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Generalized varying coefficient partially linear measurement errors models

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Abstract We study generalized varying coefficient partially linear models when some linear covariates are error prone, but their ancillary variables are available. We first calibrate the error-prone covariates, then develop a quasi-likelihood-based estimation procedure. To select significant variables in the parametric part, we develop a penalized quasi-likelihood variable selection procedure, and the resulting penalized estimators are shown to be asymptotically normal and have the oracle property. Moreover, to select significant variables in the nonparametric component, we investigate asymptotic behavior of the semiparametric generalized likelihood ratio test. The limiting null distribution is shown to follow a Chi-square distribution, and a new Wilks phenomenon

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is unveiled in the context of error-prone semiparametric modeling. Simulation studies and a real data analysis are conducted to evaluate the performance of the proposed methods.

Keywords Ancillary variables · Errors-in-variable · Error prone · LASSO · Measurement errors · Quasi-likelihood · Penalized quasi-likelihood · SCAD · Varying coefficient models