A Model Retirement

Rather than try to dazzle your clients with statistical analysis, make sure your projections take into account a complete set of factors.

November 1, 2002

Most financial Web sites include a retirement calculator. You can plug in your age, how much you have in your portfolio now, how much you plan to save until retirement, and you'll get one nice and smooth portfolio projection. This is the straight-line model. You can also use a Monte Carlo simulation and get two nice and smooth portfolio projections.

But do they work? Is there anything better? My research, as outlined in the May, June, and July issues of *Financial Planning*, showed that there is. Here's how to make it clear to your clients that what they thought they knew was wrong.

My research of data between 1900 and 1999 shows that straight-line models overestimate the portfolio life 85% to 90% of the time. Start with the value of a balanced portfolio consisting of 40% equity and 60% fixed income, rebalanced annually. Assume that the equity portion of the portfolio outperforms the underlying index by 1.5% each year, with a 6% initial withdrawal rate. The projected portfolio value during retirement years (dispersal period) typically uses the straight-line projection model. I looked instead at the portfolio value based on actual market performance and the rate of inflation, if one had retired at the beginning of 1901, 1902, 1903, and so on, for the 100-year study period. In this particular model, only in seven out of potentially 70 cases did the portfolio outlast the projection of the standard financial plan after 30 years.

Similar patterns emerged for different initial withdrawal rates of 2% to 10%, various asset mixes, equities outperforming the underlying index (DJIA) between +4% and -4%, as well as rebalancing at different time intervals. In the final analysis, the straight-line model overestimates the portfolio life in almost all cases.

To understand why portfolios deplete faster than straight-line projections, we have to look deeper into what influences retirement portfolios. We have to differentiate clearly between the factors that affect the market value of a portfolio and the factors that affect the longevity of a portfolio.

There are three factors that most influence the market value of a portfolio. They are, in decreasing order of importance:

- Megatrends;
- Market cycles; and
- Random fluctuations.

Other than the withdrawal rate, there are three factors that influence the longevity of a retirement portfolio:

- When a client's retirement begins relative to market cycle;
- Inflation; and
- Reverse dollar-cost-averaging.

Keep in mind that unless cash is withdrawn from the portfolio periodically, the factors that influence market value have no effect on the portfolio longevity.

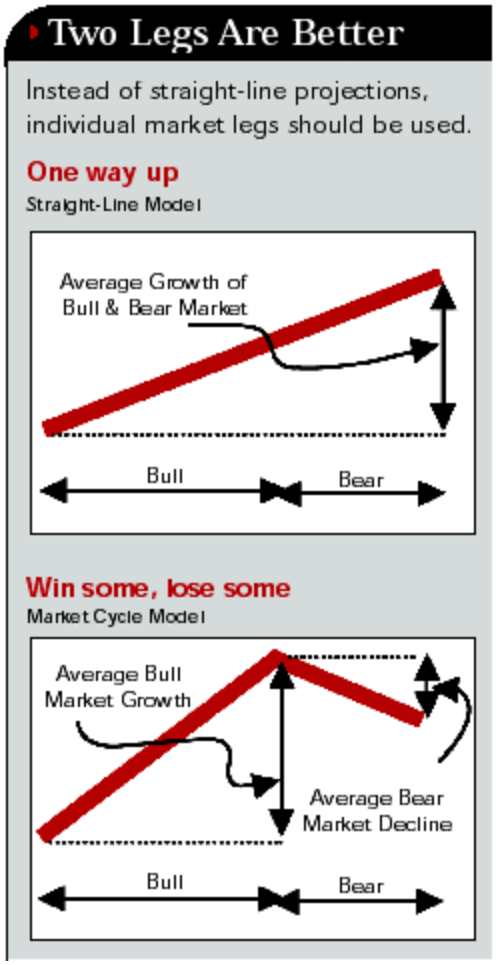
The timing of when retirement starts, relative to market cycle, has perhaps the biggest influence on the portfolio life. My research shows that it is not unusual to lose 30% to 40% of the portfolio life if one retires at the beginning of a typical bear market instead of a typical bull market.

A bear market shortens the portfolio life in a process called reverse dollar-cost-averaging -- when more shares or units must be sold at a lower price to provide the required income for the retiree.

As for inflation, consider a retiree with an asset mix of 60/40 fixed income/equity, 6% initial withdrawal rate, and 2% dividend yield at the beginning of the market crash of 1929. Surprisingly, this investor's retirement portfolio lasted longer (19.7 years) than had he or she retired at the beginning of 1966 (16.7 years), because of the high inflation rate between 1966 and 1982. If a retirement projection shows a sharp decline in portfolio value in its final years, it is almost always because of inflation, not market cycles.

The second traditional approach to retirement portfolio projections is Monte Carlo simulation. This method adds randomness to the straight-line growth. While Monte Carlo models can work well with random fluctuations, they do not handle the effects of market cycles. To circumvent this difficulty, the width of randomness is artificially increased to a point where it broad-brushes all cyclical market moves. Doing so only covers up its inherent flaw -- the typical Monte Carlo simulation is based on statistical randomness around a straight-line trajectory. In the long term, markets are neither random nor follow a straight path.

The Market Cycle Model, which I explained in detail in earlier issues of *Financial Planning*, is a better approach. It divides the straight-line model (the combined bull and bear market action averaged into a single growth rate) into a series of two "legs" -- the bull market and the bear market. Each of these legs (see chart below) is based on the average historical performance and duration of typical bull and bear markets. These zigzagging "building blocks" handle the consequences of market cycles and reverse dollar-cost-averaging better than the straight-line model.



Over time, if there are no withdrawals from the portfolio, both the straight-line model and the Market Cycle Model create similar portfolio values. When periodic withdrawals come into the picture, however, the portfolio values will diverge over time.

The Market Cycle Model also can handle the tricks of "randomness," which finds its way into retirement portfolios through the randomness of market action and the randomness of when retirement begins. A random number generator can easily dampen the market-action problem, with the individual legs of each bull and bear market varied for strength and duration.

The random factor of when retirement starts is also easily addressed. Since we cannot foretell whether one is retiring at the beginning of a bull market or a bear market (or anything in between), we make our projection based on both. That is, we use one projection assuming retiring at the beginning of a bull market and another at the beginning of a bear market, as shown by the black and tan lines in the top chart in the next column. This provides the client with a range of possible outcomes.

The Market Cycle Model appeared to be a more sensible model and work better than the straight-line model. However, it needed further engineering because its results were not entirely congruent with 100 years of market history. Factors such as megatrends, market volatility, and significant

variations of inflation did influence the outcome, which had to be modified to reflect the empirical data. We call this modified model the True Market Model.

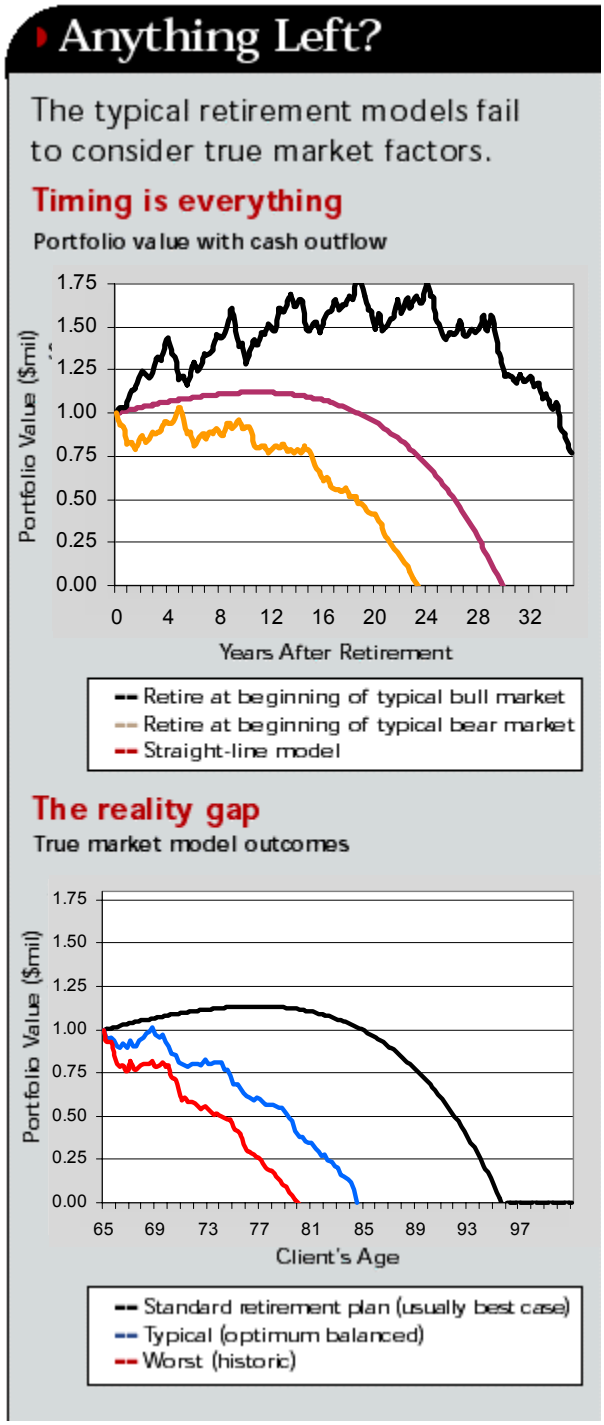
With the Market Cycle Model, there were three areas of divergence from the real-life experience:

- In the Market Cycle Model, retiring at the beginning of a bull market projected a portfolio value that was significantly larger than the straight-line model. In fact, this rarely happened in real life over the long term. Therefore, we decided to use the straight-line model as the "best-case" scenario in the True Market Model. It occurs 10% to 15% of the time.

- If one retired at the beginning of a bear market, the Market Cycle Model projected an overly optimistic portfolio life compared with historic experience. This is due to the effects of mega-bear markets and bouts of high inflation. Therefore, in the True Market Model, the worst-case projection was adjusted down to reflect the shortest portfolio life during the 1900-1999 period. The portfolios are based on an optimum asset mix and rebalancing as discussed in the June issue.

- The third observation was that in real life, most portfolio values over the 100-year study period were concentrated at one-third the distance from the worst-case line to the best-case line. While statistical conveniences such as "average" or "median" have little meaning in retirement planning and are more interesting for academics, we indicated this center of gravity as the "typical" portfolio value on our projections. This is to prevent an observer from thinking erroneously that the "average" is halfway between the best and the worst case.

These three observations allowed us to modify the Market Cycle Model and create the True Market Model. The "reality gap" chart below depicts a typical portfolio value projection based on the True Market Model. The black line represents the best-case scenario, the red line represents the worst-case scenario, and the blue line represents the typical case. The area in between the black and red lines is the scenario you can discuss with the client as most likely.



This complete retirement portfolio model (available for free downloading at www.cotar.org) addresses the effects of market cycles, reverse dollar-cost-averaging, megatrends, inflation, and random fluctuations based on 100 years of market history. As a result, we can give more realistic projections to our clients instead of trying to dazzle them with our statistical wisdom.

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-Jim C. Otar