UNIFORM CONFIDENCE BANDS IN DECONVOLUTION WITH UNKNOWN ERROR DISTRIBUTION

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Abstract. This paper develops a method to construct uniform confidence bands in deconvolution when the error distribution is unknown. We work with the setting where an auxiliary sample from the error distribution is available and the error density is ordinary smooth. The construction is based upon the "intermediate" Gaussian approximation and the Gaussian multiplier bootstrap, but not on explicit limit distributions such as Gumbel distributions, which enables us to prove validity of the multiplier bootstrap confidence band under weak regularity conditions. Importantly, the previous literature on this topic has focused on the case where the error distribution is known, but has not covered the case with unknown error distribution. However, in many applications, the assumption that the error density is known is unrealistic, and the present paper fills this important void. In addition, we also discuss extensions of the results on confidence bands to super-smooth error densities. We conduct simulation studies to verify the performance of the multiplier bootstrap confidence band in the finite sample. Finally, we apply our method to Outer Continental Shelf (OCS) Auction Data and draw confidence bands for the density of common values of mineral rights on oil and gas tracts.

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