MSc in Data Science

Time Series and Forecasting Methods

Lecturer: Ioannis Vrontos

The data you will have to analyze are in the eclass in the excel data-assignment.xls file. The dependent variables for which you will construct the models you are asked for are the returns of four investment vechicles (Y1, Y2, Y3, Y4) for the period 1/1991 - 12/2005. The independent variables you will use in the models refer to monthly values/returns for the variables x1 = RUS-Rf, x2 = RUS (-1) -Rf (-1) lagged Russel index, x3 = MXUS-Rf, x4 = MEM- Rf , x5 = SMB, x6 = HML, x7 = MOM, x8 = SBGC-Rf, x9 = SBWG-Rf, x10 = LHY-Rf, x11 = DEFSPR, x12 = FRSI-Rf, x13 = GSCI-Rf , x14 = VIX, for the period 1/1991 - 12/2005.

Analyze dependent variables based on data for the period 1/1991 - 12/2004 [You will not use the data for the period 1/2005 - 12/2005]:

1. Construct an appropriate time series model (AR, MA, ARMA).
2. Develop an appropriate regression model
    a. In case of autocorrelation problem of regression residuals, correct the autocorrelation problem (using time series AR, MA, ARMA models).
    b. In case of heteroscedasticity problem of regression residuals, correct the heteroskedasticity problem (using time-varying ARCH, GARCH models).
3. Write the models you have found at questions (1) - (2). Assess the goodness of fit of these models based on the AIC and BIC information criteria.
4. Based on the estimated models of questions (1) - (2), construct forecasts of the analyzed series for the period 1/2005 - 12/2005, and evaluate the forecasts you have found by using two evaluation criteria: a. the mean square prediction error and b. the Hit ratio (indicates the percentage of predictions that correctly evaluate the sign of the actual value of the dependent variable.)

[Each student will have to analyze **two only** dependent variables].

Date of delivery of the assignment: 5 March 2018.