On-line course materials

MATH48181 - Extreme Values and Financial Risk

Year: 4 - **Semester:** 1 - **Credit Rating:** 15

Aims

To introduce probabilistic fundamentals and some statistical models in extreme value theory with applications to finance.

Brief Description

The course will give some probabilistic and statistical details of univariate and bivariate extreme value theory. The topics covered will include: fundamental of univariate extreme value theory, the three extreme value distributions, various models for univariate extremes, fundamentals of bivariate extreme value theory, and various models for bivariate extremes. The course will contain a great deal material on applications of the models to finance. Software in R will be used.

Learning Outcomes

On successful completion of this unit students will:

- have some understanding of the probabilistic fundamentals of univariate and bivariate extreme value theory; and,
- be able to choose and fit appropriate extreme value models for a given data (univariate and bivariate).

Syllabus

I plan to cover all of the following topics:

- Fluctuations of univariate maxima: the theory [4]
- Fluctuations of univariate upper order statistics: the theory [3]
- A point process characterization for extreme values [3]
- Some statistical models for univariate extremes [4]
- Fluctuations of bivariate extremes: the theory [3]
- Some models for bivariate extremes [4]
- Time series models for extremal processes [3]
- Financial risk management [2]
- Extremal index, large claim index, the longest-success run, reinsurance treaties [3]
- Other applications to problems in finance [3]

Teaching & Learning Process (Hours Allocated To)

Lectures	Tutorials/ Example Classes	Practical Work/ Laboratory	Private Study	Total
22	22	0	106	150

Assessment and Feedback

- Coursework, weighting within unit 20%;
- Three hours end of semester examination, weighting within unit 80%.

Further Reading

- Embrechts, P., Klppelberg, C. and Mikosch, T. (1997) Modelling Extremal Events: for Insurance and Finance, Springer-Verlag, Berlin.
- Leadbetter, M.R., Lindgren, G. and Rootz_en, H. (1983) Extremes and Related Properties of Random Sequences and Processes, Springer-Verlag, Berlin.
- Resnick, S.I. (1987) Extreme values, Regular Variation and Point Processes, Springer-Verlag, Berlin.
- Coles S. (2001) An Introduction to Statistical Modelling of Extreme Values, Springer-Verlag, London.
- Kotz, S. and Nadarajah, S. (2000) Extreme Value Distributions: Theory and Applications, Imperial College Press, London.

Staff Involved

Dr Saralees Nadarajah - Lecturer

Data source is EPS system

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