

# INVESTMENT STRATEGY

## Overview

In this GitHub repo I present two investment strategies that I designed to improve the performance of my personal equity portfolio. Both strategies use a time-series predictive approach. Strategy (1) and Strategy (2) are based on Kritzman's "Relevance" statistic and at each point in time, they draw within-asset historical comparisons to extract instances in the past that are statistically relevant for the purpose of forecasting returns. Strategy (2) uses a more traditional approach and models asset returns as a linear function of macro and equity factors (see Engstrom).

## Goal

The goal of both investment strategies is to generate alpha relative to the S&P 500. Performance relative to the benchmark is assessed by comparing Sharpe Ratios. The Sharpe Ratio is computed on a rolling window basis in order to monitor its evolution over time. This will give us a time-series of Sharpe Ratios. It is crucial that the difference between the SR of the strategy and that of the S&P 500 be statistically different from 0. A simple t-stat using the time series of SRs obtained in the previous step should suffice.

## Strategies

As discussed, I present two strategies, both of which are designed to generate risk-adjusted excess returns.

### 1) Strategy (1)

- i. Investment horizon of one month with portfolio rebalancing occurring on the first day of each month.
- ii. Use 10 years of monthly excess returns data for training and then proceed to predict one-month ahead returns on a rolling window basis.
- iii. Use Kritzman's Relevance statistic to identify instances in the past that are most relevant (a tradeoff between similarity and informativeness).
- iv. Pick the 30 most relevant dates and compute one-month ahead returns following each of those dates for each of the assets in the portfolio.
- v. Obtain a distribution of returns and compute expected return and volatility for each asset.
- vi. Compute covariance among different assets in the portfolio using the distributions from step (v).
- vii. Optimize your portfolio using the moments from steps (v) and (vi) to compute the optimal portfolio weights for the current month.

- viii. The other aspect to look at is alpha generation. Regress the time series of realized returns from the strategy against the FF3 factors and determine whether alpha is statistically significant.

## 2) **Strategy (2)**

- i. The structure of Strategy (2) is very similar to strategy (1). Steps (i)-(iii) are exactly the same.
- ii. Pick the 30 most relevant dates in the past for each asset, compute one-month ahead returns and volatility, and then obtain the Sharpe Ratio for each of the most relevant dates for each asset.
- iii. Calculate an ensemble Sharpe Ratio by weighing each critical date's Sharpe Ratio based on the order of relevance, with weights summing to 1. Do this for all assets.
- iv. Assign portfolio weights based on the magnitude of the Sharpe Ratio with the largest weight assigned to the asset with the highest ensemble Sharpe Ratio, and so forth. Weights must sum to 1.
- v. Proceed as in Strategy (1).

## 3) **Strategy (3)**

- i. Details TBD.