Oracally Efficient Estimation and Simultaneous Inference in Partially Linear Single-index Models for Longitudinal Data

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Abstract: Oracally efficient estimation and asymptotically accurate simultaneous confidence band (SCB) are established for the nonparametric link function in the partially linear single-index models for longitudinal data. The proposed procedure works for possibly unbalanced longitudinal data under general conditions. The link function estimator is shown to be oracally efficient in the sense that it is asymptotically equivalent in the order of $n^{-1/2}$ to that with all true values of the parameters being known oracally. Furthermore, the asymptotic distribution of the maximal deviation between the estimator and the true link function is provided, and hence an SCB for the link function is constructed. Finite sample simulation studies are carried out which support our asymptotic theory. The proposed SCB is applied to analyze a CD4 data set.