

Generalized duration models and optimal estimation using estimating functions

Aerambamoorthy Thavaneswaran ·
Nalini Ravishanker · You Liang

Received: 27 June 2013 / Revised: 27 June 2013 / Published online: 3 January 2014
© The Institute of Statistical Mathematics, Tokyo 2013

Abstract This article introduces a class of generalized duration models and shows that the autoregressive conditional duration (ACD) models and stochastic conditional duration (SCD) models discussed in the literature are special cases. The martingale estimating functions approach, which provides a convenient framework for deriving optimal inference for nonlinear time series models, is described. It is shown that when the first two conditional moments are functions of the same parameter, and information about higher order conditional moments of the observed duration process become available, combined estimating functions are optimal and are more informative than component estimating functions. The combined estimating functions approach is illustrated on three classes of generalized duration models, viz., multiplicative random coefficient ACD models, random coefficient models with ACD errors, and log-SCD models. Recursive estimation of model parameters based on combined estimating functions provides a mechanism for fast estimation in the general case, and is illustrated using simulated data sets.

Keywords ACD models · Combined estimating functions · Generalized martingale differences · Quadratic log-SCD models · Random coefficients · Recursive estimates