

Robustness of Nonparametric Frontier Estimators

A. RUIZ-GAZEN

(in collaboration with A. DAOUIA)

GREMAQ, Université Toulouse I, U.M.R. CNRS 5604

and Laboratoire de Statistique et Probabilités, U.M.R. CNRS 5583

ABSTRACT: In the context of productivity analysis, the most popular nonparametric estimators of a monotone boundary are defined as lowest monotone functions covering all sample points and are very non robust. Two alternatives have been addressed recently: one by Cazals, Florens and Simar (2002) is based on a concept of expected order- m frontiers and the other one by Aragon, Daouia and Thomas-Agnan (2002) is based on extreme quantiles of a nonstandard conditional probability density. Unlike usual methods, both alternatives are shown to be qualitatively robust and bias-robust. Moreover, for the quantile approach, the influence function remains bounded even when the quantile order tends to one under the conditions that the conditional density function is not null and is continuous on its support. When these conditions do not hold, the robust behavior of the quantile approach can also be pointed out on numerical examples.

Aragon, Y. and Daouia, A. and Thomas-Agnan, C., 2002. “Nonparametric Frontier Estimation: A Conditional Quantile-based Approach”, Discussion paper, GREMAQ et LSP, Université de Toulouse (<http://www.univ-tlse1.fr/GREMAQ/Statistique/adt1202.pdf>), in revision.

Cazals, C. and Florens, J-P. and Simar, L., 2002. “Nonparametric frontier estimation: a robust approach”, *J. Econometrics*, 106, 1, pp. 1–25.

KEY WORDS: Continuity; Estimation of a monotone boundary; Gross-error sensitivity; Influence function; Maximum bias; Productivity analysis; Prohorov distance; Qualitative robustness.