfolio theory (MPT) has been a reliable framework that financial professionals have used to make asset allocation decisions for clients. A major assumption underlying MPT and other mean-variance optimization methods is that investment risk can be measured by return volatility, and accordingly, rational investors will seek to maximize expected investment returns for a given level of volatility. Mean-variance optimization is effective, and most relevant, during accumulation because it helps investors achieve the singular goal when saving for retirement—asset growth.

However, decumulation planning is significantly different and more complex because there are additional risks, goals, and variables one must take into account. In addition to investment risk,

retirees face new, unique risks that pre-retirees do not—namely sequence-of-returns, longevity, and inflation risks.² Goals also change and expand as retiree needs shift from wealth maximization to ensuring they have safe and reliable income, can maximize spending to maintain a certain lifestyle, and can leave a bequest if desired. Further, although pre-retirees generally have a sense of when they will retire (i.e., the planning horizon leading up to retirement is known with a relatively high degree of certainty, give or take a few years), an unknown life expectancy further complicates decumulation planning. These additional considerations have led leading academics such as Nobel laureate William Sharpe to call retirement-income planning “the nastiest, hardest problem in finance” (Max 2019), and they make mean-variance optimization an insufficient framework when planning for retirement.

OUTCOMES INSTEAD OF RETURNS

As individuals approach retirement, their mindsets and priorities transition from wanting strong returns that help them to accumulate assets to needing solutions that will help them to achieve specific outcomes such as income security, a spending level, or a bequest. A 2019 survey conducted by the Insured Retirement Institute found that the primary goal for 53 percent of retirees was to assure a comfortable standard of living in retirement and that only 5 percent are concerned about the rate of return they would generate in the stock market.³ In other words, most individuals are looking to ensure a specific outcome in retirement and are less focused on returns. Thus the approach financial professionals take to retirement portfolio construction should shift in tandem with clients’ mindsets and needs.

Asset allocation approaches focused on maximizing total and risk-adjusted returns—which work well for accumulating assets—are insufficient for decumulation because the unique risks

Figure 1

RETIREMENT OUTCOMES UNDER DIFFERENT STARTING YEARS



Source: New York Life analysis; assumptions in endnote 4.

retirees face go beyond return volatility. Although returns earned within a retirement portfolio undoubtedly will be a factor in achieving desired retirement outcomes, the relationship between the two is not one-for-one. To show this, figure 1 highlights an historical example—the 30-year period 1945–1974 (with average returns of 8 percent) versus the 30-year period 1966–1995 (with average returns of 11 percent). Assuming a 60/40 stock/bond allocation, an inflation-adjusted 4-percent withdrawal rate, annual rebalancing, and a 24-percent tax rate, a \$1-million retirement portfolio during 1966–1995 would have been depleted before the end of the 30-year period.⁴ However, in the 1945–1974 scenario, which had much lower average returns, that initial \$1 million would have lasted the entire 30-year period and the beginning account value would have doubled.

During accumulation, those who buy and hold generally should be indifferent to the order of returns, so long as the rate of return over the course of the holding period is sufficient enough to achieve desirable wealth. This is considerably different during decumulation, where the need to make fixed withdrawals from a portfolio makes the order of returns important. This is highlighted in figure 1 because the difference in outcomes was driven by the fact that the

period starting in 1966 had poor returns early on, whereas the period starting in 1945 had favorable returns early on. This dynamic is a prime example of sequence-of-returns risk, where withdrawing from a portfolio soon after market losses results in future gains accruing from a smaller base.

This example also highlights longevity risk, i.e., the risk of outliving one’s assets, which is also unique to retirement. The longer retirees live, the longer they need to draw down assets from their portfolios and the higher their chances of running out of money. In the example above, a 65-year-old who lived only 20 years more, to age 85, would have had the same total income had they started in 1945 or 1966, but living 30 additional years, to age 95, would have led to running out of money in one scenario and not the other. As such, in many ways, longevity risk can be considered the greatest risk to retirees given the multiplier effect it has on other types of risk. For example, those who live longer lives typically have greater exposure to and impact from sequence risk, inflation, healthcare and long-term care spending shocks, cognitive decline, and investment risk. So although having more time is generally a good thing in retirement, it could cause problems for those who are not well prepared for all of the major risks.

THE EFFICIENT INCOME FRONTIER

The retirement-specific considerations outlined thus far demonstrate that approaches focused on maximizing total or risk-adjusted returns are insufficient and as a result do not lead to optimal portfolio construction for retirement-income planning. Volatility and expected returns are important metrics when decumulating assets but should be considered as pieces of a more comprehensive plan given the additional variables that must be accounted for. With this in mind, we developed a decumulation framework that leverages new risk-return metrics, assesses portfolios on an outcomes basis using individual-retiree specific considerations, and provides a new efficient frontier depicting optimal portfolios in retirement.

The EIF framework utilizes a risk metric we call “income risk,” which represents the likelihood or probability of running out of money during retirement. This metric accounts via simulation for the multitude of risks that retirees face and aggregates them into a single, intuitive value. In addition to expected investment returns and volatility, income risk is driven by an individual’s age and income needs, the asset or product allocation, the sequence of returns in a given scenario, life expectancies, and inflation. The key distinction between

income risk and investment risk is that the former measures a specific outcome in retirement taking into consideration a collection of variables whereas the latter is focused exclusively on a single variable, i.e., the volatility of returns. Incorporating these additional variables to better measure retirement risk leads to portfolio optimization that considers unique client situations and focuses on avoiding the worst possible outcome in retirement-income planning—running out of money.

The upside return metric used by EIF is “spending level,” which is another outcomes-based metric that represents the highest total income that can be safely supported by the portfolio.⁵ This metric effectively captures one of retirees’ primary goals and allows them to make portfolio allocation decisions based on the trade-off between ensuring income safety and being able to fund a desired lifestyle.

Much like traditional mean-variance optimization techniques, efficient product combinations are those that maximize return (spending level) for a given amount of risk (income risk), or those that minimize income risk for a set level of spending. On the scatterplot in figure 2, the efficient product combinations create a “frontier” up and to the left

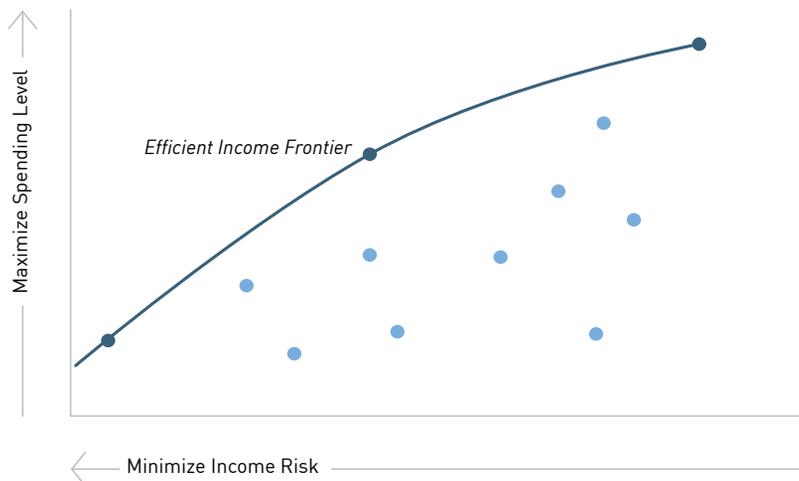
that we call the EIF, and portfolios below it are considered inefficient because they unnecessarily take on extra risk or do not maximize the desired outcome. At a very basic level, the EIF is simply mean-variance optimization’s efficient frontier recast with different risk and return metrics, both of which are focused on achieving specific outcomes. However, although MPT’s efficient frontier is universal—it covers all possible investors and all available assets, given a set of capital market assumptions—the EIF is unique to individual retirees because it is dependent on their asset levels, potential spending needs, and life expectancies.

Because EIF is outcomes-based, it can measure additional asset classes such as “insured assets” (in this case, income annuities), which cover risks beyond investment risk and generally cannot be evaluated properly in a mean-variance framework. More specifically, the framework considers single premium immediate annuities (SPIAs)—which are pension-like solutions that provide a stream of guaranteed lifetime income—as part of the potential solution set (alongside equities and bonds) in a given portfolio.

METHODOLOGY

Behind the EIF framework is a Monte Carlo cash-flow projection model that calculates outcome metrics—income risk and spending level—by stochastically projecting thousands of possible combinations of traditional assets, e.g., equities, bonds, and nontraditional or insured assets such as income annuities through a set of economic scenarios.⁶ This is different than mean-variance optimization, which leverages an expectations-based approach (i.e., it makes assumptions about average returns and volatility, and plots combinations of assets accordingly). EIF plots the simulated outcomes of thousands of combinations of equities, bonds, and income annuities, and the optimal portfolios are those that appear on the EIF by maximizing spending for a given amount of income risk or minimizing income risk for a set level of spending.

Figure 2 THE EFFICIENT INCOME FRONTIER



KEY FINDINGS

When analyzing portfolios in this way and focusing on outcomes as opposed to expected returns, we identify conclusions about retirement planning that are not possible through accumulation or total-return frameworks. The first such finding is that the EIF is usually made up of portfolios largely consisting of equities and income annuities. The protection from longevity and sequence risk that income annuities provide via a steady, uncorrelated, and duration-matched-to-your-life income stream supports higher equity allocations to generate greater income and legacy.

As a result, the second conclusion is that bond-heavy portfolios generally are inefficient, i.e., they fall below and to the right of the EIF, primarily because they lack the returns that equities can generate and the lifetime income provided by annuities. In short, although bonds have less return volatility, the lower returns and lack of protection from longevity risk mean that retirees whose portfolios are heavily allocated to bonds must constrain spending significantly or risk running out of money.

The third major conclusion is that the ratio of spending need to wealth, which is specific for each individual retiree, is a key consideration when designing optimal retirement portfolios. Individuals with sufficient assets and low spending

needs can essentially self-insure their retirements given they have little to no risk of running out of money and may not benefit as much from annuity allocations.⁷ Conversely, individuals with minimal assets and high spending need also receive lower benefit from partial annuitization given their options are really to reduce spending or “roll the dice” on high equity allocations. The population in the middle—generally those with withdrawal rates of 2–5 percent—are the retirees who benefit most from this outcomes-based approach and who typically benefit most from an allocation to income annuities.

EIF IN ACTION: A CASE STUDY

To show an example of how the EIF works in practice, let’s consider a 65-year-old man named Robin who has just retired and has \$1 million in liquid investable assets with a current asset allocation of 60-percent stocks and 40-percent bonds. Robin is receiving Social Security income but also needs to tap his portfolio to fund his retirement. To do so, he needs a pre-tax annual income of at least \$30,000 above his Social Security income, and he would like that amount to grow with inflation throughout his life, which constitutes a 3-percent real withdrawal rate. Robin’s retirement objectives are to reduce the risk of running out of money, maximize reliable income to support his pre-retirement lifestyle, and secondarily, leave money to his children.

Figure 3 shows that Robin can significantly improve portfolio outcomes for each of his goals by adjusting his mix of traditional assets and allocating some of his money to an income annuity.⁸ By doing nothing, Robin faces a 16-percent probability of running out of money in retirement and a median ending portfolio value, i.e., legacy, of \$855,000. Portfolio A, which is a portfolio optimized on minimizing income risk, shows a more diversified portfolio across stocks (35 percent), bonds (35 percent), and income annuities (30 percent) would reduce income risk by more than half to 7 percent for the same level of spending and only a modest reduction in legacy. Further, Portfolio B shows that this optimized allocation across stocks, bonds, and income annuities also supports materially higher spending without increasing income risk. In other words, by allocating his assets this way (Portfolio B), Robin can spend 10 percent more in retirement without increasing the probability of his portfolio depleting prior to life expectancy.

Robin could maximize the legacy potential of his portfolio without increasing the probability of running out of money by allocating a portion of his assets to an income annuity and increasing equity allocation in Portfolio C. This may seem counterintuitive, but it works because the income annuity is better than bonds at protecting against sequence and longevity risk—so for the same level of overall

Figure 3

OPTIMAL PORTFOLIOS UNDER DIFFERENT OBJECTIVES

	Current Portfolio	Portfolio A: Minimizes Probability of Running Out of Money	Portfolio B: Maximizes Spending	Portfolio C: Maximizes Legacy
Annual Spending	\$30,000	\$30,000	\$33,000	\$30,000
Probability of Running Out of Money	16%	7%	16%	15%
Average Legacy	\$855,000	\$684,000	\$562,000	\$1,040,000

Source: New York Life analysis; assumptions in endnotes 6 and 8.

risk, the retiree can increase equity allocations to seek greater upside. As an example of a traditional approach without income annuities, if Robin were to allocate his assets 20 percent to stocks and 80 percent to bonds, the probability of running out of money would nearly double to 28 percent, which is likely an imprudent risk that might lead to reducing the level of spending.

SUMMARY AND CONCLUSION

Accumulation investment strategies predicated on mean-variance optimization methods are insufficient for retirement planning because they do not address or account for the unique risks, goals, and variables relevant to and faced by retirees. In addition to investment risk, retirees must address sequence-of-returns, longevity, and inflation risk. Additionally, the primary goal when saving for retirement is wealth accumulation as measured by expected return, but retirees are more concerned with achieving certain outcomes such as a safe spending level or a legacy.

These differences between accumulation and decumulation planning necessitate a change in approach from a mean-variance optimization or total-return framework. The EIF is a new decumulation framework that leverages outcomes-based risk-return metrics and focuses on goals and financials that are specific to individual retirees. As a result, EIF provides a new “efficient frontier” depicting optimal portfolio design in retirement. Analyzing portfolio construction via the EIF framework leads to new conclusions about asset allocation, key considerations advisors need to discuss with clients because the optimal portfolio likely varies with wealth to income ratio, and the role of non-traditional or insured assets such as income annuities.

Advisors do not need to precisely follow the EIF metrics and specific assumptions outlined in this article in their retirement planning. Instead, they should consider the broader finding of EIF and the central argument here that retirement-income

or decumulation planning needs an outcomes-based framework that explicitly accounts for key retirement risks beyond investment risk. It should both include a consideration and measurement of a larger range of possible asset classes and an understanding and modeling of an individual retiree’s goals and specific circumstances. EIF is an example of such a framework, but the shift in mindset away from total-return or mean-variance optimization to outcomes-based approaches can be reproduced in a variety of different ways. ●

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ENDNOTES

1. The Efficient Income Frontier (EIF) framework discussed in this article is an updated and expanded version of a framework originally developed in 2011, the findings of which were published in Huang et al. (2012).
2. Given that wages tend to increase with inflation over time, we consider inflation a larger risk for retirees—who generally lack inflation-adjusted sources of income that cover all of one’s spending—than those still working and saving.
3. Insured Retirement Institute. 2019. *IRI Retirement Fact Book, 2019. A Guide to Concepts, Solutions, Trends, and Data in the Retirement Income Industry*, p. 102.
4. Stock returns are based on actual S&P 500 annual total returns; bond returns are based on actual intermediate-term government bond returns. Returns were taken from the *2020 SBBI Yearbook: Stocks, Bonds, Bills, and Inflation*. Inflation was modeled as 3 percent in all years and we assumed a 1-percent fund/management fee in all years. Past performance is no guarantee of future results. Investors cannot invest directly in an index.
5. The EIF framework also can consider legacy potential as an alternative upside metric that represents liquid assets and measures the accumulated portfolio balance at life expectancy. However, for the purposes of this article we focus on spending level given the preference of most retirees for income over bequests.
6. Income risk is calculated as the likelihood of running out of assets before the 75th percentile of longevity, although it also can be calculated stochastically. We use the 75th percentile of longevity rather than the

50th percentile because it is intended to be a downside risk measure. Mortality data is from the Society of Actuaries Annuity 2012 Basic Mortality Table with Scale G2 improvement factors.

7. However, annuities can provide additional behavioral benefits to these individuals. Because annuities offer a source of guaranteed lifetime income, retirees with annuities may be more willing to spend. Prior research conducted by New York Life found that when controlling for wealth, income, and other variables, retirees who own annuities spend 8 percent more than those who do not, all else being equal.
8. The single premium immediate annuity (SPIA) values are based on average SPIA life-only payout rates for a 65-year-old male, offered by New York Life and some of its highly rated competitors. All annuity rates are as of December 2, 2021, and subject to change. The capital market assumptions used in the Monte Carlo projection model were obtained from the Horizon Actuarial Services, LLC, 2021 Survey of Capital Market Assumptions report, which aggregates long-term capital market assumptions from 39 investment advisors in the multi-employer defined benefit pension plan market. For stocks, we used expected returns of 7.96 percent with a standard deviation of 16.42 percent. For bonds, we used expected returns of 3.38 percent with a standard deviation of 5.52 percent. Source: <https://www.horizonactuarial.com/blog/2021-survey-of-capital-market-assumptions>. We also assumed Robin’s \$30,000 initial income need to grow at a static 3-percent inflation rate; however, the EIF framework can vary inflation stochastically.

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Considerations

All examples shown regarding the likelihood of various investments and annuities projections and outcomes are hypothetical and for illustrative purposes only, and are not intended to represent actual performance of any specific investment, annuity product, or strategy. This information only represents a range of possible outcomes. There is no assurance that the use of the EIF framework will result in a better outcome than any other methodology. There are no guarantees that any investment strategy will be successful in accomplishing client goals.

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