FFCM – Smart Beta

FINE 452 – 2017

The case provides useful information/context for the assignment. You may, but are NOT required to address questions from the case. Address tasks from this assignment instead.

The goal of this assignment is to develop, backtest, and pitch a strategy for an active ETF. You will have access to daily stock data from 2010-2014. Your strategy will then be evaluated on it's performance from 2015-2016.

For the purposes of this assignment, assume the risk free rate is 0.

DATA

You have access to data similar to assignment 1, except that

- You have daily data
- You have ME, market capitalization. This variable is useful for exposure to the size factor (SMB)
- You have BE, book value of equity. This variable is useful for exposure to the value factor (HML)
- BE and ME need to be lagged before they can be used as inputs to your strategy

TASKS

You need to develop an actively managed ETF for Factor Funds Capital Management (FFCM) with the following considerations:

- The goal is to maximize the information ratio

$$IR = \frac{E[R_t - \beta \cdot MarketRP]}{\sigma[R_t - \beta \cdot MarketRP]} \cdot \sqrt{252} \tag{1}$$

$$= \frac{\alpha}{\sigma[\epsilon_t]} \cdot \sqrt{252} \tag{2}$$

$$R_t = \alpha + \beta \cdot MarketRP_t + \epsilon_t \tag{3}$$

  IR is the Sharpe Ratio concept applied to alpha. Maximizing IR is the same as maximizing SR after hedging out beta exposure to market risk.

- Hold only long positions in US equity (the provided CRSP universe), no position in the risk-free asset.

- Incorporate a dynamic mix of exposures to value, size, and momentum factors (factor timing / card counting / "Smart Beta")

- You are interested in limiting your transaction cost. One way to estimate transaction cost is to measure your portfolio turnover / average holding period.

$$trades_t = \sum_i |w_{i,t} - w_{i,t-1}| \tag{4}$$

$$turnover_t = \frac{trades_t}{2} \tag{5}$$

$$averageTurnover = \frac{252}{T} \sum_t turnover_t \tag{6}$$

$$= 252 \cdot mean(turnover_t) \tag{7}$$

$$averageHoldingPeriod = \frac{1}{averageTurnover} \tag{8}$$

  As a benchmark, a value-weighted market portfolio has almost no turnover and earns a SR of about 0.3. If your strategy has an average holding period of a day, your boss might need SRs above 2 to justify the trading costs. If you stretch your holding periods out to 5 days, then a Sharpe Ratio of 0.8 - 1 might do. At 20 - 60 trading days, even Sharpe Ratios around 0.4 - 0.5 could be interesting.

DELIVERABLES

This assignment will count towards 30% of your final grade, distributed as follows:

- 5% Individual Cody Exercises [Due in class]
  - We will work on building blocks for the assignment in class. While this part of your grade is submitted individually and will not be affected by the peer evaluation, you may still work with your teammates.
  - Currently 4 exercises are planned. Subject to change depending on how quickly we cover the material.
- 10 % Group Code Submission [Due Nov. 27th 10AM, submit ZIP file to @submissions]
  - Calculate the following
    * Sharpe Ratio
    * CAPM alpha, beta, information ratio
    * FF3 alpha, betas, information ratio
    * Average Holding Period, Average Turnover
  - Plot the following
    * Strategy cumulative log returns
    * Market cumulative log returns
  - This portion of the grade is based on the quality if your code and whether it does what it claims to do.
- 10 % Pitch [Slides Due Nov. 27th 10AM, submit PDF to @submissions]
  - 20 minute presentation
    * Brief summary of context and goal. What type of ETF are you building? Describe the investors that make up your target market.
    * Describe your strategy (preferably with plots/figures, with formulas when needed, never with actual code)
    * Describe how your strategy performs (SR, AHP, alphas and betas)
    * Explain your investment decisions. Why do you trade a certain way? Why is your strategy is profitable?
    * What are the risks involved? When might your strategy fail?
  - You are graded on the quality of your strategy, analysis, and presentation.

- 5% Due Dilligence Memo [Due Dec. 6th 10AM, submit PDF to @submissions]
  - You will take on the role of an investor with a randomly assigned team from your section.
  - You will be responsible for attending and asking questions during their pitch.
  - You will need to submit, by Dec. 6th, a $\frac{1}{2}$ to 1 page memo on your analysis of the other teams strategy (strengths, concerns..etc), and whether you would invest.