

## SMF Problems 6. 22.11.2013.

The purpose of this problem is to use time series modelling on some financial data using R. The first exercise consists in fitting some

### *Q1. ARMA fitting and the Box-Jenkins methodology*

(i) *Getting the data:* Load the data from the file and create the log-return series. Be careful about the fact that –as often– the data is in chronological reverse order. Note, however that if you have a vector **vec**, you can revert it by

```
vec<-vec[length(vec):1]
```

(iii) *Looking at the ACF and PACF functions:* Use the **acf** and **pacf** functions to check whether there are features characteristic of AR or MA models.

(iv) *ARIMA fitting:* Even if the ACF/PACF exploration is useful, in practice, one uses an information criterion based approach to figure out the ARMA. Use the package **forecast** and notably the **auto.arima** function to fit the best possible model in terms of Akaike Information criterion, ensuring the function goes through all possible models by setting the **stepwise** parameter to false.

(v) reiterate the same procedure with the Coca-Cola log returns. In particular

### *Q2. GARCH fitting*

(i) *Getting the data:* Download the VIX times series, which models the S&P volatility.

(ii) *Fitting a GARCH model:* Use the **garchFit** in the **fGarch** package (which you may have to install on your R distribution) to fit a GARCH(1,1) model to the data. What are the parameters of the model?

NHB/PMBF