MONTE CARLO SIMULATION

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This month's topic, the Monte Carlo Simulation, is not quite as exotic as it sounds. It is, however, a vital retirement planning tool. Since no one knows with certainty what the future returns of the financial markets will be, it is important to understand how fluctuations can affect your financial goals. The Monte Carlo Simulation mathematically measures your probability of achieving financial goals by simulating the uncertainty of investment returns. Here's how the process works.

What is monte carlo simulation?

The Monte Carlo Simulation had an interesting beginning. Its creator, Stanislaw Ulam developed the system to forecast ranges of nuclear explosion impacts for the Manhattan Project. He named his theory after an uncle who had a passion for gambling in Monte Carlo. While we don't suggest you use it as Mr. Ulam's Uncle did, it is an invaluable tool for the investment world.

Why use monte carlo simulation?

In the past, financial planners projected portfolio performance by using a fixed rate of return, say 7%, over the life of a portfolio. While this methodology illustrated one possible scenario, it did not account for the variety of market fluctuations a portfolio is likely to encounter on the way.

The Monte Carlo Simulation runs thousands of simulations using a wide range of returns to produce the probability of reaching a goal. It takes into consideration compounding returns, contributions and distributions from the portfolio and the timing of returns that typical linear compounding ignores. Some methodologies even randomize your other variables like life expectancy. It is important to keep in mind, however, that results may vary with each use of the Simulation and over time.

An example

Let's take a look at an example to put this in more concrete terms. Let's examine two portfolios with exactly the same average return. We'll start with $500 and assume that $500 is added at the start of each subsequent year. Portfolio 1 experienced different returns each year, but averaged 7% per year over the five year period. Portfolio 2 produced a steady 7% return every year.

Portfolio 1 - Random Returns (Averages to a 7% Return)

Year	Begin	Contrib.	Return	End
1	$500	$500	12%	$1,120
2	$1,120	$500	16%	$1,879
3	$1,879	$500	14%	$2,712
4	$2,712	$500	12%	$3,598
5	$3,598	$500	-4%	$3,934
6	$3,934	$500	-6%	$4,168
7	$4,168	$500	-2%	$4,574
8	$4,574	$500	14%	$5,785

Portfolio 2 - Level Returns (Constant 7% Return)

Year	Begin	Contrib.	Return	End
1	$500	$500	7%	$1,070
2	$1,070	$500	7%	$1,680
3	$1,680	$500	7%	$2,332
4	$2,332	$500	7%	$3,031
5	$3,031	$500	7%	$3,778
6	$3,778	$500	7%	$4,577
7	$4,577	$500	7%	$5,433
8	$5,433	$500	7%	$6,348

Although each portfolio averaged 7% per year, there is nearly a 10% difference in their ending value. Volatility of returns is the reason for the difference. While $563 doesn't sound like a lot, a $1,000,000 portfolio may have returned nearly $100,000 less than expected. That could make the difference in anyone's retirement plans.

UNDERSTANDING MONTE CARLO SIMULATION

Even if the annual investment return of a portfolio averages 7%, it is not prudent to assume 7% each and every year. Historical market returns have not supported that assumption. Furthermore, a portfolio needs to work harder after a steep decline. If your portfolio declined 25%, it would need to grow more than 33% to breakeven.

Understanding variations is especially important when timing distributions from an account. Withdrawing $250,000 to purchase a dream vacation home after a significant (25%) decline could prove to be more of a hurdle than waiting to do so after a year of positive growth. Quantifying the probability of success will allow you to make adjustments that could increase your likelihood of achieving financial goals. If after running the Monte Carlo Simulation for possible results, you find there is only a 60% probability of reaching your retirement goal, you may want to save more, work longer or reduce the amount you plan to withdraw each year. What if the chances of your success are over 95%, you say? You may then want to develop strategies of gifting or spending more rather than being left with a large estate tax burden.

We all want to make wise financial decisions. The Monte Carlo Simulation may provide you more accurate information than if you assume a constant annual return. Of course none of us know what the future holds, but by analyzing numerous financial possibilities, you can have a clearer understanding and be more confident in making financial decisions.

Please feel free to contact your Relationship Manager if you would like to discuss the Monte Carlo Simulation in more detail and how it can be used to help you work toward your financial goals.