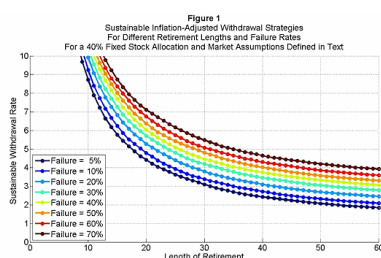


Retirement Lengths, Withdrawal Rates and Failure Probabilities

By Editor Test Sun, Jul 21, 2013

In two useful charts, our guest columnist shows how various factors--along with market performance assumptions--interact to inform our decisions about how much we can afford to spend in retirement.



The Bogleheads Forum is a great resource for investors, and in a [recent discussion thread](#), user **umfundi** proposed/requested a new way to illustrate the results about sustainable withdrawal rates in retirement. I thought it seemed like an interesting way to express things, and since I have the resources to perform the necessary calculations, it seems like a pretty good topic for a post.

This is based on the idea behind the 4% rule. What percentage of your retirement date assets can you withdraw, and then adjust the amount of income provided by this initial withdrawal rate for inflation in subsequent years, and sustainably maintain these withdrawals throughout your entire retirement? The 4% rule is based on a 30-year retirement duration. But umfundi is essentially asking to see the results for all the different possible retirement durations in order to help coordinate one's planning for different retirement lengths.

When we do this analysis, we naturally need to make some assumptions. I will use Monte Carlo simulations, which use computer power to extrapolate out hypothetical scenarios for future stock and bond returns. These simulated returns need to be tethered around some assumptions. Often the assumptions used to guide Monte Carlo simulations are historical averages, which include an inflation-adjusted average stock return of 8.6% for the S&P 500, and with intermediate-term government bonds, an inflation-adjusted return of 2.6%.

In the second figure, I will provide results for these assumptions, but I really think they are too optimistic when looking forward from today as interest rates are so low at the present. So the baseline assumptions I will use in the first figure below are assumptions that I think are more realistic and come from a very popular financial planning software program called MoneyGuidePro. With their assumptions, average inflation-adjusted stock returns are 5.5%, with 1.75% for bonds.

Two more assumptions we need are at the asset allocation to be used by the retiree, and the probability of failure that a retiree accepts for their strategy. For these figures, I will simply use a 40% stock allocation, which I think is within a reasonable ballpark for what many retirees will use (though of course everyone's situation is different and 40% may not be a good idea for any particular reader). About the probability of failure, the whole purpose of these figures is to show what the sustainable withdrawal rates are for different probabilities of failure over different retirement lengths. So this is what is illustrated.

It is worth suggesting one more note about how these results can be used. Mainly, they are initial planning numbers about what might be a reasonable withdrawal rate in retirement. Real people, when using volatile

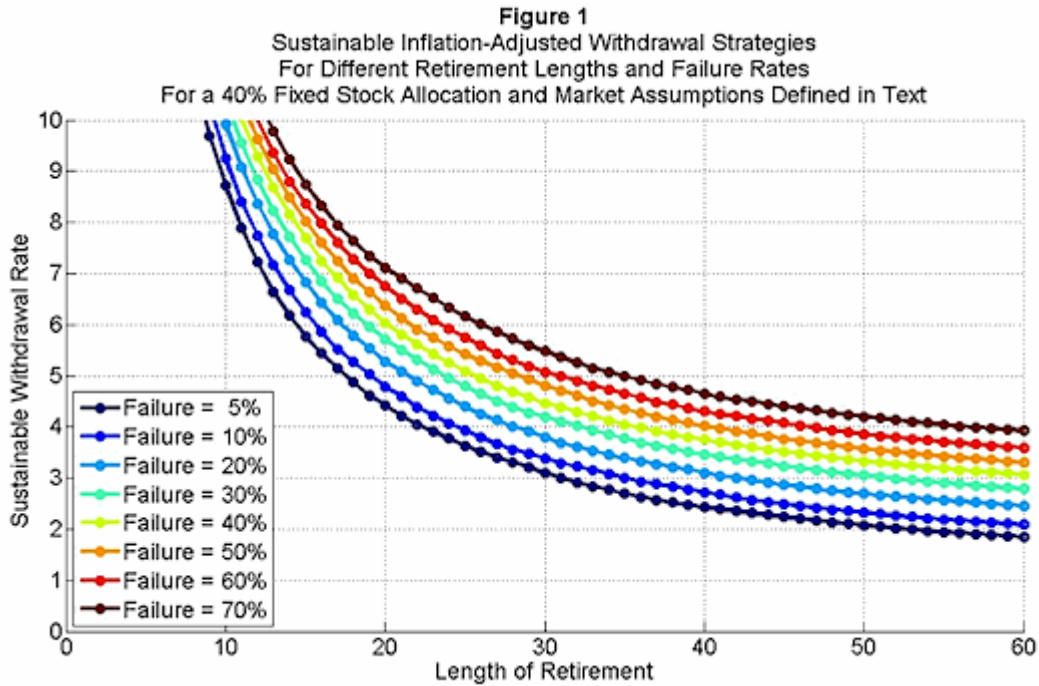
assets like stock and bond mutual funds, will need to make adjustments to their spending over their retirement. They will not play a game of chicken in which they keep withdrawing the same amount as the portfolio plummets toward zero.

And so what the different probabilities of failure really mean is that someone using a higher probability of failure (which lets them use a higher withdrawal rate) is much more likely to have to make cuts to their spending throughout retirement. There is a trade-off here. Spending more today allows for more enjoyment in the early part of retirement, but a larger chance of having to make cutbacks in the future. People have to make their own decisions about how they feel regarding these trade-offs.

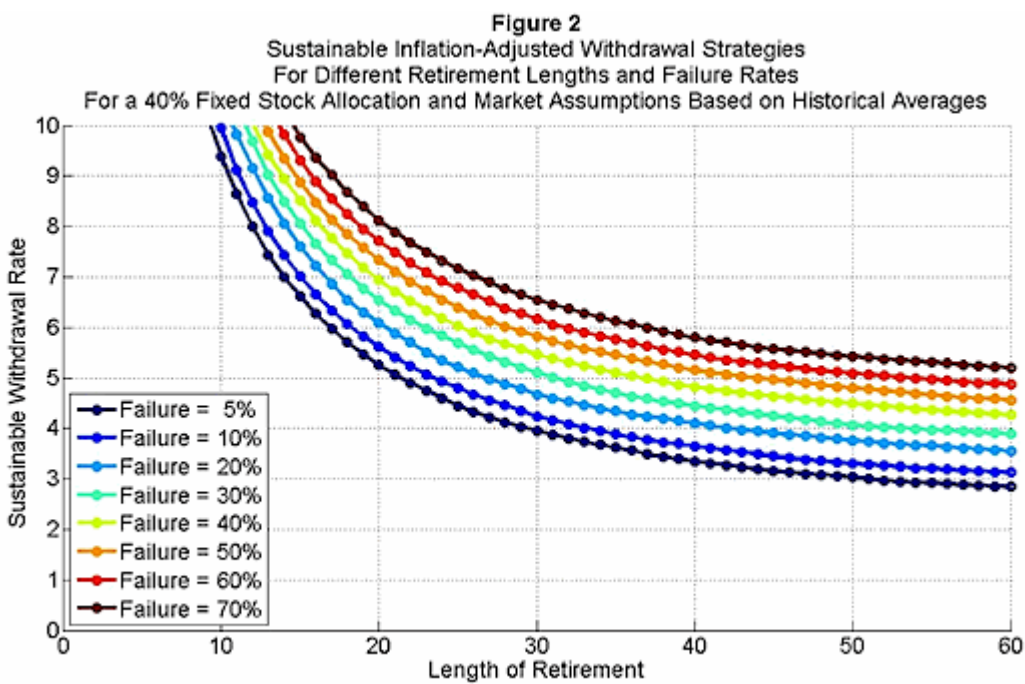
And so this brings us to our figures. This first figure is the one I would suggest spending the most time with, since I believe it has a more reasonable underlying assumptions about future market returns. We can look at this figure in different ways. For instance, moving horizontally, let's consider a 4% withdrawal rate. The figure shows that 4% should work for 22 years with a 5% chance of failure, 24 years with a 10% chance of failure, 28 years with a 20% chance of failure, 32 years with a 30% chance of failure, and so on.

Another way to look at the figure is to follow one particular curve, such as the curve associated with a 10% chance of failure. With a 10-year retirement, a withdrawal rate of over 9% could be used, while for a 20-year retirement the withdrawal rate is about 4.8%. For a 30-year retirement the withdrawal rate is about 3.2%, and for a 40-year retirement the withdrawal rate is about 2.8%. For an early retiree planning a 60-year retirement, the withdrawal rate that can be expected to work with a 10% chance of failure is just above 2%.

A final way to look at the figure is to move vertically and to note how small increases in withdrawal rates can quickly result in higher failure rates. For instance, consider a 30-year retirement. With a 5% chance of failure, the withdrawal rate is just above 3%. If someone increases their withdrawal rate to 4%, the failure rate will be somewhere between 20% and 30%. With a 5% withdrawal rate, the failure rate is already 60%.



Now, I am also including the figure below based on historical averages without further comment, except to note that you can see outcomes are much more optimistic across the board, as this figure can be interpreted in the same way. I know some people really want to hold onto the belief that it is okay to use these historical average assumptions but I suggest that readers beware when making their retirement plans based on this second figure. I think the first figure is much more applicable.



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