A KERNEL REGRESSION MODEL FOR PANEL COUNT DATA WITH TIME-VARYING COEFFICIENTS

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Abstract: We propose using the local kernel regression method to estimate the conditional mean function of a panel count model with time-varying coefficients. A partial log-likelihood with a local polynomial is used for the estimation. Under some regularity conditions, strong uniform consistency rates are obtained for the local estimator. For a fixed time point, we show that the local estimator converges in distribution to the normal distribution. Moreover, the Breslow-type estimation of the baseline mean function is shown to be consistent. Simulation studies show that the time-varying coefficient estimator is close to the true value, and that the empirical coverage probability of the confidence interval is close to the nominal level. Finally, we demonstrate the proposed method by applying it to analyze a clinical data set on childhood wheezing.

Key words and phrases: Cross-validation, kernel weight, local partial log-likelihood.

1. Introduction

Panel count data arise when events are observed at a finite number of time points and the visit times vary between subjects. The exact event times between two consecutive observation times are unknown. In reality, panel count data are often encountered in clinical, demographical, and industrial research. For example, in an observational study on childhood asthma, Tepper et al. (2008) recorded the number of wheezing episodes experienced by each child between two consecutive telephone interviews. Here, the event number may be greater than one, but the exact time of each wheezing occurrence was unknown. The wheezing event time analysis is a panel count data type. At the same time, the risk factors’ effects on the panel count outcome may vary over time, making it crucial that we explore the temporal effects of the covariates. For example, interleukin-10 (IL-10) was recorded in this study and assessed as having a significant effect on infection in early childhood. Furthermore, its effect is not linear. A panel count model with time-varying coefficients may reveal the varying effect of IL-10 at a young