

ECON7350: Applied Econometrics for Macroeconomics and Finance

Tutorial 9: Modelling Volatility - II

At the end of this tutorial you should be able to:

- construct an adequate set of models with possible TGARCH errors;
- construct an adequate set of models with possible GARCH-in-mean components;
- use R to draw inference on the presence of leverage effects from a class of TGARCH models;
- use R to draw inference on the presence of time-varying risk premia from a class of GARCH-in-mean models;
- use R to estimate and forecast volatilities based on models with TGARCH errors or GARCH-in-mean components.

Problems

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Consider the daily share prices of Merck & Co., Inc. (MRK) for the period 2 January 2001 to 23 December 2013 in the data file `Merck.csv`. Let $\{y_t\}$ denote the process of share prices. Recall that we learned how to fit ARMA-ARCH/GARCH models to data last week. We now consider extensions of these models to capture possible leverage effects and time-varying risk premia.

1. Consider the class of $\text{ARMA}(p_m, q_m)\text{-TGARCH}(p_h, q_h)$ models for the returns $r_t = \ln y_t - \ln y_{t-1}$.
 - (a) Construct an adequate set of models for estimating and forecasting volatilities.
 - (b) Draw inference on historic volatilities.
 - (c) Draw inference on the existence of leverage effects.
 - (d) Forecast volatility for the four trading days past the end of the sample.
2. Consider a class of GARCH-M models for returns r_t , with one ARCH lag and one GARCH lag.

- (a) Construct an adequate set of models for estimating the risk-premium.
 - (b) Draw inference on historic volatilities.
 - (c) Draw inference on the existence of a time-varying risk premium.
 - (d) Forecast volatility for the four trading days past the end of the sample.
3. Explain how you approach forecasting returns and volatilities assuming a process that is characterised by *both* a time-varying risk premium *and* leverage effects.

Assignment Project Exam Help

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