

Homework 2

Ma641 Time Series I

due by class time 6:15pm, Monday June 8, 2009

You can hand in the assignments either in class at the beginning of the lecture or using the elearn page. If you chose elearn please convert the report to pdf format before submitting.

Problem 1

Use the Yahoo! Finance webpage. Choose an equity with a long enough history and download the following data:

- Daily data for the past three years.
- Weekly data for the past 5 years.
- Monthly data for the past 10 years.
- Monthly data for the past 20 years (this will be used to calculate quarterly return).

Calculate continuously compounded return for each dataset. In total you should have 4 arrays of numbers (returns daily, weekly, monthly, and quarterly)

For each of the four datasets perform the following procedures:

- Calculate the ACF for each time series.
- Perform the Portmanteau Ljung&Box test with as much lag as you feel is necessary.

Then answer the following questions:

1. Please plot the four ACF plots on one page (each with its own title and axis labels) and hand that picture in (attach it within the assignment).
2. For the CAPM to be valid there should be no serial correlation between successive returns (data should be uncorrelated). Does this assumption appear to be valid based on your dataset? Compare the validity of this assumption using the various time frequencies.
3. What is the difference in the autocorrelation function when looking at data sampled at various frequencies?
4. Finally, test for normality of the returns. Perform a Jaque-Bera test to check normality for each of the data under consideration. What do you see? Explain.

Problem 2 Consider the following AR(3) model:

$$r_t - 0.01 = 0.4(r_{t-1} - 0.01) + 0.3(r_{t-2} - 0.01) + 0.23(r_{t-3} - 0.01) + a_t$$

Express this time series as a linear time series of the form

$$r_t - 0.01 = \sum_{i=0}^{\infty} \Psi_i a_{t-i}.$$

To this end find recursive relations between coefficients Ψ_i . Then, using R output the first 50 coefficients. Hand in these coefficients.

What is the first order i such that Ψ_i is less than 0.0001?

Any other problems assigned in class and not mentioned here count as bonus problems and they will earn bonus points for your assignment.