

Mapleridge Capital / Fields-MITACS Problem

A challenge in the investment management industry is to choose strategies and apply allocation weights in order to construct portfolios to achieve optimal annual returns, low drawdowns and short time-to-recovery of the drawdowns. The problem put forward for the Fields/MITACS workshop is to determine the methodologies that should be investigated to solve this challenge.

Now, we could review the theoretical literature, addressing:

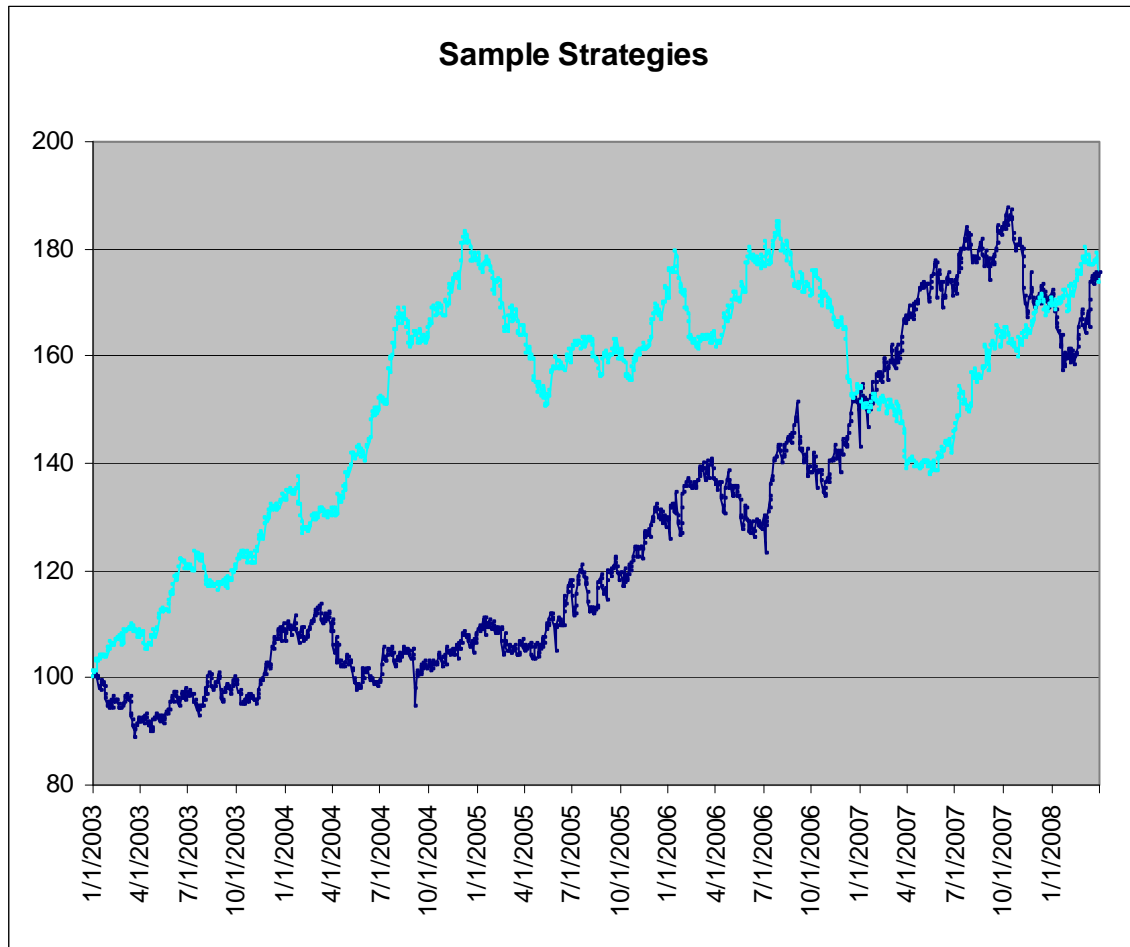
- Modern portfolio theory, or mean/variance analysis
 - Assumes investment returns are Gaussian and stationary
 - However, returns have fatter tails than the standard deviation calculation would have us believe and returns streams can be non-stationary
- Post-modern Portfolio Theory
 - Investment returns can have non-Gaussian, non-symmetrical returns
 - Fails to provide portfolio construction method
- Measurements of Risk
 - Sharpe Ratio
 - “The Sharpe Ratio” by William F. Sharpe, (1994)
 - “Sharpening Sharpe Ratios”, by Goetzman et. al. (2002)
 - “Sharpe Ratios and Alphas in Continuous Time”, by Nielsen and Vassalou (2003)
 - Sortino Ratio

However, in our experience, solving the problem of optimal portfolio allocation using the above methodologies has led us to observe sub-performing solutions when compared to equally-weighted portfolios of strategies. ***Therefore, we would like to present you with sample strategy data to work with, and have you focus on determining methodologies to create optimal portfolios through time.*** Please keep in mind the following:

- What is the optimal look-back?
- How many times does one rebalance a portfolio given transaction costs of 4 bp per transaction (adjusted proportionally if not trading in or out of a strategy completely)?
- How will you set out the process that you will use (e.g. in and out-of-sample data)?

Data

Mapleridge Capital will provide you with daily returns of various strategies in a csv file format. From this data you will be able to calculate returns, correlations, volatilities etc. Two such strategies look like the following, where the total return index starts at 100:



We can see from this simple example that there are times when one or the other strategy should be over-weighted.

The group will be provided with 35 strategies.

Goal

In summary, the goal is to provide alternative methodologies to form portfolios of strategies which will give better performance going forward. The comparison benchmark is a portfolio of equally weighted strategies. The metrics used to determine success are high Sharpe, high annual returns, low maximum drawdown and minimizing the maximum time-to-recovery.

In simulations, the minimum targets for the portfolio would be as follows:

- Highest possible Sharpe
- Return/Drawdown greater than 3.0
- Maximum time to recovery of less than 125 days

Methodology

The methodology is completely open to the study group. We also do not want you to necessarily focus on the targets if it means missing an opportunity to come up with a solution.