

ESTIMATION OF SEMI-VARYING COEFFICIENT MODELS  
FOR COUNTING PROCESS WITH APPLICATIONS

Liqui Deng

Preprint no. 2019-05

**Abstract**

Recurrent events are very common in many different fields, including biological, medical, engineering, and finance. Existing research has developed methodologies to model constant covariate effects and time-dependent covariate effects. However, in reality, for instance medical cases, covariate effects can be depending on other covariates as well. Therefore, in this dissertation, we investigate a semiparametric model for recurrent events, which incorporates both time-varying covariate effects and covariate-varying effect. In our model, we use fixed parameters to model constant covariate effects, while we assume both time-dependent effects and covariate-varying effects to be unknown functions. An estimation procedure is proposed to estimate the unknown parameters and functions. Local linear smoothing method is adopted in our estimation procedure. Detailed computation is carried out by using Newton-Raphson iterative method. The asymptotic properties including asymptotic normality and consistency are established for the proposed estimators. In order to assess the finite-sample performance of the proposed estimators and estimation procedure, simulation studies are conducted for different cases. The simulation results show that the proposed estimators perform very well with small bias and an empirical coverage probability close to its nominal level 95%.