Scaling and Robustifciation of ARMA Models with GARCH/APARCH Errors Using R/Rmetrics

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Abstract

This presentation explores concepts and methods to implement extensions of ARMA models with GARCH/APARCH errors introduced by Ding, Granger and Engle.

It is nowadays common to estimate GARCH/APARCH models of financial time series. They play an essential role in risk management and volatility forecasting. Although these models are well studied, numerical problems may arise in the estimation of series with extreme events.

In this talk, we present how to explore the different behavior in the upper and lower tails of the financial return series distribution. Generalized hyperbolic skew Student's t-distributions can explain extreme polynomial losses and exponential decaying gains. We follow ideas from robust estimation, appropriate parameter scaling from optimization, and present their implementation in R/Rmetrics.

References:

Ding, Granger and Engle, A long memory property of stock market returns and a new model, Journal of Empirical Finance 1, 1993, 83

R/Rmetrics Core Team, R/Rmetrics fGarch Package, www.rmetrics.org and r-forge.r-project.org

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