



# Nonparametric extreme conditional expectile estimation

Stéphane Girard, Gilles Stupfler, Antoine Usseglio-Carleve

► **To cite this version:**

Stéphane Girard, Gilles Stupfler, Antoine Usseglio-Carleve. Nonparametric extreme conditional expectile estimation. EVA 2019 - 11th International Conference on Extreme Value Analysis, Jul 2019, Zagreb, Croatia. pp.1. hal-02186705

**HAL Id: hal-02186705**

**<https://hal.inria.fr/hal-02186705>**

Submitted on 17 Jul 2019

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Nonparametric extreme conditional expectile estimation

Stéphane Girard<sup>1</sup>, Gilles Stupfler<sup>2</sup>, Antoine Usseglio-Carleve<sup>3</sup>

Université Grenoble Alpes, Inria, CNRS, Grenoble INP, LJK, 38000 Grenoble, France<sup>1,3</sup>,  
University of Nottingham, School of Mathematical Sciences, Nottingham NG7 2RD, United  
Kingdom<sup>2</sup>

stephane.girard@inria.fr<sup>1</sup>, Gilles.Stupfler@nottingham.ac.uk<sup>2</sup>,  
antoine.usseglio-carleve@inria.fr<sup>3</sup>

Expectiles and quantiles can both be defined as the solution of minimization problems. Contrary to quantiles though, expectiles are determined by tail expectations rather than tail probabilities, and define a coherent risk measure. For these two reasons in particular, expectiles have recently started to be considered as serious candidates to become standard tools in actuarial and financial risk management. However, expectiles and their sample versions do not benefit from a simple explicit form, making their analysis significantly harder than that of quantiles and order statistics. This difficulty is compounded when one wishes to integrate auxiliary information about the phenomenon of interest through a finite-dimensional covariate, in which case the problem becomes the estimation of conditional expectiles. In this talk, we propose nonparametric estimators of extreme conditional expectiles based on kernel smoothing techniques. We analyze the asymptotic properties of our estimators in the context of conditional heavy-tailed distributions. Applications to simulated and real data are provided.

## References

- [1] Daouia, A., Girard, S., and Stupfler, G., Estimation of tail risk based on extreme expectiles, *Journal of the Royal Statistical Society: Series B*, 2018
- [2] Usseglio-Carleve, A., Estimation of conditional extreme risk measures from heavy-tailed elliptical random vectors, *Electronic Journal of Statistics*, 2018