

THE UNIVERSITY OF CHICAGO
Graduate School of Business
Business 41202, Spring Quarter 2006, Mr. Ruey S. Tsay

Homework Assignment #3

Due Date: April 21 (Campus) & April 20 (Evening)

Note: Unless specifically assigned, all tests are based on the 5% significance level. All data are on the course web.

1. Consider the weekly yields of Moody's BAA seasoned bonds from January 8, 1982 to April 7, 2006. The data are obtained from Federal Reserve Bank at St Louis. Weekly yields are averages of daily yields. Take the natural log transformation of the bond yields to build a time series model for the series. Perform model checking using $Q(12)$ for residuals. Write down the fitted model. Use the fitted model to produce 1-step to 4-step ahead forecasts at the forecast origin April 6, 2006.
2. The bond yields are related to interest rates. To study the dependence, consider the weekly BAA bond yields as the dependent variable and the weekly Federal Funds Rate as the independent variable. Note that Federal Funds Rate end in Wednesdays and bond yields end in Fridays. Take the log transformation of the two series and build a regression model with time series errors for the two log time series. Perform model checking using $Q(12)$ of the residuals and write down the fitted model.

Note: You may use the commands shown in **Lecture 3** to perform the analysis.

3. The data file "d-dellew0105-wk.txt" has 10 columns; they are year, month, day, dell, ew, mon, tue, wed, thr, fri, where "dell" and "ew" are the daily simple returns of Dell Computer stock and CRSP equal-weighted index, respectively, the last 5 columns are indicators for Monday, ..., Friday, respectively. The sample period is from 2001 to 2005 for 5 years. Is there a Monday effect on equal-weighted index returns based on the 10% significance level? Write down the fitted model and draw your conclusion.

R commands:

```
da=read.table('d-dellew0105-wk.txt')
dell=da[,4]*100
ew=da[,5]*100
mo=da[,6]
tu=da[,7]
we=da[,8]
th=da[,9]
m1=arima(ew,xreg=mo,order=c(0,0,0))
```

```

m1
tsdiag(m1)
acf(m1$residuals)
m2=arima(ew,xreg=mo,order=c(4,0,0))
m2
tsdiag(m2)
Box.test(m2$residuals,12,type='Ljung')

```

You can compute the t-ratio, which is estimate/s.e., and its p-value to make inference.

S-Plus commands:

```

(** Load data and define variables as those in R **)
m1=OLS(ew~mo)
summary(m1)
acf(m1$residuals)
m2=OLS(ew~mo+ar(4))
summary(m2)

```

4. Consider the daily simple return of Dell stock in “d-dellew0105-wk.txt”. Is there any weekday effect based on the 10% significance level. Write down the fitted model and draw your conclusion.
5. Consider the quarterly earnings per share of Procter & Gamble Company from December 1991 to September 2005. The data are obtained from First Calls via Wharton (WRDS) and are in the file “q-pgeps.txt” (four columns: day, month, year, earnings per share). Treat the data as a quarterly time series. Build an adequate model and use the model to produce 1-step to 4-step ahead forecasts at the forecast origin September 2005. Write down the fitted model, the forecasts, and their standard errors.

[PS. Several models can fit the data well, and there is no “best” model for the data.]