An educational tour on quantile regression (dealing with heterogeneity)

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The talk aims to show potentialities of quantile regression in handling heterogeneity, both observed and unobserved. Specifically, a strategy dealing with row-partitioned data structures [1], i.e. with statistical units characterized by a group structure, is presented. The group structure can be defined by the levels of one or more stratification variables (supervised structure) or using similarities in the dependence model (unsupervised structure) [2]. The detection of a typology, namely groups of units characterized by similar dependence structures, is carried out exploiting an a priori group variable in the former case, and a clustering and modeling approach in the latter.

By taking advantage that quantile regression makes it possible to evaluate the impact of regressors on the entire distribution of a response variable and not only exclusively on the expected value, the strategy aims to evaluate if and how the group membership affects the relationship between a response variable and a set of regressors. The effect of the group membership is identified through assigning to each group the quantile best representing its impact on the dependent variable. The best quantile synthesizes the location of the response conditional distribution on which the group exerts the main effect. Moreover, the strategy estimates the group dependence structure offering a clear interpretation of group effects. Finally, classical inferential procedures are available for testing differences among the group, since the group effects are identified using the whole sample.

A different approach, proposed in [3], introduces a multigroup approach to assess group effects in quantile regression. Starting from a group structure defined according to the levels of one or more stratification variable, the procedure estimates the same regression model at different quantiles, and for different groups of observations. A bootstrap parametric test and a permutation test are then adapted for the case of quantile regression to test group effects.

References

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