Homework Assignment #3

Due Date: April 29 (Evening) & April 30 (Campus)

1. It is well-known that daily returns of equal-weighted index have some weekday effects. How about daily returns of value-weighted index or S&P composite index? To answer this question, consider the daily returns of value-weighted index and S&P composite index from January 3, 2000 to December 31, 2003. The data are in the file ”d-dell3dx0003.txt”, which has 12 columns. The first 4 columns are daily simple returns of Dell, vw, ew, and sp. Columns 5 to 9 are indicators for Monday to Friday, respectively. Columns 10 to 12 are year, month, and day. There are 1004 data points. Perform all tests using the 5% significance level, and answer the following questions:

- Is there a Friday effect on the daily simple returns of S&P composite index? You may employ a simple linear regression model to answer this question. Estimate the model and test the hypothesis that there is no Friday effect. Draw your conclusion.

  **Remark:** (a) In SCA, assume that the variable names for simple return and Friday dummy are “sp” and “fri”, respectively. You may specify a regression model with Friday indicator variable as follows:
  
tsm m1. model sp = d0 + (d1)fri(binary) + noise.
  
(b) In S-plus, assume that the data set object is “A” and the columns for the return and Friday indicator are “sp” and “fri”, respectively. Using the “FinMetrics” module, you may estimate the simple linear regression model by the OLS command
  
  fit = OLS(A$sp~ 1 + A$fri)
  
  Here “fit” is the output object of the ordinary least squares estimation. Type summary(fit)
to see the estimation result.

- Check the residual serial correlations using Q(12) statistic. Are there any significant serial correlations in the residuals?

2. Now, consider similar problems for individual stock returns. We use the daily simple returns of the stock of Dell Company in this problem; see the data set in this study. Again, use 5% significance level in all tests.
• Is there a Friday effect on the daily simple returns of Dell stock? Estimate your model and test the hypothesis that there is no Friday effect. Draw your conclusion.

• Are there serial correlations in the residuals? Use Q(12) to perform the test. Draw your conclusion.

• Refine the above model by using the technique of regression model with time-series errors. In SCA, use
tsm m1. model dell = d0 + (d1)fri(binary) + (2)noise.
Fit the model and write down the result. Is the estimate of d1 significant at the 5% level?
S-plus does not have the nice feature as SCA mentioned above, but one can use a close approximation:
fit = OLS(A$dell ~ 1 + A$fri + tslag(A$dell,2))
Here “tslag” denotes lagging operation of a time series.

3. Consider the monthly yields of Moody’s AAA &BAA seasoned bonds from January 1919 to March 2004. The data are obtained from Federal Reserve Bank at St Louis. Monthly yields are averages of daily yields. Obtain the summary statistics (sample mean, standard deviation, skewness, excess kurtosis, minimum and maximum) of the two yield series. Are the bond yields skewed? Do they have heavy tails? Answer the questions using 5% significance level.


5. Again, consider the two bond yield series. What is the relationship between the two series? To answer this question, build a time series model using yields of BAA bond as the dependent variable and yields of AAA bond as independent variable.