

Amath 546/Econ 589: Financial Econometrics and Quantitative Risk Management

HW 1

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Due: Tuesday 4/10/2012

Reading

- FRF chapter 1
- QRM chapter 1; chapter 4, sections 1 and .
- FMUND chapter 1 and chapter 2.
- SDAFE chapter 2 and chapter 4

This first assignment is an easy empirical assignment in R to get you started looking at data, and to replicate some of the results presented in class using some more recent data. I recommend that you use the following R packages

car
PerformanceAnalytics
quantmod
tseries
xts
zoo

Copy and paste the R output into your favorite word processor and answer questions and make comments in the document.

Empirical Problems

1. Download daily adjusted closing prices on Microsoft (ticker MSFT) and the S&P 500 (ticker ^GSPC) over the period 2000-01-03 to the present. Compute continuously compounded daily returns as well as continuously compounded monthly returns. Create time plots of the daily and monthly returns, absolute returns and squared returns on Microsoft and the S&P 500. Comment on any "stylized facts" of asset returns that we discussed in class. For automatically downloading data in R, you can use the `getSymbols()` function from the **quantmod** package. For aggregating

daily returns to monthly returns you can use the `to.monthly()` function in the **xts** package.

2. In this exercise, you will assess the distributional properties of the daily and monthly returns on Microsoft and the S&P 500. Create histograms and normal qq-plots for the returns. Compute sample statistics (mean, sd, skewness, kurtosis) and test the null hypothesis of normality using the JB statistic. You can do most of this using the functions in the **PerformanceAnalytics** package. You can use the `jarque.bera.test()` function from the **tseries** package for the JB test.
3. In this exercise, you will assess the serial correlation properties of the daily and monthly returns on Microsoft and the S&P 500. Plot the sample ACF and PACF and comment. Compute the Ljung-Box Q statistic for lags 1-10 and use these statistics to test the hypothesis that the returns are uncorrelated. You can use the `Box.test()` function from the **stats** package for this.
4. In this exercise, you will assess the serial correlation properties of the daily and monthly squared and absolute returns on Microsoft and the S&P 500. Plot the sample ACF and PACF and comment. Compute the Ljung-Box Q statistic for lags 1-10 and uses these statistics to test the hypothesis that the squared and absolute returns are uncorrelated.