FE 5217: Seminar in Risk Management and Alternative Investment: Algorithmic Trading and Quantitative Strategies

Assignment 4

Due: March 31, 2014

1 Problem 1

One of the most intriguing asset pricing anomalies in finance is so-called "price momentum effect". This homework consists of an exercise using data for sixteen stocks which will guide you through creating a momentum strategy. The goal is to replicate the price momentum strategy described in Jegadeesh and Titman (2001) using this data, albeit in a small scale.

1.1 Data

The daily returns from January 11, 2000 to November 20, 2005 for sixteen stocks are in the file `d_logret_16stocks`; to this add two more columns: SP500 returns and risk free rate.

1.2 Portfolio Formation

On the last day of each month, sort the stocks into four quartile portfolios based on the past six month cumulative returns. The first quartile contains the stocks with the lowest past six-month returns, and the fourth quartile contains the stocks with the highest past six-month returns.

(a) Start by accumulating the return of each quartile portfolio for next six months

(b) For each month and of the four quartile portfolios, record the average portfolio returns between January 2002 and November 2005.

1.3 Questions of Interests

After constructing the relevant portfolios, answer the following questions. When you answer these questions, note any additional assumptions/choices you made.

1.3.1 Momentum strategy profits

1. Report the monthly average returns of your quartile portfolio, as well as the winner (Q4, highest past six month return portfolios) minus losers (Q1, lowest past six month return portfolios).
2. Report the monthly average returns of quartile portfolio for January and non-January months respectively, a well as the winner (Q4, highest past six month return portfolios) minus losers (Q1, lowest past six month return portfolios).
3. Using CAPM test the spreads between winner and loser portfolio (Q4-Q1).
4. Tabulate these results in a table similar to table I in Jegadeesh and Titman (2001).
5. Compare your results to the results in Jegadeesh and Titman (2001) and comment on your findings.

2 Problem 2

Consider the 30-min price bar data for Treasury Yields from June 8, 2006 to August 29, 2013. Daily data for Treasury Yields is just a snapshot at 4 pm and the total volume for the day is the sum of 30-min volumes since the previous day.

(a) Develop ARMA time series models for both daily and the 30-min volumes. We can use daily data for developing macro strategies and 30-min data for micro strategies.

(b) Compute volatility measure, $\sigma_t^2 = 0.5[\ln(\frac{H_t}{L_t})]^2 - 0.386[\ln(\frac{C_t}{O_t})]^2$ for both levels and compare them.

(c) Compute volatility forecasts, $\hat{\sigma}_{t+1}^2$ =weighted average of $\sigma_t^2, \sigma_{t-1}^2, \ldots, \sigma_{t-22}^2$, for daily data and $\hat{\sigma}_{t+1\cdot m}^2$ = weighted average of $\sigma_{t\cdot m}^2, \ldots, \sigma_{t-22\cdot m}^2$. for m^{th} 30-min interval [In (a), you should notice strong seasonality in the 30-min data]

(d) Develop trading strategies that incorporate

   (a) price information only
   (b) price and volume information and
   (c) price, volume and volatility information

[One strategy is suggested in the note posted in IVLE, but you do not have to follow!]