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Hands on Eviews: Exercise 1

Your dataset includes 197 weekly observations on the FTSE 100 PI (obtained from Datastream) covering the period 1/1/1996 - 4/10/1999. The name of the price series is P.

1. Generate the variables: $LP = \log(P)$, and $R = LP - LP(-1)$. Note that the latter is the weekly rate of return on the FTSE. (You can do that by clicking on "Quick" , "Generate Series".)

2. Plot the series $P$and R on separate graphs (you can do that by clicking on "Quick" , "graph"). Save these graphs as FIG1 and FIG2, respectively.

3. (a) Produce the histogram of P by clicking on "Quick" , "Series Statistics", "Histogram and Stats". In the histogram window click on "Freeze" and then click on "Name" and call the resulting table HISTP. (b) Repeat the above procedure to produce the histogram of R and call the resulting table HISTR. Observe that R does not follow a normal distribution (in particular, its distibution is leptokurtic).

4. (a) Produce the correlogram of LP by clicking on "Quick" , "Series Statistics", "Correlogram". In the resulting window click on "Freeze" and then click on "Name" and call the table CORLP. (b) Repeat the above for R and call the resulting table CORR. Note that the correlograms indicate that LP_t is non stationary, while R_t follows a stationary (but not a white noise) process.

5. Test for the stationarity of LP by clicking on "Quick" , "Series Statistics", "Unit root test". In the "Unit root test" window choose the Augmented Dickey Fuller (ADF) test with a trend and an intercept. In the resulting window click on "Freeze" and then click on "Name" and call the table ADFLP. Next, test for the stationarity of LP by using the Phillips Perron (PP) unit root test. Observe that both tests show that $LP_t \sim I(1)$.

6. Repeat the above testing procedure for the rate of return R. In this case both the ADF and PP unit root tests show that $R_t \sim I(0)$, i.e. the rate of return is a stationary series.

7. Run the following OLS regression: $R_t = c + \varepsilon_t$. To do that you can click on "Quick" , "Estimate Equation", and type: R c in the equation specification window. Name this EQ1. Can you interpret the estimation output?

8. After estimating EQ1, stay in the equation window and click on "View", "Residual tests" to produce (a) the correlogram of the residuals of EQ1 (compare this correlogram with that of R in step 4b above), (b) the correlogram of the squared residuals of EQ1 (the significant correlations here indicate that the variance of R is not constant), (c) the Serial Correlation test, and (d) the ARCH LM test.

9. Estimate by OLS the regression: $R_t = c + \phi R_{t-1} + \varepsilon_t$, by typing in the equation specification window R c R(-1). Name this EQ2 and repeat steps 8a-8b above.

10. Estimate the following AR(1)-GARCH(1,1) regression:

$$
\begin{aligned}
R_t &= c + \phi R_{t-1} + \varepsilon_t, \text{ where } \varepsilon_t / \varepsilon_{t-1} \sim N\left(0, \sigma_t^2\right), \\
\sigma_t^2 &= \alpha_0 + a_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2.
\end{aligned}
$$

    To do this you need to type in the equation specification window: R c R(-1), and change the method in the estimation settings from LS to ARCH. Name this EQ3 and repeat steps 8a-8b above.

►Which of the following three models for the rate of return do you prefer and why?

- EQ1: R_t follows a **strict white noise process**, i.e. $R_t = c + \varepsilon_t$, where $\varepsilon_t \sim iid\,(0, \sigma^2)$
- EQ2: R_t follows an **AR(1) process**, i.e. $R_t = c + \phi R_{t-1} + \varepsilon_t$, where $\varepsilon_t \sim iid\,(0, \sigma^2)$
- EQ3: R_t follows an **AR(1)-GARCH(1,1) process**, i.e. $R_t = c + \phi R_{t-1} + \varepsilon_t$, where $\varepsilon_t / \varepsilon_{t-1} \sim N(0, \sigma_t^2)$ and $\sigma_t^2 = \alpha_0 + a_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$