

# TIME SERIES 4.0 Update Now Available!

## The GAUSS Time Series Module Contains:

- Full information maximum likelihood estimation of ARIMA, ARIMAX, VARMA, and VARMAX models under linear and nonlinear constraints.
- Error-Correction (ECM) Model estimation and analysis
- Panel Data (Time-Series Cross-section) Models
- Autoregressive Models
- Unit Root and Cointegration Tests

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## New Features & Enhancements

- Full Information (Exact, Unconditional) Maximum Likelihood Estimation of ARIMA, ARIMAX, VARMA, VARMAX and ECM Models. Impose linear and nonlinear constraints on the coefficients. Find Lagrangean values associated with each constraint.
- Unit Root and Cointegration Tests: Dickey-Fuller, Augmented Dickey-Fuller, Phillips-Perron, Johansen Trace and Maximum Eigenvalue
- Show Characteristic Equation Roots.
- Forecast VARMA and VARMAX models.
- Time Series 4.0 comes with on-line documentation in .PDF format which can be viewed using Adobe Acrobat Reader. Hard copy documentation is available.

## Other Features & Information

### Time-Series Cross-sectional Regression Models: TSCS

This module provides procedures to compute parameter estimates for panel data (pooled time-series cross-section) models. These models have multiple observations over time on a set of cross-sectional units (e.g. people, firms, or countries). Time is only one way to define groups for the cross-sectional units. Panel data models also apply when other types of subgroups are defined, e.g. a number of schools with sets of teachers, students, and staff.



This program provides three ways for estimating a regression model with variable intercepts. The parameters for the other explanatory variables are assumed to be constant across cross-sectional units. The three estimators are:

- Fixed-effects OLS estimator (analysis of covariance estimator)
- Constrained OLS estimator
- Random effects estimator using GLS

A Hausman test is computed to show whether the error components (random effects) model is the correct specification. In addition to providing the analysis of covariance and GLS estimates, two multiple partial-squared correlations are computed. The first partial correlation (squared correlation) shows the percentage of variation in the dependent variable that can be explained by the set of independent variables while holding constant the group variables. The second estimate shows the extent to which variation in the dependent variable can be accounted for by the group variable after the other independent variables have been statistically held constant.

A key feature of this program is that it allows for unbalanced panels, a variable number of time-series observations per cross-sectional unit. For instance, there might be 5 time-series observations for the first individual, 10 for the second, and so on. This is useful when there are missing values.

## **Autoregressive Models**

Procedures are provided to compute parameter estimates for an autoregressive regression model. The error term autocovariances and autocorrelations may also be computed.

## **ARIMA Models**

The Time Series module also includes tools for estimating general ARIMA(p,d,q) models using an exact maximum likelihood estimation procedure. Procedures for computing forecasts, theoretical autocovariances, sample autocorrelations and partial autocorrelations (using Durbin's algorithm), as well as for simulating ARIMA models are provided.

**Requirements:** Requires GAUSS version 3.6.

**Platforms:** Available for GAUSS For Windows, LINUX and UNIX.