SEMINARIO
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The Regularity of Center-Outward Distribution and Quantile Functions

Abstract: We provide sufficient conditions under which the center-outward distribution and quantile functions introduced in Chernozhukov et al. (2017) and Hallin (2017) are homeomorphisms, thereby extending a recent result by Figalli. Our approach relies on Cafarelli's classical regularity theory for the solutions of the Monge-Ampère equation, but has to deal with difficulties related with the unboundedness at the origin of the density of the spherical uniform reference measure. Our conditions are satisfied by probabilities on Euclidean space with a general (bounded or unbounded) convex support which are not covered by Figalli. We provide some additional results about center-outward distribution and quantile functions, including the fact that quantile sets exhibit some weak form of convexity.

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