The Effect of Life Expectancy on the Bucketing Strategy

By Andrew Dunkers, Yabin Shen, Dong Yang, Wilson Yale, PhD, and Luis F. Zuluaga, PhD

Well-managed retirement portfolios are essential for people who wish to maintain a high standard of living after retirement, and providing such portfolios is an important service offered by various financial institutions. Although the stock market and the U.S. economy have shown recent signs of improvement, the possibility of a retirement crisis is still a major concern for retirees. Baby boomers are approaching retirement age and corporate pension liabilities have increased significantly. With longer life-spans and higher expenses after retirement (e.g., healthcare costs), investors are facing unparalleled difficulties in managing their retirement assets. In 2014, the Employee Benefit Research Institute reported that 24 percent of Americans surveyed said they had no confidence they will have enough money to retire comfortably; one year earlier that figure was 28 percent, reflecting the highest level of pessimism recorded in the study’s 23-year history (Helman et al. 2014).

Investors face several challenges today. First, interest rates are at historic lows. If interest rates rise in the coming years, investors holding large portions of bonds in their portfolios will suffer losses. Second, healthcare costs keep rising and the government still is struggling to rein in these costs. Third, the market is volatile and hard to foresee. In fact, the past decade has been a difficult period for wealth accumulation, and many retirees have seen their retirement wealth eroded by the financial crisis. Fourth, inflation significantly affects retirement wealth because it is investment income used for daily expenses, which can be affected by rising price levels.

In addition, the precise allocation of retirement funds into different asset categories is growing in complexity, making it more difficult for individuals to self-manage assets for the whole post-retirement time horizon. Therefore, financial institutions have become the main providers of strategies for constructing and managing individual retirement fund portfolios. The most common of these strategies are buy-and-hold, systematic withdrawal plans (SWPs), target-date funds (TDFs), and bucketing.

Shalett et al. (2013) showed that, in an increasingly dynamic and complex society, some traditional retirement fund asset allocation approaches may not be optimal for retirees. An SWP is easy to set up, but it has noticeable depletion and legacy shortfall risks. TDFs are widely accepted by risk-averse retirees because TDFs reduce risk exposures along the time horizon and simultaneously provide potential for higher returns. However, in the long run, lower-than-expected returns may not cover living expenditures, especially in the worst market scenario. Bucketing assures that near-term expenditures can be financed by cash-bucket returns, and investors still realize long-term returns thanks to investments in the legacy bucket. Bucketing does not provide a predetermined amount of income or annuities, but it has significant advantages for investors who can tolerate a reasonable amount of volatility.

This article extends the analysis and insight obtained by Shalett et al. (2013) by measuring the effect of uncertain life expectancy on retirement strategies. This is accomplished by simulating the investor’s retirement wealth under different potential scenarios. Generation of these scenarios follows the methodology of Shalett et al. (2013), except for some minor changes in assumptions and the use of an uncertain lifespan rather than an average lifespan. Our analysis confirmed the advantages of bucketing over other strategies, as found by Shalett et al. (2013), and showed that bucketing is also robust against the uncertainty associated with the investor’s lifespan.

Methodology

We used Monte Carlo simulation to investigate likely outcomes for an investor under a given retirement strategy and withdrawal rate when the investor’s lifespan is uncertain. Monte Carlo simulation runs multiple trials (in this study, specifically 1,000 trials) to approximate the probability of an uncertain outcome. In each trial, assets were invested at simulated returns for the investor’s lifespan and money was withdrawn from the assets at fixed dates. Taxes, fees, and other income sources were ignored to simplify the comparison and analysis. Some additional key assumptions are addressed below.

First, a constant dollar-amount withdrawal is assumed. Once the withdrawal amount is set, every withdrawal over time is set to the same dollar amount adjusted by inflation.

Second, following the bucketing strategy used by Shalett et al. (2013), five Morgan Stanley Global Investments Committee models were used to set the initial portfolio in each bucket. Because the weight of capital invested in each bucket is different, the weight of each asset in the portfolio was computed by discounting the required future funding for each sequential period using the expected return of that bucket. The average ratio for each portfolio was set to equal the weighted average of the weight of capital. The initial and average asset allocation for each portfolio of the bucketing
Finally, the bucketing strategy was set with wealth at the end of each trial. Another key benchmark is the portfolio's ending value, i.e., the amount of trials. To incorporate uncertain lifespan, life expectancy was considered to follow a given probability distribution. Both this distribution and how it was incorporated in the simulations is discussed below.

Third, the investor was expected to live 30 years past retirement at age 60 in the basic simulations (i.e., without taking into account the investor's uncertain lifespan). To incorporate uncertain lifespan, life expectancy was considered to follow a given probability distribution. Both this distribution and how it was incorporated in the simulations is discussed below.

Fourth, the success of one simulation was defined as the investor constantly holding a positive amount of wealth during his lifetime; the success rate is simply the number of successes divided by the total number of trials. Another key benchmark is the portfolio's ending value, i.e., the amount of wealth at the end of each trial.

Finally, the bucketing strategy was set with four time buckets and one legacy bucket. The legacy bucket was defined as the last bucket from which money would be withdrawn. This bucket was set to leave its ending value to the investor's offspring. If any of the first three time buckets ran out of money before the end of its associated time period, the shortage was covered out of the fourth bucket. If any of the four time buckets had funds left at the end of its associated time period, the funds were reinvested in the legacy bucket.

Simulation Results
To validate the assumptions used here, we performed a simulation to compare the performance of bucketing against other popular retirement asset allocation strategies, similar to Shalett et al. (2013). Specifically, we compared bucketing with buy-and-hold, a systematic withdrawal plan, and a target-date fund. The corresponding initial and average asset allocations for these strategies are shown in table 1. The results of these simulations confirm the conclusion of Shalett et al. (2013) that bucketing, with its consistently higher success rate for different settings of the constant withdrawal amount, is superior to other commonly used strategies. In particular, using a constant withdrawal amount of $32,000, the success rate of the bucketing strategy reaches 94.7 percent. Without the need for dynamic rebalancing, bucketing guarantees the basic income needs in each time period as well as potential growth in the portfolio value. Furthermore, its advantage became increasingly significant as the constant withdrawal amount increased. For ending value, bucketing achieved the lowest volatility and the only positive lower bound (5th percentile), showing that it can offer retirees the maximal probability that they will not run out of money even in an adverse market.

Incorporating Uncertain Life Expectancy
In the initial simulation, the retiree lived 30 years after retirement, which may not happen in reality. If the retiree lives longer than 30 years after retirement, a much higher failure rate can be expected, because money may run out toward the end of the investor's lifespan. How does relaxation of this assumption about a 30-year lifespan affect performance of the bucketing approach?

Table 1: Asset Allocation for Different Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cash</th>
<th>Bond</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bucketing Initial</td>
<td>19.50%</td>
<td>47.50%</td>
<td>33.00%</td>
</tr>
<tr>
<td>Bucketing Average</td>
<td>10.80%</td>
<td>25.00%</td>
<td>64.20%</td>
</tr>
<tr>
<td>Systematic Withdrawal Initial</td>
<td>10.80%</td>
<td>25.00%</td>
<td>64.20%</td>
</tr>
<tr>
<td>Systematic Withdrawal Average</td>
<td>10.80%</td>
<td>25.00%</td>
<td>64.20%</td>
</tr>
<tr>
<td>Buy-and-Hold Initial</td>
<td>10.80%</td>
<td>25.00%</td>
<td>64.20%</td>
</tr>
<tr>
<td>Buy-and-Hold Average</td>
<td>4.10%</td>
<td>23.30%</td>
<td>72.50%</td>
</tr>
<tr>
<td>Target-Date Initial</td>
<td>5.50%</td>
<td>10.00%</td>
<td>84.50%</td>
</tr>
<tr>
<td>Target-Date Average</td>
<td>10.80%</td>
<td>25.00%</td>
<td>64.20%</td>
</tr>
</tbody>
</table>

To answer this question, we used the Actuarial Life Table from the Social Security Administration to obtain the conditional probability of living an additional year given the investor's current age. Based on this information, 1,000 sample values of a retiree's lifespan were generated. Figure 1 shows the empirical distribution probability associated with these 1,000 samples.

Figure 1 shows that most retirees pass away between the ages of 80 and 95. Thus, the assumption of investing for 30 years after retirement at age 60 is reasonable. However, the average lifespan is 84 years (24 years after retirement), which is less than the 90-year lifespan typically used in Shalett et al. (2013). Thus, we expected the bucketing strategy's success rate to be higher when taking into account lifespan uncertainty than when using the 90-year lifespan assumption. That is, on average, people do not need to withdraw money from the bucketing retirement portfolio for a full 30 years.

The Effect of Life Expectancy
After incorporating the life-expectancy distribution into our model, the success rate of bucketing increased from 94.7 percent to 95.7 percent, which is consistent with the discussion above. To summarize the performance of the bucketing strategy when life expectancy is taken into account, retirees were separated into lifespan groups. Figure 2 shows success rates and ending values for each of these groups.

Figure 2 shows that bucketing's success rate drops significantly when lifespan exceeds 95 years. For people with life expectancies between 91 and 95 years, the success rate is only 1.5 percent lower than the success rate of the strategy when the lifespan is between 86 and 90 years. This means that a slightly higher lifespan will not change the strategy's success rate dramatically. The life expectancy distribution shown in figure 1 indicates that 19.3 percent of retirees are expected to have a lifespan between 91 and 95 years. As a result, it can be inferred that bucketing would be effective for most of these retirees. For every additional five years in lifespan beyond age 95, the success rate drops by approximately 10 percent because the portfolio does not have enough value for the investor to keep withdrawing money. Meanwhile the dominant weight of equity
in the legacy bucket adds volatility to the ending values, which results in a decreased success rate. Simulation results also show that about one-quarter of retirees empty their retirement-fund portfolios if they keep withdrawals constant beyond age 100.

Average ending values, however, grow with lifespan because of the longer investment horizon. The ending-value rate of increase, however, becomes smaller as lifespan increases. Note that the difference between the ending values for the age 96–100 and over age 100 groups is only $10,000; this is because a large portion of retirees in the over 100 group are in debt when they pass away.

Conclusions
Among commonly used retirement-income strategies, bucketing is known to provide the proper investment horizon, because the horizon may significantly affect the performance of the retirement portfolio asset allocation strategy. Regardless, it is also possible to keep modifying the strategy as the retiree's health condition changes. Retirement-income strategies such as bucketing are customizable and always can be modified according to market conditions and personal needs. These results provide a starting point for investors and their advisors to reflect on how new trends in longevity may make a difference for retirement strategies.

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Endnote

References

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