SEQUENCE-OF-RETURNS RISK IS WORSE THAN YOU THINK

In the field of retirement income planning, the phrase bad-sequence-of-returns is as hazardous as a hurricane, tornado, or earthquake. These words—bad-sequence-of-returns—elicit images of a random event that can wreak financial havoc and, by extension, emotional stress on you and your wealth. Simply put, they all pose economic risks.

And yet, unlike the natural disasters, there is no scientific consensus on how to measure or even define the risk of a bad sequence-of-returns. Hurricane strength is measured on a scale of 1 to 5, otherwise known (to hurricane geeks) as the Saffir-Simpson Hurricane Wind Scale. Tornadoes have their Fujita scale, and everyone has heard of earthquake's Richter magnitude scale, named after C.F. Richter. But perhaps because of its recency, sequence-of-returns lacks a universally accepted metric or scale. Generally speaking, the concept is illustrated by showing how a portfolio's final value differs, assuming the same withdrawal rate under reversed investment sequences. The length of time, amount of the withdrawal and the portfolio composition are all rather ad hoc and arbitrary.

I would like to begin by suggesting a standardized method of measuring sequence-of-return risk in an idealized laboratory environment known as a Monte Carlo Simulation. Second and to my main point—with a proper measuring stick in hand—I will argue that once it's properly calibrated, sequence-of-returns risk is actually worse than you think—as in, the real world, outside the laboratory.

Without getting too technical, here is how I explain and quantify sequence-of-returns risk to my students. Assume that you have $100 at retirement, allocated to a portfolio that is 80% stocks and 20% bonds, and that every year you withdraw an inflation-adjusted $5 for as long as the money lasts. These numbers are rather arbitrary and certainly aren't investment recommendations. Rather, think of it as running experiments in a laboratory and placing the following compounds in a beaker.

Using historical returns for stocks and bonds, one can compute the random longevity of this portfolio and compare it to the random longevity of a retiree's lifetime. The difference between these two numbers, that is human longevity (H) minus portfolio longevity (L), is what I define as the retirement longevity gap. It's an important number. A positive number is bad, implying that you lived longer than your portfolio. A negative gap is a good thing, representing an event where your portfolio outlived you.

Now on to measuring the strength of a retirement hurricane or tornado. A Monte Carlo Simulation generates hundreds of thousands of scenarios for 1) portfolio returns and 2) the longevity gap. With these numbers in hand, I can compute the statistical correlation between the simulated portfolio returns in a given period and the simulated retirement longevity gap. They are displayed in Table #1.

Here is how to interpret the numbers. When the experienced investment returns are better than expected, the longevity gap is under average, but when the experienced returns are worse than expected, the longevity gap is above average. Remember, we want the smallest longevity gap possible. More importantly, look at the correlation coefficients by decade. In the first decade, it's -70%, in the second decade, it's -35%, and in the third decade, it's -15%. Ergo, the first decade is almost five times more important than the third decade. That is how to measure sequence-of-returns risk: correlation.

TABLE 1

Measuring Sequence-of-Returns Constant Withdrawal of $5 per initial $100	
Portfolio Return During Age Band	**Correlation with Longevity Gap**
65 to 75	-70%
75 to 85	-35%
85 to 95	-15%
Average of 3 Numbers	**-40%**

Source: Moshe A. Milevsky, author calculations, 2019.

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So, we arrive at the most important takeaway and concept so far, the more negative the statistical correlation coefficient, the worse the sequence-of-return's effect. The average over 30 years is -40%, but in the first decade, it's -70%. And, the objective of the retirement income process is to build a portfolio whose overall statistical correlation is lower, a.k.a. less sensitive to the sequence-of-returns.

Real World vs. Laboratory: It's Worse

But here is where the laboratory (and Table #1) differs from the real world. Recall the twin assumptions underlying the calculation: the same portfolio asset allocation and the same spending rate. But, think about this carefully, do retirees in the real world spend the same amount every year of retirement? Do they maintain the same asset allocation every year? Neither is likely.

In practice, during periods of market volatility when stocks are declining, many investors get unnerved or panicky and sell out of their equity position. In fact, some would argue that that is the definition of a bear market. More important, their actual spending patterns aren't constant over age and time, which is my next key point.

Table #2, which is based on numbers collected by the U.S. Bureau of Labor Statistics, indicate that American retirees between the age of 55 and 64 spend an average of $65,000 per year. Those between the age of 65 to 75 spend an average of $55,000 per year, and those above age 75 spend an average of $42,000 per year. Their actual spending declines with age, and retirees plan it that way. In fact, I have observed this myself when I ask large audiences of everyday retirees to select the pattern in which they would like to spend their retirement nest-egg "chips." Generally, they would like to enjoy more earlier on—when they can truly enjoy it—and spend less later, especially for those whose long-term medical needs have been covered by insurance.

Now, granted, the age bands in Table #2 aren't aligned with Table #1, and everyone retires at a different age, but the main takeaway is that planned withdrawals and spending patterns aren't constant and, in fact, decline with age. Nobody—and I mean nobody—spends the exact same amount of money every single year in retirement. It's mathematically impossible—which gets me to the next key takeaway.

How does this fact impact the sequence-of-return correlation that I defined and explained earlier? Well, in a nutshell, it makes it worse. The statistical correlation (in Table #1) will be more negative.

TABLE 2

Spending of American Retirees: It's Not Constant	
Age Band	**Average Per year**
55 to 64	$65,000
65 to 75	$55,000
Above 75	$42,000
Average of 3 Numbers	**$54,000**

Peter Finch, The New York Times, "The Myth of Steady Retirement Spending, and Why Reality May Cost Less," November 29, 2018.

Why? As you might intuit, if you are actually withdrawing more during the early years of retirement—when the sensitivity to portfolio returns is high—and less in the later years and periods, then the sensitivity between the return in those first few years and the longevity gap will be greater. Of course, the exact correlation number will depend on your precise spending plan, and this isn't the place to get into the calculus of retirement income, but I do hope you sense this relationship intuitively. If you plan to spend more when your portfolio is most vulnerable, the risk exposure is higher.

What Can You Do? Insurance

Similar to the natural disasters I alluded to at the beginning of this article, there are two strategies to deal with such risks; 1) avoidance and 2) insurance. First, you can (try to) reside in areas with reduced exposures to these risks. Second, and more important, you acquire property insurance to protect yourself. The same holds true for sequence-of-returns. You should allow for some flexibility in your spending strategy, but ultimately, you also need insurance, as well. And, to conclude, annuities are the easiest and most efficient way to insure your income against a financial hurricane, tornado, or earthquake in your investment portfolio—no matter how you choose to measure it.

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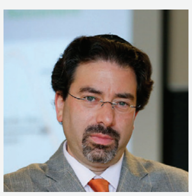
What are variable annuities?
Variable annuities are long-term, tax-deferred investments designed for retirement, involve investment risks, and may lose value. Earnings are taxable as ordinary income when distributed and may be subject to a 10% additional tax if withdrawn before age 59½.



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Note that these numbers were generated (by the author) using 100,000 Monte Carlo Simulation (MCS) that assume a Gompertz distribution of lifetimes with a modal value of 92 years, dispersion coefficient of 10 years, a portfolio expected (real) return of 3% and standard deviation of 20%.

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