

## What's New in LIMDEP 9.0?

LIMDEP 9.0 is a major expansion of our premier software for cross section, panel and time series data analysis. Version 9.0 features numerous new estimation programs, a long list of enhancements to its user interface, additions to data manipulation commands, and improvements in the internal workings of the mathematical parts of the program. The new [documentation](#), with over 2,500 pages, contains full reference guides for the program, background econometrics, and sample applications.

### New Models

- Probit model with endogenous right hand side variable
- [Models for count data](#)
  - Polya-Aeppli and generalized Poisson models for count data
  - New form of the negative binomial model for count data
  - Negative binomial model with sample selection
- Dynamic probit model for panel data
- [Numerous new forms of the stochastic frontier model](#)
  - Several forms of the Battese/Coelli model
  - Stochastic frontier model with sample selection
  - Data envelopment analysis for efficiency analysis
- Cox model with time varying covariates
- Parametric survival models with sample selection
- [Ordered choice models](#)
  - Generalized ordered probit
  - Hierarchical ordered probit
  - Zero inflated ordered probit
  - Bivariate ordered probit
  - Ordered probit with sample selection
- Propensity score matching methods
- Quantile regression model
- Nested random effects model
- Binomial, power, beta, Rayleigh and geometric loglinear models
- Discriminant and classification analysis

### Panel Data Versions of Nearly All Models

A major theme of this revision is [panel data](#). LIMDEP now offers panel data estimators for nearly all the models that are supported by the program. These estimators represent significant innovations in the capabilities of econometric software. To our knowledge, they do not exist in any other program. The estimators are of three broad classes:

- **True fixed effects:** You can fit fixed effects models with up to 50,000 dummy variable coefficients, to almost all of LIMDEP's models. (In a custom extension of this method, we used LIMDEP's

algorithm to fit a probit model with over 150,000 dummy variable coefficients.) This is a true fixed effects estimator in which the dummy variable coefficients are actually computed, not swept out of the model. (In the process, we (in collaboration with Paul Allison) have remedied a major shortcoming in the longstanding negative binomial fixed effects model proposed by Hausman, Hall and Griliches in use since 1984.)

- **Random parameters:** Full random coefficients have been proposed at several places in the literature, but almost exclusively in the setting of the linear regression model, Poisson model, and binary logit model. This version of LIMDEP extends the maximum simulated likelihood technique for random parameters models to all the models supported by LIMDEP, and several new ones that have not appeared previously, such as the sample selection model and a suite of 10 new 'loglinear' models.
- **Latent classes:** Once again, this is a model that has appeared in the literature virtually exclusively in the Poisson regression model. We have extended it to over 30 different model forms, including probit, logit, tobit, truncation, Poisson, negative binomial, stochastic frontier, and so on.

Some of these have been extended to multiple equation settings as well, including forms of the bivariate probit model and sample selection models.

We have also extended the linear regression model with panel data in several directions, including the addition of the Hausman and Taylor estimator for random effects and the Arellano, Bond, and Bover GMM estimator for dynamic panel data models. We have also built a random coefficients estimator for the linear regression model which does not require every group to have more observations than there are variables in the model. The program panel data treatment of the linear model also adds a number of features which will make estimation much easier.

### **Extensions of Existing Models and Techniques**

- Random effects multinomial logit model for panel data
- Multilevel and nested multilevel random effects models
- Extensions of several models for latent heterogeneity and heteroscedasticity

### **Extensions of Estimation and Analysis Methods**

- Variance corrections in all models for clustered and complex survey data
- Jackknife estimator for asymptotic variances
- Linear constraints in general maximum likelihood estimation
- Generalized maximum entropy estimation for multinomial logit models
- Simulation analysis for binary choice models
- Extensions of plotting and histogram programs
- Export functions for model results
- Many extensions of the programming tools for writing procedures and new estimators
- Krinsky and Robb estimators for standard errors for nonlinear functions