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################### Financial Econometrics - Fall 2018 ####################
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################### Lab 2: Testing EMH ####################

### Starbucks stock monthly price series from 1998 to 2009

starbx=read.table(file=file.choose(), header=TRUE, sep=",", dec=".")
starbx = read.delim("/Users/karollgomez/Dropbox/Karoll/Cursos/EconometriaFinanciera/NotasClase/Intro/sbuxPrices.csv",header=TRUE,sep = ",", dec = ".")


# Compute log prices
closing =starbx[, "Adj.Close"]
logprice = log(closing)
plot(logprice, type="l")
# Compute the continuously compounded 1-month returns
sbux = as.matrix(closing)
n = nrow(sbux)
sbux.ccret = log(sbux[2:n,1]) - log(sbux[1:(n - 1),1])
plot(sbux.ccret, type="l")


############## IID (RW1) => MARTINGALE DIFFERENCE (RW2) => WHITE NOISE (RW3)

###### Testing RW3
acf(sbux.ccret)
Box.test(sbux.ccret, lag = 1, type = c("Ljung-Box"), fitdf = 0)
Box.test(sbux.ccret, lag = 1, type = c("Box-Pierce"), fitdf = 0)

library(randtests)
bartels.rank.test(sbux.ccret, pvalue="normal")

###### Testing RW1
library(vrtest)
kvec = c(2,5,10) # k as k-th lag of your time series (eg. k=1 is the first difference of the time series, k=2 is the 2nd and so on).
Lo.Mac(sbux.ccret, kvec) # it checks whether the VR = 1 for a given k to see whether the series is a random walk (which is the null hypothesis).

# M1 is the Lo.Mac statistic under the homoscedastic assumption. M2 is the Lo.Mac statistic under the heteroscedastic assumption. Better to look at M2 than M1 as M2 is based on a more
 realistic assumption. M1 and M2 are assumed to follow a normal distribution. So if M1 or M2 is greater than 1.96, you can reject the null hypothesis at 5% significant level.

# Other example with different data set: Exchange rates
data(exrates)
 y = exrates$ca
nob <- length(y)
r <- log(y[2:nob])-log(y[1:(nob-1)])
kvec1 <- c(2,5,10)
Lo.Mac(r, kvec1)
VR.minus.1(r,kvec1)  #  This value is sometimes used to measure the degree of market efficiency
VR.plot(r,kvec) #

###### Homework 3
# Download data for a stock market index on daily as well as monthly frequency.
# 1. Discuss what the index measure and provide plots of the data series. Calculate returns and conduct a discussion of their time series characteristics.
# 2. Is the stock market efficient ? Use different horizons and test (strongly, weak and semi-strong hypothesis). Discuss your results.
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