

Censored Quantile Regression with Auxiliary Information

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Abstract

In quantile regression of survival data, the estimation of the regression coefficients for extreme quantiles can be affected by severe censoring. Measurement error in covariates also leads to bias and loss in efficiency of estimators. In this seminar, we discuss the methodologies that effectively use the auxiliary information to improve the efficiency of censored quantile regression estimators. In epidemiological studies, there are often times that only a small portion of the whole study cohort is accurately observed. The rest of the cohort has only some auxiliary/error prone information available. To avoid information loss and to utilize the accurately measured covariates, we propose a regression calibration technique and perform the censored quantile regression analysis using the whole study cohort when there is a linear relationship between accurate and auxiliary variables. When the form of relationship is unknown, we propose a nonparametric smoothing technique to replace regression calibration. We also consider the scenario where it is possible to have auxiliary information about population parameters from previous clinical trials/records. Using estimating equation approach, we transform the auxiliary information to the empirical likelihood based data driven probability weights and propose a weighted censored quantile regression analysis. From our simulation studies, we observed that the efficiency gain of our proposed methods is remarkable. The methods also provide us possibilities of looking into extreme quantiles of the failure distribution.