NEW! FANPAC MT 2.0 Update For GAUSS 5.0

Now Available!

FANPAC MT: Financial Modeling with GARCH

- Risk Management
- Volatility Estimation
- Value at Risk

New Features Include:

- **Supports Structures & n-Dimensional Arrays**
- **New GARCH Models**
  - **ARMA-GARCH Models**
  - **Normal & t-distribution EGARCH Models**
  - **AGARCH Models**
  - **Multivariate VAR-diagonal Vec GARCH Models**
- **New Simulation Bounds Method for Statistical Inference**

FANPAC MT is a GAUSS Application for the analysis of time-series data. It includes univariate and multivariate models: ARIMA, VAR, VARMA, GARCH, EGARCH, FIGARCH, ARMA-GARCH, ARMA-FIGARCH, Diagonal Vech ARMA-GARCH, Diagonal Vech ARMA-FIGARCH, and BEKK. FANPAC MT has been completely rewritten to use the Structures and n-Dimensional Array features found in GAUSS 5.0.

Supports Structures & n-Dimensional Arrays

- Familiar keyword interface
- New thread-safe, easier-to-use procedures

New GARCH Models

- **ARMA-GARCH Models**
  The GARCH specification can now be applied to time series with autoregressive and moving average errors.
- **Normal & t-distribution EGARCH Models**
  In addition to the log-conditional-variance model with leverage parameters and generalized exponential distribution, there are now such models with Normal and *t*-distributions.
- **AGARCH Models**
  GARCH models with asymmetry parameters for the arch parameters (Glosten, Jangannathan, and Runkle, 1993)
- **Multivariate VAR-diagonal Vec GARCH Models**
  The Diagonal Vec Model can now be applied to a multivariate time series with VAR errors.

New Simulation Bounds Method for Statistical Inference

FANPAC MT now contains a simulation bounds method for constructing confidence intervals for models with restricted parameter spaces (Andrews, D.W.K., 1999).

A special feature of FANPAC MT is the ability to place constraints on the parameters to enforce stationarity and invertability and positive definiteness of the conditional variances and covariances.

Platforms:

Available for Windows, UNIX: AIX4, Sun Sparc and HPUX11, and LINUX

Requires:

GAUSS or GAUSS Engine 5.0.22+

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FANPAC MT 2.0 Additional Product Details

FANPAC MT, through a cutting-edge implementation of GARCH models, provides an efficient platform for volatility estimation in financial time series data for portfolio managers, institutional traders and financial analysts.

GARCH and Multivariate GARCH

FANPAC MT incorporates a comprehensive suite of GARCH models for estimating volatility:

- Multivariate Diagonal Vec and constant correlation Diagonal Vec GARCH and VAR-GARCH models
- Multivariate BEKK models
- Univariate OLS, ARIMA, ARCH, GARCH, ARMA-GARCH, AGARCH, exponential GARCH, integrated and fractionally integrated GARCH
- Univariate and multivariate models in Normal or *t*-distributions
- Univariate and Diagonal Vec available "in-mean"; i.e., conditional variances and standard deviations may be included in the mean equation
- All univariate and Diagonal Vec multivariate ARCH and GARCH are available "in-CV"; i.e., regressors can be added to the conditional variance equation
- Procedures for computing standardized residuals, conditional variances, covariances matrices and forecasts
- Confidence limits by simulation bounds (Andrews, D.W.K., 1999)

Portfolio Risk Analysis

FANPAC MT uses SQPSolveMT, a GAUSS program that solves the nonlinear programming problem. It is also capable of solving the Markowitz mean/variance efficient frontier problem. Since it allows general nonlinear equality or inequality constraints, it is capable of solving much more complicated mean/variance analyses.

The major shortcoming in computing the traditional efficient frontier has been in estimating the covariance matrix. Traditional analysis assumes a constant covariance matrix across time. Experience has shown this not to be the case. The multivariate GARCH model solves this problem. In the GARCH model, the covariance matrix is allowed to vary with time. Research has shown that the GARCH model is quite successful fitting financial time series. With the multivariate ARCH/GARCH models in FANPAC MT, you can forecast the covariance matrix over the next period and use this estimate to generate investment portfolio weights that minimize your risk for a level of return and give you an estimate of your value-at-risk.

FANPAC MT 2.0 Additional Product Details (Continued)

In FANPAC MT, you are not limited to preconceived ideas about risk analysis. With the tools in FANPAC MT you can forge your own state-of-the-art methods of risk analysis. Easy-to-use Keyword commands allow immediate access to the power of this package. You can easily declare data sets, time series and independent variables, compute log-returns, perform estimation, print results, set global parameters, simulate time series, plot conditional variances and covariances, generate QQ plots, and compute standardized residuals, autocorrelation and partial autocorrelation functions.

SQPSolveMT does the hard work of generating the estimates of these models. GARCH models are very difficult to estimate but SQPSolveMT has been especially designed for tough problems. It uses the Sequential Quadratic Programming method with BFGS and NEWTON descent methods and incorporates a Trust Region method. Special techniques have been designed to switch among the descent and line search methods to prevent the iterations from bogging down.

Portfolio Allocation and Risk Analysis

The availability of multivariate GARCH models solves a very significant problem in investment portfolio management. The Markowitz mean/variance method is a standard model for optimizing portfolio allocation. In this method allocation is described by a weight matrix, w. Risk is measured as the square root of $w' \sigma w$ where σ is the covariance matrix of the individual investment returns, and portfolio return is $w' \mu$ where μ is the vector of mean returns. An "efficient frontier" is computed by finding weights that minimize risk subject to a specified portfolio return. The efficient frontier is the plot of portfolio returns against the risk.

This allocation method has heretofore received little attention because of difficulties in estimating the moments of the investment return distributions. Conventional methods assume constant moments across the window of analysis. To get reasonable results, investigators were forced to analyze monthly returns. This created rank problems for large portfolios; i.e., to get an invertable covariance matrix for a portfolio of, say, 100 stocks required a minimum of 101 observations, or more than 8 years of data.

These problems have been strongly mitigated by the ability of the multivariate GARCH model to allow the covariance matrix to vary with time. It is now possible to get good results with daily data, thereby decreasing the length of the time series required for the analysis.

The discussion continues among investigators as to the best model for explaining portfolio time series, some arguing for stochastic volatility models and others proposing one or another variation on the basic GARCH model. But there is plenty of evidence to suggest that the simple GARCH model is a very good approximation from which one can draw fruitful results.

Requirements:

Requires GAUSS Mathematical & Statistical System (GAUSS) 5.0.21+ or the GAUSS Engine/GAUSS Engine Pro/GAUSS Engine for Workgroups/GAUSS Enterprise Engine 5.0.22+.

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