

# Nonparametric check for partial linear errors-in-covariables models with validation data

Wangli Xu · Lixing Zhu

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**Abstract** In this paper, we investigate the goodness-of-fit test of partial linear regression models when the true variable in the linear part is not observable but the surrogate variable  $\tilde{X}$ , the variable in the non-linear part  $T$  and the response  $Y$  are exactly measured. In addition, an independent validation data set for  $X$  is available. By a transformation, it is found that we only need to check whether the linear model is plausible or not. We estimate the conditional expectation of  $X$  under a given the surrogate variable with the help of the validation sample. Finally, a residual-based empirical test for the partial linear models is constructed. A nonparametric Monte Carlo test procedure is used, and the null distribution can be well approximated even when data are from alternative models converging to the hypothetical model. Simulation results show that the proposed method works well.

**Keywords** Errors-in-variables model · Validation sample · Partial linear models · Goodness-of-fit testing