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Develop Business/Financial Planning

A 3-Factor Formula for Projecting Retirement Income

By Jim Otar, CMT, CFP
Jun. 12, 2006

One important measure missing from most retirement projections is the time value of fluctuations (TVF). The TVF quantifies the losses in a retirement portfolio stemming from factors beyond our control. Ignoring it can cause irreparable damage to retirement plans and pension funds.

The time value of fluctuations (TVF) has the same effect on a retirement portfolio as friction losses have on driving a truck in the sand: They both use up more "fuel" than anticipated. In many cases, the real culprit for failing retirement plans and pension funds is not the fluctuations of asset values but *our failure* to recognize and incorporate the TVF in our projections.

Many of our clients spend between 20 and 30 years in retirement. In current retirement planning practice, we assume an "average" portfolio growth rate for the entire time horizon. Many in the financial planning industry naively think that if they use historic averages, everything will be fine in the long run. Unfortunately, this is not the case. There is always a permanent loss because of the fluctuations in a distribution portfolio owing to factors beyond our control such as the luck factor, reverse-dollar-cost averaging, and fluctuating inflation. In many cases, this loss can cut the portfolio life by half of what a standard retirement calculator predicts using an "average" growth rate.

Let's look at an example: Bob, your client, asks: "I have $1 million in my retirement portfolio. I want my money to last 25 years. I expect an inflation of 3% throughout my retirement. How much can I safely take out each year?"

Factor 1: Median growth rate

When we look at all portfolios since 1900, the median portfolio with an asset mix of 40% equities and 60% conventional bonds returned from 6.4% (10-year time horizon) to 5.6% (40-year time horizon). To keep things simple, we will stick with 6% annual growth rate.

Factor 2: Annuitized withdrawal rate

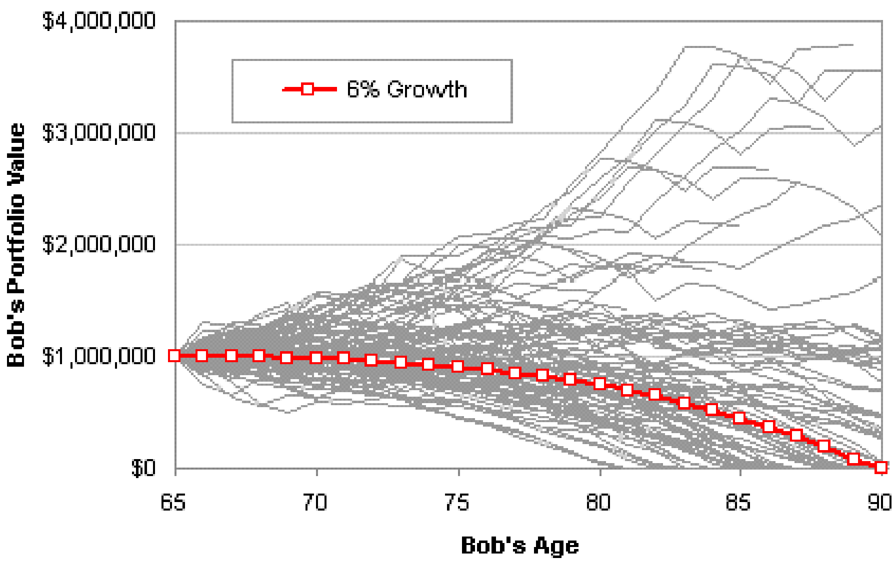
Plug in 6% as the assumed growth rate and 3% for the assumed inflation to a standard retirement calculator. It tells you that Bob could take out $59,000 annually, indexed at 3% for the next 25 years until age 90.

This result would have been accurate if Bob were buying a 25-year term annuity with 6% interest rate indexed by 3% each year. That is what a standard retirement calculator forecasts. But an investment portfolio is not an annuity; its value fluctuates each day.

Because of that, this annuitized withdrawal rate (AWR) calculated with a standard retirement calculator is of little use—although we need it in our calculation.

Figure 1 below depicts the potential outcomes of Bob's portfolio if he were to retire in any year since 1900. Each thin line shows the portfolio value if Bob were to start his retirement in any one of the years since 1900: By plotting each of these lines on the same chart, we can compare them to the red line—our projection using a steady growth rate and inflation.

Figure 1: Standard Retirement Calculator Vs. Reality



Source: Jim Otar

The fluctuations create a 54% chance that Bob's portfolio would run out of money before 25 years based on market history since 1900. The AWR alone is insufficient to tell us accurately how much Bob can withdraw from his portfolio. For that, we need to consider the sustainable withdrawal rate.

Factor 3: Sustainable withdrawal rate

Sustainable withdrawal rate (SWR) is defined as the maximum amount of indexed, periodic, life-long income that can be taken from a portfolio. It is equal to the AWR (calculated using a standard retirement calculator) less the TVF:

$$SWR = AWR - TVF$$

How do we calculate the TVF? It is mainly a function of the time horizon. The shorter the time horizon, the higher the TVF. Other less important factors are the asset mix, asset selection, portfolio management costs, and asset allocation strategies. If you hold the optimum asset mix of equities and conventional bonds and cash, you can calculate TVF for U.S. equity markets using the following empirical formula:

$$TVF = 20 / (N^{0.735})$$

Here, N is the time horizon—the number of years between 10 and 40. For example, for

Bob's time horizon—25 years—the TVF is:

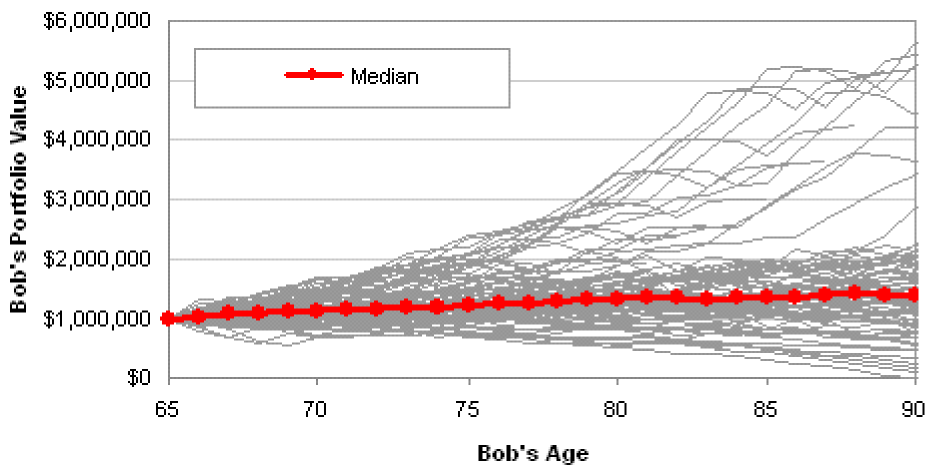
$$TVF = 20 / (25^{0.735}) = 1.9\%$$

Thus, the TVF removes approximately 1.9% from Bob's portfolio annually. Now we can calculate Bob's SWR, remembering that his AWR was 5.9% ($59,000 divided by $1 million) and his TVF is 1.9%:

$$SWR = 5.9\% - 1.9\% = 4.0\%$$

Bob's SWR is 4%. He has $1 million; therefore, he can withdraw $40,000 during the first year of his retirement indexed fully to actual inflation for the rest of his life. Based on market history, he will have lifelong income. Keep in mind that his long-term median portfolio growth is still 6%. The difference of 2% between the long-term growth rate and the SWR is the price Bob must pay for self-insuring his life-long retirement income against the TVF. Figure 2 shows the potential outcomes of Bob's portfolio if he were to retire in any year since 1900.

Figure 2: SWR Vs. Reality



Source: Jim Otar

Recovery from losses

If your portfolio loses 50% of its value, it must gain 100% to break even. Table 1 shows how much you need to gain to break even after a loss:

Table 1: Percent Gain Required to Break Even

Loss (%)	Gain required to break even (%)
10	11
20	25
30	43
50	100

80	400

Source: Jim Otar

Can we use this table if there is a periodic withdrawal from the portfolio?

The answer is no. In distribution portfolios, you need significantly higher gains to break even. That is because you need to recover not only the market losses but also the differential losses between the original forecast and the actual portfolio value after withdrawals. That is why more and more pension funds are going into an irrecoverable downward spiral. They blame the markets, but the real reason is their lack of understanding and implementing the concept of TVF in their forecast.

Table 2 shows how much you need to gain over a three-year time period for various loss and withdrawal rates, assuming a steady increase of the portfolio value after the initial loss and no indexation of withdrawals.

Table 2: Percent Gain Required to Break Even in Distribution Portfolios

	Initial withdrawal rate (%)			
	0	4	6	8
Loss (%)	**Gain required over 3 years to break even (%)**			
10	11	26	33	41
20	25	42	51	60
30	43	63	74	86
50	100	132	150	169
80	400	525	597	676

Source: Jim Otar

For example, if you lose 10% and your withdrawal rate is 6%, your portfolio needs to gain 33% within the next three years *just to break even*. In the final analysis, if you experience losses at the beginning of your retirement and don't recover these losses within a short period of time (three to four years), your retirement portfolio will very likely expire before you do.

Conclusion

The TVF is the missing link between the standard retirement calculator and the SWR. If your objective is to give realistic retirement projections, it pays to run the numbers and discuss the possible outcomes with your client.

Jim Otar is a financial planner, a professional engineer, a market technician, a financial writer, and the founder of retirementoptimizer.com. His past articles on retirement planning won the CFP Board Article Awards in 2001 and 2002. He lives and works in Thornhill, Canada, and can be reached at (905) 889-7170, or by e-mail at jimotar@rogers.com.

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