

Generalized time-dependent conditional linear models under left truncation and right censoring

Bianca Teodorescu · Ingrid Van Keilegom ·
Ricardo Cao

Received: 2 March 2007 / Revised: 24 January 2008 / Published online: 16 July 2008
© The Institute of Statistical Mathematics, Tokyo 2008

Abstract Consider the model $\phi(S(z|X)) = \boldsymbol{\beta}(z)\vec{X}$, where ϕ is a known link function, $S(\cdot|X)$ is the survival function of a response Y given a covariate X , $\vec{X} = (1, X, X^2, \dots, X^p)$ and $\boldsymbol{\beta}(z)$ is an unknown vector of time-dependent regression coefficients. The response is subject to left truncation and right censoring. Under this model, which reduces for special choices of ϕ to e.g. Cox proportional hazards model or the additive hazards model with time dependent coefficients, we study the estimation of the vector $\boldsymbol{\beta}(z)$. A least squares approach is proposed and the asymptotic properties of the proposed estimator are established. The estimator is also compared with a competing maximum likelihood based estimator by means of simulations. Finally, the method is applied to a larynx cancer data set.

Keywords Additive hazards model · Bootstrap · Least-squares estimator · Logistic model · Proportional hazards model · Semiparametric regression · Survival analysis · Time-dependent coefficients · U -statistics