

REGRESSION ANALYSIS OF PANEL COUNT DATA WITH BOTH TIME-DEPENDENT COVARIATES AND TIME-VARYING EFFECTS

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Abstract: Panel count data occur in many fields, including clinical, demographic, and industrial studies, and an extensive body of literature has been established for their regression analysis. However, most existing methods apply only to situations in which both the covariates and their effects are constant or one of them may be time dependent. This study considers the situation in which both the covariates and their effects may be time dependent, and we develop an estimating equation-based approach to estimate these time-varying effects. The proposed method uses the B-splines to approximate the time-dependent coefficients, and we establish the asymptotic properties of the proposed estimators. To assess the finite-sample performance of the proposed estimators, we conduct an extensive simulation study, showing that the proposed method works well in practical situations. Lastly, we demonstrate our method by applying it to data from the China Health and Nutrition Survey.

Key words and phrases: B-spline, panel count data, proportional mean model, time-dependent effect.

1. Introduction

Event-history studies that examine the times to recurrent event occurrences appear in many fields, including clinical, demographic, and industrial studies. Such studies give rise to two types of data namely recurrent event data and panel count data (Cook and Lawless (2007); Sun and Zhao (2013)). The former means that all study subjects can be observed or followed continuously and, thus, one has complete data on the occurrence times of the event of interest. In contrast, the latter means that study subjects can be observed only at discrete time points, yielding only incomplete information on the occurrence times. Despite the missing information, panel count data frequently arise in practice, because subjects usually cannot be followed continuously. Thus, it is necessary to develop

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