

FE570 Homework Assignment #2

Due Date: In class on Nov 27, 2018 (Tuesday).

Data Files: Datasets are available from the course website on Canvas.

Problem 1 Pair trading strategy can be simplified as: buy a portfolio consisting of long shares A with log return x_t and short shares B with log return y_t when

xom

cvx

$$y_t - \alpha x_t = c - \Delta$$

and sell the portfolio when

$$y_t - \alpha x_t = c + \Delta$$

The key is to find A, B and Δ . In this problem, you are given two stocks Exxon Mobile (xom) and Chevron (cvx) as A and B. You need to show there exists α and c such that the linear combination $z_t = y_t - \alpha x_t + c$ is $I(0)$ i.e. stationary. Please follow a two step Engle and Granger procedure first, and then apply the trading rule for the two stocks (using Close price to calculated log returns) provided:

1. Estimate the co-integrating relation (e.g. with a linear regression).
2. Test for stationarity of the residual (z_t) using Augmented-Dickey-Fuller unit root test. **z残差项**
3. Use $\Delta = 2 * std(z_t)$ to identify long and short portfolio signals. Please present your results as a table of long and short signals along with dates.

Problem 2 Suppose that the daily log return of a security follows the model

$$r_t = 0.01 + 0.2r_{t-2} + a_t,$$

where $\{a_t\}$ is a Gaussian white noise series with mean zero and variance 0.02. What are the mean and variance of the return series r_t ? Compute the lag-1 and lag-2 autocorrelations of r_t . Assume that $r_{100} = -0.01$, and $r_{99} = 0.02$. Compute the 1-step and 2-step ahead forecasts of the return series at the forecast origin $t = 100$. What are the associated standard deviations of the forecast errors?

Homework Honor Policy: You are allowed to discuss the problems between yourselves, but once you begin writing up your solution, you must do so independently, and cannot show one another any parts of your written solutions. The HW is to be pledged (that it adheres to this).