

## Helping Clients Use the *What-if?* Screen

By Mark Snodgrass

When discussing Silver Online's Monte Carlo simulation graphs and reports with clients, you might also mention how they could use the *What-If?* screen in the client portal to test out and explore different assumptions and change potential spending levels, retirement ages, returns, inflation and longevity. Before you send them their personal link to the Client Access Portal, you may want to offer some insight and cautions to help them from becoming too optimistic or too concerned about results they're seeing.

### **Multiple Conservative Assumptions Have Multiplicative Impact on Monte Carlo Probability Outcome**

As clients use the Client Access Portal *What-If?* screen, it may seem reasonable to make several assumptions at the same time that are all more conservative than the historical averages you have explained to them, and may be using as planning input starting points. When doing this, they may be dismayed to see Monte Carlo results drop dramatically, and it may put them into a tailspin in terms of their ability to successfully retire in the timeframe they had hoped for or had considered quite feasible.

Alternatively, they may assume that the only way they can successfully retire is to dramatically reduce annual spending and change their standard of living. For this reason, we recommend that you counsel them to test these more conservative scenarios by changing one variable at a time. It's one thing to simulate and model a more conservative assumption to see how a plan might work under stress; it's another thing entirely to create a perfect storm by combining multiple challenging future situations.

### **Monte Carlo Already Applies Stress to Returns**

As Money Tree's Monte Carlo 10,000-trial simulation already varies rates of returns to mimic market variations including potential patterns of annual underperformance and outperformance, it is suggested clients begin with assuming historic returns over a 10 to 30 year timeframe. The 1987-2017 historic return (for a moderately conservative portfolio) was approximately 7.5%. Using a representative historic return estimate allows the Monte Carlo simulator to do its job of modeling 10,000 different possible financial futures that center around the average, but range from lucky, with early over performing years and big gains, to others where markets drop and underperform for many years.

Understating returns, to be conservative, can essentially compound Monte Carlo stress by assuming underperformance and including it within return values. Modifying returns to represent changes in investment strategy is one thing; lowering returns to presume poor outcomes may be duplicating Monte Carlo processes. For this reason, you can alert your client to the impact it would have if they decided to add additional stress to the rate of return by modifying it in *What-If?* modeling.

To demonstrate the combination effect, the following examples showcase a hypothetical couple earning approximately \$150,000 a year who have worked diligently throughout their adult lives to save and

invest responsibly so that they now, in their early sixties, have \$900,000 in taxable and tax-deferred assets and are hoping to retire in the next five years while maintaining their \$100,000 lifestyle.

The first example below shows the Monte Carlo modeling graph and probability result when run with historic average assumptions for moderately-conservative rates of return<sup>1</sup>, inflation rate<sup>2</sup>, and longevity assumption<sup>3</sup>. We then measure results where each variable is stressed individually by approximately 10%, where all three variables are stressed simultaneously, and where two are modified.

The six assumption examples and results are summarized in this table:

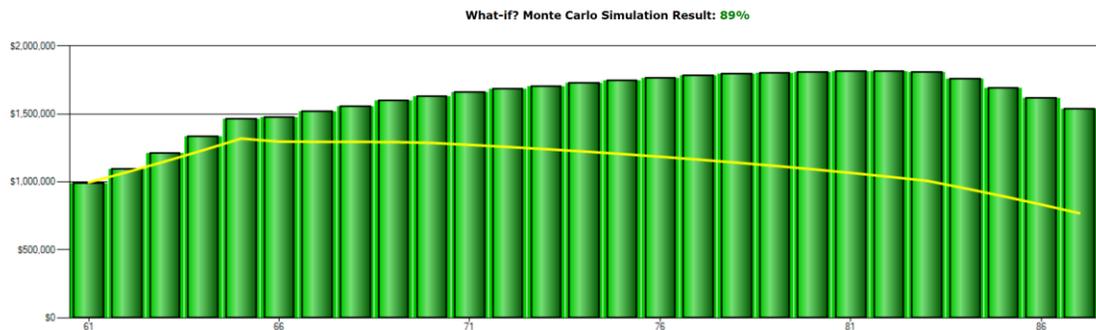
Rate of Return	Inflation Rate	Longevity	Monte Carlo Probability	Spending Levels Producing 89% Monte Carlo Probability
7.50%	2.7%	M 83 F 86	89%	\$100,000
6.75%	2.7%	M 83 F 86	79%	\$95,000
7.50%	3.0%	M 83 F 86	81%	\$96,000
7.50%	2.7%	M 90 F 93	65%	\$90,000
6.75%	3.0%	M 90 F 93	17%	\$81,000
7.50%	3.0%	M 90 F 93	48%	\$85,000

- 1) Historic 40/60 Portfolio 1926-2016 <https://personal.vanguard.com/us/insights/saving-investing/model-portfolio-allocations>
- 2) Federal Reserve Bank of St. Louis, 30-year Breakeven Inflation Rate (T30YIEM), <https://fred.stlouisfed.org/series/T30YIEM>
- 3) Health, United States 2016, CDC, Table 15, Life Expectancy at Age 65, pg 116, <https://www.cdc.gov/nchs/data/hus/hus16.pdf#015>

**Example Results of Assumption Changes - Model Clients (early sixties, \$150,000 joint income, \$100,000 spending needs, \$900,000 moderately conservative portfolio)**

**Example 1: Historical Average Assumptions: 7.5% rate of return, 2.7% inflation rate, longevity M 83, F 86**

Monte Carlo Probability: 89%



What-if? Monte Carlo Simulation Result: 89%

Recalculate | What If? Report | What If? Graph | Monte Carlo Report | Monte Carlo Area Rpt

Ret.	100,000	ROR	Taxed	Tx-Free	Tx-Def	Ann	Life Ex	Retire	SS	Pen1	Pen2	Life Ins.
Surv.	100,000	Now	7.5 %	4 %	7.5 %	8 %	Mitch	83	66	0	0	0
		Ret.	7.5 %	4 %	7.5 %	8 %	Martha	86	65	0	0	0

Inflation Tax Adds IRA Roth IRA Roth401k Q Plans Inc % SS Claiming Strategy

Now 2.7 % 20 % Mitch 0 0 0 13,000 2.7 %

Ret. 2.7 % 18 % Martha 0 0 0 13,000 2.7 %

Surv. 2.7 % Adds Annuity Tax-Free Taxable Inc%

Std. Dev. 0 % 0 0 5,000 2.7 %

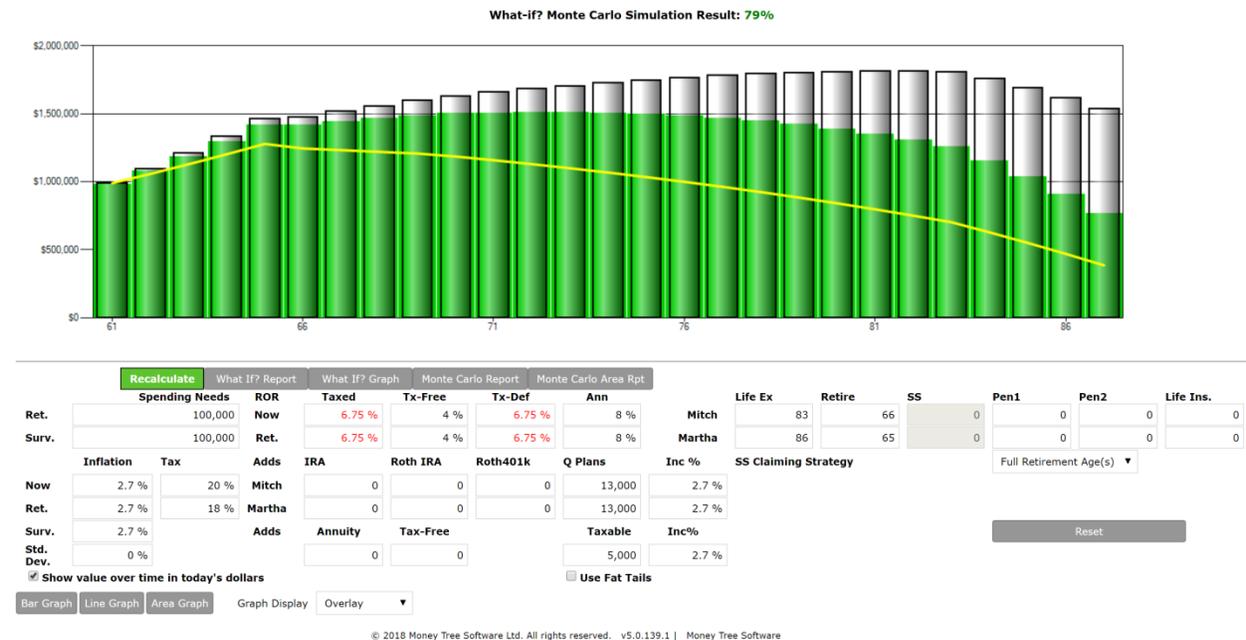
Show value over time in today's dollars  Use Fat Tails

Bar Graph | Line Graph | Area Graph | Graph Display: Overlay

Reset

Example 2: One Conservative Assumption **6.75% rate of return**, 2.7% inflation rate, longevity M 83 F 86

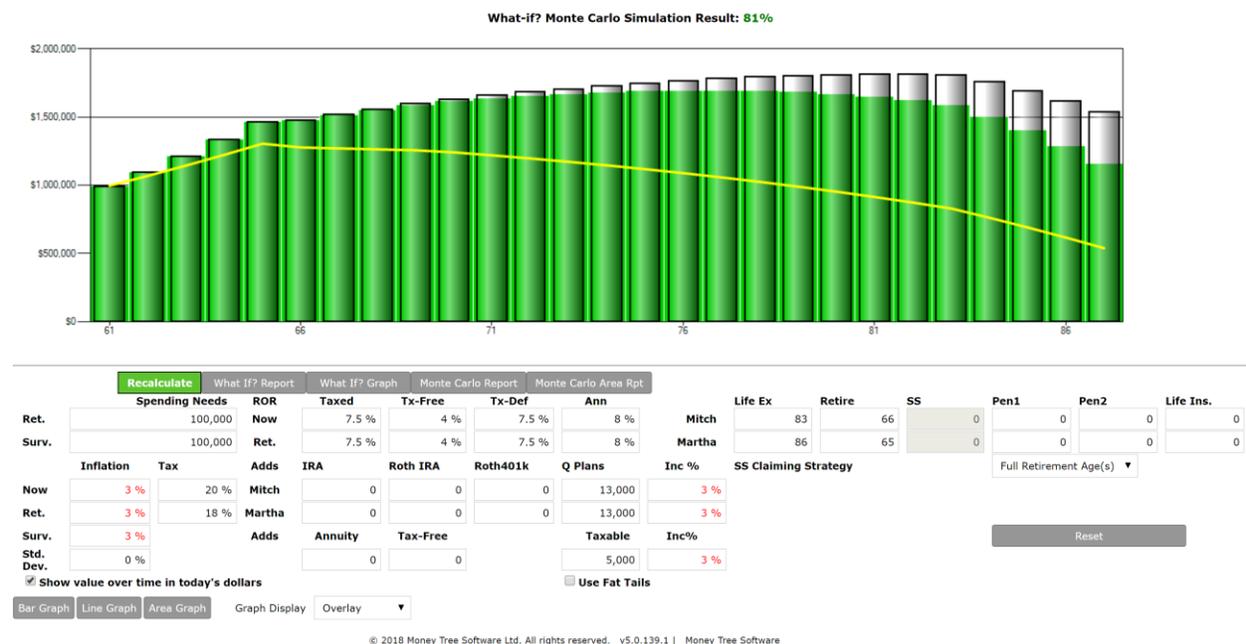
Monte Carlo Probability **drops to 79%**; requires \$5000 reduction in spending to return to 89%



Note: The grey columns with black outline represent the original results; the green bars are the What-if? results after applying the modified assumptions.

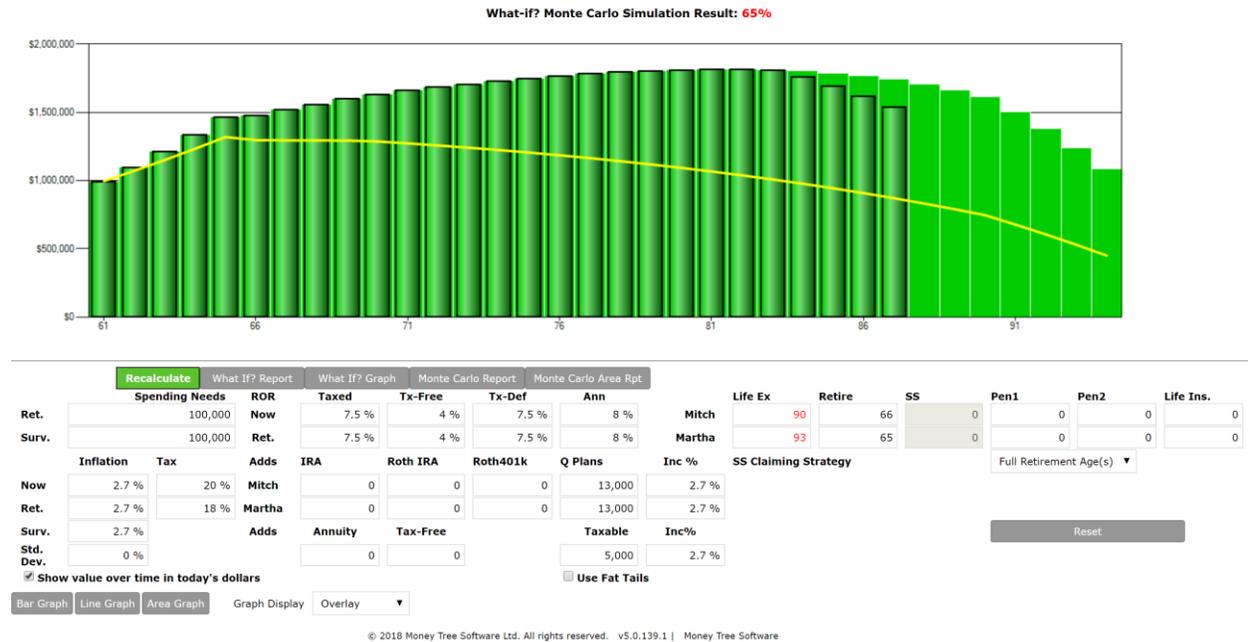
Example 3: One Conservative Assumption **7.5% rate of return**, **3% inflation rate**, longevity M 83 F 86

Monte Carlo Probability **drops to 81%**; requires \$4000 reduction in spending to return to 89%



**Example 4:** One Conservative Assumption 7.5% rate of return, 2.7% inflation rate, longevity M 90 F 93

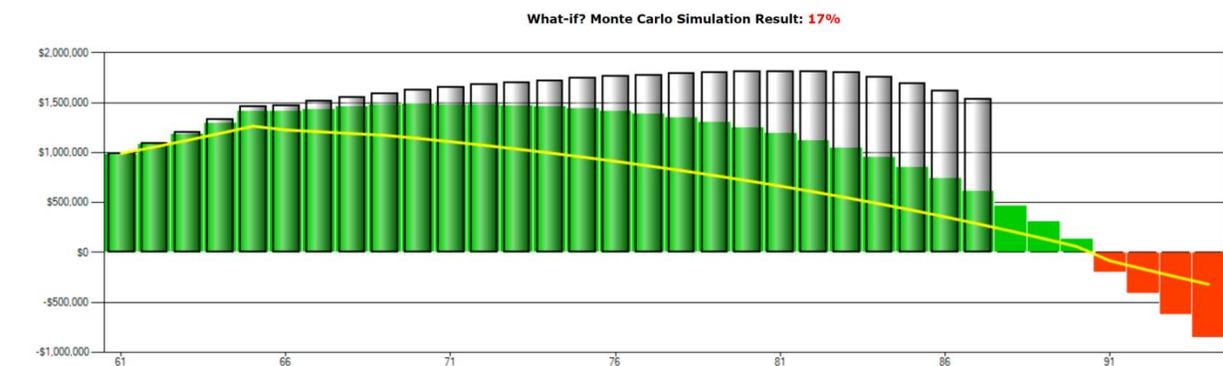
Monte Carlo Probability **drops to 65%**; requires \$10,000 reduction in spending to return to 89%



But what happens if all three moderately conservative assumptions are stacked into the same model?

**Example 5:** Three Conservative Assumptions: 6.75% rate of return, 3% inflation rate, longevity M 90 F 93

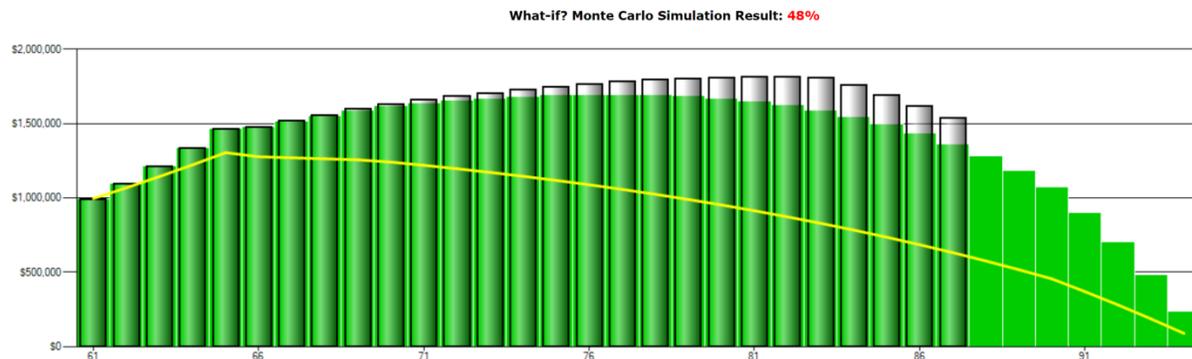
Monte Carlo Probability **drops to 17%**; requires \$19,000 reduction in spending to return to 89%



Because the Monte Carlo probability outcome responds by multiplying each of the percent reductions when several variables are stressed at the same time, the simulation result takes an alarming drop. This is why clients should be cautioned about stressing multiple variables simultaneously. And, of course, the reverse is true as well – if clients input several optimistic variables at the same time, their Monte Carlo result will rise dramatically and may lead them to make plans that are not warranted by their situation.

Example 6: Two Conservative Assumptions: 7.5% rate of return, 3% inflation rate, longevity M 90 F 93

Monte Carlo Probability **drops to 48%**; requires \$15,000 reduction in spending to return to 89%



### **Conclusion:**

Clients using *What-if?* modeling systems can benefit from guidance and suggestions regarding what constitutes average and reasonable long-term planning assumptions. Combined conservative or optimistic assumptions can have multiplicative effects on Monte Carlo simulation results. Varying single assumptions, one at a time, can offer clearer examples of potential input to result relationships.

Monte Carlo simulation already varies future annual rates of return to model sequence of return risk, so advisors may want to suggest clients take care adding additional stress to rates of return in the *What-If?*. If clients focus their stress tests on earlier retirement ages, longer life spans and higher inflation rates, the simulation results will automatically include rate of return stresses from fluctuations that are in some cases more optimistic and in some cases less optimistic than average rates of return initially input.

*What-If?* can be quite a powerful educational tool when used appropriately. Clients often become very engaged in retirement simulations when given the opportunity to make their own changes and have time to reflect on the various results. *What-if?* experimentation can offer clients helpful insights into their individual retirement dynamics. Offering clients ideas and direction on how you select average assumptions, reasonable variations, and how stacked assumption variations compound multiplicatively, can facilitate their successful exploration of financial math and probability as it applies to their futures.

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