

# Semiparametric inference for an accelerated failure time model with dependent truncation

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**Abstract** Truncated data are commonly seen in studies of biomedicine, epidemiology, astronomy and econometrics. Existing regression methods for analyzing left-truncated and right-censored data have been developed under the assumption that the lifetime variable of interest is independent of both truncation and censoring variables. In this article, we propose a semiparametric accelerated failure time model that incorporates both covariates and the truncation variable as regressors. The proposed model utilizes the truncation information in statistical modeling and hence allows for dependent truncation. For estimation, we develop a set of estimating equations constructed from the log-rank and quasi-independence test statistics. We show that the resulting estimators are consistent and asymptotically normal. We also propose an explicit formula for variance estimation based on a kernel method. Finite-sample performances of the estimators are studied by simulations. The proposed methodology is applied to analyze a real data for illustration.

**Keywords** Biased sampling · Censored regression · Left truncation · Log-rank test · Product-limit estimator · Quasi-independence · Survival analysis

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