

Title: Direct Nonparametric Conditional Quantile Estimation

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Abstract:

Nonparametric conditional cumulative distribution function (CDF) estimation has emerged as a powerful tool having widespread potential application, which has led to a literature on \textsl{indirect} estimators of conditional quantile functions that are obtained via inversion of the nonparametrically estimated conditional CDF. Other nonparametric estimators of conditional quantiles that are based on an alternative characterisation of the quantile (i.e., as the function that minimises the expectation of the check function) have also appeared in the literature. In this paper, we propose a novel \textsl{direct} nonparametric approach. Relative to its indirect peer and the check function based method, our proposed estimator has a simple closed-form expression. We also show that under certain conditions, our estimator is more efficient in the tail regions when data has an unbounded support (our theoretical results underscore this property). Theoretical underpinnings are developed, data-driven smoothing parameter selection is provided, and Monte Carlo simulations and empirical examples are considered. The empirical examples illustrates how the proposed approach can deliver more reasonable quantile and quantile derivative estimates than its indirect counterpart and check function based method, particularly in tail regions.