GARCH Toolbox 2

Analyze financial volatility using univariate GARCH models

The GARCH Toolbox extends the Financial Toolbox with functions specific to volatility modeling. The GARCH Toolbox enables financial professionals to perform Monte Carlo simulation of univariate returns, generate minimum mean square error forecasts, perform pre- and postestimation diagnostic and hypothesis testing, and estimate parameters of general ARMAX/GARCH composite models.

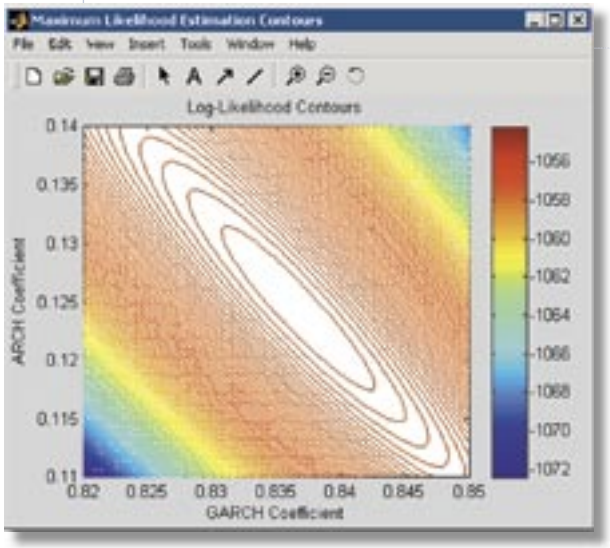
Simulation, Forecasting, and Parameter Estimation

The GARCH Toolbox enables you to perform Monte Carlo simulations of univariate returns, generate minimum mean square error forecasts, and perform pre- and postestimation diagnostics of financial time series in the presence of conditional heteroscedasticity. For pre- and postestimation diagnostic testing and hypothesis testing of residuals, the toolbox supports Engle's ARCH test, Q-tests, likelihood ratio tests, and information criteria model order selection.

The toolbox also provides general econometric time series modeling capabilities, including simulation, estimation, and forecasting of autoregressive (AR), moving average (MA), ARMA, and regression models.

KEY FEATURES

- Monte Carlo simulation of univariate returns, innovations, and conditional volatilities
- Minimum mean square error forecasts of the conditional mean and conditional variance of univariate return series
- Parameter estimation using general ARMAX conditional mean models and GARCH, GJR, or EGARCH conditional variance models
- Pre- and postestimation diagnostic and hypothesis testing, such as Engle's ARCH test, Ljung-Box Q-statistic test, likelihood ratio tests, and AIC/BIC model order selection
- Graphical correlation analysis, including autocorrelation, cross correlation, and partial autocorrelation
- Support for converting price/return series to return/price series, and transforming finite-order ARMA models to infinite-order AR and MA models



Contour plot of a log-likelihood function for a GARCH(1,1) model fitted to a typical equity return series.

Sample Functions

Univariate GARCH Modeling

Estimate parameters using univariate GARCH process

Forecast conditional means using univariate GARCH process

Perform Monte Carlo simulation using univariate GARCH process

Univariate GARCH Innovations Inference (Inverse/Whitening Filter)

Infer GARCH innovations and conditional standard deviations

Statistics and Tests

Compute Akaike and Bayesian information criteria for model selection

Run Engle's hypothesis test for the presence of ARCH/GARCH

Compute or plot sample autocorrelation function

Compute or plot sample cross-correlation function

Run Ljung-Box Q-statistic lack-of-fit hypothesis test

Run likelihood ratio hypothesis test

Compute or plot sample partial autocorrelation

Required Products

MATLAB
Optimization Toolbox
Statistics Toolbox

Related Products

Curve Fitting Toolbox. Perform model fitting and analysis

Financial Time Series Toolbox. Analyze and manage financial time series data

Financial Derivatives Toolbox. Model and analyze equity and fixed-income derivatives

For more information on related products, visit *www.mathworks.com/products/garch*

Platform and System Requirements

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Conditional Variance Modeling

Using the GARCH Toolbox, you can create a range of conditional mean and variance models. The toolbox supports several variants of GARCH (Generalized Autoregressive Conditional Heteroscedasticity) models, including standard ARCH/GARCH models, as well as asymmetric EGARCH and GJR models designed to capture leverage effects in asset returns.

Graphical Analysis and Data Manipulation

Graphics capabilities enable you to plot correlation functions and visually compare matched innovations, volatility, and return series. The GARCH Toolbox also provides utilities for manipulating time series data, converting price/return series to return/price series, and transforming finite-order ARMA models to infinite-order AR and MA models.

For demos, application examples, tutorials, user stories, and pricing:

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