PH. D. DISSERTATION ABSTRACTS

Inference on the Parameters of a Two-Error Complete Model Using Incomplete Panel Data

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An inference procedure which addresses the problem of missing observations due to a rotating sampling scheme is proposed, based on Hsiao's (1986) single equation error component model defined by $y_{it} = \beta x_{it} + v_{it}$ where β and x_{it} are k x 1 vectors of parameters and explanatory variables, respectively, and $v_{it} = a_i + u_{it}$ in which the error terms a_i and u_{it} are assumed to be independent of each other, are normally independently distributed with zero means and constant variances, α_a^2 and α_u^2 respectively, and are uncorrelated with x_{it}.

Conditions for the proposed estimated generalized least squares estimators, $\hat{\beta}_{EGLS}$, to be asymptotically unbiased, consistent, asymptotically efficient, and asymptotically equivalent to the maximum likelihood estimator, $\hat{\beta}_{MLE}$, are given. Estimators of the variance components α_u^2 and α_a^2 proposed in this paper are also shown to be unbiased, consistent, and asymptotically efficient under certain conditions. The paper also discusses the efficiencies of the proposed estimators relative to the maximum likelihood estimators.

A test specifying whether a variance components model is more appropriate for panel data than an analysis of covariance model is also proposed in this paper. The test statistics is distributed, asymptotically, as chi-squared with k degrees of freedom. The power of the test is given.

As revealed by the results of the simulation experiments, the efficiencies of the proposed parameter estimators improve as either the sample size N increases for fixed T or the number of observation periods T increases for fixed N. These efficiencies, however, deteriorate as the drop-out rate, m/N, increases.

The sensitivity analysis showed that the proposed estimators are fairly resistant to outliers and bimodality.

The simulation results further showed that the power of the proposed specification test increases as either N or T is increased. The tail probability of the proposed test closely approximates the tail probability of the x^2 distribution when $N \geq 30$ and $T \geq 9$. Again, the drop-out rate, however, causes the power of the test to deteriorate as the drop-out rate is increased. The test also suffers some degree of insensitivity when the a_i's exhibit chaotic behavior.

Estimation and Inference About Land Equivalent Ratio

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Four standardization methods for computing LER values are examined, namely: (i) monocrop yields as average of each treatment from all replications, (ii) monocrop yields as the grand mean, (iii) monocrop yields as each treatment from each replication and (iv) monocrop yields as average of all treatments from each replication. These four methods are used for the estimation of vector LER. The ordinary least square method (OLSE) for estimating parametric LER is also examined. Approximate formulas for bias, variance and mean square error are derived for each of the five methods.

To evaluate the approximate formulas and assess the different methods of estimation, a rice-mungbean intercropping simulation experiment is conducted. The experiment involves a randomized complete block design with four replications of nine treatments which include three monocrop and six intercrop treatments.

The study shows that the approximate formulas are good enough for calculating the bias, variance and MSE of LERs for each of the methods, in the sense that the average error of bias < 0.002, the average error of variance < 0.0003 and the average error of MSE < 0.00037.

The results also indicate that among the methods for estimating vector of LER, the bias and variance of LERs are less for Method II than for the other methods. Based on chi-square goodness-of-fit, LER values gave evidence of non-normality under all methods for estimating vector LER.