Estimation and diagnostics for partially linear censored regression models based on heavy-tailed distributions

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Motivation

The problem of estimation where the dependent variable is censored has been studied in different fields, for example, in AIDS research, the viral load measures may be subject to some lower and upper detection limits, below or above which they are not quantifiable. As a result, the viral load responses are either left or right censored.

Nowadays, many data problems have structures whose approach goes beyond simple linear regression. The semiparametric regression models are statistical models that allow the mean response of interest to be linearly dependent on some explanatory variables and in other variables it not.

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Objective: Modeling censored responses in Partially linear regression (PLR) models, from a frequentist perspective.

The problem: The random errors are routinely assumed to follow a normal distribution, however, if the random error distribution its tails are heavier than normal ones and there are presence of outliers, then might lead to biased estimates.

Proposal: We propose a robust partial censored regression (PCR) models based on the scale mixtures of normal (SMN) distributions and we present some influence diagnostic techniques, based on case deletion and local influence approaches.

Alternative solutions: Castro et al. (2014) advocated the use of the SMN class of distributions in PCR (SMN-PCR) models and adopted a Bayesian framework to carry out posterior inference.

Prelininares

$$Y \stackrel{d}{=} \mu + U^{-1/2}Z, \qquad (1)$$

,
where

$\mu \in \mathcal{R}$ is the location parameter and $\sigma^2 \in (0, \infty)$ is the scale parameter;
Z and U are independent random variables, with $Z \sim \mathrm{N}(0, \sigma^2)$;
U is a mixing positive random variable with cdf $H(\cdot|\boldsymbol{\nu})$, with $\boldsymbol{\nu}$ being a scalar or vector parameter indexing the distribution of U.

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