Overview

SAS/ETS 9.3 introduces three new procedures, a new data access engine, and many enhancements to existing procedures.

The COPULA Procedure

The new COPULA procedure uses the copula concept to fit and simulate from multivariate distributions. The copula concept enables you to express joint multivariate distributions in terms of their marginal distributions and the dependency structure (correlations). Copula methods are popular in many different areas (including risk management, credit scoring, asset allocations, and actuarial sciences) where many different correlated factors must be modeled jointly. Copulas often help to perform large-scale multivariate simulations of random vectors that would be difficult to perform using other multivariate fitting and simulation methods.

PROC COPULA enables you to fit multivariate distributions or copulas from a sample data set and do the following:
- estimate the parameters for a specified copula type
- simulate a copula
- plot dependent relationships among the variables

PROC COPULA supports the following types of copulas:
- normal copula
- t copula
- Clayton copula
- Gumbel copula
- Frank copula

The SSM Procedure

The new SSM procedure provides powerful and versatile tools for state space modeling and forecasting of time series and longitudinal data. PROC SSM provides a modeling language that makes it easy to specify complex state space models in terms of simpler component parts. It enables you to fit time-varying effects (which can depend on user-specified parameters in complex ways), and to fit state space models for irregularly spaced data.

These powerful new time series modeling features are particularly useful for modern financial markets analysis, where complex and changing interrelationships between multiple variables need to be analyzed and predicted.

The TCOUNTREG Procedure

The new experimental TCOUNTREG procedure is a transitional version of the COUNTREG procedure. It includes all of the features of PROC COUNTREG and several new features.

PROC TCOUNTREG provides two new variable selection methods: greedy search and penalized likelihood. The greedy search method can be used with either forward or backward selection. In each step, the AIC or BIC criterion is evaluated, and the selection continues until the selection criterion is met. The second method uses the penalized likelihood approach to select significant variables. This method is not path-dependent as in the case of greedy search—it falls into the family of LASSO estimators. Using the penalized likelihood method, PROC TCOUNTREG fits a model to the set of all candidate variables and evaluates it simultaneously to find a subset of best-fitting variables.

PROC TCOUNTREG also provides two conditional (fixed- and random-effects) count panel data models, including a Poisson regression model with fixed and random effects and a negative binomial regression model with fixed and random effects.
The SASEXCCM Interface Engine

SAS/ETS 9.3 provides a new data access engine for the CRSP/COMPSTAT Merged Database, which combines the COMPSTAT XPRESSFEED data with the CRSP Stock, Indices, and Treasury databases in one convenient source. SAS has partnered with the Center for Research in Securities Prices (CRSP) at the University of Chicago to make it easy for SAS users to directly access CRSP data. This addition to the SAS/ETS CRSP-to-SAS interface features will benefit those who use SAS software's analytical tools to understand financial markets.

Other Enhancements

The AUTOREG procedure now supports heteroscedasticity consistent covariance matrix estimators (HCCME), which consistently estimate the covariance matrix even when the heteroscedasticity structure is unknown or misspecified. Five forms of HCCMEs are supported: the plain sandwich form (HC0), the degrees-of-freedom-adjustment form (HC1), two types of leverage-adjustment forms (HC2 and HC3), and the high-leverage-adjustment form (HC4).

The ESM procedure features new ODS plots and plot options. You can now plot the periodogram for an error series or a combined periodogram and spectral density estimate plot.

The SEVERITY procedure offers many powerful new features for modeling the size of losses or insurance claims. Several new features are specifically designed for actuarial science applications in the insurance industry, such as modeling the effect of deductibles and coverage limits on the probable levels of future insurance policy payouts. Highlights of these new features include the following:

- The model specification has been made more intuitive.
- You can specify a weight for each observation by using the new WEIGHT statement.
- You can specify left-censoring and right-truncation by using the new LEFTCENSORED= and RIGHTTRUNCATED= options in the LOSS statement.
- The method of specifying censoring has been updated. Instead of using the indicator variable, you now specify censoring by using a variable that contains the censoring limit. This enables you to specify interval-censored data.
- For interval-censored data, PROC SEVERITY uses Turnbull's method to estimate the empirical distribution function (EDF). Implementation of Turnbull's EDF estimation method is an experimental feature in SAS/ETS 9.3.
- Two predefined versions of Tweedie distributions, TWEEDIE and STWEEDIE, can be fitted with PROC SEVERITY. The TWEEDIE distribution has the more popular parameterization with mean, dispersion, and index parameters. The STWEEDIE distribution has an alternative parameterization with scale, Poisson mean, and index parameters. The STWEEDIE distribution can be used for analyzing regression effects.
- A new experimental feature enables you to estimate parameters by minimizing your own objective function, which you specify using SAS programming statements. You can use various keyword functions in your SAS program; the functions are internally expanded by PROC SEVERITY with distribution-specific or problem-specific versions.
- You can now compute quantiles and limited moments for any distribution fitted with PROC SEVERITY by using the two new functions, INVCDF and LIMMOMENT, respectively. These functions are available in a PROC FCMP step.

The PANEL procedure now offers a CLUSTER option for the HCCME. This new option enables you to compute a cluster-corrected covariance matrix and provides cluster-adjusted standard errors for parameter estimates.

The X12 procedure now produces forecast plots. You can request four different plots for the forecast series on the original scale or, when applicable, on a transformed scale.

For More Information

For more information, ask your organization's SAS representative to contact the SAS Customer Interaction Center at 1.800.727.0025 or send email to CICenter@sas.com.