



MCS Instructions

MCS is a math technique used to model situations that involve uncertainty and thus cannot be modeled deterministically but can be described stochastically (i.e., statistically). For example, while you may estimate a portfolio return to be 7% per year on *average*, it certainly won't be 7% *each* year. Thus, a financial plan that works *on average* can be disastrous a disconcertingly high percentage of the time. Remember, a statistician is a person with his feet in ice water and his head in the oven and who *on average* is very comfortable. The term "Monte Carlo Simulation" was coined during the technique's use in the Manhattan Project in World War II.

MCS is particularly useful for a reasonableness test of a financial plan – especially one with irregular cash flows where rules of thumb (such as a 4% withdrawal rate being "safe") can't be easily applied. Please do not confuse precision with accuracy. I was tempted to make the program round the results off to the nearest hundred thousand dollars so people would realize that they are estimates, but I didn't. In financial planning you can be accurate ("This is a prudent plan") even when you can't be precise ("You will have \$2,057,387 in your portfolio at age 65"). You can't have precise results when most of the inputs are estimates of the unknown!

Most financial planning software today incorporates MCS, but we have found it wanting in three respects: 1) it is frequently a "black box" with assumptions that may not be obvious or desired (or even correct!), 2) it frequently has bugs, and 3) it is not inexpensive.

Thus, we have used an Excel add-in called RiskAMP to create our own MCS models for financial planning. These models are available for your use as well from our web site. (RiskAMP is available at www.RiskAMP.com and has a 30-day free trial. We are not affiliated with RiskAMP in any way and get no benefit from you purchasing their tool.)

There are two versions available on our web site, one for financial planning for individuals ("private clients"); the other for endowments, foundations, etc. and allows percentage withdrawals, smoothing of withdrawals, and a ratchet feature. The directions below pertain to the private client version.

We are not, nor do we desire to be, in the software development business. Thus, while we are happy to assist by sharing freely, we regret we cannot perform user support. If you are not comfortable with Excel, you should probably purchase a commercial financial planning package. Also, it probably goes without saying that there won't be a polished user interface on this either. That said, the following instructions should get you started.

- The first tab is where you enter your information. You may input or modify information in any yellow cell.
- There is space for 20 cash flows and other self-explanatory general assumptions. There is also room for 6 portfolios. The return is the arithmetic average, and the risk is the standard deviation. If you don't know what those terms mean, don't use this for other than entertainment purposes. Again, all yellow cells, including the names of the portfolios and cash flows, may be changed.
- The next three tabs are used to perform the calculations and otherwise prepare data for the reports. They should generally be ignored unless you are experienced with Excel and want to modify the calculations or reports in some way.

- The last three tabs are the reports which, combined with the first tab, can be printed and given to clients as you deem appropriate. You may have to modify the format of the charts depending on the age of the client. For those of you who have compliance departments to deal with, 1) I am sorry, 2) you should probably check with them to seek approval before using this with clients.
- It is a simple matter to save each plan you prepare for your clients as you normally would save a document. I recommend using the client's name, the date, and the scenario name in the filename.
- You may notice there are no tax assumptions in the software. Modeling taxes introduces *lots* of complexity and even more problems. When it is done in commercial programs, it is generally done incorrectly. For example, tax-inefficient assets should be held in tax advantaged accounts and tax-efficient investments in taxable accounts. These two types of accounts thus will have different asset allocations but can't be modeled independently because there is a correlation between them. I have not seen any software that handles this correctly. In addition, there is probably more uncertainty about future tax policy than there is about future investment returns. Thus, I advocate simply grossing up all withdrawals by an approximate blended tax rate. For example, if someone needs \$100,000 per year net to live on, and you assume a 25% blended tax bracket $\$100,000 / (1 - .25) = \$133,333$. To the extent they have retirement plans with no basis, the rate will be closer to ordinary income rates. Taxable accounts with stocks and low turnover will be at capital gains rates (on gains only), while Roth IRAs will not be grossed up at all. Thus, the combined tax rate is clearly a fudge though probably not much worse than extremely detailed computations with high precision but low accuracy (see above).
- Once you have input your data, go to the "Monte Carlo" menu item (if you don't see it, you either didn't purchase or install RiskAMP correctly), and choose "Run Monte Carlo..." I recommend a minimum of 1,000 trials for accuracy, and even more to make the lines on the graphs smoother when you are ready to run the final reports. If you uncheck the "Allow Screen Updates during Simulation" box, it will run much faster.
- This spreadsheet is *free*. Thus, I obviously can make no warranty that it is free of bugs, etc.

Notes:

The analysis in this report has been prepared by David E. Hultstrom, MBA, CFP®, CFA, ChFC®, CAIA, CPWA®, CIMA®. Questions or comments are welcome, and he may be reached at David@FinancialArchitectsLLC.com or (770) 517-8160.



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