

COMPARISONS BETWEEN SIMULTANEOUS AND COMPONENTWISE SPLINES FOR VARYING COEFFICIENT MODELS

CHIN-TSANG CHIANG

Department of Mathematics, National Taiwan University, Taipei 106, Taiwan, R.O.C.

(Received September 22, 2003; revised August 3, 2004)

Abstract. In this paper, we study the properties of the simultaneous and componentwise splines for the varying coefficient model with repeatedly measured (longitudinal) dependent variable and time invariant covariates. The proposed simultaneous smoothing spline estimators are mainly obtained from the penalized least squares with adjustment for the variations of covariates in the penalized terms. We do this mainly to avoid the penalized terms being influenced by the scales of the covariates and the random smoothing parameters appearing in the estimators, which complicates the derivation of the asymptotic properties of the estimators. It is shown in this study that our estimators have smaller variances than the componentwise ones. Through a Monte Carlo simulation and two empirical examples, the simultaneous smoothing splines are all found to be more accurate in the variances.

Key words and phrases: Componentwise smoothing splines, longitudinal data, mean squared error, penalized least squares, simultaneous smoothing splines, smoothing parameters, varying coefficient model.