Volume Title: Annals of Economic and Social Measurement, Volume 4, number 3

Volume Author/Editor: Sanford V. Berg, ed.

Volume Publisher: NBER

Volume URL: http://www.nber.org/books/aesm75-3

Publication Date: 1975

Chapter Title: NBER Computer Research Center Abstracts

Chapter Author:

Chapter URL: http://www.nber.org/chapters/c10411

Chapter pages in book: (p. 455 - 457)

NBER COMPUTER RESEARCH CENTER ABSTRACTS

The NBER Computer Research Center for Economics and Management Science has been engaged, since its formation in 1971, in developing new software systems for quantitative social science research. Prototype systems for exploratory data analysis, mathematical programming, and econometrics are now in various stages of design and implementation. Following are abstracts of recent working papers. The complete texts are available at $1.00 per copy from the respective authors at: NBER Computer Research Center, 575 Technology Square, Cambridge, Massachusetts 02139.

Brown, M. L., **Robust Line Estimation with Errors in Both Variables,** NBER Working Paper 83 (May 1975).

The central estimator in the theory of the multivariate "errors-in-the-variables" (EV) model results from orthogonal regression on variables rescaled according to the covariance matrix of the errors. Our first principal finding, via Monte Carlo on the univariate model, relegates this estimator to use only in large samples on very well-behaved data, i.e., with no traces of outlier contamination. A modification, requiring a robust preliminary slope, is proposed that sets out the generalization to EV of the w-estimator in regression. The modification is robust to outlier contamination even in small samples, given a good preliminary estimator. A candidate for a preliminary slope estimator based on the data is proposed and its performance under simulation examined. Least-absolute residuals estimation in EV is cited as an alternative candidate.

Cooley, T. F., and K. D. Wall, **On the Identification of Time-Varying Structures,** NBER Working Paper 85 (May 1975).

The identifiability of reduced form econometric models with variable co-efficients is investigated using the control theoretic concepts of uniform complete observability and uniform complete controllability. First, a variant of the state-space representation of the traditional reduced form is introduced which transcribes the underlying non-stationary estimation problem into one particularly suited to a Kalman-filter solution. Using such a formulation, observability and controllability can be called upon to the specific parameterization. The results analogous to those already established in the econometric literature; namely, the parameters of the reduced form are always identified subject to the absence of multicollinearity (referred to as "persistent excitation" in the control literature). However, now multicollinearity is seen to depend on the structure of the parameter variations as well as the statistical nature of the explanatory variables. The verification of identifiability thus reduces to a check for uniform complete observability, which can always be affected in econometric applications. Some consistency results derived from the above approach are also presented.

Hill, R. W., **Certain Aspects of Generalized Box-Jenkins Models**, NBER Working Paper 82 (May 1975).

Generalizations of regression models and of moving average-autoregressive time-series models are defined. The asymptotic and computational properties of the maximum likelihood estimator are investigated, with numerical examples. The main conclusion is that care must be exercised when using simple approximations to the covariance matrix of the estimates.

————, **A Comparison of Two Simple Methods for Obtaining Robust Confidence Intervals for a Location Parameter**, NBER Working Paper 84 (May 1975).

Two methods for finding confidence limits for the simple median are studied. One method is the new parametric procedure based on the sign test, and the other is derived in the paper. The two methods are compared asymptotically and also for small samples.

————, **Tables of Sample Size for the F-Test in One-Way Analysis of Variance Designs**, NBER Working Paper 78 (March 1975).

A method is presented for computing the value of N for which the usual noncentral F-test will have a certain power. Extensive tables are computed and displayed.

Hoaglin, D. C., **Implementing and Documenting Random Number Generators**, NBER Working Paper 75 (March 1975).

As simulation and Monte Carlo continue to play an increasing role in statistical research, careful attention must be given to problems which arise in implementing and documenting random number generators. This paper examines the value of theoretical as well as empirical evidence in establishing the quality of generators, the selection of generators to comprise a good basic set, the techniques and efficiency of implementation, and the extent of documentation. Illustrative examples are drawn from various current sources.

Wall, K. D., **FIML Estimation of Rational Distributed Lag Structural Form Models**, NBER Working Paper 77 (March 1975).

The Rational Distributed Lag Structural Form (RSF) representation of econometric model is introduced and its relationship to several standard forms of representation discussed. The FIML estimation problem for the RSF is formulated as a nonlinear, unconstrained optimization problem. The relation optimization problem is solved by an application of the Davidon–Fletcher–Powell variable metric method using simple first-difference approximations for the necessary gradients. This approach requires a minimum of effort by the model builder since there is no longer any need to analytically determine, and then program, the gradient expressions. The feasibility of the method is demonstrated with several examples.

Welsch, R. E., and R. A. Becker, **Robust Nonlinear Regression Using the DOGLEG Algorithm**, NBER Working Paper 76 (March 1975).

What are the statistical and computational problems associated with robust nonlinear regression? Several possible approaches to these problems are presented, and a particular algorithm based on the work of Powell and Dennis is developed.