



Statistical Sciences  
UNIVERSITY OF TORONTO

## SEMINAR

February 7, 2017 at 3:30 pm

*\*Refreshments will be provided at 3:15pm\**

Ramsay Wright Laboratories, Room 141

Speaker: Sebastian Engelke, Ecole Polytechnique

Federale de Lausanne, Switzerland

Host: Radu Craiu

---

### **Robust bounds in multivariate extremes**

Univariate extreme value theory is used to estimate the value at risk of an asset in regions where few or no observations are available. It is based on the asymptotic result that the maximum of the data follows approximately a generalized extreme value distribution. Blanchet and Murthy (2016, <http://arxiv.org/abs/1601.06858>) recently studied worst case bounds for high exceedance probabilities that are robust against incorrect model assumptions of the extremal types theorem.

For two or more dependent assets, multivariate extreme value theory provides an asymptotically justified framework for the estimation of joint exceedances. Here, the strength of dependence is crucial and it is typically modeled by a parametric family of distributions. In this work we analyze bounds that are robust against misspecification of the true dependence between assets. They arise as the explicit solution to a convex optimization problem and take a surprisingly simple form. In a financial context, these robust bounds can be interpreted as the worst-case scenarios of a systematic stress test. We show the importance of this approach in simulations and apply it to real data from finance.

This talk is based on the preprint Engelke and Ivanovs (2016, <https://arxiv.org/abs/1608.04214>).