Sensitivity analysis

The Goal of the sensitivity analysis is to determine how likely the ”winner” of a trade study will change given a change in either the parameter weighting, or raw data. We do this two separate ways.

Parameter Sensitivity

For parameter sensitivity analysis we only want to look at the change of one option’s raw data for a parameter at a time. That is, we want to see how much the raw data for a lower scoring option must change for it to surpass the score of the “winner”. The change in data to be intuitive for the user so we will represent the change in raw data it in term of non-denationalized units of standard deviations. This will solve the problem of data being at different scales. The standard deviation we use will be found from the data we used in the trade study. We will create a matrix that has the required change in raw data, in terms of standard deviations, for an option to become the highest scoring option for the trade study. With this information we can decide how we want to further use it for more analysis. There are a verity of viable options in which to use this data but we can added that potential later.

Weighting Sensitivity

For weighting sensitivity analysis we will perform a more brute force analysis. There will be a finite amount of combinations that the weights can have, and we will simply run that trade study for each combination. We will then count have how many combination give the same result as the original trade study and compare it to the total number of combinations. This may run into problems when we consider a large number of “n” parameters. The number of runs needed is $7^{(n-1)}$ which blows up very quickly as “n” gets bigger. If we run into find that the trades take too long to analysis, we can reduce the number of combination that we can evaluate to weights that are close to the original weights. This would reduce that evaluations to less than $3^{(n-1)}$ if we only consider weights that have a one increment change from the original, or less than $5^{(n-1)}$ if we consider weights that are two increment changes from the original. Combinations would be less than those numbers because if a weight is at an extreme it will restrict the change in one direction. If the weight is at an extreme, we could consider more increments in the opposite direction, this way we elevate the same number iterations for each weight.