**Tutorial Activity 7**

**Week 8**

In this tutorial, the objectives are as follows:

* To compute volatility forecasts using the conditional expectation from the theoretical model.
* To practise how to generate the return and volatility forecasts using R.
* To discuss the terms of ‘conditional variance’ and ‘unconditional variance’.

**Recall:**

1. Consider the following simple GARCH(1,1) model

,

Suppose that the researcher had estimated the above GARCH model for a series of log returns on palm oil prices and obtained the following parameter estimates: ; , , , and . Note that the last five observations are omitted in the estimations for forecast performance evaluation exercise. Total number of available observations is 763. Only 758 observations are used out of available 763 observations in the GARCH estimation.

1. Write down a set of equations which could be employed to produce one-, two-, and three-step-ahead forecasts for the conditional variance of .
2. Compute the values of five point forecasts of conditional variance of .

**Table 1:** Last 3 values of log returns, residuals, and conditional standard deviation series after the estimation using 758 observations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Observations** | **Returns** | **Residuals** | **Conditional standard deviation** |
| 756 | -0.175419872 | -0.1907061830 | 0.4430412 |
| 757 | -0.418491763 | -0.4359749185 | 0.4248941 |
| 758 | 0.180957995 | 0.16824626660 | 0.4357224 |

1. Suppose now that the coefficient estimate of for this model is 0.95 instead. By reconsidering the forecast expressions you derived in **part (a)**, explain what would happen to the forecasts in this case.
2. Demonstrate volatility forecasting in R.

**Student activity:**

Generate retur

n and volatility forecasts in R for times , , ..., , using the estimated AR(1)-GARCH(1,1) model. Note that the number of holdout sample observations has to be 10 in this exercise.

1. Distinguish between the terms ‘conditional variance’ and ‘unconditional variance’. Which of the two is more likely to be relevant for producing:
2. one-step-ahead volatility forecasts.
3. twenty-step-ahead volatility forecasts.