Financial Econometrics
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TP 10

Models with ARCH effects

Use the functions *garchset*, *garchfit* and *garchdisp* from the Matlab GARCH Toolbox to estimate parameters of ARMA and GARCH models, and *lbqtest* and *archtest* for the tests.

If the GARCH Toolbox is not available, use Sheppard's UCSD GARCH Toolbox.

Preestimation Analysis

1. For the series contained in *TP10.mat*, determine the values of p_1 and q_1 for a corresponding ARMA model, using the techniques of TP 8.
2. Estimate the coefficients of your ARMA model and compute the residuals. Validate your choice of p_1 and q_1 with the Ljung-Box test.
3. Test for the presence of ARCH effects using correlograms of squared residuals and the ARCH test.
4. If you detect ARCH effects, identify the orders p_2 and q_2 of a corresponding GARCH model. (See slide B.VI-36.)

Parameter Estimation

Use the *garchfit* function to obtain parameter estimates of your GARCH model, as well as residuals and conditional standard deviations.

Postestimation Analysis

Verify that your model explains the heteroscedasticity by applying the tests of the first section to the standardized residuals (the innovations divided by their conditional standard deviation).

You can also perform the same analysis on real financial returns and see how a simple GARCH(1,1) is able to model the heteroscedasticity (i.e. the volatility clustering disappears if you look at standardized residuals).