



Breaking Free from the Safe Withdrawal Rate Paradigm: Extending the Efficient Frontier for Retirement

March 5, 2013

by Wade Pfau

Combining stocks with single-premium immediate annuities (SPIAs) may be the way to optimize a retirement income portfolio for a robust set of circumstances.

That is the finding in my article from the February 2013 issue of the *Journal of Financial Planning*, A Broader Framework for Determining an Efficient Frontier for Retirement Income. I will provide an overview of that article and then delve deeper into some key assumptions and the implications of changing them.

Breaking free from the safe withdrawal rate paradigm

The traditional framework seeks to determine the highest possible inflation-adjusted withdrawal amount that can support a spending stream through a long retirement without any cutbacks. This is known as the safe withdrawal rate.

But this framework is insufficient for developing a retirement income strategy. It focuses only on whether or not financial assets deplete, without considering what other resources are available in the event of asset depletion. It also fails to track how long a client could maintain his or her lifestyle after retirement assets deplete. Lastly, it does not provide any way to incorporate partial annuitization strategies. Most practitioners of the safe withdrawal rate approach are also too wedded to U.S. historical data and too faithful to the idea that past experience is sufficiently representative of potential worst-case scenarios for retirees.

Practitioners must move away from the traditional approach and provide fixes for its limitations.

Based on pioneering work by Professor Moshe Milevsky of York University, I describe the efficient frontier framework for retirees to determine appropriate allocations of stocks, bonds, inflation-adjusted and fixed SPIAs and variable annuities with guaranteed living benefit riders (VA/GLWBs). The methodology is based on current market conditions.

Unlike the safe withdrawal rate framework, the efficient frontier does not solely focus on avoiding

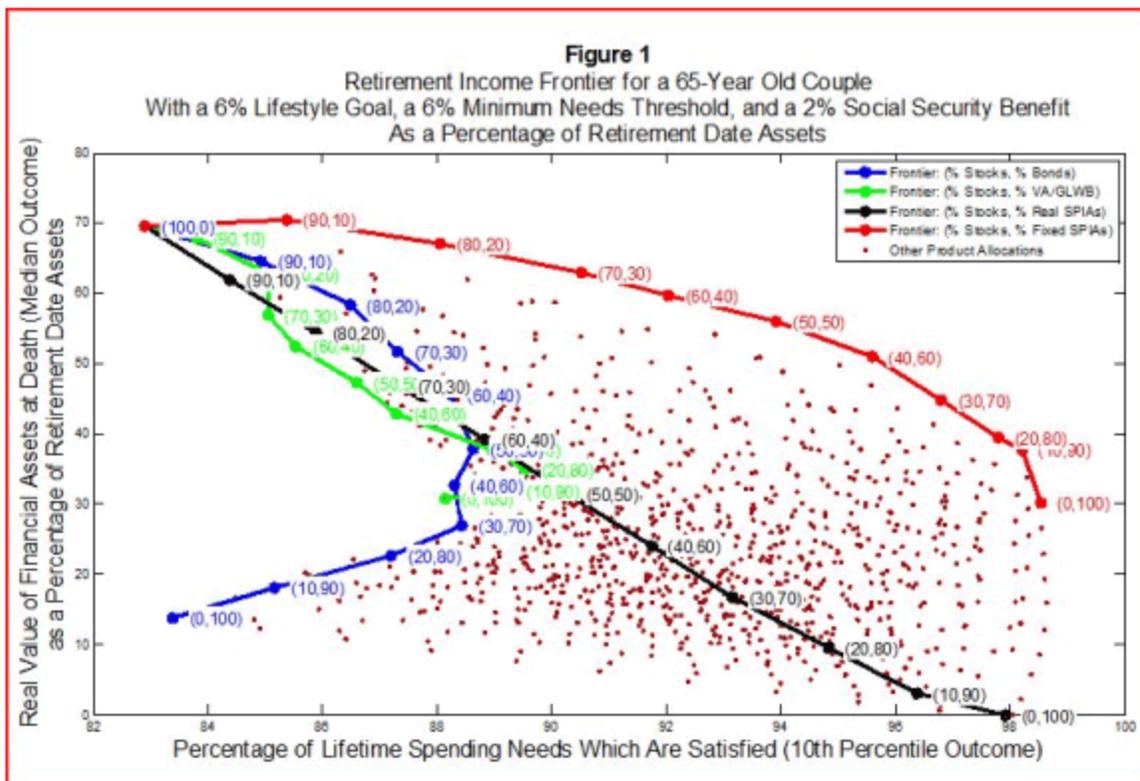
financial wealth depletion. Instead, there is a tradeoff between two objectives: supporting minimum spending needs and lifestyle spending goals, and maintaining a buffer of financial assets. This buffer could be for a legacy or to use as a reserve in the case of expensive health shocks, divorce, severe economic downturns or other emergency needs. Clients must determine how much they value each objective and choose the appropriate balance between them.

I plotted how 1,001¹ different product allocations performed with respect to meeting the two objectives. Then, I identified the efficient frontier of product allocations. The product allocations represent ways to allocate assets at one's retirement date among stocks, bonds, fixed SPIAs, inflation-adjusted SPIAs and variable annuities with guarantee riders. The assumptions I used in my analysis are documented in the appendix.

The resulting efficient frontier shows the allocations that support the largest buffer of remaining financial assets at death while still providing a given percentage of spending needs (or, alternatively, the highest percentage of spending needs that can be satisfied for a given reserve of financial assets). Any of the product allocations on the efficient frontier represent a potentially optimal point. Clients must make the final decision about which efficient allocation is most optimal for them.

The baseline case study

Results will differ for varying client circumstances. The basic case study I used is of a 65-year old couple with an inflation-adjusted lifestyle-spending goal of 6% of retirement date assets. They have Social Security benefits equal to 2% of their retirement-date assets. So to meet their lifestyle goal, they need to generate additional income equal to 4% of their retirement-date assets. The results for the baseline case appear in Figure 1.



1. Mathematically, 1,001 is the number of possible combinations of five assets, where each asset can be held in 10-percentage-point increments from 0 to 100.

In Figure 1, I plot how the 1,001 different product allocations perform with respect to meeting the two financial objectives. I've highlighted some of these allocations with different colors. Red identifies all the combinations of stocks and fixed SPIAs, while black shows stocks and inflation-adjusted SPIAs, green shows stocks and VA/GLWBs and blue shows the traditional combinations of stocks and bonds.

When considering how the various product allocations meet these objectives, I found that the combinations that best meet both criteria are those consisting of stocks and fixed SPIAs (the red curve). The traditional safe withdrawal rate approach that relies on a portfolio of only stocks and bonds (the blue curve) produces among the worst possible outcomes for meeting spending needs and preserving financial assets for other uses.

What is noticeable is the lack of bonds (as represented by a five-year constant maturity bond) in optimal portfolios (I have not incorporated bond ladders at this stage). SPIAs behave like perpetual bonds with no maturity dates. They boost retiree returns with mortality credits. Their payouts are based on average life expectancies, reducing the need for retirees to ration assets in preparation for a longer-than-average lifetime.

These results are specific to the case study in question. Each portfolio's best allocation would depend on lifestyle goals, minimum spending needs, age and marital status of the retirees and underlying

assumptions for returns and inflation.

Let's now move beyond the original research article to explore some important assumptions.

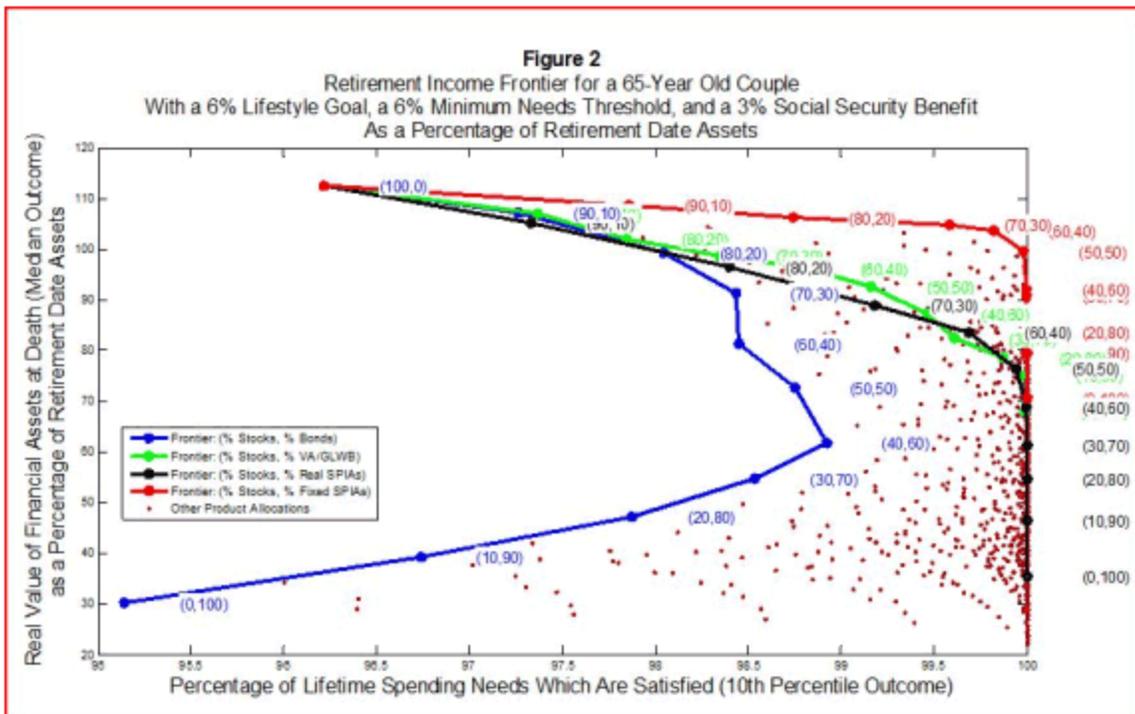
The role of Social Security

Most clients will have income sources other than their financial assets. As an example, let's consider the baseline couple's Social Security benefits. Changing the level of Social Security would change the shape and position of the efficient frontier. As any point on the efficient frontier could be optimal for a particular client's needs, the shape of the efficient frontier matters.

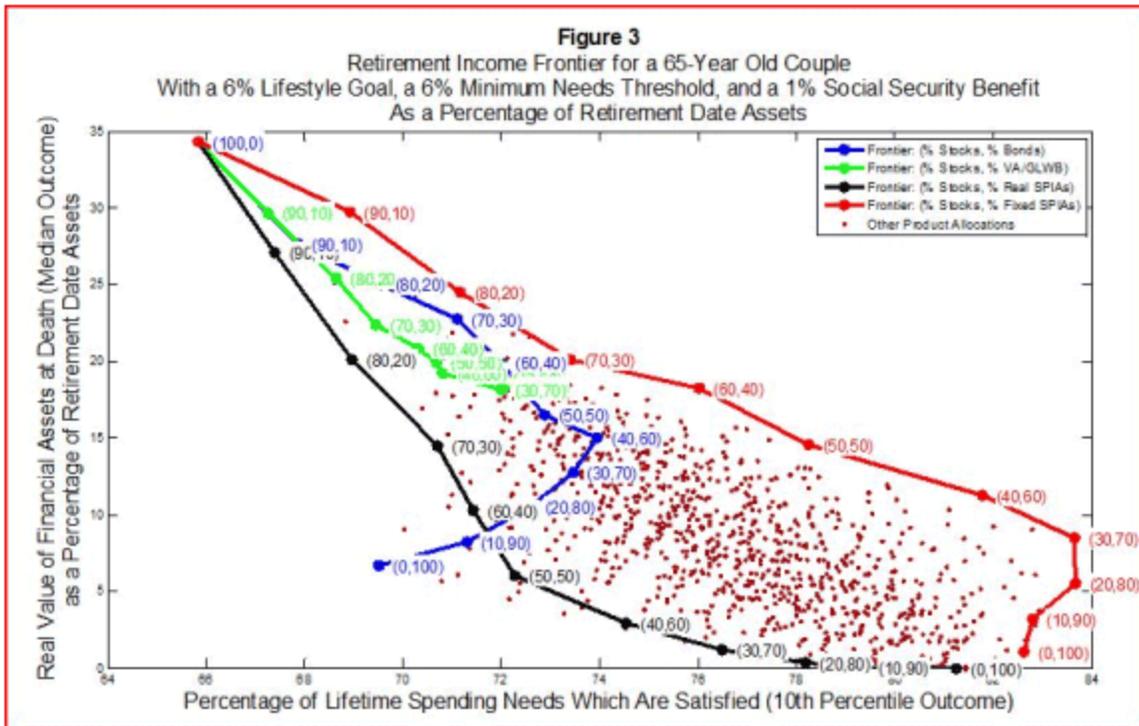
Increasing Social Security income as a percentage of overall retirement spending would shift the product allocation points up and to the right. Any point on the curve would fulfill a greater proportion of the client's lifetime spending goals, because a greater amount of Social Security would be available if other portfolio income sources were depleted.

Depending more on Social Security income increases client comfort with choosing a more aggressive allocation on the efficient frontier.

This can be seen in Figure 2. In this figure, the client has the same lifestyle goal of 6%. But now, 3% of income is from Social Security, so only 3% needs to be withdrawn from the portfolio. The frontier shifts up and to the right (notice the change in the numbers on the axes as well), which in turn reduces the benefit of using more conservative allocations. The benefit of allocating conservatively to protect spending objectives is unlikely to be worth the sacrifice in portfolio growth potential.



To further illustrate this point, consider the case in which a client maintains the same 6% lifestyle goal, but only 1% of his or her income is from Social Security. In this case, depletion of financial assets would be more likely and would cause greater harm, as there would be a smaller floor of Social Security to cushion the loss. This can be seen in Figure 3. The points on the frontier are the same as in the previous figures, but now the frontier has shifted dramatically to the lower left-hand corner. With 5% spending needs from the portfolio, clients cannot realistically expect to sustain this spending level throughout retirement. Nonetheless, to the extent that the client aims to achieve this spending level, more conservative allocations with 70% or 80% fixed SPIAs are increasingly attractive.



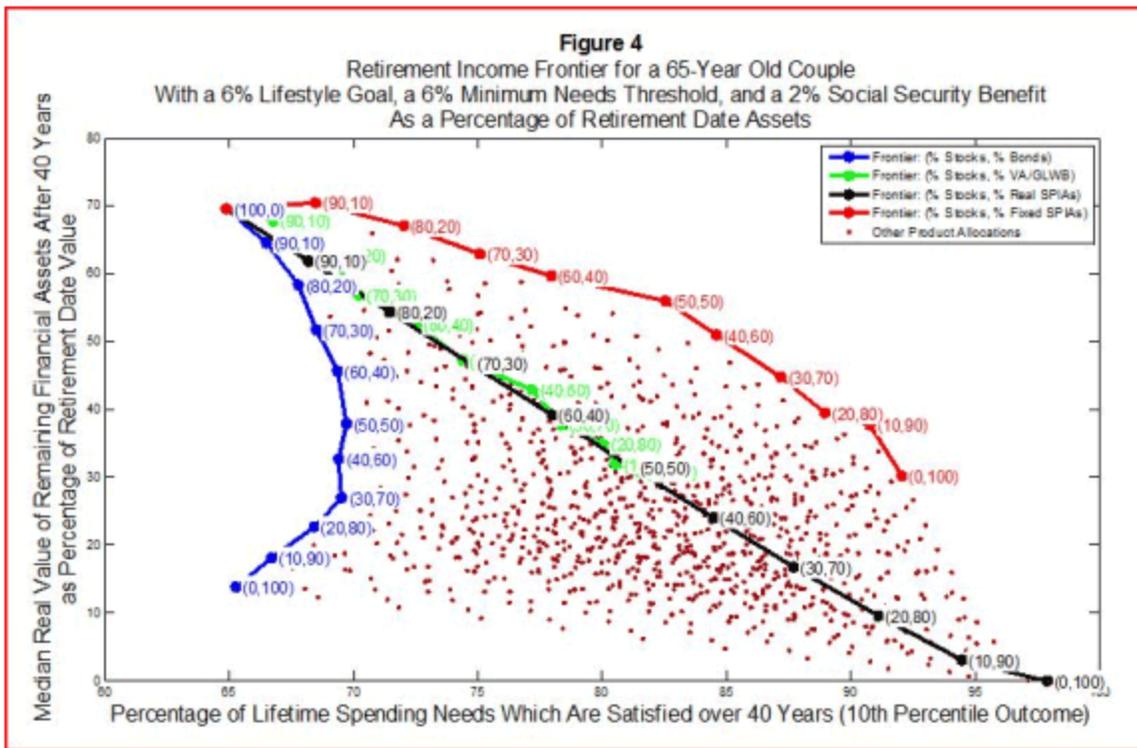
The role of longevity risk aversion

Milevsky defines longevity risk aversion as a client’s fear of outliving his or her assets. I use survival probabilities to weight the amount of spending for each year in retirement. Using survival probabilities means it is less likely that a client will be alive at later ages when resources are depleted.

Someone who is particularly concerned about outliving their resources, however, may not be comfortable applying survival probabilities. Let’s examine the efficient frontier without survival probabilities.

In Figure 4, I attempt to illustrate what happens as longevity risk aversion increases. I consider retirement income over a 40-year horizon that assumes that one member of the 65-year-old couple survives to age 105. To calculate the percentage of lifetime spending goals that have been met, I equally weight the amount of possible spending over the entire 40-year period. As before, the measure of remaining financial assets is based on survival probabilities, spending is still investigated at the

unlucky 10th percentile outcome and the vertical axis shows the median amount of financial reserves.



Importantly, the points on the efficient frontier do not change, but the shape and positioning of the efficient frontier does. Product allocations shift left because a much smaller percentage of lifetime spending needs can be satisfied over a 40-year period. In many simulations, financial assets will be depleted well before the end of the period. Also, the shape of the frontier is flatter, as more aggressive allocations are increasingly unable to meet spending goals. A 100% stock allocation is able to support about 65% of the clients' spending needs over 40 years at the 10th percentile of the outcomes.

Critically, this change to frontier shape would lead a client to choose a more conservative allocation with a greater weighting toward annuities. The combinations of fixed and inflation-adjusted SPIAs would become more viable allocations for conservative clients, as they offer a material improvement in meeting spending goals.²

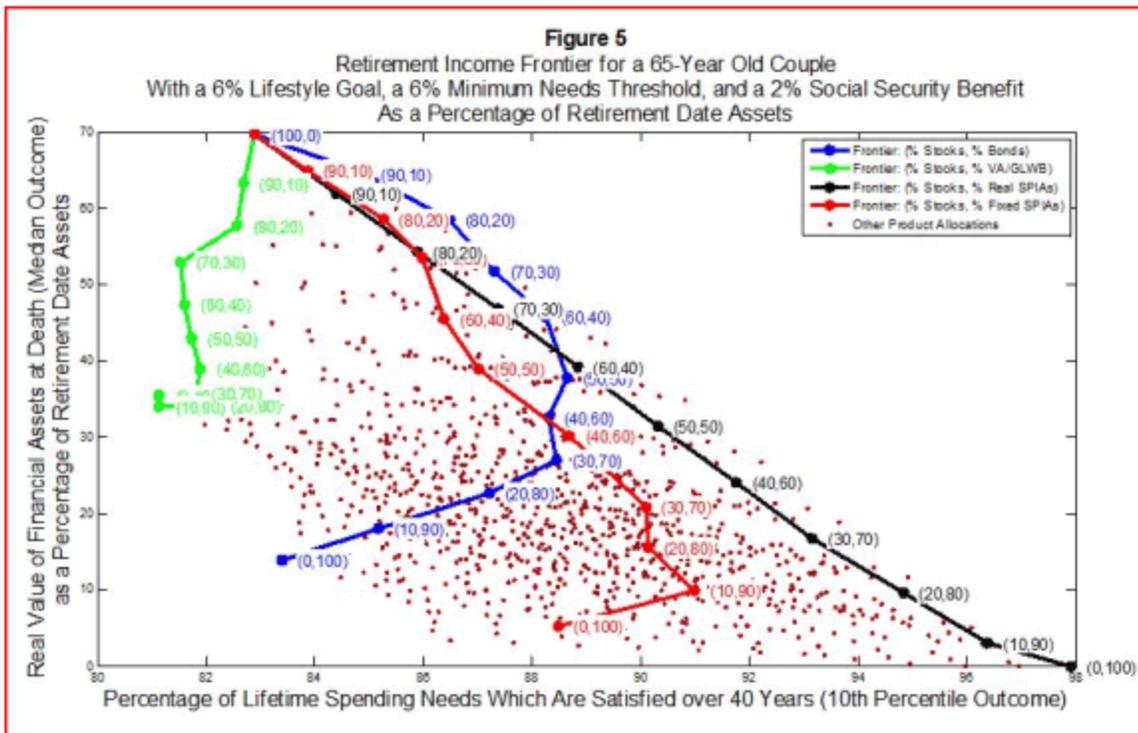
Greater longevity risk aversion makes annuitization more attractive.

2. Those points were not considered directly as they played such a little role in my analysis above, but the portion of the efficient frontier connecting 100% fixed and 100% real SPIAs in the lower right-hand portion of the diagram are combinations of fixed and real SPIAs.

The role of inflation

In the initial analysis, fixed SPIAs performed better than inflation-adjusted SPIAs. We can understand

this in the context of the assumptions. With the payout rates of 5.84% and 3.875%, the initial retirement income from the fixed SPIA is 51% larger. As the average inflation assumption guiding the simulations is 2.1%, it takes almost 20 years on average for the inflation-adjusted SPIA to provide an income that matches the fixed SPIA. For clients who expect higher inflation than the breakeven rate between Treasury bonds and TIPS, the outcome will be different. For example, suppose inflation averages 4%. In this case, it would only take 10.5 years for the 51% cumulative price increases to occur.



In Figure 5, we see that a higher inflation assumption of 4% hurts the performance of fixed SPIAs and VA/GLWBs. The first does not provide an inflation adjustment, and the second can rarely be expected to keep pace with inflation. Now, bonds and real SPIAs are more attractive. With higher inflation, more conservative allocations placing greater emphasis on inflation-adjusted SPIAs would likely appeal more to client preferences than in the case with lower inflation.

The bottom line

This efficient frontier approach provides a very robust and scalable framework for evaluating retirement income strategies. The inputs can be modified to fit the circumstances for a client. Client age, gender, marital status, asset classes and allocations, performance expectations, current pricing, available balance sheet assets and spending needs and goals can all be adjusted to product an efficient frontier.

This frontier graphically illustrates the tradeoffs between downside spending protection and the potential to grow one’s wealth. Clients can then make decisions about how to optimize the available choices.

Appendix

Assumptions for the investment choices facing a 65-year old couple:

- Fixed SPIA: 5.84% payout rate
- Inflation-Adjusted SPIA: 3.875% payout rate
- VA/GLWB: Invested in 70% stocks and 30% bonds with a 0.95% guarantee rider on the benefit base, a 0.6% VA fee on the contract value and a 4.5% payout rate with the possibility of annual step-ups
- Stocks and bonds: Underlying index returns (S&P 500 and intermediate-term U.S. government bonds) with 0.2% administrative fee

Additional details are provided in the research article in the February 2013 Journal of Financial Planning.

Wade D. Pfau, Ph.D., CFA, will be joining The American College in the spring as a professor of retirement income in its new Ph.D. program in Financial Services and Retirement Planning. He is also an active blogger on retirement research and maintains the educational Retirement Researcher website. See his Google+ profile for more information.