Do You Know Your Odds?

Have you taken a good look at your retirement plan lately? Has it been examined to 'stress test' its ability to succeed in meeting your financial objectives regardless of the market's volatility? An effective planning exercise should not only help you establish reasonable expectations, but also identify and quantify the forces that could cause the plan to fall short of its goals. Individuals may be able to reduce the likelihood they will outlive their money, by applying complex mathematical techniques to the retirement planning process.

Conventional planning techniques often overlook real world issues that experience tells us should not be ignored. The difficult market conditions over the past two years have forced many investors to recognize a common, yet significant, flaw in these techniques. Typically, these techniques assume a certain constant rate of return (ROR) for the life of the plan. However, the reality is that the probability of achieving a constant rate of return in the market year after year approaches zero. For many retirees whose retirement plans are based on constant ROR models, the damage may have already been done; although the consequences might not be known for many years.

The table below illustrates a typical constant ROR cash flow model for a couple expecting to retire at the age of 55 without ever running out of money. Using conventional planning techniques, a constant ROR makes success look easy. However, simulating the same portfolio with a fluctuating ROR yields different results, even though the average ROR remains the same.

Age	Constant ROR	Portfolio Value	Simulated ROR	Portfolio Value	Required Income After Tax(1)	Est Soc Sec After Tax	Total Withdraw
		$587,500		$587,500			
55	8.0	634,500	-14.82	500,417			
60	8.0	873,078	9.17	588,734	$45,000	0	59,211
62	8.0	902,082	-2.63	471,558	47,926	$9,711	50,283
64	8.0	949,455	-4.58	376,681	51,042	15,736	46,456
66	8.0	1,005,089	17.05	330,298	54,361	16,212	50,197
68	8.0	1,061,793	-4.57	256,878	57,896	16,702	54,204
70	8.0	1,119,165	14.10	187,813	61,661	17,206	58,493
72	8.0	1,176,701	6.49	90,505	65,670	17,726	63,084
74	8.0	1,233,767	12.59	★ -28,545	69,940	18,262	67,998
76	8.0	1,289,582	21.48	-193,241	74,488	18,814	
78	8.0	1,343,186	19.88	-430,473	79,332	19,383	
80	8.0	1,393,411	9.29	-628,925	84,490	19,969	
82	8.0	1,438,838	-2.42	-905,380	89,984	20,572	
84	8.0	1,477,757	11.44	-1,453,245	95,835	21,194	
86	8.0	1,508,112	-4.13	-1,846,474	102,067	21,835	
88	8.0	1,527,439	7.30	-2,514,722	108,704	22,495	
90	8.0	1,532,794	5.85	-3,432,968	115,772	23,174	
92	8.0	1,520,672	12.21	-5,005,922	123,300	23,875	
Avg ROR-->	8.0		8.0				

Assumptions:

(1) Inflation rate of 3.2%.
(2) Social Security of $12,200 for Rick & $7,200 for Sue & COLA@1.5%/yr
(3) 8% average growth rate
(4) Standard deviation of 8%
(5) Normal distribution of returns
(6) Flat tax rate of 24%

★Under this scenerio, the portfolio would be depleted when Rick is 74 and no further withdrawals are available

By now, we all know that the market does not provide a constant ROR every year. In fact, we should expect variable returns year after year. This means that certain years will produce returns above the expected average and other years below the expected average. In fact, investors should expect some years of negative returns along the way. The actual outcome may bear little resemblance to a plan based on a constant ROR.

In spite of this obvious inconsistency, most retirement planning strategies continue to be based on a constant ROR ignoring the market's volatility. Ask anyone who has retired in the last five years and they would likely be able to paint you a vivid picture.

The use of a constant ROR in retirement planning is built on the assumption that the good and bad years of the market are accounted for in the compounding calculation. For example, the compound return of a 30 percent gain one year followed by a 10 percent loss the next year would be 8.17 percent, (illustrated in the table below). Therefore, applying an 8.17 percent ROR to a retirement plan model is assumed valid. In fact, this would be a valid calculation only if there were no contributions or withdrawals during the entire life of the plan.

As a practical matter, few, if any, retirement plans are funded by means of a lump sum contribution with the idea that the money will never be used. Most plans involve on-going contributions, and eventually on-going withdrawals. Therefore, a retirement plan based on a constant ROR has no basis in reality. A realistic plan cannot ignore the negative impact of withdrawing money in a down year, or the positive impact of contributing money before an upswing in the market. Both instances have a dramatic impact on the ending value of a retirement plan. As the chart below illustrates, *the timing of when you receive a return is far more important than your average rate of return.* Ideally, you would get your high returns when you had a lot of money in the market and low returns when you had very little money invested. For instance, a 30 percent gain on $25,000 yields a profit of $7,500; on $10,000 it is only $3,000. A 10 percent loss on $25,000 yields a decline of $2,500; on $10,000 it equals $1,000.

The table below illustrates the difference between assuming an average ROR and changing the order of <u>actual</u> returns during the withdrawal phase.

	Constant	Return	Bear Market At Beginning of Plan	Return	Bear Market At End of Plan	Return
Starting Value	$ 25,000		$ 25,000		$ 25,000	
First Year Return	$ 2,042	8.17%	$ (2,500)	-10%	$ 7,500	30%
Ending Value Year 1	**$ 27,042**		**$ 22,500**		**$ 32,500**	
Withdrawal	$ (10,000)		$ (10,000)		$ (10,000)	
Starting Value Year 2	$ 17,042		$ 12,500		$ 22,500	
Second Year Return	$ 1,392	8.17%	$ 3,750	30%	$ (2,250)	-10%
Ending Value Year 2	**$ 18,433**		**$ 16,250**		**$ 20,250**	
Average ROR-->>>		8.17%		8.17%		8.17%

Bull and bear markets will occur and planning for them is important, because they will have a significant impact on a plan's outcome. The retirement plan's ending value was much greater when the bear market occurred at the end of the plan. Conversely, when a bear market occurs in the beginning of a plan the ending value was much lower. The average return had little to do with the actual ending values.

PROBABILITY ANALYSIS (a.k.a. Monte Carlo Simulation)

Monte Carlo simulation is a mathematical technique for solving complex equations based on the use of random numbers and probability statistics. Monte Carlo (MC) methods are used in everything from engineering to insurance underwriting to regulating traffic flow. Their application varies widely from field to field. Technically, to call something a "Monte Carlo" experiment, all you need to do is use random numbers to examine a problem.

MC modeling techniques tend to be computer intensive, often requiring several minutes or hours to solve a problem. Therefore, it is often referred to as the "method of last resort". There are problems, which are best solved by MC simulation methods, and other problems that can only be solved by MC simulation. Frequently, this method is used to resolve highly complex financial problems, such as pricing derivatives or estimating the "value-at-risk" of a portfolio.

USING PROBABILITY ANALYSIS WITH RETIREMENT PLANNING

Over the past several years, analytical software has become more sophisticated. Consequently, retirement planning models, which have traditionally been oversimplified, can now be re-examined to provide a more realistic forecast of potential outcomes.

In the case of retirement planning, the MC modeling method is neither the conventional method nor the only method. However, we believe it is likely the best method.

The purpose of a plan is to serve as a roadmap. If the plan is well designed it can plot your future financial course including the peaks and valleys along the way. Unfortunately, for many investors their plan assumes their portfolio will grow by the same ROR each year. This leads to unrealistic expectations, since, as we all know, markets simply do not perform that way.

Applying probability analysis to a retirement plan tests the results of your plan in many different market environments. Examining your retirement plan in this manner allows you to make the best choices concerning:

- Retirement income
- The risk of outliving your money
- The likelihood you will achieve your financial goals

By using probability analysis, you can randomly generate bull and bear markets using the "Monte Carlo" analysis to simulate market environments and determine the likelihood of reaching your financial objectives. While no statistical planning approach can guarantee success, by applying a market simulation model to retirement plans, individuals should be able to reduce the likelihood of outliving their money.

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